This volume is dedicated to the lovely memory of the chief-editor Hüseyin Özdikmen's khoja

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DESCRIPTIONS OF NINE NEW SPECIES OF LONGHORN BEETLES (COLEOPTERA: CERAMBYCIDAE)

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[Rapuzzi, P. & Sama, G. 2014. Descriptions of nine new species of longhorn beetles (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 9 (1): 1-16**]**

ABSTRACT: In this paper we described 9 new species of Cerambycidae from the Mediterranean area (Italy, Turkey), Iran and China.

KEY WORDS: Cerambycidae, *Grammoptera, Necydalis, Formosotoxotus, Saphanus, Neoplocaederus, Luteicenus, Xylotrechus, Anaglyptus, Pogonocherus*, new species, Italy, Turkey, Iran, China.

In the following paper we describe 9 new species of Cerambycidae belonging to 6 different subfamilies. Partly of these insects was collected by our self during several expeditions involved to study the cerambicid fauna (mainly in the Mediterranea area) and partly was provided by our colleagues that we thanks for the opportunity that they give us to study part of their researches.

The new species are divided in the different subfamilies and tribes as following:

Subfamily Lepturinae Latreille, 1802 / Tribe Lepturini Latreille, 1802 / *Grammoptera solai* n. sp. (Turkey)
Subfamily Necydalinae Latreille, 1825 / *Necydalis christinae* n. sp. (Turkey)
Subfamily Apatophyseinae Lacordaire, 1869 / Tribe Apatophyseini Lacordaire, 1869 / *Formosotoxotus kucerai* n. sp. (China)
Subfamily Spondylidinae Audinet-Serville, 1832 / Tribe *Saphanini* Gistel, 1848 / *Saphanus kadleci* n. sp. (Turkey)
Subfamily Cerambycinae Latreille, 1802 / Tribe Cerambycini Latreille, 1802 / *Neoplocaederus iranicus* n. sp. (Iran)
Subfamily Cerambycinae Latreille, 1802 / Tribe Rosaliini Fairmaire, 1864 / *Luteicenus magnificus* n. sp. (China)
Subfamily Cerambycinae Latreille, 1802 / Tribe Clytini Mulsant, 1839 / *Xylotrechus iranicus* n. sp. (Iran)
Subfamily Cerambycinae Latreille, 1802 / Tribe Anaglyptini Lacordaire, 1868 / *Anaglyptus zappii* n. sp. (Italy)
Subfamily Laminae Latreille, 1825 / Tribe Pogonocherini Mulsant, 1839 / *Pogonocherus ovatoides* n. sp. (Italy)

COLLECTIONS ACRONYMS

CNMP = National Museum Praha, Czech Republic.
MZUR = Zoological Museum of the Sapienza Rome University.
CPR = Pierpaolo Rapuzzi.
CGS = Gianfranco Sama.
COG = Olivier Gregory, Poitiers, France.
CIZ = Iuri Zappi, Casalecchio di Reno, Bologna, Italy.
CFI = Francesco Izzillo, Caserta, Italy.
CFA = Fernando Angelini, Francavilla Fontana, Brindisi, Italy.

***Grammoptera* (s. str.) *solai* n. sp.**
(Fig. 1)

Material examined. Holotypus ♀: **Turkey**: Bolu prov., Abant valley, VI.2003, C. Sola lgt. (CPR).

Description of the Holotype. Length 5,2 mm, width 1,5 mm. Body black. Head large, deep punctured, front square with a deep groove in the middle of eyes. Pubescence dense, made by short recumbent golden hairs. Pronotum much longer than wide, deep and dense punctured. The space between the points is shorter than the diameter of the single point. Pubescence made by very short and recumbent golden hairs. Pronotum bell-shaped. Elytra shining, black, regular and deep punctured, parallel side and rounded apex. From each point starts a short, golden and recumbent bristle. Legs long, black, with very short and thin light setae. Antennae long and slend, reaching the last quarter of elytral length.

Discussion. *Grammoptera solai* n. sp. is close with *Grammoptera merkli* Frivaldsky, 1884 described from Southern Turkey. It is very easy to distinguish by the black elytra instead dark-blue colored. The new species is slender, with longer antennae and the pronotum is much longer than in *merkli* where is little longer than width. Elytral shape is much more parallel side in the new species than in *merkli* where is larger towards the apex. The third antennal joint is long as the fourth in *Grammopetra solai* but it is evidently longer in *G. merkli*.

We have examined the type specimens (Figs. 2-3) of *Grammoptera merkli* preserved in National Museum (Budapest, Hungary). The type specimen is a female with the following labels:
"Asia Minor. /Achu.-Dag. (hand written by Frivaldsky)/leg. Merkl (Printed)".
"Grammoptera/merkli Friv. (hand written by Frivaldsky)/det. Joh.Friv. (Printed)".
"Monotypus (red printed)/ Grammoptera y and printed /merkli J.Frivaldsky (recently hand written).

The specimen is perfect except for the left antenna that is missing except for the first three joints. Here we design it Lectotypus.

The type specimen fit perfectly with the specimens from Southern Turkey. *Grammoptera merkli* is known from Adana to the whole Southern Mediterranean coast and in the Western Aegean coast. We know this species as well from Central Anatolia: Amasya env. and from Ayas (Ankara prov.). The new species is known only from the type locality in Abant valley (Bolu prov., Northern Turkey).

Etymology. We dedicate the new species to Claudio Sola (Guiglia, Modena, Italy) as thanksgiving for the opportunity that he gives us to study part of his interesting Cerambycidae collected in Turkey.

***Necydalis* (s. str.) *christinae* n. sp.**
(Fig. 4)

Material examined. Holotypus ♂: **Turkey**: Tunceli prov., Pülümür env., 2 km N Çakırkaya, 1580 m., 22-27.VI.2013 sugar traps, P. Rapuzzi lgt. (CPR).
Description of the Holotype. Length 25 mm, width 4 mm. Body reddish. Head, pronotum, ventral surface except for abdomen are black. Head deep punctured, mainly between eyes. Front, vertex and around the eyes with many long, thin erect golden hairs. Very prominent temples. Pronotum longer than

wide; front and rear edge deep punctured, the disk with two large swelling quite smooth, only few very small punctures. Lateral side sinuate, all the surface covered with long golden thin erect hairs. On the sides of front and rear edge part very dense golden pubescence made by dense and short recumbent hairs. Scutellum small, black and triangular. Elytra long as well as pronotum, reddish, darkened on the lateral side and very closely towards the apex. Apex dehiscent, with a small tooth on the internal side. Elytra deep and dense punctured, disk with dense short golden pubescence. All the elytral surface with short, thin black erect hairs. Legs reddish except for a small black spot on the clubs of the medium femora, the clubs of hind legs and the apex of hind tibiae. Inner side of hind tibiae with dense short golden pubescence. Antennae full reddish except for the last three joints that are reddish brown. Shorter than the middle of body. Abdomen reddish, only the last joint is black the penultimate joint is firstly reddish and towards the apex black. Episterna deep and dense punctured.

Discussion. *Necydalis christinae* n. sp. is close with *Necydalis ulmi* Chevrolat, 1838 but it is easy to distinguish immediately for the whole light antennae, blackish from the 4th joint in *N. ulmi*. The new species shows erect black hairs on elytra, missing in *ulmi*. Antennae and legs are shorter, in *Necydalis ulmi* antennae are reaching the middle of the body, in the new species they are evidently shorter than the middle. Elytra and all the appendix are lighter than in *Necydalis ulmi*. Aedeagus and endophallus are similar than in *Necydalis ulmi*. Paramers are truncate to the apex, little acuminate in *ulmi* (Figs. 5-6).

Etymology. We dedicate the new species as thanksgiving to the wife of one of the authors (Christine Canci Rapuzzi) for her patient during the time spent in the expedition around the world to collect beetles and in the long evening spent to study Cerambycidae.

***Formosotoxotus kucerai* n. sp.**

(Fig. 7)

Material examined. Holotypus ♂: **China**: Shaanxi, Lueyang, 20-30.VII.2010, E. Kucera lgt. (CPR).

Description of the Holotype. Length 12 mm, width 3 mm. Body light brown, covered by dense golden short pubescence. Head long with a deep groove between eyes. Antennal tubercles prominent. Head finely and dense punctured. Head covered by dense short recumbent golden hairs. Pronotum longer than wide, lateral side sinuate with an acute lateral tooth on each side. Disk with four high swelling to make a square just behind the middle. Pronotum with dense small punctures and covered by dense golden recumbent hairs. Scutellum long, round backwards with few recumbent golden hairs. Elytra with parallel sides, rounded backwards. Elytra with a small depression starting from the humeral region and reaching the suture just before the middle. Elytral punctuation made by sparse small punctures, denser in the first half and sparser and smaller towards the apex. Elytra covered by dense short golden recumbent hairs. Few thin erect golden hairs mainly on the elytral disk. Legs stout, tibiae flattened all legs with a quite dense golden short recumbent hairs. Antennae slender, not reaching the elytral apex, made by light joints covered by golden short recumbent hairs.

Discussion. *Formosotoxotus kucerai* n. sp. is very close with *Formosotoxotus auripilosus* (Kano, 1933) from Taiwan. It is easy to distinguish according the elytra with a deep oblique carina from the shoulders to the suture in the middle. This carina is missing in *F. auripilosus* and it is substituted by a small discoid depression. The head in the new species is thiner, alrger in *F. auripilosus*. The elytral length and the legs in *F. kucerai* are evidently shorter than in *F. auripilosus*. The new species is particular isolated because the other species of this Genus are known from Taiwan (*Formosotoxotus auripilosus*) and from the South Himalayan area (*Formosotoxotus masatakai* N. Ohbayashi, 2007 and *Formosotoxotus nobuoi* Vives & Niisato, 2006).

Etymology. We dedicate the new species as thanksgiving to Emil Kucera (Soběslav, Czech Republic) that provided us the specimen of this new interesting species.

***Saphanus kadleci* n. sp.**

(Fig. 8)

Material examined. Holotypus ♀: **Turkey**: Sakarya prov., Masukye, Sapanca, VIII.1984, Battoni lgt. (CNMP, former collection S. Kadlec); **Paratypus:** 3♀♀: same data as Holotype (CNMP, former collection S. Kadlec; CPR); 2♀♀: **Turkey:** Sakarya prov., Sapanca, 29.VII.1980, Boulben lgt. (CGS).

Description of the Holotype. Length 18 mm, width 5 mm. Body pitchy black. Head dense punctured with a deep groove between eyes. Antennal tubercles prominent, only few dark erect thin hairs around the labrum. Pronotum wider than large, constricted toward the base. An acute tooth on each side up to the middle. Punctuation made by dense and deep dots, denser on the sides. Disk with a thin and short shining median line. Sides of pronotum covered by long thin dark erect hairs. Scutellum trapezoid with few very short recumbent dark setae. Elytra oval elongate with several more or less indistinct costae on the disk. Sculpture made by dense fine points. Pubescence made by two different type of silvery setae: one is very short and recumbent and the second one is sparser than the first and made by reclined towards thin hairs. Legs long, femora with a massive clave. Tibiae sinuate and stouter towards the apex. All legs with several long dark erect hairs. Antennae short, reaching the middle of elytral length. From the fifth to the tenth joints with external process well developed. Third and fourth joints equivalent in length. From the first joint to the fourth there are several erect dark setae on the whole surface.

Discussion. The new species is related with *Saphanus piceus* (Laicharting, 1784) and mainly with its subspecies *ganglabueri* Brancsik, 1886 know from the Balkan Peninsula. It is easy to distinguish according the elytral pubescence dense and quite absent in *S. piceus* and its subspecies. The fourth antennal joint is longer than third, quite sub equal in *S. piceus*. From *S. piceus bartolonii* Sama & Rapuzzi, 1993 it is distinguish for the less convex elytra and pronotum and for the elytral costae, quite absent in *S. p. bartolonii*.

Variability of Paratypes. The specimens of the type series are very similar. The range of length is between 17 and 18 mm.

Note. In Stanislav Kadlec collection, now property of the National Museum of Prague, these specimens was separate and red labeled as "*Saphanus piceus battonii* n. ssp." showing that S. Kadlec previously identified the differences between this species and *S. piceus* but he was unable to describe it due his premature death.

Etymology. We dedicate this new species to Stanislav Kadlec, talented Cerambycidologist recently deceased, in his collection these specimens was preserved.

Neoplocaederus iranicus n. sp.

(Fig. 9)

Material examined. Holotypus ♂: **Iran**: Kordestan prov., Sanandag, 18-19.V.1999, Hácz lgt. (CPR). **Paratypus:** 8♂♂ 6 ♀: same data as Holotype (CGS; CPR; MZUR); 7♂♂ 2 ♀: **Iran:** Lorestan prov.: between Dorud and Kuh-e-Ostaran, 2600-3200 m., 33°22'N 49°12'E, 4-6.VI.2000, M. Kalabza lgt. (CGS; CPR); 1♀: **Iran:** Yazd: 10 km E Ardakan to Yazd, 11.IV.2004, Crucitti & Vignoli lgt. (CPR); 1♂: **Iran:** Lorestan prov., Dorud, 52 km SE Borugerd, 1740 m., 13.VI.2000, M. Rejzek lgt. (CGS).

Description of the Holotype. Length 35 mm, width 11 mm. Body black. Head with strong antennal tubercles, deeply grooved between eyes. Occiput finely wrinkled. Mandibles strong, heavy wrinkled. Pronotum larger than long, with deep wrinkles on the disk, with a small conic tooth on the middle of each sides. Scutellum with dark and sparse recumbent short pubescence, golden only on the external border. Elytra parallel sides, rounded towards the apex, with a dense and very thin punctuation. Elytral pubescence made by very short silvery hairs. Apex lightly concave, with two small teeth on both sides. Legs long, all tibiae with dense golden pubescence, denser toward the apex. Antennae longer than body only with the last joint. Scape strong wrinkled, joints from the third to the tenth with a strong tooth on the apical external side. Third joint longer than fourth and fifth.

Discussion. *Neoplocaederus iranicus* n. sp. is close with *Neoplocaederus scapularis* (Fischer von Waldheim, 1821) from Middle Asia and *Neoplocaederus danilevskyi* Lazarev, 2009 from Uzbekistan. It is distinguish from the first according the stronger wrinkles on the first antennal joint (similar in *N. danilevskyi)*, for the quite glabrous scutellum, covered with golden pubescence in *N. scapularis*. The third antennal joint is longer than fourth and fifth in the new species but longer than third and long as fifth in *scapularis*. The sculpture of pronotum is a little dipper in the new species as well. It is distinguish from *Neoplocaederus danilevskyi* (known for the Holotypus male only) according the shorter antennae, the black color, dark brown in *danilevskyi*, for the scutellum that is pubescent in *danilevskyi* and for the sculpture of pronotum, more regular in the species from Uzbekistan. According the peculiar sculpture of the scape the new species is close with *Neoplocaederus denticornis* (Fabricius, 1801) from Arabian peninsula as well *Neoplocaederus danilevskyi* (Danilevsky pers. comm.).

Variability of Paratypes. The specimens from the type series show the typical sexual variability: male with longer antennae (exceeding elytral apex with the last joint) and female with shorter antennae (long as body) and stouter body. The size range of the type series is between 29 and 35 mm in the males and 28 to 32 mm in the females.

Luteicenus magnificus n. sp.

(Figs. 10-11)

Material examined. Holotypus ♂: China: Guangxi prov.: Mt. Dayaoshan, Tongnam, Jinxiu, 20-30.V.2011, native collector (CPR); **Paratypus:** 1♂ 3♀♀ idem (CPR, COG).

Description of the Holotype. Length 18 mm, width 5 mm. Body black. Head small, deep punctured with many large points. Between eyes with a deep groove. Front with several thin silvery erect hairs. Pronotum little longer than wide, hardly punctured with dense large points. A median elongate shining area remains in the middle of the second half of the disk. Side of pronotum rounded with a small obtuse median tooth. Pronotum with several long thin erect silvery hairs. Scutellum black, triangular. Elytra parallel sides, yellow with black spots. Two big spots, one on each elytra, just behind the shoulders, rounded on the sutural side and not reaching the suture. Elytral apex largely black with the upper side of this band sinuate. Apex subtruncate. Elytra with few and very thin punctures. Pubescence made by sparse, very short, dark erect hairs. Between these short hairs there are few longer ones. Legs very long and slender, with dark brown dense pubescence on the inner side of the anterior and median tibiae. Antennae long, exceeding the elytral apex with the last two joints. Scape with dense and short black erect hairs. From the second joint to the fourth joints on the inner side dense short erect black hairs, on the fifth only few of them.

Discussion. The new species is close to *Luteicenus atromaculatus* (Pic, 1922) described from Vietnam and known from China (Yunnan according Vives et al., 2009 and Guangxi, Mt. Dayaoshan, Tongnam, Jinxiu, CPR). It is easy to distinguish according the following characters.

Males: the drawing is made by two black bands, one in the first half and the second one on the apex. In *L. atromaculatus* by two bands as well but the first one is on the basal third and the second one on the second half. In the new species the shoulders are light and the apex is black instead shoulders black and apex light as in *L. atromaculatus*. Pronotum is longer and deeper punctures than in *L. atromaculatus* and the antennae are evidently shorter, exceeding elytral apex only with the last two joints (in *L. atromaculatus* with the last three and half).

Females: the drawing is made by a basal band black and a central round black spot on each elytra. In *L. atromaculatus* the drawing is made by three small spots on each elytra: one on the lateral side in the first half, the second one between the previous and the suture and the third, little larger than the other two spots, on the middle of each elytra. Pronotum is shorter and wider than *L. atromaculatus*, the sculpture is deeper and sparser. The fourth antennal joint is shorter than the half of the fifth instead little longer than the half of the fifth as in *L. atromaculatus*. The elytra surface has only few erect hair, evidently denser in *L. atromaculatus*.

Variability of Paratypes. The male Paratype shows the first band entire, not interrupted at the suture, the females show quite the same drawing. The range of size is 18-22 mm. for the males and 14-15 mm for the females.

Xylotrechus (s. str.) *iranicus* n. sp.

(Fig. 12)

Material examined. Holotypus ♂: **Iran**: Mazandaran, 40 Km S Chalus, V.2002, ex larva *Ostrya* sp., emerged 25.V.2003, P. Rapuzzi lgt. (CPR); **Paratypus:** 3♀♀: idem (CPR); 1♂ 1♀: **Iran:** Golestan, Loveh, 700-1000 m., 37°22'N55°39'E, 25.IV.2008, G. Sama lgt. (CGS).

Description of the Holotype. Length 16 mm, width 5 mm. Body black. Head vertical, deep punctured with a strong carina in the middle of the front. Sides of this carina covered by short recumbent yellow hairs. Pronotum little longer than wide, deep punctured, on the disk with an oval long wrinkled area. Sides rounded. Pronotum covered by short recumbent silvery thin hairs. Four yellow spots, made by dense recumbent short hairs, mark the sides of the upper and back margins. Scutellum rounded, black, without pubescence. Elytra black marked with yellow as following: at the scutellum sides there is a small spot; one humeral, little oblique, line just behind humeri; the first band starts just behind scutellum and runs parallel to the suture side for the first part, and beginnings to be dehiscent immediately, after this curves toward to the lateral margin reaching the sides. The second band is just behind the middle and it is a little convex towards the base of elytra; the last band is just on the apex. The teguments under these bands are brown. Apex subtruncate, angular with a very small tooth on the external side. Legs long, reddish with the clave of femora darkened. Legs with several light short silvery erect hairs. Antennae short, reaching the first fifth of the elytral length. Reddish with few short erect silvery hairs.

Discussion. *Xylotrechus iranicus* n. sp. is close to *Xylotrechus arvicola* (Olivier, 1795) and *Xylotrechus antilope* (Schoenherr, 1817) and it is a middle way between these two species. It is close to *Xylotrechus bitlisiensis* Marklund & Marklund, 2013 as well. The latter is a new species described from Eastern Turkey (Bitlis) close to *Xylotrechus antilope*. It is easy to distinguish from *Xylotrechus arvicola* by the thinner bands, the curved band is angular instead rounded curved and the humeral spot is oblique instead horizontal. Shoulders are black and in *X. arvicola* are brown covered by yellow pubescence. The sculpture of the middle of pronotum is not so strong as in *X. arvicola*. The elytra are narrower towards the apex than in *X. arvicola*. From *X. antilope* it is easy to distinguish according the wider bands, the shape of pronotum, globular in *X. antilope* and stronger sculptured than in the new species. The post-median stripe is concave towards the apex instead elongate along the suture as in *X. antilope*. The antennae are shorter in the new species. From *X. bitlisiensis* it is easy to distinguish for the slender legs, the pronotum without a very strong sculpture, the curved band is angulate in the new species and regular curved in *X. bitlisiensis*. *X. iranicus* n. sp. misses a yellow spot on the humeral lateral side, well-marked in *X. bitlisiensis*.

Variability of Paratypes. The new species is quite stable and the most variability is the typical sexual variability. The size of the specimens are inside a range from 12 and 16 mm in the males and between 19 and 17 mm in the females.

Anaglyptus zappii n. sp.
(Fig. 13)

Material examined. Holotypus ♂: **Italy**: Basilicata, Castelsaraceno, between Amizzone and Monte Alpi di Latronico (Potenza province), 1300 m., 14.VIII.2008, ex larva *Fagus sylvatica* sfarf. 8.IV.2011, Iuri Zappi lgt. (CPR). **Paratypus:** 1♂, 2♀♀: idem (CIZ; CPR); 2♀♀: **Italy:** Basilicata, Massiccio del Pollino, Piani Ruggio (Potenza province, 2.VII.1984, C. Platia lgt. (CGS); 1♂: **Italy:** Basilicata, Abriola (Potenza province), 1400 m., 22.VI.1991, F. Angelini lgt. (CFI); 1♂, 1♀: **Italy:** Basilicata, Abriola, loc. La Maddalena (Potenza province), 1400 m., 22.VI.1991, F. Angelini lgt. (CFA); 2♂♂: idem 1.VI.2008 (CFA; CPR); 3♂♂, 3♀♀: **Italy:** Basilicata, Pollino, Cozzo Visitone (Potenza province), 19.VI.1991, F. Angelini lgt. (CFA; CPR); 1♀: **Italy:** Basilicata, Volturino Mountain (Potenza province), 1500 m., 10.V.2003, F. Angelini lgt. (CFA); 1♀: **Italy:** Campania, Lago Matese (Caserta province), 1100 m., 17.V.2001, F. Angelini lgt. (CFA); 1♀: (CFA); **Italy:** Calabria, Francavilla (Cosenza province), VI.1977, P. Schurmann lgt. (CGS).

Description of the Holotype. Length 12 mm, width 3 mm. Body black. Head densely punctured, covered with dens recumbent silvery pubescence. Several long, thin black hairs around eyes and on the front. Front with a long and deep median groove. Pronotum little longer than large, larger at the apex and constricted towards the base. Covered with dense and very short recumbent black hairs; several erect thin black hairs at the sides. Pronotum deep and very dense punctate.

The punctures are large and deep, between the larger points there are many smaller points that give to the surface a matt luster. Only a small area behind the middle of the disk is more polished due to the absence of the smaller points. Scutellum black, triangular and with many fine and dense small punctures. Elytra parallel sides, small constricted toward apex. Black except for two large reddish spot from the shoulders towards the first third except for the suture region that remains black. Just behind scutellum on the middle part of each elytra there are two elongate swellings. Elytra deep punctate; the points are denser on the first half and more scattered and less dense from the half towards the apex. Apex truncate with a small tooth on the external side. The base with several long dark erect setae. The elytral pattern is made by three white arched strips. The first one is bordering the red and black ground color of elytra and it is separate from the other two. The second and the third stripe are close and merged into one another near the suture. The third is on the half of the elytral length and is more or less transverse and climb up again along the suture merging with the second strip. Apex is widely covered with ash-white pubescence. On the apex several long dark erect hairs. Legs long, covered with whitish pubescence, hind and medium tibiae arched. Antennae reaching the third quarter of the elytral length, ringed with whitish pubescence on the apex from the third joint to the sixth and from the seventh to the eleventh completely covered with light pubescence. All the joints without any sort of teeth.

Discussion. *Anaglyptus zappii* n. sp. is close with *Anaglyptus mysticus* (Linnaeus, 1758). It is easy to be distinguish for the absence of teeth on the third and fourth antennal joints. The pattern is made by more or less fused white strips, well divided in *Anaglyptus mysticus*. The elytral apex is truncate instead rounded as in *A. mysticus*.

Variability of Paratypes. The specimens from the type series show a more or less large reddish area on the first third of elytra. Several of them are completely black on elytra and four are more or less reddish. This kind of ground color is the same of *Anaglyptus mysticus*.

Etymology. We dedicate the new species as thanksgiving to Iuri Zappi (Casalecchio di Reno, Bologna, Italy), specialist of *Cleridae* that provide us part of the specimens of the type series.

Pogonocherus ovatoides **n. sp.**
(Fig. 14)

Material examined. Holotypus ♂: **Italy**: Basilicata, Pollino mountain (Potenza province), 3.VI.2004, G. Sama lgt. (CGS). **Paratypus:** 1♀: **Italy**: Basilicata, Pollino mountain, Cugno dell'Acero (Potenza province), 26.VI.1987, Liberto lgt. (CPR), 1♀: **Italy**: Calabria, Aspromonte, dint. Fiume Menta (Reggio Calabria province), 15.VI.1985, Bartolozzi lgt. (CGS).

Description of the Holotype. Length 6 mm., width 1,5 mm. Body pitchy black. Head strong punctured with regular points and with a deep groove between eyes. Several short golden recumbent setae, denser between antennal tubercles. Few thin erect setae around eyes. Pronotum slightly longer than wide, side regular curved with a small acute tooth behind the middle. On the disk two small shining callosities in the middle of the disk, one on each side, and a small elongate callosity in the middle, in the basal half. Regular punctured and with many short golden recumbent short setae. Scutellum rounded-side, with a median longitudinal small stripe made by recumbent golden setae. Elytra parallel sides, just narrowed towards the apex. A small callosity on each elytra just between the shoulder and the scutellum with a tuft of black hairs on the top. Other two callosities on the middle of each elytra in the second half. Each of these callosities with a tuft of black setae on the top. Between these callosities and the external side of each elytra there are two longitudinal carina that start just up the middle and reach the apex. Elytra deep punctured. The points are arranged in lines and they are bigger and deeper in the first three quarters. Elytral pattern made by a "V" shaped band of whitish pubescence starting on the sides just before the shoulders and reaching the suture in the middle. The elytral apex is covered with the same type of pubescence. Just behind the "V" shaped band there is a more or less glabrous area on the external half of each elytra. This glabrous area gives the appearance of an oblique black band. Shoulders more or less glabrous as well. Only few short erect black setae along suture. Apex lightly emarginated with a small tooth on the external side and a very small one on the inner side. Legs brown except for the femora that are pitchy brown except for the apex that is lighter. Tibiae brown except for a thin pitchy-brown ring on the middle. All legs covered with sparse whitish recumbent setae. Few thin gray erect hairs on the tibiae. Antennae long, exceeding the elytral apex with the last four joints. All joints pitchy-brown ringed with lighter. The scape is ringed with lighter brown on the base and the apex. On the lighter part of each joint there is a sparse gray short recumbent pubescence. All joints, except for the scape, with long erect hairs at inner side.

Discussion. *Pogonocherus ovatoides* n. sp. is close related with *Pogonocherus ovatus* (Goeze, 1777) but it is very easy to separate because the elytral apex with two small teeth. Apex is truncate in *P. ovatus*. The small tooth on each side of pronotum is evidently smaller than in *P. ovatus*. Elytra are longer and with more parallel sides.

Variability of Paratypes. The variability of the known specimens is the typical sexual variation of this group of Cerambycidae (shorter antennae, larger elytra in females). The ground dark color is lighter in the females.

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Figure 1. *Grammoptera solai* n. sp. Holotypus female.

Figure 2. *Grammoptera merkli* Frivaldsky, 1884 Lectotypus.

Figure 3. *Grammoptera merkli* Frivaldsky, 1884 Lectotypus labels.

Figure 4. *Necydalis christinae* n. sp. Holotypus male.

Figure 5. *Necydalis christinae* n. sp. Paramers.

Figure 6. *Necydalis ulmi* Chevrolat, 1838 Paramers.

Figure 7. *Formosotoxotus kucerai* n. sp. Holotypus male.

Figure 8. *Saphanus kadleci* n. sp. Holotypus female.

Figure 9. *Neoplocaederus iranicus* Holotypus male.

Figure 10. *Luteicenus magnificus* n. sp. Holotypus male.

Figure 11. *Luteicenus magnificus* n. sp. Paratypus female.

Figure 12. *Xylotrechus iranicus* n. sp. Holotypus male.

Figure 13. *Anaglyptus zappii* n. sp. Holotypus male.

Figure 14. *Pogonocherus ovatoides* n. sp. Holotypus male.

THE IMPORTANCE OF SUPERFAMILY CHRYSOMELOIDEA FOR TURKISH BIODIVERSITY (COLEOPTERA)

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[Özdikmen, H., Mercan, N., Cihan, N., Kaya, G., Topcu, N. N. & Kavak, M. 2014. The importance of superfamily Chrysomeloidea for Turkish biodiversity (Coleoptera). Munis Entomology & Zoology, 9 (1): 17-45**]**

ABSTRACT: Endemism richness can be interpreted as the specific contribution of an area to global biodiversity. The degree of endemism for an area is often cited as a measure of the uniqueness of the fauna and consequently is important for prioritizing sites for conservation. Turkey has continental properties considering both species richness and endemism richness in terms of its covered area on the Earth. For this reason, the paper gives an updated list of Turkish Chrysomeloidea that includes a total of 925 species group taxa (897 species and 28 subspecies belonging to 108 genera of 18 subfamilies of 4 families). The endemism ratio for Turkish fauna of Cerambycoidea is 11.14% in 9 subfamilies of 3 families. Because, the family Orsonachnidae, 3 subfamilies in the family Bruchidae (Amblycerinae, Pachymerinae and Rhaebinae), 1 subfamily in the family Megalopodidae (Zeugophorinae), 4 subfamilies in the family Chrysomelidae (Donaciinae, Criocerinae, Timarchinae and Hispinae) do not include any endemic species. Consequently, Turkey can easily be interpreted as a "biodiversity hotspot" on the Earth in terms of the fauna of Cerambycoidea that is an important animal group for Turkish biodiversity in respect to species richness. However, fauna of Turkish Chrysomeloidea has a low (with respect to the closely related superfamily Cerambycoidea that has endemism ratio over 40%, but also a remarkable endemism ratio (11.14%).

KEY WORDS: Biodiversity, Chrysomeloidea, Coleoptera, Turkey.

The superfamily Chrysomeloidea is considered to comprise Vesperidae, Oxypeltidae, Disteniidae, Cerambycidae, Megalopodidae, Orsodacnidae and Chrysomelidae (Lawrence et al. 1999). However, Löbl & Smetana (2010) stated four families as Cerambycidae (incl. Vesperinae, Disteniinae), Megalopodidae, Orsodacnidae and Chrysomelidae in the Palaearctic catalogue of Chrysomeloidea. In accordance to this, Bouchard et al. (2011) in the lastest catalogue were used only superfamily Chrysomeloidea Latreille, 1802 instead of two superfamilies Cerambycoidea Latreille, 1802 and Chrysomeloidea Latreille, 1802 for this group. However, the great morphological diversity of beetles has led to the proliferation of suprageneric taxa at various ranks. Reid (1995) stated that "*The Chrysomeloidea are resolved as two groups of taxa: the "cerambycid and "chrysomelid" lineages*. So I prefer to use 2 names for superfamily levels of this group as CERAMBYCOIDEA Latreille, 1802 and CHRYSOMELOIDEA Latreille, 1802 now.

In accordance with the case, the superfamily CHRYSOMELOIDEA Latreille, 1802 includes currently 4 families as Megalopodidae Latreille, 1802; Orsodacnidae Thomson, 1858; Bruchidae Latreille, 1802 and Chrysomelidae Latreille, 1802 (Özdikmen, 2012). Besides, many authors regard the family Bruchidae as a subfamily of the family Chrysomelidae (e.g. Löbl & Smetana, 2010). All families are represented in Turkish fauna.

As known, Turkey that has continental properties, is origin of many taxa and is a refigium (an area where conditions have enabled a species or a community of species to survive after extinction in surrounding areas) for effected living creatures from geological and climatical changes has more biological importance than any land in the World. As seen the whole World, an incredible variations have also been seen among the insects which are the most influenced living creatures from these changes occurred in the past in Turkey. Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures.

According to Convention on Biological Diversity of United Nations (1992), *"Biological diversity" means the variability among living organisms from all sources on the Earth.* Turkey is at least a *"Country of origin of genetic resources" that means the country which possesses those genetic resources in in-situ conditions. The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.* So, the works of biodiversity are based on to determine flora and fauna of whole world or somewhere on the Earth. To achieve the other objectives are based on this base. Hence, floral and/or faunal richness is the most important indicator on biodiversity.

Turkey has continental properties considering both species richness and endemism richness in terms of its covered area on the Earth. Endemism richness can be interpreted as the specific contribution of an area to global biodiversity. The high values of endemism richness on an area emphasize their outstanding importance for global conservation of genetic resources. In addition to this, there is high overlap between regions of highest endemism richness and biodiversity hotspots. The degree of endemism for an area is often cited as a measure of the uniqueness of the fauna and consequently is important for prioritizing sites for conservation. However, the percentage of endemic species shows considerable variation between the different life forms. Currently determined ecoregions are based on vertebrates and plants. Invertebrates have not been evaluated sufficiently from the standpoint of this yet.

Knowledge about Turkish leaf beetles has increased considerably. Consequently, Löbl & Smetana (2010) stated many taxa for Turkey in their catalog. After the catalogue, Aslan (2010) published a paper on Alticinae in Antalya province of Turkey and Ekiz & Gök (2010) published a paper on the genus *Donacia* of SW Turkey. After that, Özdikmen (2011) presented a comprehensive contribution dealing with 288 Turkish leaf beetles and a checklist including 698 species under 89 genera on the base of the Palaearctic Catalogue of Löbl & Smetana (2010). Then, Özdikmen (2012) gave a simple list including 880 species under 108 genera (as 116 species of 14 genera for Bruchidae) for Turkish Chrysomeloidea. So he stated 764 species of 94 genera, except Bruchidae, for Turkish fauna. Also, Özdikmen et al. (2012), published new faunistical data on Bolu, Düzce and Kırıkkale provinces. Recently, Hızal & Parlak (2013), Şen & Gök (2013) and Aslan et al. (2013) also published a few new records for the fauna of Turkey. Finally, Ekiz et al. (2013) presented a check-list including 776 species under 90 genera, except Bruchidae, for Turkish fauna. They stated that "*Recently, Özdikmen (2011) presented a contribution dealing with 288 Turkish leaf beetles and a checklist including 698 species under 89 genera; however, the checklist provided was based on only the Palaearctic catalogue (Löbl and Smetana 2010) and ignored other literature sources of Turkish leaf beetles. Actually, the leaf* *beetle fauna of Turkey includes many more species and a complete synthesized list of whole leaf beetle fauna with distributional information is still needed*". In fact that, the work of Özdikmen (2012) and Özdikmen et al. (2012) are missing in the work of Ekiz et al. (2013). The later also do not include some known Turkish taxa. So the above consideration of Ekiz et al. (2013) do not reflect the real status of known Turkish Chrysomeloidea fauna exactly. Anyway, the work of Ekiz et al. (2013) is another valuable work for the fauna of Turkey too.

On the other side, Ekiz et al. (2013) also mentioned that "*The leaf beetle fauna of Turkey presents a remarkable endemism with 81 species, which constitute about 10% of the total number. This is surely a result of hotspots included in the area*".

Consequently, our study is based on the cited references. It shows that Turkey has species richness in terms of the fauna of Chrysomeloidea that includes a total of 925 species group taxa [including Bruchidae: 897 species and 28 subspecies (excluding the nominotypical subspecies) or excluding Bruchidae: 782 species + 28 subspecies (excluding the nominotypical subspecies)]. But the rich fauna of Turkish Chrysomeloidea includes a total of 103 endemic species group taxa [92 species and 11 subspecies (including nominotypical subspecies and others)]. So the fauna has a remarkable but also low endemism ratio (103 / 925 = 11.14%) with respect to the closely related superfamily Cerambycoidea (over 40%).

As a result of this, a simple list and updated numeric statement of all Turkish Chrysomeloidea fauna and numeric statement of all endemic species group taxa of Turkish Chrysomeloidea fauna on the base of the cited references is presented at the end of related parts of the text necessarily.

An updated faunal list of Turkish Chrysomeloidea that includes a total of 925 species group taxa is presented as follows:

AN UPDATED FAUNAL LIST OF TURKISH CHRYSOMELOIDEA

Superfamily CHRYSOMELOIDEA

Family MEGALOPODIDAE
Subfamily MEGALOPODINAE

Genus *Temnaspis* Lacordaire, 1845
T. nigropunctata (Pic, 1896)

Subfamily ZEUGOPHORINAE

Genus *Zeugophora* Kunze, 1818
Subgenus *Zeugophora* Kunze, 1818
Z. scutellaris Suffrian, 1840
Z. subspinosa (Fabricius, 1781)

Family ORSODACNIDAE
Subfamily ORSODACNINAE

Genus *Orsodacne* Latreille, 1802
O. cerasi (Linnaeus, 1758)
O. humeralis Latreille, 1804
O. variabilis Bally, 1877

Family BRUCHIDAE
Subfamily BRUCHINAE
Tribe BRUCHINI

Genus *Bruchus* Linnaeus, 1767
B. affinis J. A. Frölich, 1799
B. altaicus Fahraeus, 1839
B. anatolicus Anton, 1999
B. atomarius (Linnaeus, 1760)
B. brachialis Fahraeus, 1839
B. dentipes (Baudi di Selve, 1886)
B. emarginatus Allard, 1868
B. ervi J. A. Frölich, 1799
B. hamatus Miller, 1881
B. laticollis Boheman, 1833
B. lentis Frölich, 1799
B. libanensis Zampetti, 1993
B. loti Paykull, 1800
B. lugubris Fahraeus, 1839
B. luteicornis Illiger, 1794
B. pisorum (Linnaeus, 1758)
B. rufimanus Boheman, 1833
B. rufipes Herbst, 1783
B. sibiricus Germar, 1824
B. signaticornis Gyllenhal, 1833
B. tetragonus (Baudi di Selve, 1886)
B. tristiculus Fahraeus, 1839
B. tristis Boheman, 1833
B. ulicis Mulsant & Rey, 1858
B. venustus Fahraeus, 1839
B. viciae Olivier, 1795

TRIBE ACANTHOSCELIDINI

Genus *Acanthoscelides* Schilsky, 1905
A. obtectus (Say, 1831)

Genus *Acanthobruchidius* Borowiec, 1980
A. spiniger (Baudi di Selve, 1886)

Genus *Bruchidius* Schilsky, 1905
B. albolineatus (Blanchard, 1844)
B. albopictus (Allard, 1883)
B. annulicornis (Allard, 1868)
B. anobioides (Baudi di Selve, 1886)
B. armeniacus Ter-Minassian, 1969
B. biguttatus (Olivier, 1795)
B. bimaculatus (Olivier, 1795)
B. bituberculatus Schilsky, 1905
B. borowieci Anton, 1998
B. bythinocerus (Reitter, 1890)
B. calabrensis (Blanchard, 1844)
B. canescens (Motschulsky, 1874)
B. caninus (Kraatz, 1869)
B. cinerascens (Gyllenhal, 1833)
B. cisti (Fabricius, 1775)
B. dilutus (Motschulsky, 1874)
B. dispar (Gyllenhal, 1833)
B. fischeri (Hummel, 1827)
B. foveolatus (Gyllenhal, 1833)
B. fulvescens (Baudi di Selve, 1886)
B. holosericeus (Schoenherr, 1832)
B. imbricornis (Panzer, 1795)
B. kieneri Zampetti, 1992
B. koenigi Schilsky, 1906
B. lateobscurus (Pic, 1904)
B. lineatus (Allard, 1868)
B. lividimanus (Gyllenhal, 1833)
B. loebli Borowiec, 1985
B. longulus Schilsky, 1905
B. lucifugus (Boheman, 1833)
B. lutescens (Blanchard, 1844)
B. marginalis (Fabricius, 1776)
B. monstrosicornis (Pic, 1904)
B. mordelloides (Baudi di Selve, 1886)
B. mulsanti (Brisout de Barneville, 1863)
B. murinus (Boheman, 1829)
B. nanus (Germar, 1824)
B. obscuripes (Gyllenhal, 1839)
B. ochraceus (Baudi di Selve, 1886)
B. olivaceus (Germar, 1824)
B. picipes (Germar, 1824)
B. poecilus (Germar, 1824)
B. poupillieri (Allard, 1868)
B. pubicornis Lukjanovitch & Ter-Min., 1957
B. pusillus (Germar, 1824)
B. pygmaeus (Boheman, 1833)
B. quinqueguttatus (Olivier, 1795)
B. reitteri Schilsky, 1906
B. richteri Lukjanovitch & Ter-Min., 1954
B. robustus Lukjanovitch & Ter-Min., 1957
B. rufisurus (Allard, 1883)
B. seminarius (Linnaeus, 1767)
B. sericatus (Germar, 1824)
B. serraticornis (Fabricius, 1775)
B. siliquastri Delobel, 2007
B. sivasensis Zampetti, 1984
B. steveni (Gyllenhal, 1839)
B. talyshensis Ter-Minassian, 1969
B. terrenus (Sharp, 1886)
B. tibialis (Boheman, 1829)
B. trifollii (Motschulsky, 1874)
B. tuberculatus (Hochhut, 1847)
B. unicolor (Olivier, 1795)
B. varipictus (Motschulsky, 1874)
B. varius (Olivier, 1795)
B. villosus (Fabricius, 1792)
B. virgatoides Lukjanovitch & Ter-Min., 1957
B. virgatus (Fahraeus, 1839)

Genus *Callosobruchus* Pic, 1902
C. analis (Fabricius, 1781)
C. chinensis (Linnaeus, 1758)
C. maculatus (Fabricius, 1775)

Genus *Mimosestes* Bridwell, 1946
M. mimosae (Fabricius, 1781)

Genus *Paleoacanthoscelides* Borowiec, 1985
P. gilvoides (Lukjanovitch & Ter-Min., 1957)
P. gilvus (Gyllenhal, 1839)

Genus *Palaeobruchidius* Egorov, 1989
P. plagiatus (Reiche & Saulcy, 1857)

Genus *Pseudopachymerina* Zacher, 1952
P. spinipes (Erichson, 1833)

Genus *Salviabruchus* Decelle, 1982
S. retusus (Baudi di Selve, 1886)

Subfamily AMBLYCERINAE
Tribe SPERMOPHAGINI

Genus *Spermophagus* Schoenherr, 1833
S. calystegiae (Lukjanovitch & Ter-Min., 1957)
S. caricus Decelle, 1982
S. caucasicus Baudi di Selve, 1886
S. confusus Borowiec, 1986
S. kuesteri Schilsky, 1905
S. lukjanovitschi Savitsky, 2000
S. pubiventris Baudi di Selve, 1886
S. sericeus (Geoffroy, 1785)

Genus *Zabrotes* Horn, 1885
Z. subfasciatus (Boheman, 1833)

Subfamily PACHYMERINAE
Tribe CARYEDONTINI

Genus *Caryedon* Schoenherr, 1823
C. angeri (Semenov, 1896)
C. germari (Küster, 1845)
C. halperini Anton & Delobel, 2004

Subfamily RHAEBINAE
Genus *Rhaebus* Fischer Von Waldheim, 1824
R. mannerheimi Motschulsky, 1845

Family CHRYSOMELIDAE
Subfamily DONACIINAE

Genus *Donacia* Fabricius, 1775
D. aquatica (Linnaeus, 1758)
D. bicolora Zschach, 1788
D. cinerea Herbst, 1784
D. clavipes Fabricius, 1792
D. delagrangei Pic, 1896
D. impressa (Paykull, 1799)

D.kraatzi Weise, 1881
D. marginata Hoppe, 1795
D. microcephala J. Daniel, 1904
D. mistshenkoi Jakobson, 1910
D. simplex Fabricius, 1775
D. thalassina Germar, 1811
D. tomentosa Ahrens, 1810
D. vulgaris Zschach, 1775

Genus *Macroplea* Samouelle, 1819
M. mutica Fabricius, 1792

Genus *Plateumaris* Thomson, 1859
Subgenus *Euplateumaris* I.-Khnzorian, 1966
P. sericea (Linnaeus, 1760)
Subgenus Plateumaris Thomson, 1859
P. consimilis (Schrank, 1781)

Subfamily CRIOCERINAE

Genus *Crioceris* Geoffroy, 1762
C. asparagi (Linnaeus, 1758)
C. bicruciata (Sahlberg, 1823)
C. duodecimpunctata (Linnaeus, 1758)
C. paracenthesis (Linnaeus, 1767)
C. quatuordecimpunctata (Scopoli, 1763)
C. sokolowi Jakobson, 1894

Genus *Lema* Fabricius, 1798
Subgenus *Lema* Fabricius, 1798
L. cyanella (Linnaeus, 1758)

Genus *Lilioceris* Reitter, 1913
L. faldermanni (Guérin-Méneville, 1844)
L. lilii (Scopoli, 1763)
L. merdigera (Linnaeus, 1758)

Genus *Oulema* Gozis, 1886
O. duftschmidi (Redtenbacher, 1874)
O. gallaeciana (Heyden, 1870)
O. melanopus (Linnaeus, 1758)

Subfamily CLYTRINAE

Genus *Cheilotoma* Chevrolat, 1836
Subgenus *Cheilotoma* Chevrolat, 1836
C. beldei Kasap, 1984
C. erythrostoma Faldermann, 1837
  C. e. erythrostoma Faldermann, 1837
C. musciformis (Goeze, 1777)
  C. m. musciformis (Goeze, 1777)
C. voriseki Medvedev & Kantner, 2003

Genus *Clytra* Laicharting, 1781
Subgenus *Clytra* Laicharting, 1781
C. aliena Weise, 1897
C. laeviuscula Ratzeburg, 1837
C. quadripunctata (Linnaeus1758)
  C. q. quadripunctata (Linnaeus1758)
Subgenus *Clytraria* Semenov, 1903
C. atraphaxidis (Pallas, 1773)
  C. a. atraphaxidis (Pallas, 1773)
C. novempunctata Olivier, 1808
C. valeriana (Ménétriés, 1832)
  C. v. valeriana (Ménétriés, 1832)
  C. v. taurica Medvedev, 1961

Subgenus *Ovoclytra* Medvedev, 1961
C. binominata Monros, 1953
C. bodemeyeri Weise, 1900
  C. b. bodemeyeri Weise, 1900
C. nigrocincta (Lacordaire, 1848)
  C. n. nigrocincta (Lacordaire, 1848)
C. ovata (Lacordaire, 1848)
  C. o. ovata (Lacordaire, 1848)
  C. o. borealis Medvedev & Kantner, 2002
C. rotundata Medvedev, 1961
C. weisei Monros, 1953

Genus *Coptocephala* Chevrolat, 1836
C. destinoi Fairmaire, 1884
C. fallaciosa Fairmaire, 1884
C. gebleri (Gebler, 1841)
C. simillima Lodewyckx, 1995
C. unifasciata (Scopoli, 1763)
  C. u. unifasciata (Scopoli, 1763)

Genus *Labidostomis* Germar, 1822
Subgenus *Labidostomis* Germar, 1822
L. asiatica Faldermann, 1837
L. axillaris Lacordaire, 1848
L. basanica Sahlberg, 1913
L. beckeri Weise, 1881
L. brevipennis Faldermann, 1837
L. cyanicornis (Germar, 1822)
L. decipiens Faldermann, 1837
L. diversifrons Lefèvre, 1872
L. elegans Lefèvre, 1876
L. hebraea Lacordaire, 1848
L. humeralis (Schneider, 1792)
L. karamanica Weise, 1900
L. kaszabi (Medvedev, 1962)
L. korbi Weise, 1902
L. longimana (Linnaeus, 1760)
L. lucida (Germar, 1824)
L. maculipennis Lefèvre, 1870
L. mesopotamica Heyden, 1886
L. metallica Lefèvre, 1872
  L. m. metallica Lefèvre, 1872
L. oertzeni Weise, 1889
L. pallidipennis (Gebler, 1830)
L. peregrina Weise, 1900
L. propinqua Faldermann, 1837
L. rufa (Waltl, 1838)
L. subfasciata Weise, 1885
L. sulcicollis Lacordaire, 1848
L. testaceipes Pic, 1904

Genus *Lachnaia* Chevrolat, 1836
Subgenus *Lachnaia* Chevrolat, 1836
L. sexpunctata (Scopoli, 1763)

Genus *Macrolenes* Chevrolat, 1836
M. dentipes (Olivier, 1808)

Genus *Smaragdina* Chevrolat, 1836
S. affinis (Illiger, 1794)
  S. a. affinis (Illiger, 1794)
S. amasina (Pic, 1897)
S. aurita (Linnaeus, 1767)
  S. a. aurita (Linnaeus, 1767)
S. biornata (Lefèvre, 1872)
  S. b. biornata (Lefèvre, 1872)

S. b. angorensis (Lopatin, 2002)
S. chloris (Lacordaire, 1848)
S. c. chloris (Lacordaire, 1848)
S. djebellina (Lefèvre, 1872)
S. flavicollis (Charpentier, 1825)
S. graeca (Kraatz, 1872)
S. hypocrita (Lacordaire, 1848)
S. judaica (Lefèvre, 1872)
S. laeviceps Abeille de Perrin, 1895
S. limbata (Steven, 1806)
S. persica Pic, 1911
S. salicina (Scopoli, 1763)
S. scutellaris (Lefèvre, 1872)
S. tibialis (Brullé, 1832)
S. unipunctata (Olivier, 1808)
S. vaulogeri (Pic, 1895)
S. viridana (Lacordaire, 1848)
S. v. viridana (Lacordaire, 1848)
S. xanthaspis (Germar, 1824)

Genus *Tituboea* Lacordaire, 1848
T. arabica (Olivier, 1808)
T. macropus (Illiger, 1800)
T. sexmaculata (Fabricius, 1781)

Subfamily CRYPTOCEPHALINAE

Genus *Acolastus* Gerstaecker, 1855
Subgenus *Anopsilus* Jakobson, 1917
A. glabratus (Lopatin, 1985)
A. iranicus (Lopatin, 1980)

Genus *Cryptocephalus* Geoffroy, 1762
Subgenus *Asionus* Lopatin, 1988
C. amasiensis Weise, 1894
C. apicalis Gebler, 1830
C. curda Jakobson, 1897
C. flexuosus Krynicki, 1834
C. gloriosus Mulsant & Wachanru, 1853
C. phaleratus (Tappes, 1871)
C. pseudoreitteri Tomov, 1976
C. quatuordecimmaculatus Schneider, 1792
C. tappesi Marseul, 1868
C. volkovitshi Lopatin, 1976
Subgenus *Burlinius* Lopatin, 1965
C. ayvazi Gök & Sassi, 2002
C. bilineatus (Linnaeus, 1767)
C. chrysopus Gmelin, 1790
C. connexus Olivier, 1807
C. elegantulus Gravenhorst, 1807
C. exiguus Schneider, 1792
C. e. amiculus Baly, 1873
C. e. variceps Weise, 1884
C. fausti Weise, 1882
C. fulvus Goeze, 1777
C. f. fulvus Goeze, 1777
C. f. schatzmayri Burlini, 1969
C. labiatus (Linnaeus, 1760)
C. lederi Weise, 1889
C. macellus Suffrian, 1860
C. ocellatus Drapiez, 1819
C. o. ocellatus Drapiez, 1819
C. oranensis Weise, 1882
C. populi Suffrian, 1848
C. pusillus Fabricius, 1777
C. pygmaeus Fabricius, 1792
C. p. vittula Suffrian, 1848
C. rufipes (Goeze, 1777)
C. strigosus Germar, 1824
C. sultani Pic, 1920
C. tschimganensis Weise, 1894
C. t. tschimganensis Weise, 1894
C. tshorumae Tomov, 1984
Subgenus *Cryptocephalus* Geoffroy, 1762
C. androgyne Marseul, 1875
C. a. androgyne Marseul, 1875
C. anticus Suffrian, 1848
C. bameuli Duhaldeborde, 1999
C. bicolor Eschscholz, 1818
C. biguttatus (Scopoli, 1763)
C. biledjekensis Pic, 1909
C. bipunctatus (Linnaeus, 1758)
C. b. bipunctatus (Linnaeus, 1758)
C. cordiger (Linnaeus, 1758)
C. crassus Olivier, 1791
C. cribratus Suffrian, 1847
C. duplicatus Suffrian, 1847
C. flavipes Fabricius, 1781
C. ilicis Olivier, 1808
C. imperialis Laicharting, 1781
C. infraniger Pic, 1915
C. janthinus Germar, 1824
C. messutati Kippenberg, 2011
C. moraei (Linnaeus, 1758)
C. octomaculatus Rossi, 1790
C. octopunctatus (Scopoli, 1763)
C. o. octopunctatus (Scopoli, 1763)
C. paphlagonius Sassi & Kısmalı, 2000
C. paradisiacus Weise, 1900
C. parvulus Müller, 1776
C. peyroni Marseul, 1875
C. praticola Weise, 1889
C. quadriguttatus (Richter, 1820)
C. rugicollis Olivier, 1791
C. sericeus (Linnaeus, 1758)
C. sexpunctatus (Linnaeus, 1758)
C. s. sexpunctatus (Linnaeus, 1758)
C. signatifrons Suffrian, 1847
C. solivagus Leonardi & Sassi, 2001
C. surdus Rapilly, 1980
C. testaceitarsis Pic, 1915
C. transcaucasicus Jakobson, 1898
C. trimaculatus Rossi, 1790
C. turcicus Suffrian, 1847
C. virens Suffrian, 1847
Subgenus *Heterichnus* Warchałowski, 1991
C. loebli Sassi, 1997
C. prusias Suffrian, 1853
Subgenus *Lamellosus* Tomov, 1979
C. angorensis Pic, 1908
Subgenus *Protophysus* Chevrolat, 1836
C. schaefferi Schrank, 1789
C. s. moehringi Weise, 1884
C. wehnckei Weise, 1881

Genus *Pachybrachis* Chevrolat, 1836
Subgenus *Pachybrachis* Chevrolat, 1836
P. adaliensis (Weise, 1886)
P. albicans (Weise, 1882)
P. anatolicus Lopatin, 1985
P. bodemeyeri (Weise, 1906)

P. cordatus Sassi & Schöller, 2003
P. excisus (Weise, 1897)
P. fimbriolatus (Suffrian, 1848)
P. glycyrrhizae (Olivier, 1808)
P. hieroglyphicus (Laicharting, 1781)
P. humeralis Burlini, 1956
P. instabilis Weise, 1887
P. laticollis (Suffrian, 1860)
P. leonardii Sassi & Schöller, 2003
P. limbatus (Ménétriés, 1836)
P. mardinensis (Weise, 1900)
P. mendax Suffrian, 1860
P. m. mendax Suffrian, 1860
P. nigropunctatus Suffrian, 1854
P. nitidicollis (Weise, 1894)
P. pentheri (Ganglbauer, 1905)
P. picus (Weise, 1882)
P. scripticollis Faldermann, 1837
P. scriptidorsum Marseul, 1875
P. sinuatus (Mulsant & Rey, 1859)
P. tesselatus (Olivier, 1791)
P. t. tauricus Suffrian, 1848
P. velarum Warchałowski, 1998
P. vermicularis Suffrian, 1854
P. warchalowskii Lopatin & Nesterova, 2010

Genus *Stylosomus* Suffrian, 1848
Subgenus *Stylosomus* Suffrian, 1848
S. flavus Marseul, 1875
S. f. flavus Marseul, 1875
S. subelongatus Pic, 1913
S. tamaricis (Herrich-Schäffer, 1836)

Subfamily EUMOLPINAE

Genus *Bedelia* Lefèvre, 1875
B. insignis Lefèvre, 1875

Genus *Bromius* Chevrolat, 1836
B. obscurus (Linnaeus, 1758)

Genus *Colaspinella* Weise, 1893
C. grandis (Frivaldszky, 1880)

Genus *Chloropterus* Morawitz, 1861
C. versicolor (Morawitz, 1860)

Genus *Chrysochares* Morawitz, 1861
C. asiaticus (Pallas, 1771)

Genus *Crysochus* Chevrolat, 1836
C. asclepiadeus (Pallas, 1773)
C. a. asiaeminoris DeMonte, 1848

Genus *Damasus* Chapuis, 1874
D. albicans Chapuis, 1874

Genus *Floricola* Gistel, 1848
F. ulema (Germar, 1813)

Genus *Macrocoma* Chapuis, 1874
M. brunnipes (Olivier, 1808)
M. b. obscuricolor (Pic, 1905)
M. delagrangei (Pic, 1898)
M. doboszi Borowiec, 2005
M. fortidens (Berti & Rapilly, 1973)
M. korbi (Pic, 1901)
M. rubripes (Schaufuss, 1862)
M. r. rubripes (Schaufuss, 1862)
M. substriata Weise, 1904

Genus *Malegia* Lefèvre, 1883
M. colchica Reitter, 1912

Genus *Pachnephorus* Chevrolat, 1836
Subgenus *Pachnephorus* Chevrolat, 1836
P. bistriatus Mulsant & Wachanru, 1852
P. canus Weise, 1882
P. cylindricus Lucas, 1849
P. pilosus (Rossi, 1790)
P. robustus Desbrochers, 1870
P. tessellatus (Duftschmid, 1825)
P. villosus (Duftschmid, 1825)

Subfamily CHRYSOMELINAE

Genus *Chrysolina* Motschulsky, 1860
Subgenus *Bittotaenia* Motschulsky, 1860
C. aeneipennis (Reiche & Saulcy, 1858)
C. grata (Faldermann, 1837)
C. g. grata (Faldermann, 1837)
C. salviae (Germar, 1824)
C. s. salviae (Germar, 1824)
C. s. compuncta Weise, 1889
Subgenus *Chalcoidea* Motschulsky, 1860
C. analis (Linnaeus, 1767)
C. marginata (Linnaeus, 1758)
C. m. marginata (Linnaeus, 1758)
C. m. unificans Bechyné, 1950
C. sellata Weise, 1894
C. songarica Gebler, 1843
C. tesari Roubal, 1936
C. t. tesari Roubal, 1936
Subgenus *Chrysolina* Motschulsky, 1860
C. blanchei (Fairmaire, 1865)
C. b. blanchei (Fairmaire, 1865)
C. staphylaea (Linnaeus, 1758)
C. s. staphylaea (Linnaeus, 1758)
Subgenus *Chrysolinopsis* Bechyné, 1950
C. americana (Linnaeus, 1758)
Subgenus *Chrysomorpha* Motschulsky, 1860
C. cerealis (Linnaeus, 1767)
C. c. cerealis (Linnaeus, 1767)
C. c. cyaneoaurata Motschulsky, 1860
Subgenus *Colaphodes* Motschulsky, 1860
C. haemoptera (Linnaeus, 1758)
C. h. haemoptera (Linnaeus, 1758)
C. h. byzantia Jolivet, 1951
Subgenus *Colaphoptera* Motschulsky, 1860
C. abchasica Weise, 1892
C. planicollis (Breit, 1919)
Subgenus *Colaphosoma* Motschulsky, 1860
C. sturmi Westhoff, 1882
Subgenus *Diachalcoidea* Bechyné, 1955
C. sacarum (Weise, 1890)
C. s. sacarum (Weise, 1890)
Subgenus *Erythrochrysa* Bechyné, 1950
C. polita (Linnaeus, 1758)
C. p. polita (Linnaeus, 1758)
Subgenus *Euchrysolina* Bechyné, 1950
C. graminis (Linnaeus, 1758)

C. g. graminis (Linnaeus, 1758)
Subgenus *Fastuolina* Warchałowski, 1991
C. fastuosa (Scopoli, 1763)
C. f. fastuosa (Scopoli, 1763)
C. f. inexplicabilis Bransik, 1910
Subgenus *Hypericia* Bedel, 1892
C. anatolica (Dahlgren, 1984)
C. cuprina (Duftschmid, 1825)
C. c. cuprina (Duftschmid, 1825)
C. c. staneki Bechyné, 1949
C. didymata (Scriba, 1791)
C. d. didymata (Scriba, 1791)
C. d. syriaca (Weise, 1884)
C. geminata (Paykull, 1799)
C. hyperici (Forster, 1771)
C. h. hyperici (Forster, 1771)
Subgenus *Lopatinica* Kippenberg, 2012
C. adzharica Lopatin, 1988
C. a. heinzi Kippenberg, 2012
C. a. excavata Kippenberg, 2012
C. boluensis Kippenberg, 2012
C. daccordiana Kippenberg, 2012
C. differens Franz, 1952
C. kataevi Lopatin, 2000
Subgenus *Ovosoma* Motschulsky, 1860
C. orientalis (Olivier, 1807)
C. o. orientalis (Olivier, 1807)
C. o. halysa Bechyné, 1950
C. o. sahlbergi (Ménétriés, 1832)
C. o. thraeissa Bechyné, 1950
C. turca (Fairmaire, 1865)
C. vernalis (Brullé, 1832)
C. v. ottomana (Weise, 1906)
C. wittmeri Medvedev, 1975
Subgenus *Ovostoma* Motschulsky, 1860
C. olivieri Bedel, 1892
C. o. olivieri Bedel, 1892
C. o. azurea Bechyné, 1946
Subgenus *Paradiachalcoidea* Daccordi, 1978
C. palmyrensis Bechyné, 1955
C. p. assurensis Bechyné, 1955
Subgenus *Sphaeromela* Bedel, 1892
C. varians (Schaller, 1783)
Subgenus *Stichoptera* Motschulsky, 1860
C. gypsophilae (Küster, 1845)
C. sanguinolenta (Linnaeus, 1758)
Subgenus *Sulcicollis* Sahlberg, 1913
C. chalcites (Germar, 1824)
C. impavida Bechyné, 1949
C. oricalcia (Müller, 1776)
C. peregrina (Herrich-Schäffer, 1838)
Subgenus *Synerga* Weise, 1900
C. coerulans (Scriba, 1791)
C. c. coerulans (Scriba, 1791)
C. c. angelica (Reiche & Saulcy, 1858)
C. herbacea (Duftschmid, 1825)
C. h. herbacea (Duftschmid, 1825)
C. h. alacris Bechyné, 1950
C. h. recticollis Motschulsky, 1860
Subgenus *Taeniosticha* Motschulsky, 1860
C. pseudolurida (Roubal, 1817)
C. reitteri (Weise, 1884)
Subgenus *Threnosoma* Motschulsky, 1860
C. anceyi (Marseul, 1868)
C. a. anceyi (Marseul, 1868)
C. limbata (Fabricius, 1775)
C. l. volodi Bienkowski & O.-Bienk., 2011

Genus *Chrysomela* Linnaeus, 1758
C. collaris Linnaeus, 1758
C. populi Linnaeus, 1758
C. saliceti (Weise, 1884)
C. saliceti saliceti (Weise, 1884)
C. tremula Fabricius, 1787
C. t. tremula Fabricius, 1787
C. vigintipunctata (Scopoli, 1763)
C. v. vigintipunctata (Scopoli, 1763)

Genus *Colaphellus* Weise, 1916
C. apicalis (Ménétriés, 1832)
C. sophiae (Schaller, 1783)
C. s. amasiae Machatschke, 1954
C. s. transsylvanicus Machatschke, 1954

Genus *Cyrtonastes* Fairmaire, 1874
Subgenus *Cyrtonastes* Fairmaire, 1874
C. confusus Berti & Daccordi, 1974
C. grandis Lopatin, 1994
Subgenus *Natocyrstes* Kippenberg, 2010
N. seriatoporus Fairmaire, 1880

Genus *Entomoscelis* Chevrolat, 1837
E. adonidis (Pallas, 1771)
E. sacra (Linnaeus, 1758)
E. suturalis Weise, 1882

Genus *Gastrophysa* Chevrolat, 1836
Subgenus *Gastrophysa* Chevrolat, 1836
G. polygoni (Linnaeus, 1758)
G. p. polygoni (Linnaeus, 1758)
G. viridula (DeGeer, 1775)
G. v. viridula (DeGeer, 1775)
G. v. caucasica Jolivet, 1951

Genus *Gonioctena* Chevrolat, 1836
Subgenus *Gonioctena* Chevrolat, 1836
G. decemnotata Marsham, 1802
G. linnaeana (Schrank, 1781)
G. l. linnaeana (Schrank, 1781)
G. viminalis (Linnaeus, 1758)
G. v. viminalis (Linnaeus, 1758)
Subgenus *Spartomena* Reitter, 1913
G. akbesiana Fairmaire, 1884
G. fornicata (Brüggemann, 1873)

Genus *Leptinotarsa* Chevrolat, 1836
L. decemlineata (Say, 1824)

Genus *Neophaedon* Jakobson, 1901
N. pyritosus (Rossi, 1792)

Genus *Phaedon* Latreille, 1829
Subgenus *Phaedon* Latreille, 1829
P. armoraciae (Linnaeus, 1758)
P. cochleariae (Fabricius, 1792)
P. c. cochleariae (Fabricius, 1792)

Genus *Phratora* Chevrolat, 1836
Subgenus *Phratora* Chevrolat, 1836
P. vulgatissima (Linnaeus, 1758)

Subgenus *Phyllodecta* Kirby, 1837
P. horioni (Mohr, 1968)
P. laticollis (Suffrian, 1851)
P. tibialis (Suffrian, 1851)
P. t. tibialis (Suffrian, 1851)
P. vitellinae (Linnaeus, 1758)

Genus *Plagiodera* Chevrolat, 1836
P. versicolora (Laicharting, 1781)

Genus *Plagiosterna* Motschulsky, 1860
P. aenea (Linnaeus, 1758)
P. a. aenea (Linnaeus, 1758)

Genus *Prasocuris* Latreille, 1802
Subgenus *Hydrothassa* Thomson, 1859
P. flavocincta (Brullé, 1832)
P. glabra (Herbst, 1783)
Subgenus *Prasocuris* Latreille, 1802
P. junci (Brahm, 1790)
P. phellandri (Linnaeus, 1758)

Genus *Zygogramma* Chevrolat in Dej., 1836
Z. suturalis (Fabricius, 1775)

Subfamily TIMARCHINAE

Genus *Timarcha* Latreille, 1829
Subgenus *Metallotimarcha* Motschulsky, 1860
T. hummelii Faldermann, 1837
T. h. hummelii Faldermann, 1837
Subgenus *Timarcha* Latreille, 1829
T. olivieri (Fairmaire, 1868)
T. o. olivieri (Fairmaire, 1868)
T. pratensis Duftschmid, 1825
T. rugulosa Herrich-Schäffer, 1838
T. r. rugulosa Herrich-Schäffer, 1838
T. tenebricosa (Fabricius, 1775)

Subfamily GALERUCINAE

Genus *Agelastica* Chevrolat, 1836
A. alni (Linnaeus, 1758)
A. a. alni (Linnaeus, 1758)

Genus *Aulacophora* Chevrolat, 1836
A. foveicollis (Lucas, 1849)

Genus *Calomicrus* Dillwyn, 1829
C. angorensis (Pic, 1912)
C. apicalis Demaison, 1891
C. azureus (Fairmaire, 1884)
C. circumfusus (Marsham, 1802)
C. lividus (Joannis, 1866)
C. malkini Warchałowski, 1991
C. pinicola (Duftschmid, 1825)
C. syriacus (Weise, 1898)
C. turcicus Medvedev, 1975

Genus *Diorhabda* Weise, 1983
D. carinata Faldermann, 1837
D. elongata (Brullé, 1832)

Genus *Euluperus* Weise, 1886
E. major Weise, 1886

Genus *Exosoma* Jacoby, 1903
E. flavipes (Heyden, 1878)
E. gaudionis (Reiche, 1862)
E. neglectum Mohr, 1968
E. thoracicum (Redtenbacher, 1843)

Genus *Galeruca* Geoffroy, 1762
Subgenus *Galeruca* Geoffroy, 1762
G. armeniaca Weise, 1866
G. circassica Reitter, 1899
G. dahlii (Joannis, 1865)
G. d. dahlii (Joannis, 1865)
G. impressicollis Pic, 1934
G. interrupta (Illiger, 1802)
G. jucunda Faldermann, 1837
G. littoralis Fabricius, 1787
G. pomonae (Scopoli, 1763)
G. p. pomonae (Scopoli, 1763)
G. spectabilis (Faldermann, 1837)
G. s. orientalis (Osculati, 1844)
G. tanaceti (Linnaeus, 1758)
G. t. tanaceti (Linnaeus, 1758)
Subgenus *Emarhopa* Weise, 1886
G. rufa Germar, 1824
Subgenus *Haptoscelis* Weise, 1886
G. melanocephala (Ponza, 1805)

Genus *Galerucella* Crotch, 1873
Subgenus *Galerucella* Crotch, 1873
G. grisescens (Joannis, 1866)
G. nymphaeae (Linnaeus, 1758)
Subgenus *Neogalerucella* Chujo, 1962
G. calmariensis (Linnaeus, 1767)
G. lineola (Fabricius, 1781)
G. l. lineola (Fabricius, 1781)
G. pusilla Duftschmid, 1825
G. tenella (Linnaeus, 1760)

Genus *Lochmaea* Weise, 1883
L. caprea (Linnaeus, 1758)
L. crataegi (Forster, 1771)
L. limbata Pic, 1898
L. machulkai Roubal, 1926

Genus *Luperus* Geoffroy, 1762
L. armeniacus Kiesenwetter, 1878
L. discolor Faldermann, 1837
L. flavipennis Lucas, 1849
L. f. flavipennis Lucas, 1849
L. flavipes (Linnaeus, 1767)
L. f. flavipes (Linnaeus, 1767)
L. floralis Faldermann, 1837
L. graecus Weise, 1886
L. longicornis (Fabricius, 1781)
L. perlucidus Iablokoff-Khnzorian, 1956
L. rectangulus Weise, 1898
L. viridipennis (Germar, 1824)
L. xanthopoda (Schrank, 1781)

Genus *Nymphius* Weise, 1900
N. ensifer (Guillebeau, 1891)
N. forcipifer (Weise, 1900)
N. lydius (Weise, 1886)
N. stylifer (Weise, 1899)
N. s. stylifer (Weise, 1899)
N. s. kadleci (Bezdek, 2008)

N. s. ogloblini (Bogatchev, 1947)

Genus *Phyllobrotica* Chevrolat, 1836
P. adusta (Creutzer, 1799)
P. a. adusta (Creutzer, 1799)
P. binotata Ogloblin, 1936
P. elegans Kraatz, 1866
P. frontalis Weise, 1886
P. malinka Bezdek, 2010

Genus *Radymna* Reitter, 1913
R. fischeri (Faldermann, 1837)
R. nigrifrons (Laboissière, 1914)
R. persica (Faldermann, 1837)

Genus *Sermylassa* Reitter, 1913
S. halensis (Linnaeus, 1767)

Genus *Xanthogaleruca* Laboissiere, 1934
X. luteola (Müller, 1766)
X. subcoerulescens (Weise, 1884)

Subfamily ALTICINAE

Genus *Aeschrocnemis* Weise, 1888
Subgenus *Aeschrocnemis* Weise, 1888
A. byzantica Nadein, 2011
A. osmanica Nadein, 2011
A. serbica (Kutschera, 1860)
Subgenus *Hirticnemis* Nadein, 2011
A. anatolica (Heikertinger, 1922)
A. caria Nadein, 2011
A. curda Nadein, 2011
A. delagrangei Pic, 1903
A. iconiensis Nadein, 2011
A. pubipennis (Reitter, 1892)
Subgenus *Nudicnemis* Nadein, 2011
A. antiocha Nadein, 2011
A. turcica Nadein & Gök, 2009
A. whiteheadi (Warchałowski, 1998)

Genus *Altica* Müller, 1764
A. ampelophaga Guérin-Méneville, 1858
A. a. ampelophaga Guér.-Méneville, 1858
A. ancyrensis (Weise, 1897)
A. bicarinata Kutschera, 1860
A. brevicollis Foudras, 1860
A. b. brevicollis Foudras, 1860
A. bulgharensis Král, 1969
A. carduorum Guérin-Méneville, 1858
A. cornivorax Král, 1969
A. deserticola (Weise, 1889)
A. globicollis Weise, 1889
A. graeca Král, 1966
A. hampei Allard, 1867
A. impressicollis Reiche, 1862
A. jarmilae Král, 1979
A. longicollis (Allard, 1860)
A. lythri Aubé, 1843
A. oleracea (Linnaeus, 1758)
A. o. oleracea (Linnaeus, 1758)
A. palustris (Weise, 1888)
A. pontica (Ogloblin, 1925)
A. quercetorum Foudras, 1860
A. q. quercetorum Foudras, 1860
A. talyshana Konstantinov, 1995
A. tamaricis Schrank, 1785
A. t. tamaricis Schrank, 1785

Genus *Anthobiodes* Weise, 1887
A. turcicus (Medvedev, 1975)

Genus *Aphthona* Chevrolat, 1836
A. abdominalis Duftschmid, 1825
A. aeneomicans Allard, 1875
A. alanyensis Fritzlar, 2004
A. atrocaerulea (Stephens, 1831)
A. atrovirens Förster, 1849
A. bergeali Fritzlar, 2001
A. bergealoides Fritzlar, 2004
A. bonvouloiri Allard, 1861
A. carbonaria Rosenhauer, 1856
A. crassicornis Lopatin, 1990
A. cyparissiae Koch, 1803
A. euphorbiae Schrank, 1781
A. flava Guillebeau, 1895
A. flaviceps Allard, 1859
A. franzi Heikertinger, 1944
A. fuentei Reitter, 1901
A. gracilis Faldermann, 1837
A. konstantinovi Lopatin, 1998
A. kuntzei Roubal, 1931
A. lacertosa Rosenhauer, 1847
A. lutescens Gyllenhal, 1813
A. maculata Allard, 1876
A. nigriceps Redtenbacher, 1842
A. nigriscutis Foudras, 1860
A. nonstriata Goeze, 1777
A. ovata Foudras, 1860
A. pygmaea (Kutschera, 1861)
A. rhodiensis Heikertinger, 1944
A. rugipennis Ogloblin, 1926
A. semicyanea Allard, 1859
A. syriaca Heikertinger, 1944
A. valachica Heikertinger, 1944
A. venustula (Kutschera, 1861)
A. violacea (Koch, 1803)
A. warchalowskii Fritzlar, 2001

Genus *Batophila* Foudras, 1860
B. fallax Weise, 1888
B. olexai Král, 1964

Genus *Chaetocnema* Stephens, 1831
Subgenus *Chaetocnema* Stephens, 1831
C. aerosa (Letzner, 1847)
C. arenacea (Allard, 1860)
C. arida Foudras, 1860
C. aridula (Gyllenhal, 1827)
C. confusa (Boheman, 1851)
C. hortensis (Geoffroy, 1785)
C. igori Konstantinov et al., 2011
C. imitatrix Gruev, 1990
C. mannerheimii (Gyllenhal, 1827)
C. montenegrina Heikertinger, 1912
C. obesa (Boieldieu, 1859)
C. procerula (Rosenhauer, 1856)
C. sahlbergii (Gyllenhal, 1827)
C. subcoerulea (Kutschera, 1864)
Subgenus *Tlanoma* Motschulsky, 1845
C. breviuscula (Faldermann, 1837)
C. chlorophana (Duftschmid, 1825)

C. concinna (Marsham, 1802)
C. conducta (Motschulsky, 1838)
C. coyei (Allard, 1864)
C. delarouzeei (Brisout de Barneville, 1884)
C. major (Jacquelin du Val, 1852)
C. orientalis (Bauduer, 1874)
C. picipes Stephens, 1831
C. scheffleri (Kutschera, 1864)
C. semicoerulea (Koch, 1803)
C. s. semicoerulea (Koch, 1803)
C. tibialis (Illiger, 1807)

Genus *Crepidodera* Chevrolat, 1836
C. aurata (Marsham, 1802)
C. aurea (Geoffroy, 1785)
C. fulvicornis (Fabricius, 1792)
C. lamina (Bedel, 1901)
C. nigricoxis Allard, 1878
C. nitudula (Linnaeus, 1758)
C. plutus (Latreille, 1804)

Genus *Derocrepis* Weise, 1886
D. rufipes (Linnaeus, 1758)

Genus *Dibolia* Latreille, 1829
Subgenus *Dibolia* Latreille, 1829
D. cryptocephala (Koch, 1803)
D. cynoglossi (Koch, 1803)
D. depressiuscula Letzner, 1847
D. kralii Mohr, 1981
D. numidica Doguet, 1971
D. occultans (Koch, 1803)
D. phoenicia Allard, 1866
D. rufofemorata Reitter, 1896
D. rugulosa Redtenbacher, 1849
D. timida Illiger, 1807
Subgenus *Eudibolia* Iab.-Khnzorian, 1968
D. carpathica Weise, 1893
D. femoralis Redtenbacher, 1849
D. f. femoralis Redtenbacher, 1849
D. schillingi (Letzner, 1847)
D. tricolor Reitter, 1898
Subgenus *Pseudodibolia* Iab.-Khnzorian, 1968
D. zangezurica Iablokoff-Khnzorian, 1968

Genus *Epitrix* Foudras, 1860
E. abeillei (Bauduer, 1874)
E. atropae Foudras, 1860
E. caucasica Heikertinger, 1950
E. dieckmanni Mohr, 1968
E. hirtipennis (Melsheimer, 1847)
E. intermedia Foudras, 1860
E. pubescens (Koch, 1803)

Genus *Hermaeophaga* Foudras, 1860
Subgenus *Hermaeophaga* Foudras, 1860
H. mercurialis (Fabricius, 1792)
Subgenus *Orthocrepis* Weise, 1888
H. ruficollis (Lucas, 1849)

Genus *Hippuriphila* Foudras, 1860
H. modeeri (Linnaeus, 1760)

Genus *Longitarsus* Latreille, 1829
Subgenus *Longitarsus* Latreille, 1829
L. absynthii Kutschera, 1862
L. aeneicollis (Faldermann, 1837)
L. albineus (Foudras, 1860)
L. alfierii (Pic, 1923)
L. a. alfierii (Pic, 1923)
L. a. furthi Gruev, 1982
L. allotrophus Furth, 1979
L. angelikae Fritzlar, 2001
L. aramaicus Leonardi, 1979
L. artvinus Gruev & Aslan, 1998
L. atricillus (Linnaeus, 1760)
L. audisioi Biondi, 1992
L. australis (Mulsant & Rey, 1874)
L. baeticus Leonardi, 1979
L. ballotae (Marsham, 1802)
L. barbarae Doguet & Bergeal, 2001
L. bertii Leonardi, 1973
L. brisouti Heikertinger, 1912
L. bytinskii Furth, 1979
L. callidus Warchałowski, 1967
L. celticus (Leonardi, 1975)
L. cerinthes Schrank, 1798
L. corpulentus Weise, 1887
L. curtus (Allard, 1860)
L. echii (Koch, 1803)
L. eminus Warchałowski, 1967
L. exsoletus (Linnaeus, 1758)
L. e. exsoletus (Linnaeus, 1758)
L. e. rufulus (Foudras, 1860)
L. fallax Weise, 1888
L. foudrasi Weise, 1893
L. ganglbaueri Heikertinger, 1912
L. georgianus Allard, 1866
L. gracilis Kutschera, 1864
L. helvolus Kutschera, 1863
L. hermonensis Furth, 1979
L. holsaticus (Linnaeus, 1758)
L. jacobaeae (Waterhouse, 1858)
L. jailensis Heikertinger, 1913
L. juncicola (Foudras, 1860)
L. karlheinzi Warchałowski, 1972
L. kopdagiensis Gruev & Aslan, 1998
L. kutscherai (Rey1892)
L. latens Warchałowski, 1998
L. lateripunctatus Rosenhauer, 1856
L. l. personatus Weise, 1893
L. ledouxi Doguet,1979
L. lewisii (Baly, 1874)
L. linnaei (Duftschmid, 1825)
L. longipennis Kutschera, 1863
L. luridus (Scopoli, 1763)
L. l. luridus (Scopoli, 1763)
L. lycopi (Foudras, 1860)
L. manfredi Fritzlar, 2004
L. medvedevi Shapiro, 1956
L. melanocephalus (DeGeer, 1775)
L. membranaceus (Foudras, 1860)
L. meridionalis Weise, 1888
L. minimus Kutschera, 1864
L. minusculus (Foudras, 1860)
L. nanus (Foudras, 1860)
L. nasturtii Fabricius, 1792
L. niger (Koch, 1803)
L. nigrofasciatus (Goeze, 1777)
L. n. nigrofasciatus (Goeze, 1777)
L. nimrodi Furth, 1979
L. noricus Leonardi, 1976

L. obliteratoides Gruev, 1973
L. obliteratus (Rosenhauer, 1847)
L. ochroleucus (Marsham, 1802)
L. o. ochroleucus (Marsham, 1802)
L. ozbeki Aslan & Warchałowski, 2005
L. parvulus (Paykull, 1799)
L. pellucidus (Foudras, 1860)
L. picicollis Weise,1900
L. pratensis (Panzer, 1794)
L. pulmonariae Weise, 1893
L. quadriguttatus (Pontoppidan, 1763)
L. rectilineatus (Foudras, 1860)
L. reichei (Allard, 1860)
L. rubiginosus Foudras, 1860
L. salviae Gruev, 1975
L. scutellaris (Mulsant & Rey, 1874)
L. solaris Gruev, 1977
L. stragulatus (Foudras, 1860)
L. s. stragulatus (Foudras, 1860)
L. s. dichrous Iablokoff-Khnzorian, 1962
L. strigicollis Wollaston, 1864
L. substriatus Kutschera, 1864
L. succineus (Foudras, 1860)
L. suturellus (Duftschmid, 1825)
L. tabidus (Fabricius, 1775)
L. t. tabidus (Fabricius, 1775)
L. trepidus Warchałowski, 1973
L. violentus Weise, 1893
Subgenus *Testergus* Weise, 1893
L. anatolicus Weise, 1900
L. anchusae (Paykull, 1799)
L. aubozaorum Biondi, 1997
L. corynthius (Reiche & Saulcy, 1858)
L. c. corynthius (Reiche & Saulcy, 1858)
L. fuscoaeneus Redtenbacher, 1849
L. f. fuscoaeneus Redtenbacher, 1849
L. hittita Biondi, 1995
L. iconiensis Weise, 1900
L. lederi Weise, 1889
L. onosmae (Peyerimhoff, 1912)
L. pinguis Weise, 1888
L. truncatellus Weise, 1890
L. weisei Guillebeau, 1895

Genus *Mantura* Stephens, 1831
Subgenus *Mantura* Stephens, 1831
M. chrysanthemi (Koch, 1803)
M. c. chrysanthemi (Koch, 1803)
M. mathewsii (Curtis, 1833)
M. rustica (Linnaeus, 1767)
Subgenus *Stenomantura* Heikertinger, 1909
M. cylindrica Miller, 1881

Genus *Mniophila* Stephens, 1831
M. turcica Medvedev, 1970

Genus *Neocrepidodera* Heikertinger, 1911
N. crassicornis Faldermann, 1837
N. ferruginea (Scopoli, 1763)
N. impressa (Fabricius, 1801)
N. i. obtusangula (Daniel, 1904)
N. motschulskii Konstantinov, 1991
N. nigritula (Gyllenhal, 1813)
N. transversa (Marsham, 1802)

Genus *Ochrosis* Foudras, 1860
O. ventralis (Illiger, 1807)

Genus *Orestia* Chevrolat, 1836
O. delagrangei Pic, 1909
O. loebli Biondi, 1992
O. olympica Frivaldszky, 1884
O. oselliana Leonardi, 1977

Genus *Phyllotreta* Chevrolat, 1836
P. acutecarinata Heikertinger, 1941
P. astrachanica Lopatin, 1977
P. atra (Fabricius, 1775)
P. balcanica Heikertinger, 1909
P. bolognai Biondi, 1992
P. bulgarica Gruev, 1977
P. caucasicola Heikertinger, 1941
P. corrugata Reiche & Saulcy, 1858
P. cruciferae (Goeze, 1777)
P. dacica Heikertinger, 1941
P. diademata Foudras, 1860
P. egridirensis Gruev & Kasap, 1985
P. erysimi Weise, 1900
P. e. erysimi Weise, 1900
P. fallaciosa Heikertinger, 1941
P. fornuseki Cizek, 2003
P. ganglbaueri Heikertinger, 1909
P. judaea Pic, 1901
P. lativittata Kutschera, 1860
P. lorestanica Warchałowski, 1973
P. maculicornis Pic, 1906
P. nemorum (Linnaeus, 1758)
P. nigripes (Fabricius, 1775)
P. n. nigripes (Fabricius, 1775)
P. nodicornis (Marsham, 1802)
P. ochripes (Curtis, 1837)
P. oltuensis Gruev & Aslan, 1998
P. ozbeki Gruev & Aslan, 1998
P. pallidipennis Reitter, 1891
P. pontoaegeica Gruev, 1982
P. praticola Weise, 1887
P. procera (Redtenbacher, 1849)
P. punctulata (Marsham, 1802)
P. reitteri Heikertinger, 1911
P. sisymbrii Weise, 1888
P. striolata (Illiger, 1803)
P. tetrastigma (Comolli, 1837)
P. toelgi Heikertinger, 1941
P. undulata (Kutschera, 1860)
P. variipennis (Boieldieu, 1859)
P. v. variipennis (Boieldieu, 1859)
P. vilis Weise, 1888
P. vittula (Redtenbacher, 1849)
P. weiseana Jakobson, 1901

Genus *Podagrica* Chevrolat, 1836
P. fuscicornis (Linnaeus, 1767)
P. malvae (Illiger, 1807)
P. m. malvae (Illiger, 1807)
P. menetriesii (Faldermann, 1837)

Genus *Psylliodes* Latreille, 1825
Subgenus *Minicnema* Nadein, 2007
P. elliptica Allard, 1861
Subgenus *Psylliodes* Latreille, 1825
P. aerea Foudras, 1860

P. affinis (Paykull, 1799)
P. anatolica Gök & Çilbiroğlu, 2004
P. arista Iablokoff-Khnzorian, 1962
P. attenuata (Koch, 1803)
P. brisouti Bedel, 1898
P. cerenae Gök, Doguet & Çilbiroğlu, 2003
P. chalcomera (Illiger, 1807)
P. chrysocephala (Linnaeus, 1758)
P. c. chrysocephala (Linnaeus, 1758)
P. circumdata (Redtenbacher, 1842)
P. cuprea (Koch, 1803)
P. diversicolor Nadein, 2006
P. dogueti Warchałowski, 1993
P. drusei Furth, 1983
P. dulcamarae (Koch, 1803)
P. gibbosa Allard, 1860
P. hospes Wollaston, 1854
P. hyoscyami (Linnaeus, 1758)
P. illyrica Leonardi & Gruev, 1993
P. inflata Reiche & Saulcy, 1858
P. instabilis Foudras, 1860
P. isatidis Heikertinger, 1913
P. kiesenwetteri Kutschera, 1864
P. littoralis Biondi, 1997
P. longicollis Weise, 1900
P. luteola (Müller, 1776)
P. magnifica Gruev, 1975
P. marcida (Illiger, 1807)
P. milleri Kutschera, 1864
P. m. milleri Kutschera, 1864
P. napi (Fabricius, 1792)
P. ozisiki Leonardi & Arnold, 1995
P. pallidicolor Pic, 1903
P. pallidicornis Heikertinger, 1921
P. persica Allard, 1867
P. picina (Marsham, 1802)
P. pyritosa Kutschera, 1864
P. ridenda Nadein, 2008
P. saulcyi Allard, 1867
P. taurica Leonardi, 1971
P. testaceoconcolor Heikertinger, 1926
P. thlaspis Foudras, 1860
P. toelgi Heikertinger, 1914
P. tricolor Weise, 1888
P. valida Weise, 1889
P. vindobonnensis Heikertinger, 1914
P. wachsmanni Csiki, 1903
P. yalvacensis Gök, 2005
Subgenus *Semicnema* Weise, 1888
P. reitteri Weise, 1888
P. r. reitteri Weise, 1888

Genus *Sphaeroderma* Stephens, 1831
S. rubidum (Graells, 1858)
S. testaceum (Fabricius, 1775)

Subfamily HISPINAE

Genus *Hispa* Linnaeus, 1767
H. atra Linnaeus, 1767

Genus *Dicladispa* Gestro, 1897
D. testacea Linnaeus, 1767

Subfamily CASSIDINAE

Genus *Cassida* Linnaeus, 1758
C. algirica Lucas, 1849
C. atrata Fabricius, 1787*C. azurea* Fabricius, 1801
C. bella Faldermann, 1837
C. berolinensis Suffrian, 1844
C. brevis Weise, 1884
C. canaliculata Laicharting, 1781
C. denticollis Suffrian, 1844
C. elongata Weise, 1893
C. fausti Spaeth & Reitter, 1926
C. ferruginea Goeze, 1777
C. flaveola Thunberg, 1794
C. hablitziae Motschulsky, 1838
C. hemisphaerica Herbst, 1799
C. inquinata Brullé, 1832
C. lineola Creutzer, 1759
C. linnavuorii Borowiec, 1986
C. margaritacea Schaller, 1783
C. murraea Linnaeus, 1767
C. m. murraea Linnaeus, 1767
C. nebulosa Linnaeus, 1758
C. nobilis Linnaeus, 1758
C. palaestina Reiche, 1858
C. pannonica Suffrian, 1844
C. parvula Boheman, 1854
C. persica Spaeth, 1926
C. prasina Illiger, 1798
C. pusilla Waltl, 1835
C. reitteri Weise, 1892
C. rubiginosa Müller, 1776
C. r. rubiginosa Müller, 1776
C. rufovirens Suffrian, 1844
C. sanguinolenta Müller, 1776
C. sanguinosa Suffrian, 1844
C. saucia Weise, 1889
C. seladonia Gyllenhal, 1827
C. seraphina Ménétriés, 1836
C. stigmatica Suffrian, 1844
C. strejceki Sekerka, 2006
C. subreticulata Suffrian, 1844
C. vibex Linnaeus, 1767
C. viridis Linnaeus, 1758
C. vittata Villers, 1789

Genus *Hypocassida* Weise, 1893
H. cornea (Marseul, 1868)
H. meridionalis (Suffrian, 1844)
H. subferruginea (Schrank, 1776)

Genus *Ischyronota* Weise, 1891
I. desertorum (Gebler, 1833)
I. jordanensis Borowiec, 1986

Genus *Macromonycha* Spaeth, 1911
M. anatolica (Weise, 1900)
M. apicalis (Gebler, 1845)
M. kantnerorum Sekerka, 2008

Genus *Oxylepus* Desbrochers des Loges, 1884
O. deflexicollis (Boheman, 1862)

Genus *Pilemostoma* Desbroch. des Loges, 1891
P. fastuosum (Schaller, 1783)

Numeric statement of Turkish Chrysomeloidea fauna on the base of the cited references is presented as follows:

FAMİLY	SUBFAMİLY	GENUS	SPECIES	SUBSPECIES
MEGALOPODIDAE				
	MEGALOPODINAE	**1**	**1**	**-**
	ZEUGOPHORINAE	**1**	**2**	**-**
ORSODACNIDAE				
	ORSODACNINAE	**1**	**3**	**-**
BRUCHIDAE				
	BRUCHINAE	**10**	**102**	**-**
	AMBLYCERINAE	**2**	**9**	**-**
	PACHYMERINAE	**1**	**3**	**-**
	RHAEBINAE	**1**	**1**	**-**
CHRYSOMELIDAE				
	DONACIINAE	**3**	**17**	**-**
	CRIOCERINAE	**4**	**13**	**-**
	CLYTRINAE	**8**	**58**	**18**
	CRYPTOCEPHALINAE	**4**	**92**	**15**
	EUMOLPINAE	**11**	**20**	**3**
	CHRYSOMELINAE	**15**	**50**	**52**
	TIMARCHINAE	**1**	**2**	**3**
	GALERUCINAE	**15**	**56**	**12**
	ALTICINAE	**22**	**311**	**29**
	HISPINAE	**2**	**2**	**-**
	CASSIDINAE	**6**	**49**	**2**
Total 4	**18**	**108**	**791**	**134**

Besides, the endemic species group taxa (92 species and 11 subspecies) for Turkish Chrysomeloidea fauna are presented as follows:

A LIST OF ENDEMIC SPECIES GROUP TAXA FOR TURKISH CHRYSOMELOIDEA FAUNA

Superfamily CHRYSOMELOIDEA

Family MEGALOPODIDAE
Subfamily MEGALOPODINAE

Genus *Temnaspis* Lacordaire, 1845
T. nigropunctata (Pic, 1896)
Range: Only SC Anatolia: Adana and Hatay prov. (Pic, 1896; Reitter, 1908; Warchałowski, 2003; Özdikmen & Turgut, 2008; Ekiz et al., 2013).
Remarks: It is not distributed in Syria due to type locality "Akbez" is in Hatay province in S Turkey now). So, it is endemic to Turkey.

Family BRUCHIDAE
Subfamily BRUCHINAE

Genus *Bruchus* Linnaeus, 1767
B. anatolicus Anton, 1999
Range: Only SW Anatolia: Antalya province (Anton, 1999; ; Ekiz et al., 2013).

Family CHRYSOMELIDAE
Subfamily CLYTRINAE

Genus *Cheilotoma* Chevrolat, 1836
Subgenus *Cheilotoma* Chevrolat, 1836
C. voriseki Medvedev & Kantner, 2003
Range: Only SCE Anatolia: Adıyaman prov. (Medvedev & Kantner, 2003; Medvedev, 2004; Özdikmen et al., 2007; Ekiz et al., 2013).

Genus *Coptocephala* Chevrolat, 1836
C. simillima Lodewyckx, 1995
Range: Only EW Anatolia: Erzincan prov. (Lodewyckx, 1995; Ekiz et al., 2013).

Genus *Labidostomis* Germar, 1822
Subgenus *Labidostomis* Germar, 1822
L. kaszabi (Medvedev, 1962)
Range: Only CS Anatolia: Konya prov. (Medvedev, 1962; Gruev & Tomov, 1979; Ekiz et al., 2013).

L. korbi Weise, 1902
Range: Only CS Anatolia: Konya prov. (Weise, 1902; Warchałowski, 1985; Kasap, 1987; Ekiz et al., 2013).

L. mesopotamica Heyden, 1886
Range: Widely distributed in Anatolia: Aksaray, Ankara, Antalya, Bilecik, Bursa, Denizli, Erzincan, Erzurum, Eskişehir, Hatay, Isparta, İçel, İzmir, Kahramanmaraş, Kastamonu, Kayseri, Kocaeli, Konya, Kırşehir, Malatya, Muğla, Muş, Nevşehir, Niğde, Sivas, Yozgat prov. (Weise, 1897, 1900a; Gruev & Tomov, 1979; Warchałowski,1985b, 2003; Kasap, 1987; Aydın & Kısmalı, 1990; Aslan & Özbek, 1998; Gök, 2003; Özdikmen, 2011; Ekiz et al., 2013).
Remarks: It is not distributed in Syria in real due to type locality "Malatia" is Malatya province in Turkey and Syrian record of Claverau should be attributed Hatay province in S Turkey not Syria. So, it is endemic to Turkey

Genus *Smaragdina* Chevrolat, 1836
S. amasina (Pic, 1897)
Range: Only NC Anatolia: Amasya prov. (Pic, 1897; Warchałowski, 2003; Ekiz et al., 2013).

S. biornata angorensis (Lopatin, 2002)
Range: Only CN Anatolia: Ankara prov. (Lopatin, 2002; Ekiz et al., 2013).

S. laeviceps Abeille de Perrin, 1895
Range: Only SC Anatolia: Hatay prov. (Abeille de Perrin, 1895; Ekiz et al., 2013).

Subfamily CRYPTOCEPHALINAE

Genus *Cryptocephalus* Geoffroy, 1762
Subgenus *Asionus* Lopatin, 1988
C. amasiensis Weise, 1894
Range: NC to SC Anatolia: Amasya and Kahramanmaraş prov. (Weise, 1894; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Özdikmen, 2011; Ekiz et al., 2013).

C. gloriosus Mulsant & Wachanru, 1853
Range: Only CSW Anatolia: Karaman prov. (Mulsant & Wachanru, 1853; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Ekiz et al., 2013).

C. pseudoreitteri Tomov, 1976
Range: Only C Anatolia: Aksaray, Ankara and Kayseri prov. (Tomov, 1976; Sassi & Kısmalı, 2000; Warchałowski, 2003; Gök, Çağlar et al., 2008; Ekiz et al., 2013).

Subgenus *Burlinius* Lopatin, 1965
C. ayvazi Gök & Sassi, 2002
Range: Only SW Anatolia: Isparta prov. (Gök & Sassi, 2002; Ekiz et al., 2013).

C. sultani Pic, 1920
Range: Only C and SCE Anatolia: Adıyaman, Eskişehir and Konya prov. (Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Schöller, 2002; Warchałowski, 2003; Ekiz et al., 2013).

C. tshorumae Tomov, 1984
Range: Only NC Anatolia: Çorum prov. (Tomov, 1984; Sassi & Kısmalı, 2000; Schöller, 2002; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Cryptocephalus* Geoffroy, 1762
C. infraniger Pic, 1915
Range: Only NC Anatolia: Tokat prov. (Pic, 1915; Löbl & Smetana, 2010; Ekiz et al., 2013).

C. messutati Kippenberg, 2011
Range: Only SCW Anatolia: İçel prov. (Kippenberg, 2011; Ekiz et al., 2013).

C. paphlagonius Sassi & Kısmalı, 2000
Range: Widely distributed in Anatolia: Amasya, Ankara, Artvin, Bilecik, Erzincan, Erzurum, Eskişehir, İçel, Kahramanmaraş, Kastamonu, Konya, Karabük, Kars, Kütahya, Nevşehir, Sivas, Van prov. (Sassi & Kısmalı, 2000; Turanlı et al., 2002; Warchałowski, 2003; Özdikmen, 2011; Ekiz et al., 2013).

C. paradisiacus Weise, 1900
Range: Only SE Anatolia: Mardin prov. (Weise, 1900b; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Schöller, 2002; Ekiz et al., 2013).

C. testaceitarsis Pic, 1915
Range: Only NC Anatolia: Tokat prov. (Pic, 1915; Löbl & Smetana, 2010; Ekiz et al., 2013).

Subgenus *Heterichnus* Warchałowski, 1991
C. loebli Sassi, 1997
Range: Only NW and NC Anatolia: Amasya, Bolu, Karabük and Zonguldak prov. (Sassi, 1997; Sassi & Kısmalı, 2000; Warchałowski, 2003; Gök et al., 2010; Özdikmen, 2011; Ekiz et al., 2013).

Subgenus *Lamellosus* Tomov, 1979
C. angorensis Pic, 1908
Range: Only NC and CN Anatolia: Amasya, Ankara and Çorum prov. (Tomov, 1979; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Protophysus* Chevrolat, 1836
C. wehnckei Weise, 1881
Range: Only SW and SC Anatolia: Adana, Antalya, Isparta and İçel prov. (Weise, 1881; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Warchałowski, 2003; Sen & Gök, 2009; Ekiz et al., 2010; Ekiz et al., 2013).

Genus *Pachybrachis* Chevrolat, 1836
Subgenus *Pachybrachis* Chevrolat, 1836
P. adaliensis (Weise, 1886)
Range: Only SW Anatolia: Antalya prov. (Weise, 1886a; Aslan & Özbek, 1997; Sassi & Kısmalı, 2000; Ekiz et al., 2013).

P. anatolicus Lopatin, 1985
Range: Only SE Anatolia: Van prov. (Lopatin, 1985; Sassi & Kısmalı, 2000; Warchałowski, 2003; Ekiz et al., 2013).

P. bodemeyeri (Weise, 1906)
Range: Only NW to NE Anatolia: Bilecik, Bursa and Erzurum prov. (Weise, 1906; Aslan, 1997; Aslan & Özbek, 1997; Warchałowski, 1998a, 2003; Sassi & Kısmalı, 2000; Ekiz et al., 2013).

P. humeralis Burlini, 1956
Range: Only European Turkey (Burlini, 1956; Löbl & Smetana, 2010; Ekiz et al., 2013).

P. pentheri (Ganglbauer, 1905)
Range: Only SW to CSE Anatolia: Isparta and Kayseri prov. (Sassi & Kısmalı, 2000; Warchałowski, 2003; Sen & Gök, 2011; Ekiz et al., 2013).

P. velarum Warchałowski, 1998
Range: Only CN and NW to NE Anatolia: Ankara, Bolu, Erzincan, Erzurum, Gümüşhane, Kars and Sivas prov. (Warchałowski, 1998a, 2003; Özdikmen, 2011; Ekiz et al., 2013).

P. warchalowskii Lopatin & Nesterova, 2010
Range: Only SE Anatolia: Mardin prov. (Lopatin & Nesterova, 2010; Ekiz et al., 2013).

Subfamily EUMOLPINAE

Genus *Colaspinella* Weise, 1893
C. grandis (Frivaldszky, 1880)
Range: Only NW to SW and CS Anatolia: Adana, Antalya, Bursa, İstanbul and Konya prov. (Aslan et al., 1996; Warchałowski, 2003; Gruev, 2005; Medvedev, 2005; Özdikmen, 2011; Ekiz et al., 2013).

Genus *Crysochus* Chevrolat, 1836
C. asclepiadeus asiaeminoris DeMonte, 1848
Range: Only SW Anatolia: Denizli prov. (DeMonte, 1948; Aslan et al., 1996; Ekiz et al., 2013).

Genus *Macrocoma* Chapuis, 1874
M. brunnipes obscuricolor (Pic, 1905)
Range: Only SC Anatolia: Adana prov. (Warchałowski, 2001, 2003; Borowiec, 2005; Özdikmen, 2011; Ekiz et al., 2013).

M. doboszi Borowiec, 2005
Range: Probably widely distributed in Anatolia (European Turkey to SE Anatolia): Kırklareli and Mardin prov. (Borowiec, 2005; Ekiz et al., 2013).

M. fortidens (Berti & Rapilly, 1973)
Range: Only SC and SE Anatolia: Diyarbakır, Hatay and Van prov. (Berti & Rapilly, 1973; Aslan et al., 1996; Moseyko & Sprecher-Uebersax, 2010; Ekiz et al., 2013).

M. korbi (Pic, 1901)
Range: Only CS, CSE and SCW Anatolia: İçel, Konya and Niğde prov. (Pic, 1901; Weise, 1902; Aslan et al., 1996; Warchałowski, 2003; Borowiec, 2005; Özdikmen, 2011; Ekiz et al., 2013).

Subfamily CHRYSOMELINAE

Genus *Chrysolina* Motschulsky, 1860
Subgenus *Chalcoidea* Motschulsky, 1860
C. sellata Weise, 1894
Range: Only NC to SC Anatolia: Adana, Amasya, İçel, Konya, Kayseri, Sivas and Tokat prov. (Weise, 1894; Demaison, 1896; Kasap, 1988; Medvedev & Okhrimenko, 1992; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Colaphodes* Motschulsky, 1860
C. haemoptera byzantia Jolivet, 1951
Range: Only European Turkey: İstanbul and Kırklareli prov. (Tomov & Gruev, 1975; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Gruev, 2004, 2005a; Ekiz et al., 2013).

Subgenus *Colaphoptera* Motschulsky, 1860
C. abchasica Weise, 1892
Range: Anatolia (Kippenberg, 2010b; Ekiz et al., 2013).

C. planicollis (Breit, 1919)
Range: Only NE Anatolia: Bayburt and Trabzon prov. (Medvedev & Okhrimenko, 1992; Lopatin, 2000; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Hypericia* Bedel, 1892
C. cuprina staneki Bechyné, 1949
Range: Only NE Anatolia: Erzurum prov. (Aslan & Özbek, 1999; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Lopatinica* Kippenberg, 2012
C. adzharica heinzi Kippenberg, 2012
Range: Only NE Anatolia: Artvin prov. (Lopatin, 2000; Aslan, Gruev et al., 2003; Kippenberg, 2012; Ekiz et al., 2013).

C. adzharica excavata Kippenberg, 2012
Range: Only NE Anatolia: Artvin prov. (Lopatin, 2000; Aslan, Gruev et al., 2003; Kippenberg, 2012; Ekiz et al., 2013).

C. boluensis Kippenberg, 2012
Range: Only NW Anatolia: Bolu prov. (Kippenberg, 2012; Ekiz et al., 2013).

C. daccordiana Kippenberg, 2012
Range: Only NE Anatolia: Trabzon prov. (Kippenberg, 2012; Ekiz et al., 2013).

C. kataevi Lopatin, 2000
Range: Only NE Anatolia: Artvin, Rize and Trabzon prov. (Lopatin, 2000; Aslan, Gruev, et al., 2003; Kippenberg, 2012; Ekiz et al., 2013).

Subgenus *Ovosoma* Motschulsky, 1860
C. orientalis orientalis (Olivier, 1807)
Range: Widely distributed in Anatolia: Afyonkarahisar, Amasya, Ankara, Bilecik, Bolu, Bursa, Elazığ, Erzurum, Eskişehir, İstanbul, Kastamonu, Kayseri, Konya, Karabük, Kırşehir, Kütahya, Nevşehir, Niğde, Ordu, Samsun, Sinop, Sivas, Tokat, Van, Yozgat and Zonguldak prov. (Sahlberg, 1913; Medvedev, 1970; Dahlgren, 1984; Kasap, 1988; Campobasso et al., 1999; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Gruev, 2005; Atay & Çam, 2006; Özdikmen & Aslan, 2009; Özdikmen, 2011; Ekiz et al., 2013).

C. wittmeri Medvedev, 1975
Range: Only NE Anatolia: Gümüşhane and Trabzon prov. (Medvedev, 1975; Gruev, 1976; Bienkowski, 2001; Aslan, Gruev et al., 2003; Warchałowski, 2003; Ekiz et al., 2013).

Subgenus *Synerga* Weise, 1900
C. herbacea alacris Bechyné, 1950
Range: Only SW and SC Anatolia: Antalya, Isparta, İçel, Kahramanmaraş, Karaman and Osmaniye prov. (Medvedev, 1970; Tomov & Gruev, 1975; Gruev & Tomov, 1979; Kasap, 1988; Aslan & Özbek, 1999; Bienkowski, 2001; Aslan, Gruev et al., 2003; Gök & Çilbiroğlu, 2003; Warchałowski, 2003; Gök & Gürbüz, 2004; Gruev, 2004, 2005a; Atay & Çam, 2006; Aslan et al., 2009; Kippenberg, 2010b; Özdikmen, 2011; Ekiz et al., 2013).

Genus *Colaphellus* Weise, 1916
C. sophiae amasiae Machatschke, 1954
Range: Only NC Anatolia: Amasya prov. (Kippenberg, 2010b; Ekiz et al., 2013).

Genus *Cyrtonastes* Fairmaire, 1874
Subgenus *Cyrtonastes* Fairmaire, 1874
C. grandis Lopatin, 1994
Range: Only SCW Anatolia: İçel prov. (Lopatin & Konstantinov, 1994; Aslan, Gruev et al., 2003; Ekiz et al., 2013).

Subfamily GALERUCINAE

Genus *Calomicrus* Dillwyn, 1829
C. angorensis (Pic, 1912)
Range: Only NC to NE and E Anatolia: Ankara, Çorum, Erzurum and Muş prov. (Pic, 1912; Tomov & Gruev, 1975; Tomov, 1984; Aslan, 1998; Aslan et al., 2000; Warchałowski, 2003; Ekiz et al., 2013).

C. malkini Warchałowski, 1991
Range: Only SW Anatolia: Isparta prov. (Warchałowski, 2003; Sen et al., 2008; Sen & Gök, 2009; Ekiz et al., 2013).

C. turcicus Medvedev, 1975
Range: Only NE Anatolia: Ağrı, Erzurum and Kars prov. (Medvedev, 1975; Aslan et al., 2000; Warchałowski, 2003; Ekiz et al., 2013).

Genus *Galeruca* Geoffroy, 1762
Subgenus *Galeruca* Geoffroy, 1762
G. impressicollis Pic, 1934
Range: Anatolia (Pic, 1934; Beenen, 2010; Ekiz et al., 2013).

Genus *Luperus* Geoffroy, 1762
L. rectangulus Weise, 1898
Range: Only NC to NE Anatolia and SC to SCE Anatolia: Adıyaman, Amasya, Ankara, Erzincan, Erzurum, Gümüşhane, Hatay and Kayseri prov. (Weise, 1898; Medvedev, 1970; Gruev & Tomov, 1979; Aslan, 1997; Aslan et al., 2000; Ekiz et al., 2013).

Genus *Nymphius* Weise, 1900
N. forcipifer (Weise, 1900)
Range: Only C and SW Anatolia: Afyonkarahisar, Ankara, Eskişehir, Isparta and Konya prov. (Weise, 1900a; Warchałowski, 2003; Gök & Duran, 2004; Gök & Çilbiroğlu, 2005; Bezdek, 2008; Sen & Gök, 2009; Ekiz et al., 2013).

N. stylifer kadleci (Bezdek, 2008)
Range: Only E Anatolia: Muş prov. (Bezdek, 2008; Ekiz et al., 2013).

Genus *Xanthogaleruca* Laboissiere, 1934
X. subcoerulescens (Weise, 1884)
Range: Only CS, SW and SC Anatolia: Adana, Amasya, Antalya, İçel and Konya prov. (Weise, 1884; Silfverberg, 1974; Aslan et al., 2000, 2009; Beenen, 2003; Warchałowski, 2003; Gök et al., 2007; Özdikmen, 2011; Ekiz et al., 2013).

Subfamily ALTICINAE

Genus *Aeschrocnemis* Weise, 1888
Subgenus *Aeschrocnemis* Weise, 1888
A. byzantica Nadein, 2011
Range: Only NW Anatolia: İstanbul prov. (Nadein, 2011; Ekiz et al., 2013).

A. osmanica Nadein, 2011
Range: Only NE Anatolia: Trabzon prov. (Nadein, 2011; Ekiz et al., 2013).

Subgenus *Hirticnemis* Nadein, 2011
A. anatolica (Heikertinger, 1922)
Range: Only C, SW and SC Anatolia: Adana, Ankara, Antalya, Isparta, Konya and Muğla prov. (Heikertinger, 1922; Gruev, 1995, 2002; Çilbiroğlu, 2003; Gruev & Döberl, 2005; Aslan & Gök, 2006; Aslan, 2007; Aslan & Ayvaz, 2009; Aslan et al., 2009; Nadein & Gök, 2009; Nadein, 2011; Özdikmen, 2011; Ekiz et al., 2013).

A. caria Nadein, 2011
Range: Only SW Anatolia: Muğla prov. (Nadein, 2011; Ekiz et al., 2013).

A. curda Nadein, 2011
Range: Only SCE Anatolia: Adıyaman prov. (Nadein, 2011; Ekiz et al., 2013).

A. iconiensis Nadein, 2011
Range: Only CS Anatolia: Konya prov. (Nadein, 2011; Ekiz et al., 2013).

Subgenus *Nudicnemis* Nadein, 2011
A. antiocha Nadein, 2011
Range: Only SC Anatolia: Hatay prov. (Nadein, 2011; Ekiz et al., 2013).

A. turcica Nadein & Gök, 2009
Range: Only SW Anatolia: Denizli prov. (Nadein & Gök, 2009; Nadein, 2011; Ekiz et al., 2013).

A. whiteheadi (Warchałowski, 1998)
Range: Only CS and SW Anatolia: Antalya, Konya and Muğla prov. (Gruev, 2002; Warchałowski, 2003; Gruev & Döberl, 2005; Aslan, 2007, 2010; Aslan et al., 2009; Nadein & Gök, 2009; Nadein, 2011; Ekiz et al., 2013).

Genus *Altica* Müller, 1764
A. bulgharensis Král, 1969
Range: Only SCW Anatolia: İçel prov. (Král, 1969; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

A. pontica (Ogloblin, 1925)
Range: Only NE Anatolia: Trabzon prov. (Král, 1979; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Ekiz et al., 2013).

Genus *Aphthona* Chevrolat, 1836
A. alanyensis Fritzlar, 2004
Range: Only SW and SCW Anatolia: Antalya and İçel prov. (Fritzlar, 2004; Gruev & Döberl, 2005; Döberl, 2010; Ekiz et al., 2013).

A. bergeali Fritzlar, 2001
Range: Only NW to SW and CS Anatolia: Antalya, İstanbul and Konya prov. (Fritzlar, 2001; Gruev, 2002; Gruev & Döberl, 2005; Döberl, 2010; Ekiz et al., 2013).

A. bergealoides Fritzlar, 2004
Range: Only SW Anatolia: Antalya prov. (Fritzlar, 2004; Gruev & Döberl, 2005; Döberl, 2010; Ekiz et al., 2013).

A. crassicornis Lopatin, 1990
Range: Only E Anatolia: Van prov. (Lopatin, 1990; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Döberl, 2010; Ekiz et al., 2013).

A. warchalowskii Fritzlar, 2001
Range: Only SW Anatolia: Antalya and Isparta prov. (Fritzlar, 2001; Gruev, 2002; Gruev & Döberl, 2005; Aslan, 2007, 2010; Aslan et al., 2009; Ekiz et al., 2013).

Genus *Longitarsus* Latreille, 1829
Subgenus *Longitarsus* Latreille, 1829
L. angelikae Fritzlar, 2001
Range: Only SW Anatolia: Antalya, Isparta prov. (Fritzlar, 2001; Gruev & Döberl, 2005; Aslan & Gök, 2006; Aslan et al., 2009; Aslan, 2007, 2010; Aslan & Ayvaz, 2009; Ekiz et al., 2013).

L. artvinus Gruev & Aslan, 1998
Range: Only NE Anatolia: Artvin prov. (Gruev & Aslan, 1998; Aslan et al., 1999; Gruev & Döberl, 2005; Ekiz et al., 2013).

L. audisioi Biondi, 1992
Range: Only NE Anatolia: Trabzon prov. (Biondi, 1992; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

L. kopdagiensis Gruev & Aslan, 1998
Range: Only NE Anatolia: Bayburt and Erzurum prov. (Gruev & Aslan, 1998; Aslan et al., 1999; Gruev, 2002; Gruev & Döberl, 2005; Ekiz et al., 2013).

L. latens Warchałowski, 1998
Range: Only NE Anatolia: Trabzon prov. (Warchałowski, 1998b, 2003; Gruev, 2002; Gruev & Döberl, 2005; Ekiz et al., 2013).

L. manfredi Fritzlar, 2004
Range: Only SW Anatolia: Antalya prov. (Fritzlar, 2004; Gruev & Döberl, 2005; Döberl, 2010; Ekiz et al., 2013).

L. ozbeki Aslan & Warchałowski, 2005
Range: Only NE Anatolia: Erzurum prov. (Aslan & Warchałowski, 2005; Ekiz et al., 2013).

Subgenus *Testergus* Weise, 1893
L. aubozaorum Biondi, 1997
Range: Only CNW to CN Anatolia: Ankara and Eskişehir prov. (Biondi, 1997; Gruev, 2002; Warchałowski, 2003; Gruev & Döberl, 2005; Ekiz et al., 2013).

L. hittita Biondi, 1995
Range: Only C to NE Anatolia: Ağrı, Ankara, Erzincan, Kayseri, Konya and Yozgat prov. (Biondi, 1995; Gruev & Döberl, 1997, 2005; Aslan et al., 1999; Gruev, 2002; Ekiz et al., 2013).

L. iconiensis Weise, 1900
Range: Only NC, NCW and NS Anatolia: Ankara, Eskişehir and Konya prov. (Weise, 1900a; Gruev & Kasap, 1985; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

Genus *Mniophila* Stephens, 1831
M. turcica Medvedev, 1970
Range: Only NE Anatolia: Artvin and Rize prov. (Medvedev, 1970; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Nadein, 2009; Ekiz et al., 2013).

Genus *Orestia* Chevrolat, 1836
O. loebli Biondi, 1992
Range: Only NW Anatolia: Zonguldak prov. (Biondi, 1992; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

O. olympica Frivaldszky, 1884
Range: Only NW and NCW Anatolia: Bursa and Eskişehir prov. (Frivaldszky, 1884; Weise, 1886b; Biondi, 1992; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

O. oselliana Leonardi, 1977
Range: Only NW Anatolia: Bolu and Kastamonu prov. (Leonardi, 1977; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

Genus *Phyllotreta* Chevrolat, 1836
P. bolognai Biondi, 1992
Range: Only SW to NE Anatolia: Antalya, Erzurum and Isparta prov. (Biondi, 1992; Gruev & Döberl, 1997; Aslan et al., 1999; Doguet & Bergeal, 2000; Gruev, 2002; Çilbiroğlu, 2003; Ekiz et al., 2013).

P. oltuensis Gruev & Aslan, 1998
Range: Only NE Anatolia: Erzurum prov. (Gruev & Aslan, 1998; Aslan et al., 1999; Gruev, 2002; Gruev & Döberl, 2005; Ekiz et al., 2013).

P. ozbeki Gruev & Aslan, 1998
Range: Only NE Anatolia: Bayburt prov. (Gruev & Aslan, 1998; Aslan et al., 1999; Gruev, 2002; Gruev & Döberl, 2005; Ekiz et al., 2013).

P. toelgi Heikertinger, 1941
Range: Only NCW to NCE Anatolia: Eskişehir and Ordu prov. (Heikertinger, 1941; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Özdikmen, 2011; Ekiz et al., 2013).

Genus *Psylliodes* Latreille, 1825
Subgenus *Psylliodes* Latreille, 1825
P. anatolica Gök & Çilbiroğlu, 2004
Range: Only SW Anatolia: Antalya and Isparta prov. (Gök & Çilbiroğlu, 2004; Gruev & Döberl, 2005; Aslan, 2007, 2010; Aslan & Ayvaz, 2009; Aslan et al., 2009; Sen & Gök, 2009; Ekiz et al., 2013).

P. cerenae Gök, Doguet & Çilbiroğlu, 2003
Range: Only SW Anatolia: Antalya and Isparta prov. (Gök, Doguet et al., 2003; Gruev & Döberl, 2005; Aslan & Gök, 2006; Aslan et al., 2009; Ekiz et al., 2013).

P. diversicolor Nadein, 2006
Range: Only SW and CS Anatolia: Antalya, Isparta and Karaman prov. (Nadein, 2006; Gök & Aslan, 2007; Ekiz et al., 2013).

P. dogueti Warchałowski, 1993
Range: Only NE Anatolia: Gümüşhane prov. (Warchałowski, 1993, 2003; Gruev, 2002; Gruev & Döberl, 2005; Döberl, 2010; Ekiz et al., 2013).

P. ridenda Nadein, 2008
Range: Only SW to SE Anatolia: Adıyaman, Antalya, Hatay and Mardin prov. (Nadein, 2008; Döberl, 2010; Ekiz et al., 2013).

P. taurica Leonardi, 1971
Range: Only CS and SC Anatolia: Adana and Konya prov. (Leonardi, 1971; Gruev & Döberl, 1997; Aslan et al., 1999; Gruev, 2002; Warchałowski, 2003; Ekiz et al., 2013).

P. yalvacensis Gök, 2005
Range: Only SW Anatolia: Isparta prov. (Gök, 2005; Sen & Gök, 2009; Ekiz et al., 2013).

Subfamily CASSIDINAE

Genus *Cassida* Linnaeus, 1758
C. strejceki Sekerka, 2006
Range: Only E Anatolia: Muş prov. (Sekerka, 2006; Ekiz et al., 2013).

Genus *Macromonycha* Spaeth, 1911
M. anatolica (Weise, 1900)
Range: Only SC, SCW and CSE Anatolia: Adana, İçel and Niğde prov. (Weise, 1900a; Kısmalı & Sassi, 1994; Borowiec, 2001; Warchałowski, 2003; Sekerka, 2008; Ekiz et al., 2013).

Numeric statement of the endemic species group taxa of Turkish Chrysomeloidea fauna on the base of the cited references is presented as follows:

FAMİLY	SUBFAMİLY	GENUS	SPECIES	SUBSPECIES
MEGALOPODIDAE				
	MEGALOPODINAE	1	1	-
	ZEUGOPHORINAE	-	-	-
ORSODACNIDAE				
	ORSODACNINAE	-	-	-
BRUCHIDAE				
	BRUCHINAE	1	1	-
	AMBLYCERINAE	-	-	-
	PACHYMERINAE	-	-	-
	RHAEBINAE	-	-	-
CHRYSOMELIDAE				
	DONACIINAE	-	-	-
	CRIOCERINAE	-	-	-
	CLYTRINAE	4	7	1
	CRYPTOCEPHALINAE	2	21	-
	EUMOLPINAE	3	4	2
	CHRYSOMELINAE	3	8	7
	TIMARCHINAE	-	-	-
	GALERUCINAE	5	7	1
	ALTICINAE	8	41	-
	HISPINAE	-	-	-
	CASSIDINAE	2	2	-
Total 4	**18**	**29**	**92**	**11**

DISCUSSION

Ekiz et al. (2013) mentioned that "*This is the first attempt to present a synthesized and updated checklist of leaf beetles of Turkey. In all, 776 species (Megalopodidae three species; Orsodacnidae three species and Chrysomelidae 770 species) are listed. The species number of subfamilies of Chrysomelidae are as follows: Donaciinae, 17 species in 3 genera; Criocerinae, 13 species in 4 genera; Clytrinae, 72 species in 8 genera; Cryptocephalinae, 102 species in 4 genera; Eumolphinae, 22 species in 10 genera; Chrysomelinae, 89 species in 16 genera; Galerucinae, 67 species in 15 genera; Alticinae 336 species in 22 genera; Hispinae, 2 species in 2 genera; Cassidinae, 50 species in 6 genera. The leaf beetle fauna of Turkey presents a remarkable endemism with 81 species, which constitute about 10% of the total number. This is surely a result of hotspots included in the area*".

In fact that, these results are approximately as the same as the results of Özdikmen (2012) who gave 880 species under 108 genera with Bruchidae for Turkish Chrysomeloidea fauna. Namely, he stated 764 species without Bruchidae. Unfortunately, the work of Özdikmen (2012) is missing in the work of Ekiz et al. (2013) that also do not include a few known Turkish taxa.

For the present, as a result of the work, summarized numerical data for Turkish Chrysomeloidea in real status on the base of the cited references are as follows:

Updated Turkish Chrysomeloidea fauna including Bruchidae are repsented 925 species group taxa [897 species + 28 subspecies (excluding the nominotypical subspecies)].

Total species group taxa for Turkish Chrysomeloidea including Bruchidae are 925 [791 species + 134 subspecies (93 nominotypical subspecies and 41 others) or in an other words, 884 species + 41 subspecies (excluding the nominotypical subspecies)]. Moreover, 41 subspecies (excluding the nominotypical subspecies) are belonging to 34 species. 13 species of them are represented only by the other subspecies in the fauna. And the others (21 species) are represented with both the other subspecies and the nominotypical subspecies in the fauna. In this case, total species group taxa for Turkish Chrysomeloidea including Bruchidae are 925 [897 species + 28 subspecies (excluding the nominotypical subspecies)].

Updated Turkish Chrysomeloidea fauna excluding Bruchidae are repsented 810 species group taxa [782 species + 28 subspecies (excluding the nominotypical subspecies)].

Total species group taxa for Turkish Chrysomeloidea excluding Bruchidae are 810 [676 species + 134 subspecies (93 nominotypical subspecies and 41 others) or in an other words, 769 species + 41 subspecies (excluding the nominotypical subspecies)]. Moreover, as mentioned above, 41 subspecies (excluding the nominotypical subspecies) are belonging to 34 species. 13 species of them are represented only by the other subspecies in the fauna. And the others (21 species) are represented with both the other subspecies and the nominotypical subspecies in the fauna. In this case, total species group taxa for Turkish Chrysomeloidea excluding Bruchidae are 810 [782 species + 28 subspecies (excluding the nominotypical subspecies)].

For Turkish Chrysomeloidea fauna including Bruchidae, total endemic species group taxa are 103 (92 species + 11 subspecies). Hence, endemism ratio is 11.14% (103 / 925).

For Turkish Chrysomeloidea fauna excluding Bruchidae, total endemic species group taxa are 102 (91 species + 11 subspecies). Hence, endemism ratio is 11.03% (102 / 925).

Consequently, our study is based on the cited references. It shows that Turkey has species richness in terms of the fauna of Chrysomeloidea that includes a total of 925 species group taxa [including Bruchidae: 897 species and 28 subspecies (excluding the nominotypical subspecies) or excluding Bruchidae: 782 species + 28 subspecies (excluding the nominotypical subspecies)].

But the rich fauna of Turkish Chrysomeloidea includes a total of 103 endemic species group taxa [92 species and 11 subspecies (including nominotypical subspecies and others)]. So the fauna has a remarkable but also low endemism ratio (103 / 925 = 11.14%) with respect to the closely related superfamily Cerambycoidea (over 40%).

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AQUATIC COLEOPTERA FAUNA (ADEPHAGA: DYTISCIDAE, HALIPLIDAE, NOTERIDAE) IN SIVAS, TURKEY

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ABSTRACT: It has been evaluated Dytiscidae, Haliplidae and Noteridae (Coleoptera: Adephaga) species that were collected in Sivas, Turkey in 2009-2010. In the research area, there have been determined; 25 species belonging to the family Dytiscidae, six species belonging to the family Haliplidae and one species belonging to the family Noteridae. In this species; *Haliplus ruficollis* (De Geer, 1774) and *Haliplus obliquus* (Fabricius, 1787) have been recorded for the first time from Central Anatolian Region. In Sivas province, 27 species have been recorded for the first time.

KEY WORDS: Dytiscidae, Noteridae, Haliplidae, Fauna, Sivas, Turkey.

Dytiscidae is the largest family into the suborder Adephaga. It includes about 4000 species in 175 genera in the world. 885 species known in Palearctic region. 137 species and nine subspecies known from Turkey (Balke et al. 2004; Jäch and Balke 2008; Darılmaz and Kıyak 2009; Taşar et al. 2012).

The family Noteridae has 250 species in the world. About 30 species known in Palearctic region. 3 species known from Turkey (Darılmaz and Kıyak 2009).

The family Haliplidae has 220 species in 5 Genera in the world. About 70 species known in Palearctic region. 16 species known from Turkey (Nardi 2001; Darılmaz and Kıyak 2009).

The purpose of this study is to make a contribution to Turkish aquatic Coleoptera fauna.

MATERIAL AND METHODS

The specimens were collected from freshwater habitats of Sivas province with sieves that having 3,15x1 mm mesh size, between June-September in 2009, 2010. The beetles were killed with ethyl acetate and were stored in small bottles until identification. Specimens were cleaned with brush before identification. Aedeagus of collected specimens were dissected under a stereo microscope in the laboratory. The identified species have been converted into museum material.

RESULTS

In the freshwater habitat of Sivas province, 32 aquatic beetle species belonging to Dytiscidae, Noteridae and Haliplidae were recorded. Two species belonging to Haliplidae are recorded from Central Anatolian Region for the first time. And 27 species are recorded from the Sivas province for the first time.

The aquatic beetle fauna of Turkey has not fully been presented; therefore, many studies are needed.

Dytiscidae

Agabus biguttatus (Olivier, 1795)

Material examined: Sivas, Ulaş, 39.26.46K 37.01.52 D, 27.07.2010, 1374 m, 1♂; Beypınar, 39.32.02K 37.44.19 D, 23.05.2010, 1384 m, 3♂♂.

Distribution in Turkey: Adana, Afyon, Aksaray, Ankara, Artvin, Bayburt, Bilecik, Bursa, Çankırı, Çorum, Erzincan, Erzurum, Gümüşhane, Isparta, İçel, İzmir, Kayseri, Kastamonu, Rize, Sakarya, Trabzon, Yozgat, Toros Dağları, Karaboğa Dağı (Elazığ or Bingöl) (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010).

Remark: Newly recorded from Sivas.

Agabus bipustulatus (Linnaeus, 1767)

Material examined: Sivas, Ulaş, 39.26.46K 37.01.52 D, 27.07.2010, 1374 m, 1♂; Kaplıcalar Civarı, 39.16.47K 37.27.20 D, 28.07.2010, 1496 m, 2♂♂; Müsel, 39.05.47K 37.29.20 D, 23.05.2010, 1474 m, 4♂♂; Akıncılar Su Şehri, 40.06.43K 36.20.11 D, 14.09.2010, 869 m, 1♂. Ulaş-Aşağı ocak, 39.29.00K 37.00.39 D, 15.09.2010, 1316 m, 3♂♂ 2♀♀; Koyuncu, 39.31.35K 36.53.04 D, 31.07.2010, 1391 m, 1♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 5♂♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 5♂♂; Gürün-Gökpınar Göleti, 38.39.23K 37.18.04 D, 06.01.2009, 1484 m, 1♂; Söğütçü köyü, 39.27.32K 36.46.10 D, 28.05.2009, 1386 m, 2♂♂; Karagömlek, 39.33.59K 36.57.37 D, 23.05.2010, 1412 m, 1♂; Beşprer, 39.49.22K 37.17.31 D, 22.05.2010, 1286 m, 1♂; Çukurbelen, 39.49.27K 37.10.19D, 27.07.2010, 1285 m, 1♂.

Distribution in Turkey: Afyon, Ankara, Antalya, Balıkesir, Çorum, Erzincan, Isparta, İzmir, Kayseri, Manisa, Yozgat (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).

Remark: Newly recorded from Sivas.

Agabus conspersus (Marsham, 1802)

Material examined: Sivas, İmranlı, Piredede, 39.51.48K 38.12.39 D, 23.07.2009, 1653 m, 1♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 1♂; Keçili, 39.31.05K 36.51.52 D, 01.06.2009, 1373 m, 1♂; Tödürge Gölü, 39.52.16K 37.36.25 D, 21.05.2010, 1306 m, 1♂; Sarıdemir, 39.30.37K 36.50.24D, 28.05.2010, 1370 m, 1♂.

Distribution in Turkey: Afyon, Ankara, Antalya, Burdur, Bursa, Çorum, Denizli, Erzincan, Erzurum, Isparta, İzmir, Kayseri, Konya, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).

Remark: Newly recorded from Sivas.

Agabus labiatus (Brahm, 1790)

Material examined: Sivas, Kumarlu, 39.13.44K 37.11.03 D, 23.05.2010, 1527 m, 1♂; Akkaya, 39.32.33K 37.01.24 D, 23.05.2010, 1354 m, 1♂; Beypınar, 39.32.02K 37.44.19 D, 23.05.2010, 1384 m, 2♂♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 2♂♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 2♂♂; Yağdonduran, 39.21..08K 37.08.23 D, 23.05.2010, 1556 m, 6♂♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 1♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 1♂; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 1♂; İmranlı, 39.50.54K 38.34.40 D, 28.05.2009, 1619 m, 6♂♂; Hafik, Çukurkelen, 39.49.26K 37.10.20 D, 28.05.2009, 1280 m, 1♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 1♂; İmranlı, 39.52.28K 38.05.03 D, 21.05.2010, 1594 m, 1♂; Ahmet Hacı, 39.54.29K 37.48.12 D, 23.05.2010, 1350 m, 1♂; İsafil gölü, 39.52.17K 37.23.12D, 22.05.2010, 1200 m, 2♂♂.

Distribution in Turkey: Çorum, İzmir, Kayseri (Darılmaz and Kıyak 2009; Darılmaz et al. 2010; İncekara et al. 2010).

Remark: Newly recorded from Sivas.

Agabus nebulosus (Forster, 1771)
Material examined: Sivas, Hafik Gölü, 39.50.59K 37.22.11 D, 28.05.2009, 1302 m, 1♂; Akkaya, 39.32.33K 37.01.24 D, 23.05.2010, 1354 m, 1♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 2♂♂; Söğütçü, 39.27.32K 36.46.10 D, 28.05.2009, 1386 m, 2♂♂; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 1♂; Tödürge Gölü, 39.52.16K 37.36.25 D, 21.05.2010, 1306 m, 2♂♂.
Distribution in Turkey: Afyon, Ankara, Antalya, Aydın, Burdur, Bursa, Çorum, Denizli, Erzincan, İstanbul, İzmir, Kayseri, Muğla, Samsun, Sinop, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Colymbetes fuscus (Linnaeus, 1758)
Material examined: Sivas, İmranlı, Piredede, 39.51.48K 38.12.39 D, 23.07.2009, 1653 m, 6♂♂ 2♀♀; Kaplıcalar Civarı, 39.16.47K 37.27.20 D, 28.07.2010, 1496 m, 4♂♂; Hafik Gölü, 39.52.08K 37.23.05 D, 23.07.2009, 1296 m, 1♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 1♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 1♂; Koyuncu, 39.31.35K 36.53.04 D, 31.07.2010, 1391 m, 7♂♂; Yağdonduran, 39.21.08K 37.08.23 D, 23.05.2010, 1556 m, 2♂♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 2♂♂; Aşağıyıldız, 39.45.32K 36.46.19 D, 31.07.2010, 1270 m, 1♂; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 1♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 1♂; Ahmet Hacı, 39.54.29K 37.48.12 D, 23.05.2010, 1350 m, 1♂.
Distribution in Turkey: Afyon, Aksaray, Burdur, Çorum, Erzincan, Erzurum, İzmir, Kayseri, Konya, Samsun (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010).
Remark: Newly recorded from Sivas.

Hygrotus impressopunctatus (Schaller, 1783)
Material examined: Sivas, Hafik Gölü, 39.52.08K 37.23.05 D, 23.07.2009, 1296 m, 1♂; Demiryurt, Tödürge Gölü, 39.52.24K 37.36.34 D, 23.07.2009, 1301 m, 3♂♂.
Distribution in Turkey: Afyon, Ankara, Çorum, Erzincan, Erzurum, Konya, Kütahya, Samsun, Tuz Gölü, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).
Remark: Newly recorded from Sivas.

Hygrotus lernaeus (Schaum, 1857)
Material examined: Sivas, Ekinli:39.52.21K 37.40.34 D, 27.07.2010, 1320 m, 1♂; Kayapınar, 39.19.13K 36.20.29 D, 31.07.2010, 1221 m, 1♂; Hafik Gölü, 39.52.08K 37.23.05 D, 23.07.2009, 1296 m, 1♂; Göydün, 39.48.35K 37.12.34 D, 22.05.2010, 1269 m, 6♂♂; Akkaya, 39.32.33K 37.01.24 D, 23.05.2010, 1354 m, 1♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 5♂♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 2♂♂; Yağdonduran, 39.21..08K 37.08.23 D, 23.05.2010, 1556 m, 2♂♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 1♂; Söğütçü, 39.27.32K 36.46.10 D, 28.05.2009, 1386 m, 2♂♂; Hafik'e yakın göl, 39.51.24K 37.26.41 D, 23.07.2009, 1292 m, 13♂♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 1♂; Yarhisar Gölü, 39.51.27K 37.27.10 D, 24.07.2009, 1286 m, 4♂♂; Hanlı, 39.27.28K 36.39.08 D, 27.06.2010, 1304 m, 1♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 3♂♂; Karagömlek, 39.33.59K 36.57.37 D, 23.05.2010, 1412 m, 1♂; Alcıören, Hoşik, 39.47.43K 37.27.31D, 24.07.2009, 1373 m, 6♂♂; Çukurbelen, 39.49.27K 37.10.19D, 27.07.2010, 1285 m, 3♂♂.
Distribution in Turkey: Adana, Ankara, Antalya, Aydın, Diyarbakır, Elazığ, Erzurum, Eskişehir, Muğla, Kayseri, Kocaeli, Konya, Niğde, Samsun, Sivas, Van, Yozgat (Darılmaz and Kıyak 2009).

Hygrotus saginatus (Schaum, 1857)
Material examined: Sivas, Hafik Gölü, 39.50.59K 37.22.11 D, 28.05.2009, 1302 m, 4 ♂♂ 2♀♀; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 2♂♂; İmranlı, 39.52.28K 38.05.03 D, 21.05.2010, 1594 m, 2♂♂; Çukurbelen, 39.49.27K 37.10.19D, 27.07.2010, 1285 m, 1♂.
Distribution in Turkey: Antalya, Hatay, İçel, Kayseri, Ordu, Toros Dağları (Darılmaz and Kıyak 2009; İncekara et al. 2010).

Remark: Newly recorded from Sivas.

Hygrotus inaequalis (Fabricius, 1777)
Material examined: Sivas, Ekinli, 39.52.21.K 37.40.34 D, 27.07.2010, 1320 m, 1♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 1♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 7♂♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 3♂♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 2♂♂.
Distribution in Turkey: Afyon, Ankara, Artvin, Bolu, Çorum, Erzincan, Erzurum, Isparta, Kayseri, Konya, Manisa, Samsun (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Hydrovatus cuspidatus (Kunze, 1818)
Material examined: Sivas, Hanlı, 39.27.28K 36.39.08 D, 27.06.2010, 1304 m, 1♂; Demiryurt, Tödürge Gölü, 39.52.24K 37.36.34 D, 23.07.2009, 1301 m, 1♂.
Distribution in Turkey: Afyon, Ankara, Antalya, Kayseri, Samsun, Toros Dağları (Darılmaz and Kıyak 2009; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Hydroglyphus geminus (Fabricius, 1792)
Material examined: Sivas, Ulaş, 39.26.46K 37.01.52 D, 27.07.2010, 1374 m, 1♂; Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D. 31.07.2010, 1358 m, 6♂♂; Sarkışla, Kayapınar, 39.19.13K 36.20.29 D, 31.07.2010, 1221 m, 7♂♂; Akıncılar Su Şehri, 40.06.43K 36.20.11 D, 14.09.2010, 869 m, 30♂♂; 10♀♀; Ulaş, Aşağı ocak, 39.29.00K 37.00.39 D, 15.09.2010, 1316 m, 7♂♂; Gürün, Gökpınar Göleti, 38.39.23K 37.18.04 D, 06.01.2009, 1484 m, 2♂♂; İmranlı, 39.50.54K 38.34.40 D, 28.05.2009, 1619 m, 5♂♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 3♂♂; Hafik, Çukurkelen, 39.49.26K 37.10.20 D, 28.05.2009, 1280 m, 1♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 2♂♂; İmranlı, Kemreli, 39.51.07K 38.14.19D, 27.07.2010, 1633 m, 1♂; Gürün, İncesu, 38.46.07K 37.07.27D, 28.07.2010, 1600 m, 3♂♂; Çukurbelen, 39.49.27K 37.10.19D, 27.07.2010, 1285 m, 2♂♂; İkizel, Kıllık, 39.48.06K 36.10.12D, 14.09.2010, 1214 m, 10♂♂ 5♀♀; Yenice, 39.41.09K 37.00.34D, 27.07.2010, 1256 m, 2♂♂; Ulaş, 39.27.35K 37.01.03D, 27.07.2010, 1374 m, 3♂♂; Gemerek, Karaağıl, 39.07.29K 36.05.16D, 24.07.2009, 1226 m, 1♂.
Distribution in Turkey: Adana, Afyon, Aksaray, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bolu, Bursa, Çorum, Edirne, Erzincan, Erzurum, Eskişehir, Gümüşhane, Isparta, İçel, İzmir, Kastamonu, Kayseri, Konya, Kilis, Manisa, Muğla, Rize, Samsun, Trabzon, Yozgat (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).
Remark: Newly recorded from Sivas.

Bidessus nasutus Sharp, 1887
Material examined: Sivas, Demiryurt, Tödürge Gölü, 39.52.24K 37.36.34 D, 23.07.2009, 1301 m, 1♂; Alcıören, Hoşik, 39.47.43K 37.27.31D, 24.07.2009, 1373 m, 1♂; Tödürge Gölü, 39.52.15K 37.36.24D, 27.07.2010, 1304 m, 2♂♂.
Distribution in Turkey: Afyon, Kayseri, Konya, Samsun (Darılmaz and Kıyak 2009).
Remark: Newly recorded from Sivas.

Ilybius fuliginosus (Fabricius, 1792)
Material examined: Sivas, Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D. 31.07.2010, 1358 m, 2♂♂; Kangal, Armağan, 39.15.47K 37.25.46 D, 28.07.2010, 1477 m, 1♂; Mancılık, 39.05.27K 37.14.05 D, 28.07.2010, 1505 m, 1♂; Müsel, 39.05.47K 37.29.20 D, 23.05.2010, 1474 m, 4♂♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 1♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 2♂♂; Gürün, Gökpınar Göleti, 38.39.23K 37.18.04 D, 06.01.2009, 1484 m, 3♂♂; Aşağıyıldız, 39.45.32K 36.46.19 D, 31.07.2010, 1270 m, 2♂♂; Gürün, İncesu, 38.46.07K 37.07.27D, 28.07.2010, 1600 m, 1♂.
Distribution in Turkey: Ankara, Artvin, Çorum, Erzincan, Erzurum, Isparta, İçel, Kars, Kayseri, Konya, Rize, Trabzon, Yozgat, Karaboğa Dağı (Elazığ or Bingöl) (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Rhantus suturalis (W.S. MacLeay, 1825)
Material examined: Sivas, Akıncılar, Su Şehri, 40.06.43K 36.20.11 D, 14.09.2010, 869 m, 4♂♂; Ulaş, Aşağıocak, 39.29.00K 37.00.39 D, 15.09.2010, 1316 m, 1♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 1♂.
Distribution in Turkey: Aksaray, Ankara, Çorum, Erzurum, Kayseri, Konya, Manisa, Rize, Trabzon (Darılmaz and Kıyak 2009; Darılmaz et al. 2010; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Graphoderus cinereus (Linnaeus, 1758)
Material examined: Sivas, Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 6♂♂; Söğütçü, 39.27.32K 36.46.10 D, 28.05.2009, 1386 m, 1♂.
Distribution in Turkey: Ankara, Afyon, Ağrı, Erzurum, Samsun (Darılmaz and Kıyak 2009; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Graptodytes bilineatus (Sturm, 1835)
Material examined: Sivas, İsafil Gölü, 39.52.17K 37.23.12D, 22.05.2010, 1200 m, 1♂.
Distribution in Turkey: Erzurum, Rize (Darılmaz and Kıyak 2009).
Remark: Newly recorded from Sivas.

Graptodytes flavipes (Olivier, 1795)
Material examined: Sivas, Kangal, Armağan, 39.15.47K 37.25.46 D, 28.07.2010, 1477 m, 1♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 1♂; Gürün, Sularbaşı, 38.45.26K 37.17.24 D, 28.07.2010, 1618 m, 2♂♂; Gürün, 39.13.42K 37.23.06 D, 28.07.2010, 1545 m, 1♂; İmranlı, Kemreli, 39.51.07K 38.14.19D, 27.07.2010, 1633 m, 4♂♂.
Distribution in Turkey: İzmir, Kayseri, Manastır (most probably Trabzon) (Darılmaz and Kıyak 2009; İncekara et al. 2010).
Remark: Newly recorded from Sivas.

Scarodytes halensis (Fabricius, 1787)
Material examined: Sivas, Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D. 31.07.2010, 1358 m, 1♂; Hafik Gölü, 39.50.59K 37.22.11 D, 28.05.2009, 1302 m, 1♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 1♂; İmranlı yolu 16.km, 39.50.14K 38.16.29 D, 28.05.2009, 1717 m, 2♂♂; Atgeçmiş, 39.38.14K 37.47.16 D, 23.05.2010, 1547 m, 1♂; Beşprer, 39.49.22K 37.17.31 D, 22.05.2010, 1286 m, 1♂; Koşuldere, 39.51.14K 37.23.39D, 22.05.2010, 1321 m, 2♂♂.
Distribution in Turkey: Aksaray, Ankara, Antalya, Artvin, Bursa, Çorum, Erzincan, Erzurum, Eskişehir, Gümüşhane, Isparta, İçel, İzmir, Kayseri, Van, Trabzon, Yozgat (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).
Remark: Newly recorded from Sivas.

Hydroporus marginatus (Duftschmid, 1805)
Material examined: Sivas, Kumarlu, 39.13.44K 37.11.03 D, 23.05.2010, 1527 m, 6♂♂ 4♀♀; Akkaya, 39.32.33K 37.01.24 D, 23.05.2010, 1354 m, 10♂♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 1♂; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 2♂♂; Söğütçü, 39.27.32K 36.46.10 D, 28.05.2009, 1386 m, 4♂♂; Atgeçmiş, 39.38.14K 37.47.16 D, 23.05.2010, 1547 m, 2♂♂; Şarkışla, 39.23.51K 38.28.06 D, 28.05.2009, 1256 m, 4♂♂; Gürün, Erdoğan, 38.52.51K 36.52.44 D, 01.06.2009, 1853 m, 3♂♂; Gürün, İncesu, 38.46.07K 37.07.27D, 28.07.2010, 1600 m, 4♂♂.
Distribution in Turkey: Ankara, Çorum, Erzurum, Kars, Kayseri, Konya, Muğla, Samsun, Sivas, Trabzon (Darılmaz and Kıyak 2009; Darılmaz et al. 2010; İncekara et al. 2010).

Hydroporus palustris (Linnaeus, 1761)
Material examined: Sivas, Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 1♂; İsafil Gölü, 39.52.17K 37.23.12D, 22.05.2010, 1200 m, 1♂.
Distribution in Turkey: Ankara, Artvin, Çorum, Erzincan, Erzurum, Kayseri, Rize, Samsun, Trabzon, Yozgat (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).

Remark: Newly recorded from Sivas.

Hydroporus planus (Fabricius, 1782)
Material examined: Sivas, Akıncılar, Su Şehri, 40.06.43K 36.20.11 D, 14.09.2010, 869 m, 2♂♂; Hafik Gölü, 39.50.59K 37.22.11 D, 28.05.2009, 1302 m, 10♂♂ 8♀♀; Göydün, 39.48.35K 37.12.34 D, 22.05.2010, 1269 m, 8♂♂ 2♀♀; Yağdonduran, 39.21..08K 37.08.23 D, 23.05.2010, 1556 m, 2♂♂; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 6♂♂; Karagömlek, 39.33.59K 36.57.37 D, 23.05.2010, 1412 m, 3♂♂; Kızılkavraz, 39.47.44K 37.12.48 D, 22.05.2010, 1275 m, 6♂♂; Keşanlı, 39.46.35K 37.44.29D, 23.05.2010, 1375 m, 7♂♂.
Distribution in Turkey: Antalya, Artvin, Balıkesir, Bursa, Çorum, Erzincan, Erzurum, İstanbul, Kars, Kayseri, Rize, Samsun, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010; İncekara et al. 2010).
Remark: Newly recorded from Sivas.

Hyphydrus ovatus (Linnaeus, 1761)
Material examined: Sivas, İmranlı: 39.52.28K 38.05.03 D, 21.05.2010, 1594 m, 1♂.
Distribution in Turkey: Amasya, Bolu, Çorum, Erzurum, Samsun (Darılmaz and Kıyak 2009; Darılmaz et al. 2010).
Remark: Newly recorded from Sivas.

Laccophilus hyalinus (De Geer, 1774)
Material examined: Sivas, Mancılık, 39.05.27K 37.14.05 D, 28.07.2010, 1505 m, 6♂♂; Hafik Gölü, 39.52.08K 37.23.05 D, 23.07.2009, 1296 m, 1♂; Ayşarören, 39.02.17K 37.14.45D, 28.07.2010, 1664 m, 2♂♂.
Distribution in Turkey: Adana, Ankara, Antalya, Artvin, Aydın, Bolu, Burdur, Çorum, Erzincan, Erzurum, Isparta, İçel, İzmir, Kars, Kayseri, Kırşehir, Kilis, Konya, Manisa, Trabzon (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Laccophilus minutus (Linnaeus, 1758)
Material examined: Sivas, Ekinli, 39.52.21.K 37.40.34 D,27.07.2010, 1320 m, 5♂♂ 4♀♀; Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D. 31.07.2010, 1358 m, 1♂; Sarkışla, Kayapınar, 39.19.13K 36.20.29 D, 31.07.2010, 1221 m, 1♂; Kaplıcalar Civarı, 39.16.47K 37.27.20 D, 28.07.2010, 1496 m, 2♂♂; Akıncılar, Su Şehri, 40.06.43K 36.20.11 D, 14.09.2010, 869 m, 2♂♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 1♂; Kovalı, 39.34.25K 37.09.57 D, 28.05.2009, 1310 m, 5♂♂; Yağdonduran, 39.21..08K 37.08.23 D, 23.05.2010, 1556 m, 1♂; Pusat Brj., 40.01.50K 37.27.12 D, 22.05.2010, 1510 m, 5♂♂; Gürün, Gökpınar Göleti, 38.39.23K 37.18.04 D, 06.01.2009, 1484 m, 5♂♂ 3♀♀; Aşağıyıldız, 39.45.32K 36.46.19 D, 31.07.2010, 1270 m, 3♂♂; Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 2♂♂; Hafik'e yakın göl, 39.51.24K 37.26.41 D, 23.07.2009, 1292 m, 1♂; İmranlı, 39.50.54K 38.34.40 D, 28.05.2009, 1619 m, 1♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 3♂♂; Yarhisar Gölü, 39.51.27K 37.27.10 D, 24.07.2009, 1286 m, 4♂♂; Kangal, Mancınık, 39.05.27K 37.14.05 D, 15.09.2010, 1501 m, 7♂♂ 2♀♀; Hanlı, 39.27.28K 36.39.08 D, 27.06.2010, 1304 m, 5♂♂ 5♀♀; Gürün, Hasköy, 38.45.57K 37.05.22 D, 28.07.2010, 1620 m, 4♂♂; Hafik, Çukurkelen, 39.49.26K 37.10.20 D, 28.05.2009, 1280 m, 1♂; İmranlı, 39.52.28K 38.05.03 D, 21.05.2010, 1594 m, 3♂♂; Gürün, Erdoğan, 38.52.51K 36.52.44 D, 01.06.2009, 1853 m, 1♂; İmranlı, Kemreli, 39.51.07K 38.14.19D, 27.07.2010, 1633 m, 1♂; Alcıören, Hoşik, 39.47.43K 37.27.31D, 24.07.2009, 1373 m, 2♂♂; Çukurbelen, 39.49.27K 37.10.19D, 27.07.2010, 1285 m, 2♂♂; İkizel, Kıllık, 39.48.06K 36.10.12D, 14.09.2010, 1214 m, 1♂; Tödürge Gölü, 39.52.15K 37.36.24D, 27.07.2010, 1304 m, 1♂.
Distribution in Turkey: Afyon, Aksaray, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bolu, Burdur, Bursa, Çorum, Erzincan, Erzurum, Gümüşhane, Isparta, İzmir, Konya, Kayseri, Manisa, Rize, Samsun, Sinop, Sivas, Trabzon, Yozgat, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).

Haliplidae

Haliplus heydeni Wehncke, 1875

Material examined: Sivas, Gürün, Gökpınar Göleti, 38.39.23K 37.18.04 D, 06.01.2009, 1484 m, 2♂♂; Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D, 31.07.2010, 1349 m, 1♂.
Distribution in Turkey: Afyon, Ankara, Kütahya, Erzincan (Darılmaz and Kıyak, 2010; Darılmaz et. al. 2012; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Haliplus ruficollis (De Geer, 1774)

Material examined: Sivas, Durulmuş, 39.51.01K 37.21.33 D, 22.05.2010, 1312 m, 2♂♂ 2♀♀; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 4♂♂; Zara, Ekinli, 39.52.19K 37.40.39 D, 21.05.2010, 1305 m, 2♂♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1342 m, 2♂♂; Şarkışla, Hanlı, 39.27.31K 36.39.14 D, 15.09.2010, 1300 m, 1♂; Sucak, 39.50.56K 37.50.45 D, 21.05.2010, 1354 m, 1♂.
Distribution in Turkey: Samsun (Darılmaz and Kıyak 2009).
Remark: Newly recorded from Central Anatolian Region.

Haliplus lineatocollis (Marsham, 1802)

Material examined: Sivas, Beypınarı, 39.32.02K 37.44.19 D, 23.05.2010, 1384 m, 21♂♂ 2♀♀; Koşuldere, 39.55.14K 37.23.39 D, 22.05.2010, 1321 m, 1♂; Yıldızeli, Kallık, 39.48.06K 36.10.12 D, 14.09.2010, 1214 m, 1♂.
Distribution in Turkey: Afyon, Çorum, Erzincan, Gümüşhane, İzmir, Yozgat (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).
Remark: Newly recorded from Sivas.

Haliplus obliquus (Fabricius, 1787)

Material examined: Sivas, Aşağıyıldız, 39.45.32K 36.46.19 D, 31.07.2010, 1270 m, 6♂♂ 2♀♀; Koşuldere, 39.55.14K 37.23.39 D, 22.05.2010, 1321 m, 1♂.
Distribution in Turkey: Erzincan, Basköy (most probably Eastern Anatolia) (Darılmaz and Kıyak 2009; Darılmaz et al. 2012).
Remark: Newly recorded from Central Anatolian Region.

Haliplus variegatus Sturm, 1834

Material examined: Sivas, Ahmet Hacı, 39.54.29K 37.48.12 D, 23.05.2010, 1350 m, 3♂♂; Hafik, Çukurbelen, 39.49.26K 37.10.20 D, 28.05.2009, 1280 m, 8♂♂ 2♀♀; Tödürge Gölü, 39.52.16K 37.36.25 D, 21.05.2010, 1306 m, 1♂; Söğütçü, 39.27.32K 36.46.10 D, 28.05.2009, 1368 m, 1♂; Ahmet Hacı, 39.54.29K 37.48.12 D, 23.05.2010, 1350 m, 1♂.
Distribution in Turkey: Adana, Bilecik, Isparta, Konya, Toros Dağları (Darılmaz and Kıyak 2009).
Remark: Newly recorded from Sivas.

Peltodytes caesus (Duftschmid, 1805)

Material examined: Sivas, Aşağıyıldız, 39.45.32K 36.46.19 D, 31.07.2010, 1270 m, 1♂; Yıldızeli, Kumyurt, 39.43.01K 36.49.32 D, 31.07.2010, 1349 m, 1♂.
Distribution in Turkey: Adana, Afyon, Aksaray, Ankara, Aydın, Balıkesir, Bolu, Çorum, Erzincan, Eskişehir, Isparta, İzmir, Kayseri, Konya, Samsun, Yozgat, Toros Dağları (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012; İncekara et al. 2010; Hızarcıoğlu et al. 2010).
Remark: Newly recorded from Sivas.

Noteridae

Noterus clavicornis (De Geer, 1774)

Material examined: Sivas, Hafik Gölü, 39.52.08K 37.23.05 D, 23.07.2009, 1296 m, 2♂♂; Zara, 39.50.56K 37.50.42 D, 28.05.2009, 1347 m, 13♂♂ 2♀♀; Tecer, 39.25.12K 37.04.06 D, 23.05.2010, 1396 m, 5♂♂; Hafik'e yakın göl, 39.51.24K 37.26.41 D, 23.07.2009, 1292 m, 4♂♂; Hanlı, 39.27.28K 36.39.08 D, 31.07.2010, 1308 m, 2♂♂; Tödürge Gölü, 39.52.16K

37.36.25 D, 21.05.2010, 1306 m, 1♂; Demiryurt, Tödürge Gölü, 39.52.24K 37.36.34 D, 23.07.2009, 1301 m, 1♂; Şarkışla, Hanlı, 39.27.31K 36.39.14D, 15.09.2010, 1300m, 3♂♂.
Distribution in Turkey: Aksaray, Ankara, Antalya, Aydın, Balıkesir, Bilecik, Bolu, Çorum, Erzincan, Isparta, İzmir, Kayseri, Konya, Manisa, Samsun, Trabzon (Darılmaz and Kıyak 2009; Darılmaz et al. 2010, 2012).
Remark: Newly recorded from Sivas.

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STUDY ON THE SCANNING ELECTRON MICROSCOPY OF *NESOLYX THYMUS* A HYPERPARASITOIDS OF UZI FLY IN MUGA CULTURE

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ABSTRACT: Muga silkworm, *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae), yields golden yellow silk, is unique to Brahmaputra river valley of Assam. Among different pests reported on muga silkworm, uzi fly *Exorista bombycis* is one of the serious endo-parasitoid particularly during Nov-April causing 20-90% loss in silkworm growing areas and post winter (Dec-Mar). Chemical pesticides are harmful to this insect along with the environment ,there for biological control need to adopt in muga culture. *Nesolyx thymus*, a hyperparasitoids of uzi fly are using as a biological agent to control uzi infestation in muga culture. This hyperparasitoids are attack the immature pupae to lay eggs on the surface and develop inside to complete there life cycle. The insect killed the uzi pupa and emerge out as adult flies. In this study, Scanning electron microscope (SEM) was done to shows how development occure inside the pupae.

KEY WORDS: Uzi, hyper-parasitoids, SEM, muga culture.

Almost all arthropod herbivores have natural enemies that can be used in what is known as ‘biological control. The level of interactions can provide an essential foundation for designing effective biological control by Lewis et al. (1997), and for improving the efficacy and understanding the suppression of herbivore populations in biological control. Ecological interactions between two species are often (indirectly) mediated by a third species of the same or another trophic level (Bronstein and Barbosa 2002).Fluctuations in predator or parasitoid populations and the level of herbivore suppression, not only tritrophic interactions, but also the impact of higher-level natural enemies. Predatory and parasitic insects are attacked by their own suite of predators, parasitoids and pathogens (Rosenheim, 1998), which constitute the fourth trophic level.

Hyperparasitoids are also called secondary insect parasitoids as they develop at the expense of insect primary parasitoids (Sullivan & Völkl, 1999). In other words, a hyperparasitoid attacks another insect that is itself parasitic on a host insect, which is often an herbivore. Like parasitoids, larvae of endophagous hyperparasitoids feed inside the host, whereas ectophagous species feed externally. Koinobiont hyperparasitoid species allow their host to continue development after oviposition. *N. thymus* is under koinobiont, pupal hyperparasitoid of uzi fly *Exorista bombysis* which continued development after oviposition and emerge from the host as adults.

Scanning electron microscopic study was conducted to see the mode of development of *Nesolyx thymus*, inside the pupa.

MATERIALS AND METHODS

Insect colonies

A continuous colony of house flies was maintained under standardized laboratory conditions in 25 ± 1°C, 75 ± 10% relative humidity. Sugar, water and milk powder (energy source) were provided as food as described by Mommaerts et al. (2006a).

Biological control agents

The *Nesolyx thymus* species originated from Mysor biocontrol laboratory under central silk board which used to control uzi infestation in *B.mori* and maintained by infested with house flies pupae to control uzi infestation in muga culture.

For Scanning Electron Microscopy (SEM)

For SEM studies both adult (male and female) and parasitized pupae after 24 hrs, 48 hrs, 72 hrs, 96 hrs,120 hrs and 144 hrs were fixed in 3% glutaraldehyde in 0.1 M sodium cacodylate buffer at pH-7.6 for four hour at room temputure.Parasitized pupae are just pins by nidle to penetrad solution to well fixed. After fixation the tissue fragments were washed three times in 0.1M sodium cacodylate buffer, pH 7.2, containing 5mM CaCl2, and post fixed in a solution containing 1% osmium tetroxide and 0.8% potassium ferricyanide in 0.1M cacodylate buffer. Then dehydrated in a graed of acetone series, freeze dried with tert-butyl alcohol,mounted on a stub using double coated adhesive tape, sputter coated with gold and observed for surface morphology with JSM-6360 (Jeol) Scanning Electron Microscope operated at 20KV.

RESULTS

Development time: The egg to adult development time ranged from 13-16 day in summer and 25-29 day in winter. There are four nymphet stages in N.thymus which complete inside the pupa. The nymph duration was found in first- 2 days second -3 days third -4days and four 6- days respectively.

Longevity: There were significant differences in longevity between summer and winter seasons. In summer seasons it was 10-13 days and in winter 6-9.

Fecundity, immature mortality and sex ratio: Fecundity of N.thymus is 200-250 per female and emerge out from per housefly pupae was 35-50 pre-oviposition period (time from emergence to first oviposition) was 13-15 days in summer and 20-28 day in winter, oviposition period (period during which females laid eggs) 3-7 day ,but preferable upto 4 days are most preferable for parasitization.and post-oviposition period (time after last oviposition until death) was 2-3 days. The secondary sex ratio (proportion of males) was 1:5 male and female ratio determined at adult emergence.

Adult body size: The whole body length, head width and wing length, were significantly different females were significantly larger than males. The whole body size of female was found 2.2± 0.03 mm and male 1.3±0.12 mm. Head width of female0.4 ± 0.1mm and male0.25 ± 0.2mm .The for wing length of female was 0.9±0.2mm and hind wing 1.5 ±0.3mm and male for wing 0.7±0.2mm and hind wing1.1±0.5mm in length.

DISCUSSION

In parasitoids, development mode (koinobiont or idiobiont) has been emphasized as a major potential determinant of life histories (Godfray, 1994;

Quicke, 1997; Mayhew & Blackburn, 1999; Strand, 2000; Harvey & Strand, 2002). The dichotomous hypothesis states that natural selection operates on the life history strategies of these two categories of parasitoids to magnify their differences (Godfray, 1994). Koinobiont endoparasitoids allow their host to continue development. Therefore they are able to attack small hosts that have less efficient defenses against parasitism. Moreover, younger hosts are generally more abundant than the later stages (Price, 1974). *N. thymus* hyperparasitoid of uzi fly also need younger pupa for parasitization and development inside the host then later stages.

After parasitisation the development of the host is usually stopped therefore, the development time of parasitoids is predicted to be generally less than that shown by hyperparasitoids. This species was not tested in muga culture, which might have influenced the results. Scanning electron microscopy done for the first time to observe biology, pattern of development.

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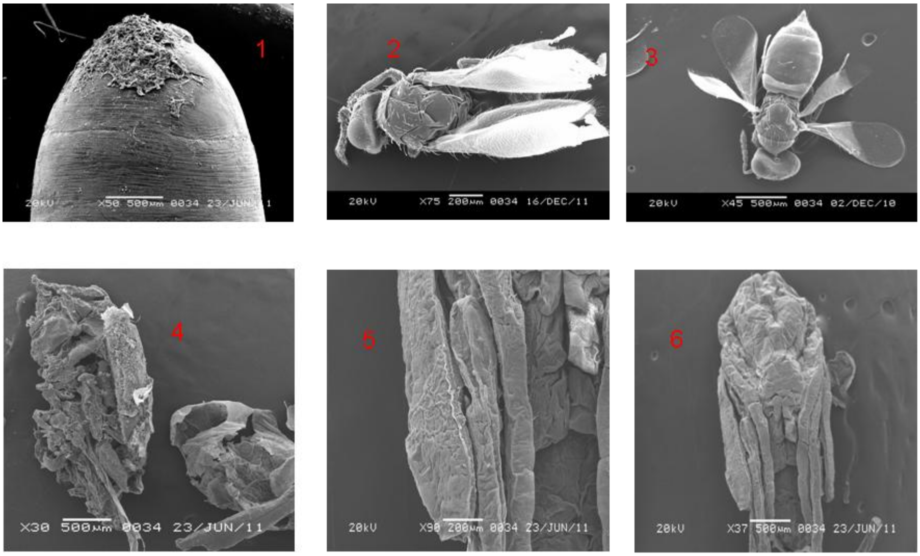

Figure A. Scanning electron microscopy of *N. thymus;* 1. Parasitied pupa of house fly, 2. Adult male, 3. Adult female, 4. *N. thymus* nymph inside the house fly pupa, 5. Development of organs, 6. Fourth instar nymph.

Figure B. Scanning electron microscopy of *N.thymus;* 7. Compound eye, 8. Antenna with head, 9. Wings with clearly visible hair.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART I – CHRYSOMELIDAE: HISPINAE AND CASSIDINAE

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[Özdikmen, H. & Kaya, G. 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part I – Chrysomelidae: Hispinae and Cassidinae. Munis Entomology & Zoology, 9 (1): 58-70**]**

ABSTRACT: The paper gives chorotype identifications for Turkish Hispinae and Cassidinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Hispinae, Cassidinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see belove for regions in Turkey) at the present.

As known, Turkey that has continental properties, is origin of many taxons and is a refigium (an area where conditions have enabled a species or a community of species to survive after extinction in surrounding areas) for effected living creatures from geological and climatical changes has more biological importance than any land in the World. As seen the whole World, an incredible variations have also been seen among the insects which are the most influenced living creatures from these changes occurred in the past in Turkey. For the present, fauna of Turkey completely has not been investigated yet. Since Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures, besides the number of studies are not enough.

Hence, a series work is planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. The present study is attempted as the first step of this aim.

Turkey is divided into seven regional parts commonly. These are;

Marmara Region (North-West Turkey)

- A. European Turkey (=Thracia)
  - 1. Ergene Part (including Edirne and Tekirdağ provinces)
  - 2. Istranca Part (including Kırklareli province)
  - 3. Çatalca Part (including İstanbul province)
- B. Asian Turkey (=North-West Anatolia)
  - 1. Kocaeli Part (including Kocaeli and Sakarya provinces)
  - 2. South Marmara Part (including Bilecik, Yalova, Bursa, Balıkesir and Çanakkale provinces)

Aegean Region (West Turkey)

- 1. Aegean Part (including Manisa, İzmir, Aydın, Muğla and Denizli provinces)

2. Central-West Anatolia Part (including Kütahya, Uşak and Afyon provinces)

Mediterranean Region (South and Sout-West Anatolia)
1. Antalya Part [= Western Mediterranean] (including Burdur, Isparta and Antalya provinces)
2. Adana Part [=Eastern Mediterranean] (including İçel, Adana, Osmaniye, Hatay, Kahramanmaraş and Kilis)

Central Anatolian Region
1. Upper Sakarya Part (including Eskişehir and Ankara provinces)
2. Konya Part (including Konya, Aksaray and Karaman provinces)
3. Central Kızılırmak Part (including Çankırı, Kırıkkale, Yozgat, Kırşehir, Nevşehir, Niğde, Kayseri and Sivas provinces)

Black Sea Region (North Anatolia)
1. Western Black Sea Part (including Düzce, Bolu, Karabük, Zonguldak, Bartın, Kastamonu and Sinop provinces)
2. Central Black Sea Part (including Samsun, Çorum, Amasya, Tokat and Ordu provinces)
3. Eastern Black Sea Part (including Giresun, Trabzon, Gümüşhane, Bayburt, Rize and Artvin provinces)

Eastern Anatolian Region
1. Erzurum-Kars Part (including Ardahan, Kars, Erzurum and Iğdır provinces)
2. Upper Fırat Part (including Erzincan, Tunceli, Elazığ, Malatya, Bingöl and Bitlis provinces)
3. Upper Murat-Van Part (including Ağrı, Muş and Van provinces)
4. Hakkari Part (including Şırnak and Hakkari provinces)

South-Eastern Anatolian Region
1. Central Fırat Part (including Gaziantep, Adıyaman and Şanlıurfa provinces)
2. Dicle Part (including Diyarbakır, Mardin, Batman and Siirt provinces)

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Hispinae comprises of 2 species of 2 genera and Turkish Cassidinae includes 51 species of 6 genera.

Subfamily HISPINAE

Genus *Hispa* Linnaeus, 1767

H. atra Linnaeus, 1767

Range: E: AL AU BE BH BU BY CR CT CZ DE FR GE GR IT MC MD NL PL PT RO SK SL SP SV SZ TR UK YU **A:** AF ES HEB HEI IN KI KZ MG TR WS XIN **Records in Turkey:** TR-A: AKS, ANK, ANT, ART, BAL, BOL, BRS, CAN, DEN, DIY, EZU, GAZ, HAK, ISP, IST, IZM, KAR, KAY, KOC, KON, KUT, MAL, MAN, MAR, NIG, ORD, SAK, SII, TOK, YAL – TR-E: IST **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Ergene Part and Istranca Part for European Turkey in Marmara Region, Adana Part for Mediterranean Region and Upper Murat-Van Part for Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Dicladispa* Gestro, 1897

D. testacea Linnaeus, 1767

Range: E: AL BU CR FR GR IT PT SP SZ TR YU **N:** AG MO TU **A:** SY TR **Records in Turkey:** TR-A: ADA, ANT, AYD, BRS, GIR, HAT, ISP, IST, IZM, KAS, MAN, MER, MUG, OSM, SAK, SIV, TRA, ZON – TR-E: IST **Remarks:** The species probably is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

Subfamily CASSIDINAE

Genus *Cassida* Linnaeus, 1758

C. algirica Lucas, 1849

Range: E: AL FR GR IT SP **N:** AG TU **A:** TR **Records in Turkey:** TR-A: ORD, VAN **Remarks:** The species should be distributed wider than known in Turkey according to known records. Because It has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region. It, however, should be distributed at least W and S Turkey due to it has Mediterranean chorotype. **Chorotype:** Mediterranean

C. atrata Fabricius, 1787

Range: E: AL AU BH BU CR CZ FR GE GR HU IT LA MC MD PL RO SK SL TR UK YU **A:** TR **Records in Turkey:** TR-A: ANK, BOL, BRS, COR, ESK, ISP, MER, NIG – TR-E: EDI **Remarks:** The species probably is rather widely distributed in Turkey. It has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. azurea Fabricius, 1801

Range: E: AU BE BU CR CZ FR GE HU IT PL RO SK SP SZ UK **N:** AG **A:** ES KZ TR WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Palearctic or Sibero-European

C. bella Faldermann, 1837

Range: E: AR GG ST **A:** TR **Records in Turkey:** TR-A: ART, DUZ, IZM, KAS, KRB, MER, SAK **Remarks:** The species is widely distributed in N Turkey. It has been recorded from 4 Turkish regions. But it has not been recorded only from Central Anatolian Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

C. berolinensis Suffrian, 1844

Range: E: AU BU CT CZ GE HU PL SK SV UK **A:** ES HEB KI KZ MG NMO SHX TR WS

XIN **Records in Turkey:** TR-A: BIL **Remarks:** The species should be distributed also at least in European Turkey. Because, it has been recorded only from 1 Turkish region as Asian Turkey in Marmara Region until now. **Chorotype:** Sibero-European

C. brevis Weise, 1884
Range: E: AR GR TR **A:** AF IN IQ IS LE SY TM TR **Records in Turkey:** TR-A: ADI, AFY, AMA, ANT, ISP, KAS, KUT, MER, MUS, SII **Remarks:** The species probably is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and Marmara Region until now. **Chorotype:** Turano-European

C. canaliculata Laicharting, 1781
Range: E: AU BH BU CR CZ FR GE HU IT MD PL RO SK SL SZ UK YU **A:** KZ TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** European or C, S, E-European

C. denticollis Suffrian, 1844
Range: E: AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LT MC MD NL NR NT PL PT RO SK SL SP SV SZ UK YU **A:** ES KZ MG WS XIN **Records in Turkey:** TR-A: KON **Remarks:** The species has been known only from Central Anatolian Region in Turkey. **Chorotype:** Sibero-European

C. elongata Weise, 1893
Range: E: BU ST UK **A:** KZ **Records in Turkey:** TR-A: KON **Remarks:** The species has been known only from Central Anatolian Region in Turkey. **Chorotype:** E-European

C. fausti Spaeth & Reitter, 1926
Range: E: BU MC ST UK **A:** TR **Records in Turkey:** TR-A: ADA, AFY, ANK, BOL, ISP, IZM, KAR, KAS, KON, KRB, NEV, NIG, SAM – TR-E: EDI **Remarks:** The species probably is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** E-European

C. ferruginea Goeze, 1777
Range: E: AU BH BU CR CZ EN FR GE GR HU IT LA PL RO SK SL ST SV SZ UK YU **N:** AG **Records in Turkey:** TR-A: SAK (Şen & Gök, 2013) **Remarks:** The species has been known only from Marmara Region in Turkey. **Chorotype:** Europeo-Mediterranean

C. flaveola Thunberg, 1794
Range: E: AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LT MC MD NL NR PL RO SK SL SP SV SZ UK YU **N:** AG **A:** FE HEI **NAR Records in Turkey:** TR-A: ANK, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region now. **Chorotype:** Holarctic

C. hablitziae Motschulsky, 1838
Range: E: AR GG ST **A:** TR **Records in Turkey:** TR-A: BOL, IST, TRA, ZON **Remarks:** The species is widely distributed only in N Turkey. It has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** SW-Asiatic

C. hemisphaerica Herbst, 1799
Range: E: AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MR NL NR NT PL PT RO SK SL SP SV SZ UK YU **N:** AG CI MO TU **A:** ES TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Europeo-Mediterranean or Sibero-European + N-Africa

C. inquinata Brullé, 1832
Range: E: AB AL AR AU BH BU CR CZ FR GG GR HU IT MC PT RO SK SL SP ST TR YU **N:** AG MO TU **A:** IS LE SY TM TR **Records in Turkey:** TR-A: BAL, BRS, CAN, GIR, IZM,

MAN, MUG, SAM, TRA – TR-E: KRK, TEK, EDI (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed only in N and W Turkey. It has been recorded only from 3 Turkish regions as Aegean Region, Black Sea Region and Marmara Region until now. **Chorotype:** Turano-Europeo-Mediterranean

C. lineola Creutzer, 1759

Range: E: AU BH BU CZ FR HU LA PL RO SK ST SZ UK **A:** CE ES FE JA KI KZ MG NC NE NO SC SE ST SW UZ WS **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Asiatic-European

C. linnavuorii Borowiec, 1986

Range: E: A: IQ LE TR **Records in Turkey:** TR-A: MAR **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian) or SW-Asiatic

C. margaritacea Schaller, 1783

Range: E: AB AL AU BE BH BU CR CZ DE FR GB GE GR HU IT LA LT MC NL PL RO SK SL SP SZ UK YU **N:** AG **A:** SY TR **Records in Turkey:** TR-A: ADA, ART, BOL, DIY, KAR, KAY, MER, TRA **Remarks:** The species probably is rather widely distributed in Turkey. It has been recorded from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Europeo-Mediterranean

C. murraea Linnaeus, 1767

C. m. murraea Linnaeus, 1767

Range: E: AL AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC NL PL RO SK SL SV SZ TR UK YU **A:** ES FE KZ MG TR WS XIN **Records in Turkey:** TR-A: BAR, BOL, DUZ, GIR, KAS, KRB, ORD, RIZ, SAK, SIN, TRA – TR-E: EDI, TEK **Remarks:** The subspecies is widely distributed only in N Turkey. It has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** Sibero-European

C. nebulosa Linnaeus, 1758

Range: E: AL AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC MD NL NR NT PL RO SK SP SV SZ TR UK YU **A:** CE ES FE KZ MG NC NE NO NW SC SW TD TR UZ WS **Records in Turkey:** TR-A: ANK, ART, BAL, BRS, CAN, DUZ, GIR, GUM, IZM, KAS, KON, SAK, TOK, YOZ **Remarks:** The species is rather widely distributed only in N and W Turkey. It has been recorded only from 4 Turkish regions. But it has not been recorded from Mediterranean Region, South-Eastern Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

C. nobilis Linnaeus, 1758

Range: E: AL AU BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MD NL NR NT PL RO SK SL SP SV SZ TR UK YU **N:** AG **A:** ES HEI IS JA KI KZ MG NC SC TR UZ WS XIN **Records in Turkey:** TR-A: AMA, ANK, ANT, AYD, BAL, CAN, COR, DEN, EZU, ISP, IZM, KAS, KOC, KON, MER, NIG, SAK, SAM, SIN, TOK **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

C. palaestina Reiche, 1858

Range: E: AR GG **A:** AF CY IN IQ IS LE KI KZ SY TD TM TR **Records in Turkey:** TR-A: ADA, BRS, DIY, HAT, IZM, KIL, MER **Remarks:** The species is rather widely distributed only in S and W Turkey. Its distribution range in Turkey, however, is very likely wider than known. It has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Turanian or Turanian + Centralasiatic

C. pannonica Suffrian, 1844

Range: E: AU BH BU CZ FR GE GR HU LA MC PL RO SK UK YU **A:** IS LE KI KZ SY TR UZ WS XIN **Records in Turkey:** TR-A: ADA, ANK, ANT, BAL, BIL, BRS, COR, DUZ, GAZ, HAK, HAT, IZM, KAS, KON, KRB, KRS, MER, MUG, MUS, NIG, OSM, SAM, TUN (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Kocaeli Part of Asian Turkey and all European Turkey in Marmara Region, Central-West Anatolia Part in Aegean Region, Eastern Black Sea Part in Black Sea Region and Dicle Part in South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. parvula Boheman, 1854

Range: E: BU CT GG RO ST UK **A:** CE CP FE KI KZ MG NO NW TM UZ XIN **Records in Turkey:** TR-A: ANT, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region in Turkey until now. **Chorotype:** Asiatic-European

C. persica Spaeth, 1926

Range: A: IN IQ **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. It, however, must be distributed very likely only in SE Turkey. **Chorotype:** SW-Asiatic (Irano-Anatolian)

C. prasina Illiger, 1798

Range: E: AL AU BE BH BU CR CZ DE FI FR GE GR HU IT LA LT MC NL NT PL RO SK SL SP SV ST SZ TR UK YU **A:** ES JIL KZ TR WS XIN **Records in Turkey:** TR-A: ANT, AYD, BAL, BAR, BIL, BOL, DEN, DUZ, GAZ, GIR, HAT, IZM, KAH, KAR, KAY, KIL, KON, KRB, MAN, MER, SAK, TOK, TUN, ZON - TR-E: KRK **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Ergene Part and Çatalca Part of European Turkey in Marmara Region, Central-West Anatolia Part in Aegean Region, Upper Sakarya Part in Central Anatolian Region, Erzurum-Kars Part, Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region and Dicle Part in South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. pusilla Waltl, 1835

Range: E: AL CR FR GR IT PT SP SZ **N:** AG MO TU **Records in Turkey:** TR-A: IZM **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Mediterranean

C. reitteri Weise, 1892

Range: E: AR **A:** TR **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

C. rubiginosa Müller, 1776

C. r. rubiginosa Müller, 1776

Range: E: AL AU BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC NL NR NT PL RO SK SL SP SV SZ TR UK YU **N:** AG MO **A:** CE CP ES FE IS JA KZ NC NO SC SE TR WS **NAR Records in Turkey:** TR-A: ADA, AFY, ANK, ANT, BAL, BOL, BRS, COR, ESK, EZU, GIR, ISP, IZM, KAS, KON, KRB, KUT, MAN, MER, SAK, SAM, SIV, ZON – TR-E: EDI, KRK, TEK **Remarks:** The subspecies is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

C. rufovirens Suffrian, 1844

Range: E: AU BE BH BU CR CZ FR GE GG HU PL RO SK SZ UK **A:** TR **Records in Turkey:** TR-A: ANK, ANT, ISP, KRS **Remarks:** The species is probably wider distributed than the known in Turkey. It has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now.

Chorotype: C and E-European

C. sanguinolenta Müller, 1776

Range: E: AL AR AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC NL NR NT PL RO SK SL SP ST SV SZ UK YU **N:** AG **A:** KZ TR WS **Records in Turkey:** TR-A: BIL, IZM,KAH, KUT, MUS, SIN **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. sanguinosa Suffrian, 1844

Range: E: AU BH BY CR CT CZ DE EN FI FR GB GE HU IT LA LT NL NR NT PL SK SL SP SV UK **N:** AG MO **A:** ES KZ WS **Records in Turkey:** TR-A: BAR, KAS **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Palearctic

C. saucia Weise, 1889

Range: E: AB AR **A:** IN TR **Records in Turkey:** TR-A: AMA, ANK, BAL, COR, DUZ, GAZ, KIL, KAY, SII **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

C. seladonia Gyllenhal, 1827

Range: E: AU BE BH BU CZ DE FR GE GR HU IT LA LT PL SK SP SV UK **N:** AG MO **A:** TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Europeo-Mediterranean

C. seraphina Ménétriés, 1836

Range: E: AR GR ST TR **A:** KZ TR **Records in Turkey:** TR-A: AMA, ANK, ANT, BAL, BIL, BOL, BUR, BRS, CNK, COR, DUZ, ESK, EZU, ISP, IST, IZM, KAS, KON, KSH, KUT, SAK, SAM, SIV, TOK, USA **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic

C. stigmatica Suffrian, 1844

Range: E: AU BE BU CR CZ DE FI FR GE GR HU IT LA MC NL PL RO SK SP SZ UK **N:** TU **A:** AF ES KI KZ TR WS XIN **Records in Turkey:** TR-A: ADA, ANK, BOL, CAN, KAS, KON, KUT **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic or Sibero-European + N-Africa

C. strejceki Sekerka, 2006

Range: A: TR **Records in Turkey:** TR-A: MUS **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

C. subreticulata Suffrian, 1844

Range: E: AL AU BE BH BU CR CZ FR GE GR HU IT LA MC PL RO SK SZ UK YU **A:** ES FE IN JA KZ MG TM TR WS XIN **Records in Turkey:** TR-A: ANK, ISP, KAS, KON, KRB, MER, NEV, ORD, TOK **Remarks:** The species is probably wider distributed than the known in Turkey. It has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European or Asiatic-European

C. vibex Linnaeus, 1767

Range: E: AL AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC NL NR NT PL RO SK SL SP SV SZ TR UK YU **A:** HEB KZ MG TR XIN **Records in Turkey:** TR-A:

ANK, ANT, BAR, BOL, COR, ISP, IZM, KAS, MER, NEV, NIG, SAM – TR-E **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded from South-Eastern Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

C. viridis Linnaeus, 1758

Range: E: AL AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT MC NL NR NT PL PT RO SK SL SV SZ UK YU **N:** MO **A:** ES FE HEI JA KZ NC SC SY TR UZ WS XIN **Records in Turkey:** TR-A: ADA, AKS, AMA, ANK, BAL, BOL, CAN, CNK, DIY, EZU, HAT, ISP, IZM, KAH, KAS, KAY, KON, KSH, MUS, NEV, NIG, OSM, SAK, TOK, TRA, TUN, URF, ZON – TR-E: TEK (Ekiz et al., 2013; pers. comm.., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Istranca and Çatalca Parts of European Turkey in Marmara Region, Central-West Anatolia Part in Aegean Region and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** Palearctic

C. vittata Villers, 1789

Range: E: AU BE BH CR CZ DE EN FR GB GE GR HU IT LA LT PL PT RO SK SP SV SZ UK **N:** AG MO TU **A:** ES IS JA KZ SC TR WS UZ **Records in Turkey:** TR-A: AMA, BAL, BUR, DEN, MER, NEV, NIG, TOK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 4 Turkish regions. But it has not been recorded from Central Anatolian Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

Genus *Hypocassida* Weise, 1893

H. cornea (Marseul, 1868)

Range: E: AU BU CR FR GR HU IT PT SP ST **N:** AG EG LB MO TU **A:** CY SY TR **AFR** **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Afrotropico-Mediterranean

H. meridionalis (Suffrian, 1844)

Range: E: FR IT PT SP **N:** MO **A:** IS TR **Records in Turkey:** TR-A: ORD **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Mediterranean

H. subferruginea (Schrank, 1776)

Range: E: AL AU BE BH BU CR CZ DE EN FI FR GE GR HU IT LA LT MC NL NT PL PT RO SK SL SP SV SZ TR UK YU **N:** AG EG MO **A:** AF ES FE HEB HEI IS KI KZ MG SHA TD TM TR UZ WS XIN **Records in Turkey:** TR-A: ADA, AGR, AKS, AMA, ANK, ANT, AYD, BAL, BIL, BIT, BRS, BOL, BUR, CAN, CNK, COR, DEN, DUZ, ERZ, ESK, EZU, HAT, ISP; IST, IZM, KAH, KAR, KAS, KAY, KOC, KON, KRB, KUT, MAN, MER, MUS, NIG, OSM, RIZ, SAK, SAM, SII, SIN, SIV, URF, YOZ, ZON – TR-E: EDI, IST, TEK (Ekiz et al., 2013; pers. comm.., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Istranca Part of European Turkey in Marmara Region and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** Palearctic

Genus *Ischyronota* Weise, 1891

I. desertorum (Gebler, 1833)

Range: E: AR RO ST UK **A:** AF IN IS KI KZ MG PA SY TM TR UZ XIN **Records in Turkey:** TR-A: AGR, CNK, IGD, IZM, KAY **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 4 Turkish regions. But it has not been recorded from Marmara Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

I. jordanensis Borowiec, 1986

Range: A: JO TR **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** E-

Mediterranean (Palaestino-Taurian)

Genus *Macromonycha* Spaeth, 1911
***M. anatolica* (Weise, 1900)**
Range: A: TR **Records in Turkey:** TR-A: ADA, MER, NIG **Remarks:** The endemic species has been recorded only from Central Anatolian Region and Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

***M. apicalis* (Gebler, 1845)**
Range: E: AB AR **A:** AF IN IQ IS KI KZ SY TR UZ **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. It, however, must be distributed very likely only in SE and E Turkey. **Chorotype:** Sibero-European

***M. kantnerorum* Sekerka, 2008**
Range: A: JO TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. It, however, must be distributed very likely only in S Turkey. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

Genus *Oxylepus* Desbrochers des Loges, 1884
***O. deflexicollis* (Boheman, 1862)**
Range: E: CR FR GR IT SP **N:** EG MO TU **A:** IN IS TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. It, however, must be distributed very likely only in S and SE Turkey. **Chorotype:** Mediterranean

Genus *Pilemostoma* Desbroch. des Loges, 1891
***P. fastuosum* (Schaller, 1783)**
Range: E: AL AU BE BH BU BY CR CZ DE FR GB GE GR HU IT LA MC MD NL PL RO SL SP ST SV UK YU **A:** ES IN KI KZ MG TR WS **Records in Turkey:** TR-A: BAR, KAH, KON, KRB **Remarks:** The species is probably wider distributed than the known in Turkey. It has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

ZOOGEOGRAPHICAL ANALYSIS

Turkish Hispinae includes only 2 species. 1 species, namely 50 % of the species has “Mediterranean” chorotype and also 1 species, namely 50 % of the species has “Sibero-European” chorotype.

For zoogeographical evaluation, the all known species of Turkish Hispinae are presented as follows:

One species as *D. testacea* has “Mediterranean” chorotype.

One species as *H. atra* has “Sibero-European” chorotype.

Turkish Cassidinae includes 51 species. 9 species, namely 17.65 % of the species have “Sibero-European” chorotype. 7 species, namely 13.73 % of the species have “Palearctic” chorotype. 6 species, namely 11.77 % of the species have “SW-Asiatic” chorotype. 5 species, namely 9.80 % of the species have “Asiatic-European” chorotype. 4 species, namely 7.84 % of the species have “Mediterranean” chorotype. Also 4 species, namely 7.84 % of the species have “Europeo-Mediterranean” chorotype. 3 species, namely 5.88 % of the species have “E-Mediterranean” chorotype. 2 species, namely 3.92 % of the species have “Anatolian” chorotype. 2 species, namely 3.92 % of the species have “E-European” chorotype. Also 2 species, namely 3.92 % of the species have “C and E-European” chorotype. And also 2 species, namely 3.92 % of the species have “Holarctic” chorotype. Each of the remaining 5 species has a different chorotype. One species, namely about 1.96 % of the species has “Afrotropico-Mediterranean” chorotype.

One species, namely about 1.96 % of the species has "European" chorotype. One species, namely about 1.96 % of the species has "Turanian" chorotype. One species, namely about 1.96 % of the species has "Turano-European" chorotype. And one species, namely about 1.96 % of the species has "Turano-Europeo-Mediterranean" chorotype (Fig. 1). So the dominant chorotype for Turkish Cassidinae is "Sibero-European" (17.65 %). "Palearctic" (13.73 %) and "SW-Asiatic" (11.77 %) chorotypes follow it respectively. Also the members of "Asiatic-European" (9.80 %), "Mediterranean" (7.84 %) and "Europeo-Mediterranean" (7.84 %) chorotypes present important contributions for Turkish fauna.

For zoogeographical evaluation, the all known species of Turkish Cassidinae are presented as follows:

A total of 9 species have "Sibero-European" chorotype as *C. berolinensis*, *C. denticollis, C. murraea*, *C. pannonica*, *C. prasina*, *C. sanguinolenta*, *C. subreticulata*, *M. apicalis* and *P. fastuosum*.

A total of 7 species have "Palearctic" chorotype as *C. azurea*, *C. nobilis*, *C. sanguinosa*, *C. stigmatica*, *C. viridis*, *C. vittata* and *H. subferruginea*.

A total of 6 species have "SW-Asiatic" chorotype as *C. bella*, *C. hablitziae*, *C. persica*, *C. reitteri*, *C. saucia* and *C. seraphina*.

A total of 5 species have "Asiatic-European" chorotype as *C. lineola*, *C. nebulosa*, *C. parvula*, *C. vibex* and *I. desertorum*.

A total of 4 species have "Europeo-Mediterranean" chorotype as *C. ferruginea*, *C. hemisphaerica*, *C. margaritacea* and *C. seladonia*.

A total of 4 species have "Mediterranean" chorotype as *C. algirica*, *C. pusilla*, *H. meridionalis* and *O. deflexicollis*.

A total of 3 species have "E-Mediterranean" chorotype as *C. linnavuorii*, *I. jordanensis* and *M. kantnerorum*.

A total of 2 species have "Anatolian" chorotype as *C. strejceki* and *M. anatolica*.

A total of 2 species have "E-European" chorotype as *C. elongate* and *C. fausti*.

A total of 2 species have "C and E-European" chorotype as *C. atrata* and *C. rufovirens*.

A total of 2 species have "Holarctic" chorotype as *C. flaveola* and *C. rubiginosa*.

One species as *H. cornea* has "Afrotropico-Mediterranean" chorotype.

One species as *C. canaliculata* has "European" chorotype.

One species as *C. palaestina* has "Turanian" chorotype.

One species as *C. brevis* has "Turano-European" chorotype.

One species as *C. inquinata* has "Turano-Europeo-Mediterranean" chorotype.

On the other side, the regional distributions of all known species of Hispinae and Cassidinae in Turkey are presented as follows (Table 1):

For the subfamily Hispinae:

2 species are represented in Marmara Region (100 %)
2 species are represented in Aegean Region (100 %)
2 species are represented in Mediterranean Region (100 %)
2 species are represented in Central Anatolian Region (100 %)
2 species are represented in Black Sea Region (100 %)
1 species are represented in Eastern Anatolian Region (50 %)
1 species are represented in South-Eastern Anatolian Region (50 %)

So Turkish Hispinae that includes only 2 species, are regarded widely distributed in all Turkish Regions.

Turkish Cassidinae includes a total of 51 species. However, provincial distributions of 9 species are unknown. So Turkish Cassidinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio.

For the subfamily Cassidinae (according to all species):
22 species are represented in Marmara Region (43 %)
19 species are represented in Aegean Region (37 %)
21 species are represented in Mediterranean Region (41 %)
25 species are represented in Central Anatolian Region (49 %)
27 species are represented in Black Sea Region (53 %)
16 species are represented in Eastern Anatolian Region (31 %)
9 species are represented in South-Eastern Anatolian Region (18 %)

For the subfamily Cassidinae (according to known provincial distribution of 42 species):
22 species are represented in Marmara Region (52 %)
19 species are represented in Aegean Region (45 %)
21 species are represented in Mediterranean Region (50 %)
25 species are represented in Central Anatolian Region (60 %)
27 species are represented in Black Sea Region (64 %)
16 species are represented in Eastern Anatolian Region (38 %)
9 species are represented in South-Eastern Anatolian Region (21 %)

So Turkish Cassidinae that includes a total of 51 species or 42 species of which are known provincial distributions in Turkey, are widely distributed in all Turkish Regions. The most number of species is represented in Black Sea Region. Central Anatolian Region follows it. Marmara Region, Mediterranean Region and Aegean Region are represented with an important number of species. However, Eastern Anatolian Region and especially South-Eastern Anatolian Region are represented with a rather little number of species now. Because, last two regions have been inadequately worked until now.

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Table 1. The regional distribution of all known species of Hispinae and Cassidinae in Turkey.

SPECIES	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyHISPINAE							
H. atra	+	+	+	+	+	+	+
D. testacea	+	+	+	+	+	-	-
SubfamilyCASSIDINAE							
C. algirica	-	-	-	-	+	+	-
C. atrata	+	-	+	+	+	-	-
C. azurea	?	?	?	?	?	?	?
C. bella	+	+	+	-	+	-	-
C. berolinensis	+	-	-	-	-	-	-
C. brevis	-	+	+	-	+	+	+
C. canaliculata	?	?	?	?	?	?	?
C. denticollis	-	-	-	+	-	-	-
C. elongata	-	-	-	+	-	-	-
C. fausti	+	+	+	+	+	+	-
C. ferruginea	+	-	-	-	-	-	-
C. flaveola	-	-	-	+	-	+	-
C. hablitziae	+	-	-	-	+	-	-
C. hemisphaerica	?	?	?	?	?	?	?
C. inquinata	+	+	-	-	+	-	-
C. lineola	-	-	-	-	-	+	-
C. linnavuorii	-	-	-	-	-	-	+
C. margaritacea	-	-	+	+	+	-	+
C. murraea	+	-	-	-	+	-	-
C. nebulosa	+	+	-	+	+	-	-
C. nobilis	+	+	+	+	+	+	-
C. palaestina	+	+	+	-	-	-	+
C. pannonica	+	+	+	+	+	+	+
C. parvula	-	-	+	+	-	-	-
C. persica	?	?	?	?	?	?	?
C. prasina	+	+	+	+	+	+	+
C. pusilla	-	+	-	-	-	-	-
C. reitteri	-	-	-	+	-	-	-
C. rubiginosa	+	+	+	+	+	+	-
C. rufovirens	-	-	+	+	-	+	-
C. sanguinolenta	+	+	+	-	+	+	-
C. sanguinosa	-	-	-	-	+	-	-
C. saucia	+	-	-	+	+	-	+
C. seladonia	?	?	?	?	?	?	?
C. seraphina	+	+	+	+	+	+	-
C. stigmatica	+	+	+	+	+	-	-
C. strejceki	-	-	-	-	-	+	-
C. subreticulata	-	-	+	+	+	-	-
C. vibex	+	+	+	+	+	-	-
C. viridis	+	+	+	+	+	+	+
C. vittata	+	+	+	-	+	-	-
H. cornea	?	?	?	?	?	?	?
H. meridionalis	-	-	-	-	+	-	-
H. subferruginea	+	+	+	+	+	+	+

I. desertorum	-	+	-	+	+	+	-
I. jordanensis	-	-	-	+	-	-	-
M. anatolica	-	-	+	+	-	-	-
M. apicalis	?	?	?	?	?	?	?
M. kantnerorum	?	?	?	?	?	?	?
O. deflexicollis	?	?	?	?	?	?	?
P. fastuosum	-	-	+	+	+	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

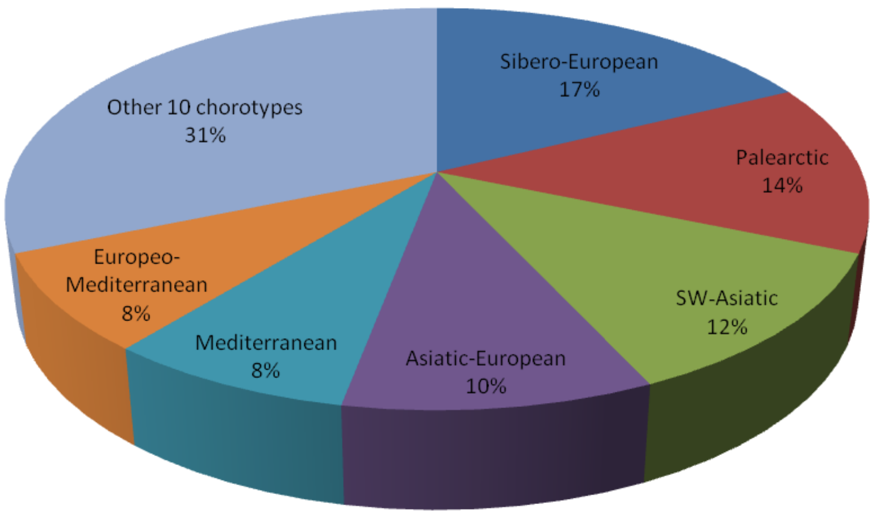

Figure 1. Chorotypical distribution of Turkish Cassidinae.

HARVESTMEN RECORDS FROM THE KÖPRÜLÜ CANYON NATIONAL PARK, ANTALYA (ARACHNIDA: OPILIONES)

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[**Çorak Öcal, İ., Kayhan, N. Y., Bayram, A., Danişman, T. & Sancak, Z.** 2014. Harvestmen records from the Köprülü Canyon National Park, Antalya (Arachnida: Opiliones). Munis Entomology & Zoology, 9 (1): 71-79]

ABSTRACT: In this study, a total of 91 harvestmen specimens were collected from various localities of the Koprulu Canyon National Park between 2005 and 2006. Adult individuals as a result of a systematic evaluation of the collected and bioecological aspect, four species in four genera in two families were determinated. Description, morphology, habitat, ecology and geographical distribution of the species were examined. At the end of this study, in Phalangiidae, *Lacinius ephippiatus* (CL Koch, 1835), *Odiellus lendli* (Soerensen 1894), *Zacheus crista* (Brulle, 1832), and in Dicranolasmatidae, *Dicranolasma scabrum* (Herbst, 1799) have been identified. Among the species *Odiellus lendli* is a new record for the opilionid fauna of Turkey. Together with *Odiellus lendli* the species number that recorded from Turkey raised to 70.

KEY WORDS: The Köprülü Canyon National Park, Fauna, Turkey, Opiliones, Harvestmen.

Harvestmen live in different ecosystems such as forests, mountains, caves, fields, steppes and moist places (Hillyard & Sankey, 1989; Snegovaya & Chemeris, 2004). They feed mostly on soft bodied arthropods in crops, including aphids, caterpillars, beetle larvae, leafhoppers, mites and tiny slugs. Harvestmen may help to reduce pest density in crops (Adams, 1984; Dixon & McKinlay, 1989; Drummond et al., 1990). Despite low potential, the use of harvestmen in pest control may be valuable for ecological investigations. Also, harvestmen do not prefer polluted places. For this reason ecologists point out their peculiarities beeing indicator species in ecosystem (Sunderland & Sutton, 1980; Adams, 1984).

Over 6.000 species were found on the world in Opiliones, up to now. Harvestmens consists of four Suborders: Cyphophthalmi, Laniatores, Dyspnoi and Eupnoi (Hillyard & Sankey, 1989). Studies on harvestmen are especially on hunting, feeding ecology, morphological and taxonomic characteristics and geographical distribution (Gruber, 1968, 1979; Mitov, 1988, 1992, 1996). Also, there are some light and electron microscopic studies with related to different anatomical, morphological and histological structures of harvestmen (Hillyard & Sankey, 1989; Yiğit et al., 2007).

In the last 50 years, many researches were performed on harvestmen in the Palearctic region. Gruber has worked on harvestmen in Central Europe and Turkey (1968, 1969, 1976, 1979, 2001). Chevrizov has studied harvestmen of Eastern Europe and Russia (1979). Martens has worked on fauna of harvestmen of the Balkan Peninsula, the Mediterranean and the Aegean Sea islands (1965, 1978, 1986). Mitov has investigated harvestmen fauna of Bulgaria and Albania

(1986-1988, 1992, 1995-1997, 2000, 2002, 2008). Snegovaya has examined harvestmen fauna of Azerbaijan (1999, 2004-2008).

In Turkey, studies on harvestmen were started first by foreign researchers in previous years, but in recent years, local researchers have begun to do studies on this group arachnids (Çorak, 2004; Kurt, 2004; Bayram & Çorak, 2007; Çorak et al., 2008; Kurt et al., 2008; Bayram et al., 2010). In Turkey, one species (*Cyphophthalmus duricorius* Joseph 1868) in Sironidae in Cyphopthalmi Suborder, 27 species in four families (Trogulidae, Nemastomatidae, Dicranolasmatidae, Ischyropsalididae) in Dyspnoi Suborder, 41 species in two family (Phalangiidae, Sclerosomatidae) in Eupnoi Suborder were determinated. Laniotores Suborder is not yet registered from Turkey. *Odiellus lendli* that found in this area is a new record for the opilionid fauna of Turkey. Together with *Odiellus lendli* the species number of harvestmen recorded from Turkey raised to 70.

THE KÖPRÜLÜ CANYON NATIONAL PARK

This national park is situated in Antalya in the Mediterranean Region (southern part) of Turkey. In the region, the Taurus Mountain Chain lays parallel to the Mediterranean Sea.The characteristic vegetation type is maqui, and the climate type is the mediterranean. Antalya has got the most productive soil of Turkey, and citrus trees, cotton fields, greenhouses are widespread in it.

The national park is on southern mountainside of the Taurus, 65 km far from Side. A twisting road crisscrosses over mountain streams and passes through virgin forests. A valley of wild beauty rich in flora and fauna is remarkable in the park. The canyon stretces for 15 km along the Kopru River and is 400 meters deep in some places. It is the most famous raftting area of Turkey. The highest peak in this mountain range is Dedegol at 2,992 meters. The densest Mediterranean cedar (*Cedrus libani* A.Rich) of the world is in this national park forest.

In the national park's flora, red pine (*Pinus burutia*), black pine (*Pinus nigra*), cedar, fir (*Abies cilicica*), cypress (*Cupressus sempervirens*), ash (*Fraxinus excelsior*), ilex oak (*Quercus ilex*), sessile oak (*Quercus petraea*), wild olive (*Olea europaea*), Sandal (*Arbutus andrachne*), Big Fruit (*Arbutus unedo*), Gum (*Pistacia lentiscus*), Goat Horn (*Ceratonia siliqua*), Laurel (*Laurus nobilis*), Mersin (*Myrtus communis*), Hawthorn (*Crataegus*), oleander (*Nerium oleander*), Laden (*Picea orientalis*), wild rose (*Rosa canina*), Funda (*Galluna*), thyme (*Thymus*), blackberry (*Rubus*), fern (*Pteridium*) are remarkable. Within the National Park fauna, deer (*Cervus*), mountain goat (*Capra*), pig (*Sus*), bear (*Ursus*), fox (*Vulpes*), wolf (*Canis lupus*), rabbit (*Lepus*), marten (*Martes*), partridge (*Alectoris*), woodcock (*Scolopax*), turtle dove (*Streptopelia*), eagle (*Aquila*), falcon (*Falco*), carp (*Cyprinus*) are found.

MATERIALS AND METHODS

A total of 57 adult (8 males, 49 females) and 34 immature harvestmen specimens were collected from various localities in the Koprulu Canyon National Park (Antalya) in 2005 and 2006. The specimens were handled with pens, aspirator and hand pots, preserved in tubes that containing 70 % ethanol, and received tag information written on the tubes. The harvestmen specimens examined in the zoological laboratory at the University of Kırıkkale. The identification was made with a SMZ10A Nikon Stereo microscope, and the keys of Silhavy (1966a-b), Gruber (1969), Chevrizov (1979) and Hillyard & Sankey (1989), Snegovaya (1999) were used. The specimens were stored in the Zoological Laboratory of Çankırı Karatekin University.

RESULTS

In this study, *Lacinius ephippiatus* (C.L.Koch 1835), *Odiellus lendli* (Soerensen 1894), *Zacheus crista* (Brulle, 1832) in Phalangiidae, *Dicranolasma scabrum* (Herbst, 1799) in Dicranolasmatidae were recorded from different localities of the Koprulu Canyon National Park. Within these species *Odiellus lendli* is the new records for the Turkish harvestmen fauna. The descriptions of the species are given below:

Lacinius ephippiatus (Koch, 1835)
Opilio ephippiatus C.L.Koch 1835, Faunae Inseca, Germany, init, 128: p. 17.
Acantholopus ephippiatus C.L.Koch 1848

Description: Body length: Male 3.5-4.5 mm, female 4.5-5.5 mm. Body has a pale brown or gray colored dorsum. Saddle is marked on male, with females is unclear. Ocular area slightly more than the length of the width. There are 4-6 short tubercle on each row. In front of the head, a gear tooth length of the overhang of three are equal and 75° upright called "trident". Scent gland openings is onspicuously. Ventrum pale in color with white spots. Chelicera is pale yellow in color. Basal ventral segment has a ventral spur which is not very significant. Pedipalps are pale yellow in color, with dark brown spots. The ventral surface of the femur has a large number of pointed tubercle. The legs are pale yellow in color, and have the rings darker than. The second leg length is 16.0 to 20.0 mm. Femur, patella and tibia are angled cross-section of the femur pointed tubercles on the corners is very striking, and partly steepened. Broad base of the corpus penis, the dorsal or ventral deeper look upward from the narrow middle ground. At the head of the spike is short, short and thick compared to other species (Figures 1-5).
Material examined: The Koprulu Canyon National Park: Altınkaya (1250 m), forest, 18.05.2005, 1♂, 3♀♀; Beşkonak (60 m), corn-field, 19.05.2005, 2♂♂, 5♀♀; Sağırin (40 m), steppe, 21.05.2005, 3♀♀; Akpaş (220 m), forest, 22.05.2005, 2♀♀.
Habitat, ecology and distribution: Stable zone of forest soil in leaves, branches, stones, under logs, among moss and weeds. At night they migrate between forest and fields. This species has also been recorded in Australia, Britain, Bulgaria, Poland, Scandinavia and the Alpine mountains.

Odiellus lendli (Soerensen, 1894)
Odiellus lendli Martens 1978.
Odiellus bieniaszi, Snegovaya N. Contribution to the Harvest Spider (Arachnida, Opiliones) Fauna of the Caucasus. Turkish Journal of Zoology. 23: 453–459, 1999.

Description: Body length: female 7.0-11.0 mm. The body is great and yellowish gray to dark grayish brown in colour. Saddle are marked and in black color by the center of saddle is blackish. Almost as a rectangular. In addition, the rear part of the saddle is flat. Ocularium is smaller. Size of prosoma is nearly 1/3 of the body. The top of the ocularium is pale in color, and it is covered with uncertain tubercles. The pale colored saddle area is expanding from ocularium to trident.

Tridentes are quite robust and almost equal in length and has an angle of 10 degrees between them. There are tubercules in several number and importance side edges of the prosoma. Each small tubercules on abdominal tergit are arranged, and there are protrusions in brown colour in the middle of the tubercules. Has unclear odoriferous gland, and ventrum pale in color. Chelicera is pale yellow in colour. The ventral spur draws attention on the basal segment. Pedipalp is pale yellowish or brown in colour and there are dark-colored dots and lines on. Femur contains a large number of prominent spine ventral tubercles. There are black, dense tooth on tarsus of the male. The second leg length is 20.0 - 28.0 mm. The legs are short and strong. Femur cylindrical, patella and tibia is angled. There is prominent tubercles on the coxa and trohanter (Figures 6-8).
Material examined: The Koprulu Canyon National Park: Beşkonak (60 m), corn-field, 18.05.2005, 4♀♀; Beşkonak (60 m), forest, 17.06.2006, 3♀♀; Sağırin (40 m), forest, 20.05.2005, 2♀♀; Akpaş (220 m), steppe, 21.06.2006, 2♀♀.
Habitat, ecology and distribution: Forest, field, bush, old building and abandoned areas. This species has also been recorded in the United Kingdom, the Netherlands, Germany, Italy, Yugoslavia, Bosnia, Azerbaijan, Serbia, Poland, Bulgaria, Russia, Georgia, Romania.

Zacheus crista (Brulle, 1832)
Phalangium crista Brulle 1832, Exp. Moree, 3 I (2): p. 60.
Zacheus crista, C.L.Koch 1839
Zacheus crista, Roewer 1923
Zacheus crista, Gruber 1963

Description: Body length: male 4.0-5.0 mm, female 4.5-6.0 mm. Prosomal saddle is in the form of "u", and the back edge is more pronounced. Opisthosomal saddle is in the form of "n", partially flat, central location expands and than shrinks, and then expands again. Front center of prosoma is brown in colour. There are 7-8 pieces spicules on each of the rows of ocular area. Odoriferous gland openings is evident. Tubercles in opisthosoma is creates a parallel transverse lines. As with many kinds of chelicera, cheliceral basal segment of the mid-dorsal aspect has an overhang. The sides of the distal segment transverse, black bands takes place. Moving quotes is in beak shape. Pedipalp looks like thin and long leg. Tarsus of the Pedipalp is nearly twice as long as the tibia. Tarsus length also slightly higher than femur. Length of second leg 15-28 mm. The legs are thin and long. Femora angular, short spines present at corner. Tarsus is the longest second walking leg of segment. Metatarsus and femur follows it. Tarsus is composed of many parts Penis is flat in ventral view, but the base and the ends of the base are a little broader. It is curved in lateral view. Penis head is triangularous, spine makes inward curve (Figures 9-13).
Material examined: The Koprulu Canyon National Park: Çataltepe (45 m), forest, 18.05.2005, 1♂, 1♀; Beşkonak (60 m), forest, 18.05.2005, 2♀♀; Beşkonak (60 m), forest, 17.06.2006, 1♂, 2♀♀; Karabük (140 m), steppe, 19.06.2006, 2♀♀; Akpaş (220 m), steppe, 21.06.2006, 2♀♀.
Habitat, Ecology and Distribution: This is a Mediterranean species. According to the records of literature they are mostly found under stones and trunks in forests, fields and grasslands. Recorded from Denmark, Norway, Sweden, Belgium, the Netherlands, Germany, Switzerland, Austria, Czech Republic, Hungary, Slovakia, Poland, Slovenia, Balkan Peninsula, Crete, Rhodes, Kos, Lesbos, Naxos, Paros (in the Mediterranean Sea), Apsheron Peninsula in the Caucasus, Azerbaijan and Lenkoran Regions, Turkey (Kurt et al., 2008).

Dicranolasma scabrum (Herbst, 1798)
Trogulus scabrum Herbst 1798, Naturgeschichte der Insekten – Gattung *Opilio,* Natursystem der Ungeflügelten Insekten. Zweytes Heft, 1-26, Berlin.
Dicranolasma scabrum, C.L.Koch 1839
Dicranolasma scabrum, Roewer 1940

Description: Body length: male 3.5-4.5 mm, female 4.0-6.0 mm. interior of Cucullus is plainand do not have teeth. Eyes are placed on the middle of cucullus. There is no pattern in the form of saddle but on the middle section there are dark transversal and parallel spots on dorsum. Rows of tubercles are prominent. The distal part of cheliceral basal segment is weak; a few small spines are noticeable on dorsum which is in this segment. Coxa of pedipalp is narrow on proximal and femur is curve on proximal. Dorsal and ventral tubercles of the femur pointed attract attention. Stronger and thicker tubercles are in the ventral. In addition, tubercles on the patella dorsum form a smooth line. The patella is flat. Tibia and tarsus lengths are close to each other. Tarsus is thicker than the other segments. Lengths of second leg are 10.0-14.0 mm. Acute tipped tubercles are found on trochanter, femora and patella. Tarsus is half of tibia, and has a claw. All segments except tarsus are angular in cross section. Base of penis is flat; proximal of corpus is wider than distal (Figures 14-17).
Material examined: The Koprulu Canyon National Park: Beşkonak (60 m), forest, 18.05.2005, 4♀♀; Beşkonak (60 m), forest, 18.06.2006, 3♀♀; Karabük (140 m), steppe, 20.05.2005, 3♀♀; Sağırin (40 m), forest, 19.06.2006, 2♀♀; Akpaş (220 m), steppe, 20.06.2006, 4♀♀.
Habitat, Ecology and Distribution: This species lives under stones in soil zone on sides of rivers and moist places. It is distributed in Rhodes, Greece, Yugoslavia, Austria, Hungary, Bulgaria, Anatolia and the Caucasus.

DISCUSSION

In the present study, we determined only four harvestmen species in the Koprulu Canyon National Park. *Lacinius ephippiatus* (C. L. Koch 1835), *Odiellus lendli* (Soerensen1894), *Zacheus crista* (Brulle, 1832) in Phalangiidae*, Dicranolasma scabrum* (Herbst, 1799)*,* in Dicranolasmatidae were determined. In this study, which was diagnosed *Odiellus lendli* is a new records for Turkey. *Odiellus lendli* distributed in United Kingdom, Netherlands, Germany, Italy, Yugoslavia, Bosnia, Azerbaijan, Serbia, Poland, Bulgaria, Russia, Georgia, Romania.

Köprülü Canyon National Park is located in the province of Antalya, and so natural beauties, rich cultural and historical sources have. This national park does not have a very large area because it has interesting and remarkable for richness of biodiversity we hope that we find more harvestmen species. However, only four harvestmen species have been recorded in this national park. Only adult harvestmen individuals investigated in this study. For some harvestmen specimens whom we collected were immature individuals, they could not be identified because their genital operculums were not opened. Moreover, in some instances some harvestmen species of specimens were collected only the female indivuduals has been very difficult for being diagnosed.

In addition, the harvestmens preferred the clean environments as a living area. Therefore they play a role in the nature as a biological indicator. In this study we could collect only clean and intact area.

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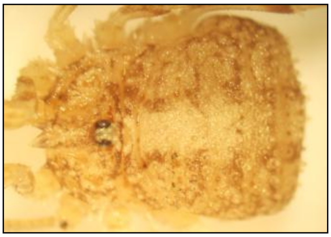

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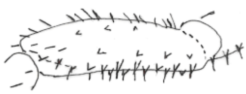

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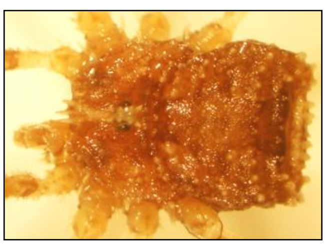
Figures 1-5. *Lacinius ephippiatus;* 1. Body, dorsal view; 2. chelicera, lateral view; 3. Pedipalp, lateral view; 4. Pedipalp, femur view; 5. Glans of penis, lateral view.



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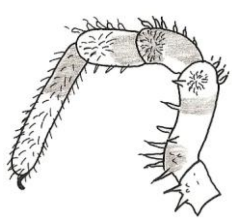

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Figures 6-8. *Odiellus lendli*; 6. Body, dorsal view; 7. chelicera, lateral view; 8. Pedipalp, lateral view.

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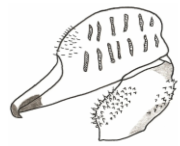

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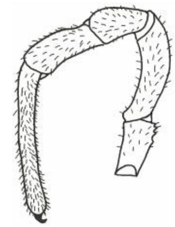

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Figures 9-13. *Zacheus crista*; 9. Body, dorsal view; 10. chelicera, lateral view; 11. Pedipalp, lateral view; 12. Glans of penis, lateral view; 13. Glans of penis, ventral view.

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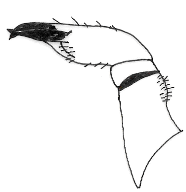

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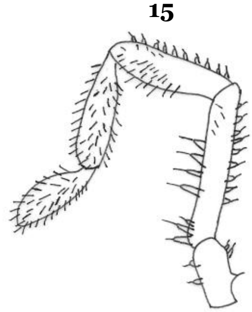

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Figures 14-17. *Dicranolasma scabrum*; 14. Body, dorsal view; 15. cucullus, dorsal view; 16. chelicera, lateral view; 17. Pedipalp, lateral view.

A STUDY ON SPIDERS AS PREDATORS IN THE AGRO ECOSYSTEMS

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[Sharma, S. 2014. A study on spiders as predators in the Agro ecosystems. Munis Entomology & Zoology, 9 (1): 80-83**]**

ABSTRACT: Spiders are one of the most abundant predatory groups in the terrestrial ecosystems as they feed on insects and some other arthropods and thus, they can play important role in pest control. There are more than 3694 genera and 40462 spider species which have been recognized all over the World, out of which about 1066 species have been reported from India. Spiders play an important role in regulating insect pests in agricultural ecosystems but in India, studies on the population and abundance of the spider assemblages in agricultural crops are limited. A preliminary study was conducted to document the spider fauna from the agroecosystems (vegetable fields) of Pauni chak, Jammu, J & K. Pauni chak is known as the vegetable basket of Jammu District as it is just 40 kms from the Jammu city and yields a good amount of seasonal vegetables. The faunistic survey from the vegetable fields yielded 12 species under 9 generas. Araneidae was the most dominant family recording 5 species. On species level, Cyclosa insulana was the dominant species. Orb web weavers represented 70% of the total species collected.

KEY WORDS: Agro ecosystem, predatory role and spiders

Spiders are one of the most abundant predatory groups in the terrestrial ecosystems as they feed on insects and some other arthropods and thus, they can play important role in pest control. There are more than 3694 genera and 40462 spider species which have been recognized all over the World, out of which about 1066 species have been reported from India. Spiders play an important role in regulating insect pests in agricultural ecosystems but in India, studies on the population and abundance of the spider assemblages in agricultural crops are limited. Among the predators, spiders are the most familiar and obligate carnivores, which feed on different types of prey in different cropping systems. Spiders are predaceous arthropods which largely feed on insects, their larvae and arthropod eggs. This study analyses the potential of spiders as natural control agents of insect pests in vegetable agro ecosystems. Accordingly the composition, abundance, predatory activities, feeding niche could be the subject of several studies. Thus, Spiders serve as buffers that limit the exponential growth of pest populations in various ecosystems by virtue of their predatory potency. Although the agricultural literature was not specifically addressed in the reviews of Uetz (1991) and Wise (1993), a rich body of work has demonstrated that vegetation diversity of agro ecosystems provides some measure of plant protection (Risch et al., 1983; Andow, 1991a).

The studies presented in the paper were conducted in the vegetable fields at Pauni chak, Jammu, J & K. Vegetables are widely grown in this region. They are the major source of food for the locals. These vegetables are also grown commercially by the farmers for the handsome income they generate.

Jammu & Kashmir

Strategically located Jammu and Kashmir (J & K) State constitutes the northernmost extremity of India. The state is situated between 32° 172'to 37°

052'North latitude and 73° 262' to 83° 202' East longitudes and 81° East of Greenwich falling in the Western Himalayan Region of the country.

One of the largest states of the Indian union, Jammu and Kashmir state covers a total geographical area of 2,22,236 sq.km. The area comprises mainly of mountainous tract including valleys and river basins of which, 24 lakh hectares form agricultural lands. The state of Jammu and Kashmir has agro- ecologically three distinct zones viz. semi-arctic cold desert areas of Ladakh, temprate Kashmir valley and some parts of Jammu region and sub –tropical region of Jammu. There is a sharp rise of altitude from 1000 ft to 28,500 feet above sea level within state's four degree of altitude. The climate of state varies from tropical plains to semi –arctic cold in Ladakh with Kashmir and Jammu mountainous tracts having temperate climatic conditions. The annual rainfall also varies from region to region with 29.6mm in Leh, 650.5mm in Kashmir valley and 1115.9 mm in Jammu.

The studies presented in the paper were conducted in the Vegetable fields at Pauni chak, Jammu, J & K. Vegetables are widely grown in this region. They are the major source of food for the locals. These vegetables are also grown commercially by the farmers for the handsome income they generate (Table 1).

MATERIALS AND METHODS

Spiders were collected from the Pauni chak vegetable fields in September 2012. The collections were made by a visual searching method following the quadrate method. Each farm was divided into 2 quadrates of 5 X 5 feet dimensions. Plants in the quadrate were carefully searched for spiders. Spiders were collected by active visual search and hand picking. Smaller spiders were collected by leading them into vials containing alcohol with the help of a brush dipped in alcohol. Sedentary spiders found on the leaf blades, and those on the webs were caught in the jar by holding it open beneath them and by tapping the spiders into it with the lid. Running and vagabond species such as lycosids were caught by throwing a handkerchief over them and carefully holding them with the hand in the folds, then transferring them to the jars or directly with hands. The collected spiders were preserved in 70% Ethyl alcohol and glycerol. Adult males and females were identified upto species level whereas immature specimens were identified upto genus level only. The scientific names of spiders and their classification follow Platnick (2011). Voucher specimens are lying with the Museum of Deptt. Of Zoology, University Of Jammu, Jammu, Jammu & Kashmir.

During the Survey of vegetable fields at Pauni chak, the spiders collected are as table 2.

RESULTS AND DISCUSSION

Spiders representing 4 families, 9 genera and 12 species were recorded from Pauni chak during the study (Table 3). Araneidae is the dominant family constituting 5 species from 4 genera. On species level, *Cyclosa insulana* was the most dominant species. Guild structure analysis revealed three feeding guilds (Uetz et al., 1999). These are orb web weavers, Stalkers and ground runners. Orb web weavers constituted the dominant feeding guild representing 70% of the total collection. These spiders due to their different foraging habits were observed preying on different types of pests viz, lepdopteran larvae, beetles, bugs, and tangling many arthropods in their webs, thereby checking the pest populations.

Many salticids were also seen wandering in the field over the leaves but could not identified due to the rupturing of the specimens.

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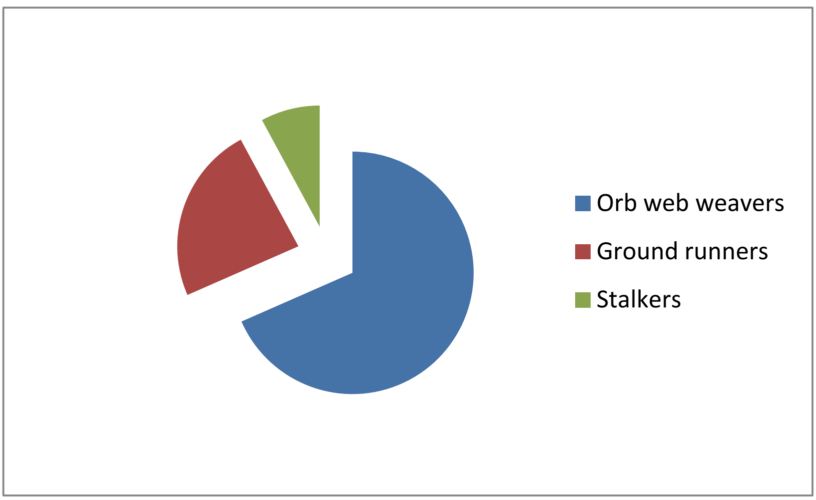

Figure 1. Showing the guild structure of spiders collected from Pauni chak vegetable fields, Jammu.

Table 1. The vegetables grown in the area during the survey period.

S.No.	Common/Vernacular name	Botanical name
1	Round melon	*Praectrullus fistulosuos*
2	Cabbage	*Brassica oleracea*, variety - *capitata*
3	Cauliflower	*Brassica oleracea*, variety - *botrytis*
4	Spinach	*Spinacia oleracea*
5	Karam - sag	*Brassica oleracea*, variety - *acephala*
6	Turnip	*Brassica rapa*

Table 2. Total number of families, genera, species and guilds of spiders reported from vegetable fields at Pauni, Jammu.

S.No.	Family	No. of Genera	No. of Species	Guild
1	Araneidae	4	5	Orb web weavers
2	Tetragnathidae	2	3	Orb web weavers
3	Lycosidae	2	3	Ground runners
4	Oxyopidae	1	1	Stalkers
Total		9	12	

Table 3. Checklist of spiders collected from Pauni chak vegetable fields.

S.No.	Family	Genus/ Species	No. of specimens collected
1.	Araneidae	*Araneus mitificus* Simon, 1886 *Cyclosa insulana* Costa, 1834 *Neoscona mukerjei* Tikader , 1980 *Neoscona elliptica* Tikader & Bal, 1981 *Poltys sp.* C.L.Koch, 1843	10 29 21 04 04
2.	Tetragnathidae	*Leucauge clebesiana* Walckenaer, 1841 *Leucauge decorata* Blackwall, 1864 *Tetragnatha javana* Thorell 1980	17 15 11
3.	Lycosidae	*Hipassa greenalliae* Blackwall, 1867 ♂ *Hipassa greenalliae* Blackwall, 1867 ♀ *Hipassa himalayensis* Gravely, 1924 *Pardosa* C.L.Koch, 1847 sp.	08 15 05 04
4.	Oxyopidae	*Peucetia viridana* Stoliczka, 1869 ♀	12

A CONTRIBUTION TO THE KNOWLEDGE OF BURROWS AND REPRODUCTIVE BIOLOGY OF *STENOTEROMMATA PLATENSIS* HOLMBERG (MYGALOMORPHAE: NEMESIIDAE)

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[Schwerdt, L. & Copperi, S. 2014. A contribution to the knowledge of burrows and reproductive biology of *Stenoterommata platensis* Holmberg (Mygalomorphae: Nemesiidae). Munis Entomology & Zoology, 9 (1): 84-88**]**

ABSTRACT: *Stenoterommata platensis* is a medium-sized nemesiid spider that lives in open burrows. The biology of the Nemesiidae is almost unknown. We describe the courtship and mating of *S. platensis* for the first time based on two observed matings and add some notes about their burrows in the wild on Martín García Island, Argentina. All males initiated courtship by beating with the first pair of legs when contacted with the female silk from the entrance of the burrow. The copulation position achieved was similar to that of most mygalomorphs. This work constitutes preliminary observations and more data are needed to a better understanding of the reproductive biology of this species.

KEY WORDS: Courtship and mating, natural history, spider, Argentina.

Because of the lack in diversity of mygalomorph species studied, it is imperative to develop an understanding of their reproductive biology (Ferretti et al., 2012). The family Nemesiidae has up to now 43 genera and 364 described species, distributed worldwide (Platnick, 2013). These spiders are found across the tropical and subtropical regions of South America, but their biology is almost unknown, with only notes available on a few species mainly distributed throughout Argentina, Chile, Peru and Uruguay (Costa, as cited by Pérez-Miles & Capocasale, 1982; Capocasale & Pérez-Miles, 1990; Goloboff, 1995; Ferretti et al., 2011).

Stenoterommata platensis is a medium-sized nemesiid spider that lives in open burrows, lined with abundant white silk; the burrow mouth is slightly widened, with the silk attached to fallen leaves or branches (Goloboff, 1995). This species is distributed in Argentina (Buenos Aires, Catamarca, Entre Ríos, Misiones and Santa Fé provinces) and Uruguay (Goloboff, 1995; Montes de Oca & Pérez-Miles, 2009; Ferretti et al., 2010). However, no specific data about natural history and reproductive biology have been published about this species.

The aim of this paper is to present for the first time the sexual behavior of *S. platensis*, adding some notes about their burrows in the wild on Martín García Island, Argentina.

MATERIAL AND METHODS

Study area and field work

The study area is located in the upper La Plata River, at the outlet of the Uruguay River, northeastern Buenos Aires Province, Argentina (34°11'25"S - 58°15'38"W). Martín García Island is 37.5 km from the Argentinean coast, 3.5 km from the Uruguayan coast, and 46 km in a straight line from the city of Buenos Aires. The island comprises an area of 168 ha and constitutes the most elevated portion of the deltaic environment in the La Plata River (25 m above sea level)

(Dalla Salda, 1981). The most elevated zone of the island is completely urbanized (Lahitte & Hurrell, 1997). Five different ecological areas are recognized on the basis of physiognomic aspects of the vegetation (Lahitte & Hurrell, 1997): jungle, shore forest, sandy xerophilous forest, airport xerophilous forest and sandy.

The field study took place during September 2009 (spring in Southern Hemisphere) corresponding to the prevailing sexual activity of this species on the island (Ferretti et al., 2010). The burrows found were excavated and measured with a digital caliper. Individuals were sexing (when possible) and collected.

Courtship and mating experiences

For experiences we used three adult males and three adult females from Martín García Island, Buenos Aires, Argentina, captured in September 2011. Voucher specimens are deposited in the collection of the Zoología de Invertebrados II, Universidad Nacional del Sur, Buenos Aires, Argentina. All the females molted before we made observations, so they did not have stored sperm. In the laboratory we kept them individually in plastic Petri dishes (9 cm diameter and 1.5 cm high), with soil as substrate and wet cotton wool moistened daily. These containers allowed us to follow their behavior as they constructed their burrows. We fed all individuals weekly with cockroaches (*Blattella germanica*) of approximately 10 mm length. We used a 12 hours light/dark cycle, and the room temperature during breeding and observations was 26.7°C ± 1.52 SD. In order to observe mating, we placed each female dish inside a larger glass cylindrical container (19 cm diameter and 10 cm high) with a layer of soil approximately 6 cm deep. A depression excavated in the center of the larger container for the female's Petri dish avoided the destruction of the female's shelter during the transfer. The mating arena was illuminated with artificial fluorescent light. For each encounter, we removed the male from his Petri dish and carefully introduced him into the larger container housing the female's dish, and at quite a distance from the female. Encounters were directly observed, recorded with notes and videotaped using a Panasonic SDR-S7. Durations and frequencies are given as averages ± standard deviations.

RESULTS

We captured 16 females and three males of *S. platensis* (Figs. 1a, b) inhabiting the jungle on Martín García Island. All the specimens were found living in short burrows under stones or logs constructed on soils with high values of moisture. The burrows mouths were slightly widened and usually the silk attached with fallen leaves or branches (Fig. 2). The dimensions of burrows are presented in Table 1.

We obtained two matings of *S. platensis* under laboratory conditions during November 2011. All males initiated courtship by beating with the first pair of legs when contacted with the female silk from the entrance of the burrow. After 1 minute of courtship away from the entrance of burrow, the male entered into the shelter and contacted the female with their forelegs. One male made beats with the second pair of legs (in 6 cases) over the female cephalothorax with a mean duration of 12.5 seconds ± 7.72 SD. Then, the male clasped with the first pair of legs between the palp base and chelicerae of female and elevated her to reach the genital opening. After that, males made palpal insertion attempts making 5 and 7 insertions respectively, with a mean duration of 27.7 seconds ± 24.9 SD. The mean duration of copulation was 1.5 and 5.21 minutes respectively. After mating, female retreated deeper into the burrow and male escaped safely.

The copulated females made an egg sac during December 2011. From one egg sac, 18 spiderlings emerged successfully (Figs. 3a, b) on January 20, 2012 and 7 spiderlings emerged from the other egg sac on January 23, 2012.

DISCUSSION

The courtship of males away from the burrow entrance could be indicating the existence of female contact sex pheromones on silk threads that elicited the male courtship, as was proposed for other mygalomorph spider (Ferretti & Ferrero, 2008; Costa & Pérez-Miles, 2002). The beating behavior of males *S. platensis* beating could be similar to that reported for another nemesiid, *Acanthogonatus centralis* Goloboff (Ferretti et al., 2011) and may serve as long-distance male-female communication.

The copulation position achieved was similar to that of most mygalomorphs (Costa & Pérez-Miles, 2002; Ferretti et al., 2011). The number of palpal insertions and the mean duration of copulation by *S. platensis* were similar to that recorded for *A. tacuariensis* Pérez-Miles & Capocasale (Costa, as cited by Pérez-Miles & Capocasale, 1982) and *A. centralis* (Ferretti et al., 2011) but *S. platensis* shows longer durations.

The present study gives a descriptive overview of the mating behavior in *S. platensis* for the first time, but obviously this work constitutes preliminary observations and more data are needed to a better understanding of the reproductive biology of this species.

ACKNOWLEDGEMENTS

Thanks to the Organismo Provincial para el Desarrollo Sostenible (OPDS) for the permits to conduct the study on Martín García Island. Sofía Copperi thanks CONICET for their doctoral fellowship.

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Table 1. Burrows dimensions of the individuals captured on Martín García Island, Argentina.

Burrow	Individual	Burrow entrance diameter (mm)	Burrow length (mm)
1	-	9.8	-
2	Female	16.3	43.3
3	-	9.5	-
4	-	8.9	-
5	Female	9.4	41.6
6	-	10.9	-
7	Female	7.6	18.6
8	Female	10.8	-
9	Female	7	19.7
10	Female	7	-
11	Female	13.5	-
12	Female	9.7	39.7
13	Female	9.9	37.3
14	Female	6.9	37.2
15	Female	10.4	-
16	Female	12.2	-

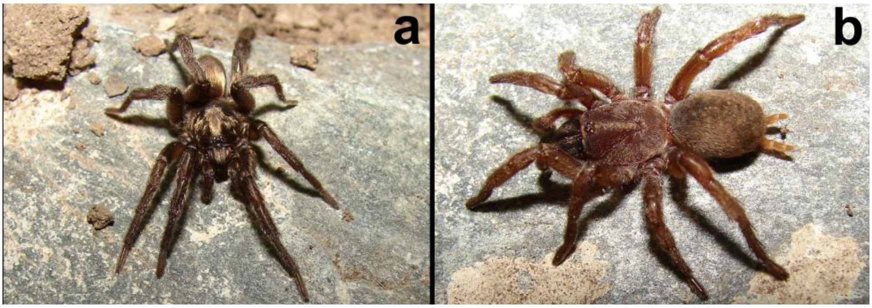

Figure 1. *Stenoterommata platensis*, live habitus, from Martín García Island, Argentina. a. Adult male. b. Adult female.

Figure 2. Burrow entrance (yellow arrow) of *S. platensis* in jungle habitat on Martín García Island. Note the fallen leaves attached with silk.

Figure 3. Adult female *S. platensis* with spiderlings. a. Spiderlings beginning emergence. b. The mother finished opening the egg sac and spiderlings are fully emerged.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART II – CHRYSOMELIDAE: CLYTRINAE

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[Özdikmen, H. & Mercan, N. 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part II – Chrysomelidae: Clytrinae. Munis Entomology & Zoology, 9 (1): 89-102**]**

ABSTRACT: The paper gives chorotype identifications for Turkish Clytrinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Clytrinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014) is the first attempt of this aim. The present study is attempted as the second step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Clytrinae comprises of 76 species group taxa (58 species and 18 subspecies) of 8 genera.

Subfamily CLYTRINAE

Genus *Cheilotoma* Chevrolat, 1836
Subgenus *Cheilotoma* Chevrolat, 1836
***C. beldei* Kasap, 1984**
Range: A: IS JO TR **Records in Turkey:** TR-A: ANK, BOL, ESK, ISP, NEV, SAM, SIV **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. erythrostoma* Faldermann, 1837**
***C. e. erythrostoma* Faldermann, 1837**
Range: E: AB AR BU CZ GG SK ST UK **A:** IN KZ TR **Records in Turkey:** TR-A: ANK, BOL, EZU, KAS, KON, SAM **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Turano-European(Turano-Sarmato-Pannonian)

***C. musciformis* (Goeze, 1777)**
***C. m. musciformis* (Goeze, 1777)**
Range: E: AU BH BU CR CT FR GR HU IT MD ME RO SL ST UK **A:** ES KZ MG TR **Records in Turkey:** TR-A: ANK, KON **Remarks:** The subspecies should be wider distributed than known in Turkey. It has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

***C. voriseki* Medvedev & Kantner, 2003**
Range: A: TR **Records in Turkey:** TR-A: ADI **Remarks:** The endemic species has been known only from South-Eastern Anatolian Region in Turkey up to now. **Chorotype:** Anatolian

Genus *Clytra* Laicharting, 1781
Subgenus *Clytra* Laicharting, 1781
***C. aliena* Weise, 1897**
Range: E: GR **A:** TR **Records in Turkey:** TR-A: ANK, KAS, SIV (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species should be wider distributed than known in Turkey. It has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***C. laeviuscula* Ratzeburg, 1837**
Range: E: AB AL AR AU BE BH BU CR CT CZ FR GB GE GR HU IT MC MD ME PL PT RO SB SK SL SP ST SZ UK **A:** AF KI KZ TD TR WS XIN **Records in Turkey:** TR-A: AFY, ANK, ARD, CNK, DEN, ERZ, EZU, ISP, IZM, KAH, KAY, KON, KRB, KRS, SAK, SIV (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

***C. quadripunctata* (Linnaeus1758)**
***C. q. quadripunctata* (Linnaeus1758)**
Range: E: AB AN AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LS LT MC MD ME NL NR NT PL PT RO SB SK SP ST SV SZ UK **A:** AF ES FE IN KI KZ MG TD TM TR UZ WS **Records in Turkey:** TR-A: ANK, BOL, EZU, KUT (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies has been recorded only from 4 Turkish regions as Aegean Region, Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Centralasiatic

Subgenus *Clytraria* Semenov, 1903
C. atraphaxidis (Pallas, 1773)
C. a. atraphaxidis (Pallas, 1773)
Range: E: AB AL AR BU FR GG GR IT MD PT RO SP ST UK **A:** AF CY IN IS KI KZ LE TR UZ **Records in Turkey:** TR-A: ANK, AMA, ART, AYD, DEN, ERZ, ESK, EZU, ISP, IZM, KAH, KAS, KON, KRS, MAN, MER, NEV, NIG, TOK – TR-E: EDI (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

C. novempunctata Olivier, 1808
Range: E: AB AL AR BU GG GR IT MC RO SB ST TR UK **N:** EG **A:** CY IN IQ IS JO SY TM TR **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, ART, AYD, BAR, BOL, BUR, COR, DEN, ELA, EZU, GAZ, GIR, ISP, IZM, HAT, KAH, KAR, KAS, KAY, KON, KRB, MAN, MAR, MER, MUG, NIG, OSM, SII, SIN, SIV, TOK, TUN, YOZ, USA – TR-E (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Asian Turkey in Marmara Region, and Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean

C. valeriana (Ménétriés, 1832)
C. v. valeriana (Ménétriés, 1832)
Range: E: AB AR BU GG GR MC SB ST TR UK **A:** CY IN IQ KZ SY TR **Records in Turkey:** TR-A: AKS, ANK, ANT, AYD, ESK, ERZ, EZU, GUM, IZM, KAY, KIR, KON, KRS, MAN, MER, NEV, NIG, OSM, SIV, USA, YOZ – TR-E (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. It is not possible to give the distributions of subspecies separately, because infraspecific data are not included in cited references. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. v. taurica Medvedev, 1961
Range: E: UK **A:** TR **Remarks:** See above. **Chorotype:** E-Mediterranean (NE-Mediterranean)

Subgenus *Ovoclytra* Medvedev, 1961
C. binominata Monros, 1953
Range: E: GR **A:** TR **Records in Turkey:** TR-A: ADA, DEN, ISP, IZM, MAN, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Aegean)

C. bodemeyeri Weise, 1900
C. b. bodemeyeri Weise, 1900
Range: A: IQ IS JO TR **Records in Turkey:** TR-A: ANK, ANT, BIL, EZU, GAZ, HAT, ISP, KON, KSH, MER, MUG, NIG, OSM **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and Aegean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

C. nigrocincta (Lacordaire, 1848)
C. n. nigrocincta (Lacordaire, 1848)
Range: A: IN SY TR **Records in Turkey:** TR-A: IST, IZM, MER **Remarks:** The subspecies is very likely wider distributed than known in Turkey. It has been recorded only from 3 Turkish regions as Aegean Region, Marmara Region and Mediterranean Region until now. It should be distributed at least in SE Turkey too. **Chorotype:** SW-Asiatic (Irano-Anatolian + Syro-Anatolian)

***C. ovata* (Lacordaire, 1848)**

***C. o. ovata* (Lacordaire, 1848)**

Range: A: IQ IS JO SY TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. However, it must be distributed very likely only in S Turkey. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. o. borealis* Medvedev & Kantner, 2002**

Range: A: LE SY TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. However, it must be distributed very likely only in S Turkey. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. rotundata* Medvedev, 1961**

Range: A: CY **Records in Turkey:** TR-A (Özdikmen et al., 2010) **Remarks:** Provincial distribution of the species is unknown. However, it must be distributed very likely only in S Turkey. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

***C. weisei* Monros, 1953**

Range: A: IQ SY TR **Records in Turkey:** TR-A: ESK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** Provincial distribution of the species was unknown. However, it is distributed in Central Anatolian Region according to personal communication. And it must be distributed very likely in S Turkey too. **Chorotype:** SW-Asiatic (Mesopotamian or Syro-Anatolian)

Genus *Coptocephala* Chevrolat, 1836

***C. destinoi* Fairmaire, 1884**

Range: E: AB AR GG GR **A:** CY IN SY TR **Records in Turkey:** TR-A: ADA, ANK, ANT, ARD, AYD, BAL, BUR, CAN, ERZ, ESK, EZU, GUM, HAT, ISP, IZM, KAH, KAS, KAY, KON, KRS, MER, MUG, OSM, SIV TR-E: EDI (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only fromSouth-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

***C. fallaciosa* Fairmaire, 1884**

Range: A: IS SY TR **Records in Turkey:** TR-A:HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. gebleri* (Gebler, 1841)**

Range: E: AB AR AL BU GR MC RO ST UK **A:** KI KZ WS **Records in Turkey:** TR-A: ADA, ANK, CAN, EZU, KRS, MER, RIZ, TOK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***C. simillima* Lodewyckx, 1995**

Range: A: TR **Records in Turkey:** TR-A: ERZ **Remarks:** The endemic species has been known only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***C. unifasciata* (Scopoli, 1763)**

***C. u. unifasciata* (Scopoli, 1763)**

Range: E: AB AL AR AU BE BU BY CR CZ EN FR GE GG GR HU IT LA LT MC MD ME PL RO SB SK SL SP ST SZ UK **A:** KZ MG TR WS **Records in Turkey:** TR-A: ADA, AFY, AMA, ANK, ANT, AYD, BAL, BAR, CNK, ERZ, EZU, HAT, ISP, IZM, KAH, KAS, KAY, KON, KRB, MER, MUG, NEV, NIG, OSM, SIV – TR-E: CAN **Remarks:** The subspecies is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Labidostomis* Germar, 1822
Subgenus *Labidostomis* Germar, 1822
L. asiatica Faldermann, 1837
Range: E: AR GG ST **A:** IN SY TR **Records in Turkey:** TR-A: ADA, AFY, AMA, ANK, AYD, BAL, BIL, BOL, ELA, ESK, EZU, DUZ, ISP, IZM, KAS, KAY, KON, KRB, MAN, MER, MUG, NIG, OSM, SIN, TRA, ZON **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian)

L. axillaris Lacordaire, 1848
Range: E: AB AU BU CR CZ FR GE GG HU IT MD PL RO SB SL ST TR UK **A:** IN KZ TR **Records in Turkey:** TR-A: EZU – TR-E: EDI, IST **Remarks:** The species is probably rather widely distributed only in N Turkey. It has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

L. basanica Sahlberg, 1913
Range: A: IQ JO SY TR **Records in Turkey:** TR-A: EZU, DIY **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

L. beckeri Weise, 1881
Range: E: RO ST UK **A:** KZ WS **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** E-European

L. brevipennis Faldermann, 1837
Range: E: AB AR GG **A:** IN IQ SY TR **Records in Turkey:** TR-A: BIN, MAL, SIR **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian)

L. cyanicornis (Germar, 1822)
Range: E: AL AU BH BU BY CR CT CZ EN FR GE HU LA LT IT MD ME PL PT RO SB SK SL SP ST SZ UK **A:** ES KZ MG WS **Records in Turkey:** TR-A: ADA, DUZ, KON **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

L. decipiens Faldermann, 1837
Range: E: AB AR GG **A:** CY IN IQ IS JO SY TR **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, GAZ, HAT, IZM, KAH, KON, MAL, MER, NIG, OSM, URF **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Marmara Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian)

L. diversifrons Lefèvre, 1872
Range: A: CY IN IS JO LE SY TR **Records in Turkey:** TR-A: ADA, AKS, ANK, EZU, HAT, MER, KAR, KAY, KIL, KON, NEV, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian + Syro-Anatolian)

L. elegans Lefèvre, 1876
Range: E: AB AR **A:** IN TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. However, it must be distributed very likely at least in E and SE

Turkey. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

L. hebraea Lacordaire, 1848
Range: A: IS JO LE SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

L. humeralis (Schneider, 1792)
Range: E: AU BE BH BU BY CR CT CZ FR GE HU IT MC MD ME PL RO SB SK SP ST SV SZ UK **Records in Turkey:** TR-A: COR, IZM, BOL **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Black Sea Region until now. **Chorotype:** C and E-European

L. karamanica Weise, 1900
Range: A: CY IS SY TR **Records in Turkey:** TR-A: ADA, ANT, BIL, KON, MER, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

L. kaszabi (Medvedev, 1962)
Range: A: TR **Records in Turkey:** TR-A: KON **Remarks:** The endemic species has been known only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

L. korbi Weise, 1902
Range: A: TR **Records in Turkey:** TR-A: KON **Remarks:** The endemic species has been known only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

L. longimana (Linnaeus, 1760)
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FR GE GG GR HU IT LA LT MC MD ME NL NR NT PL RO SB SK SL SP ST SV SZ UK **A:** ES KZ TR WS **Records in Turkey:** TR-A: AGR, ANK, ARD, BAL, BAY, BIL, BOL, DUZ, ESK, EZU, GUM, ISP, KAH, KAS, KAY, KIR, KON, KRS, NEV, NIG, OSM, SAM, SII, SIV, YOZ, ZON - TR-E: EDI, KRK, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Aegean Region until now. **Chorotype:** Sibero-European

L. lucida (Germar, 1824)
Range: E: AN AU BH BU CT FR GE IT NT PL SK SP ST SZ YU **A:** KZ TR WS **Records in Turkey:** TR-A: ANT, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. maculipennis Lefèvre, 1870
Range: A: IN LE TR **Records in Turkey:** TR-A: AMA, ANK, ANT, EZU, IZM, KAY, KIR, KON, NEV, NIG, SIV, VAN, YOZ (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Palaestinian)

L. mesopotamica Heyden, 1886
Range: A: SY TR **Records in Turkey:** TR-A: AKS, ANK, ANT, BIL, BRS, DEN, ERZ, ESK, ERZ, EZU, HAT, ISP, IZM, KAH, KAS, KAY, KOC, KON, KSH, MAL, MER, MUG, MUS, NEV, NIG, SIV, YOZ **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***L. metallica* Lefèvre, 1872**

***L. m. metallica* Lefèvre, 1872**

Range: E: ST **A:** IN KZ UZ **Records in Turkey:** TR-A: IGD **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turanian

***L. oertzeni* Weise, 1889**

Range: E: AR BU GG GR MC TR **A:** TR **Records in Turkey:** TR-A: AMA, ANK, ANT, CNK, ESK, EZU, ISP, IST, IZM, KAH, MAN, MAR, MUG, NIG – TR-E: IST, KRK **Remarks:** The species is probably widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded from the most parts of the regions in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***L. pallidipennis* (Gebler, 1830)**

Range: E: AB AL AR AU BH BU CR CT CZ FR GG GR HU IT MC ME RO SB SK SP ST TR UK **A:** ES IN KI KZ TR WS XIN **Records in Turkey:** TR-A: ANK, ART, DEN, EZU, IST – TR-E: IST **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***L. peregrina* Weise, 1900**

Range: E: AB AR GG ST **A:** TR **Records in Turkey:** TR-A: AKS, ERZ, EZU, ISP, KSH, MER, NEV **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. propinqua* Faldermann, 1837**

Range: E: AB AL AR BU GG GR MC RO ST TR UK **A:** IQ SY TR **Records in Turkey:** TR-A: ADA, AKS, AMA, ANK, ANT, BOL, CNK, ERZ, EZU, GUM, IST, IZM, KAH, KAS, KAY, KOC, KON, KRB, MER, NEV, NIG, SAK, SAM, SIV, TRA – TR-E **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***L. rufa* (Waltl, 1838)**

Range: E: BU GR MC **A:** TR **Records in Turkey:** TR-A: ADA, AFY, AMA, ANK, ANT, BIL, BOL, BRS, COR, DEN, ERZ, ESK, EZU, GAZ, ISP, IST, IZM, KON, KUT, MAN, NEV, NIG, OSM – TR-E: IST, KRK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded from the most parts of the regions in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***L. subfasciata* Weise, 1885**

Range: E: AB AR **A:** IN TM TR **Records in Turkey:** TR-A: HAK, VAN **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

***L. sulcicollis* Lacordaire, 1848**

Range: E: AR TR **A:** TR **Records in Turkey:** TR-A: ANK, IST, KON, NEV, YOZ – TR-E: IST **Remarks:** The species is probably rather widely distributed in N and C Turkey. It has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. testaceipes* Pic, 1904**

Range: A: IQ SY TR **Records in Turkey:** TR-A: DIY, GAZ, HAT **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

Genus *Lachnaia* Chevrolat, 1836
Subgenus *Lachnaia* Chevrolat, 1836
***L. sexpunctata* (Scopoli, 1763)**
Range: E: AL AU BE BH BU CR CZ FR GE GR HU IT MC MD ME NT RO SB SK SL ST SZ UK **A:** IS TR **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, BIL, BRS, BUR, COR, ISP, KAY, KON, KUT, MER, OSM, SAK, YOZ – TR-E (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

Genus *Macrolenes* Chevrolat, 1836
***M. dentipes* (Olivier, 1808)**
Range: E: AL AU BH BU CR FR GR IT MC ME SL SP **N:** AG MO TU **A:** TR **Records in Turkey:** TR-A: AYD, BAL, BRS, CAN, ISP, IZM, MAN, MUG **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Mediterranean

Genus *Smaragdina* Chevrolat, 1836
***S. affinis* (Illiger, 1794)**
***S. a. affinis* (Illiger, 1794)**
Range: E: AU BE BH BU BY CR CT CZ FI FR GB GE HU IT LA MC MD NL PL RO SK SL SP SZ UK **Records in Turkey:** TR-A: SAM **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** C and E-European

***S. amasina* (Pic, 1897)**
Range: A: TR **Records in Turkey:** TR-A: AMA **Remarks:** The endemic species has been known only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***S. aurita* (Linnaeus, 1767)**
***S. a. aurita* (Linnaeus, 1767)**
Range: E: AL AU BE BH BU CR CT CZ DE FR GE GR HU IT MC MD ME PL RO SB SK SL SP ST SV SZ TR UK **Records in Turkey:** TR-A: BOL, IST, SIN – TR-E **Remarks:** The subspecies is probably rather widely distributed only in N Turkey. It has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** European

***S. biornata* (Lefèvre, 1872)**
***S. b. biornata* (Lefèvre, 1872)**
Range: E: AR GG **A:** TR **Records in Turkey:** TR-A: AKS, AMA, ANK, BOL, CNK, COR, ERZ, EZU, GUM, ISP, IZM, KAH, KAS, KAY, KON, KSH, NEV, OSM, SAM, SIV, YOZ **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***S. b. angorensis* (Lopatin, 2002)**
Range: A: TR **Records in Turkey:** TR-A: ANK **Remarks:** The endemic subspecies has been known only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***S. chloris* (Lacordaire, 1848)**
***S. c. chloris* (Lacordaire, 1848)**
Range: E: BU HU RO **A:** TR **Records in Turkey:** TR-A: ANK **Remarks:** The subspecies has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***S. djebellina* (Lefèvre, 1872)**
Range: A: IS JO LE SY **Records in Turkey:** TR-A: HAT **Remarks:** The species has been

recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

S. flavicollis (Charpentier, 1825)

Range: E: AU BE BH BU BY CR CT CZ EN FI FR GE GR HU IT LA LS LT NL NT PL RO SK SL SP ST SZ UK **A:** TR **Records in Turkey:** TR-A: AMA, BIN, COR, ISP, MER, SIV, YOZ **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

S. graeca (Kraatz, 1872)

Range: E: BU GR MC SB **Records in Turkey:** TR-A: AMA, ANT, BOL, EZU **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

S. hypocrita (Lacordaire, 1848)

Range: E: BU GG RO SB TR UK **A:** TR **Records in Turkey:** TR-A: ANK, BOL, BRS, CNK, COR, DUZ, ESK, GAZ, GUM, HAT, IST, KAS, KUT, OSM, SAM, SIN, TOK, TRA – TR-E: IST (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

S. judaica (Lefèvre, 1872)

Range: A: IS JO LE SY TR **Records in Turkey:** TR-A: ADA, ISP, MER, OSM **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

S. laeviceps Abeille de Perrin, 1895

Range: A: TR **Records in Turkey:** TR-A: HAT **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

S. limbata (Steven, 1806)

Range: E: AB AR BU GG GR MC RO SB ST TR **A:** CY IN IS JO SY TR **Records in Turkey:** TR-A:ADA, AFY, AMA, ANK, ANT, AYD, BAL, BIL, BRS, BOL, BUR, CAN, CNK, COR, DEN, DIY, DUZ, ERZ, ESK, EZU, GAZ, HAK, HAT, ISP, IST, IZM, KAH, KAS, KON, KRB, KUT, MAN, MER, MUG, NIG, OSM, SAK, SAM, SIN, USA, YOZ, ZON – TR-E: IST, KRK, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Eastern Black Sea Part in Black Sea Region and Upper Murat-Van Part in Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

S. persica Pic, 1911

Range: A: IN **Records in Turkey:** TR-A: KAH **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. It must be distributed very likely at least in SE Turkey too. **Chorotype:** SW-Asiatic (Irano-Anatolian)

S. salicina (Scopoli, 1763)

Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GE GG GR HU IT LA LT MC MD ME NL NT PL RO SB SK SL SP ST SV SZ UK **A:** KZ TR WS XIN **Records in Turkey:** TR-A: AMA, ANK, BOL, IST, KRB, SAM, SIN – TR-E **Remarks:** The species is rather widely distributed in N Turkey. It has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

***S. scutellaris* (Lefèvre, 1872)**
Range: A: IN IS IQ LE SY TR **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian + Syro-Anatolian)

***S. tibialis* (Brullé, 1832)**
Range: E: AL BU GR HU MC RO TR **A:** CY IS LE SY TR **Records in Turkey:** TR-A: AMA, ANK, BAL, BOL, BRS, CNK, COR, DUZ, ISP, IST, IZM, KAS, KON, KRB, KUT, MAN, MUG, SAK – TR-E: EDI, IST, KRK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***S. unipunctata* (Olivier, 1808)**
Range: E: AB AR GG ST **N:** EG **A:** IN IQ IS JO SY TM TR **Records in Turkey:** TR-A: URF **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-E-Mediterranean)

***S. vaulogeri* (Pic, 1895)**
Range: A: SY TR **Records in Turkey:** TR-A: GAZ, HAT, ISP, MER, OSM **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***S. viridana* (Lacordaire, 1848)**
***S. v. viridana* (Lacordaire, 1848)**
Range: A: IS LE SY TR **Records in Turkey:** TR-A: ANT, BOL, DIY, GAZ, HAT, KAH, KON, SII **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***S. xanthaspis* (Germar, 1824)**
Range: E: AB AL AR AU BH BU CR CT CZ FR GE GG GR HU IT MC MD ME PL RO SB SK SL ST TR UK **A:** IS SY TR **Records in Turkey:** TR-A: AFY, AMA, ANK, ANT, ART, BAL, BAR, BRS, BIL, BOL, CNK, COR, DUZ, EZU, ISP, KAH, KAS, KAY, KON, KRB, NIG, ORD, SAK, SAM, SIN, SIV, TRA, YOZ, ZON - TR-E: EDI (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-European

Genus *Tituboea* Lacordaire, 1848
***T. arabica* (Olivier, 1808)**
Range: N: EG **A:** IN IQ IS JO SA SI YE **Records in Turkey:** TR-A: HAT, KAH **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic

***T. macropus* (Illiger, 1800)**
Range: E: AB AL AR AU BH BU CR CT CZ GG GR HU IT MC MD ME RO SK SL SZ UK **A:** IN IS JO KZ SY TM TR UZ **Records in Turkey:** TR-A: ADA, AKS, ANK, ANT, ART, AYD, BOL, CAN, CNK, COR, ERZ, EZU, HAT, ISP, IZM, KAH, KAS, KAY, KIL, KON, KRB, KRS, MER, MUG, NEV, NIG, OSM, SIV – TR-E: EDI, IST (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turana-Apenninian)

***T. sexmaculata* (Fabricius, 1781)**
Range: E: FR IT PT SP **N:** AG MO TU **A:** IN IS LE SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey

until now. **Chorotype:** Mediterranean

ZOOGEOGRAPHICAL ANALYSIS

Turkish Clytrinae includes 76 species group taxa (58 species and 18 subspecies that include nominotypical and other). 18 species group taxa, namely 23.68 % of the taxa have "SW-Asiatic" chorotype. 15 species group taxa, namely 19.74 % of the taxa have "Turano-Mediterranean" chorotype. 14 species group taxa, namely 18.42 % of the taxa have "E-Mediterranean" chorotype. 7 species group taxa, namely 9.21 % of the taxa have "Anatolian" chorotype. 6 species group taxa, namely 7.90 % of the taxa have "C and E-European" chorotype. 6 species group taxa, namely 7.90 % of the taxa have "Sibero-European" chorotype. 2 species group taxa, namely 2.63 % of the taxa have "Centralasiatic-European" chorotype. 2 species group taxa, namely 2.63 % of the taxa have "Mediterranean" chorotype. 2 species group taxa, namely 2.63 % of the taxa have "Turano-European" chorotype. Each of the remaining 4 species group taxa has a different chorotype. One species, namely about 1.32 % of the taxa has "E-European" chorotype. One species, namely about 1.32 % of the taxa has "European" chorotype. One species, namely about 1.32 % of the taxa has "Sibero-European + Centralasiatic" chorotype. And one species, namely about 1.32 % of the taxa has "Turanian" chorotype (Fig. 1). So the dominant chorotype for Turkish Clytrinae is "SW-Asiatic" (23.68 %). "Turano-Mediterranean" (19.74 %) and "E-Mediterranean" (18.42 %) chorotypes follow it respectively. Also the members of "Anatolian" (9.21 %), "C and E-European" (7.90 %) and "Sibero-European" (7.90 %) chorotypes present important contributions for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Clytrinae are presented as follows:

A total of 18 species group taxa have "SW-Asiatic" chorotype as *C. nigrocincta nigrocincta*, *C. weisei*, *C. destinoi*, *L. asiatica*, *L. brevipennis*, *L. decipiens*, *L. diversifrons*, *L. elegans*, *L. maculipennis*, *L. mesopotamica*, *L. peregrina*, *L. sulcicollis*, *L. testaceipes*, *S. biornata biornata*, *S. persica*, *S. scutellaris*, *S. vaulogeri* and *T. arabica*.

A total of 15 species group taxa have "Turano-Mediterranean" chorotype as *C. aliena*, *C. novempunctata*, *C. valeriana valeriana*, *C. gebleri*, *L. oertzeni*, *L. propinqua*, *L. rufa*, *L. subfasciata*, *S. chloris chloris*, *S. graeca*, *S. hypocrita*, *S. limbata*, *S. tibialis*, *S. unipunctata* and *T. macropus*.

A total of 14 species group taxa have "E-Mediterranean" chorotype as *C. beldei*, *C. valeriana taurica*, *C. binominata*, *C. bodemeyeri bodemeyeri*, *C. ovata ovata*, *C. ovata borealis*, *C. rotundata*, *C. fallaciosa*, *L. basanica*, *L. hebraea*, *L. karamanica*, *S. djebellina*, *S. judaica* and *S. viridana viridana*.

A total of 7 species group taxa have "Anatolian" chorotype as *C. voriseki*, *C. simillima*, *L. kaszabi*, *L. korbi*, *S. amasina*, *S. biornata angorensis* and *S. laeviceps*.

A total of 6 species group taxa have "C and E-European" chorotype as *L. axillaris*, *L. humeralis*, *L. lucida*, *L. sexpunctata*, *S. affinis affinis* and *S. flavicollis*.

A total of 6 species group taxa have "Sibero-European" chorotype as *C. musciformis*, *C. unifasciata unifasciata*, *L. cyanicornis*, *L. longimana*, *L. pallidipennis* and *S. salicina*.

A total of 2 species group taxa have "Centralasiatic-European" chorotype as *C. laeviuscula* and *C. atraphaxidis atraphaxidis*.

A total of 2 species group taxa have "Mediterranean" chorotype as *M. dentipes* and *T. sexmaculata*.

A total of 2 species group taxa have "Turano-European" chorotype as *C. erythrostoma* and *S. xanthaspis*.

One species as *L. beckeri* has "E-European" chorotype.

One species as *S. aurita aurita* has "European" chorotype.

One species as *C. quadripunctata quadripunctata* has "Sibero-European + Centralasiatic" chorotype.

One species as *L. metallica metallica* has "Turanian" chorotype.

On the other side, Turkish Clytrinae includes a total of 76 species group taxa. However, provincial distributions of 5 species group taxa are unknown. So Turkish Clytrinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio.

For the subfamily Clytrinae (according to all species group taxa):
29 species are represented in Marmara Region (38 %)
27 species are represented in Aegean Region (36 %)
46 species are represented in Mediterranean Region (61 %)
44 species are represented in Central Anatolian Region (58 %)
36 species are represented in Black Sea Region (47 %)
36 species are represented in Eastern Anatolian Region (47 %)
14 species are represented in South-Eastern Anatolian Region (18 %)

For the subfamily Clytrinae (according to known provincial distribution of 71 species group taxa):
29 species are represented in Marmara Region (41 %)
27 species are represented in Aegean Region (38 %)
46 species are represented in Mediterranean Region (65 %)
44 species are represented in Central Anatolian Region (62 %)
36 species are represented in Black Sea Region (51 %)
36 species are represented in Eastern Anatolian Region (51 %)
14 species are represented in South-Eastern Anatolian Region (20 %)

So Turkish Clytrinae that includes a total of 76 species group taxa or 71 species group taxa of which are known provincial distributions in Turkey, are widely distributed in all Turkish Regions. The most number of species is represented in Mediterranean Region. Central Anatolian Region follows it. Black Sea Region and Eastern Anatolian Region are represented with an important number of species. However, Marmara Region, Aegean Region and especially South-Eastern Anatolian Region are represented with a rather little number of species now.

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Table 1. The regional distribution of all known species of Clytrinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyCLYTRINAE							
C. beldei	-	-	+	+	+	-	-
C. e. erythrostoma	-	-	-	+	+	+	-
C. m. musciformis	-	-	-	+	-	-	-
C. voriseki	-	-	-	-	-	-	+
C. aliena	-	-	-	+	+	-	-
C. laeviuscula	+	+	+	+	+	+	-
C. q. quadripunctata	-	+	-	+	+	+	-
C. a. atraphaxidis	+	+	+	+	+	+	-
C. novempunctata	+	+	+	+	+	+	+
C. v. valeriana	+	+	+	+	-	+	-
C. v. taurica	?	?	?	?	?	?	?
C. binominata	-	+	+	-	-	-	-
C. b. bodemeyeri	+	-	+	+	-	+	+
C. n. nigrocincta	+	+	+	-	-	-	-
C. o. ovata	?	?	?	?	?	?	?
C. o. borealis	?	?	?	?	?	?	?
C. rotundata	?	?	?	?	?	?	?
C. weisei	-	-	-	+	-	-	-
C. destinoi	+	+	+	+	+	+	-
C. fallaciosa	-	-	+	-	-	-	-
C. gebleri	+	-	+	+	+	+	-
C. simillima	-	-	-	-	-	+	-
C. u. unifasciata	+	+	+	+	+	+	-
L. asiatica	+	+	+	+	+	+	-
L. axillaris	+	-	-	-	-	+	-
L. basanica	-	-	-	-	-	+	+
L. beckeri	-	-	-	-	-	+	-
L. brevipennis	-	-	-	-	-	+	-
L. cyanicornis	-	-	+	+	+	-	-
L. decipiens	-	+	+	+	+	+	+
L. diversifrons	-	-	+	+	-	+	+
L. elegans	?	?	?	?	?	?	?
L. hebraea	-	-	+	-	-	-	-
L. humeralis	-	+	-	-	+	-	-
L. karamanica	+	-	+	+	-	-	-
L. kaszabi	-	-	-	+	-	-	-
L. korbi	-	-	-	+	-	-	-
L. longimana	+	-	+	+	+	+	+
L. lucida	-	-	+	-	-	+	-
L. maculipennis	-	+	+	+	+	+	-
L. mesopotamica	+	+	+	+	+	+	-
L. m. metallica	-	-	-	-	-	+	-
L. oertzeni	+	+	+	+	+	+	+
L. pallidipennis	+	+	-	+	+	+	-

L. peregrina	-	-	+	+	-	+	-
L. propinqua	+	+	+	+	+	+	-
L. rufa	+	+	+	+	+	+	+
L. subfasciata	-	-	-	-	-	+	-
L. sulcicollis	+	-	-	+	-	-	-
L. testaceipes	-	-	+	-	-	-	+
L. sexpunctata	+	+	+	+	+	-	-
M. dentipes	+	+	+	-	-	-	-
S. a. affinis	-	-	-	-	+	-	-
S. amasina	-	-	-	-	+	-	-
S. a. aurita	+	-	-	-	+	-	-
S. b. biornata	-	+	+	+	+	+	-
S. b. angorensis	-	-	-	+	-	-	-
S. c. chloris	-	-	-	+	-	-	-
S. djebellina	-	-	+	-	-	-	-
S. flavicollis	-	-	+	+	+	+	-
S. graeca	-	-	+	-	+	+	-
S. hypocrita	+	+	+	+	+	-	+
S. judaica	-	-	+	-	-	-	-
S. laeviceps	-	-	+	-	-	-	-
S. limbata	+	+	+	+	+	+	+
S. persica	-	-	+	-	-	-	-
S. salicina	+	-	-	+	+	-	-
S. scutellaris	-	-	-	+	-	-	-
S. tibialis	+	+	+	+	+	-	-
S. unipunctata	+	+	+	+	+	+	-
S. vaulogeri	-	-	+	-	-	-	+
S. v. viridana	-	-	+	+	+	-	+
S. xanthaspis	+	+	+	+	+	+	-
T. arabica	-	-	+	-	-	-	-
T. macropus	+	+	+	+	+	+	-
T. sexmaculata	-	-	+	-	-	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

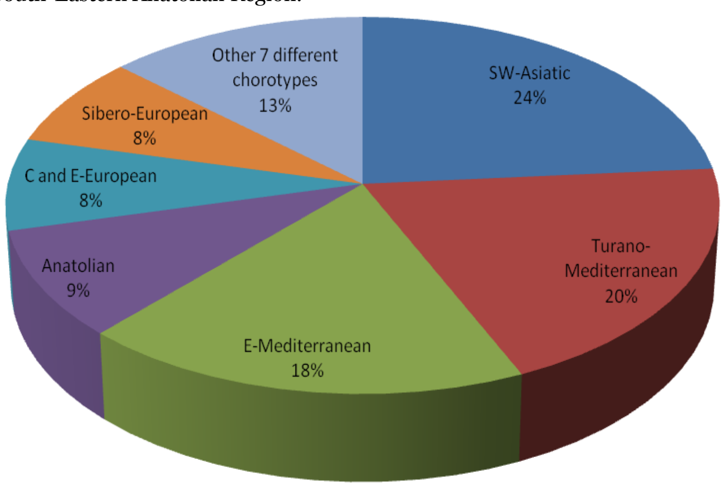

Figure 1. Chorotypical distribution of Turkish Clytrinae.

ADDITIONS TO THE RARE SPECIES OF BRACONIDAE FAUNA (HYMENOPTERA: BRACONIDAE) FROM TURKEY

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ABSTRACT: 7 subfamilies of the Braconidae family were identified, and 5 of these, Adeliinae, Charmontinae, Exothecinae, Ichneutinae and Rhyssalinae are new records for the Turkish fauna. In addition, 7 genera: *Adelius* Haliday, 1833; *Charmon* Haliday, 1833; *Ichneutes* Nees, 1816; *Proterops* Wesmael, 1835; *Pseudichneutes* Belokobylskij, 1996; *Dolopsidea* Hincks, 1944; *Colastes* Haliday, 1833 and 12 species: *Adelius* (*Adelius*) *erythronotus* (Förster, 1851); *A.*(*A.*) *subfasciatus* Haliday, 1833; *Charmon extensor* (Linnaeus, 1758); *Homolobus* (*Chartolobus*) *infumator* (Lyle, 1914); *H.* (*Phylacter*) *annulicornis* (Nees, 1834); *Hormius moniliatus* (Nees,1811); *Ichneutes reunitor* Nees,1816; *Proterops nigripennis* Wesmael, 1835; *Pseudichneutes levis* (Wesmael, 1835); *Dolopsidea tatianae* (Telenga, 1941); *D. indagator* (Haliday, 1836) and *Colastes* (*Xenarcha*) *lustrator* (Haliday, 1836) are recorded for the first time from Turkey. Comments are presented on some insufficiently known taxa, and zoogeographic interest is the record of the each species for considered to be Turkey's fauna.

KEY WORDS: Braconidae, Hymenoptera, new records, zoogeographic, Turkey.

Braconidae is a family of parasitoid wasps and one of the richest families of insects. Between 17963 species exist worldwide. The species are grouped into about 47 subfamilies, 97 tribes and 1032 genera. This work reports on the rare braconids fauna, and in particular new records for Turkey. Although there has been a significant increase in our knowledge of rare braconid taxonomy, in this paper only Homolobinae and Hormiinae subfamilies had been previously recorded from Turkey (Yu et al., 2006).

Members in this family have long and thin body, long antenna and some with very long ovipositor. They have narrow waist like most other wasps. They are from small to medium in size. The two families Braconidae and Ichneumonidae are very close related and some species look similar. They can be distinguished by the forewing venation. In the Ichneumons there is an extra vein creating a cell which can not be found on Braconids (Matthews, 1974).

Braconidae wasps are attack of wide range of host species (Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Orthoptera, Psocoptera) (Yu et al., 2006). Some species attack spiders, while some are hyperparasitic. There are both solitary and gregarious species in the family (Shaw, 1995; Wharton, 1993). Braconids represent two biological groups substantially differing in mode of life and morphology of larvae. All ectoparasites have been combined in the subfamilies Braconinae, Doryctinae and Microgastrinae, and the endoparasites in the remaining subfamilies. Since Braconidae with few exceptions are all primary parasites, this family in particular has attracted increasing interest as emphasis in pest control has shifted toward biotic agents (Sharkey, 1993; Tobias, 1986).

Although many studies were carried out about different habitats, altitude, and season on braconid wasps in different regions of Turkey, in Turkey such studies are the first time. Here, we add a few more species and discuss the distribution of others.

MATERIAL AND METHODS

Sample collection

Adult braconid wasps from Turkey were collected from various habitats and altitudes between years 1986-2009. Sweeping nets and light traps were used to obtain samples on grass-type plants. The specimens were then pinned and labeled according to taxonomic rules and regulations.

Species identification

Morphological terminology and characters used in this description follow: Achterberg, 1993; Belokobylskij, 1988, 1998; Chen et al., 2004 and Tobias, 1986. The specimens were deposited in the collection of the Zoological Museum at Trakya University.

Study area

Turkey, at the centre of Asia, Europe and Africa continents, is located between 26° and 45° east meridians according to Greenwich, between 36° and 42° North paralel according to Ecvator. Some parts of the country belongs to Asia continent (Anatolian Peninsula), and the other belongs to Europe continent (Thrace includes the westernmost part of Turkey). Also the country is related to Africa continent. According to these features, Turkey has three different bio-geographical regions, namely Europe-Siberian, Mediterranean and Iran-Turan. So, the country is a small continent according to its biodiversity (Lodos, 1995).

For each species, a listing of the materials examined, species distribution (Yu et al., 2006) and proposed chorotypes (items of classification based on distribution patterns as inferred from the comparative analysis of the geographical ranges of species, Vigna Taglianti et al., 1999). Vigna Taglianti et al. (1999) classification results from the comparision of over 3,000 geographical ranges of terrestrial and freshwater animal species. Chorotypes are useful for interspecific faunistic and biogeographic comparisions. The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999).

RESULTS

13 species belonging to 7 subfamilies within family Braconidae were identified, and 5 subfamilies, 7 genera and 12 species new records for fauna of Turkey. The taxa are presented alphabetically.

Subfamily Adeliinae Viereck, 1918

***Adelius* Haliday, 1833**

***Adelius* (*Adelius*) *erythronotus* (Förster, 1851)**

Material examined: **Kastamonu**-Ilgaz Mountain-Çatören, mixed forest, 1280 m, 30.08.2002, 1♀, 2♂♂.

Distribution: Palearctic (Azerbaijan, Bosnia Hercegovina, former Czechoslovakia, France, Georgia, Germany, Hungary, Ireland, Korea, Moldova, Poland, Russia, Switzerland, Turkmenistan, Ukraine, United Kingdom, former Yugoslavia).

Chorotype: Asiatic-European.

New record for Turkey.

Adelius (*Adelius*) *subfasciatus* Haliday, 1833

Material examined: Bolu-Gerede-Güney, pasture, 1200 m, 13.06.2002, 1♂; **Karabük**-Safranbolu-İnceçay-Sarıçiçekdağı, *Pinus* sp., oak and pasture, 1567 m, 29.06.2001, 1♀; **Trabzon**-Maçka-Şolma Yaylası, fir forest, 1677 m, 05.08.2005, 3♀♀; -Maçka-Sümela, pasture, 1073 m, 03.07.2004, 1♀; **Sivas**-Hafik-Durulmuş, clover field and pasture, 1275 m, 31.5.2007, 1♀.

Distribution: Palearctic: Belgium, Bulgaria, Croatia, Czech Republic, former Czechoslovakia, Finland, France, Georgia, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, former Yugoslavia.

Chorotype: Asiatic-European.

New record for Turkey.

Subfamily Charmontinae van Achterberg, 1979

Charmon Haliday, 1833

Charmon extensor (Linnaeus, 1758)

Material examined: Samsun-Salıpazarı-Astepe mevkii, chestnut and pasture, 600 m, 03.07.2003, 1♀.

Distribution: Ethiopian, Nearctic, Neotropical, Oriental, Paleearctic: Austria, Azerbaijan, Belgium, Bulgaria, China, former Czechoslovakia, Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, United Kingdom.

Chorotype: Holarctic.

New record for Turkey.

Subfamily Homolobinae van Achterberg, 1979

Homolobus Förster, 1862

Homolobus (*Apatia*) *truncator* (Say, 1829)

Material examined: Adana-Kadirli, pasture, 89 m, 18.12.1997, 1♀; **Afyon**-Emirdağ-Kırkpınar, poplar woodland and pasture, 911 m, 07.07.2006, 1♂; **Amasya**-Suluova, poplar woodland and pasture, 470 m, 03.09.2003 1♂; **Ankara**-Temelli-Elagöz, poplar woodland and pasture, 803 m, 10.07.2007, 1♂, 3♀♀; -Tuz Gölü 22.04.2001, pasture, 920 m, 1♀; **Aydın**-Kocarlı, orchard and pasture, 51 m, 18.09.1996, 1♂; **Batman**-Ünlüce, pasture, 1506 m, 15.08.1991, 1♂; **Bayburt**, vegetable garden, 1562 m, 07.08.2005, 1♂; -Konursu, clover field, 1522 m, 30.08.2004, 1♀, 2♂♂; **Bursa**-Süleymaniye, orchard, 380 m, 19.09.1992, 1♀; **Çanakkale**-Yenice-Sameteli, pasture, 120 m, 12.09.2002, 1♂; **Elazığ**-Cip Barajı, poplar woodland and pasture, 1006 m, 04.06.2007, 2♂♂; **Çorum**-Alacahöyük, pasture, 867 m, 07.06.2003, 1♀; -İskilip-Karlık, orchard and pasture, 546 m, 26.08.2004, 1♂; Denizli-Tavas-Tekkeköy, vegetable garden, 419 m, 30.07.1997, 1♂; **Edirne**-Lalapaşa-Sinanköy, clover field, 350 m, 02.08.2000, 1♀; **Erzurum**, pasture, 1939 m, 10.06.1999, 3♂♂; **Giresun**-Alucra, oak and clover field, 1300 m, 02.07.2004, 1♂; **Gümüşhane**-Kelkit, pasture, 1259 m, 29.07.1991, 1♀; -Şiran-Karaşeyh, poplar woodland and pasture, 1435 m, 29.08.2004, 1♂; **Isparta**-Güneykent, pasture, 1032m, 12.05.2004, 1♂; **Kastamonu**-Alamaşişli, orchard and clover field, 620 m, 06.09.2001, 1♂; -Daday-İnceğiz-Çiftlik, pine forest, 860 m, 29.08.2002, 1♀; **Kayseri**-Bağpınar, clover field, 1097 m 14.09.2006, 2♂♂; -Erciyes, pasture, 2056 m, 25.6.2009, 1♀; **Kırklareli**-İnece-Paşayeri, clover field, 150 m, 02.08.2000, 1♀; -Lüleburgaz-Türkgeldi, orchard and pasture, 60 m, 13.08.1992, 1♂; **Kırıkkale**-Karakeçili, poplar woodland and clover field, 839 m, 11.07.2007, 5♀♀, 4♂♂; **Kırşehir**-Kaman, crop field and pasture, 1020 m, 10.07.2007, 1♀, 1♂; -Kaman-Darıözü, beetroot field, 902 m, 16.09.2006, 1♂; -Özbağ, clover field and poplar woodland, 1036 m, 16.09.2006, 1♀, 1♂; **Konya**-Beyşehir, clover field, 1256 m, 22.04.2001, 1♀; -Seydişehir, vegetable garden, 1130 m, 09.09.2006, 1♂; **Mardin**-Ömerli, pasture, 1088 m, 19.6.2009, 1♀; **Muğla**-Milas-Çamiçi 24.06.1999, clover field, 100 m, 1♀; **Nevşehir**-Avanos-Saruhan, poplar woodland and pasture, 958 m, 06.06.2007, 1♀; -Gülşehir-Gümüşkent, crop field and pasture, 1286 m, 07.06.2007, 1♀; **Niğde**-Ava, pasture, 1467 m, 02.06.2005, 1♀; -Bor-Çukurkuyu, vegetable garden and clover field, 1078 m, 19.07.2007, 5♀♀, 2♂♂; **Siirt**,

pasture, 986 m, 30.7.2009, 3♀♀; **Sivas**-Taşlıdere, pasture, 956 m, 23.05.2001, 1♂; **Tekirdağ**-Işıklar, pasture, 400 m, 09.09.1999, 2♀♀; (light trap), 09.09.1999, 3♀♀; -Saray-Küçüksinekli, orchard, 170 m, 25.08.1992, 1♂; **Tokat**-Almus-Çilhane, clover field and pasture, 830 m, 02.09.2003, 1♀; **Uşak**-Banaz, orchard and crop field, 820 m, 22.07.1997, 1♀; **Yozgat**-Sorgun-Mahmatlı, crop field and pasture, 1083 m, 21.08.2008, 1♀.
Distribution: Ethiopian, Nearctic, Neotropical, Palearctic (Afghanistan, Austria, Belgium, Bosnia Hercegovina, Bulgaria, China, Cyprus, Czech Republic, former Czechoslovakia, Denmark, Finland, Egypt, France, Georgia, Germany, Greece, Hungary, Israel, Italy, Japan, Kazakhstan, Lithuania, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkmenistan, Turkey, United Kingdom, former Yugoslavia).
Chorotype: Holarctic.

Homolobus (*Chartolobus*) *infumator* (Lyle, 1914)

Material examined: Aydın-Germencik-Kızılcapınar, clover field, 70 m, 17.09.1996, 1♀; Edirne-Trakya Üniversitesi, Biyoloji Bölümü, Balkan Yerleşkesi, (light trap), crop field and pasture, 09.07.2001 1♀; **Sinop**-Ünlüce, pasture, 150 m, 17.07.1993, 1♀.
Distribution: Nearctic, Neotropical, Oriental, Palearctic (Armenia, Austria, Azerbaijan, Belgium, Bulgaria, China, Czech Republic, former Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom).
Chorotype: Holarctic.
New record for Turkey.

Homolobus (*Phylacter*) *annulicornis* (Nees, 1834)

Material examined: Gümüşhane-Kelkit-Köycük, pasture, 1223 m 08.08.2005 2♀♀; 2♂♂; -Şiran-Arıtaş, poplar woodland, oak and pasture, 1300 m, 08.08.2005, 1♀; **Ordu**-Akkuş-Yukarıdüğencili, pasture, 1340 m, 05.07.2003, 1♀.
Distribution: Oriental, Palearctic (Austria, Azerbaijan, Belgium, China, Czech Republic, former Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Sweden, Switzerland, United Kingdom, former Yugoslavia).
Chorotype: Asiatic-European.
New record for Turkey.

Subfamily Hormiinae Förster, 1862
Hormius Nees, 1819
Hormius moniliatus (Nees, 1811)

Material examined: Ankara-Kızılcahamam-Pazar, poplar woodland, oak and pasture, 959 m, 17.9.2006, 1♀; -Kızılcahamam-Özbekler, orchard, poplar woodlandand pasture, 970 m, 17.9.2006, 2♀♀; **Eskişehir**-Bilecik yolu 26. km, pasture, 789 m, 01.09.2006, 1♂; -Alpu-Sündiken mountain, pine forest,1573 m, 05.09.2006, 1♂.
Distribution: Nearctic, Oceanic, Oriental, Palaearctic (Afganistan, Armenia, Azerbaijan, Belarus, Belgium, Bulagaria, Canary islands, China, Czech Republic, former Czechlovakia, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Morocco, Netherlands, Norway, Poland, Russia, Slowakia, Spain, Sweden, Switzerland, Tajikistan, Turkmenistan, Ukraine, United Kingdom, Uzbekistan).
Chorotype: Holarctic.
New record for Turkey.

Subfamily Ichneutinae Förster, 1862
Ichneutes Nees, 1816
Ichneutes reunitor Nees, 1816

Material examined: Sivas-Yıldızeli, crop field, 1152 m, 30.05.2007, 1♂.
Distribution: Nearctic, Palearctic (Azerbaijan, Belgium, Finland, France, former Czechoslovakia, Georgia, Germany, Hungary, Ireland, Italy, Japan, Kazakhstan, Lithuania,

Mongolia, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Ukraine, United Kingdom, former Yugoslavia).
Chorotype: Holarctic.
New record for Turkey.

***Proterops* Wesmael, 1835**
***Proterops nigripennis* Wesmael, 1835**
Material examined: Trabzon-Maçka-Sümela, pasture, 1073 m, 03.07.2004, 1♂.
Distribution: Palearctic (Austria, Azerbaijan, Belgium, China, Czech Republic, former Czechoslovakia, Denmark, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Mongolia, Netherlands, Norway, Poland, Russia, Sweden, Switzerland, United Kingdom).
Chorotype: Asiatic-European.
New record for Turkey.

***Pseudichneutes* Belokobylskij, 1996**
***Pseudichneutes levis* (Wesmael, 1835)**
Material examined: Sivas-Cumhuriyet Üniversitesi, pasture, 1278 m, 13.06.2001, 1♀; **Tekirdağ**-Ganos mountain, pine forest, 554 m, 17.05.1986, 1♂.
Distribution: Palearctic (Belgium, Finland, France, Germany, Hungary, Italy, Kazakhstan, Netherlands, Poland, Russia, Sweden, United Kingdom, Ukraine).
Chorotype: Asiatic-European.
New record for Turkey.

Subfamily Rhyssalinae Förster, 1862
***Dolopsidea* Hincks, 1944**
***Dolopsidea indagator* (Haliday, 1836)**
Material examined: Amasya-Çakallar, orchard, 780 m, 28.05.2002, 1♀.
Distribution: Palaearctic (Armenia, Austria, Azarbaijan, Belgium, Bulgaria, former Czechoslovakia, Finland, France, Germany, Hungary, Ireland, Italy, Korea, Lithuania, Russia, Sweden, Switzerland, Ukraine, United Kingdom).
Chorotype: Asiatic-European.
New record for Turkey.

***Dolopsidea tatianae* (Telenga, 1941)**
Material examined: Zonguldak-Ilıksu, mixed forest, 25 m, 08.06.2002, 1♀.
Distribution: Palaearctic (Lithuania, Moldova, Russia).
Chorotype: Sibero-European.
New record for Turkey.

Subfamily Exothecinae Förster, 1862
***Colastes* Haliday, 1833**
***Colastes* (*Xenarcha*) *lustrator* (Haliday, 1836)**
Material examined: Kastamonu-Hanönü, pasture, 450 m, 06.09.2001, 1♂; -Ilgaz Dağı, pasture, 2100 m, 30.08.2002, 1♀; **Ordu**-Korgan-Belalan, vegetable garden, 1040 m, 31.08.2003, 2♀♀.
Distribution: Palaearctic (Austria, Belarus, Belgium, Bulgaria, former Czechoslovakia, Denmark, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Lithuania, Moldova, Netherlands, Poland, Russia, Spain, Sweden, Switzerland, United Kingdom).
Chorotype: Asiatic-European.
New record for Turkey.

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AN OVERVIEW OF POLYVOLTINE SILKWORM BREEDS DEVELOPED AT CSR&TI, MYSORE DURING THE LAST FIVE DECADES

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ABSTRACT: Improvement of silkworm breeds / hybrids for higher cocoon yield is the direct and efficient way to achieve good quality raw silk. Accordingly, over the last fifty years, development of polyvoltine silkworm breeds has played a pivotal role in boosting the silk production in India particularly in three southern states *viz*., Andhra Pradesh, Karnataka and Tamil Nadu. In this direction, contribution of silkworm breeders of Central Sericultural Research and Training Institute CSR&TI), Mysore towards the development of promising polyvoltine silkworm breeds / hybrids is the milestone. Indigenous polyvoltine races though well acclimatized to fluctuating eco-climatic conditions, they are poor in cocoon productivity and silk quality. During the last decade, few polyvoltine silkworm breeds having higher cocoon yield coupled with better silk quality, have been developed. Some of the polyvoltine silkworm breeds / hybrids developed at CSR&TI, Mysore for the last five decades have been compiled in one place and made it available to the scientists and students engaged in sericulture research.

KEY WORDS: *Bombyx mori,* breeding, evaluation, polyvoltine silkworm breeds / hybrids.

Systematic mulberry silkworm breeding programmes started in India during the mid 20th century after the establishment of Central Silk Board and its research and regional institutes. During 1960's, experiments were initiated at Central Sericultural Research and Training Institute (CSR&TI), Mysore with the main objective to improve polyvoltine silkworm breeds resulting in the development of quite a good number of silkworm breeds. Narayanan and his group by utilizing Nan Nung 6D, an exotic bivoltine race as male component with Pure Mysore and crossing with Japanese hybrid, Shungetsu × Hosho developed a few white polyvoltine breeds *viz,* Kolar Gold, Kollegal Jawan and Mysore Princess. Later, Krishnaswami and his group developed Hosa Mysore series during 1973. During the last two decades, promising polyvoltine silkworm breeds namely, MY_1 (Nagaraju et al., 1987), PM (SL) (Nagaraju et al., 1989), MHMP(Y), MY_3, HMN_7, MHN_7, P_2D_1 and P_4D_1 (Noamani et al., 1990), BL_{67}(Rao et al., 2002), ND_5 (Rao et al., 2005), NP_1(Singh et al., 2006), ND_7 (Dandin et al., 2006, 2007) etc. were developed. Of late, promising polyvoltine silkworm breeds have been developed through application of artificial parthenogenesis (Gangopadhyay & Singh, 2008) and androgenesis as a breeding tool (Singh et al., 2009, 2011). Superior silk quality ((2A) grade has been obtained from a recently developed polyvoltine × bivoltine hybrid L_{14} × CSR_2 (Rao et al., 2011).A brief account of some important polyvoltine breeds / polyvoltine × bivoltine hybrids is mentioned below:

1. PM × C. Nichi (Traditional polyvoltine hybrid, 1960 - 1970)

The parental indigenous race Pure Mysore (PM) is characterized by longer larval period and exotic C. Nichi race by lesser larval period and low productivity. PM produces greenish yellow, spindle shaped with more floss percentage (18 – 20 %) and C. Nichi white dumbbell cocoons and high renditta (11 - 12). The silkworm hybrid is low in productivity but well suited for subsistence farming condition, fluctuating temperature and poor hygienic conditions, hence popular among poor farmers. The traditional hybrid is characterized by larval period 18-20 days, cocoon weight 1.1 - 1.2 g, cocoon shell percentage 13 -14 %, filament length 450 - 525 m, raw silk recovery 8 - 9 %, filament size 2.0 d, renditta 12.0 - 13.0 and produces non gradable silk. The hybrid is still popular and suitable for rearing in rain-fed areas and it produces the cocoon yield of 15 - 20 kg / 100 dfls at the farmer level.

Larvae of PM × C. Nichi

Cocoons of PM × C. Nichi

2. PM × KA (1970 - 1972)

Pure Mysore with longer larval period and KA was developed by a Japanese silkworm breeder at Kalimpong, West Bengal through hybridization from a cross between (N_{122} × C_{110}) × (N_{124} × C_{124}). The hybrid is characterized by larval period 23 - 24 days, cocoon weight 1.6 - 1.7 g, cocoon shell percentage 17 - 18 %, renditta 9.0 - 9.5 and produces non gradable silk. The hybrid was popular during 70's and produces cocoon yield of 30 - 35 kg / 100 dfls at the farmer level.

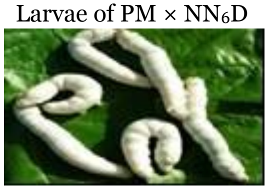
Larvae of PM × KA

Cocoons of PM × KA

3. PM × NN_6D (1970 - 1972)

NN_6D an exotic peanut shaped is characterized by white cocoons. The hybrid is characterized by larval period 24 - 25 days, cocoon weight 1.5 - 1.6 g, cocoon shell percentage 17 - 18 %, renditta 9.0 - 9.5 and produces non gradable silk. The hybrid was popular during 70's and produces cocoon yield of 30 - 35 kg / 100 dfls at the farmer level.

Larvae of PM × NN_6D



Cocoons of PM × NN_6D

4. PM × NB_4D_2 / NB_{18} (1975 - 2000)

Bivoltine silkworm breeds NB_{18} / NB_4D_2 were evolved utilizing Japanese hybrid (Koko × Seihaku) × (N_{124} × C_{124}). The polyvoltine × bivoltine hybrids are better suited for subsistence farming condition, fluctuating temperature and poor hygienic conditions, hence popular among farmers. The hybrids are characterized by larval period 23 - 24 days, cocoon weight 1.6- 1.8 g, cocoon shell percentage 16 - 17 %, filament length 700 - 800 m, raw silk percentage 11 - 1 2 %, renditta 9.0 - 9.5 and produces non gradable silk. The hybrid is suitable for rearing throughout the year and produces cocoon yield of 50 - 60 kg / 100 dfls at the farmer level.

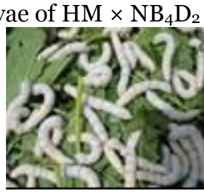
Larvae of PM × NB_4D2 / NB_{18}

Cocoons of PM × NB_4D_2 / NB_{18}

5. Hosa Mysore (HM) × NB_4D_2 / NB_{18} (1970 - 1978)

During 1970's, for the first time an attempt was made to replace the female component (PM) through introduction of a new polyvoltine breed Hosa Mysore (HM) developed at CSRTI, Mysore through hybridization utilizing two polyvoltine breeds PM and A_4E. A_4E is a low productive breed but better than PM and C. Nichi and is characterized by greenish yellow elongated oval shaped cocoons with coarse grains. Sometimes hibernating eggs appear. Poor post cocoon parameters but better than PM and C. Nichi. These hybrids are characterized by larval period 23 - 24 days, cocoon weight 1.6 - 1.8 g, cocoon shell percentage 16 -17 %, filament length 700 - 800 m, raw silk percentage 11 – 12 %, renditta 9.0 - 9.5 and produces non gradable silk. The hybrid is suitable for rearing throughout the year and produces cocoon yield of 50 - 60 kg / 100 dfls at the farmer level. It produces 10 – 15 % higher yield than the existing hybrid PM × NB_4D_2. The hybrid could not be popularized due to frequent crop loss and occurrence of hibernating eggs.

Larvae of HM × NB_4D_2 / NB_{18}



Cocoons of HM × NB_4D_2 / NB_{18}

6. MY_1 × NB_4D_2 / NB_{18} (1984 - 1987)

MY_1 was developed during 1980's utilizing two polyvoltine races Pure Mysore and Nistari. MY_1 is characterized by higher cocoon yield than PM, plain larvae with shorter larval duration and light greenish yellow elongated oval cocoons with coarse grains. Better post cocoon quality parameters than Pure Mysore. It has renditta of 11-12. Hybrid gives higher cocoon yield, shorter larval duration as compared to PM × NB_4D_2. Recommended for rearing in West Bengal, Bihar and Assam. A quantity of 3.0 lakhs dfls tested with farmers showed 15 % improvement in yield over PM × NB_4D_2.

Larvae of $MY_1 \times NB_4D_2$ / NB_{18}

Cocoons of $MY_1 \times NB_4D_2$ / NB_{18}

7. $BL_{23} \times NB_4D_2$ for rain-fed areas (1997)

BL_{23} was developed at CSRTI, Mysore during 1990s. Parentage: (Oval × A_2) × (Oval × Daizo). BL_{23} is characterized by higher cocoon yield than Pure Mysore, plain larvae and greenish yellow elongated oval cocoons with coarse grains. Floss percentage less than Pure Mysore. Post cocoon parameters better than Pure Mysore. Recommended for rain-fed areas of South India. High renditta (10 - 11). $BL_{23} \times NB_4D_2$ is characterized by robust larvae, high cocoon shell weight, high silk content, long filament length and better neatness with higher reelability as compared to PM × C Nichi. Larvae are plain and bluish white in colour. Cocoons are light greenish-yellow and intermediate in shape. Total larval duration is 22 - 23 days. Higher yield than existing hybrid PM × C. Nichi. Floss with reference to cocoon shell is less (4.8 %). Recommended for rain-fed areas. A quantity of 12,000 dfls of $BL_{23} \times NB_4D_2$ was tested with farmers showed 58 % improvement in cocoon yield compared to PM × NB_4D_2.

Larvae of $BL_{23} \times NB_4D_2$

Cocoons of $BL_{23} \times NB_4D_2$

8. PM × CSR_2 (Kolar Gold) (1999)

Realizing the productivity potential of bivoltine CSR breeds, CSR_2 was crossed with Pure Mysore and released in the field in the name of **Kolar Gold** and gained wide acceptance by the sericulturists of South India.

The hybrid is characterized by robust larvae. Higher reelability as compared to PM × NB_4D_2. Larvae are plain and bluish white in colour. Cocoons are light greenish-yellow hybrid cocoons with oblong shape gives higher yield than existing hybrid, PM × NB_4D_2.

Larvae of PM × CSR_2

Cocoons of PM × CSR_2

9. $BL_{43} \times NB_4D_2$ (Kapila) for irrigated areas (2002)

BL_{43} was developed during 1990's. Parentage: Pure Mysore, Hosa Mysore and Nistari. BL_{43} is characterized by higher cocoon yield than Pure Mysore, plain larvae and greenish yellow elongated oval cocoons with coarse grains. Less floss percentage and post cocoon parameters better than Pure Mysore. Recommended for irrigated areas of South India. Renditta (9-11).

$BL_{43} \times NB_4D_2$ (Kapila) is characterized by robust larvae, high cocoon shell weight, high silk content, longer filament length and better neatness and reelability. Larvae are plain and bluish white in colour. Cocoons are light greenish-yellow and intermediate in shape. Total larval duration is 22 - 23 days. Renditta is about 8. Produces 10 - 15% higher cocoon yield than PM × NB_4D_2. Central Silk Board authorized the hybrid for commercial exploitation during the year 2002.

Larvae of $BL_{43} \times NB_4D_2$

Cocoons of $BL_{43} \times NB_4D_2$

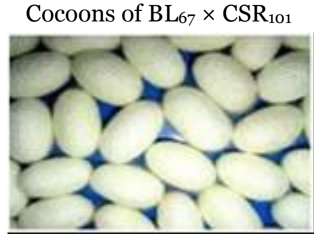
10. Cauvery ($BL_{67} \times CSR_{101}$) for irrigated areas (2005)

BL $_{67}$ was developed during 1990's. parentage: $BL_{24} \times BL_{27}$. Higher cocoon yield than Pure Mysore. BL_{67} is characterized by plain larvae and light greenish yellow elongated oval shaped cocoons with medium to coarse grains. Less floss percentage with renditta ranging from 8 – 9. Post cocoon parameters better than Pure Mysore. Recommended for irrigated areas of South India.

The polyvoltine × bivoltine hybrid **Cauvery ($BL_{67} \times CSR_{101}$)** has been identified with better productivity, high silk recovery and less renditta (6.5 - 7.0). The cocoons fetched higher rate of Rs. 15 - 20 per kg with A - 2A grade silk as compared to PM × NB_4D_2. Recommended for irrigated areas of South India. Tolerant to high temperature and BmNPV. A quantity of 1,00,467 dfls tested with 483 farmers of Karnataka, Tamil Nadu and Andhra Pradesh during 2001 - 03 recorded an average yield of 55.18kg / 100 dfls as against 46.0 kg in PM × NB_4D_2.

Larvae of $BL_{67} \times CSR_{101}$

Cocoons of $BL_{67} \times CSR_{101}$



11. BL_{24} × C Nichi (Varuna) polyvoltine hybrid for rain-fed areas (2005)

In order to replace the existing PM × C. Nichi in rain-fed areas, a new polyvoltine hybrid **Varuna (BL_{24} × C. Nichi)** with high survival and better productivity has been developed. The average cocoon yield is 31 kg / 100 dfls and renditta of 10 - 11 as compared to 23 kg / 100 dfls and 12 - 13 renditta in PM × C. Nichi. Cocoons of the hybrid fetched Rs. 8 - 10/- more per kg as compared to the control PM × C. Nichi.

The hybrid is characterized by robust larvae, high cocoon shell weight, high silk content, long filament length and better neatness with higher reelability as compared to PM × C. Nichi. Larvae are plain and bluish white in colour. Cocoons are light greenish-yellow in colour and intermediate in shape. Higher yield than existing hybrid PM × C. Nichi. Recommended for rain-fed areas of South India.

Larvae of BL_{24} × C Nichi

Cocoons of BL_{24} × C Nichi

12. Jayalakshmi (ND_7 × CSR_2 - For irrigated areas) (2007)

Concerted efforts have been made to develop polyvoltine breeds with better fibre quality. This has resulted in the development of a promising polyvoltine breed ND_7 with better fibre quality and productivity. The breed was tested with all authorized CSR breeds and hybrids and one hybrid **ND_7 × CSR_2** was found promising and christened as "Jayalakshmi".

The hybrid is characterized by high pupation rate 90 %, cocoon weight 1.962 g, cocoon shell weight 41. 3 cg, cocoon shell percentage 21 %, filament length 900 m, renditta 6.5 and neatness 90 points. The hybrid was tested under large scale trials with the farmers. Testing of 2.0 lakhs dfls with the farmers of Karnataka, Tamilnadu and Andhra Pradesh recorded an average yield of 63.40 kg / 100 dfls. Presently the hybrid is undergoing Race Authorization Test of Central Silk Board.

Larvae of ND_7 × CSR_2

Cocoons of ND_7 × CSR_2

13. D_1 × CSR_2 (For rain-fed areas) (2007)

D_1 polyvoltine silkworm breed is characterized by marked larvae, dark greenish yellow, spindle shaped cocoons and hibernating eggs. The new hybrid was evaluated in the laboratory and found promising in respect of economic characters. D_1 × CSR_2 is suited to the rain-fed areas. The hybrid is characterized by high pupation (95%) cocoon weight (1.6 - 1.7 g), cocoon shell weight (0.30 - 0.33 g), cocoon shell percentage (18 - 19%), longer filament length (700 -750m), Reelability (85%) and renditta (7 - 8) as against 90%, 1.00 - 1.10g, 0.125 - 140 g, 12.5 - 12.7 %, 400 - 450m, 80% and 11-12 in PM × C. Nichi. Further the hybrid is characterized by shorter larval duration of 20 days compared to 22 days in PM × C. Nichi. A quantity of 5,560 dfls of D_1 × CSR_2 has been distributed to the farmers in Chamarajanagar area through RSRS, Chamarajanagar during 2006-07. Data indicated an average yield of 42.5 kg / 100 dfls and a cocoon rate of Rs.115 / kg in D_1 × CSR_2 compared to 28.75 kg and Rs.88=60 in PM × C. Nichi and an improvement of 47% in cocoon yield was recorded.

Larvae of $D_1 \times CSR_2$

Cocoons of $D_1 \times CSR_2$

14. $AGL_3 \times CSR_2$ (2008)

A polyvoltine silkworm breed "AGL_3" was developed by using dispermic androgenesis. The breed was developed by crossing F_2 males derived from a polyvoltine hybrid $BL_{68} \times BL_{69}$ with another polyvoltine race "Nistari" and exposing the eggs at 38 ^oC for 200 minutes. Laboratory evaluation showed superiority of the hybrid $AGL_3 \times CSR_2$ in terms of higher fecundity, pupation rate, yield/10,000 larvae by weight, cocoon shell weight, cocoon shell percentage, filament length and neatness. The hybrid exhibited maximum average evaluation index value and manifested high hybrid vigour for several characters. The cocoons obtained from the new hybrid fetch more price which is more than 20 rupees as compared to the control (PM × CSR_2). The hybrid was tested on farm trials through the nested units of CSRTI, Mysore. Large scale trials have recorded an average cocoon yield of 71.945 kg/100 dfls as against 68.643 kg in the control. The striking features of the new hybrid are that it produces cocoons with high cocoon shell weight, cocoon shell percentage, filament length and neatness.

Larvae of $AGL_3 \times CSR_2$

Cocoons of $AGL_3 \times CSR_2$

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EVALUATION OF THE EFFECTIVENESS OF PROPOLIS AND GARLIC IN THE MANAGEMENT OF MAIZE WEEVIL (*SITOPHILUS ZEAMAIS*) IN STORED MAIZE (*ZEA MAYS*) GRAINS

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[**Adeyemi, W. A. & Osipitan, A. A.** 2014. Evaluation of the effectiveness of propolis and garlic in the management of Maize Weevil (*Sitophilus zeamais*) in stored Maize (*Zea mays*) grains. Munis Entomology & Zoology, 9 (1): 117-124]

ABSTRACT: The study evaluated the efficacy of garlic powder and propolis extracts at controlling *Sitophilus zeamais* infestation in stored maize grains. One hundred grammes of maize grains were weighed into 250 cm^3 jars. The grains were seperately mixed with 1 g, 3 g and 5 g garlic powder and 5 %, 10 % and 15 % propolis extract. The treated grains were infested with 5 pairs of 1-10 day old *S. zeamais* and left for 90 days. Each treatment was replicated four times and arranged on work table in the laboratory using Complete Randomized Design. The untreated grains (control) had a significantly ($p < 0.05$) higher number of *S. zeamais*, % weight loss, % grain damage and % weight of grain powder. All the treated grains had 100 % adult mortality of *S. zeamais* at all treatment levels. The % grain damage, % grain weight loss, weight of grain powder and number of *S. zeamais* were significantly ($P < 0.05$) lower in the garlic powder and propolis extract -treated maize grains compared to the untreated ones. Propolis extract at 15 % concentration had the lowest grain weight loss followed by maize grains treated with 3 g garlic powder. Garlic powder and propolis extract could be used to control infestation in maize grains to overcome draw-backs associated with the use of synthetic insecticides.

KEY WORDS: Garlic, propolis, infestation, *Sitophilus zeamais*, synthetic insecticide.

Maize (*Zea mays)* is an important cereal grain widely cultivated and consumed in Africa. The crop is cultivated as staple food in Meso America and it is a good source of carbohydrates, protein, vitamin B and mineral. Maize is a staple food with great nutritional value and is one of the main sources of calories in the major producing areas (Abebe et al., 2009). The crop is highly yielding, matures easily, easy to process, readily digestible and cost less than other cereals. It is the third most important cereal crop grown in Sub-Saharan Africa after rice and wheat (CIMMYT, 1994). The crop is used for animal and human consumption and also for ethanol production and about 100 million people in the world consume maize in the form of thin, round cake or as porridge (Compton, 1999).

Post-harvest insect pest of maize such as Angoumois grain moth – *Citotroga cerealella*, lesser grain borer *Rhizorpertha dominica*, larger garin borer – *Prostephanus truncatus*, rice weevil – *Sitophilus oryzae* and Maize weevil *Sitophilus zeamais* among others have been recognised as increasing problem to maize production in Africa (Gwinner et al., 1990; Giga et al., 1991; Bekele et al., 1995; Abebe et al., 2009). Maize weevil *S. zeamais* is a very serious insect pest of stored maize grains that is cosmopolitan and greatly constrains post-harvest storage of maize grains (Longstaff, 1981). Initial infestations of maize grains by maize weevil occur in the field just before harvest, and the insects are carried into the store where the population builds up rapidly and lion share of damage done to the maize (Appert, 1987; Demissie, 2008). Addis-Teshome (2008) reported that stored insect pests are capable of inflicting serious damage to stored commodities due to very rapid capacity to increase in number, migrate, infest and thus spreading the infestation. Giga et al. (1991) reported maize grain loss of 20 % - 90 % worldwide due to infestation by maize weevils.

Farmers have largely depended on the use of synthetic insecticides as insect pest control measures against *S. zeamais*, however, these chemicals have some limitations, which include development of resistance in the pest organisms, hazardous effect in the environment, high persistence, high toxicity, residues accumulation in food and feed, negative effects on non-target organisms and high cost for resource poor farmers (Dhuyo & Ahmed, 2007).

Propolis is a resin-like material from the buds of poplar and cone-bearing trees. It is the dark-brown or black sticky plant derived 'glue' found around wounds on plant and sometimes around buds and is used by bees for sealing, lining, strengthening of their hives and serve as repellent materials inside the hives and around the entrance (Banskota et al., 2001). Propolis is a veritable cascade of aromatic nutrient that possess anti-fungal, anti-bacterial anti-viral properties due to its remarkable properties. Orsi et al. (2005) reported that the flavonoids, organic, phenolic and aromatic acids coumarins, in the presence numerous mineral elements and vitamins have strong anti-oxidant, anti-inflammatory, antiseptic and pain killing effect. Torreblance et al. (1983) reported that honeybees gather propolis and combine the resin with nectar, creating a mix of wax, pollen and bee bread.

Garlic (*Allium sativum*) of the Family: Alliceae, is a close relative of onions, shallot, and leek, chive and rakkyo. It is a cosmopolitan plant grown in the temperate, tropics and the sub-tropics and used for both culinary and medicinal purposes (Block, 2010). It has a pungent hot flavour that mellows and sweetens considerably with cooking. Two major constituent of garlic oil were allyl methyl disulfide and diallyl trisulfide and when crushed, garlic yields allicin, a powerful anti-fungal and anti-biotic compound (Block, 2010). Garlic was believed to have evolved a defensive mechanism that deterred animals like birds and insects from eating the plant. Grainge et al. (1985) and Kain (1999) reported the ability of garlic to protect crops against a variety of insects such as aphids, mites and thrips. Grainge et al. (1985) reported that bulb of garlic has insect controlling properties with repellant, antifeedant, bactericidal, nematicidal and fumigant mode of action. Anwar et al. (2009) reported that garlic act as nematicide and insecticide and has been used to control cabbage root fly and red mite in poultry. *S. zeamais* is a very serious pest of stored maize grains that is highly destructive. Control of the insect is mostly done with the use of insecticides. These insecticides are however, enmeshed in controversies of drawbacks such as high cost, toxicity, hazard, adulteration, development of resistance and pollution of environment among others. Propolis and garlic are organic products with no reported cases of such drawbacks. This study therefore evaluates the use of propolis and garlic for the management of maize weevils in maize grains.

MATERIALS AND METHODS

Location of study site

This study was conducted at the Entomological Research Laboratory of the Department of Crop Protection, College of Plant Science and Crop Production, Federal University of Agriculture, Abeokuta (UNAAB).

Source of *Sitophilus zeamais* culture

The maize weevil *Sitophilus zeamais* used for the study was obtained from Federal University of Agriculture, Abeokuta (FUNAAB) and cultured in glass jars in the laboratory. The maize dust was sieved periodically in other to prevent the growth of mould which may lead to the caking of grains and ultimate death of the insects.

Source of maize grains

The maize kernels used for the study (SUWAN- 1) was procured from FUNAAB. The damaged kernels were picked and the clean ones disinfested to eliminate eggs, larvae, pupae and adult insects by subjection to aluminium phosphide (Phostoxin) for 24 hours. Dead insects were sieved out of the kernels and they were aired for 72 hours prior to use. The moisture content of the grain (13%) was determined to ensure that the kernels moisture content is suitable for the feeding of the maize weevils.

Preparation of garlic powder

The garlic *Allium sativum* used for the study was procured from kuto market, Abeokuta, Ogun State, Nigeria. They were peeled and chopped, then sun-dried for 7 days, after which they were ground into granules using an electric blender and sun-dried for 48 hours before pounding it into powder form using a mortar and a pestle. The powder was left to dry at room temperature for 48 hours.

Preparation of propolis extract

Propolis was collected from the flight entrance and openings between the top bars of bee hives located at an apiary in FUNAAB. One hundred grammes raw propolis was cut into small bits of about 5-10 mm and placed in a 250 ml conical flask. 150 ml of ethanol was poured into the conical flask to submerge the propolis. The outlet of the flask was covered with a foil paper and held tightly with rubber bands; the mixture was vigorously shaken for an hour using the IKA Orbital shaker to allow for extraction of the active ingredients in the mixture (Obasa *et al.*, 2007). The resultant extract was filtered through a Whatman No. 1 filter paper into a 250 ml conical flask. The sticky crude extract was thereafter serially diluted with ethanol to prepare 5 %, 10 % and 15 % ethanolic extracts of propolis (EEP).

Admixture of garlic powder and propolis with grains

One hundred grammes of maize grains were weighed into 250 cm^3 Kilner jars using Mettler weighing balance (Mettler Toledo). The grains were mixed with 5 %, 10 % and 15 % of ethanolic extracts of propolis and 1 g, 3 g and 5g powder of garlic in 4 cm x 4 cm sized perforated envelope and were separately inserted into maize grains in each of the jars. The treated grains were seperately infested with 5 pairs of 1-2 day's old *S. zeamais*. Each treatment was replicated four times and arranged on work tables in the laboratory using Complete Randomized Design (CRD). Four control glass jars contained 100 g maize grains and was infested with 5 pairs of 1-2 days old *S. zeamais*, but were not treated with propolis and garlic. 100 g clean disinfested grains were weighed into the jars to monitor change in weight of grains as a result of moisture loss or gain (Hurlock, 1967). At 90 days post-infestation of the maize grains, the powder and frass in each replicate sample was sieved out; the grains were sorted into damaged and undamaged and insects into dead and living. Insects that did not move or respond to three probings with a blunt probe were considered dead (Obeng-Ofori & Reichmuth, 1997). The following data were taken:

i. Number of adult *Sitophilus zeamais*.
ii. Number of adult mortality.
iii. Weight of powder/frass (g).
iv. Number of damaged and undamaged grains.
v. Total number of grains.
vi. Final weight of grains.

Percentage weight loss and percentage damage respectively were calculated using the formulae according to Baba-Tierto (1994).

$$\% \text{ Grain weight loss} = \frac{\text{Weight of control sample} - \text{Final weight of grain X 100}}{\text{Weight of control sample}}$$

$$\% \text{ Grain damage} = \frac{\text{Number of damaged grains}}{\text{Total number of grains}} \text{ X 100}$$

The weight of grain dust was determined from the composite weight of dust sieved from the grains using the formulae:

Weight of grain dust = Weight of treatment powder and grain dust – Weight of treatment powder

Weights of treatment powder are 1 g, 3 g and 5 g.

Statistical analysis

Statistical analysis of data was based on SAS's general linear models procedure (SAS, 1998). The data were subject to analysis of variance (ANOVA). Significant means were compared using Student's Newman-Keuls Test (SNK) at $P < 0.05$

RESULTS

Mortality of *Sitophilus zeamais* in maize grains treated with garlic powder and propolis

The mean mortality of *S. zeamais* in maize grains treated with garlic powder at 1g, 3g and 5g treatment levels and propolis extract 5%, 10% and 5% concentration levels shows that all the treatment caused 100 % mortality of the introduced *S.zeamais*. The mortality induced by these treatments were not significantly ($P > 0.05$) different from each other. In the control, none of the introduced *S. Zeamais* died and it was significantly ($P > 0.05$) different from the mortality in treated grains (Table 1).

Weight of grain powder and number of adult *Sitophilus zeamais* in maize grains treated with garlic powder and propolis extract.

The mean weight of grain powder and number of adult *S. zeamais* in maize grains treated with garlic powder and propolis extract is shown on Table 2. The highest grain powder (0.19g) was generated from the untreated maize grains (control) and it was significantly ($P < 0.05$) different from what obtains in treated grains that has no grain powder. The mean number of adult *Sitophilus* (34.75) was from the untreated maize grains (control) and it was significantly ($P < 0.05$) different from what obtains from other treatments. All the insects introduced to grains treated with garlic powder and propolis extract at all levels died.

Grain weight loss and damage in propolis and garlic-treated maize grains infested with *Sitophilus zeamais*.

The untreated grains (the control) had a significantly ($P < 0.05$) higher grain weight loss and grain damage relative to the treated maize grains. Of the treatments, maize grains treated with 5 % propolis ethanoic extract had the lowest grain weight loss (0.67). However, it was not significantly ($P > 0.05$) different from the % weight losses in maize grains treated with extract of propolis at 10 % (0.54), garlic at 1g (0.51), garlic at 3g (0.29) and garlic at 5g (0.37).

The maize grains treated with 15 % ethanolic extract of propolis had the lowest % grain weight loss. It was however, not significantly (P > 0.05) different from all the other treated maize grains except untreated maize grains (control) and maize grains treated with 5 % ethanolic extract of propolis. A significantly higher (P < 0.05) % grain damage (8.04) was recorded in the untreated maize grains (control). All the treated maize grains were not visibly damaged by the introduced *S. zeamais* and they were not significantly (P > 0.05) different from each other.

DISCUSSION

The results of this study revealed the potency of propolis extracts and garlic powder at managing the population of *Sitophilus zeamais.* In this study, extract from propolis and garlic powder demonstrated great potential at reducing the population of *S. zeamais* in the laboratory. The result of study corroborated the findings of Yan Huang et al. (2000) that tested the two constituents of garlic against *S. zeamais* and *T. castenum* for antifeedant activity, contact and fumigant toxicity and reported that the two constituents reduced egg hatch emergence of larva and adults. Similarly, Osipitan & Mohammed (2008) reported the ability of garlic to manage the population of larger grain borer, *Prostephanus truncantus* in maize grains. Osipitan et al. (2010) tested propolis for the management of LGB in maize grains and suggested that the product could be explored singly or integrated with other control management options to manage the population of LGB in infested maize grains. Kain (1999) also reported the ability of garlic to protect crops against variety of insect pests. Likewise, Grainge et al. (1985) reported that garlic has insect controlling properties that repel and make the host less favourable and less prone to attack and infestation by insects. Sforcin et al. (1995) and Obasa et al. (2007) reported that propolis has biological properties such as antibiotics, antifungal, anti-inflammation, anesthetic, healing, antioxidant and cacinostatic properties.

In this study, there seems to be no direct relationship between the level at which the treatments were applied and their effectiveness on *S. zeamais*, because the effect of the treatments at different levels on the *S. zeamais* were not significantly different from each other. This is a good development as it indicates the effectiveness of the treatments at minimal treatment level. The entire introduced insect died, suggesting that garlic and propolis have high insecticidal property.

Saxena (1987) reported that botanical insecticides are generally pest-specific and are relatively harmless to non-target organisms including man. They are also biodegradable and harmless to the environment. Furthermore, unlike conventional insecticides which are based on a single active ingredient, plant derived insecticides comprise an array of chemical compounds which act concertedly on both behavioural and physiological processes. Thus, the chances of pests developing resistance to such substances are less likely. Botushanov (2001) reported that propolis consist of more than 200 constituent in its waxes and resins that made it a “veritable cascade of aromatic nutrient” remarkable for combating all type of pathogens such as bacteria, virus, parasites and fungi. Orsi et al. (2005) analysed propolis from the province of Henan in China and reported sinapic acid, isoferulic acid and caffiec acid as compounds showing anti-bacteria properties.

Insect pests have been mainly controlled with the use of synthetic insecticides. However, problems of pesticide resistance and negative effects on non-target organisms, including man and the environment has negated wide spread acceptance of their use. Rembold, (1994) and FAO (1992) reported that the indiscriminate use of chemical pesticides has given rise to many well-known and serious problems, including genetic resistance of pest species, toxic residues in stored products, increasing costs of application, hazards from handling, environmental pollution and so on. Since garlic powder and propolis extract in this study were effective at managing the population of *S zeamais*. The extract from the products may be utilized as natural products in the management of *S. zeamais*.

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Table 1. Mortality of *Sitophilus* in maize grains treated with garlic powder and propolis.

TREATMENTS	NUMBER OF ADULT MORTALITY ± SE
CONTROL	0.00 ±0.00 [b]
GARLIC 5g	10.00±0.00 [a]
GARLIC 3g	10.00±0.00 [a]
GARLIC 1g	10.00±0.00 [a]
PROPOLIS 15%	10.00±0.00 [a]
PROPOLIS 10%	10.00±0.00 [a]
PROPOLIS 5%	10.00±0.00 [a]

Means followed by the same letter are not significantly different from each other at P < 0.05 using Student Newsmanskeul Test.

Table 2. Weight of powder and number of adult *sitophilus* adult *Sitophilus* in maize grains treated with garlic powder and propolis extract.

Treatments	Weight of grain powder ± SE	Number of adult *Sitophilus* ± SE
CONTROL	0.19±0.02 [a]	34.75±5.27 [a]
GARLIC 5g	0.00±0.00 [b]	0.00±0.00 [b]
GARLIC 3g	0.00±0.00 [b]	0.00±0.00 [b]
GARLIC 1g	0.00±0.00 [b]	0.00±0.00 [b]
PROPOLIS 15%	0.00±0.00 [b]	0.00±0.00 [b]
PROPOLIS 10%	0.00±0.00 [b]	0.00±0.00 [b]
PROPOLIS 5%	0.00±0.00 [b]	0.00±0.00 [b]

Means followed by the same letter are not significantly different from each other at P < 0.05 using Student Newsmanskeul Test.

Table 3. Percentage grain weight loss and percentage grain damage in maize grains treated with garlic powder and propolis extract.

TREATMENTS	% Weight loss ± SE	% Grain damage± SE
CONTROL	1.95±0.10 [a]	8.04±0.17 [a]
GARLIC 5g	0.37±0.04 [bc]	0.00±0.00 [b]
GARLIC 3g	0.29±0.03 [bc]	0.00±0.00 [b]
GARLIC 1g	0.51±0.03 [bc]	0.00±0.00 [b]
PROPOLIS 15%	0.22±0.01 [c]	0.00±0.00 [b]
PROPOLIS 10%	0.54±0.02 [bc]	0.00±0.00 [b]
PROPOLIS 5%	0.67±0.01 [b]	0.00±0.00 [b]

Means followed by the same letter are not significantly different from each other at P < 0.05 using Student Newsmanskeul Test.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART III – CRYSOMELIDAE: CRYPTOCEPHALINAE

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ABSTRACT: The paper gives chorotype identifications for Turkish Cryptocephalinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Cryptocephalinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014) is the first and Özdikmen & Mercan (2014) is the second attempt of this aim. The present study is attempted as the third step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Cryptocephalinae comprises of 107 species group taxa (92 species and 15 subspecies) of 4 genera.

Subfamily CRYPTOCEPHALINAE

Genus *Acolastus* Gerstaecker, 1855
Subgenus *Anopsilus* Jakobson, 1917
***A. glabratus* (Lopatin, 1985)**
Range: E: TR **A:** IN **Records in Turkey:** TR-A: AGR **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

***A. iranicus* (Lopatin, 1980)**
Range: A: IN TR **Records in Turkey:** TR-A: URF **Remarks:** The species has been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

Genus *Cryptocephalus* Geoffroy, 1762
Subgenus *Asionus* Lopatin, 1988
***C. amasiensis* Weise, 1894**
Range: A: TR **Records in Turkey:** TR-A: AMA, KAH **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** Anatolian

***C. apicalis* Gebler, 1830**
Range: E: AB AU BH BU CR CT HU IT MD RO SK ST TR UK YU **A:** KZ WS **Records in Turkey:** TR-A: ANK – TR-E **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

***C. curda* Jakobson, 1897**
Range: E: AB AR GG **A:** TR **Records in Turkey:** TR-A: AFY, AGR, CNK, COR, ELA, EZU, KON, KRS, ORD, SIV, TUN **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***C. flexuosus* Krynicki, 1834**
Range: E: AB BU GG RO ST UK **A:** KI KZ WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. But it must be distributed very likely at least in N and NE Turkey. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***C. gloriosus* Mulsant & Wachanru, 1853**
Range: A: TR **Records in Turkey:** TR-A: KAR **Remarks:** The endemic species has been known only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***C. phaleratus* (Tappes, 1871)**
Range: E: AB AR GG **A:** IN TR **Records in Turkey:** TR-A: ADI, DIY **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

***C. pseudoreitteri* Tomov, 1976**
Range: A: TR **Records in Turkey:** TR-A: AKS, ANK, KAY **Remarks:** The endemic species has been known only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

C. quatuordecimmaculatus Schneider, 1792

Range: E: AL AU BU CZ HU MC RO SK UK YU **A:** TR **Records in Turkey:** TR-A: ANK, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. tappesi Marseul, 1868

Range: A: LE SY TR **Records in Turkey:** TR-A: ADA, GAZ, HAT, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

C. volkovitshi Lopatin, 1976

Range: E: AB AR TR **Records in Turkey:** TR-A: IGD, KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Burlinius* Lopatin, 1965

C. ayvazi Gök & Sassi, 2002

Range: A: TR **Records in Turkey:** TR-A: ISP **Remarks:** The endemic species has been known only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

C. bilineatus (Linnaeus, 1767)

Range: E: AR AU BE BU BY CR CT CZ DE EN FI FR GB GE GG HU IT KZ LA LT LU MD NL NT PL PT RO SK SL SP ST SV SZ UK YU **A:** ES FE JA KZ MG NC TR WS XIN **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

C. chrysopus Gmelin, 1790

Range: E: AB AU BE BH BU BY CR CT CZ FR GE GR HU IT MD PL RO SK SL SP ST TR UK YU **A:** WS **Records in Turkey:** TR-A: SAM **Remarks:** The species has been known only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

C. connexus Olivier, 1807

Range: E: AB AL AR AU BH BU CR CZ FR GE GG GR HU IT MC MD PL RO SK SL ST TR UK YU **A:** IN IS JO KZ SY TM TR **Records in Turkey:** TR-A: ADI, AFY, AGR, AKS, ANK, ART, BAL, BAR, BIL, BOL, BRS, ESK, EZU, GAZ, GIR, GUM, HAT, ISP, IZM, KAH, KAR, KAS, KRB, KSH, MAN, MER, NIG, ORD, OSM, SAK, SAM, SII, TOK, TRA, ZON – TR-E: TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Istranca and Çatalca Parts of European Turkey in Marmara Region, Upper Fırat and Hakkari Parts in Eastern Anatolian Region and Dicle Part in South-Eastern Anatolian Region until now. **Chorotype:** Turano-European

C. elegantulus Gravenhorst, 1807

Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE FR GB GE GG GR HU IT KZ LA MC MD NL NT PL RO SK SL SP ST TR UK YU **A:** ES FE FUJ HUB JIX KZ MG NC TR WS **Records in Turkey:** TR-A: GIR, KON, NIG **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Sibero-European

C. exiguus Schneider, 1792

C. e. amiculus Baly, 1873

Range: A: ES FE HEB HEI JA JIL MG NC SHX TR WS **Records in Turkey:** TR-A: BRS **Remarks:** The subspecies has been known only from Marmara Region in Turkey until now. **Chorotype:** E-Palearctic

C. e. variceps Weise, 1884

Range: E: AB AR BU GR **A:** IN TR **Records in Turkey:** TR-A: ADA, EZU, IST, IZM, SAK, TOK – TR-E **Remarks:** The subspecies has been recorded from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. fausti Weise, 1882

Range: E: AB **A:** TR **Records in Turkey:** TR-A: EZU, ISP, KON **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

C. fulvus Goeze, 1777

C. f. fulvus Goeze, 1777

Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT KZ LA LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** KZ TD WS **Possible Records in Turkey:** TR-A: ANK, CAN, ERZ, EZU, GUM, TOK, TUN – TR-E: EDI, KRK **Remarks:** The species is represented by two subspecies in Turkey as the nominate form and *C. fulvus schatzmayri*. It was not possible to give infraspecific distributions separately according to available references. However, *C. fulvus schatzmayri* should be distributed very likely only in S and W Turkey. So the nominate subspecies should be distributed in 4 Turkish regions as Black Sea Region, Central Anatolian Region, Eastern Anatolian Region and Marmara Region in Turkey. **Chorotype:** Sibero-European

C. f. schatzmayri Burlini, 1969

Range: E: GR **A:** IS JO SA TR **Possible Records in Turkey:** TR-A: ANT, DEN, ISP, IZM, MAN, MER, MUG **Remarks:** With respect to the above explanation, the subspecies should be distributed in 3 Turkish regions as Aegean Region, Mediterranean Region and South-Eastern Anatolian Region in Turkey. But probably it has been recorded only from Aegean Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic or E-Mediterranean (Palaestino-Taurian) + Arabian

C. labiatus (Linnaeus, 1760)

Range: E: AB AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE HU IR IT KZ LA LT MC MD NL NR NT PL RO SK SL SP ST SV SZ TR UK YU **A:** MG TR **Records in Turkey:** TR-A: EZU, MAL, ORD **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** European or Centralasiatic-European

C. lederi Weise, 1889

Range: E: AB AR **A:** AF IN IQ TM TR **Records in Turkey:** TR-A: ANK, MAL **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

C. macellus Suffrian, 1860

Range: E: AB AL AN BE BH BU CR FR GE GR HU IT MC NL PL SK SL SP TR UK YU **N:** EG TU **A:** IN IS JO SY TR **Records in Turkey:** TR-A: AMA, BAL, BIL, BOL, CAN, EZU, HAT, ISP, IST, KON, MAL, MER, SAM, SAK – TR-E: IST **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

C. ocellatus Drapiez, 1819

C. o. ocellatus Drapiez, 1819

Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ FR GE GG GR HU IT KZ LA LT LU MC MD NL PL RO SK SL SP ST SZ TR UK YU **A:** IN IQ WS **Records in Turkey:** TR-A: ADI, AKS, AMA, ANK, ART, BAL, BIL, BOL, BRS, CAN, COR, DIY, ERZ, ESK, EZU, GUM, HAK, ISP, IST, IZM, KAS, KAY, KRS, KUT, MAR, MER, NIG, ORD, RIZ, SAM, SIN, SIV – TR-E **Remarks:** The subspecies is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Kocaeli Part of Asian Turkey and all Parts of European Turkey in Marmara Region, and Upper Murat-Van Part in Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. oranensis Weise, 1882

Range: N: AG **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

C. populi Suffrian, 1848

Range: E: AB AL AR AU BE BH BU BY CR CT CZ FR GE HU IT LA MC PL RO SK ST SZ UK YU **A:** FE KZ TR **Records in Turkey:** TR-A: ANK, GAZ, ISP, NIG **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. pusillus Fabricius, 1777

Range: E: AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** KZ WS **Records in Turkey:** TR-A: ANK, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

C. pygmaeus Fabricius, 1792

C. p. vittula Suffrian, 1848

Range: E: AB AL AR AU BH BU CR CZ FR GE GG GR HU IT KZ LA MC MD PL RO SK SL ST SZ TR YU **A:** SY **Records in Turkey:** TR-A: ADA, AFY, AKS, ANT, AYD, BRS, DEN, ERZ, EZU, ISP, IZM, KOC, MAN, MER, MUG, NIG – TR-E (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. rufipes (Goeze, 1777)

Range: E: AU BE BH CR CZ DE FR GE HU IT LA NL NT PL PT RO SK SL SP SZ TR UK **N:** AG MO **Records in Turkey:** TR-E: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Mediterranean

C. strigosus Germar, 1824

Range: E: AU BH BU CR CZ FR GR HU IT MC PL RO SK SL YU **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. sultani Pic, 1920

Range: A: TR **Records in Turkey:** TR-A: ADI, ESK, KON **Remarks:** The endemic species has been known only from 2 Turkish regions as Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

C. tschimganensis Weise, 1894

C. t. tschimganensis Weise, 1894

Range: A: KI KZ TD UZ **Records in Turkey:** TR-A: DEN, IZM **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Centralasiatic + Anatolian

C. tshorumae Tomov, 1984

Range: A: TR **Records in Turkey:** TR-A: COR **Remarks:** The endemic species has been known only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Cryptocephalus* Geoffroy, 1762
***C. androgyne* Marseul, 1875**
***C. a. androgyne* Marseul, 1875**
Range: E: AB BE BY CT CZ FI FR GE LA LT NL NT PL RO SP SV UK **A:** FE IN IS KZ MG TM TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** Sibero-European

***C. anticus* Suffrian, 1848**
Range: E: AB AL AU BE BH BU BY CR CT CZ FR GE GR HU IT LT KZ MC MD PL RO SK SL SP ST TR UK YU **A:** JO KI KZ SY TR UZ WP WS **Records in Turkey:** TR-A: ADA, AKS, ANK, ANT, BAY, BIL, BOL, BRS, CAN, CNK, DEN, DIY, ESK, EZU, HAK, ISP, IZM, KAY, KOC, KON, KRB, TOK, GUM, KOC, MAN, MAR, MER, MUS, NEV, NIG, SAK, SAM, SIN, SIV, TOK, TUN, ZON – TR-E: KRK, TEK **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Çatalca Part of European Turkey in Marmara Region, Central-West Anatolia Part in Aegean Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***C. bameuli* Duhaldeborde, 1999**
Range: E: AB AL AR AU BU CR CT CZ DE FI FR GE GR HU IT MC MD RO SB SK SL SP ST SV TR UK **A:** ES KZ TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***C. bicolor* Eschscholz, 1818**
Range: E: AB BH BU FR GG HU MC RO ST UK YU **A:** IN TR **Records in Turkey:** TR-A: EZU, TOK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian)

***C. biguttatus* (Scopoli, 1763)**
Range: E: AB AU BE BH BU BY CR CT CZ DE EN FI FR GB GE HU IT KZ LA LS LT LU MD NL NT PL RO SK SL SP SZ UK YU **A:** KZ TR WS **Records in Turkey:** TR-A: ANK, BAY, BOL, KAH (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

***C. biledjekensis* Pic, 1909**
Range: E: BU **A:** IN SY TR **Records in Turkey:** TR-A: BIL, GUM, ISP, IZM, KON **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***C. bipunctatus* (Linnaeus, 1758)**
***C. b. bipunctatus* (Linnaeus, 1758)**
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT KZ LA LS LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** TR **Records in Turkey:** TR-A: AMA, ANK, ANT, ART, BAL, BOL, BRS, CAN, CNK, COR, ERZ, EZU, ISP, IZM, KAH, KAS, KAY, KON, KRB, KRS, KUT, MAN, MER, NIG, SIN, SIV, TOK, YOZ, ZON – TR-E: EDI, KRK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** European

***C. cordiger* (Linnaeus, 1758)**
Range: E: AU BE BH BU BY CR CT CZ DE EN FI FR GE HU IT KZ LA LT LU MC MD NT

PL RO SK SL ST SV SZ UK YU **A:** ES KZ MG TR WS **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. crassus Olivier, 1791

Range: E: FR IT PT SP **N:** AG MO TU **A:** IS SY TR **Records in Turkey:** TR **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Mediterranean

C. cribratus Suffrian, 1847

Range: E: AB GG ST **A:** IN SY TM TR **Records in Turkey:** TR-A: ANK, ART, BIL, BOL, EZU, GUM, IST, IZM, KAH, KON, KRS, NEV, NIG, SIV, TRA **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

C. duplicatus Suffrian, 1847

Range: E: AB AR BU GG GR ST **A:** IS JO SY TR **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, ART, BIL, BIT, BOL, BRS, CNK, COR, DEN, ERZ, ESK, EZU, GIR, GUM, HAK, ISP, IST, IZM, KAH, KAS, KRB, KRS, KOC, KON, KUT, MAN, MER, NEV, ORD, SAK, SAM, SIN, SII, SIV, TOK, TUN, TRA, VAN, YOZ, ZON – TR-E: KRK, TEK **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Çatalca Part of European Turkey in Marmara Region, Upper Murat-Van Part in Eastern Anatolian Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. flavipes Fabricius, 1781

Range: E: AL AR AU BE BH BU BY CR CT CZ EN FR GE GR HU IT KZ LA LS LT LU MC MD NL NT PL RO SK SL SP ST SZ UK YU **A:** ES FE IN IS KZ TR WS **Records in Turkey:** TR-A: AMA, ANK, ART, AYD, BOL, BRS, CAN, DUZ, ESK, EZU, GAZ, ISP, IST, KAS, KAY, KRS, KUT, MAL, MER, ORD, SAM, SIN, TOK, TRA, TUN – TR-E: EDI, IST, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded from some Parts of Central Anatolian Region, Eastern Anatolian Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. ilicis Olivier, 1808

Range: E: AL GR IT TR YU **A:** JO SY **Records in Turkey:** TR-A: AYD, BAL, BRS, IST, IZM, KON, MAN – TR-E: KRK **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

C. imperialis Laicharting, 1781

Range: E: AL AU BH BU CR CZ FR GE GG GR HU IT MC MD RO SK SL SP ST SZ UK YU **A:** IN TR **Records in Turkey:** TR-A: AMA, EZU, ISP, KON, USA **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** S and E-European or Turano-European

C. infraniger Pic, 1915

Range: A: TR **Records in Turkey:** TR-A: TOK (Löbl & Smetana, 2010) **Remarks:** The endemic species has been known only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

C. janthinus Germar, 1824

Range: E: AB AL AU BH BU BY CR CT CZ FR GE HU IT LT MC MD PL RO SK SL ST UK YU **A:** ES FE IN IS JA JIL MG TR WS **Records in Turkey:** TR-A: ARD, CAN, ESK, ISP, KRS, MER – TR-E: KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-

Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. messutati Kippenberg, 2011

Range: A: TR **Records in Turkey:** TR-A: MER **Remarks:** The endemic species has been recorded only from Mediterranean Region until now. **Chorotype:** Anatolian

C. moraei (Linnaeus, 1758)

Range: E: AB AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** IN IQ JO TR WS **Records in Turkey:** TR-A: ADA, AFY, AKS, ANK, ANT, ARD, ART, BIL, BIT, BOL, BRS, CAN, COR, DIY, ERZ, EZU, GIR, GUM, HAK, ISP, IZM, HAK, KAH, KAS, KAY, KON, KRB, KRS, MAN, MER, MUG, NIG, ORD, OSM, RIZ, SAK, SAM, SIN, TOK TRA, TUN, ZON – TR-E: KRK, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. octomaculatus Rossi, 1790

Range: E: AB AU BU CR FR GE GG GR HU IT MD PL RO SK SL ST TR UK YU **Records in Turkey:** TR-A: ANK, ISP, KON, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

C. octopunctatus (Scopoli, 1763)

C. o. octopunctatus (Scopoli, 1763)

Range: E: AU BE BH BU BY CR CT CZ EN FI FR GE HU IT LA LT MC MD NL NT PL RO SB SK SL SP ST SZ TR UK **A:** KZ SCH WS **Records in Turkey:** TR-A: ANK, DIY, DUZ, KRS, SAK, TOK **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. paphlagonius Sassi & Kısmalı, 2000

Range: A: TR **Records in Turkey:** TR-A: AMA, ANK, ART, BIL, ERZ, ESK, EZU, KAH, KAS, KON, KRB, KRS, KUT, MER, NEV, SIV, VAN **Remarks:** The endemic species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

C. paradisiacus Weise, 1900

Range: A: TR **Records in Turkey:** TR-A: MAR **Remarks:** The endemic species has been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

C. parvulus Müller, 1776

Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG HU IR IT KZ LA LT NL NR NT PL RO SK SL SP SV UK YU **A:** ES FE FUJ HEI IS JA JIA JIL KZ LIA MG NC SCH TR WS **Records in Turkey:** TR-A: BRS, BUR, ISP, KON, SAM **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. peyroni Marseul, 1875

Range: A: IS JO LE SY TR **Records in Turkey:** TR-A: ART, GAZ, HAT, OSM, TOK **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

C. praticola Weise, 1889

Range: E: AB AR GG RO ST **A:** TR **Records in Turkey:** TR-A: ART, EZU, KRS, RIZ, SAM– TR-E: KRK **Remarks:** The species has been recorded only from 3 Turkish regions as

Black Sea Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. quadriguttatus (Richter, 1820)

Range: E: AB AR AU BH BU CR CZ GG HU IT PL RO SK SL ST UK YU **A:** KZ TR WS **Records in Turkey:** TR **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

C. rugicollis Olivier, 1791

Range: E: FR GR IT PT SP TR **N:** AG LB MO TU **A:** JO TR **Records in Turkey:** TR-A: AMA, ANT, AYD, BRS, IZM, MAN, MUG (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 4 Turkish regions as Aegean Region, Black Sea Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Mediterranean

C. sericeus (Linnaeus, 1758)

Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FR GE GG GR HU IT LA LT MC MD NL NR NT PL RO SK SL SP ST SV TR UK YU **A:** ES FE KZ MG TR WS **Records in Turkey:** TR-A: ANK, ARD, ART, BAL, BRS, CNK, COR, ERZ, EZU, GUM, ISP, IZM, KAS, KON, KRS, NEV, SAM, SIV – TR-E: KRK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. sexpunctatus (Linnaeus, 1758)

C. s. sexpunctatus (Linnaeus, 1758)

Range: E: AN AU BE BH BU BY CR CT CZ DE EN FI FR GB GE HU IT LA LT LU NL NR NT PL RO SB SK SL SP ST SV SZ UK **A:** ES FE JA JIA JIX TR WS **Records in Turkey:** TR-A: EZU, TOK **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. signatifrons Suffrian, 1847

Range: E: AL AU BH BU CR CZ FR GE HU IT LA MC PL RO SK SL TR UK YU **Records in Turkey:** TR-A: EZU, KOC, MAL **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

C. solivagus Leonardi & Sassi, 2001

Range: E: BH BU BY CR CT EN GR HU LA LT MC NT PL RO SK ST YU **A:** ES KZ TR UZ WS **Records in Turkey:** TR-A: ART, EZU, KRS, RIZ **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. surdus Rapilly, 1980

Range: E: AR GG **A:** IN JO SY TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Sw-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Irano-Palaestinian)

C. testaceitarsis Pic, 1915

Range: A: TR **Records in Turkey:** TR-A: TOK **Remarks:** The endemic species has been recorded only from Black Sea Region until now. **Chorotype:** Anatolian

C. transcaucasicus Jakobson, 1898

Range: E: AB AR GG **Records in Turkey:** TR-A: ANK, ANT, ART, BAY, BIL, BOL, ERZ, EZU, KAS, KAY, MAN, MER, RIZ – TR-E: KRK **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now.

Chorotype: Sw-Asiatic (Anatolo-Caucasian)

C. trimaculatus Rossi, 1790

Range: E: AB AL AR AU BH BU CR FR GG GR HU IT MC RO SL SP SZ YU **N:** EG **A:** IS JO SY TR WS **Records in Turkey:** TR-A: ADA, AGR, AMA, ANK, ANT, ART, BAY, BIL, BRS, BUR, COR, ESK, EZU, GUM, ISP, IZM, KAR, KAS, KAY, KON, KRB, MAN, MER, MUG, NEV, OSM, YOZ, ZON **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** W-Palearctic

C. turcicus Suffrian, 1847

Range: E: AL BH BU CR FR GR IT MC RO SL TR YU **A:** IN JO SY TR **Records in Turkey:** TR-A: ANK, ANT, BAL, BIL, BRS, CAN, DUZ, ESK, ISP, IST, IZM, KAS, KRB, SAM, TRA, YAL, ZON – TR-E **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian)

C. virens Suffrian, 1847

Range: E: AB AU BH BU CR CZ GE HU IT PL RO SB SK SL ST YU **A:** KZ MG TR WS **Records in Turkey:** TR-A: ANK, ARD, BRS, CAN, ERZ, EZU, GUM, ISP, KRS, SIV, YOZ (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 5 Turkish regions. But it has not been recorded from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Subgenus *Heterichnus* Warchałowski, 1991

C. loebli Sassi, 1997

Range: A: TR **Records in Turkey:** TR-A: AMA, BOL, KRB, ZON **Remarks:** The endemic species has been recorded only from Black Sea Region until now. **Chorotype:** Anatolian

C. prusias Suffrian, 1853

Range: E: AB AR BU GG MC **A:** JO SY TR **Records in Turkey:** TR-A: ADA, AMA, ANK, BAL, BIL, BOL, BRS, CNK, ESK, EZU, GUM, HAT, ISP, IST, KON, KUT, MER, MUS, SIV, TOK – TR-E: KRK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

Subgenus *Lamellosus* Tomov, 1979

C. angorensis Pic, 1908

Range: A: TR **Records in Turkey:** TR-A: AMA, ANK, COR **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Anatolian

Subgenus *Protophysus* Chevrolat, 1836

C. schaefferi Schrank, 1789

C. s. moehringi Weise, 1884

Range: E: GR **A:** CY JO SY TR **Records in Turkey:** TR-A: AMA, ANK, BIL, BOL, BRS, EZU, ISP, KRS, MER, SAM, TOK – TR-E: EDI, KRK, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

C. wehnckei Weise, 1881

Range: A: TR **Records in Turkey:** TR-A: ADA, ANT, ISP, MER **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

Genus *Pachybrachis* Chevrolat, 1836
Subgenus *Pachybrachis* Chevrolat, 1836
P. adaliensis (Weise, 1886)
Range: A: TR **Records in Turkey:** TR-A: ANT **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

P. albicans (Weise, 1882)
Range: E: AB GG TR **A:** IN **Records in Turkey:** TR-A: ART, EZU, TOK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sw-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

P. anatolicus Lopatin, 1985
Range: A: TR **Records in Turkey:** TR-A: VAN **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

P. bodemeyeri (Weise, 1906)
Range: A: TR **Records in Turkey:** TR-A: BIL, BRS, EZU **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Anatolian

P. cordatus Sassi & Schöller, 2003
Range: A: JO SY TR **Records in Turkey:** TR-A: AMA, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** Sibero-European

P. excisus (Weise, 1897)
Range: E: BU TR **A:** SY **Records in Turkey:** TR-A: AKS, ANK, ANT, ISP, NIG, OSM – TR-E **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

P. fimbriolatus (Suffrian, 1848)
Range: E: AL AU BH BU BY CR CZ FR GE GR HU IT KZ PL RO SK SL SP SZ TR UK YU **A:** JIL MG WS **Records in Turkey:** TR-A: ADA, AFY, AKS, ANT, ANK, BAY, BIL, BIN, BIT, BOL, CNK, DIY, ERZ, ESK, EZU, GUM, IGD, ISP, IST, KAH, KAR, KON, KRS, MAN, NEV, NIG, OSM, SIV, TOK, TUN, VAN **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region Hakkari Part in Eastern Anatolian Region, Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

P. glycyrrhizae (Olivier, 1808)
Range: E: AB AR **A:** AF IN IQ IS JO LE SA SI SY TD TM TR UZ **Records in Turkey:** TR-A: GAZ, IGD, KRS, MER, URF **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic or SW-Asiatic + Centralasiatic

P. hieroglyphicus (Laicharting, 1781)
Range: E: AL AU BE BH BU CR CT CZ EN FI FR GE GR HU IT LA MC MD NL NT PL RO SK SL SP SV TR UK YU **A:** WS **Records in Turkey:** TR-A: BIL, KON, MER **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Sibero-European

P. humeralis Burlini, 1956
Range: E: TR **Records in Turkey:** TR-E **Remarks:** The endemic species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Anatolian

P. instabilis Weise, 1887
Range: A: KI KZ **Records in Turkey:** TR-A: BAL, BRS, SAK – TR-E: KRK **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Centralasiatic + Anatolian

P. laticollis (Suffrian, 1860)
Range: N: EG **A:** IN IS SY TR **Records in Turkey:** TR-A: COR, DIY, MAN, MAR, SIV, VAN **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded only from 5 Turkish regions. But it has not been recorded only from Marmara Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean

P. leonardii Sassi & Schöller, 2003
Range: E: GR **A:** TR **Records in Turkey:** TR-A: ANT, BUR, IZM, KON, MER, MUG **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Aegean)

P. limbatus (Ménétriés, 1836)
Range: E: AL BH BU CR GR HU IT MC RO SB TR **A:** IS JO SY **Records in Turkey:** TR-A: ADA, ADI, ANK, ANT, BAL, BIL, BOL, BRS, CAN, ESK, EZU, ISP, IST, IZM, KAY, KUT, MAR, MER, NIG, SAM, SIV, YAL – TR-E (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only the most Parts of Marmara Region, Konya Part in Central Anatolian Region, Eastern Black Sea Part in Black Sea Region and The most Parts of Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian)

P. mardinensis (Weise, 1900)
Range: A: IN IQ IS LE SY TR **Records in Turkey:** TR-A: ADA, ADI, AMA, BIT, DEN, ELA, GAZ, HAK, HAT, KAH, MAR, MER, OSM, MUS, VAN **Remarks:** The species is rather widely distributed in Turkey. It has been recorded only from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian)

P. mendax Suffrian, 1860
P. m. mendax Suffrian, 1860
Range: E: ST UK **A:** AF IN TR **Records in Turkey:** TR-A: ANK, BAY, CAN, DEN, ERZ, EZU, GUM, KRS, KON, MER, NIG, SIV, VAN **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

P. nigropunctatus Suffrian, 1854
Range: E: AB AR **A:** AF IN IQ IS KZ SY TD TM TR **Records in Turkey:** TR-A: ADA **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

P. nitidicollis (Weise, 1894)
Range: A: KI KZ TD TM UZ **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Centralasiatic + Anatolian

P. pentheri (Ganglbauer, 1905)
Range: A: TR **Records in Turkey:** TR-A: ISP, KAY **Remarks:** The endemic species has

been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

P. picus (Weise, 1882)

Range: E: AU BE BH CR CZ FR GE HU IT PL RO SK SL SP SZ **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

P. scripticollis Faldermann, 1837

Range: E: AR **A:** AF IN IQ IS JO LE MG SY TM TR **Records in Turkey:** TR-A: DIY, GAZ, HAK, MAR, URF **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-e-Mediterranean)

P. scriptidorsum Marseul, 1875

Range: E: BU CZ RO ST UK **A:** HEB JIL KZ MG NC SHN SY TR WS **Records in Turkey:** TR-A: ART, BOL, DIY, EZU, GUM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

P. sinuatus (Mulsant & Rey, 1859)

Range: E: AL AU BE BH BU CR CZ FR GE GR HU IT MC MD NL PL RO SK SL TR UK YU **A:** WS **Records in Turkey:** TR-A: ANK, BOL, EZU, ISP **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

P. tesselatus (Olivier, 1791)

P. t. tauricus Suffrian, 1848

Range: E: AB AR UK **A:** IS JO LE SY TR **Records in Turkey:** TR-A: ADA, AFY, AGR, AKS, AMA, ANK, ANT, BAY, BOL, BRS, CNK, COR, ERZ, EZU, GAZ, GUM, ISP, IZM, KAH, KAR, KAY, KON, KRS, KUT, MAR, MER, NEV, NIG, SIV, TOK, VAN, YOZ (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic

P. velarum Warchałowski, 1998

Range: A: TR **Records in Turkey:** TR-A: ANK, BOL, ERZ, EZU, GUM, KRS, SIV **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Anatolian

P. vermicularis Suffrian, 1854

Range: E: ST **A:** IN KZ **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

P. warchalowskii Lopatin & Nesterova, 2010

Range: A: TR **Records in Turkey:** TR-A: MAR **Remarks:** The endemic species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

Genus *Stylosomus* Suffrian, 1848

Subgenus *Stylosomus* Suffrian, 1848

S. flavus Marseul, 1875

***S. f. flavus* Marseul, 1875**
Range: E: AL AU BU CR GR MC RO ST TR UK **A:** CY TR **Records in Turkey:** TR-A: EZU, KAS, VAN **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***S. subelongatus* Pic, 1913**
Range: A: IS SY TR **Records in Turkey:** TR-A: ADA, GUM, HAT **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***S. tamaricis* (Herrich-Schäffer, 1836)**
Range: E: BU CR FR GR IT MC SP ST TR UK **N:** AG LB MO **A:** IS KZ SI SY TR **Records in Turkey:** TR-A: DEN, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** Mediterranean

ZOOGEOGRAPHICAL ANALYSIS

Turkish Cryptocephalinae includes 107 species group taxa (92 species and 15 subspecies that include nominotypical and other). 26 species group taxa, namely 24.30 % of the taxa have "Sibero-European" chorotype. 21 species group taxa, namely 19.63 % of the taxa have "Anatolian" chorotype. 18 species group taxa, namely 16.82 % of the taxa have "Turano-Mediterranean" chorotype. 13 species group taxa, namely 12.15 % of the taxa have "SW-Asiatic" chorotype. 7 species group taxa, namely 6.54 % of the taxa have "C and E-European" chorotype. 6 species group taxa, namely 5.61 % of the taxa have "E-Mediterranean" chorotype. 6 species group taxa, namely 5.61 % of the taxa have "Mediterranean" chorotype. 3 species group taxa, namely 2.80 % of the taxa have "Centralasiatic + Anatolian" chorotype. 2 species group taxa, namely 1.87 % of the taxa have "European" chorotype. Each of the remaining 5 species group taxa has a different chorotype. One species, namely about 0.93 % of the taxa has "Asiatic-European" chorotype. One species, namely about 0.93 % of the taxa has "E-Palearctic" chorotype. One species, namely about 0.93 % of the taxa has "S and E-European" chorotype. One species, namely about 0.93 % of the taxa has "Turano-European" chorotype. And one species, namely about 0.93 % of the taxa has "W-Palearctic" chorotype (Fig. 1). So the dominant chorotype for Turkish Cryptocephalinae is "Sibero-European" (24.30 %). "Anatolian" (19.63 %) and "Turano-Mediterranean" (16.82 %) chorotypes follow it respectively. Also the members of "SW-Asiatic" (12.15 %) chorotype presents an important contribution for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Cryptocephalinae are presented as follows:

A total of 26 species group taxa have "Sibero-European" chorotype as *C. bilineatus*, *C. chrysopus*, *C. elegantulus*, *C. f. fulvus*, *C. o. ocellatus*, *C. populi*, *C. pusillus*, *C. a. androgyne*, *C. anticus*, *C. bameuli*, *C. biguttatus*, *C. cordiger*, *C. flavipes*, *C. janthinus*, *C. moraei*, *C. o. octopunctatus*, *C. parvulus*, *C. quadriguttatus*, *C. sericeus*, *C. s. sexpunctatus*, *C. solivagus*, *C. virens*, *P. cordatus*, *P. fimbriolatus*, *P. hieroglyphicus* and *P. sinuatus*.

A total of 21 species group taxa have "Anatolian" chorotype as *C. amasiensis*, *C. gloriosus*, *C. pseudoreitteri*, *C. ayvazi*, *C. sultani*, *C. tshorumae*, *C. infraniger*, *C. messutati*, *C. paphlagonius*, *C. paradisiacus*, *C. testaceitarsis*, *C. loebli*, *C. angorensis*, *C. wehnckei*, *P. adaliensis*, *P. anatolicus*, *P. bodemeyeri*, *P. humeralis*, *P. pentheri*, *P. velarum* and *P. warchalowskii*.

A total of 18 species group taxa have "Turano-Mediterranean" chorotype as *C. flexuosus*, *C. e. variceps*, *C. lederi*, *C. bicolor*, *C. biledjekensis*, *C. cribratus*, *C. duplicatus*, *C. ilicis*, *C. praticola*, *C. turcicus*, *C. prusias*, *P. excisus*, *P. limbatus*, *P. m. mendax*, *P. nigropunctatus*, *P. scripticollis*, *P. vermicularis* and *S. f. flavus*.

A total of 13 species group taxa have "SW-Asiatic" chorotype as *A. glabratus*, *A. iranicus*, *C. curda*, *C. phaleratus*, *C. volkovitshi*, *C. fausti*, *C. f. schatzmayri*, *C. surdus*, *C. transcaucasicus*, *P. albicans*, *P. glycyrrhizae*, *P. mardinensis* and *P. t. tauricus*.

A total of 7 species group taxa have "C and E-European" chorotype as *C. apicalis*, *C. quatuordecimmaculatus*, *C. p. vittula*, *C. strigosus*, *C. octomaculatus*, *C. signatifrons* and *P. picus*.

A total of 6 species group taxa have "E-Mediterranean" chorotype as *C. tappesi*, *C. peyroni*, *C. s. moehringi*, *P. laticollis*, *P. leonardii* and *S. subelongatus*.

A total of 6 species group taxa have "Mediterranean" chorotype as *C. macellus*, *C. oranensis*, *C. rufipes*, *C. crassus*, *C. rugicollis* and *S. tamaricis*.

A total of 3 species group taxa have "Centralasiatic + Anatolian" chorotype as *C. t. tschimganensis*, *P. instabilis* and *P. nitidicollis*.

A total of 2 species group taxa have "European" chorotype as *C. labiatus* and *C. b. bipunctatus*.

One species as *P. scriptidorsum* has "Asiatic-European" chorotype.

One species as *C. e. amiculus* has "E-Palearctic" chorotype.

One species as *C. imperialis* has "S and E-European" chorotype.

One species as *C. connexus* has "Turano-European" chorotype.

One species as *C. trimaculatus* has "W-Palearctic" chorotype.

On the other side, Turkish Cryptocephalinae includes a total of 107 species group taxa. However, provincial distributions of 5 species group taxa are unknown. So Turkish Cryptocephalinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio.

For the subfamily Cryptocephalinae (according to all species group taxa):
45 species are represented in Marmara Region (42 %)
28 species are represented in Aegean Region (26 %)
54 species are represented in Mediterranean Region (51 %)
49 species are represented in Central Anatolian Region (46 %)
52 species are represented in Black Sea Region (49 %)
55 species are represented in Eastern Anatolian Region (51 %)
20 species are represented in South-Eastern Anatolian Region (19 %)

For the subfamily Cryptocephalinae (according to known provincial distribution of 102 species group taxa):
45 species are represented in Marmara Region (44 %)
28 species are represented in Aegean Region (28 %)
54 species are represented in Mediterranean Region (53 %)
49 species are represented in Central Anatolian Region (48 %)
52 species are represented in Black Sea Region (51 %)
55 species are represented in Eastern Anatolian Region (54 %)
20 species are represented in South-Eastern Anatolian Region (20 %)

So Turkish Cryptocephalinae that includes a total of 107 species group taxa or 102 species group taxa of which are known provincial distributions in Turkey, are widely distributed in all Turkish Regions. The most number of species is represented in Eastern Anatolian Region and Mediterranean Region. Black sea region follows them. Central Anatolian Region and Marmara Region are represented with an important number of species. However, Aegean Region and especially South-Eastern Anatolian Region are represented with a rather little number of species now.

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Table 1. The regional distribution of all known species of Cryptocephalinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyCRYPTOCEPHALINAE							
A. glabratus	-	-	-	-	-	+	-
A. iranicus	-	-	-	-	-	-	+
C. amasiensis	-	-	+	-	+	-	-
C. apicalis	+	-	-	+	-	-	-
C. curda	+	-	-	+	+	+	-
C. flexuosus	?	?	?	?	?	?	?
C. gloriosus	-	-	-	+	-	-	-
C. phaleratus	-	-	-	-	-	-	+
C. pseudoreitteri	-	-	-	+	-	-	-
C. quatuordecimmaculatus	-	-	-	+	-	+	-
C. tappesi	-	-	+	-	-	-	+
C. volkovitshi	-	-	-	-	-	+	-
C. ayvazi	-	-	+	-	-	-	-
C. bilineatus	?	?	?	?	?	?	?
C. chrysopus	-	-	-	-	+	-	-
C. connexus	+	+	+	+	+	+	+
C. elegantulus	-	-	-	+	+	-	-
C. e. amiculus	+	-	-	-	-	-	-
C. e. variceps	+	+	+	-	+	+	-
C. fausti	+	-	-	+	-	+	-
C. f. fulvus	+	-	-	+	+	+	-
C. f. schatzmayri	-	+	+	-	-	-	-
C. labiatus	-	-	-	-	+	+	-
C. lederi	-	-	-	+	-	+	-
C. macellus	+	-	+	+	+	+	-
C. o. ocellatus	+	+	+	+	+	+	+

C. oranensis	-	-	+	-	-	-	-
C. populi	-	-	+	+	-	-	+
C. pusillus	-	-	+	+	-	-	-
C. p. vittula	+	+	+	+	-	+	-
C. rufipes	+	-	-	-	-	-	-
C. strigosus	-	-	-	-	-	+	-
C. sultani	-	-	-	+	-	-	+
C. t. tschimganensis	-	+	-	-	-	-	-
C. tshorumae	-	-	-	-	+	-	-
C. a. androgyne	?	?	?	?	?	?	?
C. anticus	+	+	+	+	+	+	+
C. bameuli	-	-	-	-	-	+	-
C. bicolor	-	-	-	-	+	+	-
C. biguttatus	-	-	+	+	+	-	-
C. biledjekensis	+	+	+	+	+	-	-
C. b. bipunctatus	+	+	+	+	+	+	-
C. cordiger	-	-	-	-	-	+	-
C. crassus	?	?	?	?	?	?	?
C. cribratus	+	+	+	+	+	+	-
C. duplicatus	+	+	+	+	+	+	+
C. flavipes	+	+	+	+	+	+	+
C. ilicis	+	+	-	+	-	-	-
C. imperialis	-	-	+	+	+	+	-
C. infraniger	-	-	-	-	+	-	-
C. janthinus	+	-	+	+	-	+	-
C. messutati	-	-	+	-	-	-	-
C. moraei	+	+	+	+	+	+	-
C. octomaculatus	-	-	+	+	-	-	-
C. o. octopunctatus	+	-	+	+	+	+	-
C. paphlagonius	+	+	+	+	+	+	-
C. paradisiacus	+	+	+	+	+	+	-
C. parvulus	+	-	+	+	+	-	-
C. peyroni	-	-	+	-	+	-	+
C. praticola	+	-	-	-	+	+	-
C. quadriguttatus	?	?	?	?	?	?	?
C. rugicollis	+	+	+	-	+	-	-
C. sericeus	+	+	+	+	+	+	-
C. s. sexpunctatus	-	-	-	-	+	+	-
C. signatifrons	+	-	-	-	-	+	-
C. solivagus	-	-	-	-	+	+	-
C. surdus	-	-	+	-	-	-	-
C. testaceitarsis	-	-	-	-	+	-	-
C. transcaucasicus	+	-	+	+	+	+	-
C. trimaculatus	+	-	+	+	+	+	-
C. turcicus	+	+	+	+	+	-	-
C. virens	+	-	+	+	+	+	-
C. loebli	-	-	-	-	+	-	-
C. prusias	+	+	+	+	+	+	-
C. angorensis	-	-	-	+	+	-	-
C. s. moehringi	+	-	+	+	+	+	-
C. wehnckei	-	-	+	-	-	-	-
P. adaliensis	-	-	+	-	-	-	-
P. albicans	-	-	-	-	+	+	-
P. anatolicus	-	-	-	-	-	+	-
P. bodemeyeri	+	-	-	-	-	+	-
P. cordatus	-	-	+	-	+	-	-

P. excisus	+	-	+	+	-	-	-
P. fimbriolatus	+	+	+	+	+	+	+
P. glycyrrhizae	-	-	+	-	-	+	+
P. hieroglyphicus	+	-	+	+	-	-	-
P. humeralis	+	-	-	-	-	-	-
P. instabilis	+	-	-	-	-	-	-
P. laticollis	+	-	+	-	-	-	-
P. leonardii	-	+	+	+	-	-	-
P. limbatus	+	+	+	+	+	+	+
P. mardinensis	-	+	+	-	+	+	+
P. m. mendax	+	+	+	+	+	+	-
P. nigropunctatus	-	-	+	-	-	-	-
P. nitidicollis	-	-	-	-	-	+	-
P. pentheri	-	-	+	+	-	-	-
P. picus	-	-	-	-	-	+	-
P. scripticollis	-	-	-	-	-	+	+
P. scriptidorsum	-	-	-	-	+	+	+
P. sinuatus	+	+	-	-	-	-	+
P. t. tauricus	+	+	+	+	+	+	+
P. velarum	-	-	-	+	+	+	-
P. vermicularis	-	-	-	-	-	+	-
P. warchalowskii	-	-	-	-	-	-	+
S. f. flavus	-	-	-	-	+	+	-
S. subelongatus	-	-	+	-	+	-	-
S. tamaricis	-	+	-	-	-	+	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

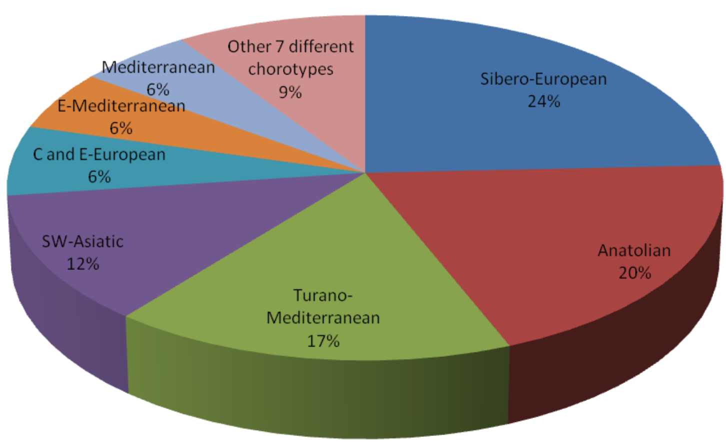

Figure 1. Chorotypical distribution of Turkish Cryptocephalinae.

ON TWO *EUOPHRYS* C. L. KOCH SPECIES NEW TO INDIA (ARANEAE: SALTICIDAE)

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[Dhali, D. C., Roy, T. K., Saha, S. & Raychaudhuri, D. 2014. On two *Euophrys* C. L. Koch species new to India (Araneae: Salticidae). Munis Entomology & Zoology, 9 (1): 143-149**]**

ABSTRACT: Till date *Euophrys frontalis* (Walckenaer, 1802) and *E. omnisuperstes* Wanless, 1975 were not known to occur in India. These have recently been recorded from the reserve forests and their adjoining Tea Estates (T.E.) of Dooars, West Bengal. Descriptions and necessary illustrations of the Indian representatives are provided.

KEY WORDS: New record, *Euophrys*, Dooars, West Bengal, India.

Salticidae is one of the most diverse families in Araneae and currently represented by 5615 species belonging to 592 genera in the world (Platnick, 2013). Several genera contain large number of species with poor taxonomic data. *Euophrys* C. L. Koch is one such (Zabka and Prószyn´ski, 1997). Metzner (2013) listed 135 nominal species while Platnick (2013) considered 117 nominal species to exist in the world. This raises a doubt on the composition of the genus which now might include few or several unrelated species simply because of small size and some convergent similarities in genitalic patterns [coiled base of embolus, meandering spermophore, one-chambered and round or oval spermathecae—quite common in salticids and even in distantly related subfamilies/groups] (Zabka, 1995). Indian *Euophrys* are known by, *E. concolorata* Roewer, 1951 and *E. minuta* (Prószyn'ski, 1992) (Sebastian & Peter, 2009; Keswani et al., 2012).

During our study on the diversity of spiders in the reserve forests and their adjoining Tea Estates (T.E.) of Dooars, West Bengal, we came across with two *Euophrys* species, namely, *E. frontalis* (Walckenaer, 1802) from Buxa Tiger Reserve and Nepuchapur tea estate and *E. omnisuperstes* Wanless, 1975 from Gorumara National Park. Both the species are the first report from India. The recorded taxa are described and illustrated in the interest of Indian Arachnology.

MATERIAL AND METHODS

Materials were mainly collected by hand from the ground and litter and under stone during the surveys conducted in the reserve forests of Dooars viz. Chapramari Wild Life Sanctuary (CWLS), Gorumara National Park (GNP), Jaldapara Wild Life Sanctuary (JWLS), Buxa Tiger Reserve (BTR) and their adjoining tea gardens**.** They were also collected by pitfall traps and Berlese extraction.

Spider specimens thus sampled were preserved following Tikader (1987) and were studied under Stereo Zoom Binocular Microscopes, model Olympus SZX-7 and Zeiss SV-11. The measurements indicated in the text are in millimeters (mm), made with an eye piece graticule. Materials are in the deposition of Entomology

Laboratory, Department of Zoology, University of Calcutta, Kolkata.
Abbreviations used: AL= abdominal length, ALE= anterior lateral eye, AME= anterior median eye, AW= abdominal width, CL= cephalothoracic length, CW= cephalothoracic width, PLE= posterior lateral eye, PME= posterior median eye, TL= total length.

TAXONOMIC ACCOUNT

Genus: *Euophrys* C. L. Koch

- *Euophrys* C. L. Koch, 1834: Ann. Soc. Ent. France, 3**:** 7-8.

Diagnosis: Small spiders (3–5 mm long). Cephalothorax as dark as eye field or only slightly lighter, moderately high and convex, accommodating the eyes in 2/5 area. Abdomen with light mosaic pattern on dark grey background. Male palp with thin tibia and long apophysis, bulbous much longer than wide and with posterior lobe, spermophore meandering, embolus base coiled and set on distal haematodocha, spermathecae oval or round.
Type species: *Aranea frontalis* Walckenaer, 1802.
Distribution: Throughout except Nearctic (Metzner, 2013; Platnick, 2013).

Key to species:

1. Abdominal dorsum with 2 pairs of sigilla; cheliceral promargin with 3 teeth, fangs serrate; spermathecae curved, both ends swollen.................... .... *frontalis* Walckenaer
-Abdominal dorsum without any sigilla; cheliceral promargin with 2 teeth, fangs not serrate; spermathecae round.......*omnisuperstes* Wanless

Euophrys frontalis (Walckenaer)

(Figs. 1-5 & 11)

- *Aranea frontalis* Walckenaer, 1802. Faune parisienne. Insectes. ou Histoire abrégée des insectes de environs de Paris. Paris 2**:** 246**.**
- *Euophrys frontalis* (Walckenaer, 1802); C. L. Koch, 1834. Arachniden. In Herrich-Schäffer, G. A. W., Deutschlands Insekten. Heft. 123.

Description: Female
CL- 2.00, CW- 1.50, AL- 2.89, AW- 1.93, TL- 5.07. Cephalothorax (Fig. 1) brown to dark brown, margins deep brown, ocular area anteriorly and laterally black, longer than wide, anteriorly subtruncate, medially widest, posteriorly U-shaped, clothed with pubescence, black setae, white long, erect hairs anteriorly and black, long, erect hairs on lateral side of ocular area; cephalic region anteriorly sloped, flat, wider than long. Eyes 8, pearly white, in 3 rows, anterior recurved, on black tubercles, frontally directed, rests straight; ocular quad wider than long. Eye diameter- AME>ALE>PLE>PME. Inter ocular distance: AME-AME- 0.46, ALE-AME- 0.43, ALE-ALE- 1.14, PME-PME- 1.14, PLE-PME- 0.43, PLE-PLE- 1.39, AME-PME- 0.61, and ALE-PLE- 0.71. Clypeus pale, vertical, height small. Thorax posteriorly strongly sloped, with a black midlongitudinal, small, prominent fovea; radii distinct. Chelicerae (Fig. 2) yellow, longer than wide, robust, promargin with 3 and retromargin with 1 brown teeth, scopulate; fang pale brown, long, strong and inner margins serrated. Labium (Fig. 3) dark brown, apically yellow, basally broader and with a black, broad, V-shaped marking, longer than wide, scopulate. Maxillae (Fig. 3) yellow, basal margins brown, longer than wide, apically subtruncate, wider, outer margins medially concave, scopulate. Sternum (Fig. 3)

yellow, longer than wide, parallel sided, anteriorly truncate, posteriorly broadly V-shaped, clothed with yellow setae and brown, erect hairs. Legs yellow, moderate, strong, 2 clawed, each with 6 pectinations and with claw tufts; femora with 3-0-2(2)-2(2), tibia I-II with 1-6(2-2-2)-2-2 and III- IV with 1-4(2-2)-2-2 spination. Leg measurements: I 3.47(1.04, 0.50, 0.89, 0.54, 0.50); II 3.28(0.96, 0.57, 0.79, 0.64, 0.32); III 3.89(1.18, 0.68, 0.71, 0.82, 0.50); IV 3.83(1.18, 0.54, 0.79, 0.93, 39). Leg formula- 3412.

Abdomen (Fig. 1) creamy white, marked by grey patches, elongately oval, clothed with pubescence and few pale brown, long, erect hairs anteriorly; dorsum, with 2 depressions, each with a brown, tiny, sigilla, anteriorly with 2 sigilla; venter creamy white, laterally and posteriorly with black patches, midlongitudinally with a faint, pale yellow band, extending from epigastric furrow to spinnerets.

Epigynum-Internal genitalia (Figs. 4-5): Epigynal plate distinct, capsule like, with 2 pockets; copulatory ducts short, triangular; spermathecae curved, both ends swollen; fertilization ducts short, opening into a broad atrium.

Material examined: 1female, Jayanti, BTR, Jalpaiguri, West Bengal, India, 10. x. 2009, coll. D. C. Dhali. 1 female, Nepuchapur T. E., Jalpaiguri, West Bengal, India, 01. xi. 2010, coll. T. K. Roy.

Distribution: India (new record): West Bengal; Afghanistan, Austria, Azerbaijan, Belgium, China, Croatia, Czech Republic, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Kyrgyzstan, Libya, Lithuania, Macedonia, Netherlands, Poland, Portugal, Romania, Russia, Sakhalin, Serbia, Slovakia, South Korea, Switzerland, Turkey, Turkmenistan, Ukraine (Prószyn'ski, 2007; Metzner, 2013; Platnick, 2013).

Remarks: Saving body colour the present samples are a copy of what has been described by Logunov et al. (1993), Logunov (1997) and Zabka & Prószyn´ski (1998).

Habitat: The species is a common resident of litters of both the surveyed habitats.

***Euophrys omnisuperstes* Wanless**

(Figs. 6-10 &12)

- *Euophrys omnisuperstes* Wanless, 1975. Bull. British Arachnol. Soc., 3: 132.

Description: Female

CL- 1.51, CW- 1.30, AL- 2.41, AW- 1.30, TL- 3.81. Cephalothorax (Fig. 6) brown, ocular area deep brown, excepting black lateral and anterior margins, longer than wide, anteriorly truncate, posteriorly little wider and U-shaped, clothed with white pubescence; cephalic region anteriorly sloped, with long pale brown hairs on sides, longer than wide, with a midlongitudinal thoracic fovea. Eyes 8, pearly white, on tubercles, excepting PME, in 3 rows, anterior recurved, each fringed with white, long hairs, forwardly directed, rests straight; ocular quad wider than long, anteriorly little wider. Eye diameter- AME>ALE>PLE>PME. Inter ocular distance: AME-AME- 0.38, ALE-AME- 0.27, ALE-ALE- 0.86, PME-PME- 0.86, PLE-PME- 0.29, PLE-PLE- 0.89, AME-PME- 0.43, and ALE-PLE- 0.59. Clypeus deep brown, vertical, height medium, with pale brown, long hairs. Thorax strongly sloped posteriorly, midlongitudinally with a black, prominent fovea; radii absent. Chelicerae (Fig. 7) deep brown, rectangular, robust, promargin with 2 and retromargin with 1 black teeth, scopulate; fang dark brown, short, robust. Labium (Fig. 8) brown, midlaterally marked by black, basally truncate, apex round, scopulate. Maxillae (Fig. 8) yellowish brown, longer than wide, apically round, posterolateral margins constricted with pedunculate base, concave, scopulate. Sternum (Fig. 8) yellow, margins pale brown, subcordate, clothed with pubescence. Legs yellow, medium, slender, excepting robust leg I, 2 clawed, with claw tufts; femora I with 3-0-2(2)-3(2-1), II-IV with 3-0-0-0, tibia I with 0-6(2-2-2)-3-3, II with 0-8(2-2-2-2)-0-0, and II-IV without any spination. Leg measurements: I 3.35(1.09, 0.39, 0.91, 0.61, 0.35); II 4.23(1.04, 0.48, 0.87, 1.45, 0.39); III 3.78(1.26, 0.48, 0.74, 0.91, 0.39); IV 3.95(1.30, 0.39, 1.04, 0.87, 0.35). Leg formula- 2431.

Abdomen (Fig. 6) creamy white, decorated with grey, longer than wide, anteriorly narrower and round, medially widest, posteriorly narrowing and pointed, clothed with pubescence and setae; venter creamy white.

Epigynum-Internal genitalia (Figs. 9-10): Epigynum nearly oval with a ring like pockets in each side, with prominent duct system; copulatory ducts very long, thin, coiled; spermathecae round; fertilization ducts short, basally thick, outwardly directed.

Material examined: female ♀, Dhupjhora, GNP, Jalpaiguri, West Bengal, India, 12. iv. 2009, coll. D. C. Dhali.

Distribution: India (new record): West Bengal; Nepal (Prószyn'ski, 2007; Metzner, 2013; Platnick, 2013).

Remarks: The recorded individual is very much akin to that of Wanless (1975), excepting (i) body colouration and abdominal decoration, (ii) leg fomula 2431 (leg fomula 142=3 in male and 41=32 in female) and (iii) no sigilla on abdomen (1 pair of sigilla in male and 2 pairs in female).

Habitat: The species is a common resident of forest litter.

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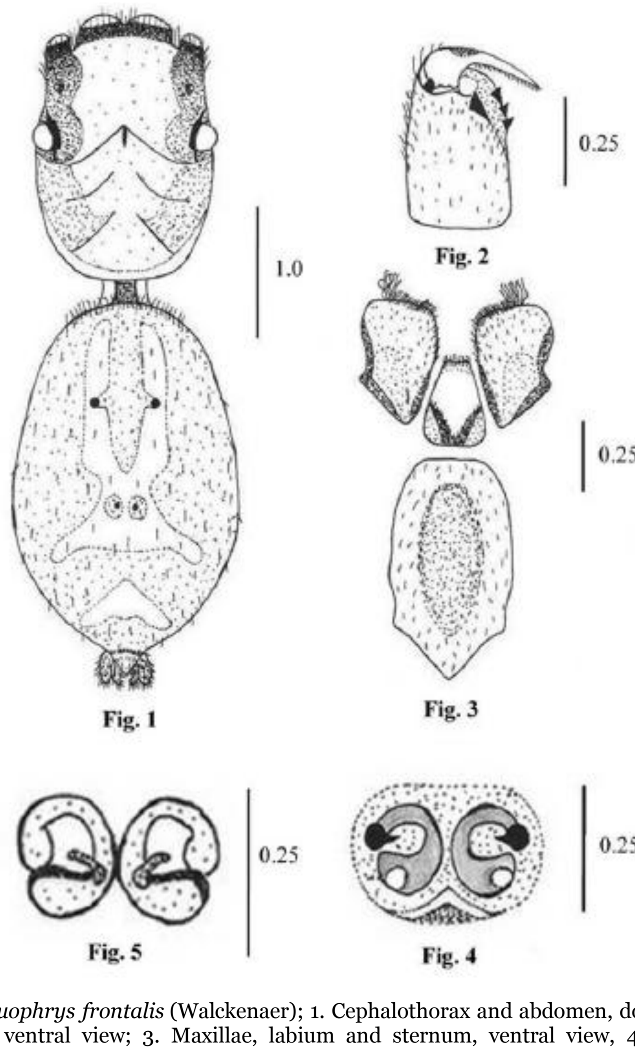

Figs. 1-5: *Euophrys frontalis* (Walckenaer); 1. Cephalothorax and abdomen, dorsal view; 2. Chelicerae, ventral view; 3. Maxillae, labium and sternum, ventral view, 4. Epigynum, ventral view, 5. Internal genitalia, dorsal view.

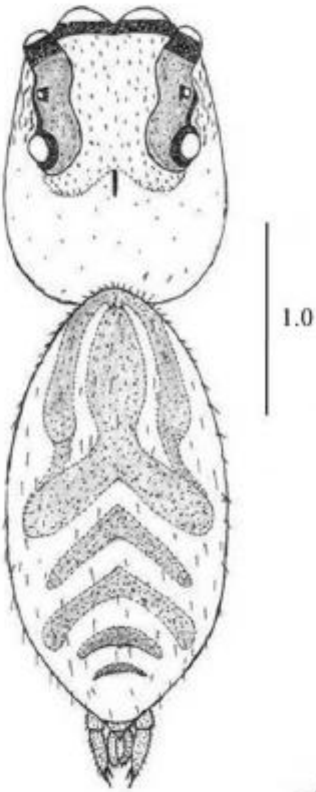

Fig. 6

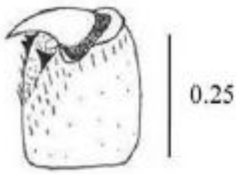

Fig. 7

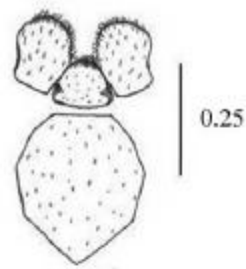

Fig. 8

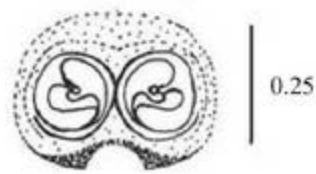

Fig. 9

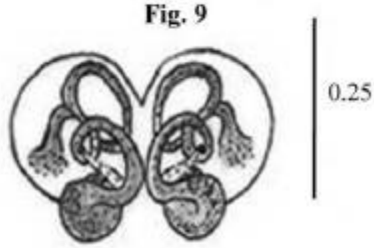

Fig. 10

Figs. 6-10: *Euophrys omnisuperstes* Wanless 6. Cephalothorax and abdomen, dorsal view; 7. Chelicerae, ventral view; 8. Maxillae, labium and sternum, ventral view, 9. Epigynum, ventral view, 10. Internal genitalia, dorsal view.

Figs. 11-12: Photographic images: 11. General habitus of *Euophrys frontalis* (Walckenaer); 12. General habitus of *Euophrys omnisuperstes* Wanless.

PRELIMINARY SURVEY OF ECONOMIC INSECTS AND THEIR INSECT PREDATORS IN NORTHERN IRAQ

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[**Mustafa, S. A., Zubair, S. M., Zandi, Z. A., Al-Maroof, I. N., Kidir, A. & Ali, M. A.** 2014. Preliminary survey of economic insects and their insect predators in northern Iraq. Munis Entomology & Zoology, 9 (1): 150-160]

ABSTRACT: A survey to identify economic insects of poplar trees was carried out during 2012 in Erbil province in northern of Iraq. Various sampling techniques were used to collect different stages of insects from all tree parts (root, stem, branches and leaves). The survey revealed the presence of 21 insect species belonging to 4 order and 12 families, including two species reported on poplar for the first time in Iraq; *Chaitophorus albus* M., *Pemphigus bursarius* L., and presence 6 species of insect predators. The intensity of infestation varied from regions to anther depending on tree age, agricultural practices and variation in food preferences for poplar trees by insects. The results of field study showed a highest percent by poplar lace bug, *Monosteira unicostata* M.R. on the plant parts of poplar trees, namely, black poplar, *Populus nigra*, euphratic poplar, *Populus euphratica* and hybrid poplar, *Populus euramericana*, with a mean reached (90, 95, 70, 90, 60, 80%), respectively, followed small borer stem, *Melanphila picta* Pall. (30%), and *Capnodis miliaris* K. (20%). While there was a lowest infestation for big borer stem, *Capnodis miliaris* K., and poplar leaf bite, *Japanagromyza* sp., with infestation (10 and 20%) on the euphratic poplar, followed *Melanphila picta* Pall. (20%) and *Japanagromyza* sp.(10%), on Hybrid poplar, respectively. Field study results showed there are different percentage of infestation according to the kind of insect, species of tree and the part of plant that has been infested. In both regions, the poplar lace bug were high infested on poplar trees with a mean (88, 83 and 75%) respectively, followed by, euphratic leaf gall, *Egeirotrioza ceardi* B. (75%), poplar gall aphid; *Pemphigus bursarius* L. (75%), *P. lichtensteini* T. (85%) and poplar leaf aphid, *Chaitophorus albus* M. (78%) on the poplar trees in this study, respectively, while a least infection showed of big borer stem, *Capnodis miliaris* K. and poplar leaf bite, *Japanagromyza* sp., with a mean reached (10 and 13%) on the euphratic poplar, in both region, respectively. On the other hands, results also showed presence numerous insects in the two regions studied, like, poplar leaf worm, *Pseudoteleia squamodorella* A., poplar leaf bond, *Gypsonoma hapalosarca* M., poplar aegeri moth, *Parathrene tabaniformis,* poplar twig bug, *Apodiphus amygdale,* scale poplar insect, *Diaspidiotus caucasicus* B., poplar leaf beetles, *Chrysomela populi,* poplar root beetle, *Anomala dubia* S., poplar root beetle, *Adoretus irakanus* O., small borer stem, *Melanphila picta* Pall., poplar leaf bond, *Nycteola asiatica* K., poplar leaf worm, *Apatele aceris* L., black poplar leaf larva, *Cerura vinula* L., poplar leaf crinkle psyllid, *Camarotoscena speciosa* F.. The results showed a number of predators that attack insects and it is the highest density of predators where a total average 40.0, 53.3 and 33.7 insect on the studied species, while the average of population density for predators where followed, normal ant, *Solenopsis inyicta* (67.5) insect, lady bird, *Coccinella septenpunctata* L. (55) insect, syrfis flies, *Syrphus corolla* F. (48.3), predators bug, *Orius laevigatus* F. (45), mantis hours, *Mantis religiosa* L. (27.5) insect and aphid lion, *Chrysopa* spp. (21.6) insect. Generally, in this field survey, the percentage of the infestation were highly on black, euphratic and hybrid poplar trees in Koysinjaq region with a total average (45, 43, 43%) compared with insect infestations in Taq-Taq regions (42, 53, 37%), respectively.

KEY WORDS: Survey, economic insects, food preferences, poplar, *Populus nigra*, *P. euphratica*, *P. euramericana*, predators, Iraq.

Populus spp. is considered as important economic trees belongs to the family Salicaceae which is distribution in medium, south and north of Iraq (Dawoody, 1979). Poplar wood is used locally for a variety of purposes, mainly as constructional timber in round for village hutments, as poles for shuttering work, paper, pulp, veneer, lumber, particle board and different hand industries (FAO, 1979; Jobling, 1981; Abady, 1988; Kasir & Salih, 1990; Taylor, 2002). Poplars have a rapid growth rate and capable of vegetative propagation, generally, genus *Populus* is represented by three species, black poplar, *Populus nigra,* euphratic poplar, *Populus euphratica* and hybrid poplar, *Populus euramericana* in the both study regions. The productive of poplar trees in Iraq declined because of humans activities, shifting cultivation, heavy grazing, wars and especially effect of insects' infestation on these trees (Robert, 1972; Abdulla, 1988). Researchers in the different parts of the world reported that genus, *Monosteira* spp. were founded on the poplar and almond trees (Abdullah et al., 1980; Awad & Amin, 1983; Moleas, 1985, 1987; Arab, 1996; Mustafa & Al-maroof, 2003; Babolmorad et al., 2006; Ozey, 1997; Ozlem & Halil, 2007). The economic important of insects is attack all species of poplar trees and may lead to their death or decline in quantity and quality of their timbers are poplar lace bug, *Monosteira unicostata* M. R., euphratic leaf gall, *Egeirotrioza ceardi* B., poplar gall aphid, *Pemphigus* spp. T., poplar leaf aphid, *Chaitophorus* spp., poplar leaf worm, *Apatele aceris* L.*,* poplar twig bug, *Apodiphus amygdale, poplar leaf beetles, Chrysomela populi, polar root beetles, Adoretus irakanus* O., poplar leaf crinkle psyllid, *Camarotoscena speciosa* F., *poplar aegeri moth*, *Parathrene tabaniformis,* small borer stem, *Melanphila picta* Pall., and big borer stem, *Capnodis miliaris* K., and poplar moth, *Gypsonoma hapalosoroa* Meyr. (Abul-Hab, 1965; Graham, 1965; Herfs, 1974; Swaillem & Amin, 1975, 1977; Wilson, 1979; Swaillem & Al-Maroof, 1981; Zubiar, 1986; Hassan, 2003; FAO, 2003; Al-Maroof & Mohammad, 1997; Al-Maroof & Mustafa, 2004; Mustafa et al., 2011; Mustafa, 2013; Aljubury, 2013). Arab (2003) recorded 15 species of harmful insects and 9 species of predators on poplar trees, *Populus alba* L., *P. nigra* L., hamoui, and *P. nigra* L., italici. in Syria, while Kailidis (1970) in Greece surveyed 91 species of insect pests on poplar trees, 4 species feed on flowers, 3 species on root, 16 species on wood, 15 species on bark, 35 species on leaves, 2 species on shoots, in addition the survey 7 species of predators, Mustafa (2011) who indicated the mortality of lace bug, *Monosteira unicostata* M. R., increased over 90% for all insecticides, Abamaction, Diazainon and Chemosiden in different concentration after 7 days of treatment under field conditions, and the best insecticide was Abamaction with concentration 0.3% when compared with the others. Knof (1972) and Robert (1972) reported that spread the numerous of insects pests on polar trees in north of Iraq, like, *Melanphila picta* Pall., *Capnodis miliaris* K., *Monosteira bucatta* Horv.*, M. unicostata* M. R., *Chrysomela populi*. AL-Maroof (1977) observed that poplar lace bug, *Monosteira unicostata* M. R. is one of the most injurious pests of colons for black poplar, *Populus nigra*, especially in nurseries and young trees as a result some sap-sucking insects attacking poplar trees in Nineveh governorate by nymphs and adults. These insects injure trees either directly by sucking their sap and robbing them of food and or indirectly by disseminating plant diseases and making the trees so weak that they can not withstand the attack of the more dangerous borers. Some studies in the Mediterranean regions mentioned the presence 67 species of insect pests on poplar in Turkiye (Sekendiz, 1973), and 60 species in Iran and Midle-East region, including orders, Hemiptera, Coleoptera and Hymenoptera (Chodjai, 1977). The objective of this study is survey for injury insects causing economic loss for poplar trees in northern of Iraq in Koysinjaq and Taq-Taq regions, Erbil province, and planning for their biological control and integrated pest management technique application in the future.

MATERIAL AND METHODS

The field study was carried out on poplar trees grown in the northern of Iraq in two basic sites, namely Koysinjaq and Taq-Taq in Erbil province, monthly sampling was conducted on the poplar trees at the selected site between March and November during the year 2012. In this study 10 trees of each for poplar species, back poplar, *Populus nigra,* euphratic poplar, *Populus euphratica*, and hybrid poplar, *Populus euramericana*, for both study regions were randomly sampled manually from different parts of the trees, stem, shoots, root and leaf. The harmful insects were identified by necked eyes or magnifying lens, in addition to symptoms on the foliage. Samples were examined in plant laboratory by light microscope and identified according to previous classification keys (Baronstev, 1998), depending on scientific references (Robert, 1972; Knopf, 1972; Al-Maroof, 1977; Swailem & Adel, 1977; Swailem & Al-Maroof, 1981). While other samples identified in the Entomology laboratory at Department of Biology, Gazi University, Turkiye. The insects that were not identified by above mentioned ways; the Erbil insect museum was consulted for the purpose of identification, in this study the predators monitored in addition to calculating the percentage of infestation by insects on poplar trees were the height 2 meter, 10 leaves, and 10 branches, all samples taken randomly from each tree and in five different directions (Arab, 2003). Numbering of living insects was done later, the percent of infestation is calculated for each insect by using the following equation (Lashenko & Bavlenov, 1988).

$$\% \text{ Infestation / insect} = \frac{\text{Number of infested parts with insects}}{\text{Total number of examined parts}} \times 100$$

RESULTS AND DISCUSSION

1-Harmful insects.

Table (1) shows the results of field survey for the economic insects in both Koysinjaq and Taq-Taq region in Erbil province in the northern of Iraq during the season of 2012. The major insect pests that were poplar lace bug, *Monosteira unicostata* M. R., on the black poplar, *Populus nigra* with highest infestation on plant parts of poplar trees in both regions were (90, 95, 90, 85%), respectively, followed poplar gall aphid, *Pemphigus lichtensteini* T., (85, 80, 90, 80%) and poplar root beetle, *Adoretus irakanus* O., (75, 80, 85, 70%) respectively, while there was a less infestation for *Cerura vinula* L. (10, 20, 10%), *Capnodis miliaris* K. (20, 10%), small borer stem, *Melanphila picta* Pall. (30, 10%) and *Nycteola asiatica* K., (30, 20%), respectively, these results were in agreement with the finding of Mustafa et al (2011) they showed significant variations between poplar trees for the population density of the poplar lace bug, *Monosteira unicostata* M.

R., and indicated that the black poplar, *Populus nigra* were higher susceptibility to infestation and insect number was more the poplar species, *P. deltoides* and, *P. euphratica*. Arab (2003) reported 24 species belonging to 8 order and 17 families, on poplar trees from Euphrates region including tree species reported on poplar for the first time in Syria; *Pemphigus bursarius* L., *Scipteron tabanformis* R., and *Polyphylla fullo* L.. These results obtained were in agreement with those of Sarmoveski (1973), and Abassi (2010), they found that black poplar trees high preferable to lace bug, *Monosteira unicostata* M. R., and *M. buccata* H., respectively. Arab (2003) who found that *Pemphigus lichtensteini* T. and *Monosteira unicostata* M. R., are greatest insect pests attacking poplar trees in Syrian Euphrates region in two location, Maskana and Dureyah with infestation reached (93.0, 87.5, 88.9 and 87.0%) respectively. The results of field survey showed many insect pests presented on black poplar, like, *Chaitophorus versicolor* K., *Chrysomelai albus* M., *Parathrene tabaniformis, Camarotoscena speciosa* F., *Apatele aceris* L., *Diaspidiotus caucasicus* B. and *Anomala dubia* S. (Table 1). From the data (Table 2) under field conditions, greatest insects attack on plant parts (stem, branches, root and leaf) of euphratic poplar trees, *Populus euphratica* occurred by *Monosteira unicostata* M. R. with infestation percentage reached (70, 90, 85, 80%) followed by *Egeirotrioza ceardi* B. (80, 70, 80%), *Apodiphus amygdale* (30, 60, 50, 65%) respectively. Generally, in this study showed a simple difference between insects infestation on euphratic poplar trees, *Populus euphratica*, by insects were the least infestation occurred by *Capnodis miliaris* K. (10, 10, 10%), followed by *Japanagromyza* sp. (20, 15, 10%), and, *Melanphila picta* Pall. (20, 10, 20, 25%) (Table 2). These results obtained were in agreement with those of Al-Maroof et al. (1981) and Mustafa (1999) they found that *Monosteira unicostata* M. R. were one of the most insects pests on poplar trees in Mosul region. Swailem & Adel (1977) they found many insect pests on euphratic poplar trees in northern of Iraq. Table (3) showed the different infestation on plant parts of poplar trees in the two survey regions on hybrid poplar, *Populus euramericana*, the highest infestation was *Monosteira unicostata* M. R. (60, 80, 70, 80%), followed *Chaitophorus albus* M., (50, 50, 75, 80%) *Chrysomela populi* (55, 40, 60%), *Adoretus irakanus* O. (35, 40, 50%), *Parathrene tabaniformis* (50, 60, 50%), *Anomala dubia* S. (10, 30, 10, 30, 20%), *Apatele aceris* L. (40, 20, 35%). While the lowest infestation was *Japanagromyza salicifolii* C. (10, 10%) and *Melanphila picta* Pall. (20, 30, 10%), respectively. From above mentioned information and through the field visits to both regions, the results of this study showed that the insect infestation were different according to species of poplar, poplar parts, and the regions, generally, the black poplar, *Populus nigra,* infested mostly by insect pests and highly density followed by, euphratic poplar, *Populus euphratica* and then hybrid poplar, *Populus euramericana*, these results of this phenomenon may be due to occurrence of differences in morphological features of tree leaves for poplar species, chemical components and nutrition content (Al-Maroof & Mustafa, 2004; Al-Mallah et al., 2008). In addition to the insect infestations were variation between two study regions, generally, it was more in Koysinjaq compare to Taq- Taq on the poplar species. In general results of this research indicate that variations in the susceptibility of poplar trees may be due to variation according to the food preferences of poplar species by insects, parts of plant, topography, altitude, and differential environmental factors.

2-Natural enemies.

Table (4) showed different kinds of predators with insects on poplar species namely, normal ant, *Solenopsis inyicta*, lady bird, *Coccinella septenpunctata* L., syrfis flies, *Syrphus corolla* F., predators bug, *Orius laevigatus* F., mantis hours, *Mantis religiosa* L. and aphid lion, *Chrysopa* spp., the present results indicated that the normal ant, *Solenopsis inyicta* and lady bird, *Coccinella quinquepunctata* L., were the most common in this study area, the highest of rate of predators were red ant, *Solenopsis inyicta* on black poplar, *Populus nigra*, with a mean reached (75) insect, followed, syrfis flies, *Syrphus corolla* F. (65) insect, and lady bird, *Coccinella quinquepunctata* L., (60) insect, while the lowest number was aphid lion, *Chrysopa* spp., (10, 20), on two poplar species, euphratic poplar, *Populus euphratica* and hybrid poplar, *Populus euramericana*, respectively, followed mantis hours, *Mantis religiosa* L. (20), according to the table (4), the rate of predators number on different poplar species can be a ranched as follows, black poplar, euphratic poplar and hybrid poplar with a mean reached (53.3, 40.0, 33.7) insects, respectively. These results obtained were in agreement with those of Arab (2003) who reported 9 insects belonging to 4 orders and 5 families, including; *Anthocoris ninki* D., *Orius* sp., *Hyilicoris* sp., *Chrysopa carnea* S., *Scymnus syriacus* M., *Coccinella quinquepunctata* L., *C. septempunctata* L., *C. undecimpunctata* L. and *Syrphus corolla* F.. Table (5) shows means of predators on poplar trees, red ant, *Solenopsis inyicta* was present at highest density with a mean of (67.5) insect, followed lady bird, *Coccinella quinquepunctata* L., (55), syrfis flies, *Syrphus corolla* F. (48.3) and predators bug, *Orius laevigatus* F. (45), while the least mean were the aphid lion, *Chrysopa* spp., (21.6), mantis hours, *Mantis religiosa* L. (27.5) and predator bug, *Orius* sp., (2.0), respectively. We conclude that most of predators were started their activities in the beginning of April on the poplar species, like, red ant and lady bird were attacked nymph of poplar lace bug, leaf aphid, leaf bite, poplar leaf psyllid and leaf bond and spiders. Al-Maroof & Amin (1986) observed that polar gall aphid, *Pemphigus lichtensteini* T. were one of the important pest attacking black poplar trees, *Populus nigra* L. in Iraq and many aphidophagous predators attacked poplar gall aphid, *Pemphigus lichtensteini* T. during the field survey are *Orius* sp. (75.5%) of the total predators, *Coccinella septempunctata* L. (16.3%), *Scymnus* sp. and *Metasyrphus corolla* F. (2.3%). Likewise, Joran (2010) observed Petiole gall aphid, *Pemphigus populitransversus* on the poplar trees, *Populus* spp. and showed that damages were not significant enough to warrant action, while Ozlem & Halil (2007) also studied the fatty acid compositions of predator *Luridus piocoris*, agents their host *Monosteira unicostata* on olmond trees in Turkey. On the other hand, Al-Maroof (1990) reported that anthocoris bug, *Anthocoris ninki* D., were the most predators attacked poplar Psyllid, *Camarotoscena speciosa* F., in northern Iraq. Joran (2010) detected that control of Cottonwood leaf beetle (*Chrysomela scripta*) by *Bacillus thuringiensis*, its showed some effectiveness in controlling the larvae, horticultural oil may also control the larvae and Imidacloprid and Permethrin will also control them

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Table 1. The Insect pests on the black poplar, *Populus nigra* and their infestation percent in northern of Iraq during season 2012.

Scientific Name of Insects	Order	Family	Damaged plant parts (%)				infestations percent (%) regions	
			Stem	Branches	Root	Leaf	Koysinjak	Taq Taq
Nycteola asiatica K.	Lepidoptera	Noctuidae	-	-	-	30	-	20
Apatele aceris L.	Lepidoptera	Noctuidae	-	-	-	40	20	35
Cerura vinula L.	Lepidoptera	Notodontidae	-	-	-	10	20	10
Parathrene tabaniformis	Lepidoptera	Aegeriidae	-	75	-	-	75	50
Monosteiria Unicostata M.R	Heteroptera	Tingidae	-	90	-	95	90	85
Camarotoscena speciosa F.	Homoptera	Psyllidae	-	-	-	50	60	30
Chaitophorus versicolor K.	Homoptera	Aphididae	-	50	-	75	70	75
Pemphigus lichtensteini T.	Homoptera	Aphididae	-	85	-	80	90	80
Pemphigus immunis B.	Homoptera	Aphididae	-	50	-	30	70	80
Diaspidiotus caucasicus B.	Homoptera	Diaspididae	-	70	-	50	65	50
Chrysomela populi	Coleoptera	Chrysomelidae	-	-	-	70	80	50
Adoretus irakanus O.	Coleoptera	Scarabaeidae	-	-	75	80	85	70
Anomala dubia S.	Coleoptera	Scarabaeidae	-	20	40	60	70	40
Melanphila picta Pall.	Coleoptera	Buprestidae	30	-	-	-	10	-
Capnodis miliaris K.	Coleoptera	Buprestidae	20	-	-	-	10	-

Table 2. The Insect pests on the euphratic poplar, *Populus euphratica* and their infestation percent in northern of Iraq during season 2012.

Scientific Name of Insects	Order	Family	Damaged plant parts (%)				infestations percent (%) regions	
			Stem	Branches	Root	Leaf	Koysinjak	Taq Taq
Pseudoteleia squamodorella A.	Lepidoptera	Gelechiidae	-	-	-	30	30	20
Gypsonoma hapalosarca M.	Lepidoptera	Tortricidae	-	-	-	75	60	85
Parathrene tabaniformis	Lepidoptera	Aegeriidae	-	30	-	-	30	50
Monosteiria Unicostata M.R.	Heteroptera	Tingidae	-	70	-	90	85	80
Apodiphus amygdale	Heteroptera	Pentatomidae	-	30	-	60	50	65
Egeirotrioza ceardi B..	Homoptera	Psyllidae	-	-	-	80	70	80
Egeirotrioza verrucifica Long.	Homoptera	Psyllidae	-	50	-	-	40	35
Diaspidiotus caucasicus B.	Homoptera	Diaspididae	-	40	-	30	50	30
Chrysomela populi	Coleoptera	Chrysomelidae	-	-	-	50	30	55
Anomala dubia S.	Coleoptera	Scarabaeidae	-	10	50	40	50	20
Adoretus irakanus O.	Coleoptera	Scarabeidae	-	-	50	40	45	70
Melanphila picta Pall.	Coleoptera	Buprestidae	20	10	-	-	20	25
Capnodis miliaris K.	Coleoptera	Buprestidae	10	-	-	-	10	10
Japanagromyza sp.	Diptera	Agromyzidae	-	-	-	20	15	10

Table 3. The Insect pests on the hybrid poplar, *Populus euramericana* and their infestation percent in northern of Iraq during season 2012.

Scientific name of Insects	Order	Family	Damaged plant parts (%)				infestations percent (%) regions	
			Stem	Branches	Root	Leaf	Koysinjak	Taq Taq
Apatele aceris L.	Lepidoptera	Noctuidae	-	-	-	40	20	35
Parathrene tabaniformis	Lepidoptera	Aegeriidae	-	50	-	-	60	50
Monosteiria unicostata M.R.	Heteroptera	Tingidae	-	60	-	80	70	80
Chaitophorus albus M.	Homoptera	Aphididae	-	50	-	50	75	80
Chrysomela populi	Coleoptera	Chrysomelidae	-	-	-	55	40	60
Anomala dubia S.	Coleoptera	Scarabaeidae	-	10	30	10	30	20
Adoretus irakanus O.	Coleoptera	Scarabeidae	-	-	35	-	40	50
Melanphila picta Pall.	Coleoptera	Buprestidae	20	-	-	-	30	10
Japanagromyza salicifolii C.	Diptera	Agromyzidae	-	-	-	10	10	-

Table 4. Insect predators on the Poplar trees in northern of Iraq during season 2012.

Poplar Species	No. of insect predators (%)			No..of insect predators %	Mean / poplar plant
	Scientific Name	Order	family		
Populus nigra	*Chrysopa* spp.	Neuropteraa	Chrysopisd	35	
	Syrphus corolla F.	Diptera	Syrphidae	65	
	Mantis religiosa L.	Dictyoptera	Mantidae	35	
	Solenopsis inyicta	Vespoidea	Formicidae	75	
	Orius laevigatus F.	Hemiptera	Anthocoridae	50	
	Coccinella quinquepunctata L.,	Coleoptera	Coccinellidae	60	
Populus euphratica	*Chrysopa* spp.	Neuropteraa	Chrysopisd	20	
	Syrphus corolla F.	Diptera	Syrphidae	45	
	Mantis religiosa L.	Dictyoptera	Mantidae	20	
	Solenopsis inyicta	Vespoidea	Formicidae	60	
	Coccinella quinquepunctata L.	Coleoptera	Coccinellidae	55	
Populus euramericana	*Chrysopa* spp.	Neuropteraa	Chrysopisd	10	
	Syrphus corolla F.	Diptera	Syrphidae	35	
	Orius laevigatus F.	Hemiptera	Anthocoridae	40	
	Coccinella quinquepunctata L.,	Coleoptera	Coccinellidae	50	

Table 5. Means of insect predators on poplar trees during season 2012.

Insect predators		
Scientific name	English name	Mean / insect predators
Chrysopa spp.	Aphid lion	21.6
Syrphus corolla F.	Syrphus flies	48.3
Mantis religiosa L.	Mantis hours	27.5
Solenopsis inyicta	Red ant	67.5
Orius laevigatus F.	Predators bug	45.0
Coccinella quinquepunctata L.,	Lady bird	55.0

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART IV – CRYSOMELIDAE: DONACIINAE AND CRIOCERINAE

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ABSTRACT: The paper gives chorotype identifications for Turkish Donaciinae and Criocerinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Donaciinae and Criocerinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014) and Özdikmen & Cihan (2014) are the previous works for this aim. The present study is attempted as the fourth step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Donacinae comprises of 17 species of 3 genera and Turkish Criocerinae comprises of 13 species of 4 genera.

Subfamily DONACIINAE

Genus *Donacia* Fabricius, 1775
***D. aquatica* (Linnaeus, 1758)**
Range: E: AU BE BH BY CT CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU NL NR NT PL RO SK SL SP SV SZ UK YU **A:** ES FE HEI JA TR WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

***D. bicolora* Zschach, 1788**
Range: E: AB AR AU BE BU BY CR CT CZ DE EN FI FR GB GE GG HU IR IT LA LT LU MD NL NR NT PL PT RO SK SL SP ST SV SZ UK **A:** ES IN IS KZ TR UZ WS **Records in Turkey:** TR-A: ANK, BOL, DEN, DUZ, KAY, SAM, SIV (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Black Sea Region and Central Anatolian Region until now. **Chorotype:** Sibero-European

***D. cinerea* Herbst, 1784**
Range: E: AB AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MD NL NR NT PL RO SK SL SP ST SV SZ UK **A:** IN KZ TR UZ WS **Records in Turkey:** TR-A: GIR **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

***D. clavipes* Fabricius, 1792**
Range: E: AU BE BU BY CR CT CZ DE EN FI FR GB GE HU IR IT LA LS LT LU MD NL NR NT PL PT RO SK SL SP ST SV SZ UK **A:** KI KZ TR WS **Records in Turkey:** TR-A – TR-E **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

***D. delagrangei* Pic, 1896**
Range: E: GG **A:** TR **Records in Turkey:** TR-A: HAT SIR **Remarks:** The species has been known only from Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***D. impressa* (Paykull, 1799)**
Range: E: AB AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG HU IR IT LA LT LU NL NR NT PL PT RO SK SL SP ST SV SZ UK YU **N:** AG MO **A:** ES KZ TR WS **Records in Turkey:** TR-A: ANK, BOL, KON, SIV **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Palearctic

***D.kraatzi* Weise, 1881**
Range: E: AR **A:** TR **Records in Turkey:** TR-A: AMA, ERZ, KAH **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***D. marginata* Hoppe, 1795**
Range: E: AB AU BE BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MC NL NT PL PT RO SK SL SP ST SV SZ TR UK **N:** MO **A:** IN IS KZ TD TR UZ WS **Records in Turkey:** TR-A: ANK, DEN, DUZ, ISP, IST, KAH, MUG, SAM, TOK – TR-E **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded only from 5 Turkish regions. But it has not been recorded only from Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***D. microcephala* J. Daniel, 1904**
Range: A: IN IQ TR **Records in Turkey:** TR-A: KON **Remarks:** The species has been recorded only from Central Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

***D. mistshenkoi* Jakobson, 1910**
Range: E: GG **A:** TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***D. simplex* Fabricius, 1775**
Range: E: AU BE BU BY CR CT CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK **N:** AG MO **A:** ES MG NMO SHX TR WS **Records in Turkey:** TR-A: DEN, DUZ, ISP, IST, MUG, SAM, ZON – TR-E: IST **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Central Anatolian Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***D. thalassina* Germar, 1811**
Range: E: AB AR AU BE BU BY CT CZ DE EN FI FR GB GE GG HU IR IT LA LT LU NL NR NT PL RO SK SL SP ST SV SZ TR UK YU **A:** ES KZ MG TR WS **Records in Turkey:** TR-A: IZM, SIV – TR-E **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

***D. tomentosa* Ahrens, 1810**
Range: E: AB BE BH BU BY CT CZ EN FI FR GE HU IT LA LT LU NL NT PL RO SK SL ST SV SZ UK **A:** KZ TM TR UZ WS **Records in Turkey:** TR-A: GIR **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

***D. vulgaris* Zschach, 1775**
Range: E: AB AR AU BE BH BU BY CT CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU NL NR NT PL PT RO SK SL SP ST SV SZ UK YU **A:** BEI ES FE HEB HEI JA JIL KZ TR WS XIN **Records in Turkey:** TR-A: DEN, EZU, KAH, KRB, SIN **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Central Anatolian Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Macroplea* Samouelle, 1819
***M. mutica* Fabricius, 1792**
Range: E: BE BY DE EN FI FR GB GE HU IT LA NL NR NT PL RO ST SV **N:** AG **A:** KI MG UZ **Records in Turkey:** TR-A: ELA **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Palearctic

Genus *Plateumaris* Thomson, 1859
Subgenus *Euplateumaris* I.-Khnzorian, 1966
***P. sericea* (Linnaeus, 1760)**
Range: E: AB AR AU BE BU BY CT CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU NL NR NT PL RO SK SL SP ST SV SZ TR UK **A:** ES IN KZ WS **Records in Turkey:** TR-A: ANK, BOL, IST, RIZ – TR-E: IST **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

Subgenus Plateumaris Thomson, 1859
***P. consimilis* (Schrank, 1781)**
Range: E: AU BE BH BU BY CR CT CZ DE FR GE HU IT LT LU NL PL RO SK SL SP SV SZ UK **A:** WS **Records in Turkey:** TR-A: BOL **Remarks:** The species has been recorded

only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

Subfamily CRIOCERINAE

Genus *Crioceris* Geoffroy, 1762
***C. asparagi* (Linnaeus, 1758)**
Range: E: AB AL AR AU BE BU BY CR CT CZ DE FR GB GE GG GR IT LA LS LT NL PL PT RO SK SL SP ST SV SZ UK YU **N:** EG **A:** IN LE SY TD TR **NAR Records in Turkey:** TR-A: AKS, AMA, ANT, ISP, IZM, KAY, KRB, KRS, OSM **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Eastern Anatolian Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

***C. bicruciata* (Sahlberg, 1823)**
Range: E: BU GR MC "Caucasus" **A:** JO KZ TD TR UZ **Records in Turkey:** TR-A: AYD, IGD, ISP, IZM, KRS, MAN **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan) or Turano-Mediterranean (Turano-Balkan) + Centralasiatic

***C. duodecimpunctata* (Linnaeus, 1758)**
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FR GB GE GR HU IT LA LT MC MD NL NT PL PT SK SL SP ST SV SZ TR UK YU **A:** FE IN KZ MG SY TR WS "Korea" **Records in Turkey:** TR-A: AKS, AMA, ANK, EZU, IZM, KAY, KON, KRS, NIG, SAM – TR-E **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***C. paracenthesis* (Linnaeus, 1767)**
Range: E: AL AN BH BU CR FR GR IT MA MC ME PT SL SP **N:** AG CI MO TU **Records in Turkey:** TR-A: ISP, KRS – TR-E: IST **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Mediterranean

***C. quatuordecimpunctata* (Scopoli, 1763)**
Range: E: AL AU BE BH BU BY CR CT CZ FR GE HU MD PL RO SK SL ST UK **A:** BEI ES FE FUJ GUX HEB HEI JA JIA JIL KZ NMO SHN TAI WS YUN ZHE "Korea" **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Asiatic-European

***C. sokolowi* Jakobson, 1894**
Range: E: "Caucasus" **Records in Turkey:** TR-A: ANK, KON, NIG **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Genus *Lema* Fabricius, 1798
Subgenus *Lema* Fabricius, 1798
***L. cyanella* (Linnaeus, 1758)**
Range: E: AL AN AU BE BU BY CR CT CZ DE EN FI FR GB GE HU IR IT LA LT LU MC MD NL NR NT PL RO SK SL SP ST SV SZ UK YU **A:** ES FE JIL KZ LIA MG WS XIN "Korea" **NAR Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Holarctic

Genus *Lilioceris* Reitter, 1913
***L. faldermanni* (Guérin-Méneville, 1844)**
Range: E: AB AR GG GR ST TR **A:** CY IQ IS JO SY **Records in Turkey:** TR-A: ANK, ANT, BAY, EZU, ISP, KAH – TR-E **Remarks:** The species is probably rather widely

distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***L. lilii* (Scopoli, 1763)**
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG HU IT LA LS LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ UK YU **N:** AG MO TU **A:** ES FE IN KZ MG WS **NAR Records in Turkey:** TR-A: IZM **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Holarctic

***L. merdigera* (Linnaeus, 1758)**
Range: E: AU BE BH BU BY CR CZ DE EN FI FR GE HU IT LA LS LT LU NL NR NT SK SL SV SZ UK **A:** BEI ES FE FUJ GUX HEB HEI HUB JA JIL KZ LIA MG NMO NP SHN SHX TAI WS ZHE "Korea" **Records in Turkey:** TR-A: IZM, KAH, KUT **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** Asiatic-European

Genus *Oulema* Gozis, 1886
***O. duftschmidi* (Redtenbacher, 1874)**
Range: E: AL AN AU CT DE FR GE GR HU IT RO SK SP SV SZ **N:** MR **Records in Turkey:** TR-A: ADA, AKS, ANK, AFY, BOL, CNK, DUZ, ESK, KAR, KAY, KON, KSH, MER, SAM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Mediterranean

***O. gallaeciana* (Heyden, 1870)**
Range: E: AL AN AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GR HU IR IT LA LT LU MC MD NL NR NT PL RO SK SL SP ST SV SZ UK YU **A:** FE KZ MG WS "Siberia" **Records in Turkey:** TR-A: BAY, BOL, EZU, KAY, KRB, KRS **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***O. melanopus* (Linnaeus, 1758)**
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MA MC MD NL NR NT PL PT RO SK SL SP ST SV SZ UK YU **N:** AG CI LB MO MR **A:** AF CH CY ES IN IQ IS JA KI KZ MG TD WS **NAR Records in Turkey:** TR-A: ADA, AFY, AKS, ANK, ANT, ARD, AYD, CAN, COR, DIY, ESK, ERZ, EZU, GAZ, HAT, IGD, IZM, KAH, KAR, KAS, KON, KRB, KRS, KUT, MAN, MUG, OSM, SAM, SII – TR-E: EDI, KRK, TEK (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Çatalca Part of European Turkey and Kocaeli Part of Asian Turkey in Marmara Region, Central Kızılırmak Part in Central Anatolian Region, Eastern Black Sea Part in Black Sea Region, and Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** Holarctic

ZOOGEOGRAPHICAL ANALYSIS

Turkish Donaciinae includes 17 species of 3 genera. 11 species, namely 64.71 % of the species have "Sibero-European" chorotype. 4 species, namely 23.53 % of the species have "SW-Asiatic" chorotype. And 2 species, namely 11.76 % of the species have "Palearctic" chorotype (Fig. 1). So the dominant chorotype for Turkish Donaciinae is "Sibero-European". "SW-Asiatic" chorotype follows it. Also the members of "Palearctic" chorotype presents an important contribution for Turkish fauna.

For zoogeographical evaluation, the all known species of Turkish Donaciinae are presented as follows:

A total of 11 species have "Sibero-European" chorotype as *D. aquatica*, *D. bicolora*, *D. cinerea*, *D. clavipes*, *D. marginata*, *D. simplex*, *D. thalassina*, *D. tomentosa*, *D. vulgaris*, *P. sericea* and *P. consimilis*.

A total of 4 species have "SW-Asiatic" chorotype as *D. delagrangei*, *D. kraatzi*, *D. microcephala* and *D. mistshenkoi*.

A total of 2 species have "Palearctic" chorotype as *D. impressa* and *M. mutica*.

On the other side, Turkish Donaciinae includes a total of 17 species. However, provincial distributions of 3 species are unknown. So Turkish Donaciinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio.

For the subfamily Donaciinae (according to all species):
4 species are represented in Marmara Region (24 %)
5 species are represented in Aegean Region (29 %)
5 species are represented in Mediterranean Region (29 %)
6 species are represented in Central Anatolian Region (35 %)
10 species are represented in Black Sea Region (59 %)
4 species are represented in Eastern Anatolian Region (24 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

For the subfamily Donaciinae (according to known provincial distribution of 14 species):
4 species are represented in Marmara Region (29 %)
5 species are represented in Aegean Region (36 %)
5 species are represented in Mediterranean Region (36 %)
6 species are represented in Central Anatolian Region (43 %)
10 species are represented in Black Sea Region (71 %)
4 species are represented in Eastern Anatolian Region (29 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

So Turkish Donaciinae that includes a total of 17 species or 14 species of which are known provincial distributions in Turkey, are rather widely distributed in all Turkish Regions except South-Eastern Anatolian Region. The most number of species is represented in Black Sea Region. Central Anatolian Region follows it. Aegean Region, Mediterranean Region, Marmara Region and Eastern Anatolian Region are represented with an important number of species. However, South-Eastern Anatolian Region has not been included any recorded species until now. Because, probably the region has been unworked for Donaciinae.

Turkish Criocerinae includes 13 species of 4 genera. 4 species, namely 30.77 % of the species have "Holarctic" chorotype. 2 species, namely 15.39 % of the species have "Asiatic-European" chorotype. 2 species, namely 15.39 % of the species have "Mediterranean" chorotype. 2 species, namely 15.39 % of the species have "Sibero-European" chorotype. 2 species, namely 15.39 % of the species have "Turano-Mediterranean" chorotype. 1 species, namely 7.67 % of the species have "SW-Asiatic" chorotype (Fig. 2). So the dominant chorotype for Turkish Criocerinae is "Holarctic". "Asiatic-European", "Mediterranean", "Sibero-European" and "Turano-Mediterranean" chorotypes follow it. Also the member of "SW-Asiatic" chorotype presents a contribution for Turkish fauna.

For zoogeographical evaluation, the all known species of Turkish Donaciinae are presented as follows:

A total of 4 species have "Holartic" chorotype as *C. asparagi*, *L. cyanella*, *L. lilii* and *O. melanopus*.

A total of 2 species have "Asiatic-European" chorotype as *C. quatuordecimpunctata* and *L. merdigera*.

A total of 2 species have "Mediterranean" chorotype as *C. paracenthesis* and *O. duftschmidi*.

A total of 2 species have "Sibero-European" chorotype as *C. duodecimpunctata* and *O. gallaeciana*.

A total of 2 species have "Turano-Mediterranean" chorotype as *C. bicruciata* and *L. faldermanni*.

One species as *C. sokolowi* has "SW-Asiatic" chorotype.

On the other side, Turkish Criocerinae includes a total of 13 species that are known provincial distributions of all species. So, the regional distributions of all known species of Criocerinae in Turkey are presented as follows (Table 2):

For the subfamily Criocerinae:
4 species are represented in Marmara Region (31 %)
6 species are represented in Aegean Region (46 %)
6 species are represented in Mediterranean Region (46 %)
7 species are represented in Central Anatolian Region (54 %)
6 species are represented in Black Sea Region (46 %)
8 species are represented in Eastern Anatolian Region (62 %)
1 species are represented in South-Eastern Anatolian Region (8 %)

So Turkish Criocerinae that includes a total of 13 species are rather widely distributed in all Turkish Regions. The most number of species is represented in Eastern Anatolian Region. Central Anatolian Region follows it. Aegean Region, Mediterranean Region and Black Sea Region, and also Marmara Region, are represented with an important number of species. However, South-Eastern Anatolian Region are represented with one species now. Because, last one has been inadequately worked until now.

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Table 1. The regional distribution of all known species of Donaciinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyDONACIINAE							
D. aquatica	?	?	?	?	?	?	?
D. bicolora	-	+	-	+	+	-	-
D. cinerea	-	-	-	-	+	-	-
D. clavipes	?	?	?	?	?	?	?
D. delagrangei	-	-	+	-	-	+	-
D. impressa	-	-	-	+	+	-	-
D.kraatzi	-	-	+	-	+	+	-
D. marginata	+	+	+	+	+	-	-
D. microcephala	-	-	-	+	-	-	-
D. mistshenkoi	?	?	?	?	?	?	?
D. simplex	+	+	+	-	+	-	-
D. thalassina	+	+	-	+	-	-	-
D. tomentosa	-	-	-	-	+	-	-
D. vulgaris	-	+	+	-	+	+	-
M. mutica	-	-	-	-	-	+	-
P. sericea	+	-	-	+	+	-	-
P. consimilis	-	-	-	-	+	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

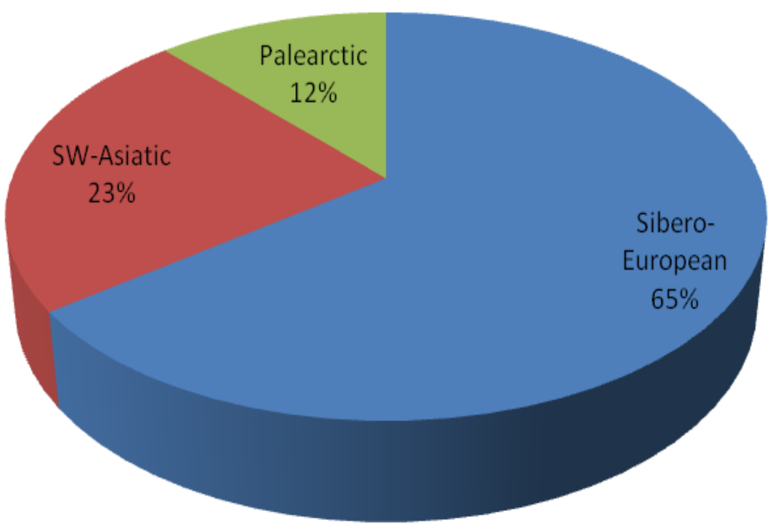

Figure 1. Chorotypical distribution of Turkish Donaciinae.

Table 2. The regional distribution of all known species of Criocerinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyCRIOCERINAE							
C. asparagi	-	+	+	+	+	-	-
C. bicruciata	-	+	-	-	-	+	-
C. duodecimpunctata	+	+	-	+	+	+	-
C. paracenthesis	+	-	+	-	-	+	-
C. quatuordecimpunctata	-	-	-	-	-	+	-
C. sokolowi	-	-	-	+	-	-	-
L. cyanella	-	-	-	-	-	+	-
L. faldermanni	+	-	+	+	+	+	-
L. lilii	-	+	-	-	-	-	-
L. merdigera	-	+	+	-	-	-	-
O. duftschmidi	-	-	+	+	+	-	-
O. gallaeciana	-	-	-	+	+	+	-
O. melanopus	+	+	+	+	+	+	+

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

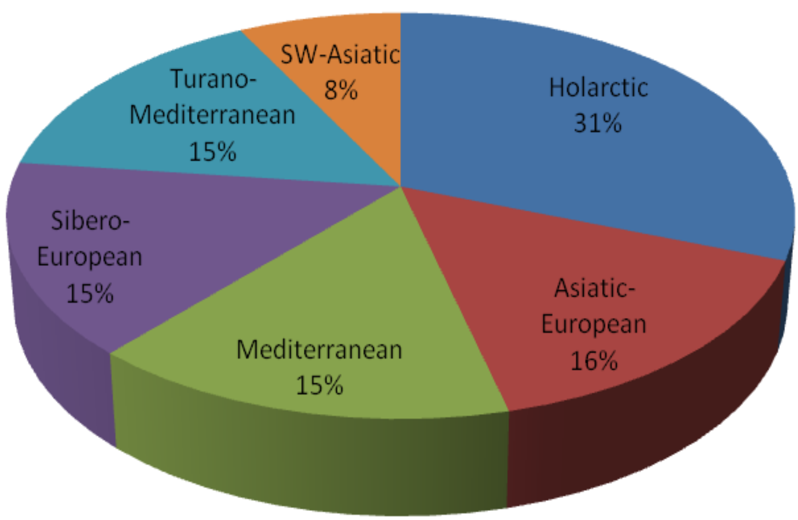

Figure 2. Chorotypical distribution of Turkish Criocerinae.

BIODIVERSITY OF THE ANTS (INSECTA: HYMENOPTERA) ASSOCIATED WITH THE CENTER AGROECOSYSTEMS OF ARGENTINA

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ABSTRACT: The world change in land use and crop modification has been, at the expenses of forests, pastures and swamps. Argentina pampean plains have not been an exception because of this global tendency with an agricultural border continuous advance from the east to the semiarid west. This generates a loss of biological diversity that affects a great number of organisms among which we find the ants, which play a very important role in the communities structure doing a balance between living creatures and their habitat. The aim of this work is compare the myrmecofauna associated with productive agroecosystems in the central region of Argentina, through the evaluation richness of these insects and diversity. The hypothesis of this study is to test the diversity of Formicidae in fields where little anthropogenic is greater than in agroecosystems of central Argentina. Three farms were chosen as study sites, each of them divided into two sampling sites that correspond to cultivated or natural areas. A total of 5.647 ants were collected among which three dominant species were found in all the sites: *Dorymyrmex breviscapis*, *Solenopsis saevissima* and *Pheidole bergi*. Significant differences were observed between the agroecosystems myrmecofauna and the natural environments.

KEY WORDS: Ants, richness, abundance, agricultural ecosystems.

Diversity is an important attribute of a community, where wealth is one of the characteristic used for measurement. Species richness, functional groups and genotypes are aspects that govern the magnitude and effectiveness of the processes and ecosystem characteristics (Chaplin et al., 1997).

Man's actions usually reduce ecosystems species richness, generating losses of biodiversity (Wilson, 1988), modifying the natural environment by developing crops and introduction of animals, causing habitat fragmentation (Cabrera, 1976; MacKay et al., 1991; Perfecto, 1996; Demaria et al., 2008).

Formicids play an important role in the structure of communities, and are also one of the most abundant terrestrial ecosystems and agro-ecosystems animal groups (Hölldobler & Wilson, 1990), (Camacho, 1995), playing an important role as predators, herbivores or detritivores, and participating in soil physicochemical processes, including decomposition and nutrient cycling (Lobry de Bruyn & Conacher, 1990). To date approximately 12,763 have been described (http://.www.antbase.org) species and an estimated formicids remains to describe the same. Several authors have considered that ants may be good bioindicators because of their high diversity and abundance, the variety of niches they occupy, their rapid response to environmental changes, sampling and its easy identification compared to other groups insect (Andersen, 1991; Peck et al., 1998; Kaspari & Majer, 2000; Alonso, 2000). They have also been found useful in assessing biotic responses against agricultural practices such as fertilization, spraying and burning (Folgarait & Farji Brener, 2005).

The anthropogenic changes in land use have led to significant changes in the diversity of the natural community, changing the perception of formicids by man, considering crop pests (Folgarait & Farji Brener, 2005). With the increasing agricultural development, ants diversity food has decreased dramatically, changing the scale at which these insects perceive the environment, for that reason we must study and retain spatial levels formicids "mosaic" because of the high degree of fragmentation that can occur habitats for the development of monocultures, which limit their diet, presenting general behaviors (Roth, 1994). On the other hand, the environment impoverishment impacts in several ways on ants either eliminating natural enemies, making homogeneous microclimate, changing the relationship between ant species and introducing exotic vegetation (Folgarait & Farji Brener, 2005).

In the province of La Pampa, Argentina, recent years of agricultural frontier expansion has increased considerably, causing a change in the affected areas biodiversity, few taxonomic surveys refer to this problem (Quiran & Casadio, 1988, 1991; Casadio & Quiran, 1990; Pilati & Quiran, 1996).

Because the issues presented by the region under study, it's expected to check that the diversity of bit fields anthropogenic formicids is greater than in agroecosystems of central Argentina.

The aim of this study is to evaluate richness and diversity ants in central Argentina Republic.

STUDY AREA

The study area is located in the east of the province of La Pampa (Fig. 1), Argentina (36° 18' 34.17'' S, 64° 16' 51.55'' W), in the transition between Espinal and Pampa phytogeographical regions. Espinal region is mainly characterized by moderately dense forests of *Prosopis caldenia*, steppe and halophytic vegetation grasses with hot and humid climate is in the north and mild dry climate in the west and south, and sandy. The Pampas region, in particular the Eastern Pampa district is characterized by prairie grasses (*Estipeas*, *Festuceas* and *Eragrosteas*) samófilas steppes, steppes halophytes, bushes, reeds and grasses, among others, the climate ranges from sub-humid to semiarid (annual average T °: 14° to 16°) with heavy seasonal rains (300-500 mm), the soil is characterized by mollisols and entisols with loess or silt subsoil (Cabrera, 1976, Natural Resources Inventory, 2004).

MATERIALS AND METHODS

Samples were taken at six plots of one hectare, four of them were found cultivated or tillage tasks (alfalfa, corn, pasture and sorghum) and other two maintained the appearance of a natural field called caldenales. Three samplings were performed, for the months of April, May and June 2008, respectively, which ranged from autumn to early winter of that year. This season was optimal in the region due to low rainfall and dry temperate presented, encouraging mobility and fall of arthropods.

The two sites considered natural, due to low human impact, consist caldenes (*Prosopis caldenia*), this is distributed in arid dry temperate Argentina, is endemic in this country, it is used in times of drought by animals for food as it consists of a fruit (legume) pastures rich in sugars and characterized by grasses

(*Estipeas*, *Festuceas* and *Eragrosteas*), generally used as fodder for cattle animals by man, are both sites 1 and 2.

The four sites contained agrocultivados: alfalfa (*Medicago sativa*), are used as fodder and frequently naturalized vegetation is this site 3; corn (*Zea mays*) is widely cultivated in arid areas to be used as fodder and food for living human, is the site 4; sorghum (*Sorghum vulgare*), make the site 5, is widely cultivated as fodder for cattle, since it is very nutritious because it contains sugars; pasture (composed by: Vetch and Oats) Site part 6, vicia (*Vicia faba*) are set as the monofilament cultivation accompanied by some cereal (oats, barley), is used as fodder. oats (*Avena sativa*), is frequently used as fodder.

Formicids capture was performed by trapping 750 cc. drop with a diameter of 7 cm (Agosti et al., 2000), barrier, completed to its 2/3 parts with 75% diluted alcohol and a few drops of glycerin or detergent. They set five pitfall traps spaced 20m each, on three transects of 100m in length, spaced from each other 25m. They were collected at the end of five days, allowing discard any disturbance produced by the installation thereof. It is part of the material prepared in the laboratory, using 72X stereomicroscope; subsequently analyzed material was placed in small vials (20 cc. capacity) with 70% alcohol for preservation, another part of the specimens were mounted pasting them into 2x1 cm paper triangles with entomological pins No. 4, then placed in boxes entomological specimens. Species were then identified using keys (Bolton, 2007). The identified material was deposited in the chair of Invertebrates II, National University of La Pampa, Argentina. Individuals were counted in each trap and diversity calculated two indices: the inverse of Simpson (1 / D) and Shannon. We performed a cluster analysis for the abundance of species based on the distance from Canberra, with the Ward method in order to identify groups of similar composition environments formicids in the study period. For this purpose we used the software R version 2.9 (Software R, 2009) and the R statistical package Biodiversity (Biodiversity R, 2009).

RESULTS

There were a total of 5,647 formicidae belonging to 3 subfamilies, 10 genera and 11 species in six study sites. The subfamily Myrmicinae was the five species best represented: *Crematogaster quadriformis* Roger, *Solenopsis saevissima* (Fr.Smith), *Pheidole bergi* Mayr, *Pheidole taurus* Emery, *Acromyrmex striatus* Roger. The Dolichoderinae and Formicinae subfamilies were represented by three species each: *Forelius breviscapus* Forel, *Dorymyrmex breviscapis* Forel, *Linepithema humile* Mayr and *Camponotus borellii* Emery, *Brachymyrmex patagonicus* Mayr and *B. fiebrigi* Forel. The species with dominance in all sites were So*lenopsis saevissima* (37%), *Pheidole bergi* (33%) and *Dorymyrmex breviscapis* (25%), corresponding to three dominant species omnivorous guild soil (Table 1).

The richness was similar for all sites except the pasture, which in turn, had the lowest value, unlike alfalfa had higher wealth, followed by caldenal and sorghum (Table 2).

Site Diversity sorghum (1.63) was higher than the rest of the other sites, in turn caldenales both had similar diversity p> 0.2 and above crops, with the exception of Sorghum, above (Table 2).

The rank-abundance curves (Fig. 2) were similar among all sites sampled, in which there were one or two dominant species, and a high proportion of low abundant and rare species. The dendrogram developed using cluster analysis based on the distance from Canberra has three groups, one composed exclusively pasture site (less diversity), the second by the sorghum (greater diversity) and the third place by both caldenales, the alfalfa and maize (Fig. 3).

DISCUSION

Omnivores formicids guild floor predominance which was present mostly in the areas of study, consistent with the assertions of Fragoso & Rojas (2000) and is proposed to be because in these sites, generalist species not are subject to the presence of a resource, but use the wide variety of foods, which are available at any time of year, as stated in their work Whitford (1978).

High crop wealth may be due to the high heterogeneity of adjacent vegetation possessing sites, as confirmed Fernandez (1999), which were not typical of cultivation made possible the creation of microenvironments.

Consistent with Magurran (1989, 2004) accumulation curves were fitted to a logarithmic distribution, inequitable environments (Table 3).

CONCLUSION

Few differences were found between the ant fauna of agroecosystems and natural environments (caldenales), since all sites shared 90% of the species collected. The results show that the region contains a richness and diversity of these insects like, explained by the anthropic ecosystems suffering in these places, where they generate patches or islands of natural vegetation surrounded by crops, which allow homogeneity Formicidae species in the region Quiran & Casadio (1991), which thrive and colonize disturbed areas at the same time as natural, this is consistent with Roth (1994) and Vasconcelos (1999).

For these reasons we can say that the hypothesis for the present work has not been confirmed, because no significant differences found between the ant fauna of sites consist of natural vegetation and agroecosystems of central Pampas. For these reasons it is suggested agroecosystem management but recommended maintenance of high plant diversity, decrease of agrochemicals and reduced soil compaction to prevent the loss of the same in this region.

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Table 1. Formicids taxonomic description found in 2008 in the prov. La Pampa, Argentina.

Subfamily	**Genera**	**Species**
Myrmicinae	*Pheidole*	*bergi*
Myrmicinae	*Pheidole*	*taurus*
Myrmicinae	*Solenopsis*	*saevissima*
Myrmicinae	*Acromyrmex*	*striatus*
Myrmicinae	*Crematgaster*	*quadriformis*
Dolichoderinae	*Dorymyrmex*	*breviscapis*
Dolichoderinae	*Forelius*	*breviscapis*
Dolichoderinae	*Linepithema*	*humile*
Formicinae	*Brachymyrmex*	*patagonicus*
Formicinae	*Brachymyrmex*	*fiebrigi*
Formicinae	*Camponotus*	*borellii*

Table 2. Formicids richness, Shannon diversity index and Simpson and total number of individuals of the six sites studied during the months of April, May and June 2008 in the prov. La Pampa, Argentina.

	Sorghum	Caldén a	Caldén b	Alfalfa	Corn	Pasture
S	8	8	8	9	7	5
H'	1.63	1.22	1.19	1.16	1.10	0.71
1/Simpson	4.09	3.12	2.84	2.79	2.53	1.55
N	440	963	1468	1450	1048	364

Table 3. Values of statistical significance of the t test on the Formicidae of the six sites studied during the months of April, May and June 2008 in the prov. La Pampa, Argentina.

	Caldén a	Caldén b	Alfalfa	Corn	Pasture
Sorgo	<0.001	<0.001	1E-23	1.1E-23	1.1E-23
Caldén a		0.200	0.043	0.00021	1.2E-18
Caldén b			0.441	0.00881	1.5E-16
Alfalfa				0.055	3.2E-15
Maíz					2.8E-11

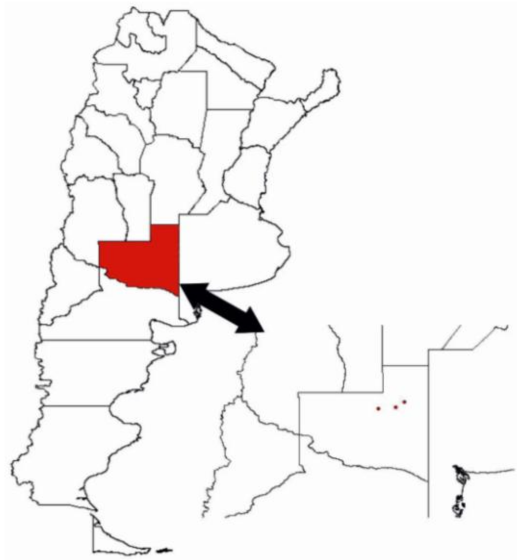

Figure 1. Geographical location of the sampling sites in the Province of La Pampa, Argentina.

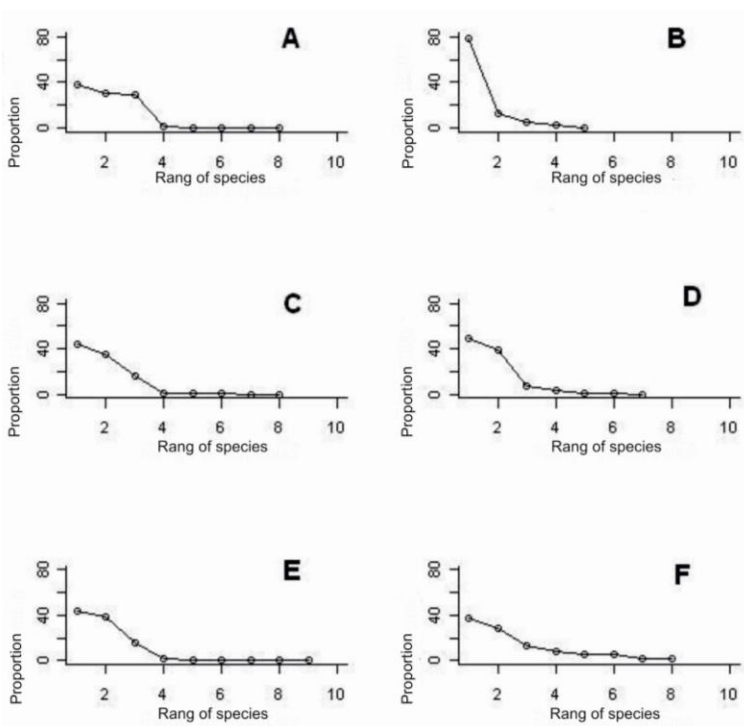

Figure 2. Rank-abundance curves of Formicidae of the sites studied in prov. La Pampa, Argentina. A: caldenal (a), B: pasture, C: caldenal (b), D: corn, E: and F alfalfa: sorghum.

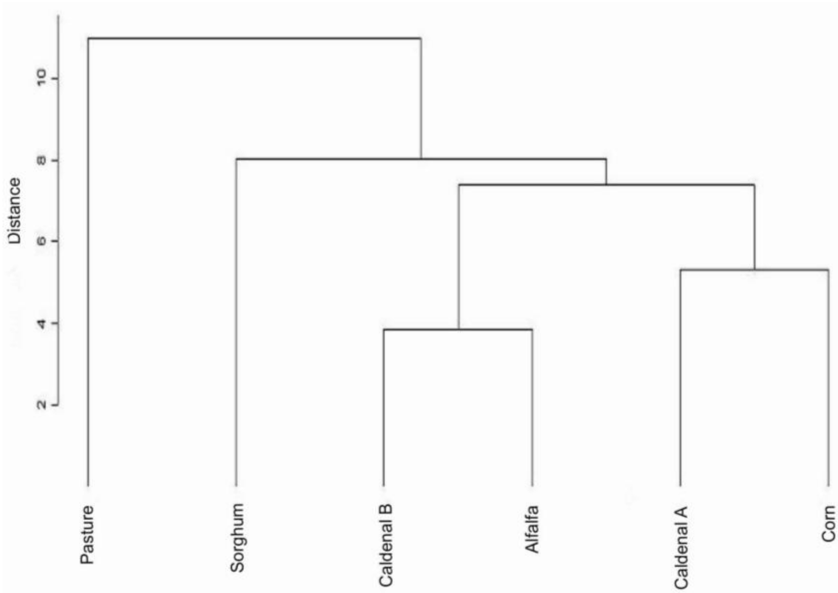

Figure 3. Cluster analysis of the sites studied during the months of April, May and June 2008 in the prov. La Pampa, Argentina.

NABIS TIBIALIS DISTANT (HEMIPTERA: NABIDAE), A FIRST RECORD FROM INDIA

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[Chandra, K., Kushwaha, S., Biswas, B. & Mukherjee, P. 2014. *Nabis tibialis* Distant (Hemiptera: Nabidae), a first record from India. Munis Entomology & Zoology, 9 (1): 178-181**]**

ABSTRACT: The paper deals with the report of *Nabis tibialis* Distant, a rare species of family Nabidae for the first time from India.

KEY WORDS: Nabidae*,* *Nabis tibialis*, India.

Nabis tibialis, Distant (1902) belong to the family Nabidae, which are commonly known as damsel bugs. They are characterized by short length, yellowish or olive brown in color, labium curved reaching up to the mesothorax, with 4 distinct segments. The family Nabidae was earlier included in the family Reduviidae. The current classification of this family was given by Schuh and Stys in 1991, which included two subfamilies viz. Nabinae and Prostemmatinae. *Nabis tibialis* belong to subfamily Nabinae, characterized by para-stigmal pits on various abdominal segments, it is worldwide distributed but more diverse in northern hemisphere. Remane (1953, 1962 and 1964) described many new species of *Nabis* from western Palearctic region. The damsel bug's fauna in India is quite poor. Distant (1902) reported *Nabis capsiformis* Germar, 1837, *N. funebris* Distant, 1902, *N. indicus* (Stål, 1873) and *N. nigrescens* Distant, 1902 from India, however *N. tibialis* from Sri Lanka and *Nabis brevilineatus* Scott, 1874 from Myanmar and Japan. The report of *N. tibialis* Distant from Chhattisgarh is a new addition to the fauna of India.

MATERIALS AND METHODS

While undertaking the survey of Kangervally National Park in Bastar district of Chhattisgarh state for making the faunal inventory, an interesting species identified as *Nabis tibialis,* Distant was collected. Photography and morphology of bug was studied by Leica microscope M 205-A. After identification specimen has been deposited in National Zoological Collection of Zoological Survey of India.

OBSERVATION AND RESULTS

Nabis Latreille, 1802

Type specimen *Nabis apterus* Fabricius
Distribution: Cosmopolitan.

Nabis tibialis, Distant, 1902

1902. *Nabis tibialis,* Distant, *Fauna of Brit. India, Rhynchota*, II: 392-401.

Material examined: Bastar, Kangervally National Park, 14.i.2006, (1 ex) Coll. D. K. Harshey and Party.

Description: The species *Nabis tibialis,* Distant was described by Distant (1902) without any illustrations, required for the accurate determination of species and hence the description of the species along with detailed measurements, illustrations and additional diagnostic features based on observations are provided.

Original Description (Distant, 1902): Shining piceous brown; a lateral marginal fascia extending from anterior margin of eyes to base of head, two oblique discal fasciae and the posterior margin to pronotum, two medial marginal spots to scutellum, claval suture, veins, lateral margin and a sub apical spot to corium, lateral margins of abdomen, legs, rostrum, and antennae luteous; apex of second joint of antennae, extreme base of second joint of rostrum, spots to abdominal lateral marginsand apices of femora and tibiae black; obscure shadings to anterior and intermediate femora, and numerous annotations to tibiae fuscous; membrane greyish, the venation pale fuscous; first joint of antennae about as long as head, almost equal in length to second joint; posterior lobe of pronotum obscurely granulate; lateral posterior angles of pronotum subnodulose.

New Description: Body olive yellow; rostum four jointed; second joint largest; scutellum have a piceous spot; posterior lobe of pronotum highly punctate, one fascise on the middle of the front lobe of pronotum; frontal lobe of head largest; legs olive brown, fore leg femora and tibia almost sub equal in length; tarsi 3 segmented, hind leg tibia larger than femora, mid leg femora larger than tibia, apical margin of femora with piceous annulation, abdomen piceous hairy, apical margin of corium with black spot (All figures are attached in Plate 1 & 2).

Measurements: BODY; Total length from head to membrane 7.49 ± 0.05 mm; EYES: length 0.317 mm, width 0.287 mm,black in color; HEAD: length 1.352 mm, length of anterior ocular region 1.09.00 mm,;length of post ocular region 0.262 mm, width of anterior lobe of head 0.536 mm, width of posterior lobe of head 0.675 mm; ROSTRUM: Total length 2.412 ± 0.03 mm, First joint 0.301 mm, Second joint 0.927 mm, Third joint 0.640 mm and fourth joint 0.544 mm. Rostrum with the second joint reaching middle of ante-ocular portion of head, third joint reaching to the prothorex, fourth slightly shorter than third and reaching to the mesothorex; LEGS- FORE LEG: length (excluding tarsi) 4.643 ± 0.05 mm, length of Coxa 0.641, length trochanter 0.501 mm, femur length 1.772 mm, tibia length 1.729 mm, length of 1^{st}, 2^{nd} and 3^{rd} tarsal joints 0.052 mm, 0.160 mm and 0.278 mm respectively; Claw 0.143 mm in length; tarsi 3-jointed; MID LEG**:** Total length (excluding tarsi) 4.359 ± 0.05 mm, Length of Coxa 0.486, femur length 2.077 mm, tibia length 1.796 mm. Femora annulated with piceous white at apices; HIND LEG**:** Total length (excluding tarsi) 25.697 ± 0.05 mm, Length of Coxa 0.332, Length of Trochanter 0.327 mm, Femur length 2.552 mm, Tibia length 3.087 mm, Length of 1^{st}, 2^{nd} and 3^{rd} Tarsal joints 0.155 mm, 0.281 mm and 0.363 mm respectively. Femora annulated with piceous at apices, Claw 0.101 mm; PRONOTUM**:** Length of anterior lobe of pronotum 0.492 mm, Width of anterior lobe of pronotum1.101 mm, Length of posterior lobe of pronotum 0.720 mm, Width of posterior lobe of pronotum 1.583 mm; HEMELYTRON: Length 5.004 mm, width 1.385 mm, Hemelytra passing abdominal apex; ABDOMEN**:** Length 3.239 mm, apical area of abdomen beneath black and Width 1.329 mm; SCUTELLUM**:** Length 0.867 mm, Width 0.804 mm, Scutellum with black triangular spot.

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Plate 1

Nabis tibialis Distant

Heah and eyes

Pronotum

Rostrum

Plate 2

Fore leg

Mid leg

Tarsi of mid leg

Hind leg

ARTHROPOD FAUNA OF WINTER WHEAT OF SOUTHWEST BUENOS AIRES PROVINCE, ARGENTINA

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ABSTRACT: Agroecosystems are populated by a great diversity and number of invertebrates that are often disturbed by agricultural practices and grazing. The arthropods are good indicators of the heterogeneity of the habitat, the biodiversity of the ecosystem and the stress conditions of the environment, therefore its use for environmental management can reduce pest invasion. The goals of this study are to describe the composition of the arthropod fauna and to analyze how this fauna are distributed throughout the phenological development in a crop of winter wheat at southwestern Buenos Aires Province. Two sampling methods were conducted: at ground level by using pit-fall traps and herbaceous level using a garden-vacuum. A total of 29608 arthropods were collected belonging to 19 orders. The most abundant order was Diptera, followed by Hemiptera, Collembola, Hymenoptera, Acarii, Coleoptera and Araneae. The abundance of the arthropod community associated with the crop increased in the last phenological stages of it. This study comprises one of the first approaches involving the study of the arthropod fauna associated with a winter wheat crop at southwestern Buenos Aires Province, and also is one of the few contributions about this topic in Argentina.

KEY WORDS: composition, abundance, cereal crop, Argentina.

Agroecosystems are often disturbed by agricultural practices and grazing (Thorbek, 2003). These disturbed areas are populated by great diversity and number of invertebrates. The large-scale studies have provided overviews of the effects of crops on populations of invertebrates, resulting in a reduction both in abundance and species diversity increasing the cultivated fields (Kladviko, 2001; Aparicio et al., 2003; Postma-Blaauw et al., 2010). The level of internal regulation of the functions of the agro-environment is partly dependent on the diversity of plants and animals (Altieri, 1994). Biodiversity supports the production of certain ecological services including recycling of nutrients, regulation of local microclimate and hydrological processes, suppression of undesirable organisms and detoxification of harmful chemicals (Altieri, 1999). The indiscriminate use of agrochemicals to combat pests and weeds, one of the traditional farming practices, produce indirect effects, such as the reduction of natural enemies (Bell et al., 2002; Liljesthrom et al., 2002). Strategies for a conservational biological control promote the rational use of chemicals combined with increasing the habitat heterogeneity (Settle et al., 1996). The managing of the habitat (spatial and temporary arrangements of the vegetation) in the agroecosystems can reduce the invasion of pests by means of the top-down effects that operates with the increase of natural enemies (Altieri, 1994); or also the pests can be suppressed by the bottom-up effects that operates in the first trophic level (vegetation) for the diversity of habitat (Andow, 1991). The type and abundance of the wished biodiversity depends on the structure and managing of the agroecosystem of interest (Landis et al., 2000; Nicholls & Altieri, 2002). Due to their small size, diversity and high sensibility to the variations of the environment, arthropods could be good indicators of the heterogeneity of the habitat, the biodiversity of the ecosystem and the stress conditions of the environment (Weaber, 1995; Andersen & Majer, 2004). Herbivorous insects achieve higher levels of abundance and, on the other side, natural enemies achieve lower levels in agricultural systems than in a diversified habitat (Andow, 1991; Tohasca, 1993). The monoculture, by eliminating plant diversity, reduces the sources of food and shelters to herbivorous insects and also to their natural enemies, leading to an undesirable damage of insect pest (Altieri, 1999). Moreover, direct seeding, as a result of the absence of ground management and the presence of stubble on the surface, creates an environment that, unlike the conventional tillage, favors the development of populations living in the soil (Lietti et al., 2008). In this system, the fauna is more diverse and abundant and there is a tendency to the restoration of the native one (Neave & Fox, 1998). However, this trend varies with the season, the age of the system, the sequence of crop and the group of arthropod considered (Rodriguez et al., 2006). In addition, with direct sowing it is necessary the application of herbicides to avoid the development of weeds, which are harmful to the insects in general, including the beneficial ones (Benamú et al., 2010). Using the conventional tillage of the soil it is not necessary to apply pesticides, and with a good rotation of the cultivated soils it is possible to diminish the deterioration of the same ones. Nevertheless, this managing of the soil diminishes the number of generalist predators, which can migrate and shelter in the edges of the crops (Thorbek & Bilde, 2004). Therefore, a habitat of considerable importance in agroecosystems is the constituted for the spontaneous vegetation existing in the edges of the cultures, which are a reservoir for the arthropods and other general predators (Thorbek & Bilde, 2004). Additionally, they work as a place from where certain species can colonize the crops (Nyffeler et al., 1992). Annual crop fields are often surrounded by margin habitats with perennial or annual non-crop vegetation (Denys & Tscharntke, 2002). The wheat (*Triticum aestivum* L.) is an annual crop and is the most important winter cereal of the central-south of Buenos Aires province, Argentina (Carrasco & Baez, 2006). The knowledge of how entomofauna interacts with winter cereals in this country is scarce, with few studies above coleopteran, aphids and spiders (Marasas et al., 1997; Reviriego et al., 2006; Armendano & Gonzalez, 2011). The aims of this study are to make a description of the composition of the arthropod fauna present in a crop of winter wheat, to determine how arthropods are distributed throughout the phenological development of the crop and to analyze the gradient of abundance of arthropods from the center of the crop toward the edge (area of spontaneous vegetation).

MATERIAL AND METHODS

Study site

The study was conducted in a field located at Southwest of Buenos Aires province, Argentina (38° 20’ 09” S; 62° 42’ 44” W) (Fig. 1). In this area, a winter wheat field of approximately 54 ha. was located. In the cultivated field it has not been applied pesticides for the last 30 years. The crop was set in August 2010 (winter in southern hemisphere) and harvested in December 2010 (beginning of summer in southern hemisphere). The sowing method was conventional, with plowed before planted. The crop field was surrounded of spontaneous vegetation, where species of Poaceae and Brassicaceae are dominant, like *Nasella caudata* Trin., *Amelichloa ambigua* Speg. and *Diplotaxis tenuifolia* L. (DC.), between others. The study site was located in an area of temperate climate with an annual average temperature of 14° and an annual average rainfall of 670 mm.

Sample design and data analysis

Two sampling methods were used: one covering ground level and another one in the herbaceous level. Pit-fall traps were used for the ground level sampling. The traps consisted in plastic cups of 9 cm of diameter and 16 cm of high, filled with ethylene-glycol (20%), water and a few drops of detergent. Plastic roofs were placed on pit-fall traps to avoid inundations of traps. Traps were refilled every 15 days and 10 traps were used in a straight line from the center of the crop to the boundary and edge of crop (trap number 1 in the center of crop and trap number 10 in the edge). In total, eight dates of sampling were obtained. The herbaceous stratum was sampled with a modified garden-vacuum (G-Vac). Each sample units consisted in one minute duration of vacuum. One sample and two replicates were obtained for each collector on each sampling area. Three collectors sampled in four different areas: crop center, between center and boundary, boundary and in the edge of crop, resulting in a total of 36 samples of G-Vac per date. Three sampling dates were carried out corresponding with the last three months of the crop, where the aerial portion of the plant was conspicuous. Voucher specimens were deposited in Laboratorio de Zoología de Invertebrados II (Universidad Nacional del Sur, Bahía Blanca). Cluster analysis with Bray-Curtis similarity indices were used to compare the arthropod composition in the crop-edge gradient with the program PAST v 1.89 (Hammer et al., 2001).

RESULTS AND DISCUSSION

Diversity and abundance of arthropods

A total of 29608 arthropods were collected belonging to 19 orders (Fig. 2). The most abundant was Diptera (7473, 25.2%), followed by Hemiptera (6771, 22.9%), Collembola (5119, 17.3%), Hymenoptera (2931, 9.9%), Acarii (2787, 9.4%), Coleoptera (2173, 7.3%) and Araneae (1343, 4.5%). These seven orders comprise the 96.6% of the total. The abundance of the arthropod community associated with the crop increased in the last phenological stages of it (Fig. 3). This increment is expected due to an increase in both temperature and crop leaf cover in the later stages of growth of the wheat. The orders Hemiptera, Diptera and Orthoptera showed a markedly increased in their abundance in the last two phenological stages of the wheat (spike and grain maturity), while other abundant arthropods orders, like Hymenoptera, Collembola and Acarii maintained constant values of abundance during all the stages of the crop. The sharp increment of the order Orthoptera could be explained by an increased in food availability, as this order is herbivore (Thomas & Marshall, 1999). Moreover, orders like Collembola and Acarii are associated with soil, and possibly for this reason its abundance does not vary significantly with increasing field herbaceous cover (Lindberg & Bengtsson, 2005).

Arthropods at herbaceous level

In herbaceous level 10871 specimens were collected distributed in 14 orders. A high abundance of herbivorous insect was observed within the crop, diminishing it as reaching the boundary and being less abundant in the edge. At this stratum, the order Hemiptera was the most abundant comprising 51.5% of specimens collected at herbaceous level, followed by Diptera (15.7%), Hymenoptera (11.8%), Coleoptera (8.7%) and Araneae (7.2%). These orders completed the 95% of total captured with G-Vac. The order Hemiptera was highly abundant within the crop, both in center (2315 specimens) and in the area placed between the center and the boundary of the crop (2057), diminishing their abundance in the boundary (833) and in the edge (392). The Hemiptera, are benefited by monoculture (Ruiz et al., 2003). Moreover, the spiders, being the most abundant within the generalist predators, maintained a constant number in all sampled areas of the crop, even out of crop. Spiders increase their abundance and diversity in a heterogeneous environment (Settle et al., 1996). Armendano & González (2011) found that the field margins constitute the most rich and dense habitats for spiders in a winter wheat field at northeastern of Buenos Aires Province. However, in this study spiders conserve similar abundances within and out of crop. The Cluster analysis obtained with the Bray-Curtis similarity index showed more similarity between the two areas within the crop, and the area outside the crop was excluded by the analysis, showing the lowest similarity with the remained areas (Fig. 4).

Arthropods at ground level

At this stratum, 18737 arthropods were collected belonging to 17 orders. The most abundant orders collected with pit-fall traps were Diptera (30.7%) and Collembola (27%). At the ground level, like in herbaceous level, an increase of the abundance of the orders Hemiptera and Orthoptera were observed in the last phenological stages of the wheat crop. The Collembola (springtails) are sensitive to soil management systems (Lindberg & Bengtsson, 2005) and in this study, they were the second most abundant order at ground stratum. The conventional tillage possible may not produce drastic effects on the soil microfauna due to the great abundance of springtails. Nonetheless, more exhaustive studies are needed for discuss the effects of conventional tillage over the entomofauna. No variation in the abundance of arthropods along the crop-edge gradient was observed. Cluster analysis grouped the traps within the crop and excluded the trap number 10 located at further edge, with the exception of the trap number 3, which showed the most differences (Fig. 5). Trap number 3 may have differed by a high abundance of Diptera compared with the remaining traps. The trap number 10 is out of wheat crop, and this area has vegetation with high floral and structural diversity that generally tends to present high invertebrate diversity (Thomas & Marshall, 1999). However, in this study, a higher diversity in the edge of crop was not observed, but more extended studies are needed to understand about how arthropods interact with the agroecosystems at Buenos Aires Province.

CONCLUSIONS

This study comprises one of the first works on the arthropod fauna associated with a winter wheat crops at Southwestern Buenos Aires Province, and also is one of the few contributions on this topic in Argentina. While these results should be improved with future studies, for example, in more than one season, the results presented here indicate high values of abundance of arthropods in wheat. The absence of pesticides in this area could be reflected by the abundance of certain groups considered as pests, however, a highly abundance of generalist predators can be found. Therefore, it is of considerable interest to start thinking more at level of biological control and integrated pest management before proceeding with an indiscriminate use of agrochemicals.

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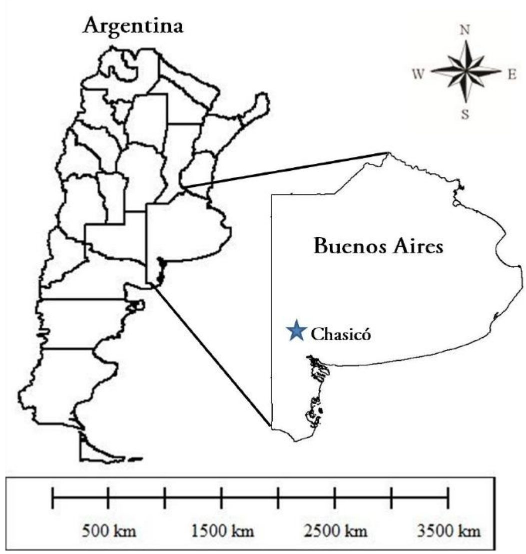

Figure 1. Geographic location of the study area (Chasicó, Buenos Aires province, Argentina).

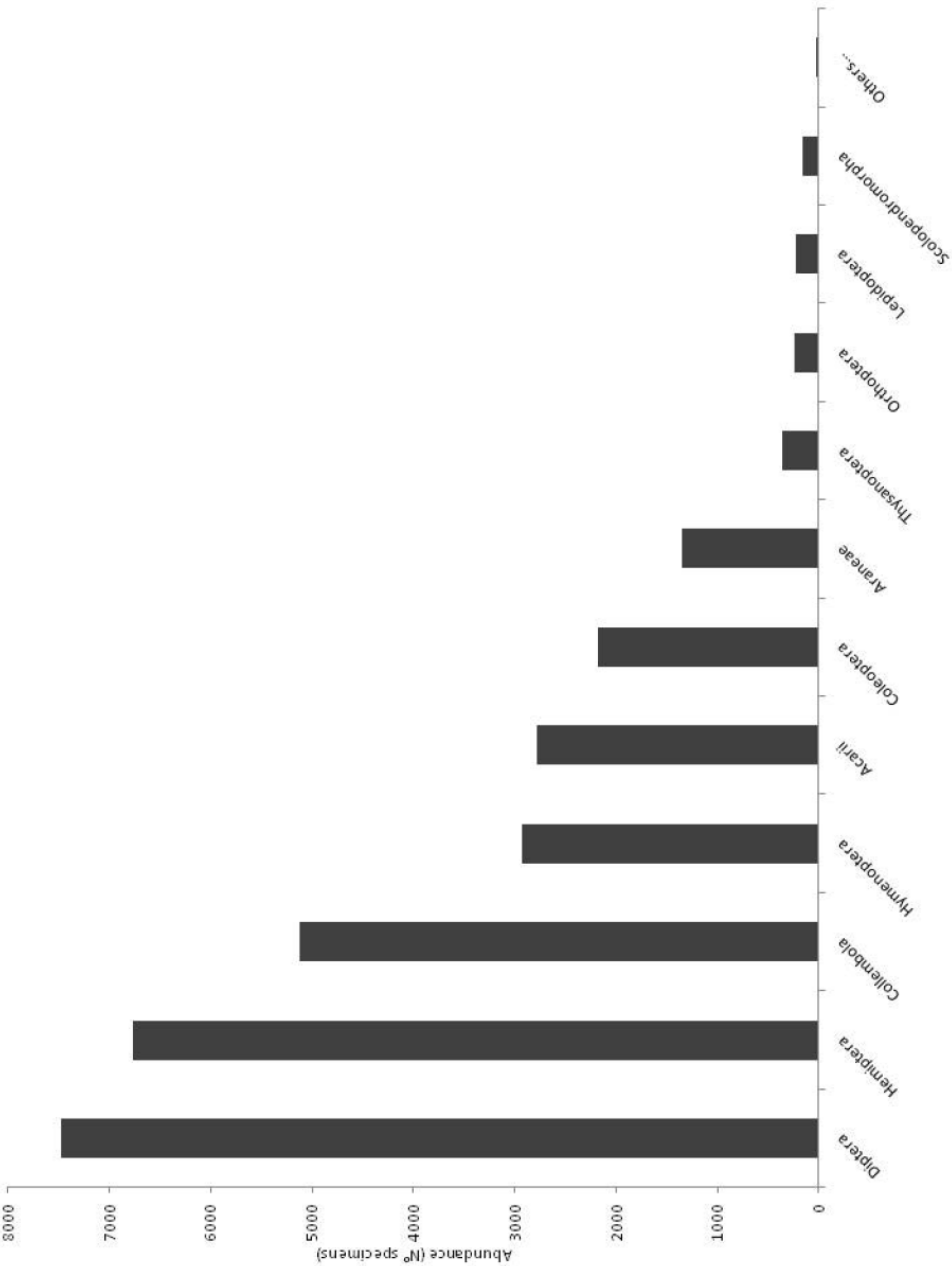

Figure 2. Abundance of arthropod orders collected from wheat crop.

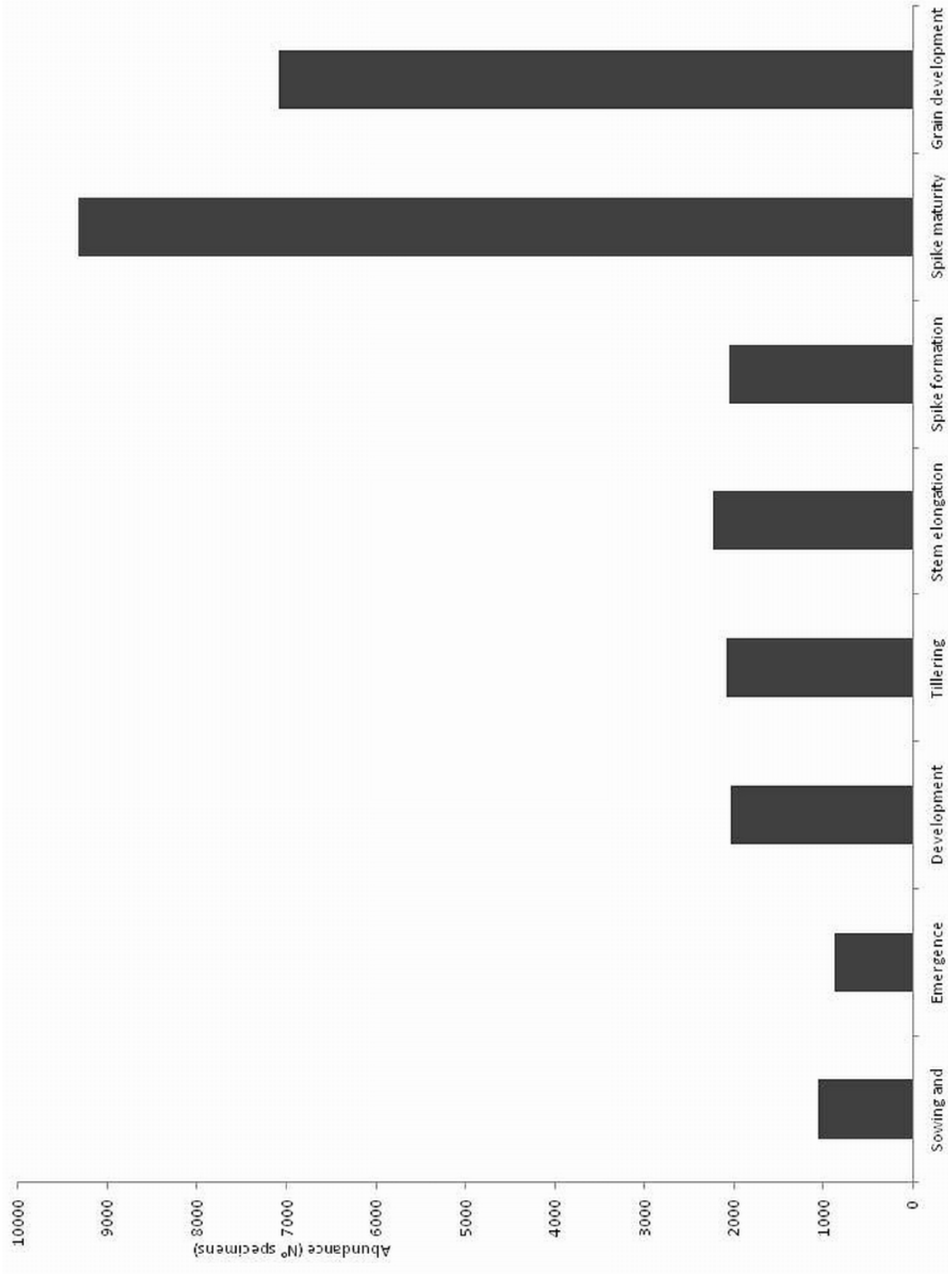

Figure 3. Abundance of arthropods associated with different phenological stages of wheat crop.

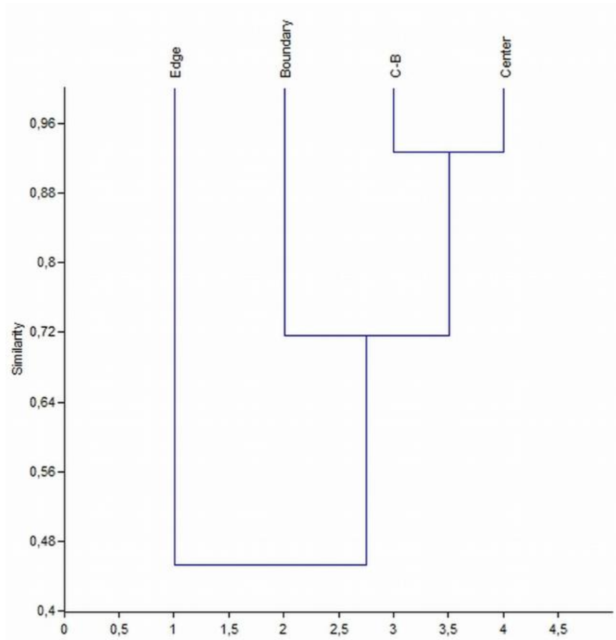

Figure 4. Cluster analysis resultant with the Bray-Curtis similarity index of the crop-edge gradient in the herbaceous level.

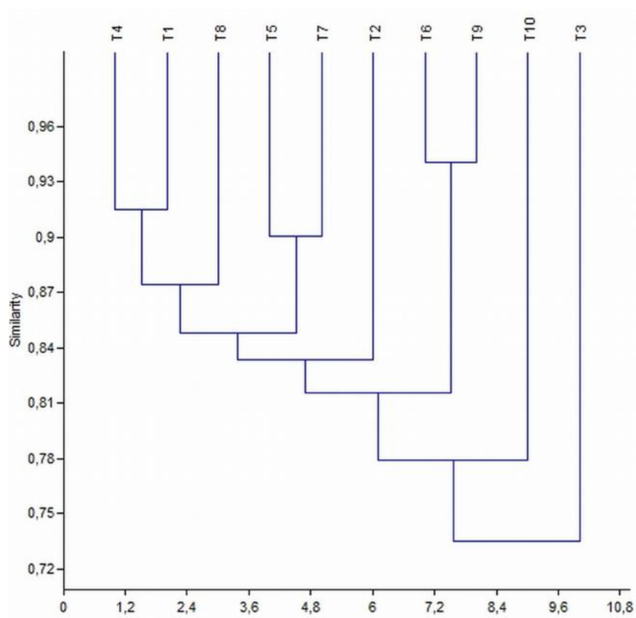

Figure 5. Cluster analysis resultant with the Bray-Curtis similarity index of the crop-edge gradient in the ground level.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART V – CRYSOMELIDAE: EUMOLPINAE

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[**Özdikmen, H. & Kavak, M.** 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part V – Chrysomelidae: Eumolpinae. Munis Entomology & Zoology, 9 (1): 191-197]

ABSTRACT: The paper gives chorotype identifications for Turkish Eumolpinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Eumolpinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014) and Özdikmen & Özbek (2014) are the previous works for this aim. The present study is attempted as the fifth step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Eumolpinae comprises of 23 species group taxa (20 species + 3 subspecies) of 11 genera.

Subfamily EUMOLPINAE

Genus *Bedelia* Lefèvre, 1875
***B. insignis* Lefèvre, 1875**
Range: E: AB AR GG ST **A:** AF IN KI KZ TD TM TR UZ **Records in Turkey:** TR-A: DEN, ERZ **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European or Centralasitaic + SW-Asiatic

Genus *Bromius* Chevrolat, 1836
***B. obscurus* (Linnaeus, 1758)**
Range: E: AB AU BE BH BU BY CR CT CZ DE EN FI FR GE HU IT KZ LA LS LT MC MD NR NT PL RO SK SL SP ST SV SZ TR UK YU **A:** ES FE GAN GUI HEB HEI HUN JA JIA KI KZ MO NC SC SCH SHX UZ WS XIN XIZ **NAR Records in Turkey:** TR-A: OSM – TR-E **Remarks:** The species has been recorded only from 2 Turkish regions as Marmara Region and Mediterranean Region until now. **Chorotype:** Holarctic

Genus *Colaspinella* Weise, 1893
***C. grandis* (Frivaldszky, 1880)**
Range: A: TR **Records in Turkey:** TR-A: ADA, ANT, BRS, IST, KON – TR-E: IST **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Anatolian

Genus *Chloropterus* Morawitz, 1861
***C. versicolor* (Morawitz, 1860)**
Range: E: AB ST UK **A:** KZ TM **Records in Turkey:** TR-A: AYD, IZM (Aslan et al., 2013) **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

Genus *Chrysochares* Morawitz, 1861
***C. asiaticus* (Pallas, 1771)**
Range: E: AB ST **A:** KZ MG TD TM UZ XIN **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European or Centralasiatic + SW-Asiatic (Anatolo-Caucasian)

Genus *Crysochus* Chevrolat, 1836
***C. asclepiadeus* (Pallas, 1773)**
***C. a. asiaeminoris* DeMonte, 1848**
Range: A: TR **Records in Turkey:** TR-A: DEN **Remarks:** The endemic subspecies has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Anatolian

Genus *Damasus* Chapuis, 1874
***D. albicans* Chapuis, 1874**
Range: A: SY TR **Records in Turkey:** TR-A: DIY **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

Genus *Floricola* Gistel, 1848
***F. ulema* (Germar, 1813)**
Range: E: BU CR GR HU MC RO TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

Genus *Macrocoma* Chapuis, 1874
***M. brunnipes* (Olivier, 1808)**
***M. b. obscuricolor* (Pic, 1905)**
Range: A: TR **Records in Turkey:** TR-A: ADA **Remarks:** The endemic subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

***M. delagrangei* (Pic, 1898)**
Range: A: SY TR **Records in Turkey:** TR-A: DIY, ISP, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***M. doboszi* Borowiec, 2005**
Range: A: TR **Records in Turkey:** TR-A: MAR – TR-E: KRK **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

***M. fortidens* (Berti & Rapilly, 1973)**
Range: A: TR **Records in Turkey:** TR-A: DIY, HAT, VAN **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

***M. korbi* (Pic, 1901)**
Range: A: TR **Records in Turkey:** TR-A: KON, MER, NIG **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

***M. rubripes* (Schaufuss, 1862)**
***M. r. rubripes* (Schaufuss, 1862)**
Range: E: AB AR BU GR RO TR **A:** CY IN SY TR **Records in Turkey:** TR-A: ADA, ANK, ANT, CNK, EZU, GAZ, ISP, IZM, KAY, KON, MER, NIG **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***M. substriata* Weise, 1904**
Range: A: IN TR **Records in Turkey:** TR-A: DIY **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

Genus *Malegia* Lefèvre, 1883
***M. colchica* Reitter, 1912**
Range: E: AB AR TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Genus *Pachnephorus* Chevrolat, 1836
Subgenus *Pachnephorus* Chevrolat, 1836
***P. bistriatus* Mulsant & Wachanru, 1852**
Range: E: FR IT MA **N:** AG MO **A:** TR **ORR Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Mediterranean + Oriental

***P. canus* Weise, 1882**
Range: E: AL BU GR IT ST TR UK **A:** TM TR **Records in Turkey:** TR-A: IST, IZM – TR-E: IST **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Marmara Region until now. **Chorotype:** Turano-European (Turano-Apenninian)

P. cylindricus Lucas, 1849

Range: E: FR GR SP **N:** AG MO **Records in Turkey:** TR-A: ADA **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

P. pilosus (Rossi, 1790)

Range: E: AB AL AU BE BH BU BY CR CT CZ EN FI FR GE HU LA LS LT LU NT PL RO SK SP ST SZ TR UK YU **A:** ES TR WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

P. robustus Desbrochers, 1870

Range: E: ST UK **A:** TR **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** E-European

P. tessellatus (Duftschmid, 1825)

Range: E: AB AL AR AU BE BH BU BY CR CT CZ EN FR GE GR HU IT LA LS LT PL RO SK SP ST SZ TR UK YU **N:** CI **A:** AF ES FE KI KZ MO NE NO NW TD TM UZ WS **NAR** **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Holarctic

P. villosus (Duftschmid, 1825)

Range: E: AB AL AU BH BU CR CZ GR HU IT RO SK ST TR UK YU **A:** TR **Records in Turkey:** TR-A: ADA, ANK, ANT, BAL, BRS, CAN, HAT, ISP, KON, MER, OSM, SAK, SAM, SIN **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

ZOOGEOGRAPHICAL ANALYSIS

Turkish Eumolpinae includes 23 species group taxa (20 species and 3 subspecies) of 11 genera. 6 species, namely 26.09 % of the species have "Anatolian" chorotype. 4 species, namely 17.39 % of the species have "SW-Asiatic" chorotype. 3 species, namely 13.04 % of the species have "Turano-Mediterranean" chorotype. 2 species, namely 8.70 % of the species have "Centralasiatic-European or Centralasitaic + SW-Asiatic" chorotype. 2 species, namely 8.70 % of the species have "Holarctic" chorotype. Each of the remaining 6 species group taxa has a different chorotype. One species, namely about 4.35 % of the taxa has "C and E-European" chorotype. One species, namely about 4.35 % of the taxa has "E-European" chorotype. One species, namely about 4.35 % of the taxa has "Mediterranean" chorotype. One species, namely about 4.35 % of the taxa has "Mediterranean + Oriental" chorotype. One species, namely about 4.35 % of the taxa has "Sibero-European" chorotype. One species, namely about 4.35 % of the taxa has "Turano-European" chorotype (Fig. 1). So the dominant chorotype for Turkish Eumolpinae is "Anatolian". "SW-Asiatic" chorotype follows it. Also the members of "Turano-Mediterranean" chorotype presents an important contribution for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Eumolpinae are presented as follows:

A total of 6 species have "Anatolian" chorotype as *C. grandis*, *C. a. asiaeminoris*, *M. b. obscuricolor*, *M. doboszi*, *M. fortidens* and *M. korbi*.

A total of 4 species have "SW-Asiatic" chorotype as *D. albicans*, *M. delagrangei*, *M. substriata* and *M. colchica*.

A total of 3 species have "Turano-Mediterranean" chorotype as *C. versicolor*, *F. ulema* and *M. r. rubripes*.

A total of 2 species have "Centralasiatic-European or Centralasitaic + SW-Asiatic" chorotype as *B. insignis* and *C. asiaticus*.

A total of 2 species have "Holarctic" chorotype as *B. obscurus* and *P. tessellatus*.

One species as *P. villosus* has "C and E-European" chorotype.

One species as *P. robustus* has "E-European" chorotype.

One species as *P. cylindricus* has "Mediterranean" chorotype.

One species as *P. bistriatus* has "Mediterranean + Oriental" chorotype.

One species as *P. pilosus* has "Sibero-European" chorotype.

One species as *P. canus* has "Turano-European" chorotype.

On the other side, Turkish Eumolpinae includes a total of 23 species group taxa. However, provincial distributions of 5 species group taxa are unknown. So Turkish Eumolpinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio (Table 1).

For the subfamily Eumolpinae (according to all species group taxa):

4 species are represented in Marmara Region (17 %)

6 species are represented in Aegean Region (26 %)

8 species are represented in Mediterranean Region (35 %)

4 species are represented in Central Anatolian Region (17 %)

0 species are represented in Black Sea Region (0 %)

4 species are represented in Eastern Anatolian Region (17 %)

7 species are represented in South-Eastern Anatolian Region (30 %)

For the subfamily Eumolpinae (according to known provincial distribution of 18 species group taxa):

4 species are represented in Marmara Region (22 %)

6 species are represented in Aegean Region (33 %)

8 species are represented in Mediterranean Region (44 %)

4 species are represented in Central Anatolian Region (22 %)

0 species are represented in Black Sea Region (0 %)

4 species are represented in Eastern Anatolian Region (22 %)

7 species are represented in South-Eastern Anatolian Region (39 %)

So Turkish Eumolpinae that includes a total of 23 species group taxa or 18 species group taxa of which are known provincial distributions in Turkey, are rather widely distributed in all Turkish Regions except Black Sea Region. The most number of species is represented in Mediterranean Region. South-Eastern Anatolian Region and Aegean Region follow it respectively. Central Anatolian Region, Marmara Region and Eastern Anatolian Region are represented with an important number of species. However, Black Sea Region has not been included any recorded species until now. Because, probably the region has been unworked for Eumolpinae.

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Table 1. The regional distribution of all known species of Eumolpinae in Turkey.

TAXON	**R**	**E**	**G**	**I**	**O**	**N**	**S**
	MAR	**AER**	**MER**	**CAR**	**BSR**	**EAR**	**SEAR**
SubfamilyEUMOLPINAE							
B. insignis	-	+	-	-	-	+	-
B. obscurus	+	-	+	-	-	-	-
C. grandis	+	-	+	+	-	-	-
C. versicolor	-	+	-	-	-	-	-
C. asiaticus	-	-	-	-	-	+	-
C. a. asiaeminoris	-	+	-	-	-	-	-
D. albicans	-	-	-	-	-	-	+
F. ulema	?	?	?	?	?	?	?
M. b. obscuricolor	-	-	+	-	-	-	-
M. delagrangei	-	-	+	-	-	-	+
M. doboszi	+	-	-	-	-	-	+
M. fortidens	-	-	+	-	-	+	+
M. korbi	-	-	+	+	-	-	-
M. r. rubripes	-	+	+	+	-	+	+
M. substriata	-	-	-	-	-	-	+
M. colchica	?	?	?	?	?	?	?
P. bistriatus	?	?	?	?	?	?	?
P. canus	+	+	-	-	-	-	-
P. cylindricus	-	-	+	-	-	-	-
P. pilosus	?	?	?	?	?	?	?
P. robustus	-	-	-	+	-	-	-
P. tessellatus	?	?	?	?	?	?	?
P. villosus	-	+	-	-	-	+	+

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

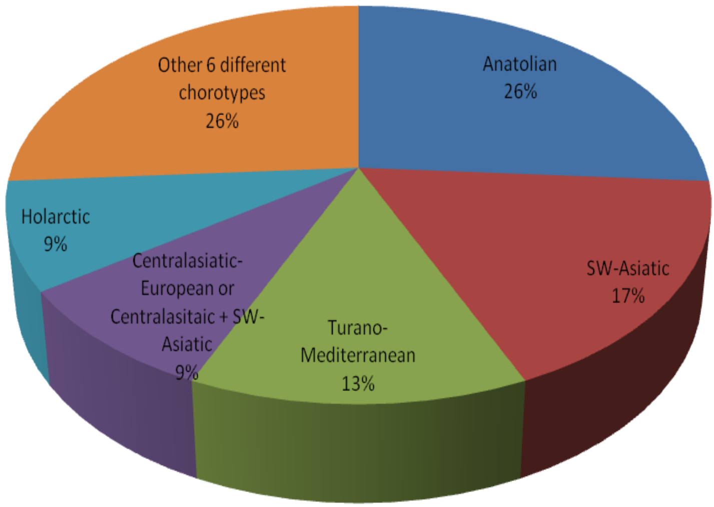

Figure 1. Chorotypical distribution of Turkish Eumolpinae.

SUPERFAMILY PENTATOMOIDEA (HEMIPTERA: HETEROPTERA) OF MADHYA PRADESH, INDIA

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[Chandra, K., Biswas, B. & Kushwaha, S. 2014. Superfamily Pentatomoidea (Hemiptera: Heteroptera) of Madhya Pradesh, India. Munis Entomology & Zoology, 9 (1): 198-205**]**

ABSTRACT: The paper deals with the study of 57 species of true bugs belonging to 41 genera and 7 families of the superfamily Pentatomoidea (Hemiptera: Heteroptera) from Madhya Pradesh. Of these 23 species are new additions to the fauna of the state.

KEY WORDS: Pentatomoidea, Heteroptera, Madhya Pradesh, New Record.

The true bugs representing the superfamily Pentatomoidea are commonly referred to as shield bugs and stink bugs. These bugs are mostly phytophagous in nature, and the species belonging to subfamily Amyotinae are predaceous (Schaefer & Panizzi, 2000). These bugs are characterized by large scutellum either covering the whole abdomen or occupying a large portion of base of abdomen between the hemelytra. Presently around 7000 species under 1300 genera of Pentatomoidea are reported throughout the world (Henry, 2009). A little over 590 species (Distant 1902, 1907, 1918; Ahmad & Afzal, 1989) are known to occur in India. About 4700 species classified in 900 genera of family Pentatomidae are known globally (Henry, 2009). Information on Pentatomoidea of central India was included in '*Fauna of British India*' by Distant (1902, 1907, 1918). Altogether, 34 species of shield bugs are known through the publications of Ramakrishna et al. (2006), Chandra (2008, 2009), Chandra et al. (2010, 2012), and Roychoudhury & Joshi (2011). Presently, 57 species belonging to 41 genera under 7 families of the Pentatomoidea are reported from the Madhya Pradesh.

MATERIALS AND METHODS

The shield bugs were collected in the field with killing jars, pinned and labeled in the lab. The bugs were sorted out and identified with the help of literature present in ZSI Jabalpur and *Fauna of British India* by Distant (1902, 1907 and 1918) and (Lis, 1990 and 1999). Identified specimens were confirmed with the help of reference collection available in ZSI Kolkata. The microscopy was done by Leica M205-A stereo zoom microscope and photographs were taken by Sony DSC-W55 Camera.

RESULT AND DISCUSSION

Present investigation deals with the study of superfamily Pentatomoidea of Madhya Pradesh, which includes 57 species under 39 genera belonging to 7 families (Table 1). Of these, 23 species of stink bugs are new additions to the fauna of Madhya Pradesh. Among the families, Pentatomidae was found to be dominant with 32 species followed by the 9 species of Plataspidae. This study will be help in the preparing the base line information on stink bugs and their host plant information in Madhya Pradesh. Distribution list of species in each family was given in Graph 1. Photographs were given in plates 1, 2, 3 and 4.

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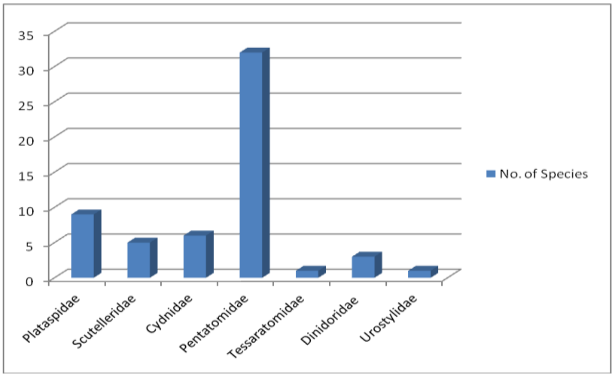
Table 1. List of superfamily Pentatomoidea reported from Madhya Pradesh.
Classification of Pentatomoidea is followed after Rider (2013).
Abbreviations used: PTR-Pench Tiger Reserve; PNP-Panna National Park; MNP-Madhav National Park; PBR-Pachmarhi Biosphere Reserve; SWLS-Singhori Wildlife Sanctuary; VDWLS-Veerangana Durgavati Wildlife Sanctuary; VVNP-Van Vihar National Park; FRH-Forest Rest house; RH- Rest House ; ZSI-Zoological Survey of India; TFRI- Tropical Forest Research Institute; * -New record to state.

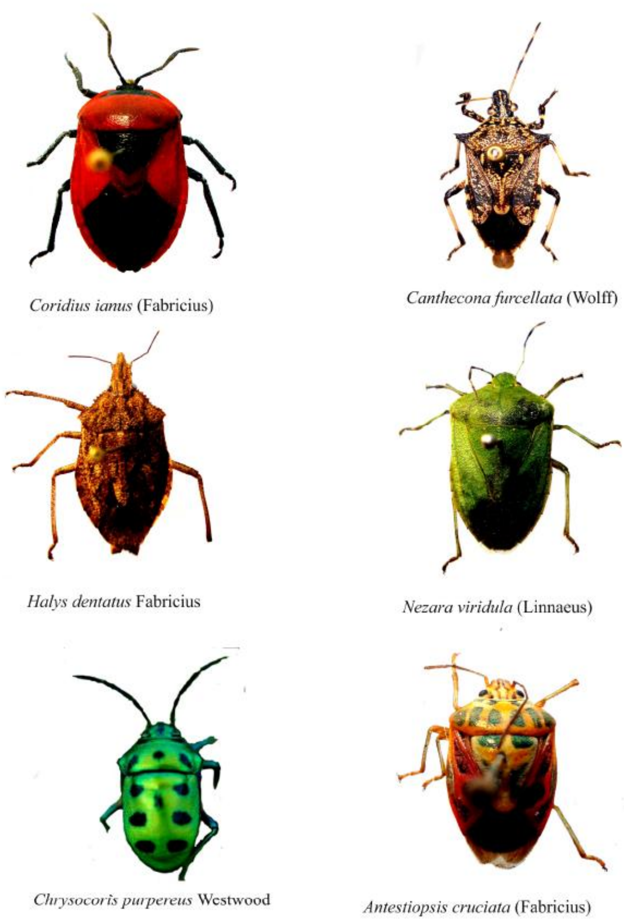
S. No.	Suborder / Infraorder / Superfamily / Family/ Subfamily /Division/ Genus / Species	No. of exp.	Collection localities in districts / WLS / National Park / Biosphere Reserve)	District of Madhya Pradesh	Date of Collection
	Order: HEMIPTERA				
	Suborder: Heteroptera				
	Superfamily: Pentatomoidea				
	Family: Plataspidae				
1	*Coptosoma abbreviatum* Montand.	1	Napier town	Jabalpur	22.iv.1970
2	*Coptosoma biosculatum* Montand.	1	Katangi	Jabalpur	22.vi.2000
3	*Coptosoma cardoni* Distant	1	Bhavartal garden	Jabalpur	16.i.1999
4	*Coptosoma libidinosum* Montand.	1	Dumna Nature Park	Jabalpur	15.ix.2009
5	*Coptosoma noualhieri* Montand.	1	Bargi Dam	Jabalpur	24.viii.2001
6	*Coptosoma siamicum* Walker	1	Gwarighat	Jabalpur	11.xi.2010
7	*Coptosoma sparsum* Montand.	1	SBI Chowk	Jabalpur	32.ix.1965
8	*Coptosoma sphaerula* Germar	1	Wright town	Jabalpur	18.iii.1981
9	*Megacopta cribraria* Hsiao and Ren	24	ZSI Colony	Jabalpur	12.vi.2012
II	**Family: Scutelleridae**				
10	**Chrysocoris patricius* Fabricius	1	Karmajhiri, PTR	Seoni	22.vi.2001
11	*Chrysocoris purpureus* Westwood	6	Gadarvara	Narsinghpur	22.vi.2000
12	*Chrysocoris stolli* Wolff	3	Paruliya, SWLS	Raisen	10.xii.2010
13	**Poecilocoris interruptus* Westwood	2	Bhagdehi, SWLS	Raisen	9.xii.2010
		1	Badalpur, PTR	Seoni	16.vi.2001
		2	Pulpuldoh, PTR	Chhindwara	14.viii.2001
14	*Scutellera perplexa* (Westwood)	15	Silviculture nursery, TFRI	Jabalpur	26.ix.2000
III	**Family: Cydnidae**				
15	**Adrisa magna* Uhler	1	Pulpuldoh, PTR	Chhindwara	24.viii.2001
16	*Aethus indicus* (Westwood)	4	ZSI Colony	Jabalpur	24.vi.2011
		2	Jaitgarh forest, SWLS	Raisen	13.iv.2011
		1	Nidankund,VDWLS	Damoh	14.iii.2011
		1			
17	*Byrsinus varians* (Fabricius)	2	ChurnaBori, PBR	Hoshangabad	10.06.1999
18	**Fromundus pygmaeus* (Dallas)	1	FRH, PNP	Panna	18.xi.2000
19	**Macroscytus brunneus* (Fabricius)	2	Totladoh, PTR	Chhindwara	20.viii.2001
20	**Macroscytus subaeneus* (Dallas)	1	Karmajhiri, PTR	Seoni	23.vi.2001
IV	**Family: Pentatomidae**				
	Subfamily: Pentatominae				
	Tribe: Halyini				
21	*Halys dentatus* Fabricius	19	Damoh Naka	Jabalpur	24.iv.2012
		1	Bamhori, SWLS	Raisen	17.ix.2011
		1	Kola Nala, VDWLS	Damoh	25.vi.2010
		2	Sangrampur, VDWLS	Damoh	24.vi.2010
		1	GolPahariya	Gwalior	29.iv.2011
		6	Singanama, PBR	Hoshangabad	30.x.2002
22	*Erthesina fullo* (Thunberg)	25	ZSI Colony	Jabalpur	30.v.2011
		3	Ekeyavanriver, SWLS	Raisen	03.xii.2010
		3	Giridarshan, VDWLS	Damoh	13.iii.2011
		9	Churna, Bori	Hoshangabad	30.x.2002
		3	Samarbh, PTR	Chhindwara	10.xi.2001
		5	MNP	Shivpuri	17.ix.1975
		2	Panna, PNP	Panna	19.xi.2001
	Tribe :Myrocheini				
23	**Dorpius indicus* Distant	1	Hinauta RH, PNP	Panna	19.xi.2000
24	*Laprius varicornis* Dallas	1	Bus stand	Bhind	24.iv.2011
	Tribe: Carpocorini				
25	**Gulielmus laterarius* Distant	1	Jhiriya, PNP	Panna	14.xi.2000
26	**Aeliomorpha lineaticollis* (Westwood)				
27	*Dolycoris indicus* Stal	1	SindhiyaVihar	Gwalior	23.iv.2011
28	**Dolycoris baccarum* (Linnaeus)	2	Totladoh, PTR	Chhindwara	5.xi.2001
	Tribe: Cappaeini				
29	**Halyomorpha picus* (Fabricius)	1	Hinauta RH, PNP	Panna	18.xi.2000
	Tribe: Eysarcorini				
30	**Adria parvula* (Dallas)	1	Narnagar	Khargon	3.x.2007
31	*Eysarcoris ventralis* (Westwood)	1	Matkulli, PBR	Hoshangabad	27.viii.2000
		2	Sukad River, SWLS	Raisen	15.ix.2009
32	**Eysarcoris guttiger* (Thunberg)	1	GandadevNala, PTR	Seoni	10.xi.2001
33	**Eysarcoris montivagus* Distant	1	Bamhori, SWLS	Raisen	9.iv.2011
34	**Carbula biguttata* (Fabricius)	01	Totladoh, PTR	Chhindwara	3.xi.2001
	Tribe: Antestiini				
35	*Plautia fimbriata* (Fabricius)	01	Singrampur FRH, VDWLS	Damoh	10.iii.2011
		01	ZSI Colony	Jabalpur	28.iv.2012

		01	Lamandoti, PTR	Seoni	12.11.2001
		01	Tikoni, PTR	Seoni	09.11.2001
		01	Lamandoti, PTR	Seoni	24.07.2001
36	*Antestiopsis cruciata* (Fabricius)	01	Panchmarhi, Mahadev R.H.	Hoshangabad	13.vi.1999
		03	ZSI Colony	Jabalpur	12.vi.2008
		08	Sitapur, SWLS	Raisen	10.iv.2011
		02	ChotaChakkar, VDWLS	Damoh	14.iii.2011
	Tribe: Agonoscelidini				
37	*Agonoscelis nubila* (Fabricius)	01	Vijay Nagar	Jabalpur	11.vii.2010
	Tribe:Strachiini				
38	*Bagrada picta* (Fabricius)	02	Karmajhiri, PTR	Seoni	11.vi.2001
		01	ZSI Colony	Jabalpur	24.vii.2011
		06	Bamhori RH, SWLS	Raisen	3.iv.2011
		03	Nidankund, VDWLS	Damoh	14.iii.2011
		04	,Neanjudi, PNP	Panna	16.vi.2001
		01	Nidankund, VDWLS	Damoh	14.iii.2011
39	**Stenozygum speciosum* (Dallas)	01	Totladoh, PTR	Chhindwara	26.viii.2001
	Tribe: Degonetini				
40	*Degonetus serratus* Distant	02	VDLS, Nazara Point	Damoh	11.iii.2011
		03	Singhanama, PBR	Hoshangabad	31.xii.2002
		01	Singhanama, PBR	Hoshangabad	30.xii.2002
		01	Singhanama, PBR	Hoshangabad	29.xii.2002
		01	Rajola, PTR	Seoni	7.xi.2001
		01	Dudhya, PTR	Seoni	8.xi.2001
	Tribe :Pentatomini				
41	**Placosternum taurus* (Fabricius)	01	BadaChakkar, VDWLS	Damoh	4.xi.2011
42	*Placosternum dama* (Fabricius)	01	Napier Town	Jabalpur	8.v.2000
	Tribe: Nezarini				
43	*Nezara viridula* (Linnaeus)		Widely distributed		
44	*Acrosternum gramineum* (Fabricius)		ZSI Colony	Jabalpur	24.xii.2011
	Tribe: Piezodorini				
45	**Piezodorus rubrofasciatus* (Fabricius)	1	SSS Club, MNP	Shivpuri	17.ix.1975
		1	ZSI Colony	Jabalpur	24.vii.2011
	Tribe: Menidini				
46	**Menida formosa* (Westwood)	1	SSS Club, MNP	Shivpuri	17.ix.1975
	Tribe: Sephelini				
47	**Ochrophara montana* Distant	1	Vijay Nagar	Jabalpur	11.vi.2011
	Subfamily:Phyllocephalinae				
48	*Tetroda histeroides* (Fabricius)	1	SSS Club, MNP	Shivpuri	17.ix.1975
	Subfamily: Asopinae				
49	*Canthecona furcellata* (Wolff)	2	Belgaon, SWLS	Raisen	15.ix.09
		1	Vijay Nagar	Jabalpur	11.vi.2011
		2	Baghdev, PTR	Chhindwara	27.vii.2001
		1	Pulpuldoh, PTR	Chhindwara	14.vii.2001
		3	Totladoh, PTR	Chhindwara	23.viii.2001
		5	Thumdagadi, PTR	Chhindwara	22.ix.2001
		2	Delakharri, PTR	Chhindwara	7.vii.2001
		1	Delakharri, PTR	Chhindwara	14.vii.2001
		1	Kheda	Morena	27.iv.2011
		3	Giridarsan,VDWLS	Damoh	12.vi.2011
50	*Andrallus spinidens* (Fabricius)	1	Mohania	Sidhi	22.vii.1999
51	*Amyotea malabarica* (Fabricius)	2	SWLS	Raisen	03.iv.2011
52	**Zicrona caerulea* Linnaeus	1	VVNP	Bhopal	13.xii.2012
V	**Family:Tessaratomidae**				
53	**Tessaratoma javanica* (Thunberg)	1	ZSI Office	Jabalpur	1.v.2012
VI	**Family: Dinidoridae**				
54	*Cyclopelta siccifolia* (Westwood)	12	ZSI Colony	Jabalpur	5.vii.2011
		2	SBI Chowk, Vijay Nagar	Jabalpur	04.vi.2011
		2	Gaganwada, SWLS	Raisen	02.iv.2011
55	*Coridius brunneus* (Thunberg)	2	Napier town	Jabalpur	23.vii.1960
			ZSI Office	Jabalpur	28.viii.1970
56	*Coridius ianus* (Fabricius)	1	ZSI Colony	Jabalpur	02.i.1966
		2	Barha RH, SWLS	Raisen	15.ii.2010
		1	Singhanama, PBR	Hoshangabad	32.ix.1965
VII	**Family: Urostylidae**				
57	**Urochela bimaculata* Dallas	1	Vijay Nagar	Jabalpur	11.vii.2012



Graph 1. Showing number of species in different families of superfamily Pentatomoidea.

Plate 1



Coridius ianus (Fabricius)

Canthecona furcellata (Wolff)

Halys dentatus Fabricius

Nezara viridula (Linnaeus)

Chrysocoris purpereus Westwood

Antestiopsis cruciata (Fabricius)

Plate 2

Erthesina fullo (Thunberg)

Degonetus serratus Distant

Plautia fimbriata (Fabricius)

Aethus indicus (Westwood)

Adria parvula (Dallas)

Amyotea malabarica (Fabricius)

Plate 3

Bagrada picta (Fabricius)

Gulielmus lalterarius Distant

Macroscytus brunneus (Fabricius)

Megacopta cribraria Hsiao and Ren

Tessaratoma javanica (Thunberg)

Scutellera perplexa (Westwood)

Plate 4

Coridius brunneus (Thunberg)

Byrsinus varians (Fabricius)

Agonoscelis nubila (Fabricius)

Dorpius indicus Distant

Eysarcoris guttiger (Thunberg)

Menida formosa (Westwood)

APHIDS (HEMIPTERA: APHIDOIDEA) OF GÖLCÜK NATURAL PARK (ISPARTA PROVINCE, TURKEY)

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ABSTRACT: Winged morphs of aphids were investigated in 2008-2009 in Gölcük Natural Park (Isparta Province, Turkey). Nineteen species of aphids were caught in 3 Malaise traps in 3 localities of the above mentioned territory. Most of the aphid species (12 species) were members of the subfamily Aphidinae, subfamilies Calaphidinae and Eriosomatinae were each represented by two species, with one species in each of the subfamilies Anoeciinae, Lachninae and Thelaxinae. Eight species and one subspecies are new records for the aphid fauna of Isparta Province, Turkey.

KEY WORDS: Aphid, new record, Gölcük Natural Park, Isparta, Turkey.

Gölcük Natural Park as a protected area was established in 1991. Plants of this natural park was studied in by Fakir (1998) and Fakir & Dutkuner (1999). Twenty two species of the plants (9.7% of total) are endemics to the Irano-Anatolian biodiversity hotspot, and 17 (7.5%) are endemic to the Mediterranean basin hotspot. Twenty five species (11%) are endemic to Turkey (Fakir, 1998).

Previous studies on the different taxa of insects such as Hymenoptera, Coleoptera and Hemiptera of Gölcük Natural Park have been done during 2008-2009 (Japoshvili et al., 2009, 2010; Japoshvili & Celik, 2010; Japoshvili & Karaca, 2010; Japoshvili & Anlas, 2011; Japoshvili & Ljubomirov, 2011; Japoshvili & Toyganozu, 2011; Japoshvili et al., 2011). Only one aphid species - *Myzus cerasi* (Fabricius, 1775) - was recorded in this park before our investigation (Aslan & Karaca, 2005).

MATERIAL AND METHODS

Alate aphids collected by Malaise traps in Gölcük Natural Park in 2008 and 2009 were mounted and identified. Sampling sites are shown on the map (Fig. 1). The aphids were cleared and individually mounted in Canada balsam on microscope slides using J. Martin's technique (Martin, 1983). The specimens were studied using a Hirox microscope and each morphological character was measured by binocular micrometer. For alate aphid identification the following works were used: Jacky & Bouchery (1984); Taylor et al. (1981); Remaudiére & SecoFernández (1990); Heie (1992, 1994, 1995); Quednau (2003). Aphids slides are deposited in the Entomology and Biocontrol Research Centre of the Agricultural University of Georgia.

RESULTS

Nineteen species of aphids were recorded in Gölcük Natural Park during our investigation in 2008-2009. Information about the collected species, which belong to 18 genera in 6 subfamilies, are given in the annotated list. The following species: *Acyrthosiphon pisum* (Harris, 1776), *Anoecia corni* (Fabricius, 1775), *Hyadaphis foeniculi* (Passerini, 1860), *Liosomaphis berberidis* (Kaltenbach, 1843), *Sitobion fragariae* (Walker, 1848), *Therioaphis arnaultae* Remaudière, 1989, *Therioaphis trifolii* (Monell, 1882), *Uroleucon inulicola* (Hille Ris Lambers, 1939), were recorded for the first time from Isparta Province. The subspecies *Therioaphis trifolii ventromaculata* F.P. Müller, 1968 was also a new record for the aphid fauna of Isparta Province.

Annotated list of the aphid species collected in Gölcük Natural Park collected by Malaise traps in 2008-2009

(Newly recorded species for Isparta Province are indicated by an asterisk.)

Aphididae
Anoeciinae

1. *Anoecia corni* (Fabricius, 1775) *
Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.09, leg. G. Japoshvili.
Biology: Host alternating between *Cornus sanguinea* and roots of plants of the family Poaceae, or anholocyclic on roots of Poaceae (Blackman & Eastop, 2013).
Distribution: Europe, central and eastern Asia, Africa, Argentina and North America (Blackman & Eastop, 2013).
Comment: This species was recorded on *Triticum aestivum* (as *Triticum sativa*) in İnecik (Tekirdag) for the first time from Turkey by Tuatay & Remauduère (1964).

Aphidinae
Macrosiphini

2. *Acyrthosiphon pisum* (Harris, 1776) *
Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.
Biology: It is a monoecious holocyclic on plants of the family Leguminosae (Blackman & Eastop, 2013).
Distribution: Almost cosmopolitan (Blackman & Eastop, 2013).
Comment: This species was recorded on *Medicago sativa* in Ankara from Turkey by Düzgünes & Tuatay (1956).

3. *Brachycaudus (Prunaphis) cardui* (Linnaeus 1758)
Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 21-28.05.2009, leg. G. Japoshvili; 1 alate viviparous female, stony place, Gölcük National Park, 06.06.2009, leg. G. Japoshvili; 1 alate viviparous female, stony place, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.
Biology: It is a heteroecious holocyclic species. It migrates from *Prunus* spp. to plants of the families Boraginaceae and Compositae (Blackman & Eastop, 2013).
Distribution: Europe, Asia, north Africa and North America (Blackman & Eastop, 2013)
Comment: This species was recorded on *Carduus* sp. in Ankara for the first time from Turkey by Düzgünes & Tuatay (1956); It was recorded on *Prunus amygdalus* (as *Amygdalus communis*) in Eğirdir (Mahmutlar) in Isparta province by Aslan & Karaca (2005).

4. *Chaetosiphon (Pentatrichopus) tetrarhodum* (Walker 1849)
Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on wild and cultivated *Rosa* spp. (Blackman & Eastop, 2013).
Distribution: World-wide except east Asia (Blackman & Eastop, 2013).
Comment: This species was recorded on *Rosa* sp. in Ankara and Atabey (Isparta) for the first time in Turkey by Tuatay & Remauduère (1964).

5. *Diuraphis noxia* (Kurdjumov, 1913)
Material examined: 3 alate viviparous females, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.
Biology: It is monoecious holocyclic on grasses and cereals in cold temperate climates, probably anholocyclic elsewhere (Blackman & Eastop, 2013).
Distribution: Europe, central Asia, Middle East, Central Asia, north Africa, Kenya, South Africa, Chile, Argentina, North America (Blackman & Eastop, 2013).
Comment: This species was recorded on undetermined grasses no locality and no date for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Triticum* sp. in Eğirdir (Isparta) and Yalvaç (Isparta) (Tuatay and Remaudiere 1964).

6. *Dysaphis (Pomaphis) plantaginea* (Passerini 1860)
Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.
Biology: It is a hetereocious holocyclic species, migrating from *Malus* spp. and sometimes *Pyrus* spp. to *Plantago* spp. (Blackman & Eastop, 2013).
Distribution: Europe, south-west and central Asia, India, Pakistan, Nepal, North and South America (Blackman & Eastop, 2013).
Comment: This species was recorded on *Pyrus communis* in Ankara, on *Malus pumila* (as *Pyrus malus*) in Gaziantep - for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Malus pumila* (as *Malus communis*) in in Eğirdir, Gönen, Keçiborlu, Aksu, Merkez (Çünür) in Isparta Province by Aslan & Karaca (2005).

7. *Hyadaphis foeniculi* (Passerini, 1860)
Material examined: 4 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.09; 1 alate viviparous female, the same locality, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.
Biology: It is a heteroecious holocyclic species, migrating from *Lonicera* spp. to various plants of the family Apiaceae (Blackman & Eastop, 2013).
Distribution: Widespread in Europe, eastward to Turkey and Iraq, North America (Blackman & Eastop, 2013).
Comment: This species was recorded on *Lonicera* sp. in Ankara for the first time from Turkey by Bodenheimer & Swirski (1957).

8. *Liosomaphis berberidis* (Kaltenbach, 1843)
Material examined: 1 alate male, Pilavtepe, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.
Biology: It lives holocyclically on *Berberis* spp. and *Mahonia japonica* (Blackman & Eastop, 2013).
Distribution: Europe, eastward to India, North America, Australia and New Zealand (Blackman & Eastop, 2013).
Comment: This species was recorded on *Berberis vulgaris* in Ahlat (Bitlis), Beyşehir (Konya) and Ankara for the first time from Turkey by Tuatay & Remaudière (1964).

9. *Macrosiphum rosae* (Linnaeus, 1758)
Material examined: 1 alate viviparous female, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.
Biology: Heteroecious holocyclic or monoecious anholocyclic on *Rosa* spp. It has a facultative migration from *Rosa* to plants of the families Dipsacaceae and Valerianaceae, and sometimes to certain Aquifoliaceae and Onagraceae (Blackman & Eastop, 2013).
Distribution: World-wide, except for east and south-east Asia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Rosa* sp. in Ankara for the first time from Turkey by Düzgünes & Tuatay (1956). It was recorded on on *Rosa* sp. in Isparta by Toros (1991-1992).

10. ***Myzus cerasi*** **(Fabricius, 1775)**
Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.09, leg. G. Japoshvili.
Biology: It is a heterecious holocyclic species, migrating from *Prunus* spp. to plants of the families Rubiaceae, Orobanchaceae, Plantaginaceae and Brassicaceae (Blackman & Eastop, 2013).
Distribution: Europe, across Asia to Pakistan and India, introduced to Australia, New Zealand and North America (Blackman & Eastop, 2013).
Comment: This species was recorded on *Prunus cerasus* in İznik (Kocaeli) for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Prunus avium* in in Eğirdir, Keçiborlu, Merkez (Gölcük), Merkez (Milas), Merkez (Kirazlidele) in Isparta Province by Aslan & Karaca (2005).

11. ***Sitobion fragariae*** **(Walker, 1848)** *
Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.
Biology: It is a heteroecious holocyclic species, migrating from *Rubus* spp. and other Rosaceae to species of Poaceae (Blackman & Eastop, 2013).
Distribution: Europe, Asia, introduced to South Africa and North and South America (Blackman & Eastop, 2013).
Comment: This species was recorded on wheat in Konya for the first time from Turkey by Uysal et al. (2004).

12. ***Uroleucon inulicola*** **(Hille Ris Lambers, 1939)***
Material examined: 1 alate viviparous female, stony place, Gölcük Natural Park, 06.06.2009, leg. G. Japoshvili.
Biology: It is monoecious holocyclic on *Inula* spp. (Blackman & Eastop, 2013).
Distribution: Europe, west Siberia and Central Asia (Blackman & Eastop, 2013).
Comment: This species was recorded on *Inula hirta* in Artvin for the first time from Turkey by Tuatay (1991).

13. ***Wahlgreniella nervata*** **(Gillette, 1908)**
Material examined: 2 alate viviparous females, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.
Biology: It is a heterecious holocyclic species in North America, where it migrates from *Rosa* spp. to Ericaceae , but it probably lives without host alternation on *Rosa* spp. outside of North America (Blackman & Eastop, 2013).
Distribution: North America, introdiced to Central and South America, Africa and Pakistan (Blackman & Eastop, 2013).
Comment: This species was recorded on *Berberis thunbergii* (not a true host) for the first time from Turkey by Çirakli et al. (2008), while from Isparta province it was recorded as a pest of damask rose (*Rosa damascena*) in Isparta city by Barjadze et al. (2011).

Calaphidinae
Panaphidini

14. ***Therioaphis arnaultae*** **Remaudière, 1989***
Material examined: 4 alate viviparous females, Pilavtepe, Gölcük Natural Park, 24.09.09, leg. G. Japoshvili; 1 alate viviparous female, the same locality, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.
Biology: It is a monoecious holocyclic species on *Astragalus* spp. (Blackman & Eastop, 2013).
Distribution: Iran, Turkey and Lebanon (Blackman & Eastop, 2013).
Comment: This species was recorded on *Astragalus* sp. in Ivriz (Eregli) and Erciyesdag (Kayseri) for the first time from Turkey by Remaudière (1989).

15. *Therioaphis trifolii* (Monell, 1882))*
Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.09.2009, leg. G. Japoshvili; 2 alate viviparous females, the same locality, Gölcük Natural Park, 14-21.10.08, leg. G. Japoshvili;
Biology: It is monoecious holocyclic on Leguminosae, or anholocyclic in warmer regions (Blackman & Eastop, 2013).
Distribution: Europe, North Africa, Middle East, India, Pakistan, Japan, China, introduced to North and South America, South Africa and Australia (Blackman & Eastop, 2013).
Comment: This species was recorded on *Medicago sativa* in Konya, Kırşehir, Ankara, Niğde for the first time from Turkey by Bodenheimer & Swirski (1957).

15a. *Therioaphis trifolii ventromaculata* F.P. Müller, 1968)*
Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.09.2009, leg. G. Japoshvili.
Biology: It is monoecious holocyclic on *Astragalus* spp. (Blackman & Eastop, 2013).
Distribution: Europe (Holman, 2009).
Comment: This subspecies was recorded on *Astragalus* sp. in Elma dag, Ankara for the first time from Turkey by Remaudière (1989).

Eriosomatinae
Fordini

16. *Forda formicaria* von Heyden, 1837)*
Material examined: 3 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili; 2 alate viviparous females, Pilavtepe, Gölcük Natural Park, 12.07.2009, leg. G. Japoshvili.
Biology: It is a heteroecious holocyclic species, migrating from *Pistacia* spp. to Poaceae and Cyperaceae species or it lives anholocyclically on the roots of grasses (Blackman & Eastop, 2013).
Distribution: Northern Europe, Mediterranean region, south-west Asia, Central Asia, Siberia, North America.
Comment: This species was recorded on *Pistacia terebinthus* in Alemdağ (Kocaeli) for the first time from Turkey by Trotter (1903).

17. *Geoica setulosa* (Passerini, 1860)
Material examined: 3 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.2009, leg. G. Japoshvili.
Biology: It is a heteroecious holocyclic species, migrating from *Pistacia khinjuk* to Poaceae plants or living anholocyclically on the roots of grasses (Blackman & Eastop, 2013).
Distribution: Italy, Turkey, Georgia, Iran, Israel, introduced to USA (Blackman & Eastop, 2013).
Comment: This species was recorded on *Pistacia* sp. in Eğirdir (Isparta) for the first time from Turkey by Tuatay & Remaudière (1964).

Lachninae
Cinarini

18. *Eulachnus rileyi* (Williams, 1911))*
Material examined: 1 alate viviparous female, Pilavtepe, Gölcük National Park, 21.07.2009, leg. G. Japoshvili; 1 alate viviparous female, the same locality, Gölcük National Park, 24.09.09, leg. G. Japoshvili; 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.
Biology: It is monoecious holocyclic on *Pinus* spp., but apparently anholocyclic in warmer regions (Blackman & Eastop, 2013).
Distribution: North, South and Central America, Europe, Medditerranean area, south-west Asia, introduced into Africa south of Equator (Blackman & Eastop, 2013).
Comment: This species was recorded on *Pinus nigra* in Ankara for the first time from Turkey by Tuatay & Remaudière (1964).

Thelaxinae

19. *Thelaxes suberi* (deI Guercio, 1911)
Material examined: 2 alate viviparous females, stony place, Gölcük National Park, 06.06.2009, leg. G. Japoshvili.
Biology: It is monoecious holocyclic on *Quercus* spp., and is also recorded from *Castanea sativa* (Blackman & Eastop, 2013).
Distribution: England, Southern Europe, Mediterranean region, southwest Asia (Blackman & Eastop, 2013).
Comment: This species was recorded on *Quercus fraimetto* (as *Quercus conferta*) in Alemdağ (Kocaeli) for the first time from Turkey by Schimitschek (1944).

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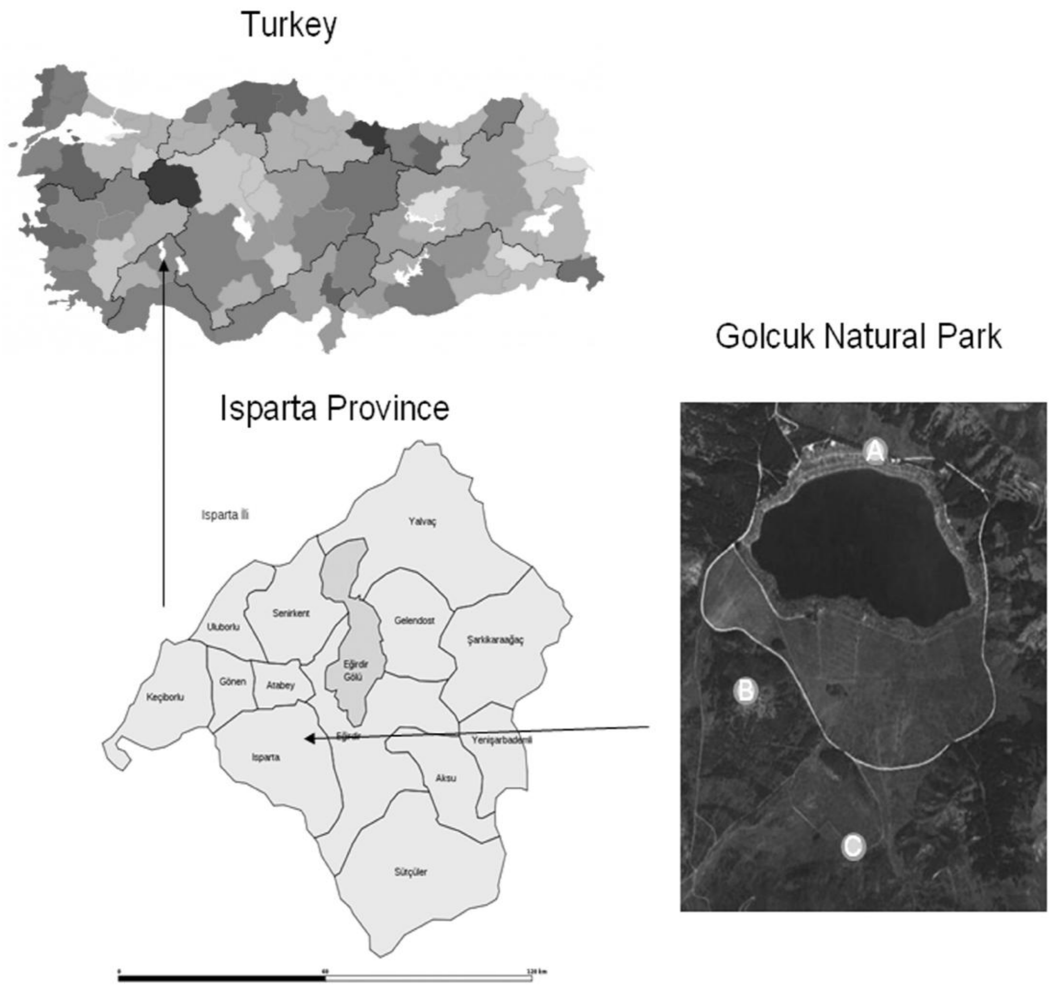

Figure 1. Sampling sites of aphids in Gölcük Natural Park. A: place with *Robinia pseudoacacia* trees; B: Pilavtepe; C: stony place.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART VI – CRYSOMELIDAE: GALERUCINAE

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[**Özdikmen, H. & Topcu, N. N.** 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part VI – Chrysomelidae: Galerucinae. Munis Entomology & Zoology, 9 (1): 214-226]

ABSTRACT: The paper gives chorotype identifications for Turkish Galerucinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Galerucinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014) and Özdikmen & Kavak (2014) are the previous works for this aim. The present study is attempted as the sixth step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Galerucinae comprises of 67 species group taxa (55 species + 12 subspecies) of 15 genera.

Subfamily GALERUCINAE

Genus *Agelastica* Chevrolat, 1836
***A. alni* (Linnaeus, 1758)**
***A. a. alni* (Linnaeus, 1758)**
Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL RO SK SP SV SZ UK YU **A:** IN TR **Records in Turkey:** TR-A: ADA, ANT, ART, BAL, BRS, ESK, EZU, DUZ, GIR, ISP, IST, IZM, KAH, KOC, MER, OSM, RIZ, SAK, TRA – TR-E: IST, KRK **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** European

Genus *Aulacophora* Chevrolat, 1836
***A. foveicollis* (Lucas, 1849)**
Range: E: FR GR IT PT SP **N:** EG **A:** AF CY IN IS OM PA SA ST SY TR YE **AFR ORR Records in Turkey:** TR-A: ADA, AYD, DEN, ESK, EZU, IZM, MAN, MUG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Afrotropico-Indo-Mediterranean + Oriental

Genus *Calomicrus* Dillwyn, 1829
***C. angorensis* (Pic, 1912)**
Range: A: TR **Records in Turkey:** TR-A: ANK, COR, EZU, MUS, YOZ (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Anatolian

***C. apicalis* Demaison, 1891**
Range: A: SY TR **Records in Turkey:** TR-A: ADA, ANT, BOL, EZU, HAT, ISP, KAR, KAS, MER, SIV **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***C. azureus* (Fairmaire, 1884)**
Range: A: LE SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. circumfusus* (Marsham, 1802)**
Range: E: AU BE BH BU BY CZ FR GB GE HU IT LU MC MD NL PL SK SP SZ UK YU **N:** TU **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

***C. lividus* (Joannis, 1866)**
Range: A: IS JO LE SY TR **Records in Turkey:** TR-A: ADA, AGR, ANT, DIY, ERZ, ESK, EZU, HAT, ISP, IZM, KON, KRS, MER, OSM **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and Marmara Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. malkini* Warchałowski, 1991**
Range: A: TR **Records in Turkey:** TR-A: ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

C. pinicola (Duftschmid, 1825)
Range: E: AL AU BE BU BY CZ EN FI FR GE HU IT LA LS LT LU NL PL RO SK SP SV SZ UK **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

C. syriacus (Weise, 1898)
Range: A: IS SY TR **Records in Turkey:** TR-A: ANT, HAT, ISP, MER **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

C. turcicus Medvedev, 1975
Range: A: TR **Records in Turkey:** TR-A: AGR, EZU, KRS **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

Genus *Diorhabda* Weise, 1983
D. carinata Faldermann, 1837
Range: E: AB AR GG UK **A:** AF IN KI KZ PA SY TD TM TR UZ XIN **NAR Records in Turkey:** TR-A: AGR, ART, EZU, SII **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic + SW-Asiatic + Nearctic or Holarctic

D. elongata (Brullé, 1832)
Range: E: AL BH BU CR GR MC PT SP ST YU **N:** AG EG **A:** CY LE SY TR **NAR Records in Turkey:** TR-A: ADA, ANK, ANT, ART, AYD, CNK, DIY, ESK, EZU, ISP, IZM, KAY, MAL, MAN, MER, SAM, USA, YOZ, ZON – TRE: EDI **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only the most Parts of Marmara Region, Central-West Anatolia Part in Aegean Region, Konya Part in Central Anatolian Region, Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean + Nearctic

Genus *Euluperus* Weise, 1886
E. major Weise, 1886
Range: E: BU HU RO **A:** TR **Records in Turkey:** TR-A: ANK, KIR, SIV, YOZ (pers. comm.., 2013) **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

Genus *Exosoma* Jacoby, 1903
E. flavipes (Heyden, 1878)
Range: E: AB AR **A:** TR **Records in Turkey:** TR-A: AMA, ANK, ARD, ART, BAY, BOL, COR, ERZ, EZU, GIR, GUM, KRS, SIV, YOZ (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

E. gaudionis (Reiche, 1862)
Range: E: AL BU GR MC **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

E. neglectum Mohr, 1968
Range: A: SY TR **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, BUR, DIY, ERZ, ESK, ISP, KON, MER, OSM **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

E. thoracicum (Redtenbacher, 1843)
Range: E: AL GR **A:** IS SY TR **Records in Turkey:** TR-A: ADA, DIY, MAR, URF **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (NE-Mediterranean)

Genus *Galeruca* Geoffroy, 1762
Subgenus *Galeruca* Geoffroy, 1762
G. armeniaca Weise, 1866
Range: E: ST **A:** IN KI KZ TD TM TR UZ **Records in Turkey:** TR-A: AFY, ERZ, EZU, IGD, ISP, KRS (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Centralasiatic + SW-Asiatic

G. circassica Reitter, 1899
Range: E: AR GG **A:** TR **Records in Turkey:** TR-A: ANK, ANT, ARD, BAY, CAN, EZU, HAK, TOK, SIV, KAS **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

G. dahlii (Joannis, 1865)
G. d. dahlii (Joannis, 1865)
Range: E: AU FR GE HU IT PL SK UK **Records in Turkey:** TR-A: EZU **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

G. impressicollis Pic, 1934
Range: A: TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the endemic species is unknown. **Chorotype:** Anatolian

G. interrupta (Illiger, 1802)
Range: E: BE BY FR IT SK SP SV **N:** MO **A:** SY TR **Records in Turkey:** TR-A: AMA, ANK, ANT, COR, DIY, ESK, EZU, ISP, KON, MER, SIV **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

G. jucunda Faldermann, 1837
Range: E: AB AU BH BU CR CZ DE FR GE GR HU LT PL RO SK SV SZ UK YU **A:** AF ES MG NMO SY TR WS XIZ “Caucasus” **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

G. littoralis Fabricius, 1787
Range: E: BH BU CR FR GR IT MC YU **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** S-European

G. pomonae (Scopoli, 1763)
G. p. pomonae (Scopoli, 1763)
Range: E: AB AL AU BE BU BY CZ DE EN FI FR GE GR HU IT LA LS LT LU NL NR PL RO RU SK SV SZ UK YU **N:** MO **A:** KZ MG SHX TD TR WS **Records in Turkey:** TR-A: AFY, AKS, ANK, ANT, ART, BOL, CAN, CNK, COR, EZU, GIR, ISP, IZM, KAH, KAS, KAY, KON, NEV, NIG, OSM, RIZ, ZON **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

G. spectabilis **(Faldermann, 1837)**

G. s. orientalis **(Osculati, 1844)**

Range: A: IN SY TR **Records in Turkey:** TR-A: AKS, ANK, ANT, ARD, ART, BAY, EZU, KAS, KAY, KIR, KON, KRS, MER, NEV, NIG, SIN, TRA **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Syro-Anatolian)

G. tanaceti **(Linnaeus, 1758)**

G. t. tanaceti **(Linnaeus, 1758)**

Range: E: AB AL AR AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT KZ LA LS LT LU MC NL NR PL RO RU SK SP SV SZ UK YU **N:** AG MO TU **A:** JA KI KZ SY TR WS **Records in Turkey:** TR-A: ANK, COR, ESK, EZU, ISP, KAS, KRS, ORD, SIN **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

Subgenus *Emarhopa* Weise, 1886

G. rufa **Germar, 1824**

Range: E: AB AL AU BH BU CZ FR GR HU IT MC RO SK SP UK YU **A:** TR **Records in Turkey:** TR-A: MAR **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

Subgenus *Haptoscelis* Weise, 1886

G. melanocephala **(Ponza, 1805)**

Range: E: AU BY CZ DE FI FR GE HU IT RU SK ST SV UK **A:** TR WS **Records in Turkey:** TR-A – TR-E **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

Genus *Galerucella* Crotch, 1873

Subgenus *Galerucella* Crotch, 1873

G. grisescens **(Joannis, 1866)**

Range: E: AU BE BY CZ EN FI FR GB GE HU IT LA LT NL PL RU SZ UK **A:** ANH FE FO FUJ GUA GUI GUX HAI HEB HEI HEN HUB HUN JA JIA JIL JIX LIA MG NMO SC SCH SHA SHN SHX TAI XIZ YUN ZHE "Siberia" **ORR Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Palearctic + Oriental

G. nymphaeae **(Linnaeus, 1758)**

Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LT MC NL NR PL RO RU SK ST SV SZ UK YU **A:** FE IS KZ MG TR **Records in Turkey:** TR-A: AFY **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Sibero-European

Subgenus *Neogalerucella* Chujo, 1962

G. calmariensis **(Linnaeus, 1767)**

Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL RU SK SP ST SV SZ UK YU **N:** AG MO **A:** FE JA JIL KI KZ MG TM TR "Siberia" **Records in Turkey:** TR-A: AFY, ART, BOL, DEN, EZU, ISP, IST, IZM, MUG, SAM, SIN, TOK – TR-E: IST **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

G. lineola **(Fabricius, 1781)**

G. l. lineola **(Fabricius, 1781)**

Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL RU SK SP ST SV SZ UK YU **N:** AG MO **A:** FE IN JA JIL KZ MG TD TR "Siberia"

"Korea" **Records in Turkey:** TR-A: ANK, ART, EZU, IST, KOC, RIZ, SIV, TRA, ZON – TR-E: IST (Ekiz et al., 2013; pers. comm., 2013) **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

G. pusilla Duftschmid, 1825

Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT MC NL NR PL RU SK SP ST SV SZ UK YU **A:** HKG IN JIL KI KZ LIA MG SHN SHX TR **Records in Turkey:** TR-A: BIL, CAN, EZU, KOC, SAM, YOZ **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

G. tenella (Linnaeus, 1760)

Range: E: AB AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT LU NL NR PL RU SK SP ST SV SZ UK YU **A:** FE GAN KI KZ MG NMO QIN TR **Records in Turkey:** TR-A: ART, AYD, BOL, KRS **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Aegean Region until now. **Chorotype:** Sibero-European

Genus *Lochmaea* Weise, 1883
L. caprea (Linnaeus, 1758)

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE HU IT LA LS LT LU NL NR PL RU SK SP SV SZ UK YU **A:** FE HEI JA JIL LIA MG NMO SC SHX TR WS **Records in Turkey:** TR-A: ANK, CAN, ESK, EZU, ISP, IST, MAN, TOK, TRA – TR-E: IST **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

L. crataegi (Forster, 1771)

Range: E: AB AL AU BE BH BU BY CZ DE FR GB GE GR HU IT LA LT LU MC NL PL SK SP SV SZ UK YU **N:** AG TU **A:** MG SHX **Records in Turkey:** TR-A: BOL, ESK, EZU, ISP **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

L. limbata Pic, 1898

Range: A: IN IS JO SY TR **Records in Turkey:** TR-A: ANT, BIN, ISP, KAR, URF **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian)

L. machulkai Roubal, 1926

Range: E: AB AR GG ST **A:** IN TR **Records in Turkey:** TR-A: ERZ **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

Genus *Luperus* Geoffroy, 1762
L. armeniacus Kiesenwetter, 1878

Range: E: AB UK "Transcaucasus" **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

L. discolor Faldermann, 1837

Range: E: AB **A:** TR **Records in Turkey:** TR-A: AMA, ANT, GUM, MAL, SAM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. flavipennis* Lucas, 1849**

***L. f. flavipennis* Lucas, 1849**

Range: N: AG MO **Records in Turkey:** TR-A: EZU **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Mediterranean

***L. flavipes* (Linnaeus, 1767)**

***L. f. flavipes* (Linnaeus, 1767)**

Range: E: AB A L AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL PL RU SK SP ST SV SZ UK YU **A:** KZ MG TR **Records in Turkey:** TR-A: ANK, ART, CNK, EZU, ISP **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

***L. floralis* Faldermann, 1837**

Range: E: AB TR **Records in Turkey:** TR-A: BAY, EZU, RIZ **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. graecus* Weise, 1886**

Range: E: AL BU GR MC TR YU **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***L. longicornis* (Fabricius, 1781)**

Range: E: AB AL AU BE BH BU BY CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL PL RU SK SP SV SZ UK YU **A:** FE MG **Records in Turkey:** TR-A: AMA, ANK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Sibero-European

***L. perlucidus* Iablokoff-Khnzorian, 1956**

Range: E: AR **A:** TR **Records in Turkey:** TR-A: GUM **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. rectangulus* Weise, 1898**

Range: A: TR **Records in Turkey:** TR-A: ADI, AMA, ANK, ERZ, EZU, GUM, HAT, KAY **Remarks:** The endemic species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and Marmara Region until now. **Chorotype:** Anatolian

***L. viridipennis* (Germar, 1824)**

Range: E: AB AU BU CZ FR GE HU IT PL SK SZ UK YU **Records in Turkey:** TR-A: KAH **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

***L. xanthopoda* (Schrank, 1781)**

Range: E: AB AL AU BH BU BY CZ FR GE HU IT KZ MC PL SK ST SZ UK YU **A:** KI TR **Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, CNK, ESK, EZU, GUM, ISP, KON, KRS, NEV, NIG **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Ergene Part and Istranca Part for European Turkey in Marmara Region, Adana Part for Mediterranean Region and Upper Murat-Van Part for Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

Genus *Nymphius* Weise, 1900

***N. ensifer* (Guillebeau, 1891)**

Range: A: IS SY TR **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***N. forcipifer* (Weise, 1900)**

Range: A: TR **Records in Turkey:** TR-A: AFY, ANK, ESK, ISP, KON **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

***N. lydius* (Weise, 1886)**

Range: E: AR BU **A:** IN TR **Records in Turkey:** TR-A: ADI, AFY, AMA, ANK, ANT, BAR, CNK, ESK, EZU, ISP, IZM, KON, KAS, KRB, KRS, MAN, MER, SAM **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Marmara Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***N. stylifer* (Weise, 1899)**

***N. s. stylifer* (Weise, 1899)**

Range: E: AB AR GG ST "Eastern Carpathians" **A:** TR **Records in Turkey:** TR-A: EZU, KRS, VAN **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan) or SW-Asiatic (Anatolo-Caucasian)

***N. s. kadleci* (Bezdek, 2008)**

Range: A: TR **Records in Turkey:** TR-A: MUS **Remarks:** The endemic subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***N. s. ogloblini* (Bogatchev, 1947)**

Range: E: AR **A:** IN TR **Records in Turkey:** TR-A: HAK **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

Genus *Phyllobrotica* Chevrolat, 1836

***P. adusta* (Creutzer, 1799)**

***P. a. adusta* (Creutzer, 1799)**

Range: E: AL AU BH BU CZ GR HU MC RO SK UK YU **A:** TR **Records in Turkey:** TR-A: ART, EZU – TR-E: EDI, KRK, TEK **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

***P. binotata* Ogloblin, 1936**

Range: E: AR **A:** TR **Records in Turkey:** TR-A: ART, EZU, VAN **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***P. elegans* Kraatz, 1866**

Range: E: AB BU UK **A:** ST TR **Records in Turkey:** TR-A: ANK, ART, BOL, BRS, ESK, EZU, ISP, IST, KAY, KON, MER, OSM – TR-E: IST **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***P. frontalis* Weise, 1886**

Range: A: IN SY TR **Records in Turkey:** TR-A: ADA, ADI, AMA, BIL, BOL, COR, ESK, ISP, KAS, KAY, KON, MER, SIV **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Syro-Anatolian)

P. malinka Bezdek, 2010

Range: A: IN TR **Records in Turkey:** TR-A: KAH, MAR **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

Genus *Radymna* Reitter, 1913

R. fischeri (Faldermann, 1837)

Range: E: AB ST **A:** IN TM TR **Records in Turkey:** TR-A: ANK, EZU, GAZ, IGD, ISP, KAY, KRS, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

R. nigrifrons (Laboissière, 1914)

Range: E: AR **A:** TR **Records in Turkey:** TR-A: IGD, KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

R. persica (Faldermann, 1837)

Range: E: AB GR **A:** AF IN IS KZ PA SY TR XIN **Records in Turkey:** TR-A: AKS, ANK, KAY, KON, KRS **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Mediterranean

Genus *Sermylassa* Reitter, 1913

S. halensis (Linnaeus, 1767)

Range: E: AB AU BE BH BU BY CZ DE FR GB GE HU IT LS LT LU NL PL SK SP ST SV SZ UK YU **A:** KZ TR WS **Records in Turkey:** TR-A: EZU, ISP, SAM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

Genus *Xanthogaleruca* Laboissiere, 1934

X. luteola (Müller, 1766)

Range: E: AB AL AU BE BH BU CR CZ DE FR GE GR HU IT LA LT LU MC NL PL RO SK SP ST SV SZ UK YU **N:** AG MO **A:** AF IN KA KZ NMO TM TR **Records in Turkey:** TR-A: ANK, ANT, AYD, BAL, BIL, BOL, ESK, EZU, IGD, ISP, IST, IZM, KRB, MUG, SAM, SIN, TRA, ZON – TR-E: IST, TEK **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean

X. subcoerulescens (Weise, 1884)

Range: A: TR **Records in Turkey:** TR-A: ADA, AMA, ANT, KON, MER **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

ZOOGEOGRAPHICAL ANALYSIS

Turkish Galerucinae includes 68 species group taxa (56 species and 12 subspecies) of 15 genera. 16 species, namely 23.88 % of the species have “SW-Asiatic” chorotype. 8 species, namely 11.94 % of the species have “Anatolian” chorotype. 8 species, namely 11.94 % of the species have “Sibero-European” chorotype. 7 species, namely 10.45 % of the species have “Turano-Mediterranean” chorotype. 5 species, namely 7.46 % of the species have “C and E-European” chorotype. 5 species, namely 7.46 % of the species have "E-Mediterranean" chorotype. 4 species, namely 5.97 % of the species have "Palearctic" chorotype. 3 species, namely 4.48 % of the species have "Mediterranean" chorotype. 2 species, namely 2.99 % of the species have "Centralasiatic-European" chorotype. And each of the remaining 10 species group taxa has a different chorotype. One species, namely about 1.34 % of the taxa has "Afrotropico-Indo-Mediterranean + Oriental" chorotype. One species, namely about 1.34 % of the taxa has "Asiatic-European" chorotype. One species, namely about 1.34 % of the taxa has "Centralasiatic-Europeo-Mediterranean" chorotype. One species, namely about 1.34 % of the taxa has "Centralasiatic + Mediterranean" chorotype. One species, namely about 1.34 % of the taxa has "Centralasiatic + SW-Asiatic" chorotype. One species, namely about 1.34 % of the taxa has "Centralasiatic + SW-Asiatic + Nearctic or Holarctic" chorotype. One species, namely about 1.34 % of the taxa has "European" chorotype. One species, namely about 1.34 % of the taxa has "Mediterranean + Nearctic" chorotype. One species, namely about 1.34 % of the taxa has "Palearctic + Oriental" chorotype. And one species, namely about 1.34 % of the taxa has "S-European" chorotype (Fig. 1). So the dominant chorotype for Turkish Galerucinae is "SW-Asiatic". "Anatolian" and "Sibero-European" and also "Turano-Mediterranean" chorotypes follow it. Also the members of "C and E-European", "E-Mediterranean" and also "Palearctic" chorotypes present important contributions for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Galerucinae are presented as follows:

A total of 16 species have "SW-Asiatic" chorotype as *C. apicalis*, *E. flavipes*, *E. neglectum*, *G. circassica*, *G. s. orientalis*, *L. limbata*, *L. machulkai*, *L. armeniacus*, *L. discolor*, *L. floralis*, *L. perlucidus*, *N. s. ogloblini*, *P. binotata*, *frontalis*, *P. malinka* and *R. nigrifrons*.

A total of 8 species have "Anatolian" chorotype as *C. angorensis*, *C. malkini*, *C. turcicus*, *G. impressicollis*, *L. rectangulus*, *N. forcipifer*, *N. s. kadleci* and *X. subcoerulescens*.

A total of 8 species have "Sibero-European" chorotype as *G. jucunda*, *G. p. pomonae*, *G. melanocephala*, *G. nymphaeae*, *G. tenella*, *L. caprea*, *L. longicornis* and *S. halensis*.

A total of 7 species have "Turano-Mediterranean" chorotype as *E. major*, *E. gaudionis*, *L. graecus*, *N. lydius*, *N. s. stylifer*, *P. elegans* and *R. fischeri*.

A total of 5 species have "C and E-European" chorotype as *C. pinicola*, *G. d. dahlii*, *G. rufa*, *L. viridipennis* and *P. a. adusta*.

A total of 5 species have "E-Mediterranean" chorotype as *C. azureus*, *C. lividus*, *C. syriacus*, *E. thoracicum* and *N. ensifer*.

A total of 4 species have "Palearctic" chorotype as *G. t. tanaceti*, *G. calmariensis*, *G. l. lineola* and *L. crataegi*.

A total of 3 species have "Mediterranean" chorotype as *C. circumfusus*, *G. interrupta* and *L. f. flavipennis*.

A total of 2 species have "Centralasiatic-European" chorotype as *L. f. flavipes* and *L. xanthopoda*.

One species as *A. foveicollis* has "Afrotropico-Indo-Mediterranean + Oriental" chorotype.

One species as *G. pusilla* has "Asiatic-European" chorotype.

One species as *X. luteola* has "Centralasiatic-Europeo-Mediterranean" chorotype.

One species as *R. persica* has "Centralasiatic + Mediterranean" chorotype.

One species as *G. armeniaca* has "Centralasiatic + SW-Asiatic" chorotype.

One species as *D. carinata* has "Centralasiatic + SW-Asiatic + Nearctic or Holarctic" chorotype.
One species as *A. a. alni* has "European" chorotype.
One species as *D. elongata* has "Mediterranean + Nearctic" chorotype.
One species as *G. grisescens* has "Palearctic + Oriental" chorotype.
One species as *G. littoralis* has "S-European" chorotype.

On the other side, Turkish Galerucinae includes a total of 68 species group taxa. However, provincial distributions of 3 species group taxa are unknown. So Turkish Galerucinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio (Table 1).

For the subfamily Galerucinae (according to all species group taxa):
14 species are represented in Marmara Region (21 %)
15 species are represented in Aegean Region (22 %)
39 species are represented in Mediterranean Region (57 %)
32 species are represented in Central Anatolian Region (47 %)
33 species are represented in Black Sea Region (49 %)
44 species are represented in Eastern Anatolian Region (65 %)
12 species are represented in South-Eastern Anatolian Region (18 %)
For the subfamily Galerucinae (according to known provincial distribution of 65 species group taxa):
14 species are represented in Marmara Region (22 %)
15 species are represented in Aegean Region (23 %)
39 species are represented in Mediterranean Region (60 %)
32 species are represented in Central Anatolian Region (49 %)
33 species are represented in Black Sea Region (51 %)
44 species are represented in Eastern Anatolian Region (68 %)
12 species are represented in South-Eastern Anatolian Region (19 %)

So Turkish Galerucinae that includes a total of 68 species group taxa or 65 species group taxa of which are known provincial distributions in Turkey, are rather widely distributed in all Turkish Regions. The most number of species is represented in Eastern Anatolian Region. Mediterranean Region follows it. Black Sea Region and Central Anatolian Region are represented with an important number of species. However, Aegean Region, Marmara Region and South-Eastern Anatolian Region are represented with a rather little number of species now.

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Table 1. The regional distribution of all known species of Galerucinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyGALERUCINAE							
A. a. alni	+	+	+	+	+	+	-
A. foveicollis	-	+	+	+	-	+	-
C. angorensis	-	-	-	+	+	+	-
C. apicalis	-	-	+	+	+	+	-
C. azureus	-	-	+	-	-	-	-
C. circumfusus	-	-	+	-	-	-	-
C. lividus	-	+	+	+	-	+	+
C. malkini	-	-	+	-	-	-	-
C. pinicola	-	-	-	-	-	+	-
C. syriacus	-	-	+	-	-	-	-
C. turcicus	-	-	-	-	-	+	-
D. carinata	+	+	+	+	-	-	-
D. elongata	+	+	+	+	+	+	+
E. major	-	-	-	+	-	-	-
E. flavipes	-	-	-	+	+	+	-
E. gaudionis	-	-	+	-	-	-	-
E. neglectum	-	-	+	+	+	+	+
E. thoracicum	-	-	+	-	-	-	+
G. armeniaca	-	+	+	-	-	+	-
G. circassica	+	-	+	+	+	+	-
G. d. dahlii	-	-	-	-	-	+	-
G. impressicollis	?	?	?	?	?	?	?
G. interrupta	+	-	+	+	+	+	-
G. jucunda	-	-	-	+	-	-	-
G. littoralis	?	?	?	?	?	?	?
G. p. pomonae	+	+	+	+	+	+	-
G. s. orientalis	-	-	+	+	+	+	-
G. t. tanaceti	-	-	+	+	+	+	-
G. rufa	-	-	-	-	-	-	+
G. melanocephala	?	?	?	?	?	?	?
G. grisescens	-	-	+	-	-	-	-
G. nymphaeae	-	+	-	-	-	-	-
G. calmariensis	+	+	+	-	+	+	-
G. l. lineola	+	-	-	+	+	+	-
G. pusilla	+	-	-	+	+	+	-
G. tenella	-	+	-	-	+	-	-
L. caprea	+	+	+	+	+	+	-
L. crataegi	-	-	+	+	+	+	-
L. limbata	-	-	+	+	-	+	+
L. machulkai	-	-	-	-	-	+	-

L. armeniacus	-	-	-	-	-	+	-
L. discolor	-	-	+	-	+	+	-
L. f. flavipennis	-	-	-	-	-	+	-
L. f. flavipes	-	-	+	+	+	+	-
L. floralis	-	-	-	-	+	+	-
L. graecus	-	-	-	-	-	+	-
L. longicornis	-	-	-	+	+	-	-
L. perlucidus	-	-	-	-	+	-	-
L. rectangulus	-	-	+	+	+	+	+
L. viridipennis	-	-	+	-	-	-	-
L. xanthopoda	+	+	+	+	+	+	+
N. ensifer	-	-	+	-	-	-	-
N. forcipifer	-	+	+	+	-	-	-
N. lydius	-	+	+	+	+	+	+
N. s. stylifer	-	-	-	-	-	+	-
N. s. kadleci	-	-	-	-	-	+	-
N. s. ogloblini	-	-	-	-	-	+	-
P. a. adusta	+	-	-	-	+	+	-
P. binotata	-	-	-	-	+	+	-
P. elegans	+	-	+	+	+	+	-
P. frontalis	+	-	+	+	+	-	+
P. malinka	-	-	+	-	-	-	+
R. fischeri	-	-	+	-	+	+	+
R. nigrifrons	-	-	-	-	-	+	-
R. persica	-	-	-	+	-	+	-
S. halensis	-	-	+	-	+	+	-
X. luteola	+	+	+	+	+	+	-
X. subcoerulescens	-	-	+	+	+	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

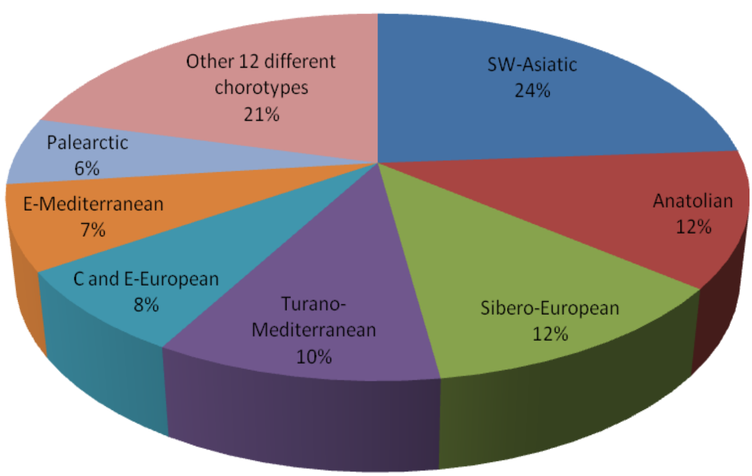

Figure 1. Chorotypical distribution of Turkish Galerucinae.

A NEW GENUS *TRICHODORUS* COBB (STUBBY ROOT NEMATODE) (TRIPLONCHIDA: TRICHODORIDAE) AND PRELIMINARY LIST OF VIRUS VECTOR NEMATODES ASSOCIATED IN TURKEY

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[Kepenekci, İ. 2014. A new genus *Trichodorus* Cobb (Stubby Root Nematode) (Triplonchida: Trichodoridae) and preliminary list of virus vector Nematodes associated in Turkey. Munis Entomology & Zoology, 9 (1): 227-244**]**

ABSTRACT: Grapevines (*Vitis vinifera*) are hosts for many plant parasitic nematode species and some of the species can transmit viruses. In this study, virus vector nematode (VVN) species of Dorylaimida in grapevines growing areas of The Central Anotolia of Turkey are examined considering their two main aspects, namely faunistic and taxonomic. With this, totally 5 species were determined [*Xiphinema diversicaudatum* (Micoletzky), *X. pachtaicum* (Tulaganov), *Longidorus elongatus* (de Man), *L. attenuatus* (Hooper) and *Trichodorus similis* Seinhorst]. All of them constitute new records on grapevines in Turkey and *X. diversicaudatum* and *T. similis* are reported for the first time in the fauna of Turkey. There is not any record about nematodes belonging to *Trichodorus* in Turkey therefor its new genus. Identifications, distribution of them in the areas of study, habitats, and literature records, morphological and morphometric characteristics of new records on grapevines in Turkey are given. A detailed description of taxonomic characteristics of VVNs determined in the context of this study is given, which has been previously done in our country, but the taxonomic characteristics have not been given (*L. attenuatus* and *L. elongatus*).

KEY WORDS: Vine, *Vilis vinifera*, Nematode, Virus, Turkey.

Grapevine (*Vitis vinifera*) is one of the most extensive fruit crop grown worldwide. Approximately 7.086.022 ha of grapevine are grown in the worldwide and Turkey where takes the 5nd order for grapevine growing areas in the world covers 472.545 ha mainly in Aegean, Southeast Anatolia and Central Anatolia region (Anonymous, 2013).

Crop losses caused by plant parasitic nematodes are increasing in Turkey, but the economic significance of the damage caused by these parasites is not well-understood or recognised by growers. Basic information about plant parasitic nematodes, their host associations, and occurrence in different localities in Turkey was recently reviewed by Kepenekci (2012) who listed 240 nematode species associated from different localities in the country.

When the virus vector nematodes (VVNs) studies held in Turkey are examined, eleven species in *Xiphinema* and two in *Longidorus* species and one in *Trichodorus* species were detected (Kepenekci, 2012; Table 1). *Longidorus, Paratrichodorus* and *Trichodorus* species associated with nematological studies are very few. There are two studies defining these nematods in our country: Öztürk & Enneli (1994) in trefoil planting sites in Central Anatolian Region, *L. elongatus*, *L. attenuatus*, *L. goodeyi* and *L. leptocephalus* and Kepenekci et al. (2006) detected *L. elongatus*, *L. attenuatus* and *T. similis* in the vineyards of Nevşehir, Karaman, Konya, Isparta and Burdur cities. Except for these studies, no other VVNs associated with nematological studies were detected.

Seven of 172 species of Longidoridae family *Xiphinema* sp. and 7 of 83 species of *Longidorus* sp. are known as virus vector (Table 2&3). Similarly, 13 of 50 species of *Paratrichodoridorus* and *Trichodoridorus* are detected to be virus vector (Weischer, 1993). These numbers are thought to increase with the continuation of proliferation to transfer techniques and taxonomies (Kepenekci, 2012).

Today, nematological and virological determination activities still continue. As a result of these studies, within the recent 20 years, the number of nepovirus defined increased from 8 to 36 while tobravirus from 2 to 3. However, of 12 nepovirus out of the 36 known nepoviruses, nematode species were detected. Due to the fact that taxonomic and virus vector associated with the studies are increased and that the methods used are developed, these figures are expected to increase, as well.

Grapevines are hosts for many nematode species. The most serious direct damage is caused by *Meloidogyne*, *Xiphinema* and *Pratylenchus* (Brown et al. 1993). Less important are species of *Criconemoides*, *Paratylenchus*, *Helicotylenchus*, *Rotylenchus*, *Longidorus*, *Paralongidorus* and *Trichodorus* (Boubals & Dalmaso, 1964; Raski & Krusberg, 1984; Tacconi & Mancini, 1987; Raski, 1988). One of the most serious problems is grapevine fanleaf nepovirus, transmitted by *X. index*. This problem is covered in the section on nematode transmitted viruses. However, little information is available on the VVNs associated with grapevine in Turkey (Table 1) and no information is available for Central Anotolia.

This study was conducted to identify Dorylaimida and Triplonchida (VVNs) occurring in soil and root samples from the vineyard areas in Central Anatolia Region of Turkey.

MATERIALS AND METHODS

Soil samples and vine roots were collected from vineyards of two provinces in the Central Anatolia Region between July and August. Fifteen vineyards, older than ten years, from Nevşehir (3), Karaman (3), Konya (3), Burdur (3) and Isparta (3) provinces were sampled. Soil samples were collected with a spade or a 70 mm auger (800-1500 cm^3) from depths of 0-30 cm and 30-60 cm. Ten subsamples were taken from each vineyard and each depth. Totally 300 subsamples were examined. Root samples were collected from ten vines in each vineyard (approximately 50 gram of roots for each sample).

In laboratory studies, sieve and funnel methods were used to obtaining active nematodes from soil (Hooper, 1986a). Incubation method was used to extract the nematodes from plant roots (Young, 1954). For identification nematodes were fixed according to deGrisse (1969). The slides were prepared by ring method (Hooper, 1986b). Taxonomic status was given according to Hunt (1993).

RESULTS AND DISCUSSION

Five species were determined belonging to three genuses [2 species of Dagger (*Xiphinema*), 2 species of Needle nematode (*Longidorus*) and 1 species of Stubby root nematode (*Trichodorus*)] within the orders Dorylaimida and Triplonchida; all of them are new records for vineyards in Turkey (Table 1).

Five species of virus vector nematodes (*Xiphinema diversicaudatum*, *X. pachtaicum*, *Longidorus elongatus, L. attenuatus, and Trichodorus similis*) were detected. *X. diversicaudatum* and *T. similis* were found for the first time in

Turkey (Table 1). The species most frequently encountered was *X. pachtaicum*. Among these VVNs only *X. pachtaicum* which was detected by Arinç (1982), Elekçioğlu (1992), Elekçioğlu & Uygun (1994) and Lamberti et al. (1994) found previously in Turkey. Identifications, distribution, habitats, literature records, morphological and morphometric characteristics of this species are given. So a detailed description of taxonomic characteristics of *X. pachtaicum* determined in the context of this study is not given.

Xiphinema index which is most important nematode species in vineyards were not found available to study.

Although the study cannot be considered as exhaustive, it indicates that several nematodes are associated with vineyeard. However, more investigations are required to fully elucidate the role that nematodes play in vine production in Turkey.

A detailed discussion and description of taxonomic characteristics of VVNs determined in the context of this study:

Taxonomic status: Order: Dorylaimida Pearse; Suborder: Dorylaimina Pearse; Superfamily: Dorylaimoidea deMan (Thorne); Family: Longidoridae Thorne (Meyl); Subfamily: Longidorinae Thorne; Genus: *Longidorus* Micoletzky (Filipjev)

Genus: *Longidorus* Micoletzky (Filipjev)

Body is very long (3 to >10mm) and slender. Heat relaxed form varying from more or less straight to C-shaped. Lateral chords broad and with one or two rows of lateral body pores. Cephalic region rounded; continuous or offset. Lips fused and with the usual 6+10 arrangement of papillae. Amphidial apertures in the form of small, inconspicuous pores lead back to well-developed pouch-like amphid fovea. Odontostyle elongate is needle-like; not heavily sclerotized. Guiding apparatus with a simple ring usually situated within a couple of head-widths of the anterior end, but exceptionally further posterior, perhaps at up to 40% of the odontostyle length of odontostyle and odontophore simple. Odontophore about two thirds of the odontostyle in length is moderately sclerotized, thickening slightly in the posterior region, but it lacks basal flanges. Odontostylet protractor muscles attached to base of odontophore and running parallel to the cephalic region. Oesophagus comprises a narrow, cylindrical anterior section, which is looped back on it when the odontostylet is in the retracted position, and a posterior bulboid expansion which is muscular and glandular with valve plates running for almost the full length. There are three glands: dorsal and two ventrosublateral. The nucleus of the dorsal gland is situated some distance posteriorly to the orifice and is smaller than the ventrosublateral nuclei. Nerve ring located around the narrow anterior section of the oesophagus; a second nerve ring, located more posteriorly, occurs in some species. Hemizonid is prominent. Intestine simple, prerectum well developed and several anal body widths long. Anus is in the form of a transverse slit. Vulva is a transverse slit, median in position. Vagina is well developed, muscular, at right angles to the body axis and leading to a substantial ovejector. Genital tract amphididelphic is reflexed. Tail short, dorsally convex-conoid to a finely rounded terminus, or broadly rounded. Several pairs of caudal pores are present. Male genital tract is diorchic, opposed to the posterior testis being reflexed. Both testes join a common vas deferens well anterior to the cloaca. Spicules dorylaimoid, paired, massive, ventrally arcuate and with short accessory guiding pieces located distally. Oblique copulatory muscles are prominent and extending to several body widths anterior to the cloaca. Copulatory supplements consisting of an adanal pair (some species have two or three pairs) and then a ventromedian series of up to 20 extending anteriorly without a hiatus between the adanal pair and the series. In some species the ventromedian series may in part form a double, staggered row. Tail is similar in shape to that of the female.

Species: *Longidorus attenuatus* (Hooper) [Figure 1 (a-c) & Table 4]
Description (Morphology): Female; body 6.3 (5.8-6.8) mm long and narrow [189.8 (175-195)], body open "C" shape when heat relaxed, posterior part more strongly coiled ventrally. Cephalic region flattened, characteristically expanded and definitely offset from the neck contour. Amphids are large, symmetrically bilobed at their base, extending half way to the guide ring and almost encircling the head. Amphid pores very small. Odontostyle long [76.2 (70-78) μm], attenuate, about twice the length of the odontophore [38.8 (35-40) μm] with which it has a simple junction. Oesophagus is typical of the genus. Oesophagus is 426 (380-460) μm long. Oesophago-intestinal valve is roundly conoid. Lateral chords about half mid-body width, tapering to a thin line in the oesophageal region where lateral pores are serially arranged. The oesophageal region has five to eight ventral body pores. The reproduction system is didelphic. Vulva a transverse slit one quarter of the mid-body width wide [%V= 48.8 (48-50)]. The tail is dorsally convex, conoid, 1.66 (1.4-1.8) times the anal body width long. Apair of caudal pores is present on each side of tail. **Male;** is rare. Spicule is well-developed, 46.6 (41-48) μm long and of the usual longidorid shape, but with a small, internal, dorsal diverticulum which looks thorn-like in some views. General body shape, head area and oesophagus resemble the females. Testicles lie to the anterior of the body and have no curration.
Bionomics: The species is found most frequently in open, well-drained, sandly soil (Whitehead & Hooper, 1970; Taylor & Brown, 1976). Depth distribution depends on crop and time of year with feww nematodes being found in the top 5 cm in the summer months (Whitehead et al. 1971). Reproduction is parthenogenetic, the life cycle lasting is excess of one year (Flegg, 1968). *L. attenuatus* feeds mainly on root tips and is a contributory factor in docking disorder of sugarbeet (Whitehead & Hooper, 1970). It is polyphagous, but mainly attacks on herbaceous plants, the host range including barley, brassicas, carrot, clover, grapevine, lucerne, potato, strawberry, sugarbeet and wheat. *L. attenuatus* is a vector of tomato black ring virus (*TomBRV*) to sugarbeet (Hunt, 1993).
Discussion: The female of *L. attenuatus* individual detected in the study fit the original definition of Hooper (1961) in the aspects of both morphometric measurement and general morphological characteristics, but a valve smaller [189.8 (175-195) vs. 201], the odontophore is shorter [38.8 μm (35-40) vs. 43 μm]. The male, fit the original definition of Hooper (1961) in the aspects of both morphometric measurement and general morphological characteristics, but the odontosty is shorter [78.2 μm (77-79) vs. 80, 84 μm] (Table 4). A detailed description of taxonomic characteristics of *L. attenuatus* determined in the context of this study is given, which has been previously done in our country (Öztürk & Enneli, 1994), but the taxonomic characteristics have not been given. The species was found in Nevşehir (Turkey).

Species: *L. elongatus* (deMan) Micoletzky [Figure 1 (d-f) & Table 4]
syn. *Dorylaimus elongatus* deMan ; *D.* (*Longidorus*) *elongatus* deMan (Micoletzky); *Trichodorus elongatus* (deMan) Filipjev; *D. tenuis* von Linstow; *L. menthasolanus* Konicek & Jensen; *L. monohystera* Altherr
Description (Morphology): Female; body 5.3 (4.6-5.8) mm long and narrow [97.6 (88-116)], open “C” shape to slightly coiled when heat relaxed, narrows anteriorly to a cephalic region that is continuous with or very slightly offset from the neck contour. Cephalic region flattened anteriorly about half to two-thirds the body width at the guide ring with 16 papillae directed away from the oral aperture. Amphids large, pouch-like, extending about half the distance from the oral aperture to the conspicuous guide ring; amphid apertures pore-like, very indistinct, at base of lip region. Odontostyle is 92.2 (88-96) µm long and narrow, odontophore about half the odontostyle length. Oesophagus is typical of the genus. Oesophagus is 436 (410-444) µm long. Oesophago-intestinal valve is roundly conoid. A nevre ring surrounds the anterior oesophagus just behind the base of the odontophore. Tail dorsally convex, ventrally flattened or very slightly concave about 1.14 (1.0-1.2) anal body widths long with a roundly conoid terminus and two or three lateral pores present on each side. Usually four to six ventral pores present in the oesophageal region. The reproduction system is didelphic. Genital tracts paired, opposed, reflexed. Vulva a transverse slit about a third of the mid-body width wide [%V= 50.8 (50-52)]. **Male;** is rare. It is similar to female. Paired spicule is prominent, about 57.8 (52-66) µm long, separate, arcuate with bluntly rounded distal ends. Tail is conoid to bluntly conoid, dorsally convex, ventrally concave with two or three lateral pores on each side. An adanal pair plus a ventral series of seven to ten supplementary papillae present. Testes paired.
Bionomics: *L. elongatus* accurs in varios soil types ranging from sandy to sandy loams to fen peat. Depth distribution (Boag et al. 1987) is related to the penetration of the host root system, soil moisture and time of year. Boag et al. 1987 showed that the distribution of *L. elongatus* in Europe was related to the July soil isotherm. Reproduction is usually parthenogenetic although some populations have abundant male. At 30 °C the life cycle can be completed in 9 weeks (Wyss, 1970), but under field conditions there is probably one generation per year (Thomas, 1969). *L. elongatus* is a polyphagous ectoparasite attacking plants such as carrot, peppermint, raspberry, redcurrant, strawberry and sugarbeet. Direct feding activities can severely damage carrot, peppermint, strawberry and sugarbeet, the affected root systems being stunted with galled root tips. *L. elongatus* has been implicated in docking disorder of sugarbeet (Whitehead & Hooper 1970) and transmits raspberry ring spot virus (*RRV*), tomato black ring virus (*TomBRV*) and spoon leaf virus. RRV is readily transmitted to raspberry even though the plant is a poor host to the nematode (Hunt, 1993).
Discussion: The female of *L. elongatus* individual detected in the study fit the original definition of Hooper (1961) in the aspects of both morphometric measurement and general morphological characteristics, but a and b valve smaller [97.6 (88-116) vs. 122 and 14.1 (10.2-16.6) vs. 18.7], tail length longer [52.2 µm (45-55) vs. 38 µm] (Table 4). A detailed description of taxonomic characteristics of *L. attenuatus* determined in the context of this study is given, which has been previously done in our country (Öztürk & Enneli, 1994), but the taxonomic characteristics have not been given. The species was found in Nevşehir (Turkey).

Taxonomic status: Order: Dorylaimida Pearse; Suborder: Dorylaimina Pearse; Superfamily: Dorylaimoidea deMan (Thorne); Family: Longidoridae Thorne (Meyl); Subfamily: Xiphinematinae Dalmasso; Genus: Genus: *Xiphinema* Cobb

Genus: *Xiphinema* Cobb
Body is very long, 1.5-6.0 mm, and fairly stout. Heat relaxed form straight, ventrally arcuate, C-shaped or an open spiral. Cuticle is smooth. Lateral chords broad with one or two rows of lateral body pores. Dorsal and ventral series of body pores may be present, particularly in the oesophageal region. Cephalic region rounded, continuous or offset. Lips fused with the usual 6+10 circlets of papillae. Amphidial apertures broad slits are extending to almost the entire lip width. Amphid is fovea stirrup or funnel-shaped. Odontostyle is elongate, needle-like; heavily sclerotized. Guiding apparatus tubular with a strongly sclerotized posterior ring and, apparently, a lightly sclerotized anterior ring (really just a fold in the guiding sheath). The guide ring proper is posteriorly located near the odontostyle/odontophore junction. Proximal end of odontostyle appearing forked at its junction with the odontophore which is strongly developed with three massive posterior flanges to which the protractor muscles attach. Oesophagus comprises a narrow, cylindrical anterior section, which is normally looped back on it, leading to an expanded cylindroid expansion containing the glands. Dorsal gland nucleus located at the same level as the orifice, more developed than ventrosublateral nuclei. Nerve ring around the anterior section of the oesophagus. Hemizonid is prominent. Intestine simple, pre-rectum well developed and several anal body widths long. Anus in the form of a transverse slit. Vulva located anteriorly to post-median, in the form of a transverse slit. Vagina well developed, muscular; at right angles to the body axis or posteriorly directed in some forms with an anterior vulva. Ovejector is prominent. Genital tract variable; often amphididelphic reflexed, but as the vulva migrates anteriorly the anterior branch progressively regresses, first becoming non-functional, then a remnant and finally completely absent (=mono-opistho-delphic). Some species display sclerotized structures in the uterus. Rarely these sclerotizations are found in a “Z” organ, a specialized structure with thick walls and circular muscles which is constricted at both ends by a sphincter. More commonly the sclerotizations take the form of spines or variously shaped structures in the uterus. Tail form very variable, e.g. short hemispheroid, with or without a digitate process; medium to long conoid; initially conoid and then attenuating to a filiform terminal section. Male genital tract diorchic, opposed. Spicules are paired, massive, dorylaimoid with distal accessory guiding pieces. Oblique copulatory muscles are prominent and extending anteriorly from the cloaca. Copulatory supplements consisting of an adanal pair followed by a hiatus and then a ventromedian series of up to seven papillae. Tail is of similar form to that of the female.

Species: *Xiphinema diversicaudatum* (Micoletzky) Thome (Figure 2 & Table 4)
syn. *X. paraelongatum* Altherr; *Dorylaimus elongatus* apud Micoletzky; *Dorylaimus* (*Longidorus*) *diversicaudatus* Micoletzky; *Longidorus diversicaudatus* (Micoletzky) Thome & Swanger) nec *X. diversicaudatum* apud Luc (=*X. seredouense*); *X. diversicaudatum* apud Cohn (=*X. israeliae*)
Description (Morphology): Female; body 5.1 (4.8-5.2) mm long, cylindrical (vermiform) nematodes assuming a “J” shape when heat relaxed, posterior part more strongly coiled ventrally. Body cuticle is smooth, 3.5 (3.4-3.8) µm thick at mid-body. Lateral chords broad with body pores in a single line in the oesophageal region and irregular posterior, forming a single or double row.

Cephalic region smoothly rounded, continuous with body contour. Lips fused. Amphids stirrup-shaped with amphidial apertures broad slits extending for almost the entire lap widith. Odontostyle is elongate, needle-shaped, heavily sclerotized. Odontostyle and odontophore are averaging 146 (142-148) µm and 80 (79-82) µm long, recpectively. Guiding apparatus tubular with a strongly sclerotized posterior guide ring and a fold in the guiding sheath giving the appearance of a light sclerotized anterior ring. Guide ring located near the odontostyle/odonotphore junction. Proximal end of the odontostyle forked at its junction with the odontophore. Strongly developed odontophore with prominent posterior tripartite flanges to which the protractor muscles are attached. Oesosphagus comprising anteriorly a narrow, cylindrical part, usually looped back on itself. Oesophago-intestinal valve is conoid-rounded. Vulva a transverse slit [%V= 42 (41-44)]. Genital tracts amphidelphic, reflexed. A uterus near vagina is from a well developed ovejector. Each oviduct and uterus joined through a sphincter-Z. A prominent pseudo-Z organ containing 12-18 (16) irregular globular bodies 4-12 µm in diameter present in each uterus. Intestine simple, pre-rectum well developed and several anal body widths long. Anus a transverse slit. Tail 51 (42-58) µm long, ventral surface usually convex although less so than dorsal surface; about 1.1 (1.0-1.3) anal body width long; tail peg variable in length from 12 (7-22) µm; two to four (usually three) pairs of lateral body pores on tail. **Male;** has a body shape, cephalic region, odontostylet [144 (138-144) µm], odontophore [84 (74-90) µm] and oesophagus as described for female but with genital tract comprising testes. Vas deferens usually filled with sperm. Paired supplementary papillae slightly anterior to the anal opening followed by 2-5 well developed. Strong copulatory muscle is present in region of the supplements; responsible for strong curvature of tail. Tail 51 (45-55) µm long, dorsally convex-conoid, ventrally somewhat flattened, about 1.4 (1.3-1.6) anal body widths long, with terminal digitate, bluntly rounded peg [18 (12-25) µm], two to four (usually three) pairs of lateral body pores on tail. Spicules are robust, ventrally curved; lateral guiding pieces present. Inner cuticle layer with radial striations do not extend into the digitate peg.

Bionomics: *X. diversicaudatum* is found in wide variety of soil, particularly those under deciduous woodland, hedgerows and permanent pasture. Highest densities ocur in the top 20 cm, but nematodes can be found down to at least one metre. The vertical distribution of this species is discussed by Boag et al. (1987) and the influence of the July soil isotherm on distribution in Europe by Boag et al. (1987). Reproduction is amphimictic, the life cycle taking up to there years to complete with individual females living for as long as five years (Dalmasso, 1970). The host range mostly comprises woody plants such as apple, grapevine, hops, raspberry, rose, etc., but also includes asparagus, brassicas, carrot, clover and strawberry. Direct feding results in galling and necrosis, but *X. diversicaudatum* also vectors arabis mosaic virus (*AMV*) and strawberry latent ring spot virus (*SLRV*) (Hunt, 1993).

Discussion: Although the *X. diversicaudatum* individuals fixed in this study fit the original definition of Goodey et al. (1960), from aspects of measurement and general morphological characteristics (Table 4). We have not seen a record saying that it existed before, so it is a new record for Turkey. The species was found in Nevşehir, Konya and Isparta (Turkey).

Taxonomic status: Order: Triplonchida Coob; Suborder: Diphtherophorina Coomans and Loof; Superfamily: Trictiodoroidea Thorne (Siddiqi); Family:

Trichodoridae Thorne (Siddiqi); Subfamily: Trichodoridae Thorne; Genus: *Trichodorus* Cobb

Genus: *Trichodorus* Cobb
Body is plump, cylindrical with rounded ends. Heat relaxed females die ventrally arcuate, the males J-shaped with the tail region more sharply curved ventrad. Cuticle is not swelling strongly on fixation. One to four pairs of lateral body pores usually present. One pair of lateral body pores (i.e. one pore on each side) always situated within a body width of the vulva (reportedly absent in two species), and usually located posteriorly. Onchiostyle is dorsally convex with a simple, anterior, guiding ring. Oesophagus consists of a narrow anterior section which expands posteriorly to form a spathulate bulb. Bulb.usually non-overlapping, but in some species a ventral overlap develops whereas in others the intestine extends dorsally along the bulb to form an overlap. Posterior ventrosublateral nuclei located anterior to the oesophago-intestinal junction and with the dorsal nucleus usually at the same level. Vulva a median pore or a transverse or longitudinal slit. Vagina is extending into the body for about half the corresponding diameter. Vaginal musculature is well developed and prominent and sclerotization usually strong. Genital tract amphididelphic reflexed; spermatheca present, although weakly developed in a few species. Anus subterminal; tail rounded. Caudal pores are paired. Males usually with one to three ventromedian are cervical papillae; exceptionally absent or as many as four present. Lateral cervical pores usually present, the pair (one pore on each side) being between the onchiostyle base and the nerve ring. Male genital tract monorchic, outstretched. Sperm is large, subcylindroid, with a large sausage-shaped or, rarely, a rounded nucleus. Spicules more or less ventrally arcuate, never straight; either smooth or with various ornamentations, bristles, etc. A ventral flange, or velum, is present in the eponymous *T. velatus*. Gubernaculum is present. Spicule suspensor muscles are forming a prominent oval capsule around the spicules. Bursa absent (but regarded as being present, although very small, in *T. cyiindricus*). There are three, sometimes four, ventromedian copulatory supplements; the first being within the range of the retracted spicules. Oblique copulatory muscles are extending to several body widths anterior to the retracted spicules. Tail short, rounded, with one pair of ventrosublateral papillae and a pair of caudal pores.

Species: *Trichodorus similis* Seinhorst (Figure 3 & Table 4)
Description (Morphology): Female; body moderately long [0.89 (0.88-0.90) mm] and plump 28.6 (28.2-29.4), slightly curved ventrally when heat relaxed. Odontostyle and oesophagus are averaging 40.6 (40-41) µm and 139.4 (135-142) µm long, recpectively. Nervering in the middle of the isthmus is 58.8 (55-62) µm away from the anterior end. Basal bulb of oesophagus abuts onto intestine. Excretory pore is usually about one onchiostyle-length behind the onchiostyle base. A pair of lateral body pores present close behind the vulva. In ventral view the vulva shows as a narrow transverse slit [%V= 55 (52-56)]. Refractive sclerotizet thickenings are at the vulva very conspicuous, approximately triangular in shape when seen laterally. Vagina of characteristic shape is in lateral view. Genital tracts are amphididelphic, reflexed; spermatheca is usually with sperm. Anus subterminal, in the form of short, slightly curved transverse is slit in ventral view; tail is rounded, 3.4 (2-4) µm long with terminal caudal pores. **Male**; posterior part of body curves ventrally when killed by head. Onchiostyle is characteristic and 38.4 (38-39) µm long. Excretory pore is about one body width behind the nevre ring. Thre ventromedian cervical papillae located anterior to the

excretory pore. Basal bulb of oesophagus abuts onto intestine. Testis single, anteriorly outstretched [%T= 56 (55-58)]. Three ventromedian preanal copulatory supplements; the first opposite or just above the proximal end of the spicules; the second about 1.5 body widths anterior to the first and the third, which is less conspicuous, slightly more than 1.5 body widths from the second. Paired postanal papillae and caudal pores are also present. Spicule is about 38.6 (35-40) µm long, without transverse striations, ventrally curved, proximal end distinctly cephalated, expanding in the mid-region nearly to the width of the proximal end, and then narrowing towards the distal end. In dissected spicules, bristles or setae are clearly visible in the narrow "neck" region. Spicule tips are slightly bifid. Gubernaculum is about 18.2 (16-22) µm long, with a characteristic of proximal hook and distal knob.

Bionomics: *T. similis* is most abundant and widespread in sandy or sandy loam soils. Highest densities occur at 20-30 cm (dePelsmaeker et al. 1985), rarely deeper, and the nematode shows a high tolerance to low pH soils. Reproduction is amphimictic with males being as numerous as females. dePelsmaeker & Coomans (1986) reported that *T. similis* was most abundant in Belgium in acidic, sandly soil after a graminaceous crop. *T. similis* causes direct damage to root systems as a result of its feeding, but also transmits tobacco rattle virus (*TRV*) to potato and gladiolus. It is polyphagous, hosts including brassicas and trees such as *Juglans*, *Picea* and *Prunus* (Hunt, 1993).

Discussion: The female of *T. similis* individual detected in the study fit the original definition of Seinhorst (1963) in the aspects of both morphometric measurement and general morphological characteristics, body length longer [0.89 µm (0.88-0.90) vs. 0.75-0.83 µm], a valve bigger [28.6 (28.2-29.4) vs. 21-27], the onchiostyle is shorter [40.6 µm (40-41) vs. 41-43 µm]. The male, fit the original definition of Seinhorst (1963) in the aspects of both morphometric measurement and general morphological characteristics, but c valve bigger [88.8 (86.2-96.6) vs. 63-79] (Table 4), we have not seen a record saying that it existed before, so it is a new record for Turkey. The species was found in Nevşehir and Isparta (Turkey).

Studies on VVNs in Turkey and discussion

Some studies associated with *Xiphinema* species are carried out in Turkey (Arseven et al. 1969; Ertürk & Özkut, 1974; Arınç, 1982; Elekçioğlu, 1992) while *Longidorus, Paratrichodorus* and *Trichodorus* species associated studies are very few (Öztürk & Enneli, 1994; Kepenekci et al. 2006) (Table 1). These (*Longidorus, Paratrichodorus* and *Trichodorus*) nematods are the substantial VVN as they could carry viral diseases.

The first detection of VVN in Turkey was initiated with the detection of *X. index* and *Longidorus* of vine short virus (Kaşkaloğlu & Türkmenoğlu, 1965; Kaşkaloğlu, 1965). In another study, in a travel performed by Yüksel and Ertürk in Izmir and Manisa vineyards in 1964 May, soil samples were acquired from grapevines and as a result of the analyses it was reported that *X. index, X. americanum* species were detected to be dominant (Yüksel, 1966). In our country, *X. mediterraneum* was firstly detected in the grapevine sites associated studies held by Arınç (1982). According to the statement of the analyst, Tarjan (1969), in another study on different populations of *X. americanum,* the analyses were performed in the populations available in Adapazarı, Söke, Amasya and Gaziantep, some cities of Turkey. Some researchers stressed out the fact that the species defined as *X. americanum* and detected in some Mediterranean countries should be a separate species (Dalmasso & Younes, 1970; Coomans & Loof, 1969). Lamberti & Martelli (1971) claimed that this species should be *X. mediterraneum*.

It is claimed that this species was the same as the one previously detected in the surveys on Aegean and Marmara and defined as *X. americanum* and great possibly this species was *X. mediterraneum* (Arınç, 1982). It is apparent that different and similar nematode was confused by another nematode belonging to *X. americanum* of which presence is still not known in Turkey and Europe. The presence of this species is not known in our country (Kepenekci, 2012).

The first study held on nematode-virus relations in Turkey carried out by Arınç (1982) was associated with "Aegean Region vineyard sites in *Xiphinema* species (Nematoda: Longidoridae), as well as their separation, hosts and damages". In this research, the studies were performed between 1971-1974 in order for detecting the *Xiphinema* species associated with nematodes in Aegean Region including İzmir, Manisa, Balıkesir, Çanakkale, Aydın, Denizli, Muğla and Uşak cities. According to the results of the study, *X. turcicum, X. mediterraneum, X. index, X. italiae, X. brevicolle, X. ingens* and *X. pyrenaicum* were detected. In addition to morphological and morphometric properties, synonyms, variations detected, the separation in research area, and in literature as well as habitats are demonstrated. Of this *X. index* and *X. italiae* species are virus vector nematods. These two viruses are available in the vineyards of our country where *Grapevine fanleaf nepovirus* are also available.

Note: This study is presented in the *28.th Europen Society of Nematologist Congress* [This study is a part of the presentation "Plant parasitic nematodes associated with Vineyards (*Vitis vinifera* L.) in the Central anatolia region of Turkey"].

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Table 1. Distribution and host association of VVN in Turkey.

Nematode species	syn.	HA*	L#	Reference
Xiphinema brevicolle Lordello & Da Costa	*X. americanum* apud Carvalho *X. saopaoloense* Khan & Ahmad	*(1), (6), (4)*	(8), (2)	Arınç, 1982
X. diversicaudatum (Micoletzky,) Thome	*X. paraelongatum* Altherr *Dorylaimus elongatus* apud Micoletzky *Dorylaimus* (*Longidorus*) *diversicaudatus* Micoletzky *Longidorus diversicaudatus* (Micoletzky) Thome & Swanger) nec *X. diversicaudatum* apud Luc (=*X. seredouense*) *X. diversicaudatum* apud Cohn (=*X. israeliae*)	*(2)*	(10), (7), (5)	Kepenekci et al. 2006
X. index Thorne & Allen		*(2)*	(6), (8)	Vuittenez, 1962
X. ingens Luc & Dalmasso		*(2)*	(12)	Arseven et al. 1969[1]
X. italiae Meyl	*X. arenarium* Luc & Dalmasso *X. bulgariense* Stoyanovnec *X. italiae* apud Chaves & Geraert (= *X. savanicola*)	*(2)*	(4)	Ertürk & Özkut, 1974
X. macrogastrum Lamberti, Castillo, Gomez-Barcina & Agostinelli		?	(4)	Lamberti et al. 1992
X. opisthohysterum Siddiqi		*(2)*	(12)	Arseven et al. 1969
X. pachtaicum (Tulaganov) Kirjanova	*Longidorus pachtaicus* Tulaganov *X. mediterraneum* Martelli & Lamberti *X. neoelongotum* Bajaj & Jairajpuri		(1), (9)	Elekçioğlu, 1992
X. pyrenaicum Dalmaso		*(1), (3)*	(3)	Arınç, 1982
X. turcicum Luc & Dalmasso		*(2)*	(12)	Arseven et al. 1969
Longidorus attenuatus (Hooper)		*(5)*	(11)	Öztürk & Enneli, 1994
L. elongatus (deMan) Micoletzky	*Dorylaimus elongatus* deMan *D.* (*Longidorus*) *elongatus* deMan (Micoletzky) *Trichodorus elongatus* (deMan) Filipjev *D. tenuis* von Linstow *L. menthasolanus* Konicek & Jensen *L. monohystera* Altherr	*(5)*	(11)	Öztürk & Enneli, 1994
L. goodeyi Hooper		*(5)*	(11)	Öztürk & Enneli, 1994
L. leptocephalus Hooper		*(5)*	(11)	Öztürk & Enneli, 1994
Trichodorus similis (Seinhorst)		*(2)*	(10), (5)	Kepenekci et al. 2006

Host association (HA)*: Grapevines *(1)*, vineyards *(2)*, walnut *(3)*, cypress *(4)*, alfalfa *(5)*, olive *(6)*.
Localities (L) #: Adana (1), Balıkesir (2), Denizli (3), Ege Bölgesi (4), Isparta (5), İzmir (6), Konya (7), Manisa (8), Mersin (9), Nevşehir (10), Central Anatolia (11), Thrace (12).

[1] Arseven et al. (1969), The ninth year report of the project "The survey of *Xiphinema* species in Marmara Region vineyard and vine nurseries"

Table 2. Nematode-virus relations, nepovirus carried by nematodes of the genus *Xiphinema*.

Nematodes	**Viruses**	**Host association** #	**Geographic distribution**
Xiphinema americanum sensu lato	*Tomato ringspot nepoviriis*	(2), (3), (4)	North America
	Cherry rasp leaf nepoviriis	(2)	North America
X. americanum sensu stricto	*Tomato ringspot nepoviriis*	(2), (3), (4)	North America
	Peach rosette mosaic nepoviriis	(2)	North America
X. californicum	*Tomato ringspot nepoviriis*	(2), (3), (4)	North America
	Grapevine yellow vein strain	(1)	North America
X. diversicaudatum	*Arabis mosaic nepoviriis*	(2), (3), (4)	European, Mediterranean
	Strawberry latent ringspot	(2), (3), (4)	European, Mediterranean
X. index	*Grapevine fanleaf nepoviriis*	(1)	All vine growing areas
X. italiae		(1)	European, Mediterranean
X. rivesi	*Tomato ringspot nepoviriis*	(2), (3), (4)	North America

#: Grapevines (1), fruits (2), vegetables (3), ornamental plants (4).

Table 3. Nematode-virus relations, nepovirus carried by nematodes of the genus *Longidorus*

Nematodes	**Viruses**	**Host association** #	**Geographic distribution**
Longidorus apulus	*Artichoke Italian latent Italian strain*	(3)	Mediterranean
L. attenuatus	*Tomato black ring nepoviriis*	(2), (3), (5)	European
L. diadecturus	*Peach rosette mosaic nepoviriis*	(2)	North America
L. elongatus	*Raspberry ringspot nepoviriis Scottish strain*	(2)	European
	Tomato black ring nepoviriis Beet ringspot strain	(4)	European
	Peach rosette mosaic nepoviriis	(2)	North America
L. fasciatus	*Artichoke Italian latent Grek strain*	(3)	Mediterranean
L. macrosoma	*Raspberry ringspot nepoviriis English strain*	(2)	European
L. martini	*Mulberry ringspot nepoviriis*	(1)	Japan

#: Mulberry (1), fruits (2), vegetables (3), sugar beet (4), ornamental plants (5).

Table 4. Morphometric characteristics of VVNs in this study.

	Longidorus attenuatus		*L. elongatus*		*Xiphinema diversicaudatum*		*Trichodorus similis*	
♀	In this study	Hooper, 1961 (Holotype)	In this study	Hooper, 1961 (Neotype)	In this study	Goodey et al., 1960	In this study	Seinhorst, 1963
n	5		8		9	43	7	10
L*	6.3 (5.8-6.8)	6.0	5.3 (4.6-5.8)	4.87	5.1 (4.8-5.2)	4.9 (4.0-5.5)	0.89 (0.88-0.90)	0.75-0.83
a	189.8 (175-195)	201	97.6 (88-116)	122	79 (77-82)	74 (57-92)	28.6 (28.2-29.4)	21-27
b	19.7 (17-22)	18.9	14.1 (10.2-16.6)	18.7	10.6 (10.1-10.8)	9.1 (6.6-11.4)	5.6 (5.5-5.8)	5-6
c	111.8 (102-122)	107	128.7 (122-134)	128	82 (77-88)	78 (61-134)	very close to the anus	anus subterminal
c'	1.66 (1.4-1.8)		1.14 (1.0-1.2)		1.1 (1.0-1.3)			
Odontostyl**	76.2 (70-78)	75	92.2 (88-96)	95	146 (142-148)	143 (130-157)	-	-
Odontophore**	38.8 (35-40)	43	48.7 (38-57)		80 (79-82)	85 (70-97)	-	-
Onchiostyle**	-	-	-	-	-	-	40.6 (40-41)	41-43
V***	48.8 (48-50)	$^{8}49^{7}$	50.8 (50-52)	51	42 (41-44)	43 (36-46)	55 (52-56)	51-58
Tail**	53.7 (47-58)	55	52.2 (45-55)	38	51 (42-58)		3.4 (2-4)	
♂								
n	3	2	4		3	33	4	8
L*	6.0 (5.9-6.2)	5.5, 6.3	5.0 (4.4-5.5)		5.0 (4.8-5.5)	4.9 (4.1-6.2)	0.87 (0.86-0.91)	0.76-0.87
a	188.8 (188-191)	119, 171	108.8 (102-111)		71 (64-75)	76 (57-96)	26.8 (25.2-28.3)	24-30
b	17.1 (15-18)	12.9, 17.1	12.3 (9.9-14.4)		10.2 (9.7-11.0)	8.8 (7.4-11.3)	5.8 (5.5-6.0)	5.2-6.3
c	108.8 (105-111)	99, 114	121.3 (118-127)		88 (82-94)	78 (55-100)	88.8 (86.2-99.6)	63-79
c'	1.52 (1.2-1.6)		1.65 (1.4-1.8)		1.48 (1.33-1.64)		0.58 (0.50-0.66)	
Odontostyl**	78.2 (77-79)	80, 84	87.3 (85-89)		144 (138-144)	143 (131-153)	-	-
Odontophore**	38.3 (37-39)	38, 40	48.1 (35-52)		84 (74-90)	85 (70-97)	-	-
Onchiostyle**		-	-		-	-	38.4 (38-39)	38-42
T***	59.2 (52-62)		52.9 (50-55)		52 (48-57)	58 (47-67)	56 (55-58)	
Tail**	59.6 (44-56)		91.8 (88-110)		51 (45-55)		11.2 (8-12)	
Spicule*	46.6 (41-48)		57.8 (52-66)		75 (72-77)	76 (69-81)	38.6 (35-40)	36-40

* : mm
** : µm
***: %

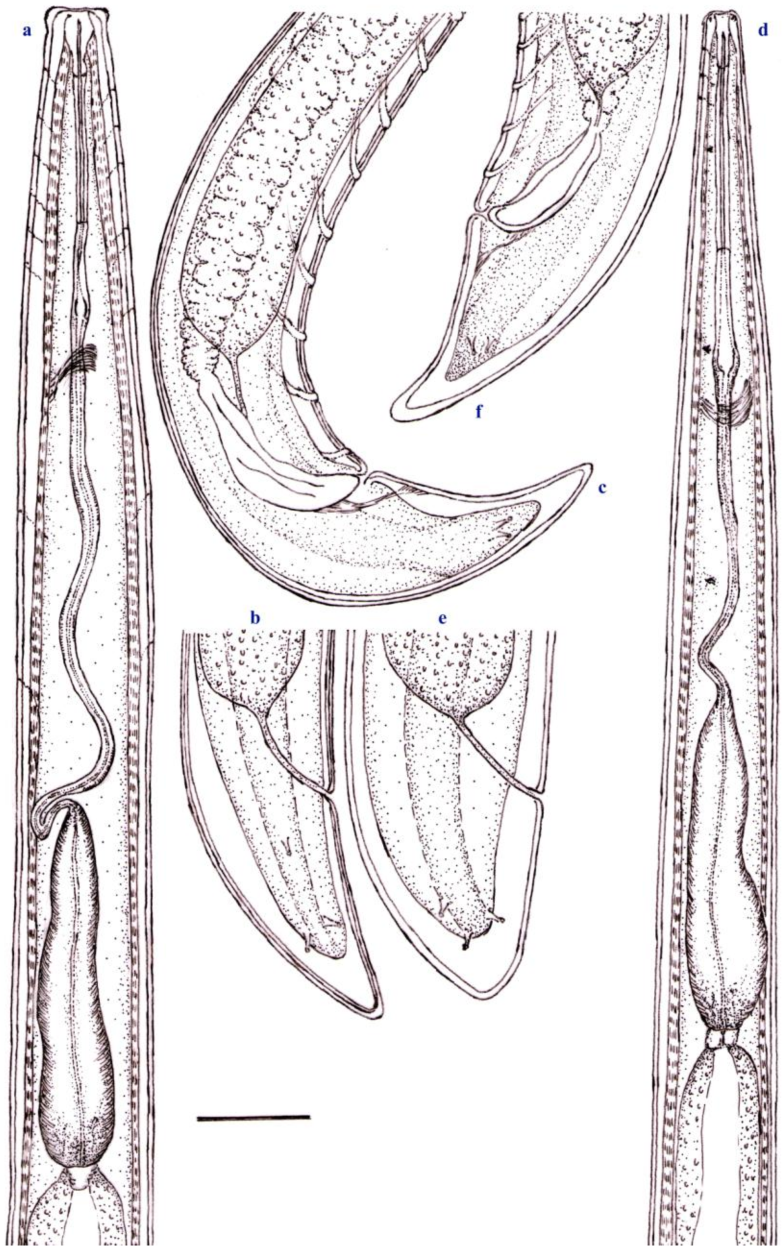

Figure 1. *Longidorus attenuatus* (a-c) and *L. elongatus* (d-f); female (a, b, d, e) and male (e, f); oesophageal regions (a, d) and tails (b, c, e, f) [scale 25µm (a, c, d) and 50µm (b, e, f)].

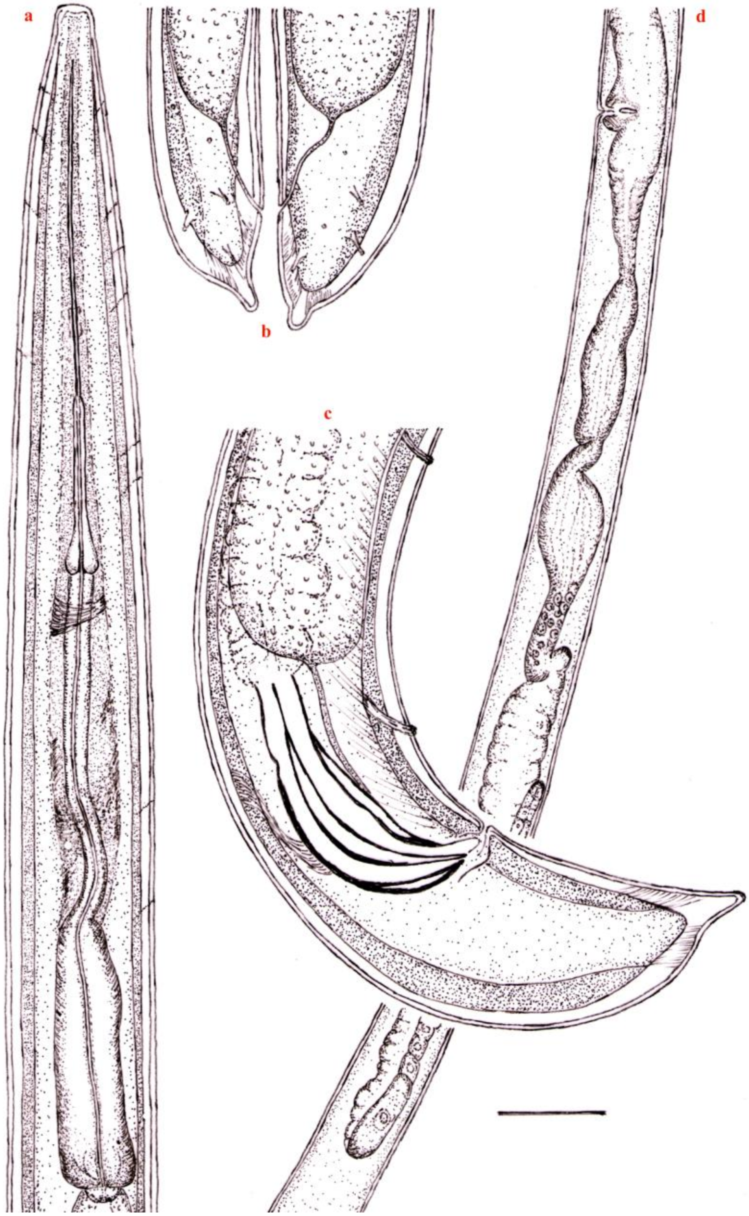

Figure 2. *Xiphinema diversicaudatum* (a-d); female (a, b, d) and male (c); oesophageal region (a), reproductive system (d) and tails (b, c) [scale 25μm (c); 50μm (a, b) and 100μm (d)].

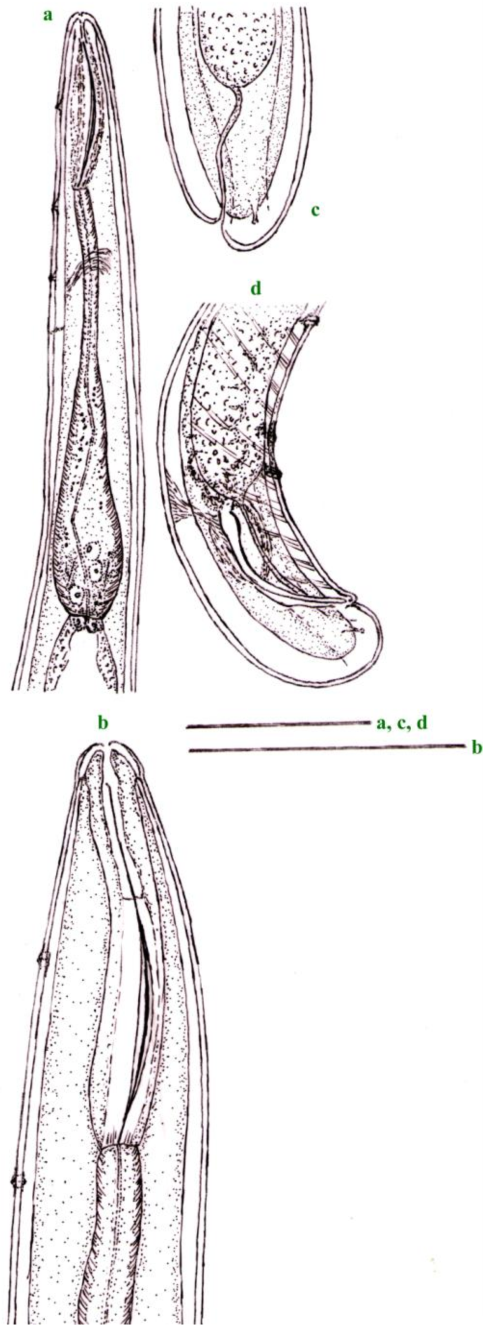

Figure 3. *Trichodorus similis* (a-d); female (a-c) and male (d); oesophageal region (a), head region (b) and tails (c, d) (scales 50μm).

TURKISH RED LIST CATEGORIES OF LONGICORN BEETLES (COLEOPTERA: CERAMBYCIDAE) PART I – SUBFAMILIES VESPERINAE AND PRIONINAE

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ABSTRACT: The aim of this study is to create a Turkish Red List of the longicorn beetles. Moreover, presence such a Red List is necessary for Turkey. Even governmental evaluations could cause some erroneous decisions due to absence such a Red List. Since, governmental evaluations at the present time are based on the works that are realized with respect to the European Red List. Furthernore, Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures. So, the status of European fauna and the status of Turkish fauna are not the same. Clearly, there is no any work that subjected to create a Turkish Red List. Hence, a series work is planned with this purpose. This type of study is the first attempt for Turkey.

KEY WORDS: Red List, Conservation, Cerambycidae, Turkey

The conservation of beetles has received a great deal of attention in many parts of the world in recent years. Human activities like growing cities, wood harvesting and global warming that destroy natural ecosystem threaten unique species day by day. So currently, a great deal of researches is aimed at conserving these organisms. Moreover, numerous researchers in Europe have arranged meetings to conserve the habitats upon which these species depend. Although represented by a large number of species in Turkey have not received much attention (Avgin et al., 2013).

So, the purpose of the current study was to create a Turkish Red List of longicorn beetles similarly to "European Red List of Saproxylic Beetles" that was compiled by Ana Nieto & Keith N. A. Alexander and published by IUCN (International Union for Conservation of Nature) in collaboration with the European Union in 2010. "European Red List of Saproxylic Beetles" includes 153 species within the subfamilies Prioninae, Cerambycinae and Lamiinae of the European Cerambycidae. In the future, I hope that the present work will be lead to preparation a more comprehensive "Turkish Red List".

Hence, a series work is planned with this purpose. The present study is attempted as the first step of this aim. It should be noted that the using information at the present work on Turkish longicorn beetles are on the base of my personal database. The data of distribution are given on base of Löbl & Smetana (2010, 2011), Danilevsky (2010a,b, 2012a,b,c,d, 2013), Özdikmen (2011) and Miroshnikov (2011). Identification of chorotypes is based on the chorotype classification of the Anatolian fauna, proposed by Vigna Taglianti et al. (1999).

The evaluations of Turkish longicorn beetles at the present work based on "The IUCN Red List Categories" that is presented as follows:

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycles and life form.

EXTINCT IN THE WILD (EW)
A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)
A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)
A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

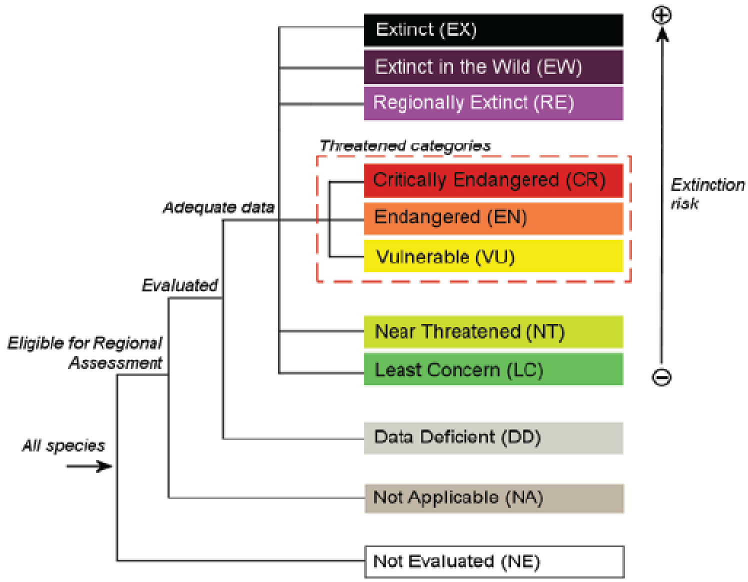


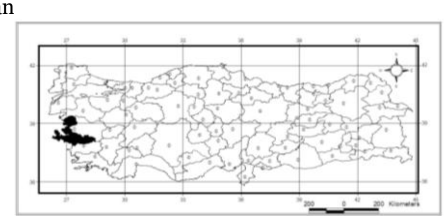
Figure 1. IUCN Red List Categories at regional scale.

TURKISH RED LIST FOR VESPERINAE AND PRIONINAE

SUBFAMILY VESPERINAE Mulsant, 1839
TRIBE VESPERINI Mulsant, 1839
GENUS *VESPERUS* Dejean, 1821: 111
SPECIES *V. ocularis* Mulsant & Rey, 1863: 172

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from the type locality "Smyrne = İzmir prov." in W Anatolia. It has not been recorded by any author from Turkey since 1863. So, Turkish Red List category of the species is **NE**.

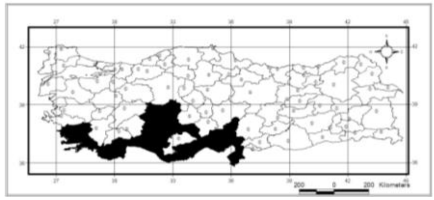
Range: Turkey
Chorotype: Anatolian



SUBFAMILY PRIONINAE Latreille, 1802: 212
TRIBE ERGATINI Fairmaire, 1864: 117
GENUS *CALLERGATES* Lameere, 1904: 47
SPECIES *C. gaillardoti* (Chevrolat, 1854: 481)

According to European Red List of Saproxylic Beetles, the species was placed in a "Threatened Category" as **EN**. It is distributed only in SC and SW Anatolia (Muğla to Hatay) for Turkey. So, Turkish Red List category of the species is **NT**.

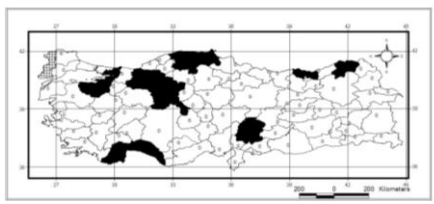
Range: Europe (Rhodes and Samos islands), Turkey, Syria, Cyprus, Lebanon, North Africa (introduced Egypt).
Chorotype: E-Mediterranean



GENUS *ERGATES* Audinet-Serville, 1832: 143
SPECIES *E. faber* (Linnaeus, 1760: 187)
SUBSPECIES *E. faber faber* (Linnaeus, 1760: 187)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It is represented only by the nominative subspecies in Turkey. It probably widely distributed in Turkey. So, Turkish Red List category of the species is also **LC**.

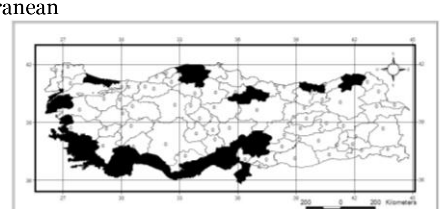
Range: Europe, North Africa (Morocco), Turkey, Syria, Iraq.
Chorotype: W-Palaearctic



TRIBE MACROTOMINI Thomson, 1861: 312
GENUS *PRINOBIUS* Mulsant, 1842: 207
SPECIES *P. myardi* Mulsant, 1842: 207

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is also **LC**.

Range: S Europe, North Africa (Algeria, Egypt, Libya, Morocco, Tunisia), Turkey, Transcaucasia (Georgia), Iran, Middle East (Cyprus, Syria, Jordan, Israel, Lebanon).
Chorotype: Mediterranean

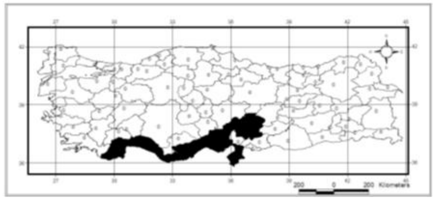


Moreover, the species is represented by two subspecies in Turkey as *P. m. atropos* Chevrolat, 1854 and *P. m. slamorum* Danilevsky, 2012. However, European Red List of Saproxylic Beetles does not include the subspecies of *P. myardi* Mulsant, 1842.

SUBSPECIES *P. m. atropos* Chevrolat, 1854: 482

The subspecies is distributed only in SC Anatolia (Antalya to Hatay) for Turkey. So, Turkish Red List category of the subspecies is **NT**.

Range: Turkey, Middle East (Cyprus, Syria, Jordan, Israel, Lebanon).
Chorotype: E-Mediterranean (Palestino-Cyprioto-Taurian)

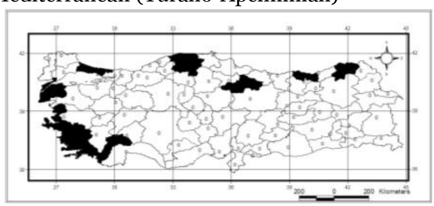


SUBSPECIES *P. m. slamorum* Danilevsky, 2012: 698

The subspecies probably is widely distributed in N and W Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: SE Europe, Turkey, Transcaucasia (Georgia), Iran.

Chorotype: Turano-Mediterranean (Turano-Apenninian)



TRIBE REMPHANINI Lacordaire, 1868: 103

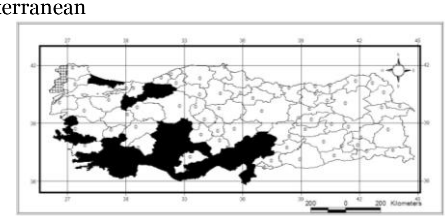
GENUS *RHAESUS* Motschulsky, 1875: 153 [RN]

SPECIES *R. serricollis* (Motschulsky, 1838: 187)

According to European Red List of Saproxylic Beetles, the species was placed in **NT**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: SE Europe, Turkey, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Syria, Cyprus, Israel, Lebanon, North Africa (introduced Egypt).

Chorotype: E-Mediterranean



TRIBE AEGOSOMATINI Thomson, 1861: 308

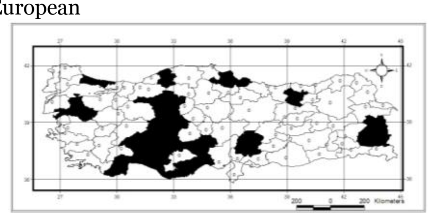
GENUS *AEGOSOMA* Audinet-Serville, 1832: 162

SPECIES *A. scabricorne* (Scopoli, 1763: 54)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Turkey, Caucasus, Transcaucasia (Armenia, Azerbaijan), Iran, Syria, Lebanon.

Chorotype: Turano-European



TRIBE PRIONINI Latreille, 1802: 212

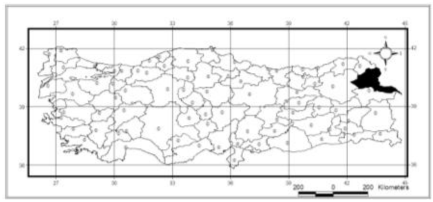
GENUS *MESOPRIONUS* Jakovlev, 1887: 323

SPECIES *M. asiaticus* (Faldermann, 1837: 263)

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It is distributed only in NE Anatolia for Turkey. So, Turkish Red List category of the species is **EN**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran, Kazakhstan.

Chorotype: SW-Asiatic

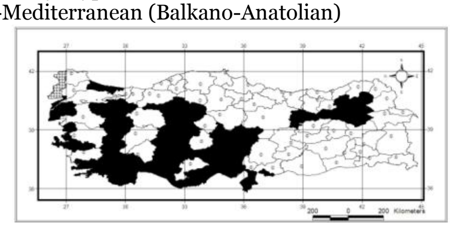


SPECIES *M. besikanus* (Fairmaire, 1855: 318)

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: SE Europe, Turkey, Cyprus.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)

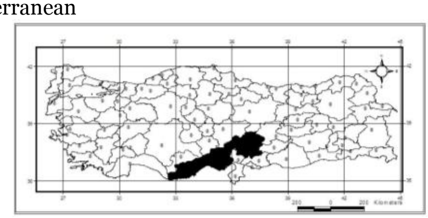


SPECIES *M. lefebvrei* (Marseul, 1856: 47)

European Red List of Saproxylic Beetles does not include the species rightly. It is known only from SC Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.

Range: Turkey, Middle East (Syria, Jordan, Israel, Lebanon), North Africa (Egypt).

Chorotype: E-Mediterranean

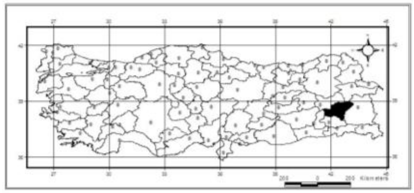


SPECIES *M. persicus* (Redtenbacher, 1850: 49)

European Red List of Saproxylic Beetles does not include the species rightly. It is also known from Turkey to the reference, Löbl & Smetana (2010) without any exact locality in Turkey. It probably is distributed only in E Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.

Range: Turkey, Iran, Iraq.

Chorotype: SW-Asiatic



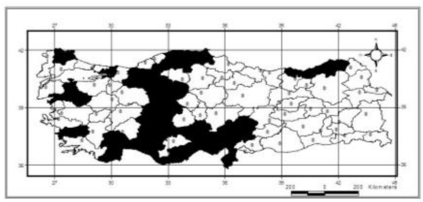
GENUS *PRIONUS* Geoffroy, 1762: 198

SPECIES *P. coriarius* (Linnaeus, 1758: 389)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: urkey

Chorotype: Anatolian

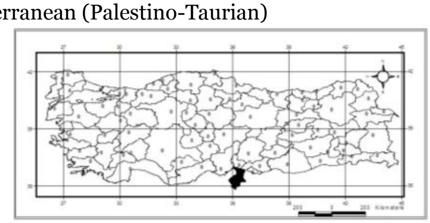


SPECIES *P. komiyai* Lorenc, 1999: 13

European Red List of Saproxylic Beetles does not include the species rightly. It is known only from SC Anatolia for Turkey. So, Turkish Red List category of the species is **VU**.

Range: Turkey, Syria, Lebanon.

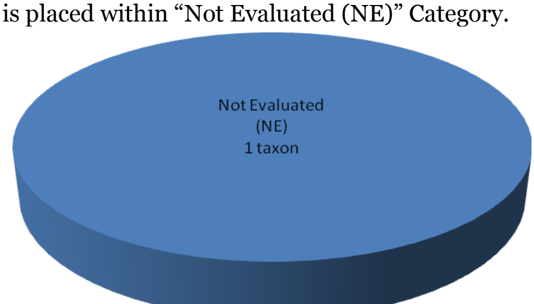
Chorotype: E-Mediterranean (Palestino-Taurian)



CONCLUSION:

With the present work, “Turkish Red List Categories” for 13 Turkish species group taxa determined (Appendix 1).

For Turkish Vesperinae: The subfamily includes only 1 species in Turkey. The species is placed within “Not Evaluated (NE)” Category.



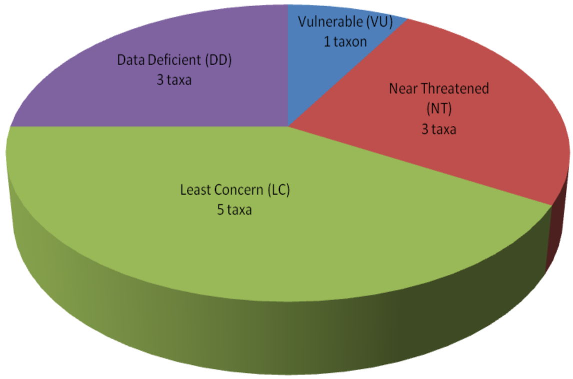
For Turkish Prioninae: The subfamily includes 12 species group taxa (9 species + 3 subspecies) in Turkey. Among them;

Only 1 species is placed within "Vulnerable (VU)" Category.

2 species and 1 subspecies are placed within "Near Threatened (NT)" Category.

3 species and 2 subspecies are placed within "Least Concern (LC)" Category.

3 species are placed within "Data Deficient (DD)" Category.



Consequently, only a total of 8 species of Prioninae were evaluated in "European Red List Saproxylic Beetles". Among them, the Red List Categories of 4 species were changed in "Turkish Red List".

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Appendix 1. Red List Categories of Turkish longicorn beetles belonging to Vesperinae and Prioninae.

TAXA	TURKISH RED LIST CATEGORY	EUROPEAN RED LIST CATEGORY	ENDEMISM FOR TURKEY
VESPERINAE			
Vesperus ocularis	**NE**	**---**	**YES**
PRIONINAE			
Callergates gaillardoti	**NT**	**EN**	**---**
Ergates faber faber	**LC**	**LC**	**---**
Prinobius myardi	**LC**	**LC**	**---**
P. myardi atropos	**NT**	**---**	**---**
P. myardi slamorum	**LC**	**---**	**---**
Rhaesus serricollis	**LC**	**NT**	**---**
Aegosoma scabricorne	**LC**	**LC**	**---**
Mesoprionus asiaticus	**DD**	**EN**	**---**
Mesoprionus besikanus	**DD**	**LC**	**---**
Mesoprionus lefebvrei	**NT**	**---**	**---**
Mesoprionus persicus	**DD**	**---**	**---**
Prionus coriarius	**LC**	**LC**	**---**
Prionus komiyai	**VU**	**---**	**---**

FIRST RECORD OF FOUR COLOUR MORPHS OF THE SOUTHERN GREEN STINK BUG, *NEZARA VIRIDULA* (L.) (HETEROPTERA: PENTATOMIDAE), FROM MADHYA PRADESH, INDIA

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[**Chandra, K., Kushwaha, S. & Tyagi, K.** 2014. First record of four colour morphs of the southern green stink bug, *Nezara viridula* (L.) (Heteroptera: Pentatomidae), from Madhya Pradesh, India. Munis Entomology & Zoology, 9 (1): 254-257]

ABSTRACT: During the several faunastic surveys of Madhya Pradesh by the Zoological Survey of India Jabalpur since 1960, many specimens of southern green stink bug, *Nezara viridula* (L.), were collected. The collection revealed the presence of four morphs showing the phenomenon of colour polymorphism. These entire colour morphs are the new records for Madhya Pradesh. All the specimens have been submitted to ZSI, Jabalpur.

KEY WORDS: *Nezara viridula* (L.), Polymorphism, Madhya Pradesh, India.

The precision in identification of an organism formulates the fundamental step for most aspects of biological science. In Hemiptera as well as in most of the insect groups, traditional taxonomic research is practiced with morphology as a fundamental, which sometime have great variations in members of a species dealing with a number of characters i.e. polymorphism. These variations have tested taxonomic research for nearly 300 years is one of the important reasons for large number of synonymies (Bickford et al., 2007; Winker, 2005).

Color polymorphisms make available data to explain variation in morphology and ecology of the taxa under consideration. Insects are the best examples among animals to study intra-specific variations including colour polymorphism (Kettlewell, 1973). Within the insects, members of order Hemiptera especially aphids are an attractive group for study where color polymorphism is fairly common (Dixon, 1985; Weber, 1985; Tomiuk et al., 1990). The present study report the colour polymorphism in "The southern green stink bug" for the first time from State of Madhya Pradesh, India.

Nezara viridula (L.), commonly known as "The southern green stink bug" due to its pungent smell is an important pest for various agricultural crops worldwide. It is believed to have Afrotropical origin (Jones, 1988) with a worldwide distribution now (Todd, 1989). It is predominant in most of the warmer regions, damaging a wide variety of fruit, nut, grain, and vegetable crops (Dewitt & Godfrey, 1972; Todd & Herzog, 1980). *N. viridula* is highly polymorphic with 10 different colour morphs which are originated from four basic types that are G, O, F & R (Kiritani & Yukawa, 1963; Yukawa & Kiritani, 1965; Kiritani, 1970; Hokkanen, 1986). These four basic colour forms were distinguished and given names based on the colour pattern on the dorsal body surface (Kiritani & Yukawa, 1963; Yukawa & Kiritani, 1965). *N. viridula* f. *smaragdula* F. (G-type) is the common green form, f. *torquata* F. (O-type) has median and lateral lobes and the anterior margin of the pronotum yellow or orange, f. *viridula* L. (R-type) has green spots on a background of yellow or orange over the entire body, and an unnamed morph (F-type) is like f. *torquata* except it also has yellow or orange along the margins of the convexium.

The present study is based on the collection made by Zoological Survey of India, Jabalpur, in Madhya Pradesh over a period of 50 years. All the specimens have been deposited in Zoological Survey of India, Jabalpur Insect collections. The objective of the present study is to report four colour morphs of *N. viridula* from the state of Madhya Pradesh for the first time and is probably the first authenticated report of four colour morphs of this species from India.

MATERIAL AND METHODS

During the several faunastic surveys by Zoological survey of India, Jabalpur has collected many specimens of *Nezara viridula* (L.) by hand picking, net trap and light tarp methods, collected from various localities of Madhya Pradesh. Specimens were shorted out and different specimens of *Nezara viridula* (L.) were pinned, drayed and were identified with the help of literature available in ZSI library and Fauna of British India. Four basic colour types G, O and R, are identified and shorted out form collected specimens. Morphology of bugs were studied by Leica microscope M205-A. Photography of various morphs was done by Sony DSC-H10 camera.

Abbreviation used: f.-Variety of *Nezara viridula* (L.); KGNP- Kangerghati National Park; PTR- Pench Tiger Reserve; M.P- Madhya Pradesh; ZSI- Zoological Survey of India.

RESULTS AND DISCUSSION

There are about 10 colour morphs present in all over the world (Yukawa & Kiritani, 1965), few of them are mentioned here viz. f. *smaragdula* (Fabr.), f. *torquata* (Fabr.), f. *viridula* (L.), f. *aurantica* Costa, f. *vicaria* Walker, f. *chiorocephala* Westwood, etc (Table 1). They are symbolized with alphabetically types G, O, R, Y, B and C respectively, in spite of this OR and FR types are the cross product of O, R and F, R types respectively. There are no intermediate forms between such forms as G, O and R, which seem to be fundamental. This color variation occurs in all types during hibernation in temperate regions. R type which is very rare variety reported from District Jhabua, G and O type from all over Madhya Pradesh. Among them G-polymeric form is the most common in Madhya Pradesh due to ecological cline and probability of invasion of G-polymeric form become greater than other types in the habitats. R-polymeric form is the very rare found in our study area. Distant (1902) used the term *var*.a & *var*.b for polymeric forms of this bug. Even though Indian species of *Nezara* Amyot & Serville was studied by Azim and Shafee (1978), the polymorphic forms of the species, *N. viridula* (L.) were not mentioned.

Three colour morphs of *N. viridula* along with notes on colour pattern have recently been reported from Karnataka (Salini, 2011). The author stated that the specimens have been collected "*from various ecosystems covering almost all districts of Karnataka. Besides this, specimens were procured on loan from various agricultural institutions*". However there is no indication of locality and other data for specimen of each colour morph and no information has been provided about the depositions of these specimens in any designated national repository, so that these can be available for others to study.

Different morphological types of *Nezara viridula* (L.) were recorded from Madhya Pradesh. Their distribution frequencies are provided in table 2 and are briefly discussed here.

f. *smaragdula* (Fabr.): Body entirely dark green. Fig.1-A

f. *viridula* (L.): Body yellow with green spots (New record from M.P.) Fig.1-B

f. *torquata* (Fabr.): Median, lateral lobes, anterior margin of pronotum yellow; anterior and lateral margin of head yellow. Fig. 2-A

f. *smaragdula* (Fabr.): Body green-yellowish. Fig. 2-B

f. *torquata* (Fabr.), median and lateral lobes, anterior margin of pronotum yellow, body green-yellowish and f. *viridula* (L.) body yellow with green spots was firstly reported by Yukawa and Kiritani (Yukawa and Kiritani, 1965) from India these two varieties are reported first time from the state of Madhya Pradesh, India.

ACKNOWLEDGEMENTS

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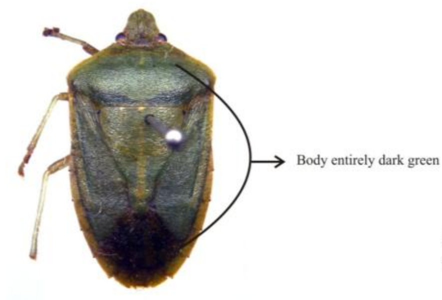
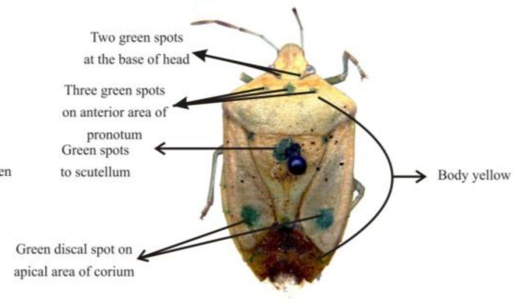
Different morphological varieties of *Nezara viridula* (L.) occurring in Madhya Pradesh



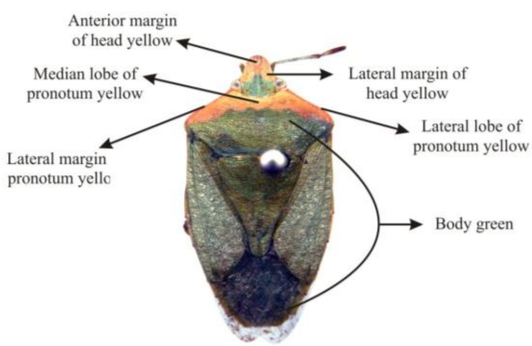
f. *smaragdula* (Fabr.)

Fig. 1 A



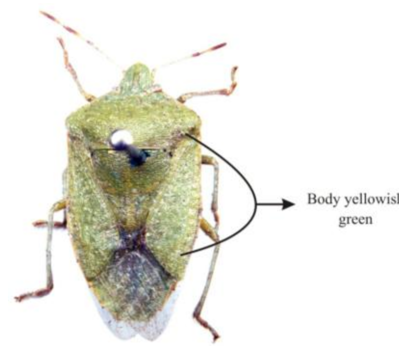
f. *viridula* (L.)

Fig. 1B



f. *torquata* (Fabr.)

Fig. 2 A



f. *smaragdula* (Fabr.)

Fig. 2 B

Table 1. All reported morphs of *Nezara viridula* (L.) all over the world.

S.No.	Morphological name	Type	Morph pattern
1	f. *smaragdula* (Fabr.)	G	Body entirely green
2	f. *torquata* (Fabr.)	O	Median and lateral lobes, anterior margin of pronotum yellow
3	f. *smaragdula* (Fabr.)	-	Body green-yellowish
4	f. *viridula* (L.)	R	Body yellow with green spots
5	f. *aurantica* Costa	Y	Entirely yellow, orange or pink
6	f. *vicaria* Walker	B	Entirely brown
7	f. *chiorocephala* Westwood	C	Entirely cobalt

Table 2. Showing the distribution frequency of different morphological types of *Nezara viridula* (L.) occurring in Madhya Pradesh.

S. No.	Morphological name	Type	Distr. in Madhya Pradesh	No. of exs.
1	f. *smaragdula* (Fabr.)	G	Very High	52
2	f. *torquata* (Fabr.)	O	Low	08
3	f. *smaragdula* (Fabr.)	-	High	30
4	f. *viridula* (L.)	R	Very Rare	01

CONTRIBUTION TO THE KNOWLEDGE OF CARABIDAE FAUNA FROM ESKİŞEHİR OSMANGAZİ UNIVERSITY MEŞELİK CAMPUS

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ABSTRACT: We here reported 16 species and one subspecies of Carabidae from Meşelik Campus of Eskişehir Osmangazi University and the distribution of species both in Turkey and Palearctic are also given. Three of collected species which *Calathus (Calathus) syriacus* Chaudoir, 1863, *Harpalus (Harpalus) distinguendus* (Duftschmid, 1812) *and Harpalus sulphuripes* Germar, 1824 are new records for Eskişehir province.

KEY WORDS: Carabidae, Ground beetles, Fauna, Meşelik, Turkey.

The family, Carabidae as ground beetles is one of the best-known taxa in insects. These beetles have been studied intensively by generations of coleopterists, who have clarified the taxonomy and phylogeny, geographic distribution, habitat associations and ecological requirements (Kotze et al., 2011).

There are many studies publisehed by many authors on Turkish Carabidae fauna and the prominent ones can be listed as Lodos (1983), Yücel & Şahin (1988); Casale & Taglianti (1999); Kesdek & Yıldırım (2003, 2010), Kocatepe & Mergen (2004); Avgın (2006); Avgın & Özdikmen (2007); Anlaş & Tezcan (2010); Tezcan et al. (2011); Avgın & Cavazutti (2011); Surgut & Varlı (2012). On the other hand, there is no current checklist about ground beetles of Turkey but according to Casale & Taglianti (1999) 1100 Carabidae species in 170 genera have been found in Turkey until now and 41 % of them are endemic. Furthermore, the knowledge of the ground beetle species living in Turkey and distributional patterns in the country have been not sufficient yet, concerning to the species richness of the family and the biodiversitical potential of Turkey.

The aim of this study is reveal the Carabidae fauna of Meşelik Campus and to make a contribution to the knowledge of Turkish Carabidae fauna.

MATERIAL AND METHODS

Study Area

Meşelik Campus (Figure 1), and the forestry area are between 39˚–44˚ north latitude and 30˚–29˚ east meridians in south of Eskişehir province. This area is 3–3.5 km away from the center of province. The altitude of the region varies from 850m to 1050 m. The aspect direction is northern. Forest, soil depth is shallow and medium (less than 60 cm), flat and very inclined (0–24%). The climatic characteristics of the area is typically of Central Anatolia Region (Varol, 2008).

Collecting and Identification

Ground beetles were collected by using hand and pitfall traps, during to March and November in 2007-2012. The catches were sieved on site, and stored in vials with 70% ethyl alcohol until sorting and identification in the laboratory. For identification, the keys written by Lindroth, 1985; Trautner and Geigenmüller, 1987; Hurka, 1996; Avgın, 2006 were used. All specimens are deposited in the Eskişehir Osmangazi University Entomology Collection.

RESULTS

Totally 337 specimen belong to 16 species and one subspecies were recorded. The alphabetic list of the collected species, associated with Turkey and Palearctic distribution were also given below;

Amara (*Amara*) *aenea* (De Geer, 1774)

Material examined: 20.V.2008, 1 ex.

Distribution in Turkey: : Adana, Ardahan, Artvin, Erzincan, Erzurum, Eskişehir, Iğdır, Kahramanmaraş, Kars, Konya, Malatya (Türktan, 1998; Avgın, 2006; Kesdek & Yıldırım, 2010b).

Distribution in Palearctic: Afghanistan, Albania, Algeria, Andorra, Armenia, Austria, Azerbaijan, Azores, Belarus, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, China, Crimea, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Georgia, Greece, Himalaya, Hungary, India, Iran, Iraq, Ireland, Israel, Italy, Jordan, Kazakhstan, Kyrgyzstan, Lake Baikal, Latvia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, Macedonia, Madeira Archipelago, Malta, Moldova, Mongolia, Montenegro, Morocco, Nepal, Netherlands, Norway, North America, Pakistan, Poland, Portugal, Romania, Russia, Serbia, Siberia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, the Canary Islands, the Caucasus, the Urals, Transcaucasia, Tunisia, Turkmenistan, Turkey, Uzbekistan, Ukraine (Gueorguiev & Gueorguiev, 1995; Hurka, 1996; Löbl & Smetana, 2003).

Amara (*Amara*) *eurynota* (Panzer, 1796)

Material examined: 25.V.2010 1ex.

Distribution in Turkey: Eskişehir, Gaziantep, Kahramanmaraş, Kayseri (Avgın, 2006; Küçükkaykı, 2013).

Distribution in Palearctic: Albania, Algeria, Altai, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, Caucasia, China, Crimea, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Germany, Georgia, Hungary, Holland, Iran, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Morocco, North America, Norway, Poland, Portugal, Romania, Russia, Serbia, Siberia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Transcaucasia, Tunisia, Turkey, Ukraine (Gueorguiev & Gueorguiev, 1995; Hurka, 1996; Löbl & Smetana, 2003).

Brachinus (*Brachynidius*) *explodens* Duftschmid, 1812

Material examined: 27.IV.2008, 1 ex.

Distribution in Turkey: Adıyaman, Bingöl, Çorum, Erzincan, Eskişehir, Erzurum, Gaziantep, Giresun, Kahramanmaraş, Kayseri, Kars, Tokat (Yücel & Şahin, 1988; Avgın, 2006; Kesdek & Yıldırım, 2007; Kocatepe, 2011)

Distribution in Palearctic: Azerbaijan, Albania, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Estonia, France, Germany, Georgia, Greece, Hungary, Iran, Iraq, Israel, Italy, Kyrgyzstan, Kazakhstan Latvia, Lithuania, Luxembourg, Moldavia, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Syria, Turkey, Tadzhikistan, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003)

Calathus (*Neocalathus*) *ambiguus* (Paykull, 1790)

Material examined: 31.VII.2012, 1 ex.; 13.VIII.2012, 4 ex.; 22.VIII.2012, 1 ex.; 27.IX.2012, 3 ex.; 21.XI.2012, 1 ex.

Distribution in Turkey: Ardahan, Artvin, Erzincan, Erzurum, Eskişehir, Iğdır (Yücel & Şahin, 1988; Kesdek & Yıldırım, 2010a)

Distribution in Palearctic: Afghanistan, Azerbaijan, Albania, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Syria, Sweden, Switzerland, Tadzhikistan, Turkmenistan, Turkey, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

Calathus (_Neocalathus_) _cinctus_ Motschulsky, 1850

Material examined: 27.VII.2012, 2 ex.; 31.VII.2012, 7 ex.; 13.VIII.2012, 86 ex.; 22.VIII.2012 47 ex.; 27.IX.2012, 12 ex.; 27.XI.2012, 56 ex.

Distribution in Turkey: Ardahan, Bingöl, Erzincan, Erzurum, Eskişehir, Kars, Konya (Kesdek & Yıldırım, 2004, 2010a; Küçükkaykı, 2013).

Distribution in Palearctic: Austria, Belgium, Czech Republic, Great Britain, Germany, Greece, Hungary, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovakia, Spain, Switzerland, Turkey (Löbl & Smetana, 2003).

Calathus (_Neocalathus_) _erratus_ Sahlberg, 1827

Material examined: 22.V.2008, 1 ex.; 25.V.2009, 2 ex.; 25.V.2010, 1 ex.; 25.V.2011, 1 ex.

Distribution in Turkey: Eskişehir (Küçükkaykı, 2013).

Distribution in Palearctic: Albania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Hungary, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, Ukraine, Yugoslavia (Löbl & Smetana, 2003).

Calathus (_Calathus_) _fuscipes_ (Goeze, 1777)

Material examined: 23.V.2007, 1 ex.; 18.V.2008, 1 ex.; 26.V.2011, 1 ex.; 25.V.2010, 3 ex.; 26.VI.2011, 1 ex.; 02.VI.2011, 1 ex.; 03.VI.2011, 1 ex.

Distribution in Turkey: Afyon, Ankara, Eskişehir, Kayseri, Sivas (Yücel & Şahin, 1988; Kocatepe & Mergen, 2004)

Distribution in Palearctic: South Europe, South Russia, Caucasia, North Africa, Middle Asia, Turkey (Kocatepe & Mergen, 2004).

Calathus (_Neocalathus_) _melanocephalus_ Linne, 1758

Material examined: 22.VIII.2012, 1 ex.; 27.XI.2012, 1 ex.

Distribution in Turkey: Afyon, Ankara, Ardahan, Artvin, Çankırı, Çorum, Erzurum, Erzincan, Eskişehir, Kars, Kayseri, Rize Tokat (Yücel & Şahin, 1988; Kocatepe & Mergen, 2004; Kesdek & Yıldırım, 2010a; Kocatepe, 2011, Küçükkaykı, 2013)

Distribution in Palearctic: (All 3 subspecies) Afghanistan, Algeria, Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Georgia, Greece, Hungary, Iceland, Israel, Italy, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldavia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tadzhikistan, Turkey, Ukraine, Yugoslavia (Löbl & Smetana, 2003).

Calathus (_Calathus_) _syriacus_ Chaudoir, 1863

Material examined: 27.VII.2012,27.VII.2012, 9 ex.; 31.VII.2012, 5 ex.; 27.IX.2012, 6 ex.;13.VIII.2012, 4 ex.; 22.VIII.2012, 6 ex.; 27.XI.2012, 2 ex.

Distribution in Turkey: Adana, Ankara, Antalya, Artvin, Bayburt, Bingöl, Elazığ, Erzincan, Erzurum, Kars, Malatya, Mersin; Muğla (Kesdek & Yıldırım, 2004, 2010a)

Distribution in Palearctic: Azerbaijan, Armenia, Georgia, Greece, Iran, Israel, Lebanon, Russia, Syria, Turkey, Ukraine (Löbl & Smetana, 2003).

Carabus (_Pachystus_) _graecus morio_ Mannerheim, 1830

Material examined: 19.V.2008, 1 ex.; 22.V.2008, 2 ex.; 29.V.2009, 1 ex.; 23.V.2009, 1 ex.; 27.V.2011, 4 ex.; 26.V.2011, 2 ex.; 03.VI.2011, 1 ex.; 13.VI.2011, 1 ex.; 13.VIII.2012, 6 ex.; 22.VIII.2012, 8 ex.;27.IX.2012, 4 ex.; 27.XI.2012, 7 ex.

Distribution in Turkey: Eskişehir; Kahramanmaraş (Avgın, 2006; Küçükkaykı, 2013)

Distribution in Palearctic: Albania, Bulgaria, Greece, Macedonia, Romania, Turkey (Gueorguiev & Gueorguiev,1995; Löbl & Smetana, 2003).

Cicindela (_Cicindela_) _campestris_ Linne, 1758

Material examined: 27.IV.2008, 2 ex.; 20.V.2008, 1 ex.; 26.IV.2008, 1 ex.; 09.III. 2008, 1 ex.; 25.V.2010, 2 ex.

Distribution in Turkey: Aksaray, İçel, Eskişehir (Franzen, 2007; Küçükkaykı, 2013)

Distribution in Palearctic: Albania, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Belorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Macedonia, Moldavia, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Yugoslavia, Iran, Kyrgyzstan, Kazakhstan, Uzbekistan (Löbl & Smetana, 2003; Avgın & Özdikmen, 2007).

***Harpalus* (*Harpalus*) *distinguendus* (Duftschmid, 1812)**

Material examined: 12.V.2007, 1 ex.; 18.V.2008, 1 ex.; 02.VI.2011, 1 ex.

Distribution in Turkey: Ankara, Antalya, Ardahan Erzincan, Erzurum, Iğdır, İzmir, Kars, Konya, Trabzon Gaziantep, Kahramanmaraş, Rize, Sivas (Kesdek & Yıldırım, 2003; Kocatepe & Mergen, 2004; Avgın & Emre, 2007; Tezcan et al., 2011; Kocatepe, 2011; Kesdek, 2013).

Distribution in Palearctic: Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan Azores, Belgium, Bosnia and Herzegovina, Bulgaria, Belorussia, Canary Island, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Georgia, Greece, Hungary, Iran, Israel, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Macedonia, Moldavia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tadzhikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Harpalus* (*Harpalus*) *sulphuripes* Germar, 1824**

Material examined: 25.V.2011, 1 ex.; 04.VI.2011, 1 ex.

Distribution in Turkey: No location, Turkey (Casale & Taglianti, 1999).

Distribution in Palearctic: Albania, Austria, Bosnia Herzegovina, Bulgaria, Croatia, France, Germany, Greece, Italy, Macedonia, Poland, Portugal, Romania, Slovenia, Spain, Switzerland, Turkey, Ukraine, Yugoslavia (Löbl & Smetana, 2003).

***Ophonus* (*Hesperophonus*) *azureus* (Fabricius, 1775)**

Material examined: 18.05.2008, 2 ex.

Distribution in Turkey: Ankara, Bayburt, Erzurum, Eskişehir, Kahramanmaraş, Kayseri, Sinop, Tokat, Trabzon (Yücel & ŞAhin, 1988; Kesdek & Yıldırım, 2003; Kocatepe & Mergen, 2004; Avgın, 2006; Kocatepe, 2011; Küçükkaykı, 2013).

Distribution in Palearctic: Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan Azores, Belgium, Bosnia and Herzegovina, Bulgaria, Belorussia, Canary Island, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Georgia, Greece, Hungary, Iran, Israel, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Macedonia, Moldavia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tadzhikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Poecilus* (*Poecilus*) *cupreus* (Linné, 1758)**

Material examined: 15.V.2007, 1 ex.; 18.V.2008, 1 ex.

Distribution in Turkey: Adana, Adıyaman, Çorum, Eskişehir, Gaziantep, Kahramanmaraş, Malatya, Tokat (Türktan, 1998; Avgın, 2006; Kocatepe, 2011)

Distribution in Palearctic: Azerbaijan, Albania, Armania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Georgia, Greece, Hungary, Ireland, Italy Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Moldovia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Spain, Syria, Sweden, Switzerland, Tadzhikistan, Turkmenistan, Turkey, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Pterostichus* (*Platysma*) *niger niger* (Schaller, 1783)**

Material examined: 27.V.2011, 1 ex.; 22.VIII.2012, 1 ex.; 27.IX.2012, 3 ex.

Distribution in Turkey: Adana, Erzurum, Eskişehir, Igdır, Kahramanmaraş, Kars, Kayseri (Avgın, 2006; Kesdek, 2007; Küçükkaykı, 2013)

Distribution in Palearctic: Azerbaijan Austria, Belgium, Bosnia Herzegovina Bulgaria, Byelorussia, Croatia, Czech Republic Denmark, Estonia, Finland, France, Great Britain, Germany, Greece, Hungary, Iran, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Macedonia, Moldovia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden Switzerland, Tadzhikistan, Turkey Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

Zabrus (*Zabrus*) *tenebrioides* (Goeze, 1777)

Material examined: 03.V.2007, 1 ex.; 15.V.2007, 1 ex.; 24.V.2007, 4 ex.; 25.V.2009, 1 ex.; 30.V.2009, 1 ex.; 31.V.2009, 1 ex.; 04.VI.2011, 1 ex.
Distribution in Turkey: Adıyaman, Artvin, Bingöl, Edirne, Erzurum, Eskişehir, Diyarbakır, İstanbul, Kars, Kırklareli, Kocaeli, Muş, Sakarya (Lodos, 1983; Kesdek & Yıldırım, 2010a).
Distribution in Palearctic: Caucasia, Crimea, Moldavia, Turkey, Siberia, Ukraine (Gueorguiev & Gueorguiev, 1995; Casale & Taglianti, 1999).

16 species and one subspecies has determined from the study area. Three of them are new record for Eskişehir province.

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Amara eurynota

Brachinus explodens

Calathus ambiguus

Calathus cinctus

Calathus erratus

Calathus fuscipes

Calathus melanocephalus

Calathus syriacus

Carabus graecus

Cicindela campestris

Harpalus distinguendus

Harpalus sulphuripes

Ophonus azureus

Poecilus cupreus

Pterostichus niger niger

Zabrus tenebrioides

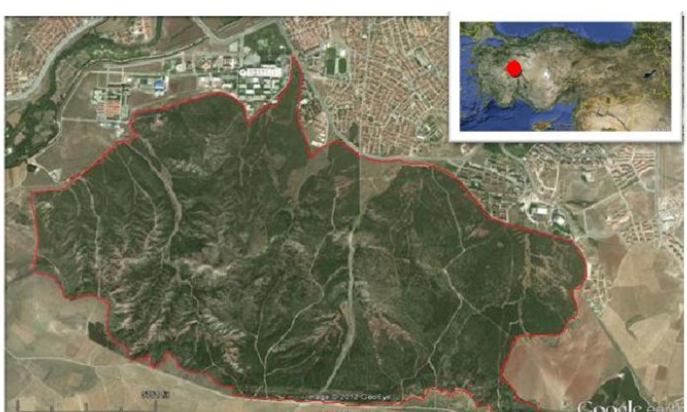

Figure 1. General view of the study area.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART VII – CRYSOMELIDAE: CHRYSOMELINAE AND TIMARCHINAE

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[Özdikmen, H. 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part VII – Chrysomelidae: Chrysomelinae and Timarchinae. Munis Entomology & Zoology, 9 (1): 266-286**]**

ABSTRACT: The paper gives chorotype identifications for Turkish Chrysomelinae and Timarchinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Chrysomelinae, Timarchinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014), Özdikmen & Kavak (2014) and Özdikmen & Topcu (2014) are the previous works for this aim. The present study is attempted as the seventh step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Chrysomelinae comprises of 102 species group taxa (50 species + 52 subspecies) of 15 genera, and Turkish Timarchinae comprises of 5 species group taxa (2 species + 3 subspecies) of 1 genus.

Subfamily CHRYSOMELINAE

Genus *Chrysolina* Motschulsky, 1860
Subgenus *Bittotaenia* Motschulsky, 1860
C. aeneipennis (Reiche & Saulcy, 1858)

Range: N: AG EG LB **A:** IS JO SY **Records in Turkey:** TR-A: AMA, KAR **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Mediterranean or E-Mediterranean

C. grata (Faldermann, 1837)
C. g. grata (Faldermann, 1837)

Range: E: GG **A:** AF IN IQ TM TR **Records in Turkey:** TR-A: URF **Remarks:** The subspecies has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

C. salviae (Germar, 1824)
C. s. salviae (Germar, 1824)

Range: E: AB AL AR BH BU CR GG GR HU IT MC RO SK SL ST TR YU "Circassia" **A:** CY IN IS LE SY TR **Records in Turkey:** TR-A: ADA, AFY, AMA, ANK, BIL, ELA, IZM, KON, NIG, TRA – TR-E **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian)

C. s. compuncta Weise, 1889

Range: A: CY LE SY TR **Records in Turkey:** TR-A: MER **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

Subgenus *Chalcoidea* Motschulsky, 1860
C. analis (Linnaeus, 1767)

Range: E: AU BE BY CT CZ DE EN FI FR GE HU LA NL NR NT PL RO SK SP ST SZ UK **N:** AG **Records in Turkey:** TR-A: AFY, AKS, ANK, ESK, KAR, KAY, KRB, NIG, SIN **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Black Sea Region and Central Anatolian Region until now. **Chorotype:** Mediterranean + C and E-European

C. marginata (Linnaeus, 1758)
C. m. marginata (Linnaeus, 1758)

Range: E: AL AR AU BH BU BY CR CZ DE FI FR GE GG GR HU IT LA LS LT MC MD NL NR NT PL RO SK SL ST SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: ANT, ARD, ART, BAY, ERZ, ESK, EZU, KAH, KON, KRS, NEV, SIV, TOK **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. m. unificans Bechyné, 1950

Range: E: "Caucasus" **A:** TR **Records in Turkey:** TR-A: ISP, VAN **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

C. sellata Weise, 1894

Range: A: TR **Records in Turkey:** TR-A: ADA, AMA, KON, KAY, MER, SIV, TOK **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

C. songarica Gebler, 1843

Range: E: AB AR GG ST **A:** IN IS KZ TR **Records in Turkey:** TR-A: AMA, ANK, ART, ERZ, EZU, IST, IZM, MAR, MER – TR-E: KRK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded from the most Parts of all Regions until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Irano-Palaestinian)

C. tesari Roubal, 1936

C. t. tesari Roubal, 1936

Range: E: AB AR GG **A:** TR **Records in Turkey:** TR-A: ARD, KRS **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Chrysolina* Motschulsky, 1860

C. blanchei (Fairmaire, 1865)

C. b. blanchei (Fairmaire, 1865)

Range: A: CY IS LE SY TR **Records in Turkey:** TR-A: HAT, KRB **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

C. staphylaea (Linnaeus, 1758)

C. s. staphylaea (Linnaeus, 1758)

Range: E: AU BH BU BY CR CT CZ FR GB GE GG HU IT LA LS LT NT PL PT RO SK SL SP ST SZ UK YU “Caucasus” **N:** LB **A:** TR WS **NAR Records in Turkey:** TR-A: ANK, EZU, KAS, KRB **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** W-Palearctic + Nearctic or Holarctic

Subgenus *Chrysolinopsis* Bechyné, 1950

C. americana (Linnaeus, 1758)

Range: E: AL BE CR FR GB GR IT LA MA MC PT SL SP SZ YU **N:** AG MO TU **A:** TR **Records in Turkey:** TR-A: AYD, ANK, ANT, IZM, MAN, MUG **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Mediterranean

Subgenus *Chrysomorpha* Motschulsky, 1860

C. cerealis (Linnaeus, 1767)

C. c. cerealis (Linnaeus, 1767)

Range: E: AL AU BH BU BY CR CZ DE FI FR GB GE GG GR HU IC LA LS LT MC NL NR NT PL RO SK SL SP SV SZ TR UK YU **Records in Turkey:** TR-A: SAM **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** European

C. c. cyaneoaurata Motschulsky, 1860

Range: A: ES FE KZ MG TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. However, it should be distributed very likely only in E Turkey. **Chorotype:** Sibero-European

Subgenus *Colaphodes* Motschulsky, 1860
***C. haemoptera* (Linnaeus, 1758)**
***C. h. haemoptera* (Linnaeus, 1758)**
Range: E: AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NT PL PT RO RU SK SL SP ST SV SZ TR UK YU "Caucasus" **A:** IN TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. However, it should be distributed very likely only in Asian Turkey. **Chorotype:** European

***C. h. byzantia* Jolivet, 1951**
Range: A: TR **Records in Turkey:** TR-E: IST, KRK **Remarks:** The endemic subspecies has been recorded only from European Turkey in Marmara Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Colaphoptera* Motschulsky, 1860
***C. abchasica* Weise, 1892**
Range: A: TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the endemic species is unknown. **Chorotype:** Anatolian

***C. planicollis* (Breit, 1919)**
Range: A: TR **Records in Turkey:** TR-A: BAY, TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Colaphosoma* Motschulsky, 1860
***C. sturmi* Westhoff, 1882**
Range: E: AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE HU IT LA LS LT LU MC MD NL NR NT PL RO RU SK SL SP ST SV SZ TR UK YU "Caucasus" **A:** ES KZ WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

Subgenus *Diachalcoidea* Bechyné, 1955
***C. sacarum* (Weise, 1890)**
***C. s. sacarum* (Weise, 1890)**
Range: A: AF IN KI TD TM UZ **Records in Turkey:** TR-A: MUS **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Centralasiatic + SW-Asiatic (Irano-Anatolian)

Subgenus *Erythrochrysa* Bechyné, 1950
***C. polita* (Linnaeus, 1758)**
***C. p. polita* (Linnaeus, 1758)**
Range: E: AL AU BH BU BY CR CT CZ DE FI FR GB GE GR HU IT LA LT MC MD NL NR NT PL RO SK SL SP ST SV SZ TR UK YU **A:** CY IS KI KZ LE MG SY TR UZ **Records in Turkey:** TR-A: AMA, ART, CNK, EZU, ISP, KAH, KAS, KRB, MAR, MER, NIG, ORD, RIZ, SAM, TRA – TR-E: KRK **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Aegean Region until now. **Chorotype:** Centralasiatic-European

Subgenus *Euchrysolina* Bechyné, 1950
***C. graminis* (Linnaeus, 1758)**
***C. g. graminis* (Linnaeus, 1758)**
Range: E: AU BH BU BY CZ DE FI FR GB GE GR HU IT LA MC NL NR NT PL RO SK SL SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: DEN, IZM, MUS **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** European

Subgenus *Fastuolina* Warchałowski, 1991
***C. fastuosa* (Scopoli, 1763)**
***C. f. fastuosa* (Scopoli, 1763)**
Range: E: AL AU BE BH BU BY CR CT CZ DE FI FR GB GE GG GR HU IT LA LS MC NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU "Caucasus" **A:** AF ES KZ TR WS **Records in Turkey:** TR-A: TRA **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

***C. f. inexplicabilis* Bransik, 1910**
Range: E: BU RO YU **A:** TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. However, it should be distributed very likely in western half of Turkey. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

Subgenus *Hypericia* Bedel, 1892
***C. anatolica* (Dahlgren, 1984)**
Range: E: BU **A:** TR **Records in Turkey:** TR-A: AMA **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***C. cuprina* (Duftschmid, 1825)**
***C. c. cuprina* (Duftschmid, 1825)**
Range: E: AU BU BY CR CZ FR GG HU IT PL RO SK SL UK YU **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The subspecies has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

***C. c. staneki* Bechyné, 1949**
Range: A: TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** Anatolian

***C. didymata* (Scriba, 1791)**
***C. d. didymata* (Scriba, 1791)**
Range: E: AR BH BU FR GR HU IT MC YU **A:** CY IN KZ TM TR **Records in Turkey:** TR-A: AFY, AMA, ANK, ANT, BIL, DEN, ISP, IZM, KON, MAR, SIV **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

***C. d. syriaca* (Weise, 1884)**
Range: A: IS LE SY **Records in Turkey:** TR-A: ADA, MER, OSM **Remarks:** The subspecies is probably distributed only in S Turkey. It probably has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. geminata* (Paykull, 1799)**
Range: E: AL AU BH BU BY CR CZ DE FR GE GG GR IT LA MC NL NR NT PL RO SK SL SP SV SZ UK YU "Caucasus" **A:** TR **Records in Turkey:** TR-A: EZU, TRA **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** C and E-European

***C. hyperici* (Forster, 1771)**
***C. h. hyperici* (Forster, 1771)**
Range: E: AL AU BH BU BY CR CT CZ DE FI FR GB GE GR HU IT LA MC NL NR NT PL PT RO SK SP ST SV SZ TR UK YU **A:** CY KZ TR UZ WS **AUR Records in Turkey:** TR-A: AMA, ANK, ANT, BRS, DEN, EZU, ISP, IST, IZM, KAS, MER, SAM, SIN – TR-E: IST **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Australian

Subgenus *Lopatinica* Kippenberg, 2012
***C. adzharica* Lopatin, 1988**
***C. a. heinzi* Kippenberg, 2012**
Range: A: TR **Records in Turkey:** TR-A: ART **Remarks:** The endemic subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***C. a. excavata* Kippenberg, 2012**
Range: A: TR **Records in Turkey:** TR-A: ART **Remarks:** The endemic subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***C. boluensis* Kippenberg, 2012**
Range: A: TR **Records in Turkey:** TR-A: BOL **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***C. daccordiana* Kippenberg, 2012**
Range: A: TR **Records in Turkey:** TR-A: TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***C. differens* Franz, 1952**
Range: E: GG "Caucasus" **A:** TR **Records in Turkey:** TR-A: ART **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***C. kataevi* Lopatin, 2000**
Range: A: TR **Records in Turkey:** TR-A: ART, RIZ, TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Ovosoma* Motschulsky, 1860
***C. orientalis* (Olivier, 1807)**
***C. o. orientalis* (Olivier, 1807)**
Range: E: TR **A:** TR **Records in Turkey:** TR-A: ADA, AFY, AMA, ANK, AYD, BIL, BOL, BRS, DIY, ELA, ESK, EZU, HAT, ISP, IST, IZM, KAH, KAS, KAY, KON, KRB, KSH, KUT, MER, NEV, NIG, ORD, OSM, SAM, SII, SIN, SIV, TOK, VAN, YOZ, ZON – TR-E: IST **Remarks:** Provincial distribution of the subspecies is unknown. Because the species is represented by 4 subspecies in Turkey as the nominate subspecies and the others. It was not possible to give infraspecific distributions separately. However, the nominate subspecies should be distributed very likely in N, W and C Turkey. *C. o.* halysa Bechyné, 1950 should be distributed very likely in Central Parts of Turkey from S to N. *C. o. sahlbergi* (Ménétriés, 1832) should be distributed very likely in C, SE and E Turkey mostly. *C. o. thraeissa* Bechyné, 1950 should be distributed very likely only in SW to SC Turkey. **Chorotype:** Anatolian

***C. o. halysa* Bechyné, 1950**
Range: A: CY IS LE SY TR **Records in Turkey:** TR-A (see above) **Remarks:** Provincial distribution of the subspecies is unknown (see above). **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

***C. o. sahlbergi* (Ménétriés, 1832)**
Range: A: CY IN IQ TR **Records in Turkey:** TR-A (see above) **Remarks:** Provincial distribution of the subspecies is unknown (see above). **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian)

***C. o. thraeissa* Bechyné, 1950**
Range: E: GR **Records in Turkey:** TR-A (see above) **Remarks:** Provincial distribution of the subspecies is unknown (see above). **Chorotype:** E-Mediterranean (Aegean)

C. turca (Fairmaire, 1865)

Range: E: BU TR **A:** TR **Records in Turkey:** TR-A: BRS, IST – TR-E: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

C. vernalis (Brullé, 1832)

C. v. ottomana (Weise, 1906)

Range: E: BU GR MC TR **A:** TR **Records in Turkey:** TR-A: AGR, ART, CAN, DEN, ISP, IST, IZM, TOK – TR-E: IST, TEK **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

C. wittmeri Medvedev, 1975

Range: A: TR **Records in Turkey:** TR-A: GUM, TRA **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Ovostoma* Motschulsky, 1860

C. olivieri Bedel, 1892

C. o. olivieri Bedel, 1892

Range: E: AL AU BU CR MD PL RO SK SL TR UK YU **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** C and E-European

C. o. azurea Bechyné, 1946

Range: E: GG ST **A:** TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Paradiachalcoidea* Daccordi, 1978

C. palmyrensis Bechyné, 1955

C. p. assurensis Bechyné, 1955

Range: A: IN IQ TR **Records in Turkey:** TR-A: GAZ **Remarks:** The subspecies has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

Subgenus *Sphaeromela* Bedel, 1892

C. varians (Schaller, 1783)

Range: E: AU BE BH BU BY CR CT CZ DE FI FR GB GE HU IT LA LS LT MC NL NR NT PL RO SK SL SP ST SV SZ UK YU “Caucasus” **N:** AG **A:** TR WS **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** W-Palearctic or Sibero-European + N-Africa

Subgenus *Stichoptera* Motschulsky, 1860

C. gypsophilae (Küster, 1845)

Range: E: AL AR AU BH BU BY CR CZ DE FI FR GE GG GR HU IT LA MC NR NT PL RO SK ST SV SZ TR UK YU “Caucasus” **A:** CY IN IS KI KZ SY TR **Records in Turkey:** TR-A: ADA, AFY, AKS, AMA, ANK, ANT, ART, BAR, BIL, BRS, ESK, EZU, IZM, KAR, KON, KSH, MER, NEV, NIG, OSM, SIN, TOK, ZON **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

C. sanguinolenta (Linnaeus, 1758)

Range: E: AR AU BE BH BU BY CT CZ DE FI FR GB GE GR HU IT LA MC NL NR NT PL RO SK SL ST SV SZ TR UK YU **A:** ES FE KI KZ MG TR WS **Records in Turkey:** TR-A: IST – TR-E: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Sibero-European

Subgenus *Sulcicollis* Sahlberg, 1913

C. chalcites (Germar, 1824)

Range: E: AR BU CR CT GG GR HU IT RO SK ST TR UK YU **A:** AF CY IN IS SY TD TR WS **Records in Turkey:** TR-A: AMA, ANT, ART, BOL, BRS, DEN, DIY, EZU, GAZ, IST, IZM, KON, MER, OSM, SAK, SAM, SIN – TR-E: IST **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Ergene Part and Istranca Part of European Turkey in Marmara Region, Central-West Anatolia Part in Aegean Region, the most Parts of Central Anatolian Region and the most Parts of Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

C. impavida Bechyné, 1949

Range: E: GR **A:** CY IS SY TR **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian + Aegean)

C. oricalcia (Müller, 1776)

Range: E: AL AU BH BU CR CZ DE FR GB GE GR HU IT LS MC NL NR PL RO SK SL SV SZ TR UK YU **A:** MG TR "Siberia" **Records in Turkey:** TR-A: ANT, KAH – TR-E **Remarks:** The species has been recorded only from 2 Turkish regions as Marmara Region and Mediterranean Region until now. **Chorotype:** Sibero-European

C. peregrina (Herrich-Schäffer, 1838)

Range: E: CR FR IT MA PT SP **N:** AG MO TU **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** Mediterranean

Subgenus *Synerga* Weise, 1900

C. coerulans (Scriba, 1791)

C. c. coerulans (Scriba, 1791)

Range: E: AU BH BU BY CR CT CZ FR GE GG HU IT LS MC NL NT PL RO SK SL ST SZ TR YU **A:** TR **Records in Turkey:** TR-A: ANK, ART, ERZ, EZU, KAS, KRS – TR-E **Remarks:** The subspecies probably has been recorded from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

C. c. angelica (Reiche & Saulcy, 1858)

Range: A: IN IS SY **Records in Turkey:** TR-A: ANT, HAT, IZM, KAH, MER **Remarks:** The subspecies probably has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian)

C. herbacea (Duftschmid, 1825)

C. h. herbacea (Duftschmid, 1825)

Range: E: AL AU BH BU BY CR CT CZ DE FR GB GE GG GR HU IT LS MC NL NT PL RO SK SL SP ST SZ TR UK YU **A:** KZ TM TR WS **Records in Turkey:** TR-A: AKS, ANK, BAR, BIL, BOL, BRS, BUR, CNK, COR, DEN, DUZ, ERZ, ESK, EZU, IST, IZM, KAS, KAY, KOC, KON, KRB, KSH, MAN, MUS, NEV, NIG, ORD, SAM, SIN, SIV, TOK, TRA, YOZ, ZON – TR-E: EDI, IST, KRK **Remarks:** Provincial distribution of the subspecies is unknown. Because the species is represented by 3 subspecies in Turkey as the nominate subspecies and the others. It was not possible to give infraspecific distributions separately. However, *C. h. recticollis* Motschulsky, 1860 should be distributed very likely only in NE and E Turkey, *C. h. alacris* Bechyné, 1950 should be distributed very likely in S and CS Turkey, and the nominate subspecies should be distributed very likely in the other parts of Turkey. So the subspecies is rather widely distributed in Turkey. It probably has been recorded from 6 Turkish regions. It has not been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

***C. h. alacris* Bechyné, 1950**
Range: A: TR **Records in Turkey: Records in Turkey:** TR-A: ANT, ISP, KAH, KAR, MER, OSM **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

***C. h. recticollis* Motschulsky, 1860**
Range: E: AR **A:** TR **Records in Turkey: Records in Turkey:** TR-A: ART **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Taeniosticha* Motschulsky, 1860
***C. pseudolurida* (Roubal, 1817)**
Range: E: BH BU FR GE HU IT PL SK ST UK **Records in Turkey:** TR-A: ADA, ANK, BOL, KON, KRS, TOK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** S and E-European

***C. reitteri* (Weise, 1884)**
Range: E: GG **Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, ARD, ART, BAY, BIL, BOL, ESK, EZU, ISP, KON, MER, NIG, YOZ **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Threnosoma* Motschulsky, 1860
***C. anceyi* (Marseul, 1868)**
***C. a. anceyi* (Marseul, 1868)**
Range: A: IS LE SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***C. limbata* (Fabricius, 1775)**
***C. l. volodi* Bienkowski & O.-Bienk., 2011**
Range: E: AR **A:** TR **Records in Turkey:** TR-A: ARD, BIN, BRS, KRS **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Marmara Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Genus *Chrysomela* Linnaeus, 1758
***C. collaris* Linnaeus, 1758**
Range: E: AL AU BH BU BY CR CT CZ DE FI FR GE GR HU IT LA MC NL NR NT PL RO SK ST SV SZ UK YU **A:** ES FE KZ MG NE NO TR WS **Records in Turkey:** TR-A: ADA, EZU, KAY **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

***C. populi* Linnaeus, 1758**
Range: E: AL AR AU BE BH BU BY CR CZ DE FI FR GB GE GG GR HU IT LA LS MC MD NL NR NT PL RO SK SL SP ST SZ TR UK YU **A:** AF AHN BEI ES FE FUJ GAN GUA GUI GUX HEB HEI HUB HUN IN JA JIA JIL JIX LIA MG NIN NMO NP QIN SC SCH SD SHA SHN SHX TR UP WS XIN XIZ YUN ZHE **Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, AYD, ART, BIL, BIT, BUR, COR, DEN, ERZ, ESK, EZU, ISP, IST, IZM, KAH, KAR, KAS, KAY, KOC, KON, KRB, KRS, MAN, NEV, NIG, ORD, OSM, SAM, SIN, SIV, TOK, TRA, ZON – TR-E: IST **Remarks:** The species is widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

***C. saliceti* (Weise, 1884)**

***C. saliceti saliceti* (Weise, 1884)**

Range: E: AL AU BH BU BY CR CZ DE FI FR GE GR HU IT LS NL NT PL SK SL SP ST SV SZ UK YU **A:** ES FE IN KZ MG NMO TR WS XIN **Records in Turkey:** TR-A: AKS, ANK, CNK, COR, ERZ, EZU, ISP, KAH, KAY, KON, KSH, NEV, NIG, SIV, YOZ **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***C. tremula* Fabricius, 1787**

***C. t. tremula* Fabricius, 1787**

Range: E: AL AU BE BU BY CR CZ DE FI FR GB GE GR HU IT LA NL NR NT PL RO SK SL ST SV SZ UK YU **A:** AF ANH BEI ES FE GUI HEB HEI IN JA JIL KZ LIA MG NMO QIN PA SCH TR WS XIZ YUN ZHE **NAR Records in Turkey:** TR-A: ANK, BOL, BRS, CAN, CNK, ELA, ESK, GUM, IST, KAS, KOC, KON, KSH, MUG, SIN, TOK, TRA, ZON – TR-E: EDI, IST **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European + Nearctic or Holarctic

***C. vigintipunctata* (Scopoli, 1763)**

***C. v. vigintipunctata* (Scopoli, 1763)**

Range: E: AL AU BH BU BY CZ FR GE GR HU IT LA LS MC NL NT PL RO SK SL ST SV SZ TR UK YU **A:** ANH ES FE FUJ GUI HUB HUN JA JIL LIA SCH SHA TAI TR WS YUN ZHE **Records in Turkey:** TR-A: AMA, BIL, BRS, CAN, CNK, IST, KOC, TOK, ZON – TR-E: IST **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Asiatic-European

Genus *Colaphellus* Weise, 1916

***C. apicalis* (Ménétriés, 1832)**

Range: A: AF IN IS KI KZ SY TM TR UZ **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Centralasiatic + SW-Asiatic (Irano-Anatolian + Irano-Palaestinian)

***C. sophiae* (Schaller, 1783)**

***C. s. amasiae* Machatschke, 1954**

Range: A: TR **Records in Turkey:** TR-A: AMA **Remarks:** The endemic subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***C. s. transsylvanicus* Machatschke, 1954**

Range: E: BU GR MC RO TR YU **A:** TR **Records in Turkey:** TR-A: AFY, AKS, AMA, ANK, AYD, BOL, CAN, DEN, DIY, EZU, ISP, IST, IZM, KAS, KAY, KON, KRB, MAN, NEV, NIG, TOK, YOZ – TR-E: EDI **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

Genus *Cyrtonastes* Fairmaire, 1874

Subgenus *Cyrtonastes* Fairmaire, 1874

***C. confusus* Berti & Daccordi, 1974**

Range: A: SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***C. grandis* Lopatin, 1994**

Range: A: TR **Records in Turkey:** TR-A: MER **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Natocyrstes* Kippenberg, 2010
***N. seriatoporus* Fairmaire, 1880**
Range: E: GR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Aegean)

Genus *Entomoscelis* Chevrolat, 1837
***E. adonidis* (Pallas, 1771)**
Range: E: AU BU CT CZ FR GE GR HU LA MC NT PL RO SK SP ST TR UK YU "Caucasus" **A:** ES IN KZ MG PA SY TR WS XIN **NAR Records in Turkey:** TR-A: AFY, AKS, AMA, ANK, ANT, ARD, DEN, DIY, DUZ, ESK, EZU, GAZ, HAT, ISP, IZM, KAH, KAS, KAY, KIR, KON, KRB, KSH, NEV, NIG, SIV, TOK, YOZ, ZON – TR-E **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region, Eastern Black Sea Part in Black Sea Region, and the most Parts of Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

***E. sacra* (Linnaeus, 1758)**
Range: E: AU BU GG HU RO SK ST UK **A:** KZ SY TR "Palestina" **Records in Turkey:** TR-A: AKS, ANK, ESK, GAZ, ISP, IZM, KAR, KON, NEV, NIG, URF **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

***E. suturalis* Weise, 1882**
Range: E: GR MC MD RO UK **A:** IN **Records in Turkey:** TR-A: ADA, AKS, AMA, ANK, ANT, BIT, BOL, COR, EZU, ISP, KAH, KAR, KAS, KAY, KON, KSH, MER, NEV, NIG, TOK, VAN, YOZ, ZON **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

Genus *Gastrophysa* Chevrolat, 1836
Subgenus *Gastrophysa* Chevrolat, 1836
***G. polygoni* (Linnaeus, 1758)**
***G. p. polygoni* (Linnaeus, 1758)**
Range: E: AU BE BH BU BY CR CZ DE FI FR GB GE GR HU IT LA LS MC NL NR NT PL RO SK SL SP ST SV SZ TR UK YU "Caucasus" **A:** TR WS **NAR Records in Turkey:** TR-A: ADA, AKS, AMA, ANK, ARD, ART, BOL, CNK, DEN, DIY, DUZ, ERZ, ESK, EZU, ISP, IST, IZM, KAH, KAR, KAS, KAY, KON, KRB, KRS, MER, NEV, NIG, ORD, SAM, SIN, TRA, TOK, YOZ – TR-E: EDI, IST **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region, Central-West Anatolia Part in Aegean Region, Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

***G. viridula* (DeGeer, 1775)**
***G. v. viridula* (DeGeer, 1775)**
Range: E: AU BE BH BU BY CZ DE FI FR GB GE HU IT LA LS NL NR NT PL RO SK ST SV SZ UK YU "Caucasus" **A:** KZ TR **NAR Records in Turkey:** TR-A: EZU, TRA **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** European + Nearctic

***G. v. caucasica* Jolivet, 1951**
Range: E: "Caucasus" **Records in Turkey:** TR-A: ART **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Genus *Gonioctena* Chevrolat, 1836
Subgenus *Gonioctena* Chevrolat, 1836
***G. decemnotata* Marsham, 1802**
Range: E: AU BH BU BY CR CT CZ DE FI FR GB GE HU IT LA NL NR NT PL RO RU SK SL ST SV SZ TR UK **A:** ES FE KZ MG NE NO TR WS **Records in Turkey:** TR-A: BAL, IST, KRS – TR-E: IST **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

***G. linnaeana* (Schrank, 1781)**
***G. l. linnaeana* (Schrank, 1781)**
Range: E: AU BE BH BU BY CR CZ FI FR GE GG GR HU IT LA LS NL NR NT PL RO RU SK SL SP ST SV SZ TR UK YU **A:** ES KZ MG NE TR **Records in Turkey:** TR-A: BIN, EZU, GUM, TUN **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***G. viminalis* (Linnaeus, 1758)**
***G. v. viminalis* (Linnaeus, 1758)**
Range: E: AN AU BE BH BU BY CR CZ DE EN FI FR GB GE HU IR IT LA LS NL NR NT PL RO RU SK SL ST SV SZ TR UK YU "Caucasus" **A:** ES KZ MG NE "Korea" **Records in Turkey:** TR-E **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** Sibero-European

Subgenus *Spartomena* Reitter, 1913
***G. akbesiana* Fairmaire, 1884**
Range: A: IS SY **Records in Turkey:** TR-A: HAT **Remarks:** The species has been known only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***G. fornicata* (Brüggemann, 1873)**
Range: E: AL BH BU BY CR CZ DE FR GB GE HU IT MC NL PL PT RO SK SP ST SZ UK **N:** MO **Records in Turkey:** TR-A: ADA, AFY, AKS, ANK, ANT, ART, BOL, BIL, CNK, COR, DEN, DIY, DUZ, ERZ, ESK, EZU, GAZ, HAT, ISP, IZM, KAH, KAR, KAS, KAY, KON, KRB, MAR, MER, MUS, NEV, NIG, OSM, SIN, TOK, TUN, YOZ, ZON – TR-E **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region and Hakkari Part in Eastern Anatolian Region until now. **Chorotype:** Mediterranean

Genus *Leptinotarsa* Chevrolat, 1836
***L. decemlineata* (Say, 1824)**
Range: E: AL AU BE BH BU BY CR CZ DE FI FR GE GR HU IT LA LS MC NT PL PT RO SK SP SZ UK YU "Caucasus" **A:** IS SY TR **NAR Records in Turkey:** TR-A: ADA, AFY, AKS, ANK, ART, BOL, CAN, DUZ, ERZ, ESK, EZU, KAH, KAR, KAS, KAY, NEV, NIG, OSM, SIN, TOK, ZON – TR-E: EDI, TEK **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** C and E-European + Nearctic

Genus *Neophaedon* Jakobson, 1901
***N. pyritosus* (Rossi, 1792)**
Range: E: AU BH BU BY CR CZ FR GE GR HU IT NL PL RO SK SL SP ST SZ TR UK YU "Caucasus" **A:** AF KZ TM TR UZ **Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, DUZ, ESK, EZU, ISP, IST, IZM, KAS, KON, KRB, KSH, MAN, MAR, ORD, SAM, SIV, TOK, TRA, URF, YOZ – TR-E: IST **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region, Central-West Anatolia Part in Aegean Region, Adana Part in Mediterranean Region, Eastern Black Sea Part in Black Sea Region and the most Parts of Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

Genus *Phaedon* Latreille, 1829
Subgenus *Phaedon* Latreille, 1829
***P. armoraciae* (Linnaeus, 1758)**
Range: E: AU BH BU BY CR CZ DE FI FR GB GE GR HU IT LA NL NR NT PL RO SK SL SP SV SZ UK YU "Caucasus" **A:** HEB KZ MG TR **Records in Turkey:** TR-A: BOL, EZU, RIZ, NEV, ORD, TOK **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

***P. cochleariae* (Fabricius, 1792)**
***P. c. cochleariae* (Fabricius, 1792)**
Range: E: AU BH BU BY CR CZ DE FI FR GB GE GR HU IT LA LS MC NL NR NT PL RO SK SL SP ST SV SZ TR UK YU "Caucasus" **A:** FE KZ MG TR **Records in Turkey:** TR-A: ANK, ANT, DIY, EZU, GAZ, KAY, KON, KSH, NIG, TOK, TRA – TR-E: KRK **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Phratora* Chevrolat, 1836
Subgenus *Phratora* Chevrolat, 1836
***P. vulgatissima* (Linnaeus, 1758)**
Range: E: AU BH BU BY CR CZ DE FI FR GB GE GG GR HU IT LA LS NL NR NT PL RO SK SL SV SZ UK **A:** FE HEI KZ MG NMO TR XIN **NAR Records in Turkey:** TR-A: AKS, ANK, BAR, DUZ, KAS – TR-E **Remarks:** The species has been recorded only from 3 Turkish regionsas Black Sea Region, Central Anatolian and Marmara Region until now. **Chorotype:** Sibero-European + Nearctic

Subgenus *Phyllodecta* Kirby, 1837
***P. horioni* (Mohr, 1968)**
Range: E: "Caucasus" **A:** TR **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***P. laticollis* (Suffrian, 1851)**
Range: E: AU BE BH BU BY CR CZ DE FR GB GE GR HU IT LA NL NT PL RO SK SP SZ UK YU "Caucasus" **A:** ES FE HUB JA JIL KZ LE MG NC SCH TR WS YUN **Records in Turkey:** TR-A: ANK, CNK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Asiatic-European

***P. tibialis* (Suffrian, 1851)**
***P. t. tibialis* (Suffrian, 1851)**
Range: E: AL AU BE BH BU BY CR CZ DE FR GE HU IT LA LS NL PL RO SL SP SZ UK YU **A:** KZ TR **Records in Turkey:** TR-A: ANK, EZU, TOK **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** C and E-European

***P. vitellinae* (Linnaeus, 1758)**
Range: E: AL AU BE BH BU BY CR CT CZ DE FI FR GB GE HU IC IT LA LS NL NR NT PL RO SK SL SP ST SV SZ UK **A:** ES FE HEI JIL LIA MG NMO QIN TR WS XIN **NAR Records in Turkey:** TR-A: AMA, ANK, ART, BIL, BOL, BRS, CNK, COR, DIY, EZU, GIR, IST, KAS, KOC, MAR, MUS, SAK, SAM, SIN, SIV, TOK, TRA, ZON – TR-E: EDI, IST **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and Mediterranean Region until now. **Chorotype:** Asiatic-European + Nearctic

Genus *Plagiodera* Chevrolat, 1836
***P. versicolora* (Laicharting, 1781)**
Range: E: AL AU BE BH BU CR CZ DE FI FR GB GE GG GR HU IT LA MC NL NR NT PL RO SK SL SP SV SZ TR UK YU **N:** MO **A:** ANH BEI ES FE FUJ GAN GUI HEB HEI HEN HKG HUB HUN JA JIA JIL JIX LIA MG NC NIN NMO SC SCH SHA SHN TAI TIA TR WS XIN YUN ZHE **ORR Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, ART, BOL, BRS, BUR, DIY, ERZ, EZU, ISP, IST, IZM, KAH, KAS, KAY, KOC, KON, MAR, MER, SAM, SAK, TOK, TRA, YAL, ZON – TR-E: EDI, IST, KRK **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from Central-West Anatolia Part in Aegean Region, Upper Murat-Van Part and Hakkari Part in Eastern Anatolian Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** Palearctic + Oriental

Genus *Plagiosterna* Motschulsky, 1860
***P. aenea* (Linnaeus, 1758)**
***P. a. aenea* (Linnaeus, 1758)**
Range: E: AL AU BH BU BY CR CZ FR GB GE HU IT LA MC PL RO SK SL SP UK YU **A:** ES FE HEI JA JIL LIA TAI TR WS **Records in Turkey:** TR-A: BAL, BAR, CAN, IST, KIR – TR-E: IST **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Asiatic-European

Genus *Prasocuris* Latreille, 1802
Subgenus *Hydrothassa* Thomson, 1859
***P. flavocincta* (Brullé, 1832)**
Range: E: AL BH BU CR GR HU TR YU **A:** TR **Records in Turkey:** TR-A: IST – TR-E: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian) or SE-European

***P. glabra* (Herbst, 1783)**
Range: E: AU BE BH BU BY CR CZ DE FI FR GB GE GG GR HU IT LA LS NL NR NT PL PT RO SK SL SP ST SV SZ UK **N:** MO **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Europeo-Mediterranean

Subgenus *Prasocuris* Latreille, 1802
***P. junci* (Brahm, 1790)**
Range: E: AU BH BU BY CR CZ DE FI FR GB GE GG GR HU IT LA NL NR NT PL RO SK SL SP ST SV SZ UK YU "Caucasus" **A:** TR **Records in Turkey:** TR-A: AFY, ANK, DEN, DIY, ESK, EZU, GAZ, GUM, ISP, KAY, KSH, KON, MUG, NEV, NIG, OSM, SAM, SIV, TOK, VAN, YOZ **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Marmara Region until now. **Chorotype:** European

***P. phellandri* (Linnaeus, 1758)**
Range: E: AU BH BU BY CZ DE FI FR GB GE GR HU IT LA NL NR NT PL RO SK SL SP ST SV SZ TR UK YU "Caucasus" **N:** MO **A:** ES JA TR WS **NAR Records in Turkey:** TR-A: IST, SAM – TR-E: IST, KRK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** Holarctic

Genus *Zygogramma* Chevrolat in Dej., 1836
***Z. suturalis* (Fabricius, 1775)**
Range: E: GG ST UK **A:** ES TR **NAR Records in Turkey:** TR-A: ADI **Remarks:** The species has been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

Subfamily TIMARCHINAE

Genus *Timarcha* Latreille, 1829
Subgenus *Metallotimarcha* Motschulsky, 1860
***T. hummelii* Faldermann, 1837**
***T. h. hummelii* Faldermann, 1837**
Range: E: AB AR TR **A:** IN TR **Records in Turkey:** TR-A: ART **Remarks:** The subspecies has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

Subgenus *Timarcha* Latreille, 1829
***T. olivieri* (Fairmaire, 1868)**
***T. o. olivieri* (Fairmaire, 1868)**
Range: E: CR SL TR **Records in Turkey:** TR-A: ESK, KON, MAN, IST – TR-E: IST **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian) or SE-European

***T. pratensis* Duftschmid, 1825**
Range: E: AU BH BU CR HU IT ME RO SL **Records in Turkey:** TR-A: AMA, ESK, KON, IST – TR-E: IST **Remarks:** The species has been recorded only from3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

***T. rugulosa* Herrich-Schäffer, 1838**
***T. r. rugulosa* Herrich-Schäffer, 1838**
Range: E: CR CZ HU MD RO SB SK TR UK **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the subspecies is unknown. **Chorotype:** E-European

***T. tenebricosa* (Fabricius, 1775)**
Range: E: AB AL AU BE BH BU CR CZ DE FR GB GE GG GR HU IR IT MC ME PL RO SB SK SL SP ST SZ TR UK **A:** TR **Records in Turkey:** TR-A: ANT, ISP, TRA **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** European

ZOOGEOGRAPHICAL ANALYSIS

Turkish Chrysomelinae includes 102 species group taxa (50 species + 52 subspecies) of 15 genera. 15 species, namely 14.71 % of the species group taxa have "Anatolian" chorotype. 14 species, namely 13.73 % of the species group taxa have "SW-Asiatic" chorotype. 12 species, namely 11.77 % of the species group taxa have "Sibero-European" chorotype. 10 species, namely 9.80 % of the species group taxa have "Turano-Mediterranean" chorotype. 9 species, namely 8.82 % of the species group taxa have "E-Mediterranean" chorotype. 7 species, namely 6.86 % of the species group taxa have "C and E-European" chorotype. 6 species, namely 5.88 % of the species group taxa have "Asiatic-European" chorotype. 4 species, namely 3.92 % of the species group taxa have "Centralasiatic-European" chorotype. 4 species, namely 3.92 % of the species group taxa have "European" chorotype. 4 species, namely 3.92 % of the species group taxa have "Mediterranean" chorotype. 4 species, namely 3.92 % of the species group taxa have "Sibero-European + Nearctic" chorotype. 2 species, namely 1.96 % of the species group taxa have "Centralasiatic + SW-Asiatic" chorotype. And each of the remaining 11 species group taxa has a different chorotype. One species group taxa, namely about 0.98 % of the taxa has "Asiatic-European + Nearctic" chorotype. One species group taxa, namely about 0.98 % of the taxa has "C and E-European + Nearctic" chorotype. One species group taxa, namely about 0.98 % of the taxa has "Europeo-Mediterranean" chorotype. One species group taxa, namely about 0.98 % of the taxa has "European + Nearctic" chorotype. One species group taxa, namely about 0.98 % of the taxa has "Holarctic" chorotype. One species group taxa, namely about 0.98 % of the taxa has "Mediterranean + C and E-European" chorotype. One species group taxa, namely about 0.98 % of the taxa has "Palearctic + Oriental" chorotype. One species group taxa, namely about 0.98 % of the taxa has "S and E-European" chorotype. One species group taxa, namely about 0.98 % of the taxa has "Sibero-European + Australian" chorotype. One species group taxa, namely about 0.98 % of the taxa has "W-Palearctic or Sibero-European + N-Africa" chorotype. One species group taxa, namely about 0.98 % of the taxa has "W-Palearctic + Nearctic or Holarctic" chorotype (Fig. 1A). So the dominant chorotype for Turkish Chrysomelinae is "Anatolian". "SW-Asiatic" and "Sibero-European" chorotypes follow it. Also the members of "Turano-Mediterranean", "E-Mediterranean" and also "C and E-European" chorotypes present important contributions for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Chrysomelinae are presented as follows:

A total of 15 species have "Anatolian" chorotype as *C. sellata*, *C. h. byzantia*, *C. abchasica*, *C. planicollis*, *C. c. staneki*, *C. a. heinzi*, *C. a. excavata*, *C. boluensis*, *C. daccordiana*, *C. kataevi*, *C. o. orientalis*, *C. wittmeri*, *C. h. alacris*, *C. s. amasiae* and *C. grandis*.

A total of 14 species have "SW-Asiatic" chorotype as *C. m. unificans*, *C. songarica*, *C. t. tesari*, *C. differens*, *C. o. sahlbergi*, *C. o. azurea*, *C. p. assurensis*, *C. c. angelica*, *C. h. recticollis*, *C. reitteri*, *C. l. volodi*, *C. confusus*, *G. v. caucasica* and *P. horioni*.

A total of 12 species have "Sibero-European" chorotype as *C. c. cyaneoaurata*, *C. sturmi*, *C. f. fastuosa*, *C. sanguinolenta*, *C. oricalcia*, *C. h. herbacea*, *C. collaris*, *C. s. saliceti*, *G. decemnotata*, *G. l. linnaeana*, *G. v. viminalis* and *P. c. cochleariae*.

A total of 10 species have "Turano-Mediterranean" chorotype as *C. g. grata*, *C. s. salviae*, *C. f. inexplicabilis*, *C. anatolica*, *C. d. didymata*, *C. turca*, *C. v. ottomana*, *C. s. transsylvanicus*, *E. suturalis* and *P. flavocincta*.

A total of 9 species have "E-Mediterranean" chorotype as *C. s. compuncta*, *C. b. blanchei*, *C. d. syriaca*, *C. o. halysa*, *C. o. thraeissa*, *C. impavida*, *C. a. anceyi*, *N. seriatoporus* and *G. akbesiana*.

A total of 7 species have "C and E-European" chorotype as *C. m. marginata*, *C. c. cuprina*, *C. geminata*, *C. o. olivieri*, *C. c. coerulans*, *E. sacra* and *P. t. tibialis*.

A total of 6 species have "Asiatic-European" chorotype as *C. populi*, *C. t. tremula*, *C. v. vigintipunctata*, *P. armoraciae*, *P. laticollis* and *P. a. aenea*.

A total of 4 species have "Centralasiatic-European" chorotype as *C. p. polita*, *C. gypsophilae*, *C. chalcites* and *N. pyritosus*.

A total of 4 species have "European" chorotype as *C. c. cerealis*, *C. h. haemoptera*, *C. g. graminis* and *P. junci*.

A total of 4 species have "Mediterranean" chorotype as *C. aeneipennis*, *C. americana*, *C. peregrina* and *G. fornicata*.

A total of 4 species have "Sibero-European + Nearctic" chorotype as *E. adonidis*, *G. p. polygoni*, *P. vulgatissima* and *Z. suturalis*.

A total of 2 species have "Centralasiatic + SW-Asiatic" chorotype as *C. s. sacarum* and *C. apicalis*.

One species as *P. vitellinae* has "Asiatic-European + Nearctic" chorotype.

One species as *L. decemlineata* has "C and E-European + Nearctic" chorotype.

One species as *P. glabra* has "Europeo-Mediterranean" chorotype.
One species as *G. v. viridula* has "European + Nearctic" chorotype.
One species as *P. phellandri* has "Holarctic" chorotype.
One species as *C. analis* has "Mediterranean + C and E-European" chorotype.
One species as *P. versicolora* has "Palearctic + Oriental" chorotype.
One species as *C. pseudolurida* has "S and E-European" chorotype.
One species as *C. h. hyperici* has "Sibero-European + Australian" chorotype.
One species as *C. varians* has "W-Palearctic or Sibero-European + N-Africa" chorotype.
One species as *C. s. staphylaea* has "W-Palearctic + Nearctic or Holarctic" chorotype.

On the other side, Turkish Chrysomelinae includes a total of 102 species group taxa. However, provincial distributions of 17 species group taxa are unknown. So Turkish Chrysomelinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio (Table 1).

For the subfamily Chrysomelinae (according to all species group taxa):
32 species are represented in Marmara Region (31 %)
23 species are represented in Aegean Region (23 %)
39 species are represented in Mediterranean Region (38 %)
39 species are represented in Central Anatolian Region (38 %)
54 species are represented in Black Sea Region (53 %)
40 species are represented in Eastern Anatolian Region (39 %)
17 species are represented in South-Eastern Anatolian Region (17 %)

For the subfamily Chrysomelinae (according to known provincial distribution of 85 species group taxa):
32 species are represented in Marmara Region (38 %)
23 species are represented in Aegean Region (27 %)
39 species are represented in Mediterranean Region (46 %)
39 species are represented in Central Anatolian Region (46 %)
54 species are represented in Black Sea Region (64 %)
40 species are represented in Eastern Anatolian Region (47 %)
17 species are represented in South-Eastern Anatolian Region (20 %)

So Turkish Chrysomelinae that includes a total of 102 species group taxa or 85 species group taxa of which are known provincial distributions in Turkey, are rather widely distributed in all Turkish Regions. The most number of species is represented in Black Sea Region. Eastern Anatolian Region, Mediterranean Region and Central Anatolian Region follow it. Marmara Region is represented with an important number of species. However, Aegean Region and especially South-Eastern Anatolian Region are represented with a rather little number of species now.

Turkish Timarchinae includes 5 species group taxa (2 species + 3 subspecies) of 1 genus. Each of the taxa has a different chorotype. One species group taxa, namely about 20 % of the taxa has "C and E-European" chorotype. One species group taxa, namely about 20 % of the taxa has "E-European" chorotype. One species group taxa, namely about 20 % of the taxa has "European" chorotype. One species group taxa, namely about 20 % of the taxa has "SW-Asiatic" chorotype. And one species group taxa, namely about 20 % of the taxa has

"Turano-Mediterranean" chorotype (Fig. 1B). So all chorotypes for Turkish Timarchinae are represented by the same ratio. As seen above, however, European members that belong to C and E-European, E-European and European chorotypes, havea dominancy for the Turkish Timarchinae fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Timarchinae are presented as follows:

One species as *T. pratensis* has "C and E-European" chorotype.
One species as *T. r. rugulosa* has "E-European" chorotype.
One species as *T. tenebricosa* has "European" chorotype.
One species as *T. h. hummelii* has "SW-Asiatic" chorotype.
One species as *T. o. olivieri* has "Turano-Mediterranean" chorotype.

On the other side, Turkish Timarchinae includes a total of 5 species group taxa. However, provincial distributions of 1 species group taxa is unknown. So Turkish Timarchinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio (Table 2).

For the subfamily Timarchinae (according to all species group taxa):
2 species are represented in Marmara Region (40 %)
1 species are represented in Aegean Region (20 %)
1 species are represented in Mediterranean Region (20 %)
2 species are represented in Central Anatolian Region (40 %)
3 species are represented in Black Sea Region (60 %)
0 species are represented in Eastern Anatolian Region (0 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

For the subfamily Timarchinae (according to known provincial distribution of 4 species group taxa):
2 species are represented in Marmara Region (50 %)
1 species are represented in Aegean Region (25 %)
1 species are represented in Mediterranean Region (25 %)
2 species are represented in Central Anatolian Region (50 %)
3 species are represented in Black Sea Region (75 %)
0 species are represented in Eastern Anatolian Region (0 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

So Turkish Timarchinae that includes a total of 5 species group taxa or 4 species group taxa of which are known provincial distributions in Turkey, have narrow distribution in Turkey. The most number of species is represented in Black Sea Region. Marmara Region and Central Anatolian Region follow it. Aegean Region and Mediterranean Region are represented only by one species group taxon. However, Eastern Anatolian Region and South-Eastern Anatolian Region have not been included any recorded species group taxa until now.

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Table 1. The regional distribution of all known species group taxa of Chrysomelinae in Turkey.

TAXON	**R**	**E**	**G**	**I**	**O**	**N**	**S**
	MAR	**AER**	**MER**	**CAR**	**BSR**	**EAR**	**SEAR**
SubfamilyCHRYSOMELINAE							
C. aeneipennis	-	-	-	+	+	-	-
C. g. grata	-	-	-	-	-	-	+
C. s. salviae	-	-	-	-	-	-	+
C. s. compuncta	-	-	+	-	-	-	-
C. analis	-	+	-	+	+	-	-
C. m. marginata	-	-	+	+	+	+	-
C. m. unificans	-	-	+	-	-	+	-
C. sellata	-	-	+	+	+	-	-
C. songarica	+	+	+	+	+	+	+
C. t. tesari	-	-	-	-	-	+	-
C. b. blanchei	-	-	+	-	+	-	-
C. s. staphylaea	-	-	-	+	+	+	-
C. americana	-	+	+	+	-	-	-
C. c. cerealis	-	-	-	-	+	-	-
C. c. cyaneoaurata	?	?	?	?	?	?	?
C. h. haemoptera	?	?	?	?	?	?	?
C. h. byzantia	+	-	-	-	-	-	-
C. abchasica	?	?	?	?	?	?	?
C. planicollis	-	-	-	-	+	-	-
C. sturmi	?	?	?	?	?	?	?
C. s. sacarum	-	-	-	-	-	+	-
C. p. polita	+	-	+	+	+	+	+
C. g. graminis	-	+	-	-	-	+	-
C. f. fastuosa	-	-	-	-	+	-	-
C. f. inexplicabilis	?	?	?	?	?	?	?
C. anatolica	-	-	-	-	+	-	-
C. c. cuprina	-	-	-	-	-	+	-
C. c. staneki	?	?	?	?	?	?	?
C. d. didymata	+	+	+	+	+	-	+
C. d. syriaca	-	-	+	-	-	-	-
C. geminata	-	-	-	-	+	+	-
C. h. hyperici	+	+	+	+	+	+	-
C. a. heinzi	-	-	-	-	+	-	-

C. a. excavata	-	-	-	-	+	-	-
C. boluensis	-	-	-	-	+	-	-
C. daccordiana	-	-	-	-	+	-	-
C. differens	-	-	-	-	+	-	-
C. kataevi	-	-	-	-	+	-	-
C. o. orientalis	?	?	?	?	?	?	?
C. o. halysa	?	?	?	?	?	?	?
C. o. sahlbergi	?	?	?	?	?	?	?
C. o. thraeissa	?	?	?	?	?	?	?
C. turca	+	-	-	-	-	-	-
C. v. ottomana	+	+	+	-	+	+	-
C. wittmeri	-	-	-	-	+	-	-
C. o. olivieri	?	?	?	?	?	?	?
C. o. azurea	?	?	?	?	?	?	?
C. p. assurensis	-	-	-	-	-	-	+
C. varians	?	?	?	?	?	?	?
C. gypsophilae	+	+	+	+	+	+	-
C. sanguinolenta	+	-	-	-	-	-	-
C. chalcites	+	+	+	+	+	+	+
C. impavida	?	?	?	?	?	?	?
C. oricalcia	+	-	+	-	-	-	-
C. peregrina	?	?	?	?	?	?	?
C. c. coerulans	+	-	-	+	+	+	-
C. c. angelica	-	+	+	-	-	-	-
C. h. herbacea	+	+	+	+	+	+	-
C. h. alacris	-	-	+	+	-	-	-
C. h. recticollis	-	-	-	-	+	-	-
C. pseudolurida	-	-	+	+	+	+	-
C. reitteri	+	-	+	+	+	+	-
C. a. anceyi	-	-	+	-	-	-	-
C. l. volodi	+	-	-	-	-	+	-
C. collaris	-	-	+	+	-	+	-
C. populi	+	+	+	+	+	+	-
C. s. saliceti	-	-	+	+	+	+	-
C. t. tremula	+	+	-	+	+	+	-
C. v. vigintipunctata	+	-	-	+	+	-	-
C. apicalis	?	?	?	?	?	?	?
C. s. amasiae	-	-	-	-	+	-	-
C. s. transsylvanicus	+	+	-	+	+	+	+
C. confusus	-	-	+	-	-	-	-
C. grandis	-	-	+	-	-	-	-
N. seriatoporus	-	-	+	-	-	-	-
E. adonidis	+	+	+	+	+	+	+
E. sacra	-	+	+	+	-	-	+
E. suturalis	-	-	+	+	+	+	-
G. p. polygoni	+	+	+	+	+	+	+
G. v. viridula	-	-	-	-	+	+	-
G. v. caucasica	-	-	-	-	+	-	-
G. decemnotata	+	-	-	-	-	+	-
G. l. linnaeana	-	-	-	-	+	+	-
G. v. viminalis	?	?	?	?	?	?	?
G. akbesiana	-	-	+	-	-	-	-
G. fornicata	+	+	+	+	+	+	+
L. decemlineata	+	+	+	+	+	+	-
N. pyritosus	+	+	+	+	+	+	+
P. armoraciae	-	-	-	+	+	+	-

P. c. cochleariae	+	+	+	+	+	+	-
P. vulgatissima	+	-	-	+	+	-	-
P. horioni	-	-	+	-	-	-	-
P. laticollis	-	-	-	+	-	-	-
P. t. tibialis	-	-	-	+	+	+	-
P. vitellinae	+	-	-	+	+	+	+
P. versicolora	+	+	+	+	+	+	+
P. a. aenea	+	-	-	+	+	-	-
P. flavocincta	+	-	-	-	-	-	-
P. glabra	-	-	-	-	-	+	-
P. junci	-	+	+	+	+	+	+
P. phellandri	+	-	-	-	+	-	-
Z. suturalis	-	-	-	-	-	-	+

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

Table 2. The regional distribution of all known species group taxa of Timarchinae in Turkey.

TAXON	**R**	**E**	**G**	**I**	**O**	**N**	**S**
	MAR	**AER**	**MER**	**CAR**	**BSR**	**EAR**	**SEAR**
SubfamilyTIMARCHINAE							
T. h. hummelii	-	-	-	-	+	-	-
T. o. olivieri	+	+	-	+	-	-	-
T. pratensis	+	-	-	+	+	-	-
T. r. rugulosa	?	?	?	?	?	?	?
T. tenebricosa	-	-	+	-	+	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

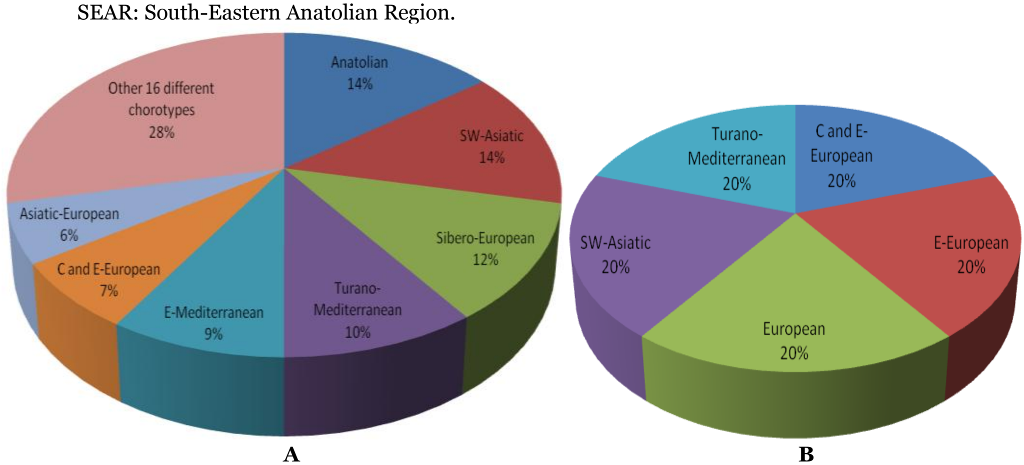

Figure 1. A. Chorotypical distribution of Turkish Chrysomelinae, B. Chorotypical distribution of Turkish Timarchinae.

DESCRIPTION OF A NEW ADULT OF *PODOTHROMBIUM* BERLESE 1910 FROM TURKEY; *PODOTHROMBIUM FILIPES* C.L. KOCH, 1837 (ACARI: PROSTIGMATA: PODOTHROMBIIDAE)

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ABSTRACT: In this study, adult of *Podothrombium filipes* C. L. Koch, 1837 which are first new record for Turkish fauna and are given the morphological characters and drawings of various organs, identification key and its zoogeographical distributions.

KEY WORDS: Acari, Podothrombiidae, *Podothrombium*, adult, Erzincan, Turkey.

Podothrombiidae is a family that has 52 species registered in 2 genus (Makol & Wohltmann, 2012). Genus *Podothrombidium* is widely distributed in Western Palaearctic. One species of this genus has been given which as *Podothrombium proti* from Turkey by Haitlinger (2000) basing on the larvae. But, *P. proti* is regarded a synonym of *P. filipes* by Makol (2005).

In this paper females, males and deutonymphs of *Podothrombium filipes* is firstly described and illustrated, which is collected from Erzincan, Turkey. The species *Podothrombium filipes* adult is recorded from Turkey for the first time.

MATERIAL AND METHODS

Adults collected from land with aspirator, handing sifting and with Berlese funnels. Examined material was preserved in 70% ethyl alcohol and cleared in 9% KOH. Specimens for light microscope studies were fixed on slides in Hoyer's medium (Krantz & Walter, 2009). Measurements were taken and drawings made under a Leica DM 4000 microscope with differential interference contrast and phase contrast. Makol (2005 & 2007) followed for the morphological terminology in the text. All measurements are given in micrometers (μm).

RESULTS AND DISCUSSION

Family Podothrombiidae Thor, 1935
Genus *Podothrombium* Berlese, 1910

Type species *Trombidium filipes* C. L. Koch, 1837

***Podothrombium filipes* C. L. Koch, 1837**

Adult. Standart measurements in Table 1. Colour in life orange-red to brick red. Body length is 1230-1596 and width 759-1061.

Gnathosoma. Internal edge of cheliceral blade serrated (Fig. 1a). Palps curved towards the body venter. Palp tarsus extending beyond the termination of palp tibia claw, covered with numerous solenidia (Fig. 1b).

Idiosoma. Anterior border of aspidosoma concave. Anterior process of crista metopica not clearly marked termination (Fig. 1c). Eyes parallelised, length and width equal length. Anterior lens slightly larger than posterior lens. Sensillary

area of crista metopica widened. Dorsal opisthosomal setae uniform. Setal bases asymmetrical and close to the circle. Dorsal opisthosomal setae pointed toward end and single-side barbed (Fig. 1d). Genital opening between koksa III and IV; consist of epivalve and centrovalve. Epivalve surround centrovalve. Centrovalval setae smooth and sharply terminated. Epivalval setae with several barbs (Fig. 1e).
Legs. Each one occur seven part. Femur divided into basifemur and telofemur. Normal setae on all segments narrowing apically, setulose. All tarsi termination with paired claws. Females Ti I ≤ Ta I and males Ti I > Ta I.
In this species display sexual dimorphism ratio of the Ti I / Ta I length and palp tibia also the structure of dorsal opisthosomal setae.
Males. Standard measurements in Table 1. Ti I > Ta I (Fig. 2c). The basal height of palp tibia almost equal length to the ventral edge of segment. Dorsal surface of palp tibia, 2-3 spine like setae arranged in row behind odontus. Ventral surface of palp tibia, 4-7 spine like or some of splinter setae arranged (Fig. 1b). Dorsal opisthosomal setae not bifurcate at the end (Fig. 1d).
Females. Standard measurements in Table 1. Ti I ≤ Ta I (Fig. 2d). The basal height of palp tibia shorter than ventral edge of segment. Dorsal surface of palp tibia 3-4 spine like setae arranged in row behind odontus. Ventral surface of palp tibia, 4-7 spine like or some of splinter setae arranged (Fig. 2a). Dorsal opisthosomal setae asymmetrically bifurcate at the end (Fig. 2b).
Deutonymphs. Body smaller than adult. Other characters as in adults. Standart measurements are give in Table 1. Ti I < Ta I (Fig. 3c). Dorsal surface of palp tibia with one spine like setae behind odontus (Fig. 3a). Two pairs of genital papillae.
Material examined. 06.11.2012, 1 male. Litter under trees, 39°43'36" N 39°29'38" E 1176 m Ergan mountain, Erzincan, Turkey. 30.06.2012, 17 male. Grassy soil, 39°34'34" N 39°30'17" E 3134 m the valley of snow water. Ergan Mountain, Erzincan, Turkey. 30.06.2012, 15 female. Grassy soil, 39°34'34" N 39°30'17" E 3134 m, Ergan Mountain Erzincan, Turkey. 30.06.2012, 1 deutonymph. Grassy soil, 39°34'34" N 39°30'17" E 3134 m the valley of snow water. Ergan Mountain, Erzincan, Turkey. Leg. S. Adil.
Disribution. Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania, Moldova, Norway, Poland, Slovenia, Sweden, Switzerland, Ukraine, Turkey (Makol & Wohltmann, 2012).

DISCUSSION

Podothrombium filipes are given from Turkey similar to the European specimens. But differs by structure of crista metopica and dorsal setae (*pDS*). European specimens, anterior and posterior border of crista metopica marked but of Turkish specimens not clearly marked. Dorsal setae (*pDS*) in male similar to European specimens but females don't. In female of European specimens, dorsal setae (*pDS*) stour, with several barbs esp. in distal part of a stem and asymmetrically bifurcate at the end. But in Turkish specimens, sharply terminated top of stem not divided. Morphometric data on adult of Turkish specimens and European specimens show of Table 1.

ACKNOWLEDGEMENTS

This work was produced mainly from the material supported by Scientific Research Project (BAP) number 11.02.08. This study is a part of the first author's master degree.

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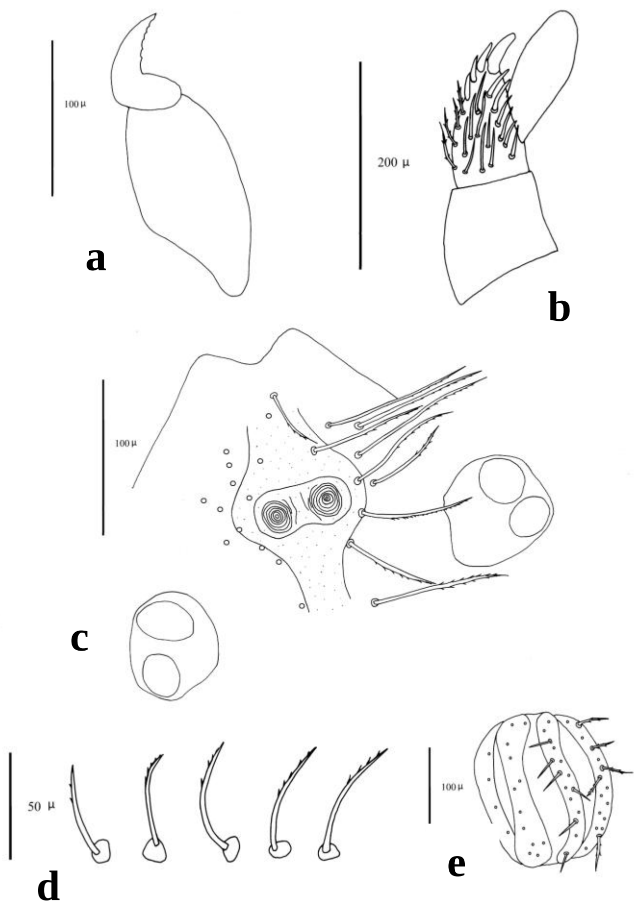

Figure 1. *Podothrombium filipes* (C. L. Koch). Male. a) Chelicer b) Palp c) Crista metopica d) *pDS* setae e) Genital opening.

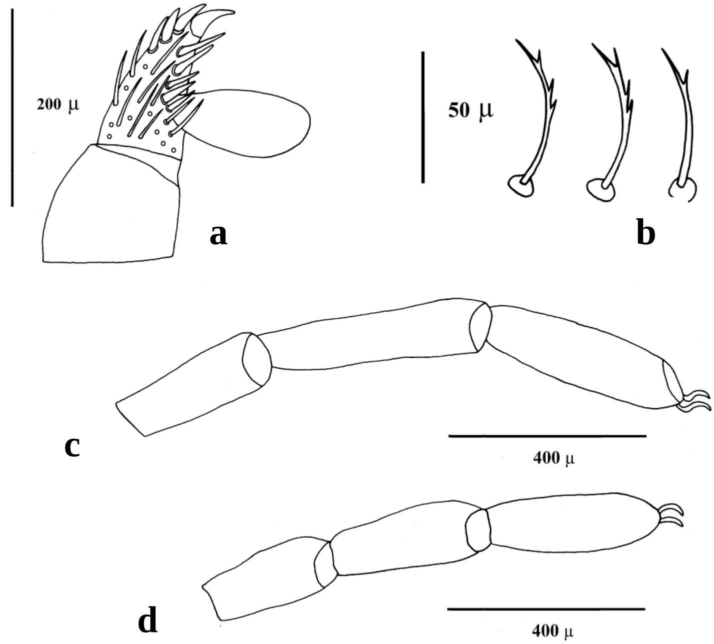

Figure 2. *Podothrombium filipes* (C. L. Koch). Female. a) Palp b) *pDS* setae c) Male Leg I d) Female Leg I.

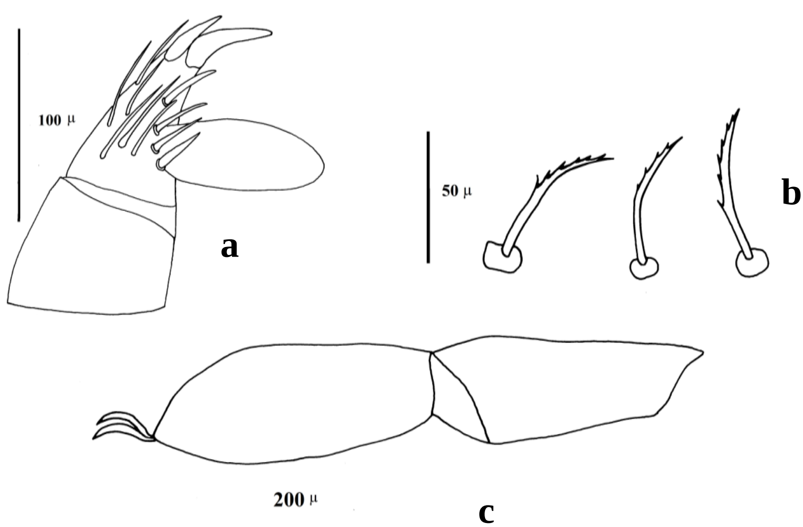

Figure 3. *Podothrombium filipes* (C. L. Koch). Deutonymph. a) Palp b) *pDS* setae c) Leg I.

Table 1. Morphometric data on adults and deutonymphs of *Podothrombium filipes* (C. L. Koch).

Character	*Podothrombium filipes* male		*Podothrombium filipes* female				*Podothrombium filipes* deutonymph	
	Turkish Specimens Mean (n=6)	Europe Specimens (n=1)	Turkish Specimens min.	Turkish Specimens max.	Europe Specimens min.	Europe Specimens max.	Turkish Specimens (n=1)	Europe Specimens Mean
L	1641,8	1540	1230	1596	1925	3080	1213	117,3
W	1099,3	847	759	1061	1078	1694	877	611,8
L/W	1,51	1,8	1,5	1,62	1,5	2	1,38	1,7
CML	256,4	-	-	-	181,7	304,1	-	134,3
SB	35,8	43,4	25,6	40,6	35,5	51,3	26,7	30,6
S	168,8	-	98,7	207	209,3	237	201	135,6
E	84,3	102,7	55	81,2	67,1	114,5	50	43,9
pDS min./max.	44,3 / 61,1	49 / 59	35	62	49,5	59,4	39/46	39,5/55,4
GOP I	361,2	225,1	246,5	246,5	25,7	379,2	-	135,2
GOP w	237,4	185,6	195,7	195,7	217,2	331,8	-	104,7
GOP I/w	1,56	1,2	1,25	1,25	1,1	1,4	-	1,3
Ch	42,4	43,4	38,3	46,7	47,4	67,1	33,4	39
TiCI	46,9	55,3	42,4	49,8	43,4	75	45,4	42,3
PaTa	133,8	120	130,3	153,6	122,5	162,5	83,1	67,2
Ti I	353,1	523,6	272,2	385	235,2	400,4	205	142,1
Ta I I	345,3	462	291	413	277,2	446,6	201	202,7
Ta I w	124,9	130,3	110	138	114,5	184,8	85	98,3
Ta I I/w	2,77	3,5	2,64	2,99	2,1	3,8	2,36	2,1

TURKISH RED LIST CATEGORIES OF LONGICORN BEETLES (COLEOPTERA: CERAMBYCIDAE) PART II – SUBFAMILY LEPTURINAE: XYLOSTEINI, ENOPLODERINI, RHAMNUSIINI, OXYMIRINI AND RHAGIINI

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[**Özdikmen, H.** 2014. Turkish Red List Categories of Longicorn Beetles (Coleoptera: Cerambycidae) Part II – Subfamily Lepturinae: Xylosteini, Enoploderini, Rhamnusiini, Oxymirini and Rhagiini. Munis Entomology & Zoology, 9 (1): 292-312]

ABSTRACT: The aim of this study is to create a Turkish Red List of the longicorn beetles. Moreover, presence such a Red List is necessary for Turkey. Even governmental evaluations could cause some erroneous decisions due to absence such a Red List. Since, governmental evaluations at the present time are based on the works that are realized with respect to the European Red List. Furthernore, Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures. So, the status of European fauna and the status of Turkish fauna are not the same. Clearly, there is no any work that subjected to create a Turkish Red List except Parts I. Hence, a series work is planned with this purpose. This type of study is the second attempt for Turkey.

KEY WORDS: Red List, Conservation, Cerambycidae, Turkey

The purpose of the current study was to create a Turkish Red List of longicorn beetles similarly to "European Red List of Saproxylic Beetles" that was compiled by Ana Nieto & Keith N. A. Alexander and published by IUCN (International Union for Conservation of Nature) in collaboration with the European Union in 2010. "European Red List of Saproxylic Beetles" includes 153 species within the subfamilies Prioninae, Cerambycinae and Lamiinae of the European Cerambycidae. So, it does not include any members of the subfamily Lepturinae. In the future, I hope that the present work will be lead to preparation a more comprehensive "Turkish Red List".

Hence, a series work is planned with this purpose. The present study is attempted as the second step of this aim. The previous work is Özdikmen (2014). It should be noted that the using information at the present work on Turkish longicorn beetles are on the base of my personal database. The data of distribution are given on base of Löbl & Smetana (2010, 2011), Danilevsky (2010a,b, 2012a,b,c,d, 2013), Özdikmen (2011) and Miroshnikov (2011). Identification of chorotypes is based on the chorotype classification of the Anatolian fauna, proposed by Vigna Taglianti et al. (1999).

The evaluations of Turkish longicorn beetles at the present work based on "The IUCN Red List Categories" that was presented in Part I (Özdikmen, 2014).

TURKISH RED LIST FOR LEPTURINAE (TRIBES XYLOSTEINI, ENOPLODERINI, RHAMNUSIINI, OXYMIRINI AND RHAGIINI)

SUBFAMILY LEPTURINAE Latreille, 1802: 218

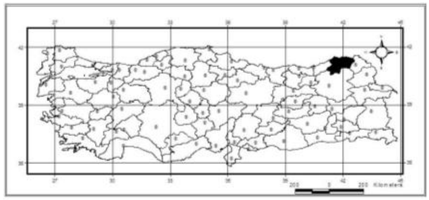
TRIBE XYLOSTEINI Reitter, 1913: 5

GENUS *XYLOSTEUS* Frivaldszky, 1837: 180

SPECIES *X. caucasicola* Plavilstshikov, 1936: 496

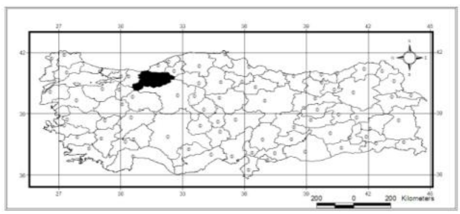
The species is known only from NE Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Caucasus, Transcaucasia (Georgia), Turkey.
Chorotype: SW-Asiatic



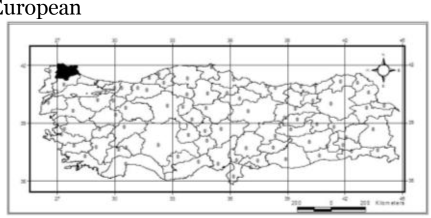
SPECIES *X. kadleci* Miroshnikov, 2000: 38

The endemic species is known only from NW Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *X. spinolae* Frivaldszky, 1837: 180

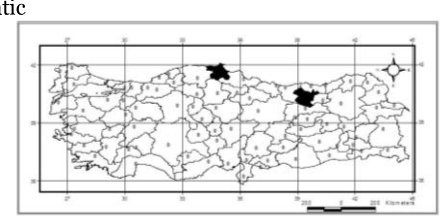
The species is known only from European Turkey for Turkey. So, Turkish Red List category of the species is **VU**.
Range: C and E Europe, European Turkey.
Chorotype: C and E European



GENUS *LEPTORHABDIUM* Kraatz, 1879: 118

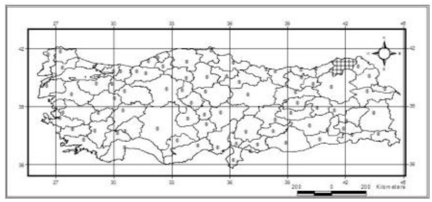
SPECIES *L. caucasicum* (Kraatz, 1879: 118)

The species is known only from NC and NE Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic



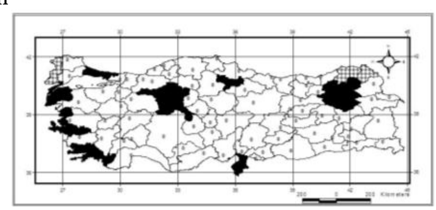
TRIBE ENOPLODERINI Bartenev, 2009: 6
GENUS *ENOPLODERES* Faldermann, 1837: 309
SUBGENUS *ENOPLODERES* Faldermann, 1837: 309
SPECIES *E. sanguineus* Faldermann, 1837: 310

The species is known only from the data of reference without any exact locality. It probably can occur in NE Anatolia. So, Turkish Red List category of the species is **NE**.
Range: E Europe (Ukraine), Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran.
Chorotype: SW-Asiatic



TRIBE RHAMNUSIINI Sama [in Sama and Sudre], 2009: 383
GENUS *RHAMNUSIUM* Latreille, 1829: 130
SPECIES *R. bicolor* (Schrank, 1781: 132)

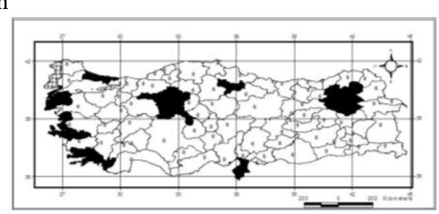
The species probably is widely distrbuted in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Kazakhstan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria.
Chorotype: European



Moreover, the species is represented by three subspecies in Turkey as *R. bicolor testaceipenne* Pic, 1897, *R. bicolor praeustum* Reitter, 1895 and *R. bicolor juglandis* Fairmaire, 1866.

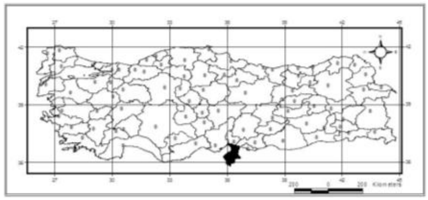
SUBSPECIES *R. b. juglandis* Fairmaire, 1866: 276

The endemic subspecies probably is widely distrbuted in Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Turkey.
Chorotype: Anatolian



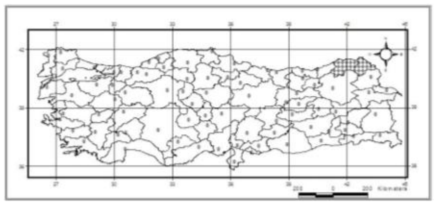
SUBSPECIES *R. b. praeustum* Reitter, 1895: 85

The endemic subspecies is known only from SC Anatolia. So, Turkish Red List category of the subspecies is **EN**.
Range: Turkey.
Chorotype: Anatolian



SUBSPECIES *R. b. testaceipenne* Pic, 1897: 299

The subspecies is known only from the data of reference without any exact locality. It probably occurs only in NE Anatolia. So, Turkish Red List category of the subspecies is **DD**.
Range: E Europe (Ukraine), Caucasus, Transcaucasia (Armenia, Georgia), Turkey.
Chorotype: SW-Asiatic

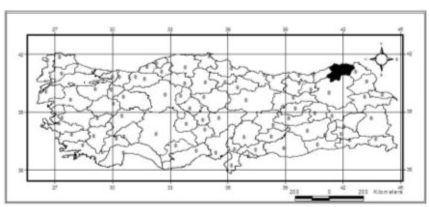


TRIBE OXYMIRINI Danilevsky, 1997: 8

GENUS *OXYMIRUS* Mulsant, 1862: 464

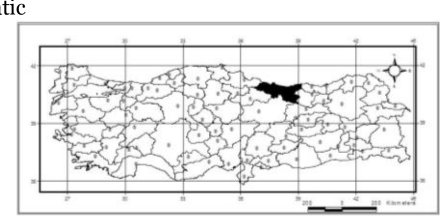
SPECIES *O. cursor* (Linnaeus, 1758: 393)

The species is known only from NE Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Europe, Caucasus, Turkey.
Chorotype: European



SPECIES *O. mirabilis* (Motschulsky, 1838: 183)

The species is known only from NE Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: SW-Asiatic



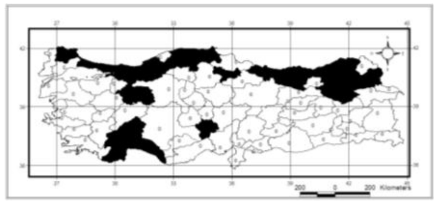
TRIBE RHAGIINI Kirby, 1837: 178

GENUS *RHAGIUM* Fabricius, 1775: 182

SUBGENUS *HAGRIUM* Villiers, 1978: 85

SPECIES *R. bifasciatum* Fabricius, 1775: 183

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: European

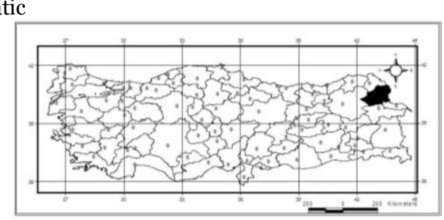


SUBGENUS *MEGARHAGIUM* Reitter, 1913: 6

SPECIES *R. caucasicum* Reitter, 1889: 287

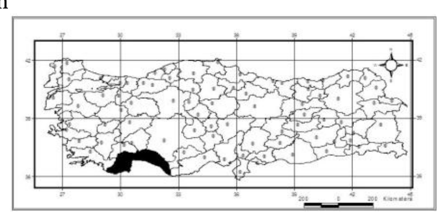
SUBSPECIES *R. c. caucasicum* Reitter, 1889: 287

The species is known only from NE Anatolia for Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the species is **VU**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic



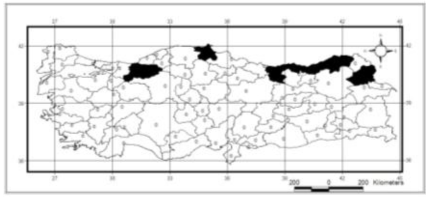
SPECIES *R. elmaliense* Schmid, 1999: 157

The endemic species is known only from SW Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *R. fasciculatum* Faldermann, 1837: 304

The species is known only from N Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic

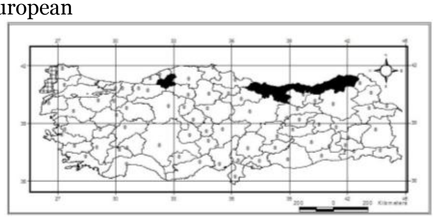


SPECIES *R. mordax* (DeGeer, 1775: 124)

The species is known only from N Turkey. So, Turkish Red List category of the species is **NT**.

Range: Europe, Siberia, Kazakhstan, Caucasus, Turkey.

Chorotype: Sibero-European

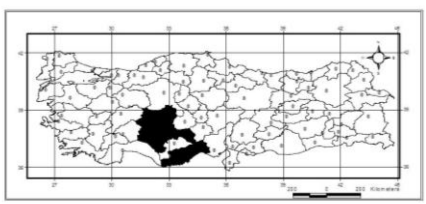


SPECIES *R. phrygium* K. Daniel, 1906: 176

The endemic species is known only from CS Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

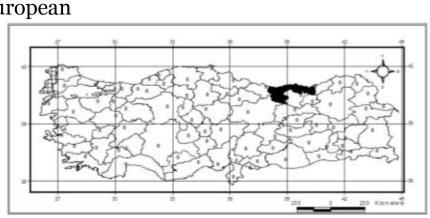


SPECIES *R. sycophanta* (Schrank, 1781: 137)

The species is known only from N Turkey. So, Turkish Red List category of the species is **NT**.

Range: Europe, W Siberia, Caucasus, Turkey.

Chorotype: Sibero-European

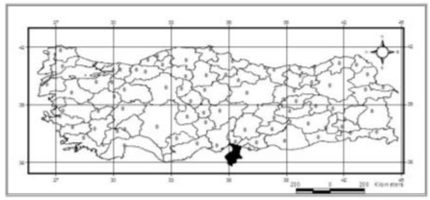


SPECIES *R. syriacum* Pic, 1892: CXI [1893: 414]

The species is known only from SC Anatolia. So, Turkish Red List category of the species is **EN**.

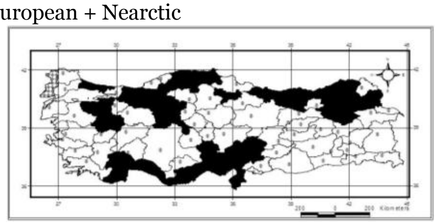
Range: Turkey, Syria.

Chorotype: SW-Asiatic



SUBGENUS *RHAGIUM* Fabricius, 1775: 182
SPECIES *R. inquisitor* (Linnaeus, 1758: 393)

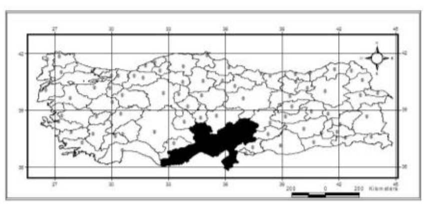
The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Nearctic Region.
Chorotype: Asiatic-European + Nearctic



Moreover, the species is represented by three subspecies in Turkey as the nominative subspecies, *R. inquisitor fortipes* Reitter, 1898 and *R. inquisitor schtschukini* Semenov, 1898.

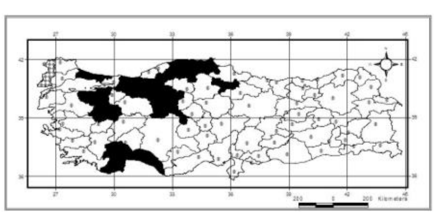
SUBSPECIES *R. i. fortipes* Reitter, 1898: 357

The endemic subspecies is known only from SC Anatolia. So, Turkish Red List category of the subspecies is **NT**.
Range: Turkey.
Chorotype: Anatolian



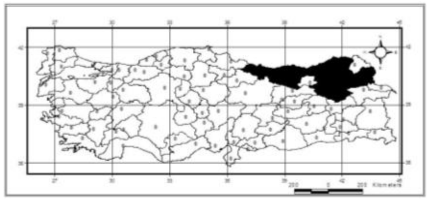
SUBSPECIES *R. i. inquisitor* (Linnaeus, 1758: 393)

The subspecies probably is widely distributed in Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Europe, Siberia, Kazakhstan, Mongolia, Caucasus, Turkey, Nearctic Region.
Chorotype: Sibero-European + Nearctic



SUBSPECIES *R. i. schtschukini* Semenov, 1898: 601

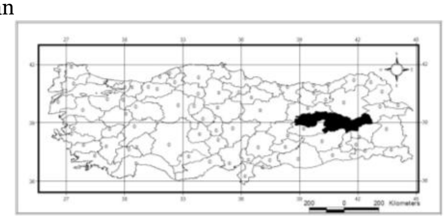
The subspecies is known only from NE Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic



GENUS *AKIMERUS* Audinet-Serville, 1835: 212

SPECIES *A. berchmansi* Breit, 1915: 353

The endemic species is known only from E Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian

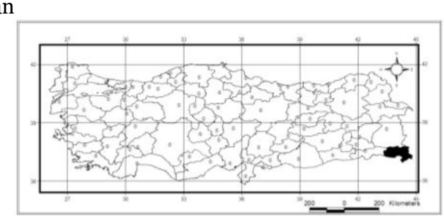


GENUS *STENOCORUS* Geoffroy, 1762: 221

SUBGENUS *ANISORUS* Mulsant, 1862: 467

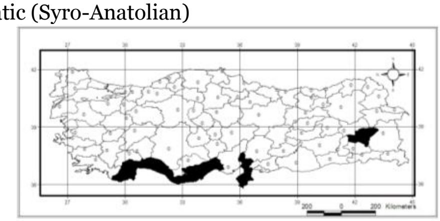
SPECIES *S. brunnescens* (Holzschuh, 1991: 5)

The endemic species is known only from SE Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian



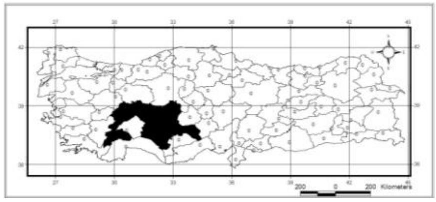
SPECIES *S. heterocerus* (Ganglbauer, 1882: 139)

The species is known only from S and SE Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Turkey, Syria.
Chorotype: SW-Asiatic (Syro-Anatolian)



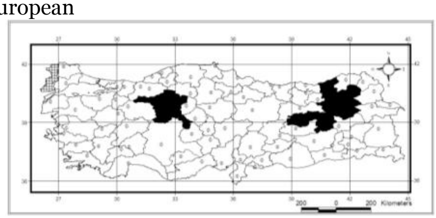
SPECIES *S. homocerus* (K. Daniel, 1900: 139)

The endemic species is known only from CSW Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *S. quercus* (Götz, 1783: 74)

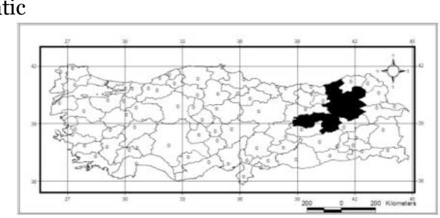
The species is known from both European Turkey and Anatolia. However, Turkish Red List category of the species is **NT** now.
Range: Europe, Siberia, Mongolia, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: Sibero-European



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *S. quercus aureopubens* (Pic, 1908).

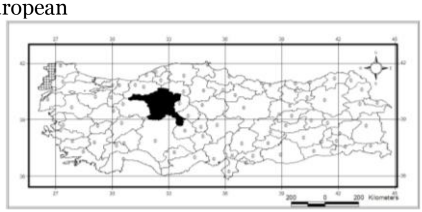
SUBSPECIES *S. q. aureopubens* (Pic, 1908: 2)

The subspecies probably is rather widely distributed in NE and E Anatolia. So, Turkish Red List category of the subspecies is **NT** now.
Range: Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: SW-Asiatic



SUBSPECIES *S. q. quercus* (Götz, 1783: 74)

The subspecies probably is rather widely distributed in European Turkey and NW Anatolia. However, Turkish Red List category of the subspecies is **DD** now.
Range: Europe, Siberia, Mongolia, Caucasus, Turkey.
Chorotype: Sibero-European



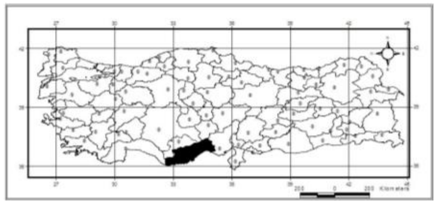
SUBGENUS *STENOCORUS* Geoffroy, 1762: 221

SPECIES *S. auricomus* (Reitter, 1890: 250)

The endemic species is known only from SCW Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian



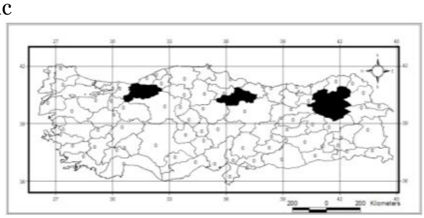
SPECIES *S. insitivus* (Germar, 1824: 520)

SUBSPECIES *S. i. insitivus* (Germar, 1824: 520)

The species is known only from N Anatolia. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the species is **NT**.

Range: E Europe (Ukraine), Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: SW-Asiatic

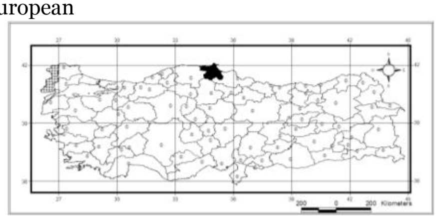


SPECIES *S. meridianus* (Linnaeus, 1758: 398)

The species is known from both European Turkey and Anatolia. However, Turkish Red List category of the species is **DD**.

Range: Europe, Siberia, Kazakhstan, Caucasus, Turkey.

Chorotype: Sibero-European

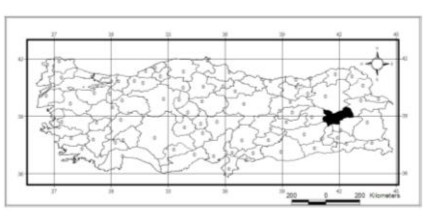


SPECIES *S. serratus* Holzschuh, 1974: 86

The endemic species is known only from E Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian

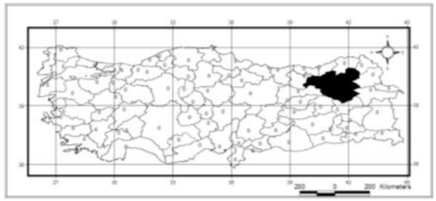


SPECIES *S. vittidorsum* (Reitter, 1890: 250)

The species is known only from NE Anatolia. So, Turkish Red List category of the species is **NT**.

Range: Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: SW-Asiatic



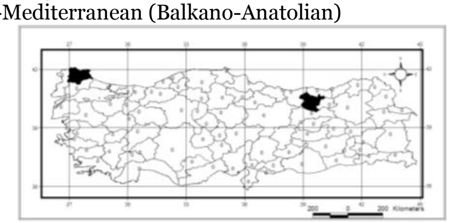
GENUS *BRACHYTA* Fairmaire, 1864: 185

SPECIES *B. balcanica* Hampe, 1871: 336

The species is known only from N Turkey. So, Turkish Red List category of the species is **DD**.

Range: SE Europe, Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)

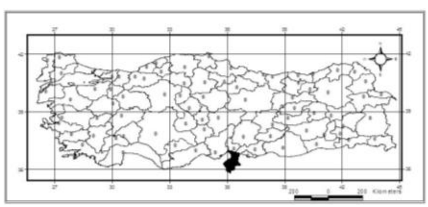


SPECIES *B. delagrangei* Pic, 1891: 102

The endemic species is known only from SC Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian



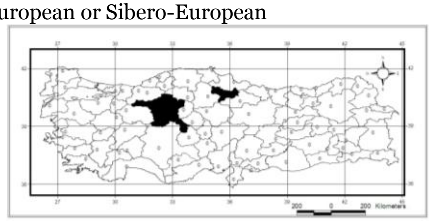
GENUS *ACMEOPS* LeConte, 1850: 235

SPECIES *A. marginatus* (Fabricius, 1781: 247)

The species is known only from CN Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Europe, Siberia, Far East Russia, Japan, Kazakhstan, Mongolia, China, T urkey.

Chorotype: Asiatic-European or Sibero-European



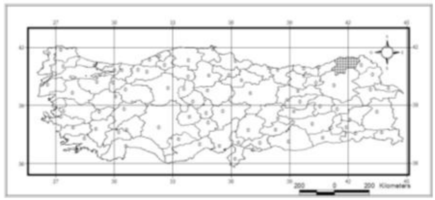
GENUS *GNATHACMEOPS* Linsley & Chemsak, 1972: 135

SPECIES *G. pratensis* (Laicharting, 1784: 172)

The species occurs in Turkey according to references without any exact locality. It is distributed at least in NE Anatolia. So, Turkish Red List category of the species is **NE**.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Kirgizia, Mongolia, Uzbekistan, Korea, China, T urkey, Nearctic Region.

Chorotype: Asiatic-European + Nearctic Region



GENUS *DINOPTERA* Mulsant, 1863: 494

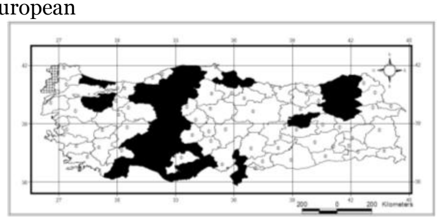
SUBGENUS *DINOPTERA* Mulsant, 1863: 494

SPECIES *D. collaris* (Linnaeus, 1758: 398)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Kazakhstan, Mongolia, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, T urkey.

Chorotype: Sibero-European

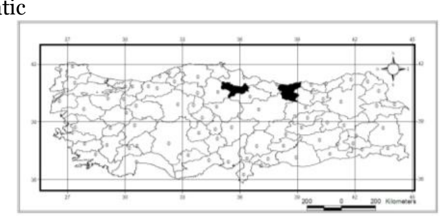


SPECIES *D. concolor* (Heyden & Faust, 1888: 45)

The species is known only from NC to NE Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.

Range: T urkey, Transcaucasia (Georgia).

Chorotype: SW-Asiatic



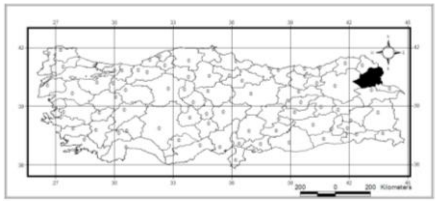
GENUS *CORTODERA* Mulsant, 1863: 572

SPECIES *C. aestiva* Sama & Rapuzzi, 1999: 466

The endemic species is known only from the type locality in NE Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian

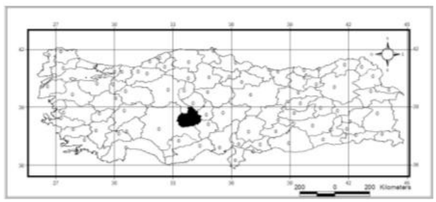


SPECIES *C. aksarayensis* Özdikmen & Özbek, 2012: 931

The endemic species is known only from the type locality in CS Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian

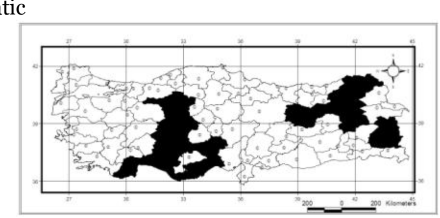


SPECIES *C. alpina* (Ménétries, 1832: 230)

The species is rather widely distributed in Anatolia. So, Turkish Red List category of the species is **LC**.

Range: Caucasus (e.g. Dagestan), Transcaucasus (Armenia, Azerbaijan, Goergia), Iran, Turkey.

Chorotype: SW-Asiatic



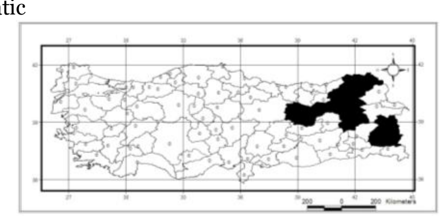
Moreover, the species is represented at least by two subspecies in Turkey as *C. alpina armeniaca* Pic, 1898 and *C. alpina xanthoptera* Pic, 1898.

SUBSPECIES *C. a. armeniaca* Pic, 1898: 114

The subspecies is known from NE and E Anatolia. However, Turkish Red List category of the subspecies is **DD**.

Range: Transcaucasia (Armenia), Turkey.

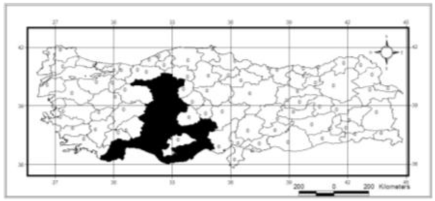
Chorotype: SW-Asiatic



SUBSPECIES *C. a. xanthoptera* Pic, 1898: 115

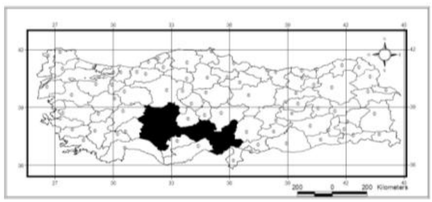
The endemic subspecies is known only from C and S Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Turkey.
Chorotype: Anatolian



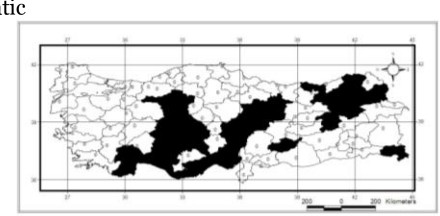
SPECIES *C. cirsii* Holzschuh, 1975: 82

The endemic species is known only from CS and SC CS Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian



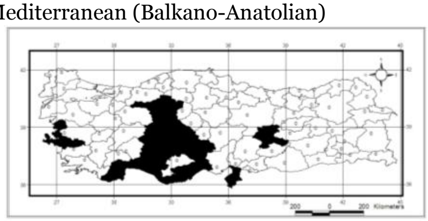
SPECIES *C. colchica* Reitter, 1890: 246
SUBSPECIES *C. c. colchica* Reitter, 1890: 246

The species is rather distributed in Anatolia. So, Turkish Red List category of the species is **LC**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria, Lebanon.
Chorotype: SW-Asiatic



SPECIES *C. discolor* Fairmaire, 1866: 277

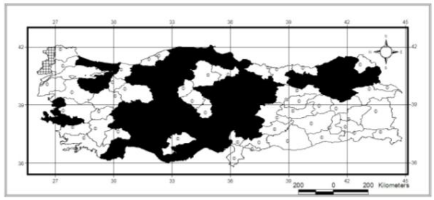
The species probably is rather widely distributed at least in W half of Turkey. However, Turkish Red List category of the species is **NT**.
Range: E Europe (Bulgaria), Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian)



SPECIES *C. flavimana* (Waltl, 1838: 471)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

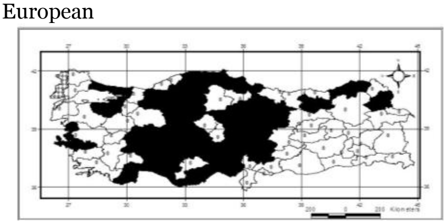
Range: C and E Europe, Turkey.
Chorotype: C and E European



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *C. flavimana corallipes* Pesarini & Sabbadini, 2009. The distribution patterns of the subspecies is still need confirmation now.

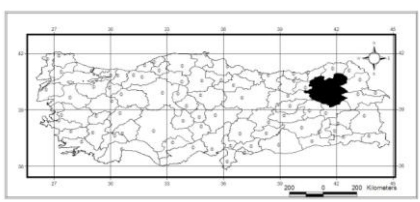
SUBSPECIES *C. f. flavimana* (Waltl, 1838: 471)

The subspecies is widely distributed in Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: C and E Europe, Turkey.
Chorotype: C and E European



SUBSPECIES *C. f. corallipes* Pesarini & Sabbadini, 2009: 19

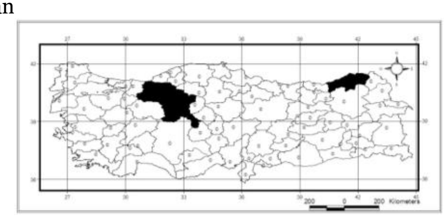
The endemic subspecies is known only from The type locality in NE Anatolia. So, Turkish Red List category of the subspecies is **DD**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *C. humeralis* (Schaller, 1783: 297)

SUBSPECIES *C. h. humeralis* (Schaller, 1783: 297)

The species is known only from N Anatolia for Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the species is **DD**.
Range: Europe, Caucasus, Turkey.
Chorotype: European

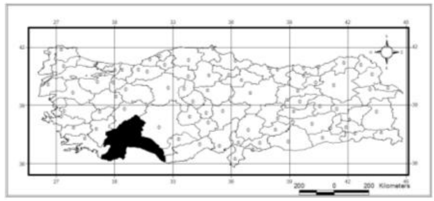


SPECIES *C. imrasanica* Sama & Rapuzzi, 1999: 464

The endemic species is known only from the type locality in SW Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

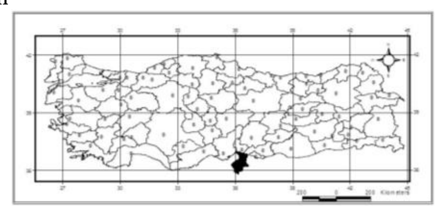


SPECIES *C. longipilis* Pic, 1898: 50

The endemic species is known only from the type locality in SC Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian

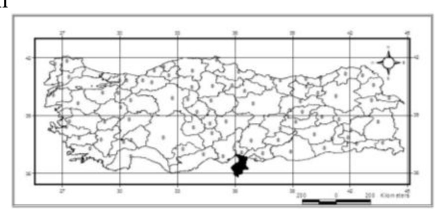


SPECIES *C. obscurans* Pic, 1892: CXI

The endemic species is known only from the type locality in SC Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian

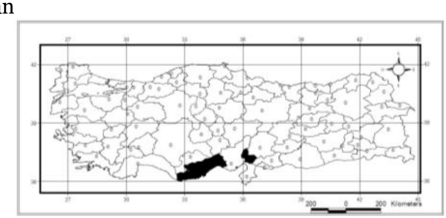


SPECIES *C. omophloides* Holzschuh, 1975: 77

The endemic species is known only from SC Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian

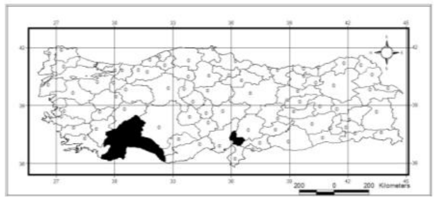


SPECIES *C. orientalis* Adlbauer, 1988: 264

The endemic species is known only from SC and SW Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

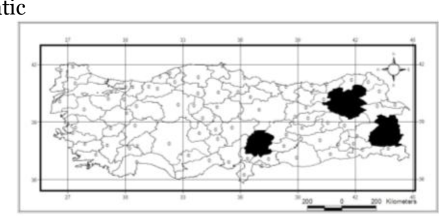


SPECIES *C. pseudomophlus* Reitter, 1889: 40

The species is known only from E half of Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Transcaucasia (Armenia, Azerbaijan), Iran, Turkey.

Chorotype: SW-Asiatic

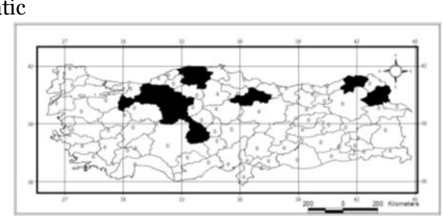


SPECIES *C. pumila* Ganglbauer, 1882: 710

The species is known only from N and C Anatolia. So, Turkish Red List category of the species is **LC**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: SW-Asiatic



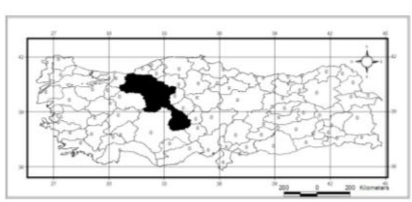
Moreover, the species is represented by two subspecies in Turkey as *C. pumila meltemae* Özdikmen et al., 2012 and *C. pumila tournieri* Pic, 1895. The distribution patterns need confirmation at least for NW Anatolian records (Bilecik, Bolu, Kastamonu).

SUBSPECIES *C. p. meltemae* Özdikmen, Mercan, Cihan, 2012: 746

The endemic species is known only from the type locality in C and CNW Anatolia. So, Turkish Red List category of the subspecies is **DD**.

Range: Turkey.

Chorotype: Anatolian

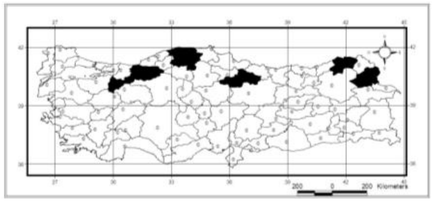


SUBSPECIES *C. p. tournieri* Pic, 1895: 75

The subspecies is known only from N Anatolia. So, Turkish Red List category of the subspecies is **LC**.

Range: Transcaucasia (Armenia, Georgia), Turkey.

Chorotype: SW-Asiatic

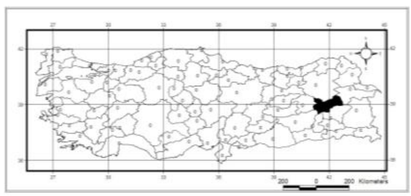


SPECIES *C. ranunculi* Holzschuh, 1975: 80

The endemic species is known only from the type locality in E Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian

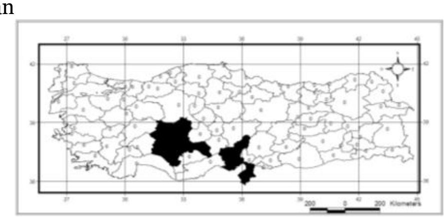


SPECIES *C. rubripennis* Pic, 1891: 102

The endemic species is known only from SC and CS Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

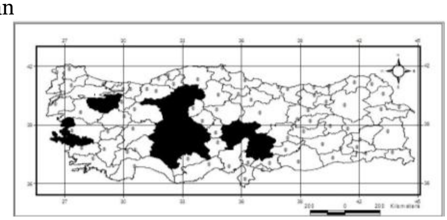


SPECIES *C. f. rufipes* (Kraatz, 1876: 344)

The endemic species probably is rather widely distributed in Anatolia. So, Turkish Red List category of the species is **LC**.

Range: Turkey.

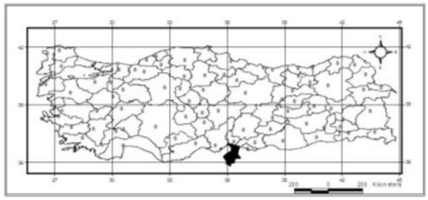
Chorotype: Anatolian



SPECIES *C. semilivida* Pic, 1892: CXCIII

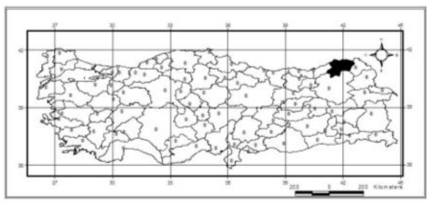
The endemic species is known only from the type locality in SC Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.
Chorotype: Anatolian



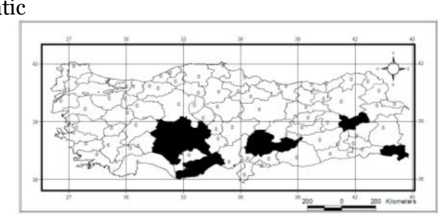
SPECIES *C. simulatrix* Holzschuh, 1975: 83

The endemic species is known only from the type locality in NE Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *C. syriaca* Pic, 1901: 90

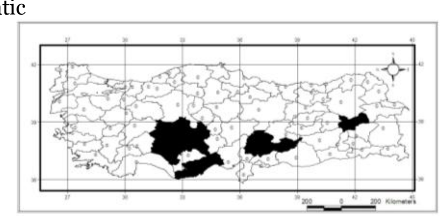
The species probably is widely distributed in CS, SC, SE and E Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.
Range: Transcaucasia (Armenia, Azerbaijan), Iran, Turkey, Syria, Lebanon.
Chorotype: SW-Asiatic



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *C. syriaca nigroapicalis* Holzschuh, 1981.

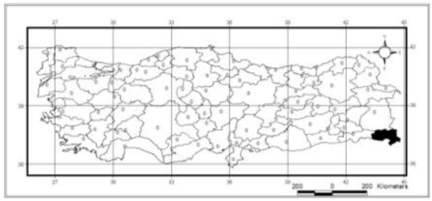
SUBSPECIES *C. s. syriaca* Pic, 1901: 90

The subspecies is known only from N Anatolia. So, Turkish Red List category of the subspecies is **LC**.
Range: Transcaucasia (Armenia, Georgia), Turkey.
Chorotype: SW-Asiatic



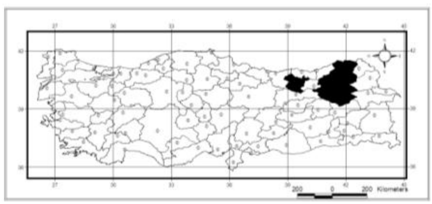
SUBSPECIES *C. s. nigroapicalis* Holzschuh, 1981: 95

The subspecies is known only from SE Anatolia. So, Turkish Red List category of the subspecies is **EN**.
Range: Turkey, Iran.
Chorotype: SW-Asiatic



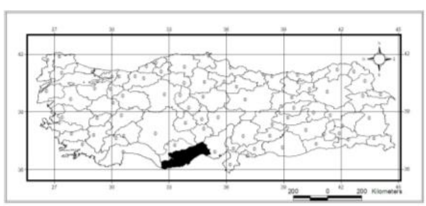
SPECIES *C. uniformis* Holzschuh, 1975: 79

The endemic species is known only from NE Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian



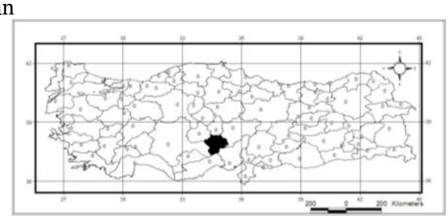
SPECIES *C. wewalkai* Holzschuh, 1995: 9

The endemic species is known only from the type locality in SC Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *C. wittmeri* Holzschuh, 1995: 9

The endemic species is known only from the type locality in CSE Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian

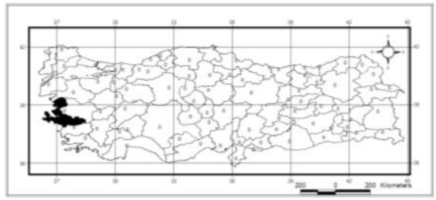


SPECIES *C. zoiai* Pesarini & Sabbadini, 2009: 17

The endemic species is known only from the type locality in W Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian



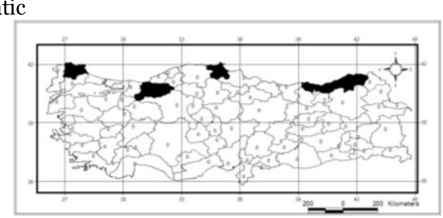
GENUS *FALLACIA* Mulsant & Rey, 1863: 180

SPECIES *F. elegans* (Faldermann, 1837: 319)

The species is known only from N Turkey. So, Turkish Red List category of the species is **NT**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: SW-Asiatic



Note: The conclusions and cited references for Turkish Lepturinae will be presented at the end of evaluations in Part III.

THE SYNERGISTIC EFFECT OF PHENOLIC COMPOUNDS ON POLYPHAGOUS HERBIVORE *EUPROCTIS* CHRYSORRHOEA (L.) (LEPIDOPTERA: LYMANTRIIDAE)

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[Yanar, O. & Topkara, E. F. 2014. The synergistic effect of phenolic compounds on polyphagous herbivore *Euproctis chrysorrhoea* (L.) (Lepidoptera: Lymantriidae). Munis Entomology & Zoology, 9 (1): 313-319**]**

ABSTRACT: This study aims at putting forward the co-effects of secondary compounds on total food consumption, the amount of pupal lipid and protein, weight of pupae and development time in the last larval stage of *Euproctis chrysorrhoea*. A non-choice feeding experiment was applied with a total of 14 foods. While the total food consumption of the larvae feeding on food with tannic and gallic acid increased, the total food consumption of the larvae feeding on food with p-coumaric acid decreased. The total food consumption of the larvae feeding on food with a double concentration of gallic and p-coumaric acid increased, yet the total food consumption of the larvae feeding on food with a double concentration of tannic and p-coumaric acid decreased. While the pupal weight decreased when the food contained gallic and p-coumaric acid, it increased when the food contained tannic acid. It decreased in all double concentrations. Pupal lipit and protein amounts decreased in the food where the secondary compounds were found in triple combinations. The longest evolution time was observed in the larvae feeding on the food that contained the double combination of gallic and tannic acid.

KEY WORDS: *Euproctis chrysorrhoea,* secondary compounds, artificial diet.

Plants contain chemicals known as secondary metabolite (allelochemical) that does not directly affect the reproduction, evoulution and growth of organisms but has a functional effect on the survival, evolution and behaviour of species. These chemicals are generally synthesis products of primary metabolites (Whittaker, 1970). It is known that these compounds perform the function of being deterrent to the herbivores or being toxic against them (Fraenkel, 1959; Ehrlich & Raven, 1964).

One of these substances is phenolic compounds. Phenolic compounds are aromatic compounds containing one or more hydroxyl group. Functioning in plant-herbivore interaction, phenolic compounds are benzoic acids, hydroxycinnamic acids (and its derivations), stilbenes, flavanoid (specifically flavonols), hydrolysable tannins, condensed tannins (katekin polymers) and lignins (Constable, 1999).

This research aims at studying the co-effect of secondary compounds on *Euproctis chrysorrhoea*. For this purpose, 3 phenolic compounds (tannic acid, gallic acid and *p*-coumaric acid) with different molecular weights will be used and the co-effect of these phenolic compounds on the nutrition and growth of last larval stage will be studied.

MATERIAL AND METHODS

E. chrysorrhoea larvae were collected from *Crataegus monogyna* around Cernek lake in Bafra, Samsun in July, 2011. For each food group, 10 larvae were put in plastic cases (sized 5cm x 10cm x 2cm) one by one and feeding experiment was iniated. For these feeding experiments, every other day a new food was given after weighed in 0,001 gr sensitive scale and after the remaining food was dried in incubator, their dry weight was calculated. This process was carried out until the larvae turned into pupae.

The artificial food developed by Yamamoto (1969) was modified and used as the control food the feed the larvae. The content of Yamamoto's artifical food is wheat germ (Sigma, W-0125), casein as the protein (Sigma, C 6554), (30g/kg (modified amount)); saccharose as the carbohydrate (Sigma, S 1888), (30g/kg (modified amount)), torula yeast (Sigma, Y 4625), vitamin mixture (Sigma, V-1007), salt mixture (Sigma, W 1374), cholesterol (Sigma, C 2044), sorbic acid (Sigma, S 1626), methyl paraben (Sigma, H 3647), linseed oil (Sigma, L 3026), agar and water. Other foods were prepared by putting secondary compounds such as tannic acid (T.A), gallic acid (G.A) and p-coumaric acid (P.C.A) into the control food. By adding an amount of 1, 3 and 5% of tannic acid, gallic acid and *p*-coumaric acid of total dry weight to artificial food, 9 foods were prepared and by adding an amount of 3% of tannic acid, gallic acid and *p*-coumaric acid of dry weight to artificial food, 3 foods with double combination, a food with triple combination (TA+GA+PCA) and a control food were made. Therefore, 14 foods were prepared. These foods are shown in Table 1. The pupae at the end of the feeding experiments were dried in incubator at 50°C degree. Then, in order to determine the fat content they were kept in chloroform for 24 hours and this process was repeated 3 times. They were put into the incubator and redried. After that, the weights of the larvae without lipit were calculated. The determination of nitrogen in pupae were carried out with semi-micro Kjeldahl method and Kjeltec Auto 1030 analyser (Tecator, Sweden). The nitrogen amounts found at the end of this process were multiplied by 6,25 constant and the percentage of the protein amounts was found (Monk, 1987). The total food consumption, pupal weight, the amount of pupal lipid and protein and development time derived from the larvae feeding in food groups were determined by ANOVA and Dunnet test (SPSS 17 version) was used.

RESULTS AND DISCUSSION

The total food consumption of the larvae feeding on food that contained tannic acid (B, C, D food) and gallic acid (E, F, G food) is much more when compared to control food (Table 2). It is important that total food consumption of the larvae feeding on food with tannic acid is more when compared to control food. It is known that a number of secondary compounds, specifically tannins are deterrent to herbivores. Contrary to this study, that tannic acid amount reduces total consumption is derived from the studies carried out with *Locusta migratoria* and *M. Disstria* (Simpson ve Raubenheimer 2001; Hemming &Lindroth, 1995; Hemming & Lindroth, 2000). This result may be regarded as defunctioning the negative effects physiologically when *E. Chrysorrhea* larvae take into secondary substances one at a time.

The total food consumption of the larvae feeding on food that contained p-coumaric acid (H,K, L food) is less when compared to control food and other foods (Table 2). Even though tannic acid, gallic acid and p-coumaric acid are all phenolic compounds, this difference in mode of action is significant. the chemical structure of phenolic compounds and the physiological roles vary with the phenolic in relation to the physicochemical environment (for example, pH, redox potential, oxidase concentrations, oxidants and antioxidants) (Larson, 1995;

Metadiewa et al., 1999; Sugihara et al., 1999; Galati et al., 2002; Sakihama et al., 2002; Hagerman et al., 2003).

The total food consumption of the larvae feeding on food containing only gallic acid (F food) and only tannic acid (C food) is more than that of larvae feeding on food containing the double combination of tannic-gallic acid (M food). This puts forward that 2 secondary compounds (tannic acid and gallic acid) have negative effects when joint. While the total food consumption of the larvae feeding on P food (KB+ 3% GA+ 3% PCA) and on food containing only gallic acid (E, F, G food) increased when compared to control group, the total consumption of the larvae feeding on K food (KB + % 3 PCA) is the least when compared to control group. It is significant that the total food consumption of the larvae feeding on F food (K.B.+ % 3 G.A.) is more when compared to control group.

The total food consumption in N food (CF+ 3% of TA+ 3% of PCA) decreased when compared to control group. However, the total food consumption of the larvae feeding on C food (KB + % 3 TA) increased when compared to control group and the total food consumption of the larvae feeding on K food (KB + % 3 PKA). It also applies to P food (KB + % 3 GA + % 3 PCA). While the total food consumption of the larvae feeding on P food was more when compared to control group, the total food consumption of the larvae feeding on N food was less when compared to control group. The total food consumption of the larvae feeding on R food decreased when compared to control group. These results specifically found in the larvae feeding on M,N,P and R food may show that the synergistic effect is different.

Simpson and Raubenheimer (2001) have pointed when the amount of tannic acid increases in the grasshoppers feeding on foods with tannic acid, the weight decreases in *L. migratoria*. Similarly in this study, when the tannic acid concentration increased (except for C food), the pupal weight decreased. These results contradict with the result showing that 3% of proanthocyanidin amounts of *Rheumaptera hastata* larvae has a negative effect on pupal weight (Bryant et al., 1993).

The pupal weight of the larvae feeding on food groups apart from C and F food was less when compared to control group. (Table 2) The lowest pupal weight was found in the larvae feeding on H food (KB + % 1 PCA). When the amount of PCA in food increased, pupal weight decreased. The low weigt of the pupae can effect the fecundity of the mature (Honek, 1993). The previous researches pointed out that the differences in the secondary compounds content change the food choice and performance of *Malacosoma disstria* larvae in a definite way (Hemming & Lindroth, 1995; Hemming & Lindroth, 2000).

In all food groups (apart from C and F food), pupal protein content was lower when compared to control group (Table 2). The highest pupal protein amount was observed in the larvae feeding on C and F food. While there was no difference between the larvae feeding on P and M food and control group, it is significant that there was a statistical difference in the larvae feeding on F food when compared to these foods. The low amount of pupal protein content in triple combinations (R food) when compared to control group may mean that the negative effect of tannic acid and *p*-coumaric acid in the food transcended the positive effect of gallic acid. The stored proteins carried from the larval period to the adult period can play an important role especially due to the limited nitrogen consumption of adult herbivore insects (Hahn, 2005). In this study, the individual or synergistic effect of secondary compounds on the pupal protein amount can be a disadvantage for this species apart from the larvae feeding on C and F foof.

The study carried out with *L. Migratoria* pointed out that the protein amount of the larvae feeding on food without tannic acid is higher than those feeding on food with tannic acid (Simpson & Raubenheimer, 2001). The results of this study (apart from C food) contradict with the results mentioned before. It was found out that when PCA amount in food increased, the pupal protein amount of the larvae increased. This can be regarded as the physiological adaption of *E. Chrysorrhoea* larvae to increasing amount of p-coumaric acid in food.

The pupal lipit amount of the larvae feeding on food with tannic acid (apart from C food) decreased when compared to control food (Table 2). The common trait of these foods is that they contained tannic acid. Simpson and Raubenheimer (2001) have found in their study with *Locusta migratoria*. that tannic acid has not prevented the carbohydrate in the foods from turning into fats in the body. Yanar (2007) indicated in his study with H.cunea that similarly tannic acid in foods affected the process of carbohydrates turning into fat. It can be put forward that pupal lipit amounts (apart from C and F food) did not display any change with the individual or synergistic effect of secondary substances. The lipids used during the adult period were derived from the lipids stored during the pre-adult phases (Giron & Casas, 2003). It can be a disadvantage for this species that the pupal lipit amount of the larvae feeding on other food groups apart from C and F food was less when compared to control group.

Simpson and Raubenheimer (2001) have found that the larval periods extend when tannic acid is added to the food in *L. migratoria*. In this study it was found out that the development time prolonged in the larvae feeding on D food (KB + % 5 TA) containing tannic acid. The extension of development time, the chance of facing with the natural enemies during feeding or searching for food (Bernays, 1997) or the increase of predator/parasitism risk with a longer development and feeding time (Moran & Hamilton, 1980; Loader & Damman, 1991; Benrey & Denno, 1997) are also available for this species.

One of the significant results of this study is that the larvae feeding on L food had the shortest development time (Table 2). The longest development time of the foods with double combinations was observed in the larvae feeding on M food (K.B.+ % 3 T.A.+ % 3 G.A.). It can be put forward that the synergistic effect of tannic acid and gallic acid on this food had a more powerful effect than p-coumaric acid.

In conclusion, it can be said that *E. Chrysorrhoea* larvae, which are polyphagous, have an immense ecological tolerance to nutrition and secondary substances. Since they have an immense ecological tolerance to secondary substances, this can also signify that it is hard to struggle with this species during population explosion.

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Table 1. Food types and contents.

Food Types	Food Contents
A	Control Food (CF)
B	CF + % 1 T.A.
C	CF + % 3 T.A.
D	CF + % 5 T.A.
E	CF + % 1 G.A.
F	CF + % 3 G.A.
G	CF + % 5 G.A.
H	CF + % 1 P.C.A.
K	CF+ % 3 P.C.A.
L	CF + % 5 P.C.A.
M	CF + % 3 T.A. + % 3 G.A.
N	CF + % 3 T.A. + % 3 P.C.A.
P	CF + % 3 G.A. + % 3 P.C.A.
R	CF + % 3 T.A. + % 3 G.A. + % 3 P.C.A.

CF: Yamamoto food content

Table 2. The development time, total food consumption, pupal weight, the amount of pupal protein and lipid of *E. chrysorrhoea* in the non- choice feeding experiment.

	Food types	Total food consumption (mg)	Pupal weight (mg)	Amount of pupal protein (mg)	Amount of pupal lipid (mg)	Development time (day)
	A	1630,4±12,7	31,8±0,7	18,3±0,2	10,9±0,2	3,8±0,1
AVERAGE ± STANDARD ERROR	B	2164,9±21,2	27,7±0,2	15,1±0,1	9,5±0,1	4,1±0,1
	C	2416,0±11,9	35,6±0,2	19,2±0,1	12,6±0,1	4,1±0,1
	D	2033,7±12,0	25,1±0,2	16,0±0,1	4,3±0,1	4,8±0,1
	E	1714,6±7,1	18,7±0,2	11,5±0,2	5,8±0,1	5,2±0,1
	F	2580,4±9,9	35,5±0,2	18,7±0,1	11,7±0,1	5,0±0,0
	G	2197,0±8,1	17,9±0,1	10,8±0,1	4,9±0,1	5,0±0,0
	H	483,3±3,9	13,1±0,1	8,1±0,1	3,1±0,1	5,2±0,1
	K	372,2±4,6	17,7±0,1	10,6±0,1	4,6±0,1	5,0±0,0
	L	1308,0±4,8	20,6±0,1	13,8±0,1	3,6±0,1	3,0±0,0
	M	2179,6±7,1	20,7±0,1	10,3±0,1	6,9±0,1	5,0±0,0
	N	1502,8±9,3	19,7±0,1	14,0±0,1	3,5±0,1	4,0±0,0
	P	1899,4±16,6	28,7±0,2	14,1±0,1	6,9±0,1	4,0±0,0
	R	929,2±6,9	17,5±0,1	10,5±0,1	3,5±0,1	4,0±0,0
ANOVA	s.d.*	139	139	139	139	139
	F	4066.0	1007.7	947.4	1053.1	69.0
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	Dunnet testi	B < 0,001	B < 0,001	B < 0,001	B < 0,001	D < 0.001
		C < 0.001	C < 0.001	C < 0.001	C < 0.001	E < 0.001
		D < 0.001	D < 0.001	D < 0.001	D < 0.001	F < 0.001
		E < 0.001	E < 0.001	E < 0.001	E < 0.001	G < 0.001
		F < 0.001	F < 0.001	G < 0.001	F < 0.001	H < 0.001
		G < 0.001	G < 0.001	H < 0.001	G < 0.001	K < 0,001
		H < 0.001	H < 0.001	K < 0,001	H < 0.001	L < 0.001
		K < 0,001	K < 0,001	L < 0.001	K < 0,001	M < 0,001
		L < 0.001	L < 0.001	M < 0,001	L < 0.001	
		M < 0,001	M < 0,001	N < 0.001	M < 0,001	
		N < 0.001	N < 0.001	P < 0.001	N < 0.001	
		P < 0.001	P < 0.001	R < 0.001	P < 0.001	
		R < 0.001	R < 0.001		R < 0.001	

AN PRELIMINARY LIST OF THE MOSQUITOES (DIPTERA: CULICIDAE) OF SHANDONG PROVINCE, CHINA

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[Yan, L.-X. 2014. An preliminary list of the mosquitoes (Diptera: Culicidae) of Shandong province, China. Munis Entomology & Zoology, 9 (1): 320-324**]**

ABSTRACT: This survey, resulting in the collection of over 40,000 adults specimens, was conducted by the authors from 2011 to 2013. The collection records and literature show 33 species and 1 subspecies as occurring or having occurred in Shandong province. A key to all known genera of mosquito in Shandong province is provided.

KEY WORDS: Shandong, mosquitoes, distribution, surveys.

Mosquitoes, comprise a monophyletic taxon (Wood & Borkent, 1989; Miller et al., 1997; Harbach & Kitching, 1998; Harbach, 2007) belonging to family Culicidae, order Diptera. This family is divided into three subfamilies: Toxorhynchitinae, Anophelinae (anophelines) and Culicinae (culicines). Culicidae, includes 3523 extant species classified in 111 genera (including the 80 genera of tribe Aedini recognized in the phylogenetic classification of Reinert et al., 2009), is a large and abundant group that occurs throughout temperate and tropical regions of the world, and well beyond the Arctic Circle. Mosquitoes are most diverse and least known in tropical forest environments. Mosquitoes have a worldwide distribution.

Shandong province is located on the eastern edge of the North China Plain. Shandong borders the Bohai Sea to the north, Hebei province to the northwest, Henan province to the southwest, Jiangsu province and Anhui province to the south, and the Yellow Sea to the east and southeast. The Yellow River passes through Shandong's western areas, entering the sea along Shandong's northern coast; in its traversal of Shandong it flows on a levee, higher than the surrounding land, and dividing western Shandong into the Hai He watershed in the north and the Huai He watershed in the south. The Grand Canal of China enters Shandong from the northwest and leaves on the southwest. Weishan Lake is the largest lake of the province.

Shandong province was one of the areas in China with the highest prevalence of malaria, but its incidence rate has declined yearly since the 1990s. However, with increased trade and travel, incidences of imported cases of malaria laso have increased. Cases of malaria were reported between 1989 and 2008 from several areas in Shandong province, such as Heze and Jining in the western area of the province and Rizhao on the coast of Yellow Sea (Gui et al., 2008; Wang & Zhao, 2009).

Although various authors (Zheng et al., 1990; Jing et al., 2007; Yang et al., 2007; Dai et al., 2011) have reported mosquito collection records as a result of surveys of public health malaria inspections and localized surveys, there has been no previous systematic statewide study of mosquitoes in Shandong. The distribution records in this paper are based on the published records of authors cited in the references and our surveys in 17 cities in Shandong province (see fig. 1) from 2011-2013. The surveys were conducted during June to October each year, when mosquitoes are most abundant and diverse in Shandong.

Adults specimens were collected using CDC (Centers for Disease Control) miniature light traps, with carbon dioxide from dry ice as an attractant. The traps were placed in trees approx or near pools, 1.5 m above the ground surface. The traps were operated from 5:00 pm until to 7:00 am. Collected specimens were anaesthetized with carbon dioxide, dispensed into plastic ampoules, and killed by freezing on dry ice. Date were grouped and organized according to locality.

Key to the genera of mosquitoes of Shandong province: adults

1. Scutellum evenly rounded with setae evenly distributed along border; maxillary palpus of females with 5 palpomeres and about as long as proboscis (in males, somewhat clubbed, at apex); abdominal sterna (and usually also terga) wholly or largely devoid of scales (subfamily Anophelinae)---*Anopheles*
- Scutellum trilobed with setae in 3 distinct groups; maxillary palpus of females with fewer than 5 palpomeres and distinctly shorter than proboscis (usually male palpus longer than proboscis and generally not clubbed at apex); abdominal sterna and terga covered with scales; vein Rs without basal spur (subfamily Culicinae)---------------------------------------2

2. Prespiracular setae present; wing with setae present ventrally at base of subcosta (Sc) [paratergite with scales]---*Culiseta*
- Prespiracular setae absent; wing without setae ventrally at base of Sc-------------------------3

3. Fore- and midtarsomere I longer than tarsomeres 2-5 combined, and tarsomere 4 shorter than 5; scutum with delicate white lines---*Orthopodomyia*
- Fore- and midtarsomere I shorter than tarsomeres 2-5 combined, and tarsomere 4 longer than 5; scutum with another scale pattern---4

4. Postspiracular setae present---5
- Postspiracular setae absent--7

5. Dorsal surface of wing with broad, asymmetrical dark and pale scales intermixed --*Mansonia*
- Dorsal surface of wing with narrow scales, if broad, then not asymmetrical---------------- 6

6. Proboscis rather stout, laterally compressed and curved downwards; occiput with broad decumbent scales--*Armigeres*
- Proboscis more slender, not laterally compressed or notably curved; occiput with at least some decumbent scales narrow (except in subgenus *Stegomyia*)---------------(in part) *Aedes*

7. Postspiracular area covered with broad pale scales; female palpus less than 0.4 length of proboscis--(in part) *Aedes*
- Postspiracular area without scales---8

8. Pulvilli conspicuous; ungues (claws) of hindleg small and inconspicuous; hindtarsomere 1 as long as or longer than hindtibia; scales of wing usually narrow-------------------------*Culex*
- Pulvilli inconspicuous; ungues of hindleg large and conspicuous; hindtarsomere 1 distinctly shorter than hindtibia; scales of wing usually broad [upper and lower mesepimeral setae present; upper proepisternal setae present; femora, tibia, and abdominal terga covered by broad scales; proboscis largely pale-scaled]-------------------------------------*Coquillettidia*

The species list of mosquitoes of Shandong province as follows:

Subfamily Anophelinae
Genus *Anopheles* Meigen, 1818
Anopheles (*Anopheles*) *lindesayi* Giles, 1900

Distribution. Shandong (Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Yantai, Weihai, Qingdao).

***Anopheles* (*Anopheles*) *sinensis* Wiedemann, 1828**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Anopheles* (*Cellia*) *pattoni* Christophers, 1926**
Distribution. Shandong (Jinan, Linyi, Rizhao, Tai'an, Laiwu, Qingdao).

Subfamily Culicinae
Tribe Aedini
Genus *Aedes* Meigen, 1818
***Aedes* (*Aedimorphus*) *vexans* (Meigen, 1830)**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Aedes* (*Finlaya*) *koreicus* (Edwards, 1917)**
Distribution. Shandong (Linyi, Rizhao, Tai'an, Laiwu, Yantai, Weihai, Qingdao).
***Aedes* (*Finlaya*) *seoulensis* Yamada, 1921**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Tai'an, Laiwu, Zibo, Weifang, Yantai, Weihai, Qingdao).
***Aedes* (*Finlaya*) *togoi* (Theobald, 1907)**
Distribution. Shandong (Rizhao, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Aedes* (*Stegomyia*) *albopictus* (Skuse, 1894)**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Aedes* (*Stegomyia*) *chemulpoensis* Yamada, 1921**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Dongying, Yantai, Weihai, Qingdao).
***Aedes* (*Ochlerotatus*) *dorsalis* (Meigen, 1830)**
Distribution. Shandong (Jinan, Jining, Tai'an, Laiwu, Zibo).
Genus *Armigeres* Theobald, 1901
***Armigeres* (*Armigeres*) *subalbatus* (Coquillett, 1898)**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
Tribe Culicini
Genus *Culex* Linnaeus, 1758
***Culex* (*Culex*) *bitaeniorhynchus* Giles, 1901**
Distribution. Shandong (Jinan, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *sitiens* Wiedemann, 1828**
Distribution. Shandong (Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *fuscocephala* Theobald, 1907**
Distribution. Shandong (Zaozhuang, Jining, Linyi, Rizhao, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *tritaeniorhynchus* Giles, 1901**
Distribution. Shandong (Jinan, Dezhou, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *jacksoni* Edwards, 1934**
Distribution. Shandong (Jinan, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *mimeticus* Noe, 1899**
Distribution. Shandong (Rizhao, Tai'an, Laiwu, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *mimulus* Edwards, 1915**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Linyi, Tai'an, Laiwu).
***Culex* (*Culex*) *pipiens pallens* Coquillet, 1898**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *pseudovishnui* Colless, 1957**
Distribution. Shandong (Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Weifang, Binzhou, Weihai, Qingdao).

***Culex* (*Culex*) *sinensis* Theobald, 1903**
Distribution. Shandong (Jinan, Dezhou, Liaocheng, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *theileri* Theobald, 1903**
Distribution. Shandong (Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *tritaeniorhynchus* Giles, 1901**
Distribution. Shandong (Jinan, Liaocheng, Jining, Linyi, Rizhao, Tai'an, Laiwu, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *vagans* Wiedemann, 1828**
Distribution. Shandong (Jining, Linyi, Rizhao, Tai'an, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
***Culex* (*Culex*) *whitmorei* (Giles, 1904)**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Rizhao, Tai'an, Weifang, Binzhou, Dongying, Weihai, Qingdao).
***Culex* (*Culiciomyia*) *pallidothorax* Theobald, 1905**
Distribution. Shandong (Zaozhuang, Jining, Linyi, Rizhao, Qingdao).
***Culex* (*Eumelanomyia*) *hayashii* Yamada, 1917**
Distribution. Shandong (Jinan, Jining, Linyi, Rizhao, Tai'an, Laiwu).
***Culex* (*Eumelanomyia*) *malayi* (Leicester, 1908)**
Distribution. Shandong (Zaozhuang, Jining, Linyi, Rizhao, Qingdao).
***Culex* (*Lutzia*) *fuscanus* Wiedemann, 1820**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Weifang, Qingdao).
***Culex* (*Lutzia*) *halifaxia* Theobald, 1903**
Distribution. Shandong (Jinan, Heze, Zaozhuang, Jining, Linyi, Rizhao, Tai'an, Laiwu, Zibo, Weifang, Binzhou, Dongying, Yantai, Weihai, Qingdao).
Tribe Culisetini
Genus *Culiseta* Felt, 1904
***Culiseta* (*Culiseta*) *niveitaeniata* (Theobald, 1907)**
Distribution. Shandong (Jinan, Jining, Tai'an).
Tribe Mansoniini
Genus *Coquillettidia* Dyar, 1905
***Coquillettidia* (*Coquillettidia*) *ochracea* (Theobald, 1903)**
Distribution. Shandong (Jinan, Zaozhuang, Jining, Tai'an, Laiwu).
Genus *Mansonia* Blanchard, 1901
***Mansonia* (*Mansonioides*) *uniformis* (Theobald, 1901)**
Distribution. Shandong (Jinan, Jining, Tai'an).
Tribe Orthopodomyiini
Genus *Orthopodomyia* Theobald
***Orthopodomyia* (*Orthopodomyia*) *anopheloides* (Giles, 1903)**
Distribution. Shandong (Heze, Zaozhuang, Jining, Linyi, Tai'an, Laiwu, Zibo).

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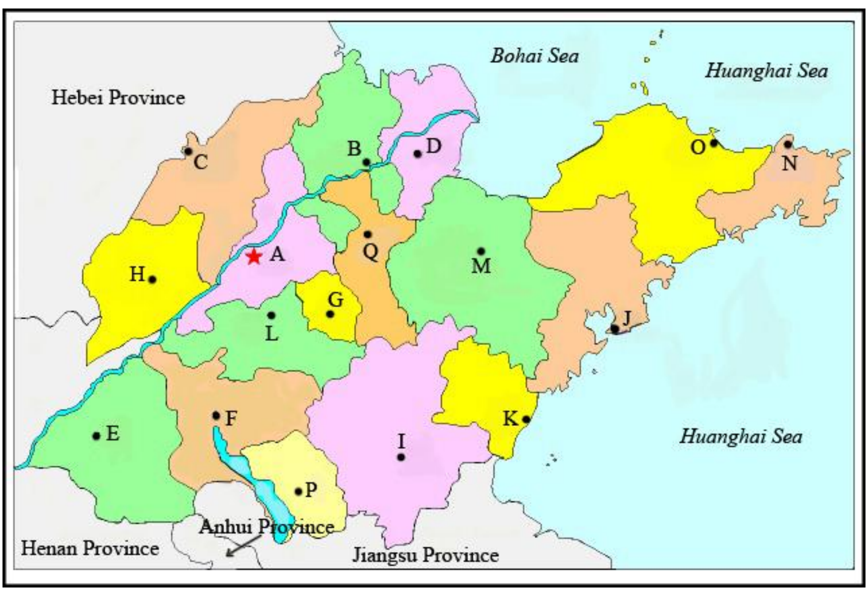

Figure 1. Cities of Shandong province. A. Jinan, B. Binzhou, C. Dezhou, D. Dongying, E. Heze, F. Jining, G. Laiwu, H. Liaocheng, I. Linyi, J. Qingdao, K. Rizhao, L. Taian, M. Weifang, N. Weihai, O. Yantai, P. Zaozhuang, Q.Zibo.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART VIII – CRYSOMELIDAE: ALTICINAE

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[Özdikmen, H. 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part VIII – Chrysomelidae: Alticinae. Munis Entomology & Zoology, 9 (1): 325-375**]**

ABSTRACT: The paper gives chorotype identifications for Turkish Alticinae (Coleoptera: Chrysomelidae). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Alticinae, Chrysomelidae, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014), Özdikmen & Kavak (2014), Özdikmen & Topcu (2014) and Özdikmen (2014) are the previous works for this aim. The present study is attempted as the eigth step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range, Records in Turkey, Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Alticinae comprises of 340 species group taxa (311 species + 29 subspecies) of 22 genera.

Subfamily ALTICINAE

Genus *Aeschrocnemis* Weise, 1888
Subgenus *Aeschrocnemis* Weise, 1888
***A. byzantica* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: IST **Remarks:** The endemic species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Anatolian

***A. osmanica* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***A. serbica* (Kutschera, 1860)**
Range: E: AB BU CR GR RO TR UK YU **A:** TR **Records in Turkey:** TR-A: BRS, IST, TOK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

Subgenus *Hirticnemis* Nadein, 2011
***A. anatolica* (Heikertinger, 1922)**
Range: A: TR **Records in Turkey:** TR-A: ADA, ANK, ANT, ISP, KON, MUG **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

***A. caria* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: MUG **Remarks:** The endemic species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Anatolian

***A. curda* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: ADI **Remarks:** The endemic species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***A. delagrangei* Pic, 1903**
Range: A: SY **Records in Turkey:** TR-A: HAT, TOK **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***A. iconiensis* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: KON **Remarks:** The endemic species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***A. pubipennis* (Reitter, 1892)**
Range: E: AB or AR (Arax valley) GG ST **Records in Turkey:** TR-A: IGD, KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Nudicnemis* Nadein, 2011
***A. antiocha* Nadein, 2011**
Range: A: TR **Records in Turkey:** TR-A: HAT **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

***A. turcica* Nadein & Gök, 2009**
Range: A: TR **Records in Turkey:** TR-A: DEN **Remarks:** The endemic species has been

recorded only from Aegean Region in Turkey until now. **Chorotype:** Anatolian

A. whiteheadi (Warchałowski, 1998)
Range: A: TR **Records in Turkey:** TR-A: ANT, KON, MUG **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

Genus *Altica* Müller, 1764
A. ampelophaga Guérin-Méneville, 1858
A. a. ampelophaga Guér.-Méneville, 1858
Range: E: AZ CR FR GE GR IT PT SP SZ YU **N:** AG MO TU **Records in Turkey:** TR-A: ANK, IGD, ISP, IZM, KON **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Europeo-Mediterranean

A. ancyrensis (Weise, 1897)
Range: E: AR **A:** IS TR **Records in Turkey:** TR-A: ANK, BUR, EZU, KON, NEV **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

A. bicarinata Kutschera, 1860
Range: E: GR MC MD **N:** EG **A:** CY IN IS JO LE SA SY TR **Records in Turkey:** TR-A: ADA, ANT, BIL, ESK, HAT, MER, NEV, SAM, TRA **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean + SW-Asiatic

A. brevicollis Foudras, 1860
A. b. brevicollis Foudras, 1860
Range: E: AB AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GR HU IT LA LT LU NL NR NT PL PT RU SK SL SV SZ TR UK YU **A:** ES FE IN KZ TR WS **Records in Turkey:** TR-A: ADI, EZU, IST, MER, RIZ, TOK **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

A. bulgharensis Král, 1969
Range: A: TR **Records in Turkey:** TR-A: MER **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

A. carduorum Guérin-Méneville, 1858
Range: E: AB AL AR AU BH BU CR CT FI FR GB GE GG GR HU IT LA MC RO SK SL SP ST SV SZ UK YU **A:** ES FE KI KZ TD TR WS **NAR Records in Turkey:** TR-A: ANK, AKS, ART, CNK, COR, ESK, EZU, KAY, KIR, KON, KSH, NEV, ORD, SIV, YOZ **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

A. cornivorax Král, 1969
Range: E: AU BU CZ HU PL SK SZ TR UK **Records in Turkey:** TR-A: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** C and E-European

A. deserticola (Weise, 1889)
Range: E: AB AR ST **A:** AF IN IQ IS JO KI KZ MG NMO SY TM TR WS XIN **Records in Turkey:** TR-A: AFY, AGR, AKS, AMA, ANK, ART, BAT, CNK, DIY, DUZ, EZU, IGD, ISP,

KRS, MAL, MUS, NIG, SAK, SII, TOK, VAN **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Marmara Region until now. **Chorotype:** Asiatic + SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Irano-Palaestinian)

A. globicollis Weise, 1889

Range: E: AR ST **A:** IN TR **Records in Turkey:** TR-A: EZU, IST, MER **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

A. graeca Král, 1966

Range: E: GR **A:** IN TR **Records in Turkey:** TR **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

A. hampei Allard, 1867

Range: E: AR ST UK **A:** TR **Records in Turkey:** TR-A: AMA, ANK, EZU **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

A. impressicollis Reiche, 1862

Range: E: AB AL AU BH BU CR CZ FR GE GR HU IT LA MC PL RO SK ST SZ TR UK YU **A:** IN IS SY TR **Records in Turkey:** TR-A: ANT, ART, BIL, EZU, IST, KAY, KOC, SAM, SAK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

A. jarmilae Král, 1979

Range: E: BU GG GR **A:** IS TR **Records in Turkey:** TR-A: ANK, EZU, IZM, MER **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

A. longicollis (Allard, 1860)

Range: E: BE BY CZ DE EN FI FR GB GE LA LU NL NR NT PL SP SV SZ **A:** TR **Records in Turkey:** TR-A: AKS, ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** European

A. lythri Aubé, 1843

Range: E: AB AL AU BE BH BU BY CR CZ DE FI FR GB GE GR HU IT LU MC NL PL PT RO RU SK SL SP SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: ANT, DEN, EZU, ISP, IZM, MER, TRA **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Central Anatolian Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** European

A. oleracea (Linnaeus, 1758)

A. o. oleracea (Linnaeus, 1758)

Range: E: AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR NT PL RO SK SL SP ST SV SZ UK YU **A:** ES FE GUX HEB HEI IN IS JA JIL KI KZ LIA MG SCH TR WS XIN YUN “Korea” “Manchuria” **AUR NAR Records in Turkey:** TR-A: ANK, ANT, BAY, BUR, ESK, EZU, ISP, KAY, KON, KRS, NEV, RIZ, SAM, SIV, ZON – TR-E: EDI **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European + Australian + Nearctic

***A. palustris* (Weise, 1888)**
Range: E: AB AR AU BE BU BY CT CZ DE EN FI FR GB GE GG HU IT LA LS LT LU NL NR NT PL PT SK SP ST SV SZ UK **N:** AG TU **A:** AF IN KI KZ TD TR UZ **Records in Turkey:** TR-A: ANK, BAR, BAY, BOL, CNK, DUZ, EZU, IZM, KAH, KAY, KAS, KON, KRB, MER, OSM, SIN, YAL, ZON **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean

***A. pontica* (Ogloblin, 1925)**
Range: A: TR **Records in Turkey:** TR-A: TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***A. quercetorum* Foudras, 1860**
***A. q. quercetorum* Foudras, 1860**
Range: E: AB AR AU BE BH BU BY CR FR GE GG GR HU IT LU NL RO RU SK SL SP SZ TR UK YU **A:** TR **Records in Turkey:** TR-A: ANT, ISP, IST, IZM, OSM **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Aegean Region, Marmara Region and Mediterranean Region until now. **Chorotype:** C and E-European

***A. talyshana* Konstantinov, 1995**
Range: E: AB **A:** TR **Records in Turkey:** TR-A: BAY, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***A. tamaricis* Schrank, 1785**
***A. t. tamaricis* Schrank, 1785**
Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GE GR HU IT LA LS LT MC NL PL PT RO RU SK SL SP SV SZ TR UK YU **A:** AF ES FE IN IQ KI KZ MG TR UZ WS **Records in Turkey:** TR-A: ADA, EZU, ISP, IST, ORD, RIZ, TRA – TR-E: EDI **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Anthobiodes* Weise, 1887
***A. turcicus* (Medvedev, 1975)**
Range: E: GR **A:** TR **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Aegean)

Genus *Aphthona* Chevrolat, 1836
***A. abdominalis* Duftschmid, 1825**
Range: E: AB AR AU BH BU CR CZ FR GE GG GR HU IT LA PL RO SK SL SP ST SZ UK YU **A:** AF ES HEB HEI IN JA JIA KZ MG SCH SHA SHX TR "Korea" **ORR Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Asiatic-European + Oriental

***A. aeneomicans* Allard, 1875**
Range: E: FR IT SP **A:** CY TR **Records in Turkey:** TR-A: ANT, ISP, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** S-European

***A. alanyensis* Fritzlar, 2004**
Range: A: TR **Records in Turkey:** TR-A: ANT, MER **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

***A. atrocaerulea* (Stephens, 1831)**
Range: E: AU BE BH CR CZ DE FR GB GE HU IT LT LU NL NR PL RO SK SL SP SV SZ UK YU **N:** AG MO **A:** IN **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Europeo-Mediterranean

***A. atrovirens* Förster, 1849**
Range: E: AU BE BU CR CZ FR GE GR HU IR IT LU NL PL RO SK SL ST SZ UK YU **A:** TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

***A. bergeali* Fritzlar, 2001**
Range: A: TR **Records in Turkey:** TR-A: ANT, IST, KON **Remarks:** The endemic species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Anatolian

***A. bergealoides* Fritzlar, 2004**
Range: A: TR **Records in Turkey:** TR-A: ANT **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

***A. bonvouloiri* Allard, 1861**
Range: E: BU GR IT TR **N:** EG **A:** IN IS LE SY TR **Records in Turkey:** TR-A: ADA, ANT, BIL, ESK, EZU, ISP, IST, KON, MER **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean

***A. carbonaria* Rosenhauer, 1856**
Range: E: FR GR IT MA PT SP **N:** AG MO TU **A:** CY **Records in Turkey:** TR-A: GAZ **Remarks:** The species has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** Mediterranean

***A. crassicornis* Lopatin, 1990**
Range: A: TR **Records in Turkey:** TR-A: VAN **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***A. cyparissiae* Koch, 1803**
Range: E: AL AN AU BE BH BU CT CZ FR GB GE HU IT LA LS LU MC MD NL PL RO SK SL SP SZ UK YU **A:** TR **NAR Records in Turkey:** TR-A: KON **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** European + Nearctic

***A. euphorbiae* Schrank, 1781**
Range: E: AB AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MA MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **N:** AG LB MO TU **A:** CY ES IS JO KZ LE SY TR WS **Records in Turkey:** TR-A: ADA, AMA, ANK, COR, DEN, EZU, IST, KAY, MER – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

***A. flava* Guillebeau, 1895**
Range: E: AB AL AU BH BU CR CZ GR HU IT MC PL RO SK SL TR UK YU **A:** TR **NAR Records in Turkey:** TR-A: EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European + Nearctic

***A. flaviceps* Allard, 1859**
Range: E: AB AR BH BU CR FR GG GR HU IT MA MC MD SK SL SP ST SZ TR UK YU **N:**

AG EG TU **A:** AF CY FE IN IQ IS JO KZ SY TD TM TR UZ **Records in Turkey:** TR-A: ADA, ANK, ANT, EZU, ISP, IST, KON, MER **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Mediterranean

A. franzi Heikertinger, 1944

Range: E: AR AU BU BY HU IT MD RO SK ST SV UK YU **A:** ES IS SY TR **Records in Turkey:** TR-A: AMA, ANK, ART, ERZ, EZU, KAY, KRS **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

A. fuentei Reitter, 1901

Range: E: GR IT SP **N:** AG EG MO TU **A:** IN IS TR **AFR Records in Turkey:** TR-A: ADA, ANK **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Afrotropico-Mediterranean

A. gracilis Faldermann, 1837

Range: E: AB AR GG MD RO ST UK **A:** AF ES IN IQ IS KZ MG TD TM TR UZ **Records in Turkey:** TR-A: BAY, EZU, KAY **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

A. konstantinovi Lopatin, 1998

Range: E: ST UK **A:** TR **Records in Turkey:** TR-A: KAY **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** E-European

A. kuntzei Roubal, 1931

Range: E: BH CR GR UK **A:** CY IS JO LE SY TR **Records in Turkey:** TR-A: ANK, EZU, ISP, KON, KRS **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean

A. lacertosa Rosenhauer, 1847

Range: E: AB AU BU CR CZ FR HU MD PL RO RU SK TR UK YU **NAR Records in Turkey:** TR-E: EDI **Remarks:** The species has been recorded only from European Turkey Part of Marmara Region in Turkey until now. **Chorotype:** C and E-European

A. lutescens Gyllenhal, 1813

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **A:** CY ES IN IS KZ MG TR YE **Records in Turkey:** TR-A: ANT, ESK, EZU, IST, KON **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Arabian

A. maculata Allard, 1876

Range: E: AR GR ST **A:** CY IN IQ IS JO KZ LE SY TD TR **Records in Turkey:** TR-A: ADA, ANT, GAZ, IZM, KIL, SII **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

A. nigriceps Redtenbacher, 1842

Range: E: AB AR AU BH BU CR FR GB GG GR IT MC PT RO SL SP ST TR UK YU **N:** AG MO TU **A:** TR **Records in Turkey:** TR-A: ANK, EZU, ISP – TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now.

Chorotype: Europeo-Mediterranean

A. nigriscutis Foudras, 1860
Range: E: AB AR AU BH BU BY CR CZ GE GG GR HU IT MC MD PL RO SK ST UK YU **A:** ES IN KZ TR **NAR Records in Turkey:** TR-A: ANK, EZU, GUM, ISP, KRS, MER, NEV **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now.**Chorotype:** Sibero-European + Nearctic

A. nonstriata Goeze, 1777
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GG GR HU IR IT LA LS LT LU MA MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **N:** CI **A:** IN KZ TR **Records in Turkey:** TR-A: IST, KON, SAM – TR-E: KRK **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** W-Palearctic

A. ovata Foudras, 1860
Range: E: AU BH BU CR CZ FR GE GR HU IT PL RO SK SL SP ST SZ TR UK YU **A:** TR **Records in Turkey:** TR-A: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** C and E-European

A. pygmaea (Kutschera, 1861)
Range: E: AB AL AR AU BE BH BU CR CZ FI FR GE GG GR HU IT LS LT LU MA MC NL PL RO RU SK SL SZ TR UK YU **N:** EG LB **A:** CY IN IS JO LE SY TR YE **Records in Turkey:** TR-A: ADA, ANT, ERZ, EZU, ISP, IZM, MER, SAK – TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

A. rhodiensis Heikertinger, 1944
Range: E: GR **A:** TR **Records in Turkey:** TR-A: HAK **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** E-Mediterranean (Aegean)

A. rugipennis Ogloblin, 1926
Range: E: AR CZ GG HU SK ST UK **A:** KZ UZ **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** E-European

A. semicyanea Allard, 1859
Range: E: AB AL AR AU BH BU CR CZ FR GG GR HU IT MD RO SK SL ST UK YU **A:** ES HP IN IS KI KZ MG SY TD TM TR UZ **Records in Turkey:** TR-A: ANK, BRS, COR, CNK, DEN, EZU, NEV, SAM, YOZ **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

A. syriaca Heikertinger, 1944
Range: A: IQ IS SY TR **Records in Turkey:** TR-A: EZU, IZM, KRS **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

A. valachica Heikertinger, 1944
Range: E: RO **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

A. venustula (Kutschera, 1861)
Range: E: AL AU BE BH BU CR CZ EN FR GE GR HU IR IT LS LT LU MC MD NL PT RO RU SK SL SP SZ TR UK YU **A:** TR **Records in Turkey:** TR-A: ESK, EZU – TR-E: EDI **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** European

A. violacea (Koch, 1803)
Range: E: AR AU BY CR CT CZ EN FR GE GG HU IT LA LU NL PL RO SK SL SP ST SV SZ UK **A:** ES TR **Records in Turkey:** TR-A: YAL **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Sibero-European

A. warchalowskii Fritzlar, 2001
Range: A: TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

Genus *Batophila* Foudras, 1860
B. fallax Weise, 1888
Range: E: AB GG HU MC PL RO RU TR UK **A:** IN TR **Records in Turkey:** TR-A: ART, BOL, ESK, EZU, GIR, IST, ORD, RIZ, SAK, SAM **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan) or E-European

B. olexai Král, 1964
Range: E: BU GG GR **A:** TR **Records in Turkey:** TR-A: GIR **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

Genus *Chaetocnema* Stephens, 1831
Subgenus *Chaetocnema* Stephens, 1831
C. aerosa (Letzner, 1847)
Range: E: AU BE BH BY CZ EN FI FR GB GE HU IT LA LU NL NR NT PL RO SK SP ST SV SZ YU **A:** IS TR **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** European

C. arenacea (Allard, 1860)
Range: E: AB AL AU BU CR FR GR HU IT PT RO SK SP ST SZ TR UK YU **N:** AG MO **A:** IN TR **Records in Turkey:** TR-A: ADA, AKS, ANK, DEN, ESK, EZU, GUM, HAK, KON, MER, NEV, NIG, SIV, YOZ – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

C. arida Foudras, 1860
Range: E: AU BE BH BU CR CZ FR GB GE GR HU IT LA LS LU MC NL PL RO RU SK SL SP SZ UK YU **N:** AG MO TU **A:** IN TR **Records in Turkey:** TR-A: EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Europeo-Mediterranean

C. aridula (Gyllenhal, 1827)
Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GE GR HU IT LA LS LT LU MA MC NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **N:** AG **A:** ES KI KZ TR **ORR Records in Turkey:** TR-A: ANK, EZU, IST, MAN, SIV, YOZ – TR-E: EDI, KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Oriental

C. confusa (Boheman, 1851)
Range: E: AU BE BH CR DE FR GB GE GR HU IT LA LU NL PL RU SK SL SP SV SZ UK YU **A:** IN TR **Records in Turkey:** TR-A: ANK, BAY, EZU, IST, KAY, NIG, ZON **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** European

C. hortensis (Geoffroy, 1785)
Range: E: AB AL AU AZ BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU "Lapland" **N:** MO MR TU **A:** AE AF CY ES FE IN IQ IS JIA KZ MG SY TD TM TR UZ YE **Records in Turkey:** TR-A: ADA, AKS, ANK, BAY, BUR, EZU, ISP, IST, IZM, KAY, KON, MER, SIV – TR-E: EDI, IST **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

C. igori Konstantinov et al., 2011
Range: E: AB AR **A:** AF KZ TD TR UZ **Records in Turkey:** TR-A: AKS, BAY, EZU, KAY **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Centralasiatic + SW-Asiatic

C. imitatrix Gruev, 1990
Range: E: BU **Records in Turkey:** TR-A: AKS **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

C. mannerheimii (Gyllenhal, 1827)
Range: E: AL AU BE BU BY CR CZ EN FI FR GE GR HU IT LA LS LU NL PL RO RU SK SL SV SZ TR UK YU **A:** ES FE KI KZ MG TR **Records in Turkey:** TR-A: ANK, ESK – TR-E: EDI **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

C. montenegrina Heikertinger, 1912
Range: E: AL AR BH BU CR GR IT MC RO RU UK YU **A:** AF IN KI TD TM TR UZ **Records in Turkey:** TR-A: ADA, ANK, ANT, BAY, EZU, ISP, KON **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

C. obesa (Boieldieu, 1859)
Range: E: AL AU BE BH BU BY CR CZ FR GE GR HU IT LA MC MD PL PT RO SK SL SP ST SZ TR UK YU **N:** AG MO TU **A:** ES IQ KZ MG TR XIZ **Records in Turkey:** TR-A: AKS, ANK, COR, ERZ, ESK, EZU, KON, NEV, NIG, SIV – TR-E: EDI, KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. procerula (Rosenhauer, 1856)
Range: E: AL AU BU CR CZ FR GE GR HU IT MC PL SK SP ST SZ TR UK YU **N:** AG MO TU **A:** TR **Records in Turkey:** TR-A: AKS, ANK, BAL, CAN, EZU, ISP, IST, KAY, KON, KSH, SIV, YOZ TR-E: KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

C. sahlbergii (Gyllenhal, 1827)
Range: E: AL AU BE BU BY CT CZ DE EN FI FR GB GE GR HU IR IT LA LS LT LU MC NL NR NT PL RO SK SL ST SV SZ UK YU **A:** ES FE MG TR **Records in Turkey:** TR-A: ANK,

EZU, ISP, IST, KAR, KON, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. subcoerulea (Kutschera, 1864)

Range: E: AL AU BE BU CR CZ DE EN FI FR GB GE GR HU IT LA LT LU MC NL PL RO RU SK SL SV SZ UK **Records in Turkey:** TR-A: IST **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** European

Subgenus *Tlanoma* Motschulsky, 1845

C. breviuscula (Faldermann, 1837)

Range: E: AB AR BU GR HU LA MD RO RU SK TR UK **A:** AF HEI HUB IN IQ JO KZ SY TD TM TR UZ "Korea" "North China" **Records in Turkey:** TR-A: ADA, AKS, ANK, ESK, EZU, IST, MER, SAK, SAM, SIV, TOK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

C. chlorophana (Duftschmid, 1825)

Range: E: AB AL AU BE BU CR CZ FR GE GR HU IT LU MC PT RO RU SK SL SP TR UK YU **N:** AG MO TU **A:** IQ IS SY TR **Records in Turkey:** TR-A:ADA, EZU, GAZ, IST, KON, MER – TR-E: KRK, TEK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and Black Sea Region until now. **Chorotype:** Europeo-Mediterranean

C. concinna (Marsham, 1802)

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR PL RO RU SK SL SP SV SZ TR UK YU **N:** AG MO **A:** ES FE GUI IS JA KZ MG TAI TM TR "Korea" **NAR Records in Turkey:** TR-A: AMA, ANK, ANT, BAY, ESK, EZU, ISP, KOC, NEV, SAM – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

C. conducta (Motschulsky, 1838)

Range: E: AL AR AU BH BU CR CZ FR GE GR HU IT MC MD PT RO RU SK SL SP SZ TR UK YU **N:** AG EG MO TU **A:** IN IS KI KZ SY TD TM TR **AFR Records in Turkey:** TR-A: ADA, AKS, ANK, ESK, EZU, ISP, IST, IZM – TR-E: EDI, KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Afrotropica-Mediterranean + Centralasiatic-European

C. coyei (Allard, 1864)

Range: E: AB AL AR BU CR GR RO ST TR YU **A:** CY IN IQ IS JO SY TR **Records in Turkey:** TR-A: ADA, ADI, AKS, ANK, ANT, ESK, EZU, GAZ, HAT, ISP, IST, IZM, KAY, KON, KSH, MER, NEV, NIG, SAM, SII, SIV, YOZ – TR-E: KRK **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region, Black Sea Region and Eastern Anatolian Region, and Central-West Anatolia Part in Aegean Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. delarouzeei (Brisout de Barneville, 1884)

Range: N: AG MO TU **A:** IS JO TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean or E-Mediterranean + N-Africa

C. major (Jacquelin du Val, 1852)

Range: E: AB AL AU BU CT CZ FR GR HU MD RO RU SK SL SP TR YU **N:** AG **A:** CY IN IQ IS JA KZ SY TR **Records in Turkey:** TR-A: ADA, ANK, BUR, CAN, ESK, EZU, MER –

TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

C. orientalis (Bauduer, 1874)

Range: E: BU GG GR MC RO ST TR **A:** IN IQ IS JO SY TM TR **Records in Turkey:** TR-A:ADA, CAN, IST, KON, MER – TR-E: KRK **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

C. picipes Stephens, 1831

Range: E: AB AR AU BE BU BY CZ DE EN FI FR GE GG HU IT LA LS LT LU NL NR PL RO RU SK SL SP SV SZ UK **A:** ES FE IN KI KZ MG "Korea" "North-East China" **Records in Turkey:** TR-A: ZON **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

C. scheffleri (Kutschera, 1864)

Range: E: AB AU BU CR FR GE GR HU IT MD RO RU SL SP SZ UK YU **N:** AG MO TU **A:** IN IQ IS TR **Records in Turkey:** TR-A: ANK, ANT, BUR, EZU, ISP, IST, IZM, KON **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

C. semicoerulea (Koch, 1803)

C. s. semicoerulea (Koch, 1803)

Range: E: AB AL AU BH BU BY CR CZ EN FR GE GR HU IT LA LT LU MC PL RO RU SK SL SP SZ UK YU **A:** ES KI TR **Records in Turkey:** TR-A: AMA, CAN, CNK, DIY, SAK **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

C. tibialis (Illiger, 1807)

Range: E: AL AN AU BH BU CR CZ FI FR GE GR HU IT LA MA MC PL PT RO RU SK SL SP SZ TR UK YU **N:** AG EG LB MO TU **A:** AF CY ES IN IQ IS JO KI KZ MG SY TD TM TR UZ "Korea" **Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, BAL, BUR, CAN, DUZ, ERZ, ESK, EZU, ISP, IZM, KOC, KON, KRS, MAL, SAM **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Crepidodera* Chevrolat, 1836

C. aurata (Marsham, 1802)

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MC NL NR PL RO RU SK SL SP SV SZ TR UK YU **N:** MO **A:** ES FE IN JIA KZ MG TR "Korea" **Records in Turkey:** TR-A: AKS, AMA, ANK, ANT, BAL, BIL, BOL, CNK, COR, DUZ, ESK, ERZ, EZU, GUM, ISP, KAY, KOC, KON, KSH, NEV, NIG, SIV, TRA, YOZ, ZON – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. aurea (Geoffroy, 1785)

Range: E: AR AU BE BH BU BY CR CZ DE EN FR GB GE GG GR HU IT LS LT LU MC NL PL RO RU SK SL SP SZ TR UK YU **A:** ES KI KZ TR **Records in Turkey:** TR-A: ANK, BAR, ESK, EZU, HAT, IST, ORD **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. fulvicornis (Fabricius, 1792)
Range: E: AB AU BE BH BU BY CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU NL NR PL PT RO RU SK SL SP SV SZ UK YU **A:** ES FE IN KZ LE MG TR WS XIN **Records in Turkey:** TR-A: EZU, SAM **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

C. lamina (Bedel, 1901)
Range: E: AU BH BU CR CZ FR GE GG HU IT NR PL RO RU SK SL SP SZ TR UK YU **A:** TR **Records in Turkey:** TR-A: ANK, BAY, ISP – TR-E **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** C and E-European

C. nigricoxis Allard, 1878
Range: E: AL AU BU GR MC RO SK ST YU **A:** NC TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Asiatic-European or C and E-European

C. nitudula (Linnaeus, 1758)
Range: E: AU BE BH BU BY CZ DE EN FI FR GB GE HU IT LA LT LU MC NL NR PL RO RU SK SL SV SZ UK YU **A:** ES **Records in Turkey:** TR-A: GUM **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Sibero-European

C. plutus (Latreille, 1804)
Range: E: AL AU BE BH BU BY CR CZ DE FR GB GE GG GR HU IT LA LU MC NL PL PT RO RU SK SL SP SV SZ UK YU **A:** ES FE HEI IN KI KZ MG TD TR WS XIZ “Korea” **AFR Records in Turkey:** TR-A: ANK, ANT, ART, SAM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European + Afrotropical

Genus *Derocrepis* Weise, 1886
D. rufipes (Linnaeus, 1758)
Range: E: AB AU BE BH BU BY CR CZ DE EN FR GB GE HU IR IT LA LS LU NL PL RO RU SK SL SP SV SZ UK YU **A:** ES TR **Records in Turkey:** TR-A: ESK, KRB **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Dibolia* Latreille, 1829
Subgenus *Dibolia* Latreille, 1829
D. cryptocephala (Koch, 1803)
Range: E: AB AR AU BE BH BU BY CR CZ EN FR GE GR HU IT LT LU MC PL RO SK SL SP ST SZ UK YU **A:** KZ TR **Records in Turkey:** TR-A: EZU, KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

D. cynoglossi (Koch, 1803)
Range: E: AL AR AU BE BH BU CZ DE EN FR GB GE HU IT LA NL PL RO RU SK SL SP SZ UK **A:** TR **Records in Turkey:** TR-A: ADI, EZU, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** European

D. depressiuscula Letzner, 1847
Range: E: AU BE BU BY CR CZ DE EN FI FR GE GR HU IT LA LT LU MC MD PL RO RU SK SL SZ UK YU **A:** ES IS JO KZ MG TR **Records in Turkey:** TR-A: ANK, ART, EZU, KON, NEV **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now.

Chorotype: Sibero-European

D. kralii Mohr, 1981
Range: A: IN TR **Records in Turkey:** TR-A: BAY, EZU, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Mediterranean Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

D. numidica Doguet, 1971
Range: N: AG TU **A:** TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean or N-Africa + Anatolian

D. occultans (Koch, 1803)
Range: E: AL AU BE BH BU BY CR CZ DE EN FR GE GR HU IT LA LU MA MC NL PL PT RO RU SK SL SP SV SZ UK YU **N:** AG CI MO **A:** IN TR **Records in Turkey:** TR-A: ADA, ANK, ART, BUR, EZU, ISP, SIV, TRA **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

D. phoenicia Allard, 1866
Range: E: GG HU "Balkan Peninsula" **A:** IS JO LE TR **Records in Turkey:** TR-A: ANT, BAL **Remarks:** The species has been recorded only from 2 Turkish regions as Marmara Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (NE-Mediterranean + Palaestino-Taurian) or Turano-Mediterranean (Turano-Balkan)

D. rufofemorata Reitter, 1896
Range: A: CY IS JO SY TR **Records in Turkey:** TR-A: ADA, HAT, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

D. rugulosa Redtenbacher, 1849
Range: E: AB AL AN AR AU BE BH BU CR CZ FR GE GG GR HU IT LU MC PL RO RU SK SL SP SZ UK YU **A:** TR **Records in Turkey:** TR-A: ANT, BUR, EZU, ISP, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

D. timida Illiger, 1807
Range: E: AL AU BH BU CR CZ FR GE GR HU IT MC PT RO RU SK SL SP SZ UK YU **N:** AG MO TU **A:** TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Europeo-Mediterranean

Subgenus *Eudibolia* Iab.-Khnzorian, 1968
D. carpathica Weise, 1893
Range: E: AB AR BU CR GG GR HU RO RU SK UK YU **A:** IS KZ TR **Records in Turkey:** TR-A: ADA, ANK, ANT, BAY, EZU, ISP, KON, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** E-European

D. femoralis Redtenbacher, 1849
D. f. femoralis Redtenbacher, 1849
Range: E: AL AU BH BU CR CZ FR GE GR HU IT LU MC PL RO RU SK SL SP SZ UK YU **A:** TR **Records in Turkey:** TR-A: ADI **Remarks:** The subspecies has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

***D. schillingi* (Letzner, 1847)**
Range: E: AR AU BE BU BY CR CZ GE GR HU IT MC PL RO SK SL ST SZ UK **A:** KZ TR **Records in Turkey:** TR-A: ADA, EZU, ISP, KON, MER **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

***D. tricolor* Reitter, 1898**
Range: E: AR **A:** TR **Records in Turkey:** TR-A: EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

Subgenus *Pseudodibolia* Iab.-Khnzorian, 1968
***D. zangezurica* Iablokoff-Khnzorian, 1968**
Range: E: AR **A:** IN TR **Records in Turkey:** TR-A: ANK, EZU, KAH, KAR, KON, MAL **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

Genus *Epitrix* Foudras, 1860
***E. abeillei* (Bauduer, 1874)**
Range: E: AB **N:** EG **A:** AF IN IQ IS JO KZ LE MG SY TM TR UZ **Records in Turkey:** TR-A: ADA **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Centralasiatic-Mediterranean

***E. atropae* Foudras, 1860**
Range: E: AB AL AR AU BE BH BU CR CZ FR GB GE HU IT LU MC NL PL RO RU SK SL SP SZ UK YU **N:** AG **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Europeo-Mediterranean

***E. caucasica* Heikertinger, 1950**
Range: E: AB GG RU ST **A:** IN KZ TM TR "India" **Records in Turkey:** TR-A: ERZ, EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Anatolian)

***E. dieckmanni* Mohr, 1968**
Range: A: AE IN IS JO SA TM TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic

***E. hirtipennis* (Melsheimer, 1847)**
Range: E: BU GR IT **A:** SY TR **NAR NTR Records in Turkey:** TR-A: IZM, MAR **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian) + Nearctic + Neotropical

***E. intermedia* Foudras, 1860**
Range: E: AB AL BU FR GR HU IT MC RO SK SL SP ST UK YU **A:** TR **Records in Turkey:** TR-A: ERZ, EZU, GIR, SAM **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** S and E-European

***E. pubescens* (Koch, 1803)**
Range: E: AB AL AU AZ BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL PL PT RO RU SK SL SP SV SZ TR UK YU **A:** CY ES IN IS KI KZ TR **Records in Turkey:** TR-A: BAL, BIL, DEN, DUZ, ESK, EZU, IST – TR-E: KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded

from Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Genus *Hermaeophaga* Foudras, 1860
Subgenus *Hermaeophaga* Foudras, 1860
***H. mercurialis* (Fabricius, 1792)**
Range: E: AU BE BH BU BY CR CZ DE EN FR GB GE HU IT LA LU MC NL PL RO RU SK SL SV SZ UK YU **A:** JO TR **Records in Turkey:** TR-A: ORD **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** European

Subgenus *Orthocrepis* Weise, 1888
***H. ruficollis* (Lucas, 1849)**
Range: E: AL FR GR MC SP **N:** AG EG LB MO TU **A:** AE AF CY IN IQ IS JO KZ LE NP OM SA SY TD TM TR UZ YE **Records in Turkey:** TR-A: ADA, ANT, BOL, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** Saharo-Turano-Sindian + Mediterranean or Centralasiatic-Mediterranean + SW-Asiatic

Genus *Hippuriphila* Foudras, 1860
***H. modeeri* (Linnaeus, 1760)**
Range: E: AL AU BH BU BY CR CZ DE EN FI FR GB GE HU IR IT LA LS LT LU NL NR PL RO RU SK SL SP SV SZ UK WS YU **A:** ES MG TR WS **Records in Turkey:** TR-A: DUZ, IST, KOC **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Marmara Region until now. **Chorotype:** Sibero-European

Genus *Longitarsus* Latreille, 1829
Subgenus *Longitarsus* Latreille, 1829
***L. absynthii* Kutschera, 1862**
Range: E: AU BH CR CZ FR GB GE HU IT LA PL RO RU SK SL SP UK YU **A:** KZ MG TR UZ "Turkestan" **Records in Turkey:** TR-A: ANK, KON **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Centralasiatic-European

***L. aeneicollis* (Faldermann, 1837)**
Range: E: AB AU BE BH BU BY CR CZ FR GB GE GG GR HU IT LA LT LU MC MD NL PT RO RU SK SP SV SZ UK YU **N:** AG MO TU **A:** AF IN IQ IS KI KZ LE SY TD TM TR UZ **Records in Turkey:** TR-A: ADA, ANK, ANT, ERZ, EZU, IGD, ISP, IZM, KRS, MER, SIV **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean

***L. albineus* (Foudras, 1860)**
Range: E: AB BU CR FR GR HU IT MC PT RO SK SP ST UK **N:** AG EG MO TU **A:** AF CY IN IQ IS TD TR UZ **AUR Records in Turkey:** TR-A: ANT, AYD, BUR, EZU, ISP, IZM, KAY, KON, MER, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Mediterranean + Australian

***L. alfierii* (Pic, 1923)**
***L. a. alfierii* (Pic, 1923)**
Range: E: GR **N:** EG **A:** AF IN IS JO KI LE SY TR **Records in Turkey:** TR-A: ANT, EZU, ISP, KON **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Centralasiatic-Mediterranean

L. a. furthi **Gruev, 1982**
Range: E: BU GG GR MC SP UK YU **A:** TR **Records in Turkey:** TR-A: ANT, EZU, ISP **Remarks:** The subspecies has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** S-European

L. allotrophus **Furth, 1979**
Range: A: IS JO TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

L. angelikae **Fritzlar, 2001**
Range: A: TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

L. aramaicus **Leonardi, 1979**
Range: A: CY IS JO TR **Records in Turkey:** TR-A: ANK, ANT, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Cyprioto-Taurian)

L. artvinus **Gruev & Aslan, 1998**
Range: A: TR **Records in Turkey:** TR-A: ART **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

L. atricillus **(Linnaeus, 1760)**
Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LT LU MD NL NR PL PT RO RU SK SL SP SV SZ UK YU **N:** AG LB MO TU **A:** CY ES FE IN TM TR UZ **Records in Turkey:** TR-A: ANK, ANT, BAY, DEN, EZU, ISP **Remarks:** The species has been recorded only from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

L. audisioi **Biondi, 1992**
Range: A: TR **Records in Turkey:** TR-A: TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

L. australis **(Mulsant & Rey, 1874)**
Range: E: FR GE GR IT PT SP SZ YU **N:** AG MO **A:** TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

L. baeticus **Leonardi, 1979**
Range: E: SP **N:** AG MO **A:** TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

L. ballotae **(Marsham, 1802)**
Range: E: AL AU BE BH BU CR CZ FR GB GE GG GR HU IR IT LA LU MC NL PL PT RO RU SK SL SP SZ UK YU **N:** AG MO TU **A:** CY ES IN IS JO KZ MG SY TR YE **Records in Turkey:** TR-A: ANK, ANT, BUR, EZU, ISP, KON, MER **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Palearctic

L. barbarae **Doguet & Bergeal, 2001**
Range: E: GR **A:** TR **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian) or E-Mediterranean (Aegean)

L. bertii **Leonardi, 1973**
Range: E: AL AU BH BU CZ GR HU IT MC SK SL ST UK **A:** CY IN IS SY TM TR **Records in Turkey:** TR-A: AKS, ANT, EZU, GUM, ISP, KON **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Turano-European

L. brisouti **Heikertinger, 1912**
Range: E: BE BH BU CR FR GE GR HU IT RO SK SL SP ST UK YU **A:** TR **Records in Turkey:** TR-A: ERZ, EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. bytinskii **Furth, 1979**
Range: E: AR **A:** IS TR **Records in Turkey:** TR-A: ANT, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

L. callidus **Warchałowski, 1967**
Range: E: AB AU CZ FR GE HU IT PL SK SL SZ **N:** TU **A:** IN KZ TR **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Europeo-Mediterranean

L. celticus **(Leonardi, 1975)**
Range: E: AU CZ FR GE IT SK SP SZ UK YU **A:** TR **Records in Turkey:** TR-A: ANT, BAY **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. cerinthes **Schrank, 1798**
Range: E: AU CR CZ FR GE GR HU IT PT RO SK SL SP SZ UK YU **N:** AG CI LB MO MR TU **A:** CY TR **Records in Turkey:** TR-A: IGD, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Europeo-Mediterranean

L. corpulentus **Weise, 1887**
Range: A: KZ TD TM TR UZ **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Centralasiatic + Anatolian

L. curtus **(Allard, 1860)**
Range: E: AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IR IT LA LT LU NL PL RO SK SL SP ST SV UK YU **A:** AF ES TD "Turkestan" **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Sibero-European

L. echii **(Koch, 1803)**
Range: E: AL AU BH BU CR CZ FR GE GR HU IT LT MA MC PL PT RO RU SK SL SP SZ UK YU **N:** AG CI MO MR TU **A:** AF SY TR **AFR AUR Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Europeo-Mediterranean + Afrotropical + Australian

L. eminus **Warchałowski, 1967**
Range: A: AF IN IQ IS KI KZ TD TR UZ **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Centralasiatic + SW-Asiatic (Irano-Anatolian + Irano-Palaestinian + Palaestino-Taurian)

***L. exsoletus* (Linnaeus, 1758)**

***L. e. exsoletus* (Linnaeus, 1758)**

Range: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FR GB GE GG GR HU IT LA LS LT LU MA MD NL NR PL PT RO RU SK SL SP SV SZ UK YU **A:** CY IN SY TM TR **Records in Turkey:** TR-A: ISP **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-European

***L. e. rufulus* (Foudras, 1860)**

Range: E: CR FR GR IT **A:** CY TR **Records in Turkey:** TR-A: ANK, EZU, GUM, IZM, KAH, KAY, SAM **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** S-European

***L. fallax* Weise, 1888**

Range: E: AB AR BU CR FR GR IT RO RU TR UK **N:** AG EG LB MO **A:** AF IN IQ IS KI KZ TD TM TR UZ **Records in Turkey:** TR-A: ANK, ART, ANT, BUR, ERZ, EZU, ISP, IST, MAN, SIV – TR-E: IST **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Mediterranean

***L. foudrasi* Weise, 1893**

Range: E: AL AN AR AU BH BU CR CZ FR GE GR HU IT MC PL RO SK SL SP ST SZ UK YU **N:** AG MO TU **A:** ES FE TR **Records in Turkey:** TR-A: ANT, EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Palearctic

***L. ganglbaueri* Heikertinger, 1912**

Range: E: AU BE BH BU BY CR CZ DE FI FR GB GE GR HU IR IT LS LT LU MC NL NR PL RO RU SK SL SP SV SZ UK YU **A:** ES FE MG TR **NAR Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Sibero-European + Nearctic

***L. georgianus* Allard, 1866**

Range: E: GG **A:** TR **Records in Turkey:** TR **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***L. gracilis* Kutschera, 1864**

Range: E: AU BE BU CR CZ DE EN FR GB GE GR HU IR IT LA LT LU MA NL PL RO SK SL SP ST SV SZ UK YU **N:** AG MO **A:** IS TR **Records in Turkey:** TR-A: EZU, GAZ, ISP, IZM **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

***L. helvolus* Kutschera, 1863**

Range: E: AU CR CZ FR GE HU IT SK SL SZ **A:** TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

***L. hermonensis* Furth, 1979**

Range: A: IS TR **Records in Turkey:** TR-A: ANT, BAY, EZU, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

***L. holsaticus* (Linnaeus, 1758)**

Range: E: AU BE BH BU BY CR CZ DE EN FI FR GB GE HU IR IT LA LS LT LU MC NL NR PL RO RU SK SL SP SV SZ UK YU **A:** ES FUJ JA SCH "Korea" **Records in Turkey:** TR

Remarks: Provincial distribution of the species is unknown. **Chorotype:** Sibero-European

L. jacobaeae (Waterhouse, 1858)
Range: E: AB AU BE BU BY CR CZ DE EN FR GB GE GR HU IR IT LA LS LT LU NL NR PL RO RU SK SL SV SZ UK YU **A:** ES KI KZ MG TR XIZ **NAR AUR Records in Turkey:** TR-A: BAY, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic + Australian

L. jailensis Heikertinger, 1913
Range: E: BU TR UK **A:** TR **Records in Turkey:** TR-A: ESK, IST **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

L. juncicola (Foudras, 1860)
Range: E: AB AL AU BE BH BU CR FR GR HU IT MA PT RO SL SP ST UK YU "Transcaspia" **N:** AG LB MO TU **A:** TR **Records in Turkey:** TR-A: ANT, ESK, EZU, HAT, TRA **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

L. karlheinzi Warchałowski, 1972
Range: E: UK **A:** IN IS SY TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic (Irano-Anatolian + Irano-Palaestinian + Syro-Anatolian)

L. kopdagiensis Gruev & Aslan, 1998
Range: A: TR **Records in Turkey:** TR-A: BAY, EZU **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Anatolian

L. kutscherai (Rey1892)
Range: E: AL AU BH BU BY CZ DE FI FR GB GE GG GR HU IR IT NL NR PL PT RO SK SL SP ST SV SZ **N:** AG **A:** NMO TR "Korea" **Records in Turkey:** TR-A: BUR, EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Palearctic

L. latens Warchałowski, 1998
Range: A: TR **Records in Turkey:** TR-A: TRA **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

L. lateripunctatus Rosenhauer, 1856
L. l. personatus Weise, 1893
Range: E: AU BH BU CR CZ FR GE GR HU IT MD RO SK SL ST SZ UK YU **A:** CY IS TR **Records in Turkey:** TR-A: ANT, BUR, ISP **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

L. ledouxi Doguet,1979
Range: E: GG ST **A:** TR **Records in Turkey:** TR-A: RIZ **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

L. lewisii (Baly, 1874)
Range: E: AU BH BU CZ FI FR GE GG GR HU IT MC PL RO SK SL SP SZ UK **A:** AF ES FE FUJ HEB HEI IN JA KI MG PA SHA SHX TAI TD TR UZ "Korea" **ORR Records in Turkey:** TR-A: ART, EZU, RIZ **Remarks:** The species has been recorded only from 2

Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Asiatic-European + Oriental

L. linnaei (Duftschmid, 1825)
Range: E: AB AR AU BH BU CR CZ FR GG GR HU IT PL PT RO RU SK SL SP SZ TR UK YU **A:** IN IS SY TR **Records in Turkey:** TR-A: ADA, ANT, ART, DIY, ESK, EZU, ISP, IST, IZM **Remarks:** The species is widely distributed in Turkey. It has been recorded from all Turkish regions. But it has not been recorded only from the most Parts of Marmara Region, Central Anatolian Region, Black Sea Region and Eastern Anatolian Region, Central-West Anatolia Part in Aegean Region and Central Fırat Part in South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

L. longipennis Kutschera, 1863
Range: E: AU BE BU CR CZ GE GR HU IT LA LU NL PL RO SK ST SZ UK YU **N:** MO **A:** ES KZ TR "Turkestan" **Records in Turkey:** TR-A: ANT, EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Palearctic

L. luridus (Scopoli, 1763)
L. l. luridus (Scopoli, 1763)
Range: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MA MC NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **A:** CY ES IN IQ IS KZ LE MG SY TR UZ **NAR Records in Turkey:** TR-A: ANK, ANT, ART, BAY, BUR, ESK, EZU, ISP, IST, KSH, SIV, YOZ – TR-E: IST **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

L. lycopi (Foudras, 1860)
Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LT LU MA MC NL PL PT RO RU SK SL SP ST SV SZ TR UK YU **N:** AG MO TU **A:** CY IN IQ IS JO KZ SA SY TD TM TR UZ YE **AFR Records in Turkey:** TR-A: ADA, ANK, ANT, ART, BAL, BRS, ERZ, ESK, EZU, GIR, HAT, ISP, MER – TR-E: KRK **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Afrotropico-Mediterranean + European

L. manfredi Fritzlar, 2004
Range: A: TR **Records in Turkey:** TR-A: ANT **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

L. medvedevi Shapiro, 1956
Range: E: AU BU CZ HU PL RO RU SK SV UK YU **A:** TR UZ **Records in Turkey:** TR-A: BAY, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

L. melanocephalus (DeGeer, 1775)
Range: E: AB AL AN AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **A:** AF ES IN IS KZ MG TD TM TR WS **Records in Turkey:** TR-A: ANK, ART, BAY, ERZ, ESK, EZU, IGD, ISP, IST, NIG – TR-E **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

L. membranaceus (Foudras, 1860)
Range: E: AU BE BH BU CR FR GB GE GR HU IT LU MA NL PT RO RU SP UK **N:** AG MO TU **A:** CY IN IS TR **Records in Turkey:** TR-A: ADA **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Europeo-

Mediterranean

L. meridionalis Weise, 1888

Range: A: IS SY TR **Records in Turkey:** TR-A: ANT, ISP, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

L. minimus Kutschera, 1864

Range: E: AU BH CZ GE HU IT PL SK ST SZ UK **A:** ES TR **Records in Turkey:** TR-A: ANT, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

L. minusculus (Foudras, 1860)

Range: E: AU BE BH BU CR CZ FR GE GR HU IT PT RO RU SK SL SP SZ UK YU **A:** TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** European

L. nanus (Foudras, 1860)

Range: E: AB AU BE BH BU CR CZ FR GE GR HU IT LA LS LU NL RU SK SL SP SZ UK YU **N:** AG **A:** IS TR **Records in Turkey:** TR-A: ANT, EZU, ISP, KON **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Europeo-Mediterranean

L. nasturtii Fabricius, 1792

Range: E: AB AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MD NL NR PL RO RU SK SL SP SV SZ UK YU **A:** ES FE HEB HEI KI KZ MG SHA SHX TR XIZ "Korea" **Records in Turkey:** TR-A: ISP, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** Sibero-European

L. niger (Koch, 1803)

Range: E: AL AU BE BH BU CR CZ DE EN FR GE GG GR HU IT LA LU MC NL PL RO RU SK SL SP SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: ESK, EZU, IST **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** European

L. nigrofasciatus (Goeze, 1777)

L. n. nigrofasciatus (Goeze, 1777)

Range: E: AB AL AN AR AU BE BH BU BY CR CZ FR GB GE GR HU IR IT LA LS LU MC NL NR PL PT RO RU SK SL SP SZ TR UK YU **N:** AG CI MO MR TU **A:** AF CY ES IN IQ IS JO KZ SY TD TM TR UZ **Records in Turkey:** TR-A: ANK, ANT, BRS, BUR, DUZ, ESK, EZU, ISP, MER – TR-E: EDI **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

L. nimrodi Furth, 1979

Range: E: AU BU CZ IT MC SK SL **A:** IS TR **Records in Turkey:** TR-A: ANT, EZU, ISP, TRA **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. noricus Leonardi, 1976

Range: E: AB AU BH BU CZ GE GG HU IT LA PL RO SK SL ST SZ UK **A:** TR **Records in Turkey:** TR-A: EZU, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. obliteratoides Gruev, 1973

Range: E: AB FR GB GE GG GR PT SK SP SZ **N:** MO **A:** CY **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

L. obliteratus (Rosenhauer, 1847)

Range: E: AB AR AU BH BU CR CZ FR GB GE GG GR HU IT LT MC NL PL PT RO RU SK SL SP SZ TR UK YU **A:** IN IS JO SY TR **Records in Turkey:** TR-A: ADA, ANT, BUR, DEN, EZU, HAT, ISP, IST, IZM – TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** European

L. ochroleucus (Marsham, 1802)

L. o. ochroleucus (Marsham, 1802)

Range: E: AB AN AU BE BU CR CZ DE FI FR GB GE GR HU IT LA LU MA MC NL NR PL PT RO RU SK SL SP ST SV SZ UK YU **N:** AG CI MO TU **A:** IN NP TR YUN **Records in Turkey:** TR-A: ANT, BUR, DEN, ERZ, ISP, IZM, KAY, MER **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean or W-Palearctic + Oriental

L. ozbeki Aslan & Warchałowski, 2005

Range: A: TR **Records in Turkey:** TR-A: EZU **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

L. parvulus (Paykull, 1799)

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IR IT LA LT LU MC MD NL NR PL PT RO RU SK SL SP ST SV SZ UK YU **N:** AG CI LB MO MR TU **A:** CY ES IS TR **Records in Turkey:** TR-A: ANT, BUR, EZU, ISP, KRS, URF **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

L. pellucidus (Foudras, 1860)

Range: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FR GB GE GR HU IT LA LT LU MA MD NL NR PL PT RO RU SK SL SP ST SV SZ UK YU **N:** AG MO TU **A:** AF CY ES IN IS JO KI KZ MG SY TR UZ “India” **NAR Records in Turkey:** TR-A: ADA, AMA, ANK, ANT, ART, BAY, ERZ, EZU, GUM, IGD, ISP, IZM, KRS, SIV, TOK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

L. picicollis Weise,1900

Range: E: AB BU GG RO UK “Transcaucasus” **A:** AF IN IQ KZ TD TM TR UZ **Records in Turkey:** TR-A: ANK, ANT, BUR, EZU, ISP, IZM, KAH **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

L. pratensis (Panzer, 1794)

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MA MC MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **N:** AG CI MO **A:** AF FE IN IS KI KZ TD TM TR UZ **AFR NAR Records in Turkey:** TR-A: AKS, ANK, ANT, ART, ERZ, ESK, EZU, ISP, IST, KAS, KON, RIZ, SIV – TR-E: KRK **Remarks:** The species probably rather is widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic + Afrotropical

L. pulmonariae Weise, 1893

Range: E: AR AU BE BH BU CR CT CZ DE GE GG HU LU PL RO SK SL ST UK YU **A:** TR **Records in Turkey:** TR-A: BAY, ISP, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. quadriguttatus (Pontoppidan, 1763)

Range: E: AU BU BY CZ DE EN FR GB GE GR HU IT LA LU MC PL RO RU SK SP SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: BAL, DIY, EZU **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** European

L. rectilineatus (Foudras, 1860)

Range: E: AU BH BU CR CZ FR GE GG GR HU IT MC SP ST SZ UK **N:** AG TU **A:** AF CY IN IQ IS KI KZ SY TD TM TR UZ **Records in Turkey:** TR-A: ANK, EZU, IST **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Centralasiatic-Mediterranean

L. reichei (Allard, 1860)

Range: E: AL AR AU BH BU CR CZ DE FR GB GE GR HU IT NL NR PL RO RU SK SL SP ST SV SZ TR UK YU **A:** IN **Records in Turkey:** TR-A: ANT, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** European

L. rubiginosus Foudras, 1860

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU NL NR PL RO RU SK SL SP ST SV SZ UK YU **A:** ES FE IN TR “Turkestan” “North China” **NAR Records in Turkey:** TR-A: ADI, ANK **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

L. salviae Gruev, 1975

Range: E: AR AU BH BU CZ FR GE GG GR HU IT MC PL RO SK SL SP ST SZ UK YU **A:** TR **Records in Turkey:** TR-A: ANT, EZU, GUM, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. scutellaris (Mulsant & Rey, 1874)

Range: E: AB AL AN AU BH BU BY CR EN FI FR GE GG HU IT LA PL RO RU SL SP SZ UK YU **A:** CH ES FE JA MG TR “Korea” **ORR Records in Turkey:** TR-A: ART, EZU, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European + Oriental

L. solaris Gruev, 1977

Range: E: BU GR **A:** TR **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

L. stragulatus (Foudras, 1860)

L. s. stragulatus (Foudras, 1860)

Range: E: IT MA SP **N:** AG EG LB MO TU **A:** IS JO **Records in Turkey:** TR-A: ISP **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

L. s. dichrous Iablokoff-Khnzorian, 1962
Range: E: AR **A:** TR **Records in Turkey:** TR-A: DIY **Remarks:** The subspecies has been recorded only from South-Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

L. strigicollis Wollaston, 1864
Range: E: AU BU CR CZ FR GE GG HU IT PT SK SL SP SZ UK **N:** AG CI MO TU **A:** TR **AFR Records in Turkey:** TR-A: BAY, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean + Afrotropical

L. substriatus Kutschera, 1864
Range: E: AL AU BU CR CZ FR GE GR HU IT RO SK SL ST SV UK YU **A:** KZ TR **Records in Turkey:** TR-A: IZM, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Central Anatolian Region until now. **Chorotype:** C and E-European

L. succineus (Foudras, 1860)
Range: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL PT RO RU SK SL SP ST SV SZ UK YU **N:** AG MO **A:** AF BEI CY ES FE IN IS JA KI KZ MG NP TD TR UZ "India" "Korea" **NAR Records in Turkey:** TR-A: ANT, DEN, ESK, EZU, ISP, IST, MER **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Aea Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

L. suturellus (Duftschmid, 1825)
Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IR IT LA LS LT LU MC MD NL NR PL RO RU SK SL ST SV SZ UK YU **A:** CH ES FE JA MG TR "Korea" **Records in Turkey:** TR-A: ANK, ERZ, ESK, EZU, ISP, URF **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and Marmara Region until now. **Chorotype:** Sibero-European

L. tabidus (Fabricius, 1775)
L. t. tabidus (Fabricius, 1775)
Range: E: AB AL AN AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MA MC MD NL NR PL PT RO RU SK SP ST SV SZ TR UK YU **N:** AG MO TU **A:** CY ES IN IS KI KZ MG TM TR **Records in Turkey:** TR-A: AKS, ANT, BRS, BUR, EZU, ISP, KAR, KON, KRS, MER, NEV, NIG – TR-E: EDI **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

L. trepidus Warchałowski, 1973
Range: E: GG **A:** AF IN IQ TR **Records in Turkey:** TR-A: ADA, ANK, ANT, ARD, EZU, ISP, KAY, KON, KRS, MAL, MER, VAN **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

L. violentus Weise, 1893
Range: E: AB AR GG ST **A:** AF ES FE FUJ IN KI KZ MG NMO TM TR UZ **Records in Turkey:** TR-A **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** Asiatic + SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

Subgenus *Testergus* Weise, 1893
L. anatolicus Weise, 1900
Range: E: AB BU **A:** IN IS TR "Palaestina" **Records in Turkey:** TR-A: ADA, AKS, ANK,

BAR, BIT, COR, DIY, ERZ, EZU, ISP, KAR, KAY, KAH, KOC, KON, MAL, MER, MUS, SII, SIV, VAN, YOZ **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Aegean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

L. anchusae (Paykull, 1799)
Range: E: AB AU BE BH BU CR CZ DE EN FR GB GE GG GR HU IT LA LT LU MC MD NL PL PT RO SK SL SP ST SV SZ TR UK YU **A:** AF CY ES IN IQ IS JO KZ SY TD TR **Records in Turkey:** TR-A: ADA, ANT, ARD, EZU, ISP, KAS, KRS, MER– TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Central Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

L. aubozaorum Biondi, 1997
Range: A: TR **Records in Turkey:** TR-A: ANK, ESK **Remarks:** The endemic species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

L. corynthius (Reiche & Saulcy, 1858)
L. c. corynthius (Reiche & Saulcy, 1858)
Range: E: AL BH BU CR GR **A:** CY **Records in Turkey:** TR-A: ISP **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

L. fuscoaeneus Redtenbacher, 1849
L. f. fuscoaeneus Redtenbacher, 1849
Range: E: AR AU BE BU CZ FR GG HU IT LA LU NL PT RO RU SK UK YU **A:** CY IS JO SY TR **Records in Turkey:** TR-A: ADA, ANK, ANT, BUR, EZU, ISP, KAY, MER **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region Eastern Anatolian Region until now. **Chorotype:** C and E-European

L. hittita Biondi, 1995
Range: A: TR **Records in Turkey:** TR-A: AGR, ANK, ERZ, KAY, KON, YOZ **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** Anatolian

L. iconiensis Weise, 1900
Range: A: TR **Records in Turkey:** TR-A: ANK, ESK, KON **Remarks:** The endemic species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Anatolian

L. lederi Weise, 1889
Range: E: GG ST **A:** TR **Records in Turkey:** TR-A: ART **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

L. onosmae (Peyerimhoff, 1912)
Range: N: AG MO TU **Records in Turkey:** TR-A: ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean or N-Africa + Anatolian

L. pinguis Weise, 1888
Range: E: AR AU BU BY CZ GE GG GR HU IT PL RO SK SL SZ YU **A:** IS JO SY TR **Records in Turkey:** TR-A: ANT, ISP, IST **Remarks:** The species has been recorded only from 2 Turkish regions as Marmara Region and Mediterranean Region until now. **Chorotype:** C and E-European

L. truncatellus Weise, 1890
Range: E: GR **A:** IS JO TR **Records in Turkey:** TR-A: ANT, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Aegean + Palaestino-Taurian)

L. weisei Guillebeau, 1895
Range: E: AL FR GE PL SP SZ **A:** AF ES HEB IN NP TD TM TR **Records in Turkey:** TR-A: KRS **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

Genus *Mantura* Stephens, 1831
Subgenus *Mantura* Stephens, 1831
M. chrysanthemi (Koch, 1803)
M. c. chrysanthemi (Koch, 1803)
Range: E: AU BE BY CZ DE EN FI FR GB GE HU IR IT LA LT LU NL NR PL PT RO RU SK SP SV SZ UK YU **N:** AG CI MO **A:** TR **AFR NAR Records in Turkey:** TR-A: MUG **Remarks:** The subspecies has been recorded only from Aegean Region in Turkey until now. **Chorotype:** W-Palearctic + Afrotropical + Nearctic

M. mathewsii (Curtis, 1833)
Range: E: AB AU BE BH BU CR CZ FR GB GE IT LU NL SK SP SZ UK YU **A:** TR **Records in Turkey:** TR-A: DEN, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** European

M. rustica (Linnaeus, 1767)
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT KZ LA LS LT LU MC MD NL NR NT PL PT RO RU SK SL SP ST SV SZ TR UK YU **N:** AG **A:** AF CY ES FE HEB HEI IN IQ IS JA JO KI KZ LE MG SY TD TM TR UZ WS XIN **Records in Turkey:** TR-A: ANK, EZU, ISP, IST, KON, SIV, YOZ – TR-E: KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

Subgenus *Stenomantura* Heikertinger, 1909
M. cylindrica Miller, 1881
Range: E: AB BU CR GR IT ST **A:** SY TR **Records in Turkey:** TR-A: AMA **Remarks:** The species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Turano-Apenninian)

Genus *Mniophila* Stephens, 1831
M. turcica Medvedev, 1970
Range: A: TR **Records in Turkey:** TR-A: ART, RIZ **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Genus *Neocrepidodera* Heikertinger, 1911
N. crassicornis Faldermann, 1837
Range: E: AB AU BH BU CR FR HU IT MC PT RO SK SL SP ST SZ UK YU "Caucasus" **A:** KZ TR **Records in Turkey:** TR-A: EZU, ISP, SAM **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

N. ferruginea (Scopoli, 1763)
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT KZ LA LS LT LU MC MD NL NR NT PL PT RO RU SK SL SP ST SV SZ TR UK YU **N:** AG **A:** AF CY ES FE HEB HEI IN IQ IS JA JO KI KZ LE MG SY TD TM TR UZ WS XIN **Records in Turkey:** TR-A: ANK, ANT, EZU, ISP, IST, KAY, KON, SAK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean

Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

N. impressa (Fabricius, 1801)

N. i. obtusangula (Daniel, 1904)

Range: E: BU **A:** CY TR **Records in Turkey:** TR-A: EZU, ISP, IZM **Remarks:** The subspecies has been recorded only from 3 Turkish regions as Aegean Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

N. motschulskii Konstantinov, 1991

Range: E: AR AU BE BU BY CT CZ DE EN FI FR GE GG HU LT LU NL NR NT PL SK ST SV UK **A:** ES FE IN TD TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

N. nigritula (Gyllenhal, 1813)

Range: E: AU BH BU BY CR CZ EN FI GE HU IT LA LT MC PL RO RU SK SL SV SZ TR UK YU **Records in Turkey:** TR-A: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** C and E-European

N. transversa (Marsham, 1802)

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FR GB GE GR HU IR IT LS LT LU MC MD NL PL PT RO RU SK SL SP SV SZ TR UK YU "Caucasus" **A:** CY IN TR **Records in Turkey:** TR-A: AKS, ANK, ANT, EZU, ISP, MER, SAM, SIV, TOK – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** European

Genus *Ochrosis* Foudras, 1860

O. ventralis (Illiger, 1807)

Range: E: AL AU BE BH BU CR FR GB GE GR HU IR IT LA LU MA NL PL PT RU SK SP ST SZ TR UK YU **N:** AG CI EG MO MR TU **A:** CY IN IS LE SY TR **AFR Records in Turkey:** TR-A: ANK, BOL, ERZ, EZU, HAT, IGD, ISP, IST, KAH, KAS, KAY, KOC, KRS, SIV – TR-E: KRK **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean or W-Palearctic + Afrotropical

Genus *Orestia* Chevrolat, 1836

O. delagrangei Pic, 1909

Range: A: IS JO LE SY TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

O. loebli Biondi, 1992

Range: A: TR **Records in Turkey:** TR-A: ZON **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

O. olympica Frivaldszky, 1884

Range: A: TR **Records in Turkey:** TR-A: BRS, ESK **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** Anatolian

O. oselliana Leonardi, 1977

Range: A: TR **Records in Turkey:** TR-A: BOL, KAS **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

Genus *Phyllotreta* Chevrolat, 1836

P. acutecarinata Heikertinger, 1941

Range: E: AU GR PL RU SK UK **A:** AF TR **Records in Turkey:** TR-A: KON **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** C and E-European

P. astrachanica Lopatin, 1977

Range: E: AB AU BU CZ FR GE GG GR HU IT NL PL SK SL SP ST SZ YU **A:** CY IN KZ TR **Records in Turkey:** TR-A: ANK, ANT, ART, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** C and E-European

P. atra (Fabricius, 1775)

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LT LU MC NL NR PL RO RU SK SL SP ST SV SZ TR UK YU **N:** AG MO **A:** AF ES FE IN JO KI KZ MG SY TD TR YE **Records in Turkey:** TR-A: ANK, ANT, BAY, BOL, ESK, EZU, GUM, ISP, KAY, KOC, NIG, RIZ, SAM, SIV, TRA – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

P. balcanica Heikertinger, 1909

Range: E: AB AL AU BH BU CR FR GR HU IT MC RO SL SP ST UK YU **A:** AF KI KZ TR UZ **Records in Turkey:** TR-A: ADA, BRS, EZU, KOC **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Marmara Region and Mediterranean Region until now. **Chorotype:** Centralasiatic-European

P. bolognai Biondi, 1992

Range: A: TR **Records in Turkey:** TR-A: ANT, EZU, ISP **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

P. bulgarica Gruev, 1977

Range: E: BU GR **A:** IS **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

P. caucasicola Heikertinger, 1941

Range: E: AR ST **A:** IQ TR **Records in Turkey:** TR-A: ANK **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

P. corrugata Reiche & Saulcy, 1858

Range: E: AB AR BU FR GB GR IT MA SP ST UK **N:** AG EG LB MO TU **A:** AF CY IN IQ IS JO KZ SY TM TR UZ **Records in Turkey:** TR-A: ADA, AFY, ANK, ANT, BUR, HAT, ISP, IZM, KAY, KON, SIV, YOZ **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Centralasiatic-Mediterranean

P. cruciferae (Goeze, 1777)

Range: E: AB AL AU BH BU BY CR CZ DE FR GB GE GG GR HU IT LA LS LT LU MA MC MD NL PL PT RO RU SK SL SP SV SZ UK YU **N:** AG EG MO TU **A:** AF CY IN IS JA JO KI KZ MG PA SY TD TR "India" **AFR NAR Records in Turkey:** TR-A: ADA, AMA, ANK, BIL, BRS, BUR, CNK, COR, ESK, EZU, ISP, IZM, KAY, KON, MAN, NIG, TOK, TRA – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Holarctic + Afrotropical

P. dacica **Heikertinger, 1941**
Range: E: AB BH BU CR RO UK YU **A:** TR **Records in Turkey:** TR-A: ISP, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** SE-European

P. diademata **Foudras, 1860**
Range: E: AB AL AU BE BH BU CR CZ FR GB GE GG GR HU IT LU MC NL PL RO RU SK SL SP SV SZ UK YU **A:** AF IN IQ SD SU TR "Turkestan" **Records in Turkey:** TR-A: ADA, AKS, ANK, ANT, ESK, ERZ, EZU, ISP, KOC, KON – TR-E: EDI **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

P. egridirensis **Gruev & Kasap, 1985**
Range: A: IN TR **Records in Turkey:** TR-A: ADA, ANT, ISP, KON **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

P. erysimi **Weise, 1900**
P. e. erysimi **Weise, 1900**
Range: E: AB BU GR MC RO RU TR UK YU "Caucasus" **A:** AF IN IS KI KZ MG SY TD TM TR UZ **Records in Turkey:** TR-A: ANK, ANT, BAY, EZU, ISP, KON, MAN, SAM, TRA – TR-E **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

P. fallaciosa **Heikertinger, 1941**
Range: E: FR GR IT SP **N:** AG MO **A:** CY IN IS JO TR **Records in Turkey:** TR-A: NIG **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Mediterranean

P. fornuseki **Cizek, 2003**
Range: E: CZ SK **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-European

P. ganglbaueri **Heikertinger, 1909**
Range: E: AU BH BU CR CZ FR IT PT RO SL SP SZ UK YU **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

P. judaea **Pic, 1901**
Range: E: AR BU SK **A:** IN IS JO TR **Records in Turkey:** TR-A: ISP, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** Turano-Mediterranean (Turano-Balkan)

P. lativittata **Kutschera, 1860**
Range: E: AB AR GR IT MA **A:** AF CY IN IQ IS JO KI KZ LE OM SY TD TM TR UZ XIN **Records in Turkey:** TR-A: EZU, IZM, KRS **Remarks:** The species has been recorded only from Aegean Region and Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-E-Mediterranean

P. lorestanica **Warchałowski, 1973**
Range: A: IN **Records in Turkey:** TR-A: BUR, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

***P. maculicornis* Pic, 1906**
Range: A: SY TR **Records in Turkey:** TR-A: ANT, ISP, KON, NIG **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

***P. nemorum* (Linnaeus, 1758)**
Range: E: AB AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR NT PL RO SK SL SP ST SV SZ TR UK YU **A:** CY ES FE IN IS KZ MG TD TR UZ WS "Korea" **AUR Records in Turkey:** TR-A: ANK, BAY, BIL, BOL, COR, ESK, ERZ, EZU, ISP, IST, SIV – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Aegean Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Australian

***P. nigripes* (Fabricius, 1775)**
***P. n. nigripes* (Fabricius, 1775)**
Range: E: AB AL AN AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LT LU MC MD NL PL RO RU SK SL SP SV SZ TR UK YU **N:** AG CI EG MO TU **A:** AF CY IN IS KI KZ SY TD TR UZ **Records in Turkey:** TR-A: ADA, ANK, ANT, BAY, BIL, ERZ, ESK, EZU, HAT, IGD, ISP, KAY, KON, KRS, MAN, MER, SIV, YOZ – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean

***P. nodicornis* (Marsham, 1802)**
Range: E: AU BE BH BU CR CZ FR GB GE HU IT LU NL PL PT RO SK SL SP ST SZ UK YU **A:** TR UP **Records in Turkey:** TR-A: ANK, ESK, EZU, ISP, MAN, SIV **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** European + Indian

***P. ochripes* (Curtis, 1837)**
Range: E: AB AU BE BH BU BY CR CZ DE FI FR GB GE GR HU IT LA LT LU NL NR PL PT RO RU SK SL SP ST SV SZ TR UK YU **A:** ES FE IN JA TR **Records in Turkey:** TR-A: GIR, IST, NIG **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Marmara Region until now. **Chorotype:** Sibero-European

***P. oltuensis* Gruev & Aslan, 1998**
Range: A: TR **Records in Turkey:** TR-A: EZU **Remarks:** The endemic species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Anatolian

***P. ozbeki* Gruev & Aslan, 1998**
Range: A: TR **Records in Turkey:** TR-A: BAY **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

***P. pallidipennis* Reitter, 1891**
Range: E: KZ ST UK WS **A:** AF ES IN KI KZ MG PA TD TM TR UZ XIZ **Records in Turkey:** TR-A: ANK, KAY **Remarks:** The species has been recorded only from Central Anatolian Region until now. **Chorotype:** Centralasiatic + SW-Asiatic (Irano-Anatolian)

***P. pontoaegeica* Gruev, 1982**
Range: E: BU GR **A:** TR **Records in Turkey:** TR-A: ANT, ISP, MER **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

***P. praticola* Weise, 1887**
Range: E: AB ST **A:** AF ES IN KI KZ MG TD TR UZ WS "India" NW China" **Records in Turkey:** TR-A: EZU, IST, KAY **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Asiatic + SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

***P. procera* (Redtenbacher, 1849)**
Range: E: AB AN AU BE BH BU CR CZ FR GB GE GG GR HU IT LU MA MC NL PT RO RU SK SL SP SZ UK YU **N:** AG CI MO MR TU **A:** CY IN IS JO TD TM TR **AFR Records in Turkey:** TR-A: ADA, ANK, ANT, ERZ, ESK, EZU, ISP, KON **Remarks:** The species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean + Afrotropical

***P. punctulata* (Marsham, 1802)**
Range: E: AB AU BE BH BU CR CZ FR GB GE GR HU IT LU MC MD NL PL PT RO RU SK SL SP ST SZ TR UK YU **N:** MO **A:** IS TR **NAR Records in Turkey:** TR-A: ANT, BRS, BUR, ESK, GIR, ISP, IST – TR-E: KRK **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean or W-Palearctic + Nearctic

***P. reitteri* Heikertinger, 1911**
Range: E: UK **A:** KZ TR UZ **Records in Turkey:** TR-A: DEN **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Centralasiatic + E-European

***P. sisymbrii* Weise, 1888**
Range: E: AB AR GG ST **A:** IN SY TR **Records in Turkey:** TR-A: ANK, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian)

***P. striolata* (Illiger, 1803)**
Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **A:** ANH FE FUJ GAN GUA GUI GUX HAI HEI HKG HUB JA JIA KZ MG NP SCH SD TAI TR XIZ YUN ZHE "Korea" **AFR AUS NAR ORR Records in Turkey:** TR-A: DUZ, EZU – TR-E: EDI **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Subcosmopolitan or Asiatic-European + Nearctic + Afrotropical + Australian + Oriental

***P. tetrastigma* (Comolli, 1837)**
Range: E: AU BE BH BU BY CR CZ DE EN FI FR GB GE HU IT LA LS LT LU NL NR PL RO RU SK SL SP SV SZ UK **A:** ES TR **Records in Turkey:** TR-A: ART, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***P. toelgi* Heikertinger, 1941**
Range: A: TR **Records in Turkey:** TR-A: ESK, ORD **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Black Sea Region and Central Anatolian Region until now. **Chorotype:** Anatolian

***P. undulata* (Kutschera, 1860)**
Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC NL NR PL PT RO RU SK SL SP ST SV SZ TR UK YU **N:** AG **A:** ES FE KI KZ MG TM TR UZ **AUR NAR Records in Turkey:** TR-A: BIL, ESK, EZU, IST **Remarks:** The

species has been recorded only from 3 Turkish regions as Central Anatolian Region, Eastern Anatolian Region and Marmara Region until now. **Chorotype:** Holarctic + Australian

***P. variipennis* (Boieldieu, 1859)**

***P. v. variipennis* (Boieldieu, 1859)**

Range: E: BH BU CR FR GR IT MA MC PT SL SP SZ TR YU **N:** AG CI MO TU **A:** CY IN IQ IS TR **Records in Turkey:** TR-A: ANK, ESK, ISP, IST, IZM **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

***P. vilis* Weise, 1888**

Range: E: BU CR GR IT **A:** TR **Records in Turkey:** TR-A: ANK, ISP, IST, IZM, MER **Remarks:** The subspecies has been recorded only from 4 Turkish regions. But it has not been recorded from Black Sea Region, Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** SE-European or Turano-Mediterranean (Turano-Apenninian)

***P. vittula* (Redtenbacher, 1849)**

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IR IT LA LT LU MC NL NR PL RO RU SK SL SP SV SZ TR UK YU **A:** AF ES FE HEI IN KI KZ MG TD TR WS “Korea” **NAR Records in Turkey:** TR-A: ANK, ANT, EZU, ISP, IZM – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European + Nearctic

***P. weiseana* Jakobson, 1901**

Range: E: AB ST UK **A:** IN KZ TR **Records in Turkey:** TR-A: ANK, BAY, EZU, KON **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian) + E-European

Genus *Podagrica* Chevrolat, 1836

***P. fuscicornis* (Linnaeus, 1767)**

Range: E: AB AL AU BE BH BU CR CZ DE FR GB GE GR HU IT LA LU MC NL PL PT RO RU SK SL SP SZ TR UK YU **N:** AG CI MO TU **A:** IS LE SY TR **Records in Turkey:** TR-A: BAL, IST, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Marmara Region until now. **Chorotype:** Europeo-Mediterranean

***P. malvae* (Illiger, 1807)**

***P. m. malvae* (Illiger, 1807)**

Range: E: AB AL AU BH BU BY CR CZ FR GE GG GR HU IT LU MA MC PL PT RO RU SK SL SP ST SZ TR UK YU **A:** CY IN IQ IS JO SY TR **Records in Turkey:** TR-A: ANK, ANT, ART, BRS, ESK, EZU, GIR, IGD, ISP, IST, IZM, KAY, KON, MAN, MER, NIG, OSM, SIV – TR-E: KRK **Remarks:** The subspecies is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** C and E-European

***P. menetriesii* (Faldermann, 1837)**

Range: E: AB AL AU BH BU CR CZ FR GE GR HU IT MC PT RO RU SK SL SP ST TR UK YU **A:** IQ KI KZ TM TR UZ XIN **Records in Turkey:** TR-A: AFY, AGR, AKS, ANK, ANT, BAL, BRS, EZU, IGD, ISP, IZM, KAY, KON, KRS, KSH, MUG, ORD – TR-E: EDI **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-European

Genus *Psylliodes* Latreille, 1825
Subgenus *Minicnema* Nadein, 2007
P. elliptica Allard, 1861
Range: A: IS JO SY TR **Records in Turkey:** TR-A: BUR, KAR, KON, KUT, MER **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Central Anatolian Region and Mediterranean Region until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

Subgenus *Psylliodes* Latreille, 1825
P. aerea Foudras, 1860
Range: E: AR AU BE BU CZ FR GE HU IT RO SK SP UK **Records in Turkey:** TR-A: ANT, BUR, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

P. affinis (Paykull, 1799)
Range: E: AB AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MC MD NL NR PL PT RO RU SK SL SP SV SZ UK YU **N:** MO **A:** ES KZ TR **Records in Turkey:** TR-A: HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Palearctic

P. anatolica Gök & Çilbiroğlu, 2004
Range: A: TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

P. arista Iablokoff-Khnzorian, 1962
Range: E: AR GG ST **A:** IN TR **Records in Turkey:** TR-A: ANK, ART, EZU, KRS **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Central Anatolian Region and Eastern Anatolian Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

P. attenuata (Koch, 1803)
Range: E: AB AU BE BH BU CR CZ FI FR GB GE GR HU IR IT LA LT LU MD NL PL RO RU SK SL SP SV SZ UK YU **A:** ES FE GUI HEI JA KI KZ MG SHA SHX TAI TR UZ “Korea” “Manchuria” **Records in Turkey:** TR-A: ADA, AKS, ANK, ART, ESK, EZU, KAY, KON, MER, NIG **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Asiatic-European

P. brisouti Bedel, 1898
Range: E: AL AU BU CR CZ FR GE GR HU IT MC NR PL RO SK SL SP SV SZ UK YU **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** C and E-European

P. cerenae Gök, Doguet & Çilbiroğlu, 2003
Range: A: TR **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

P. chalcomera (Illiger, 1807)
Range: E: AB AL AU BE BH BU BY CR CZ DE EN FR GB GE GR HU IT LA LT LU MC NL PL PT RO RU SK SL SP ST SV SZ TR UK YU **N:** AG MO TU **A:** CY ES FE HEI IN IS KI KZ SY TR **NAR Records in Turkey:** TR-A: ADA, ANK, ANT, BAY, BUR, ESK, EZU, HAT, ISP, IST, IZM, KON, KSH, NEV, OSM, SIV, YOZ – TR-E: EDI **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

P. chrysocephala (Linnaeus, 1758)

P. c. chrysocephala (Linnaeus, 1758)

Range: E: AB AL AR AU AZ BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MA MC MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **N:** AG MO MR TU **A:** CY IN IS JO LE SY TR **AFR NAR Records in Turkey:** TR-A: ADA, AFY, AKS, ANK, ANT, BAL, BIL, EZU, ESK, HAT, ISP, IST, IZM, KAY, KOC, KON, MER, NEV, NIG, SAM **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic + Afrotropical

P. circumdata (Redtenbacher, 1842)

Range: E: AB AU BH BU CR FR GE GG GR HU IT MC PL RO RU SK SL SP UK YU **N:** AG LB MO TU **A:** CY IN IS LE SY TR **Records in Turkey:** TR-A: AMA, ANK, ANT, ERZ, ESK, EZU, ISP, IZM, KON **Remarks:** The subspecies is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

P. cuprea (Koch, 1803)

Range: E: AB AL AR AU BE BH BU BY CR CZ DE EN FR GB GE GG GR HU IT LS LT LU MA MC MD NL PL PT RO RU SK SL SP SV SZ TR UK YU **N:** AG MO TU **A:** CY ES IN IS JO KI KZ LE MG SY TM TR **Records in Turkey:** TR-A: ADA, AKS, ANT, ART, BRS, ERZ, EZU, ISP, IST, IZM, KRS, MER, NIG, ORD, SAM, TRA **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from South-Eastern Anatolian Region until now. **Chorotype:** Palearctic

P. diversicolor Nadein, 2006

Range: A: TR **Records in Turkey:** TR-A: ANT, ISP, KAR **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

P. dogueti Warchałowski, 1993

Range: A: TR **Records in Turkey:** TR-A: GUM **Remarks:** The endemic species has been recorded only from Black Sea Region in Turkey until now. **Chorotype:** Anatolian

P. drusei Furth, 1983

Range: A: IS **Records in Turkey:** TR-A: ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-Mediterranean (Palaestino-Taurian)

P. dulcamarae (Koch, 1803)

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IR IT LA LT LU NL PL PT RO RU SK SL SP SV SZ UK YU **A:** ES KZ MG TR **Records in Turkey:** TR-A: ANK, KSH **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Sibero-European

P. gibbosa Allard, 1860

Range: E: CR FR IT MC SL SP SZ **N:** AG MO **A:** IS TR **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean

P. hospes Wollaston, 1854

Range: E: FR IT SP **N:** AG CI MO MR TU **A:** AE IS SA SI **Records in Turkey:** TR-A: ANT, ISP **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Mediterranean + Saharo-Sahale-Arabian

***P. hyoscyami* (Linnaeus, 1758)**
Range: E: AB AR AU BE BH BU CR CZ DE EN FI FR GB GE GR HU IT LA LT LU NL NR PL RO RU SK SP ST SV SZ UK YU **A:** CY ES FE IQ IS JO KI KZ SY TR UZ **Records in Turkey:** TR-A: ADA, AKS, ANT, BAY, EZU, ISP, HAT, KAR, KON, MER, NIG, OSM, SIV **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Sibero-European

***P. illyrica* Leonardi & Gruev, 1993**
Range: E: RO SK UK YU **A:** TR **Records in Turkey:** TR-A: MER **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** E-European

***P. inflata* Reiche & Saulcy, 1858**
Range: E: FR IT MA PT SP **N:** AG LB MO TU **A:** IN IQ IS JO **Records in Turkey:** TR-A: ADA, ANT, DIY, ERZ, GAZ, MER, OSM, URF **Remarks:** The species has been recorded only from 3 Turkish regions as Eastern Anatolian Region, Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Mediterranean

***P. instabilis* Foudras, 1860**
Range: E: AU BE BH BU CR CZ FR GE GG GR HU IT MC PL RO RU SK SP SZ UK **N:** AG MO TU **A:** CY IS TR **Records in Turkey:** TR-A: AMA, ANK, ANT, BUR, DEN, DIY, EZU, ISP, IZM **Remarks:** The species is rather widely distributed in Turkey. It has been recorded from 6 Turkish regions. But it has not been recorded only from Marmara Region until now. **Chorotype:** Europeo-Mediterranean

***P. isatidis* Heikertinger, 1913**
Range: E: AU BE BU CR CZ FR GE GR HU IT LS LU MC RO RU SK SZ UK YU **A:** ES IN KZ MG TR UZ **Records in Turkey:** TR-A: AMA, ERZ, EZU, ISP **Remarks:** The species has been recorded only from 3 Turkish regions as Black Sea Region, Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** Sibero-European

***P. kiesenwetteri* Kutschera, 1864**
Range: E: AL AU BH BU CR GR HU IT MC SL TR YU **A:** TR **Records in Turkey:** TR-A: ANT, ISP, MAR, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** C and SE-European

***P. littoralis* Biondi, 1997**
Range: A: CY TR **Records in Turkey:** TR-A: MUG **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** E-Mediterranean (Cyprioto-Taurian)

***P. longicollis* Weise, 1900**
Range: E: AB AR GG ST **Records in Turkey:** TR-A: Northeast Turkey **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

***P. luteola* (Müller, 1776)**
Range: E: AB AU BE BH BU CR CZ FR GB GE GR HU IT LA LU NL PL RO RU SK SP SZ UK **N:** AG MO **A:** CY IN LE SY TR **Records in Turkey:** TR-A: ANK, ANT, BIL, EZU, KAY, MER **Remarks:** The species has been recorded only from 4 Turkish regions. But it has not been recorded from Aegean Region, Black Sea Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

***P. magnifica* Gruev, 1975**
Range: E: BU GR **A:** TR **Records in Turkey:** TR-A: BAT, DIY, ISP **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-

Eastern Anatolian Region until now. **Chorotype:** Turano-Mediterranean (Balkano-Anatolian)

P. marcida (Illiger, 1807)

Range: E: AZ BE BU CR DE EN FI FR GB GE GG GR IT LA NL NR PL PT RU SP SV UK **N:** AG MO TU **A:** CY IS LE TR **Records in Turkey:** TR-A: DEN, EZU **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean

P. milleri Kutschera, 1864

P. m. milleri Kutschera, 1864

Range: E: GR IT SP **A:** CY TR **Records in Turkey:** TR-A: ANT **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** S-European

P. napi (Fabricius, 1792)

Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LS LT LU MA MD NL NR PL PT RO RU SK SL SP SV SZ TR UK YU **N:** AG MO **A:** ES KZ TR **NAR Records in Turkey:** TR-A: ADA, ANK, ANT, EZU, ISP, KAY, MAN, MER, ORD **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Holarctic

P. ozisiki Leonardi & Arnold, 1995

Range: E: AR **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

P. pallidicolor Pic, 1903

Range: E: BU GR SP **N:** AG **A:** IQ IS LE SY TR **Records in Turkey:** TR-A: AMA, ANT, MER **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** Mediterranean

P. pallidicornis Heikertinger, 1921

Range: E: AR ST **A:** TM **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turanian + SW-Asiatic (Anatolo-Caucasian)

P. persica Allard, 1867

Range: E: AB ST **A:** AF IQ JO KZ SA SY TD TM UZ **Records in Turkey:** TR-A: MAR, SIR **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic + SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian)

P. picina (Marsham, 1802)

Range: E: AU BE BH BU BY CR CZ DE EN FI FR GB GE HU IR IT LU NL NR PL RO RU SK SL SP SV SZ UK **Records in Turkey:** TR-A: MER **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** European

P. pyritosa Kutschera, 1864

Range: E: AU BH CR FR GR IT SP YU **N:** CI MR **AFR Records in Turkey:** TR-A: GAZ, MER, OSM **Remarks:** The species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Europeo-Mediterranean + Afrotropical

P. ridenda Nadein, 2008

Range: A: TR **Records in Turkey:** TR-A: ADI, ANT, HAT, MAR **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Mediterranean Region and South-Eastern Anatolian Region until now. **Chorotype:** Anatolian

P. saulcyi Allard, 1867
Range: E: CT SK UK **N:** EG **A:** AE CY IN IQ IS JO KZ MG SY TR **Records in Turkey:** TR-A: ERZ **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** Turano-Mediterranean + SW-Asiatic

P. taurica Leonardi, 1971
Range: A: TR **Records in Turkey:** TR-A: ADA, KON **Remarks:** The endemic species has been recorded only from 2 Turkish regions as Central Anatolian Region and Mediterranean Region until now. **Chorotype:** Anatolian

P. testaceoconcolor Heikertinger, 1926
Range: E: AB **A:** CY IS LE TR **Records in Turkey:** TR-A: ANT, ERZ **Remarks:** The species has been recorded only from 2 Turkish regions as Eastern Anatolian Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian) + E-Mediterranean (Palaestino-Taurian)

P. thlaspis Foudras, 1860
Range: E: AN AU BE BU CR CZ FR GE GR HU IT MC MD PL RO SK SL SP ST SZ UK YU **A:** TR **Records in Turkey:** TR-A: EZU, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Eastern Anatolian Region until now. **Chorotype:** C and E-European

P. toelgi Heikertinger, 1914
Range: E: AU CR CZ FR GE HU IT RO SK SL SP SZ UK YU **Records in Turkey:** TR-A: ANT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

P. tricolor Weise, 1888
Range: E: AB AR AU BU BY CZ DE EN FI FR GB GE GG GR HU IT LT MC MD NR PL RO RU SK SP SV SZ UK **N:** MO **A:** AF ES IN IS KI KZ LE TD TM TR UZ **Records in Turkey:** TR-A: AKS, ANK, ANT, ART, BAY, DIY, ERZ, ESK, EZU, HAT, ISP, KON, KAY, KSH, NEV, NIG, OSM, SAM **Remarks:** The species is probably rather widely distributed in Turkey. It has been recorded from 5 Turkish regions. But it has not been recorded only from Marmara Region and South-Eastern Anatolian Region until now. **Chorotype:** Centralasiatic-Europeo-Mediterranean

P. valida Weise, 1889
Range: E: GG ST **A:** TR **Records in Turkey:** TR-A: EZU **Remarks:** The species has been recorded only from Eastern Anatolian Region in Turkey until now. **Chorotype:** SW-Asiatic (Anatolo-Caucasian)

P. vindobonnensis Heikertinger, 1914
Range: E: AU CR CZ FR GE IT SK SP SZ UK **A:** TR **Records in Turkey:** TR-A: KON **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** C and E-European

P. wachsmanni Csiki, 1903
Range: E: AL BH CR IT SL TR YU **A:** CY JO **Records in Turkey:** TR-E **Remarks:** Provincial distribution of the species is unknown. **Chorotype:** SE-European

P. yalvacensis Gök, 2005
Range: A: TR **Records in Turkey:** TR-A: ISP **Remarks:** The endemic species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** Anatolian

Subgenus *Semicnema* Weise, 1888
***P. reitteri* Weise, 1888**
***P. r. reitteri* Weise, 1888**
Range: E: AU BH BU CZ GE HU SK ST UK **A:** TR **Records in Turkey:** TR-A: ISP **Remarks:** The subspecies has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** C and E-European

Genus *Sphaeroderma* Stephens, 1831
***S. rubidum* (Graells, 1858)**
Range: E: AL AU BE BH BY CR CZ DE FR GB GE GR HU IT LS LT LU MA MD NL PL PT RO SK SL SP ST SV TR UK YU **N:** AG MO MR TU **A:** CY IS TR **Records in Turkey:** TR-A: IST, IZM, ORD **Remarks:** The species has been recorded only from 3 Turkish regions as Aegean Region, Black Sea Region and Marmara Region until now. **Chorotype:** Europeo-Mediterranean

***S. testaceum* (Fabricius, 1775)**
Range: E: AB AL AU BE BH BU BY CR CZ DE EN FI FR GB GE GR HU IT LA LU MC NL NR PL RO RU SK SL SP SV SZ UK YU **A:** CY **NAR Records in Turkey:** TR-A: BOL, DUZ, OSM **Remarks:** The species has been recorded only from 2 Turkish regions as Black Sea Region and Mediterranean Region until now. **Chorotype:** European + Nearctic

ZOOGEOGRAPHICAL ANALYSIS

Turkish Alticinae includes 340 species group taxa (311 species + 29 subspecies) of 22 genera. 41 species group taxa, namely 12.06 % of the species group taxa have "Anatolian" chorotype. 36 species group taxa, namely 10.59 % of the species group taxa have "Sibero-European" chorotype. 35 species group taxa, namely 10.29 % of the species group taxa have "C and E-European" chorotype. 26 species group taxa, namely 7.65 % of the species group taxa have "SW-Asiatic" chorotype. 23 species group taxa, namely 6.77 % of the species group taxa have "Europeo-Mediterranean" chorotype. 22 species group taxa, namely 6.47 % of the species group taxa have "Turano-Mediterranean" chorotype. 16 species group taxa, namely 4.70 % of the species group taxa have "E-Mediterranean" chorotype. 16 species group taxa, namely 4.70 % of the species group taxa have "European" chorotype. 14 species group taxa, namely 4.12 % of the species group taxa have "Mediterranean" chorotype. 14 species group taxa, namely 4.12 % of the species group taxa have "Palearctic" chorotype. 8 species group taxa, namely 2.35 % of the species group taxa have "Centralasiatic-European" chorotype. 6 species group taxa, namely 1.77 % of the species group taxa have "Centralasiatic-Mediterranean" chorotype. 6 species group taxa, namely 1.77 % of the species group taxa have "Sibero-European + Nearctic" chorotype. 5 species group taxa, namely 1.47 % of the species group taxa have "E-European" chorotype. 5 species group taxa, namely 1.47 % of the species group taxa have "Holarctic" chorotype. 4 species group taxa, namely 1.18 % of the species group taxa have "Centralasiatic-Europeo-Mediterranean" chorotype. 4 species group taxa, namely 1.18 % of the species group taxa have "Centralasiatic + SW-Asiatic" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "Asiatic-European" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "Asiatic + SW-Asiatic" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "Europeo-Mediterranean or W-Palearctic + Afrotropical" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "Holarctic + Afrotropical" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "S-European" chorotype. 3 species group taxa, namely 0.88 % of the species group taxa have "SE-European" chorotype. 2 species group taxa, namely

0.59 % of the species group taxa have “Asiatic-European + Oriental” chorotype. 2 species group taxa, namely 0.59 % of the species group taxa have “European + Nearctic” chorotype. 2 species group taxa, namely 0.59 % of the species group taxa have “Sibero-European + Oriental” chorotype. 2 species group taxa, namely 0.59 % of the species group taxa have “Turano-European” chorotype. And each of the remaining 33 species group taxa has a different chorotype. One species group taxa, namely about 0.29 % of the taxa has “Afrotropico-Mediterranean” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Afrotropica-Mediterranean + Centralasiatic-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Afrotropico-Mediterranean + European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Asiatic-European + Australian + Nearctic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “C and E-European + Nearctic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “C and SE-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Centralasiatic + Anatolian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Centralasiatic + E-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Centralasiatic-E-Mediterranean” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Centralasiatic-Europeo-Mediterranean + Afrotropical” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Centralasiatic-Mediterranean + Australian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “E-Mediterranean + SW-Asiatic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “European + Indian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Europeo-Mediterranean or W-Palearctic + Nearctic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Europeo-Mediterranean or W-Palearctic + Oriental” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Europeo-Mediterranean + Afrotropical + Australian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Holarctic + Australian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Mediterranean + Saharo-Sahale-Arabian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Saharo-Turano-Sindian + Mediterranean” chorotype. One species group taxa, namely about 0.29 % of the taxa has “S and E-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “S-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Sibero-European + Afrotropical” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Sibero-European + Arabian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Sibero-European + Australian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Sibero-European + Nearctic + Australian” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Subcosmopolitan” chorotype. One species group taxa, namely about 0.29 % of the taxa has “SW-Asiatic + E-European” chorotype. One species group taxa, namely about 0.29 % of the taxa has “SW-Asiatic + E-Mediterranean” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Turanian + SW-Asiatic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Turano-Mediterranean + Nearctic + Neotropical” chorotype. One species group taxa, namely about 0.29 % of the taxa has “Turano-Mediterranean + SW-Asiatic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “W-Palearctic” chorotype. One species group taxa, namely about 0.29 % of the taxa has “W-Palearctic + Afrotropical + Nearctic” chorotype (Fig. 1). So the dominant chorotype for

Turkish Alticinae is "Anatolian". "Sibero-European" and "C and E-European" chorotypes follow it. Also the members of "SW-Asiatic", "Europeo-Mediterranean" and also "Turano-Mediterranean" chorotypes present important contributions for Turkish fauna.

For zoogeographical evaluation, the all known species group taxa of Turkish Alticinae are presented as follows:

A total of 41 species group taxa have "Anatolian" chorotype as *A. byzantica*, *A. osmanica*, *A. anatolica*, *A. caria*, *A. curda*, *A. iconiensis*, *A. antiocha*, *A. turcica*, *A. whiteheadi*, *A. bulgharensis*, *A. pontica*, *A. alanyensis*, *A. bergeali*, *A. bergealoides*, *A. crassicornis*, *A. warchalowskii*, *L. angelikae*, *L. artvinus*, *L. audisioi*, *L. kopdagiensis*, *L. latens*, *L. manfredi*, *L. ozbeki*, *L. aubozaorum*, *L. hittita*, *L. iconiensis*, *M. turcica*, *O. loebli*, *O. olympica*, *O. oselliana*, *P. bolognai*, *P. oltuensis*, *P. ozbeki*, *P. toelgi*, *P. anatolica*, *P. cerenae*, *P. diversicolor*, *P. dogueti*, *P. ridenda*, *P. taurica* and *P. yalvacensis*.

A total of 36 species group taxa have "Sibero-European" chorotype as *A. b. brevicollis*, *A. t. tamaricis*, *A. franzi*, *A. gracilis*, *A. semicyanea*, *A. violacea*, *C. mannerheimii*, *C. obesa*, *C. sahlbergii*, *C. picipes*, *C. s. semicoerulea*, *C. tibialis*, *C. aurata*, *C. aurea*, *C. fulvicornis*, *C. nitudula*, *D. rufipes*, *D. depressiuscula*, *E. pubescens*, *H. modeeri*, *L. curtus*, *L. holsaticus*, *L. melanocephalus*, *L. minimus*, *L. nasturtii*, *L. suturellus*, *L. anchusae*, *L. weisei*, *M. rustica*, *N. ferruginea*, *N. motschulskii*, *P. ochripes*, *P. tetrastigma*, *P. dulcamarae*, *P. hyoscyami* and *P. isatidis*.

A total of 35 species group taxa have "C and E-European" chorotype as *A. cornivorax*, *A. impressicollis*, *A. q. quercetorum*, *A. atrovirens*, *A. lacertosa*, *A. ovata*, *C. lamina*, *D. cryptocephala*, *D. rugulosa*, *D. f. femoralis*, *D. schillingi*, *L. brisouti*, *L. celticus*, *L. helvolus*, *L. l. personatus*, *L. linnaei*, *L. nimrodi*, *L. noricus*, *L. pulmonariae*, *L. salviae*, *L. substriatus*, *L. f. fuscoaeneus*, *L. pinguis*, *N. crassicornis*, *N. nigritula*, *P. acutecarinata*, *P. astrachanica*, *P. ganglbaueri*, *P. m. malvae*, *P. aerea*, *P. brisouti*, *P. thlaspis*, *P. toelgi*, *P. vindobonnensis* and *P. r. reitteri*.

A total of 26 species group taxa have "SW-Asiatic" chorotype as *A. delagrangei*, *A. pubipennis*, *A. ancyrensis*, *A. globicollis*, *A. hampei*, *A. talyshana*, *D. kralii*, *D. tricolor*, *D. zangezurica*, *E. dieckmanni*, *L. bytinskii*, *L. georgianus*, *L. karlheinzi*, *L. ledouxi*, *L. s. dichrous*, *L. trepidus*, *L. lederi*, *P. caucasicola*, *P. egridirensis*, *P. lorestanica*, *P. maculicornis*, *P. sisymbrii*, *P. arista*, *P. longicollis*, *P. ozisiki* and *P. valida*.

A total of 23 species group taxa have "Europeo-Mediterranean" chorotype as *A. a. ampelophaga*, *A. atrocaerulea*, *A. nigriceps*, *A. pygmaea*, *C. arenacea*, *C. arida*, *C. procerula*, *C. chlorophana*, *C. scheffleri*, *D. occultans*, *D. timida*, *E. atropae*, *L. callidus*, *L. cerinthes*, *L. gracilis*, *L. membranaceus*, *L. nanus*, *P. circumdata*, *P. fuscicornis*, *P. instabilis*, *P. luteola*, *P. marcida* and *S. rubidum*.

A total of 22 species group taxa have "Turano-Mediterranean" chorotype as *A. serbica*, *A. graeca*, *A. jarmilae*, *A. maculata*, *A. valachica*, *B. fallax*, *B. olexai*, *C. imitatrix*, *C. coyei*, *C. orientalis*, *E. caucasica*, *L. barbarae*, *L. jailensis*, *L. solaris*, *L. anatolicus*, *L. c. corynthius*, *M. cylindrica*, *N. i. obtusangula*, *P. bulgarica*, *P. judaea*, *P. pontoaegeica* and *P. magnifica*.

A total of 16 species group taxa have "E-Mediterranean" chorotype as *A. turcicus*, *A. bonvouloiri*, *A. kuntzei*, *A. rhodiensis*, *A. syriaca*, *D. phoenicia*, *D. rufofemorata*, *L. allotrophus*, *L. aramaicus*, *L. hermonensis*, *L. meridionalis*, *L. truncatellus*, *O. delagrangei*, *P. elliptica*, *P. drusei* and *P. littoralis*.

A total of 16 species group taxa have "European" chorotype as *A. longicollis*, *A. lythri*, *A. venustula*, *C. aerosa*, *C. confusa*, *C. subcoerulea*, *D. cynoglossi*, *H.*

mercurialis, *L. minusculus*, *L. niger*, *L. obliteratus*, *L. quadriguttatus*, *L. reichei*, *M. mathewsii*, *N. transversa* and *P. picina*.

A total of 14 species group taxa have "Mediterranean" chorotype as *A. carbonaria*, *C. delarouzeei*, *D. numidica*, *L. australis*, *L. baeticus*, *L. juncicola*, *L. obliteratoides*, *L. s. stragulatus*, *L. onosmae*, *P. fallaciosa*, *P. v. variipennis*, *P. gibbosa*, *P. inflata* and *P. pallidicolor*.

A total of 14 species group taxa have "Palearctic" chorotype as *A. euphorbiae*, *C. hortensis*, *C. major*, *L. atricillus*, *L. ballotae*, *L. foudrasi*, *L. kutscherai*, *L. longipennis*, *L. n. nigrofasciatus*, *L. parvulus*, *L. t. tabidus*, *P. atra*, *P. affinis* and *P. cuprea*.

A total of 8 species group taxa have "Centralasiatic-European" chorotype as *C. montenegrina*, *L. absynthii*, *L. medvedevi*, *L. picicollis*, *P. balcanica*, *P. diademata*, *P. e. erysimi* and *P. menetriesii*.

A total of 6 species group taxa have "Centralasiatic-Mediterranean" chorotype as *A. flaviceps*, *E. abeillei*, *L. a. alfierii*, *L. fallax*, *L. rectilineatus* and *P. corrugata*.

A total of 6 species group taxa have "Sibero-European + Nearctic" chorotype as *A. carduorum*, *A. nigriscutis*, *L. ganglbaueri*, *L. l. luridus*, *L. rubiginosus* and *P. vittula*.

A total of 5 species group taxa have "E-European" chorotype as *A. konstantinovi*, *A. rugipennis*, *D. carpathica*, *P. fornuseki* and *P. illyrica*.

A total of 5 species group taxa have "Holarctic" chorotype as *C. concinna*, *L. pellucidus*, *L. succineus*, *P. chalcomera* and *P. napi*.

A total of 4 species group taxa have "Centralasiatic-Europeo-Mediterranean" chorotype as *A. palustris*, *L. aeneicollis*, *P. n. nigripes* and *P. tricolor*.

A total of 4 species group taxa have "Centralasiatic + SW-Asiatic" chorotype as *C. igori*, *L. eminus*, *P. pallidipennis* and *P. persica*.

A total of 3 species group taxa have "Asiatic-European" chorotype as *C. breviuscula*, *C. nigricoxis* and *P. attenuata*.

A total of 3 species group taxa have "Asiatic + SW-Asiatic" chorotype as *A. deserticola*, *L. violentus* and *P. praticola*.

A total of 3 species group taxa have "Europeo-Mediterranean or W-Palearctic + Afrotropical" chorotype as *O. ventralis*, *P. pyritosa* and *L. strigicollis*.

A total of 3 species group taxa have "Holarctic + Afrotropical" chorotype as *L. pratensis*, *P. cruciferae* and *P. c. chrysocephala*.

A total of 3 species group taxa have "S-European" chorotype as *A. aeneomicans*, *L. a. furthi* and *L. e. rufulus*.

A total of 3 species group taxa have "SE-European" chorotype as *P. dacica*, *P. vilis* and *P. wachsmanni*.

A total of 2 species group taxa have "Asiatic-European + Oriental" chorotype as *A. abdominalis* and *L. lewisii*.

A total of 2 species group taxa have "European + Nearctic" chorotype as *A. cyparissiae* and *S. testaceum*.

A total of 2 species group taxa have "Sibero-European + Oriental" chorotype as *C. aridula* and *L. scutellaris*.

A total of 2 species group taxa have "Turano-European" chorotype as *L. bertii* and *L. e. exsoletus*.

One species as *A. fuentei* has "Afrotropico-Mediterranean" chorotype.

One species as *C. conducta* has "Afrotropico-Mediterranean + Centralasiatic-European" chorotype.

One species as *L. lycopi* has "Afrotropico-Mediterranean + European" chorotype.

One species as *A. o. oleracea* has "Asiatic-European + Australian + Nearctic" chorotype.

One species as *A. flava* has "C and E-European + Nearctic" chorotype.

One species as *P. kiesenwetteri* has "C and SE-European" chorotype.

One species as *L. corpulentus* has "Centralasiatic + Anatolian" chorotype.

One species as *P. reitteri* has "Centralasiatic + E-European" chorotype.

One species as *P. lativittata* has "Centralasiatic-E-Mediterranean" chorotype.

One species as *P. procera* has "Centralasiatic-Europeo-Mediterranean + Afrotropical" chorotype.

One species as *L. albineus* has "Centralasiatic-Mediterranean + Australian" chorotype.

One species as *A. bicarinata* has "E-Mediterranean + SW-Asiatic" chorotype.

One species as *P. nodicornis* has "European + Indian" chorotype.

One species as *P. punctulata* has "Europeo-Mediterranean or W-Palearctic + Nearctic" chorotype.

One species as *L. o. ochroleucus* has "Europeo-Mediterranean or W-Palearctic + Oriental" chorotype.

One species as *L. echii* has "Europeo-Mediterranean + Afrotropical + Australian" chorotype.

One species as *P. undulata* has "Holarctic + Australian" chorotype.

One species as *P. hospes* has "Mediterranean + Saharo-Sahale-Arabian" chorotype.

One species as *H. ruficollis* has "Saharo-Turano-Sindian + Mediterranean" chorotype.

One species as *E. intermedia* has "S and E-European" chorotype.

One species as *P. m. milleri* has "S-European" chorotype.

One species as *C. plutus* has "Sibero-European + Afrotropical" chorotype.

One species as *A. lutescens* has "Sibero-European + Arabian" chorotype.

One species as *P. nemorum* has "Sibero-European + Australian" chorotype.

One species as *L. jacobaeae* has "Sibero-European + Nearctic + Australian" chorotype.

One species as *P. striolata* has "Subcosmopolitan" chorotype.

One species as *P. weiseana* has "SW-Asiatic + E-European" chorotype.

One species as *P. testaceoconcolor* has "SW-Asiatic + E-Mediterranean" chorotype.

One species as *P. pallidicornis* has "Turanian + SW-Asiatic" chorotype.

One species as *E. hirtipennis* has "Turano-Mediterranean + Nearctic + Neotropical" chorotype.

One species as *P. saulcyi* has "Turano-Mediterranean + SW-Asiatic" chorotype.

One species as *A. nonstriata* has "W-Palearctic" chorotype.

One species as *M. c. chrysanthemi* has "W-Palearctic + Afrotropical + Nearctic" chorotype.

On the other side, Turkish Alticinae includes a total of 340 species group taxa. However, provincial distributions of 9 species group taxa are unknown. So Turkish Alticinae have 2 different evaluations necessarily. But, results of both assessments are the same except the occurrence ratio (Table 1).

For the subfamily Alticinae (according to all species group taxa):

95 species are represented in Marmara Region (28 %)

64 species are represented in Aegean Region (19 %)

208 species are represented in Mediterranean Region (61 %)
152 species are represented in Central Anatolian Region (45 %)
114 species are represented in Black Sea Region (34 %)
177 species are represented in Eastern Anatolian Region (52 %)
25 species are represented in South-Eastern Anatolian Region (7 %)

For the subfamily Alticinae (according to known provincial distribution of 331 species group taxa):
95 species are represented in Marmara Region (29 %)
64 species are represented in Aegean Region (19 %)
208 species are represented in Mediterranean Region (63 %)
152 species are represented in Central Anatolian Region (46 %)
114 species are represented in Black Sea Region (34 %)
177 species are represented in Eastern Anatolian Region (54 %)
25 species are represented in South-Eastern Anatolian Region (8 %)

So Turkish Alticinae that includes a total of 340 species group taxa or 331 species group taxa of which are known provincial distributions in Turkey, are rather widely distributed in all Turkish Regions. The most number of species is represented in Mediterranean Region. Eastern Anatolian Region and Central Anatolian Region follow it respectively. Black Sea Region and Marmara Region are represented with an important number of species respectively. However, Aegean Region and especially South-Eastern Anatolian Region are represented with a little number of species now.

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Table 1. The regional distribution of all known species group taxa of Alticinae in Turkey.

TAXON	R	E	G	I	O	N	S
	MAR	AER	MER	CAR	BSR	EAR	SEAR
SubfamilyALTICINAE							
A. byzantica	+	-	-	-	-	-	-
A. osmanica	-	-	-	-	+	-	-
A. serbica	+	-	-	-	+	-	-
A. anatolica	-	+	+	+	-	-	-
A. caria	-	+	-	-	-	-	-
A. curda	-	-	-	-	-	-	+
A. delagrangei	-	-	+	-	+	-	-
A. iconiensis	-	-	-	+	-	-	-
A. pubipennis	-	-	-	-	-	+	-
A. antiocha	-	-	+	-	-	-	-
A. turcica	-	+	-	-	-	-	-
A. whiteheadi	-	+	+	+	-	-	-
A. a. ampelophaga	-	-	+	+	-	+	-
A. ancyrensis	-	-	+	+	-	+	-
A. bicarinata	+	-	+	+	+	-	-
A. b. brevicollis	+	-	+	+	+	+	-
A. bulgharensis	-	-	+	-	-	-	-
A. carduorum	-	-	-	+	+	+	-
A. cornivorax	+	-	-	-	-	-	-
A. deserticola	-	+	+	+	+	+	+
A. globicollis	+	-	+	-	-	+	-
A. graeca	?	?	?	?	?	?	?
A. hampei	-	-	-	+	+	+	-
A. impressicollis	+	-	+	+	+	+	-
A. jarmilae	-	+	+	+	-	+	-
A. longicollis	-	-	-	+	-	-	-
A. lythri	-	+	+	-	+	+	-
A. o. oleracea	+	-	+	+	+	+	-
A. palustris	+	+	+	+	+	+	-
A. pontica	-	-	-	-	+	-	-
A. q. quercetorum	+	+	+	-	-	-	-
A. talyshana	-	-	-	-	+	+	-
A. t. tamaricis	+	-	+	-	+	+	-
A. turcicus	-	-	+	-	-	-	-
A. abdominalis	?	?	?	?	?	?	?
A. aeneomicans	-	-	+	+	-	-	-
A. alanyensis	-	-	+	-	-	-	-
A. atrocaerulea	-	-	-	-	-	+	-
A. atrovirens	-	-	+	-	-	-	-
A. bergeali	+	-	+	+	-	-	-
A. bergealoides	-	-	+	-	-	-	-
A. bonvouloiri	+	-	+	+	-	+	-
A. carbonaria	-	-	-	-	-	-	+
A. crassicornis	-	-	-	-	-	+	-
A. cyparissiae	-	-	-	+	-	-	-
A. euphorbiae	+	+	+	+	+	+	-
A. flava	-	-	+	-	-	+	-
A. flaviceps	+	-	+	+	-	+	-
A. franzi	-	-	-	+	+	+	-

A. fuentei	-	-	+	+	-	-	-
A. gracilis	-	-	-	+	+	+	-
A. konstantinovi	-	-	-	+	-	-	-
A. kuntzei	-	-	+	+	-	+	-
A. lacertosa	+	-	-	-	-	-	-
A. lutescens	+	-	+	+	-	+	-
A. maculata	-	+	+	-	-	-	+
A. nigriceps	+	-	+	+	-	+	-
A. nigriscutis	-	-	+	+	+	+	-
A. nonstriata	+	-	-	+	+	-	-
A. ovata	+	-	-	-	-	-	-
A. pygmaea	+	+	+	-	-	+	-
A. rhodiensis	-	-	-	-	-	+	-
A. rugipennis	-	-	-	-	-	+	-
A. semicyanea	+	+	-	+	+	+	-
A. syriaca	-	+	-	-	-	+	-
A. valachica	-	-	+	-	-	-	-
A. venustula	+	-	-	+	-	+	-
A. violacea	+	-	-	-	-	-	-
A. warchalowskii	-	-	+	-	-	-	-
B. fallax	+	-	-	+	+	+	-
B. olexai	-	-	-	-	+	-	-
C. aerosa	-	-	-	-	-	+	-
C. arenacea	+	+	+	+	+	+	-
C. arida	-	-	+	-	-	+	-
C. aridula	+	+	-	+	-	+	-
C. confusa	+	-	-	+	+	+	-
C. hortensis	+	+	+	+	+	+	-
C. igori	-	-	-	+	+	+	-
C. imitatrix	-	-	-	+	-	-	-
C. mannerheimii	+	-	-	+	-	-	-
C. montenegrina	-	-	+	+	+	+	-
C. obesa	+	-	-	+	+	+	-
C. procerula	+	-	+	+	-	+	-
C. sahlbergii	+	-	+	+	-	+	-
C. subcoerulea	-	-	+	-	-	-	-
C. breviuscula	+	-	+	+	-	+	-
C. chlorophana	+	-	+	+	-	+	+
C. concinna	+	-	+	+	+	+	-
C. conducta	+	-	+	+	-	+	-
C. coyei	+	+	+	+	+	+	+
C. delarouzeei	-	-	+	-	-	-	-
C. major	+	-	+	+	-	+	-
C. orientalis	+	-	+	+	-	-	-
C. picipes	-	-	-	-	+	-	-
C. scheffleri	+	+	+	+	-	+	-
C. s. semicoerulea	+	-	-	+	+	-	+
C. tibialis	+	+	+	+	+	+	-
C. aurata	+	-	+	+	+	+	-
C. aurea	+	-	+	+	+	+	-
C. fulvicornis	-	-	-	-	+	+	-
C. lamina	+	-	-	+	+	-	-
C. nigricoxis	-	-	-	-	-	+	-
C. nitudula	-	-	-	-	+	-	-
C. plutus	-	-	+	+	+	-	-
D. rufipes	-	-	-	+	+	-	-

D. cryptocephala	-	-	-	-	-	+	-
D. cynoglossi	-	-	+	-	-	+	+
D. depressiuscula	-	-	-	+	+	+	-
D. kralii	-	-	+	-	+	+	-
D. numidica	-	-	+	-	-	-	-
D. occultans	-	-	+	+	+	+	-
D. phoenicia	+	-	+	-	-	-	-
D. rufofemorata	-	-	+	+	-	-	-
D. rugulosa	-	-	+	-	-	+	-
D. timida	-	-	+	-	-	-	-
D. carpathica	-	-	+	+	+	+	-
D. f. femoralis	-	-	-	-	-	-	+
D. schillingi	-	-	+	+	-	+	-
D. tricolor	-	-	+	-	-	+	-
D. zangezurica	-	-	+	+	-	+	-
E. abeillei	-	-	+	-	-	-	-
E. atropae	-	-	-	-	-	+	-
E. caucasica	-	-	-	-	-	+	-
E. dieckmanni	-	-	+	-	-	-	-
E. hirtipennis	-	+	-	-	-	-	+
E. intermedia	-	-	-	-	+	+	-
E. pubescens	+	+	-	+	+	-	-
H. mercurialis	-	-	-	-	+	-	-
H. ruficollis	-	-	+	-	+	-	-
H. modeeri	+	-	-	-	+	-	-
L. absynthii	-	-	-	+	-	-	-
L. aeneicollis	-	+	+	+	-	+	-
L. albineus	-	+	+	+	-	+	-
L. a. alfierii	-	-	+	+	-	+	-
L. a. furthi	-	-	+	-	-	+	-
L. allotrophus	-	-	+	-	-	-	-
L. angelikae	-	-	+	-	-	-	-
L. aramaicus	-	-	+	+	-	-	-
L. artvinus	-	-	-	-	+	-	-
L. atricillus	-	+	+	+	+	+	-
L. audisioi	-	-	-	-	+	-	-
L. australis	-	-	+	-	-	-	-
L. baeticus	-	-	+	-	-	-	-
L. ballotae	-	-	+	+	-	+	-
L. barbarae	-	-	+	-	-	-	-
L. bertii	-	-	+	+	+	+	-
L. brisouti	-	-	+	-	-	+	-
L. bytinskii	-	-	+	-	-	+	-
L. callidus	-	-	-	-	-	+	-
L. celticus	-	-	+	-	+	-	-
L. cerinthes	-	-	+	-	-	+	-
L. corpulentus	?	?	?	?	?	?	?
L. curtus	-	-	+	-	-	-	-
L. echii	?	?	?	?	?	?	?
L. eminus	-	-	-	-	-	+	-
L. e. exsoletus	-	-	+	-	-	-	-
L. e. rufulus	+	-	+	+	+	+	-
L. fallax	-	-	-	-	-	-	+
L. foudrasi	-	-	+	-	-	+	-
L. ganglbaueri	-	-	-	-	-	+	-
L. georgianus	?	?	?	?	?	?	?

L. gracilis	-	+	+	+	-	+	-
L. helvolus	-	-	+	-	-	-	-
L. hermonensis	-	-	+	-	+	+	-
L. holsaticus	?	?	?	?	?	?	?
L. jacobaeae	-	-	-	-	+	+	-
L. jailensis	+	-	-	+	-	-	-
L. juncicola	-	-	+	+	+	+	-
L. karlheinzi	-	-	+	-	-	-	-
L. kopdagiensis	-	-	-	-	+	+	-
L. kutscherai	-	-	+	-	-	+	-
L. latens	-	-	-	-	+	-	-
L. l. personatus	-	-	+	-	-	-	-
L. ledouxi	-	-	-	-	+	-	-
L. lewisii	-	-	-	-	+	+	-
L. linnaei	+	+	+	+	+	+	+
L. longipennis	-	-	+	-	-	+	-
L. l. luridus	+	-	+	+	+	+	-
L. lycopi	+	-	+	+	+	+	-
L. manfredi	-	-	+	-	-	-	-
L. medvedevi	-	-	-	-	+	+	-
L. melanocephalus	+	-	+	+	+	+	-
L. membranaceus	-	-	+	-	-	-	-
L. meridionalis	-	-	+	+	-	-	-
L. minimus	-	-	+	-	-	+	-
L. minusculus	-	-	+	-	-	-	-
L. nanus	-	-	+	+	-	+	-
L. nasturtii	-	+	+	-	-	-	-
L. niger	+	-	-	+	-	+	-
L. n. nigrofasciatus	+	-	+	+	+	+	-
L. nimrodi	-	-	+	-	+	+	-
L. noricus	-	-	+	-	-	+	-
L. obliteratoides	-	-	+	-	-	-	-
L. obliteratus	+	+	+	-	-	+	-
L. o. ochroleucus	-	+	+	+	-	+	-
L. ozbeki	-	-	-	-	-	+	-
L. parvulus	-	-	+	-	-	+	+
L. pellucidus	-	+	+	+	+	+	-
L. picicollis	-	+	+	+	-	+	-
L. pratensis	+	-	+	+	+	+	-
L. pulmonariae	-	-	+	-	+	-	-
L. quadriguttatus	+	-	-	-	-	+	+
L. rectilineatus	+	-	-	+	-	+	-
L. reichei	-	-	+	-	-	+	-
L. rubiginosus	-	-	-	+	-	-	+
L. salviae	-	-	+	-	+	+	-
L. scutellaris	-	-	+	-	+	+	-
L. solaris	-	-	+	-	-	-	-
L. s. stragulatus	-	-	+	-	-	-	-
L. s. dichrous	-	-	-	-	-	-	+
L. strigicollis	-	-	-	-	+	+	-
L. substriatus	-	+	-	+	-	-	-
L. succineus	+	+	+	+	-	+	-
L. suturellus	-	-	+	+	-	+	+
L. t. tabidus	+	-	+	+	-	+	-
L. trepidus	-	-	+	+	-	+	-
L. violentus	?	?	?	?	?	?	?

L. anatolicus	+	-	+	+	+	+	+
L. anchusae	+	-	+	-	+	+	-
L. aubozaorum	-	-	-	+	-	-	-
L. c. corynthius	-	-	+	-	-	-	-
L. f. fuscoaeneus	-	-	+	+	-	+	-
L. hittita	-	-	-	+	-	+	-
L. iconiensis	-	-	-	+	-	-	-
L. lederi	-	-	-	-	+	-	-
L. onosmae	-	-	+	-	-	-	-
L. pinguis	+	-	+	-	-	-	-
L. truncatellus	-	+	+	-	-	-	-
L. weisei	-	-	-	-	-	+	-
M. c. chrysanthemi	-	+	-	-	-	-	-
M. mathewsii	-	+	+	-	-	-	-
M. rustica	+	-	+	+	-	+	-
M. cylindrica	-	-	-	-	+	-	-
M. turcica	-	-	-	-	+	-	-
N. crassicornis	-	-	+	-	+	+	-
N. ferruginea	+	-	+	+	-	+	-
N. i. obtusangula	-	+	+	-	-	+	-
N. motschulskii	-	-	-	-	-	+	-
N. nigritula	+	-	-	-	-	-	-
N. transversa	+	-	+	+	+	+	-
O. ventralis	+	-	+	+	+	+	-
O. delagrangei	-	-	+	-	-	-	-
O. loebli	-	-	-	-	+	-	-
O. olympica	+	-	-	+	-	-	-
O. oselliana	-	-	-	-	+	-	-
P. acutecarinata	-	-	-	+	-	-	-
P. astrachanica	-	-	+	+	+	-	-
P. atra	+	-	+	+	+	+	-
P. balcanica	+	-	+	-	-	+	-
P. bolognai	-	-	+	-	-	+	-
P. bulgarica	-	-	+	-	-	-	-
P. caucasicola	-	-	-	+	-	-	-
P. corrugata	-	+	+	+	-	-	-
P. cruciferae	+	+	+	+	+	+	-
P. dacica	-	-	+	+	-	-	-
P. diademata	+	-	+	+	-	+	-
P. egridirensis	-	-	+	+	-	-	-
P. e. erysimi	+	+	+	+	+	+	-
P. fallaciosa	-	-	-	+	-	-	-
P. fornuseki	-	-	+	-	-	-	-
P. ganglbaueri	-	-	+	-	-	-	-
P. judaea	-	+	+	-	-	-	-
P. lativittata	-	+	-	-	-	+	-
P. lorestanica	-	-	+	-	-	+	-
P. maculicornis	-	-	+	+	-	-	-
P. nemorum	+	-	+	+	+	+	-
P. n. nigripes	+	+	+	+	+	+	-
P. nodicornis	-	+	+	+	-	+	-
P. ochripes	+	-	-	+	+	-	-
P. oltuensis	-	-	-	-	-	+	-
P. ozbeki	-	-	-	-	+	-	-
P. pallidipennis	-	-	-	+	-	-	-
P. pontoaegeica	-	-	+	-	-	-	-

P. praticola	+	-	-	+	-	+	-
P. procera	-	-	+	+	-	+	-
P. punctulata	+	-	+	+	+	-	-
P. reitteri	-	+	-	-	-	-	-
P. sisymbrii	-	-	-	+	-	+	-
P. striolata	+	-	-	-	+	+	-
P. tetrastigma	-	-	-	-	+	+	-
P. toelgi	-	-	-	+	+	-	-
P. undulata	+	-	-	+	-	+	-
P. v. variipennis	+	+	+	+	-	-	-
P. vilis	+	+	+	+	-	-	-
P. vittula	+	+	+	+	-	+	-
P. weiseana	-	-	-	+	+	+	-
P. fuscicornis	+	+	-	-	-	-	-
P. m. malvae	+	+	+	+	+	+	-
P. menetriesii	+	+	+	+	-	+	-
P. elliptica	-	+	+	+	-	-	-
P. aerea	-	-	+	-	-	-	-
P. affinis	-	-	+	-	-	-	-
P. anatolica	-	-	+	-	-	-	-
P. arista	-	-	-	+	+	+	-
P. attenuata	-	-	+	+	+	+	-
P. brisouti	-	-	-	-	-	+	-
P. cerenae	-	-	+	-	-	-	-
P. chalcomera	+	+	+	+	+	+	-
P. c. chrysocephala	+	+	+	+	-	+	-
P. circumdata	-	+	+	+	+	+	-
P. cuprea	+	+	+	+	+	+	-
P. diversicolor	-	-	+	+	-	-	-
P. dogueti	-	-	-	-	+	-	-
P. drusei	-	-	+	-	-	-	-
P. dulcamarae	-	-	-	+	-	-	-
P. gibbosa	-	-	+	-	-	-	-
P. hospes	-	-	+	-	-	-	-
P. hyoscyami	-	-	+	+	+	+	-
P. illyrica	-	-	+	-	-	-	-
P. inflata	-	-	+	-	-	+	+
P. instabilis	-	+	+	+	+	+	+
P. isatidis	-	-	+	-	+	+	-
P. kiesenwetteri	-	-	+	-	-	-	+
P. littoralis	-	+	-	-	-	-	-
P. longicollis	?	?	?	?	?	?	?
P. luteola	+	-	+	+	-	+	-
P. magnifica	-	-	+	-	-	-	+
P. marcida	-	+	-	-	-	+	-
P. m. milleri	-	-	+	-	-	-	-
P. napi	-	+	+	+	+	+	-
P. ozisiki	-	-	-	-	-	+	-
P. pallidicolor	-	-	+	-	+	-	-
P. pallidicornis	-	-	-	-	-	+	-
P. persica	-	-	-	-	-	+	+
P. picina	-	-	+	-	-	-	-
P. pyritosa	-	-	+	-	-	-	+
P. ridenda	-	-	+	-	-	-	+
P. saulcyi	-	-	-	-	-	+	-
P. taurica	-	-	+	+	-	-	-

P. testaceoconcolor	-	-	+	-	-	+	-
P. thlaspis	-	+	-	-	-	+	-
P. toelgi	-	-	+	-	-	-	-
P. tricolor	-	+	+	+	+	+	-
P. valida	-	-	-	-	-	+	-
P. vindobonnensis	-	-	-	+	-	-	-
P. wachsmanni	?	?	?	?	?	?	?
P. yalvacensis	-	-	+	-	-	-	-
P. r. reitteri	-	-	+	-	-	-	-
S. rubidum	+	+	-	-	+	-	-
S. testaceum	-	-	+	-	+	-	-

Abreviations: MAR: Marmara Region, AER: Aegean Region, MER: Mediterranean Region, CAR: Central Anatolian Region, BSR: Black Sea Region, EAR: Eastern Anatolian Region, SEAR: South-Eastern Anatolian Region.

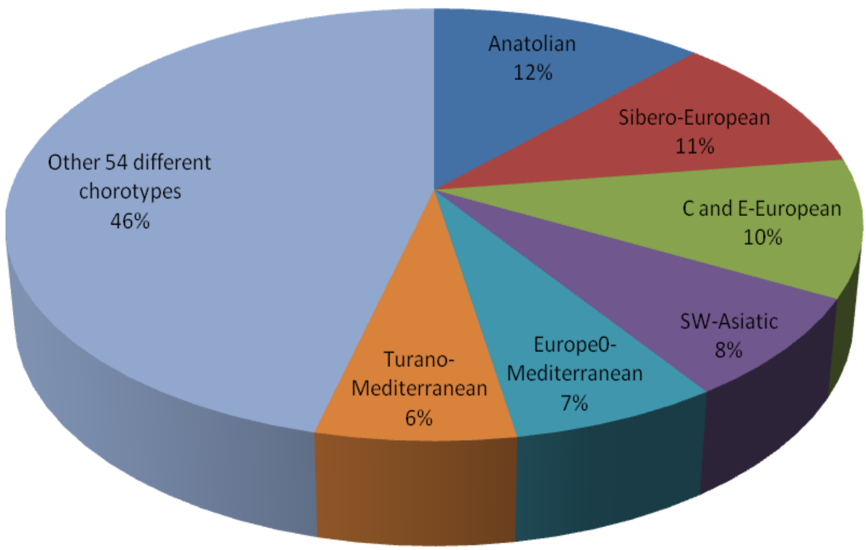

Figure 1. Chorotypical distribution of Turkish Alticinae.

FIRST RECORD OF *PHITACNEMIA PICTA* (DRURY, 1770) (HETEROPTERA: COREIDAE), IN THE PROVINCE OF LA PAMPA, ARGENTINA

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[Vilches, J. Y., Quirán, E. M. & Pall, J. L. 2014. First record of *Phitacnemia picta* (Drury, 1770) (Heteroptera: Coreidae), in the province of La Pampa, Argentina. Munis Entomology & Zoology, 9 (1): 376-378**]**

ABSTRACT: We report the first record of *Phitacnemia picta* capture (Drury, 1770) (Heteroptera: Coreidae) for the province of La Pampa. This species has economic importance attacking ornamental and fruit crops. This record brings the number of species of Heteroptera in the province.

KEY WORDS: Coreidae, Heteroptera, phytophagous, passionflower, *Phitacnemia picta*.

The Heteroptera, with over of 40,000 species, are part of the most successful group of hexapods. They are predominantly herbivorous.

The arthropods of the superfamily Coreoidea are generally of habits phytophagous and economic importance (Cobben, 1978), attacking crops Fabaceae, Cucurbitaceae, passifloraceae, Solanaceae, etc. (Maes, J. M. & J. Tellez Robleto, 1988). Within this superfamily, we highlight the family Coreidae as detrimental to ornamental plants and fruit, appearing within this family at the species *Phthiacnemia picta* (Drury, 1770), found on the vegetation (Maes, J. M & U. goellner-Scheiding 1993; Schaefer & Mitchell, 1893).

In Passiflora (Passifloraceae: Passiflora), located in Realicó, (La Pampa, Argentina) (35 ° 1 'S 64 º 15' W) in the month of March 2011 were found individuals to the species *P. picta*, taxon unregistered for the province of La Pampa.

This species is widely distributed throughout the Neotropics (Osuna, 1981).

Knowing the distribution of *Phitacnemia picta* in a given area is of vital importance, because this heteroptera can cause economic loss, in crops of Passiflora. These insects damage the crop by suck the juices from the developing fruit. Mechanical damage of the seed caused by bugs allows infection and colonization by fungi, bacteria and viruses, in addition to reducing the yield and seed (Serra, 2009). The present contribution have from objective publicize the new record of the species *Phthiacnemia picta*, for the province of La Pampa.

MATERIALS AND METHODS

The material was collected on a flower of the Passiflora sp. located in Realicó (La Pampa, Argentina) (35 ° 1 'S 64 º 15' W) in the month of March 2011. Both the adult and stages immature of *Phthiacnemia picta* Dury, were obtained by direct capture with a deadly bottle, then were placed in 70% alcohol for preservation. The adults were identified to level species using a dichotomous key Brailovsky (2009) and the material was deposited in the Museum of Natural Sciences of La Plata.

RESULTS

Were collected (12) adults, on leaves and flowers of passionari and (10) of nymphs, on the fruits.

Genus *Phthiacnemia* Brailovsky
2009 *Phthiacnemia* Brailovsky, 60. Type species: *Cimex picta* Drury, 1770: 107
http://coreoidea.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=4496

Diagnosis. (After Brailovsky, 2009) Head usually longer than wide; tylus in lateral view higher than juga; posttylar depression absent; antennal segment I thicker than following segments, cylindrical, weakly curved outward, thickened gradually from base to apex, longer than head; antennal segments II and III slender, cylindrical, segment IV fusiform; segment IV usually longest, segment I shortest, segment II longer than III; rostrum reaching posterior margin of abdominal sternite III or middle third of sternite IV; rostral segment I at most slightly extending beyond base of head; rostral segment III shortest, segment IV longest, segments I and II subequal. Thorax. Pronotum wider than long; anterolateral borders obliquely straight, dentate, teeth relatively stout and acute; humeral angles obtuse, truncate or gently subacute; posterolateral borders straight, smooth; posterior border straight to weakly concave, smooth; calli rounded, slightly raised, anteriorly with two small spines, each lateral to midline, and posteriorly with two deep pits, each lateral to midline; posterior lobe of pronotal disk with low longitudinal medial carinae; posterior margin with low transverse ridge; mesosternum with shallow sulcus; metathoracic peritreme bilobate, with two well separated lobes, anterior one longer, semicircular, posterior one shorter, subacute; opening obliquely directed. Scutellum longer than wide. Legs. Male: Fore and middle femora ventrally armed with two subapical spines and one row of obtuse spines, dorsally almost smooth; hind femur gradually incrassate, armed with two subapical spines and two rows of large and stout spines, dorsal surface densely tuberculate; fore and middle tibiae slender, unarmed, sulcate; hind tibiae robust, sulcate, ventral face armed with two rows of irregular and stout spines, dorsal face with one row of small tubercles or spines. Female: Fore femur ventrally armed with two short, subapical spines; middle femur ventrally armed with two short subapical spines, and one row of 2–3 short denticles; hind femur gradually incrassate (less than in males), ventrally with two subapical spines and one row of 3–4 narrow spines; tibiae. Dorsal view of *Phthiacnemia picta* (Drury, 1770). unarmed, sulcate. Abdomen. Abdominal sterna with medial furrow. Male genitalia. Posteroventral edge of genital capsule with deep median notch, entire posterior edge gradually produced over curvature of capsule, with lateral angles acutely projected. Female genitalia. Abdominal sternite VII with fi ssura short, covering one third of length of sternite; plica quadrate, apically traight; gonocoxae I subtriangular, inner margin open, upper and outer margins rounded and continuous, in lateral view slightly convex. Integument. Body surface rather dull, without metallic iridescence; dorsally and entrally clothed with short, erect, golden to silvery pubescence; pronotal disk, clavus, corium, scutellum, acetabulae, great portion of propleura, and posterior margin of mesopleura and metapleura dense and fi nely punctate; head, calli, anterior and middle margin of mesopleura and metapleura, pro-, meso- and metasternum, abdominal sterna, male genital capsule and female genital plates impunctate; antennal segments I–III densely covered with short, erect setae, segment IV with dense adpressed setae; legs clothed with large, erect, bristle-like setae.

Distribution. Argentina: Buenos Aires; Catamarca; Chaco; Corrientes; Córdoba; Entre Ríos; Formosa; Jujuy; La Rioja; Mendoza; Misiones; Neuquén; Salta; San Juan; San Luis; Santa Fé; Santiago del Estero; Tucumán.

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A NEWLY RECORDED GENUS *EVARCHA* SIMON, 1902 (ARANEAE: SALTICIDAE) FROM INDIA

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[**Roy, T. K., Dhali, D. C., Saha, S. & Raychaudhuri, D.** 2014. A newly recorded genus *Evarcha* Simon, 1902 (Araneae: Salticidae) from India. Munis Entomology & Zoology, 9 (1): 379-383]

ABSTRACT: Genus *Evarcha* Simon with its species *E. flavocinta* (C. L. Koch, 1846) is recorded for the first time from India. They are diagnosed, described and illustrated here in.

KEY WORDS: *Evarcha flavocinta,* first record, India, Araneae, Salticidae.

Salticidae is the largest family of the order Araneae. Till date members of this family compose 7.84% species of the world araneofauna (Metzner, 2013; Platnick, 2013). In India they are represented by a total of 207 species under 73 genera (Keswani et al., 2012). During our survey for the spiders of tea ecosystem of Dooars and its adjoining reserve forests, we sampled *Evarcha flavocinta* (C. L. Koch, 1846) from Kailashpur tea estate, Nepuchapur tea estate and Jaldapara Wild Life Sanctuary. Search of literature reveals that the genus *Evarcha* Simon with its species is the first record from India. The recorded species is described and illustrated in the interest of Indian Arachnology. Diagnosis of the newly recorded genus is also provided.

MATERIAL AND METHODS

Material were mainly collected by visual search and hand picking from the tea bushes and litter of the tea estates and its adjoining reserve forests of Dooars respectively. Collected samples were preserved following Tikader (1987) and studied under Stereo Zoom Binocular Microscopes, model Olympus SZX-7 and Zeiss SV-11. The measurements indicated in the text are in millimeters (mm), made with an eye piece graticule. Leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus). Material are in the deposition of Entomology Laboratory, Department of Zoology, University of Calcutta, Kolkata.

Abbreviations used: AL= abdominal length, ALE= anterior lateral eye, AME= anterior median eye, AW= abdominal width, CL= cephalothoracic length, CW= cephalothoracic width, PLE= posterior lateral eye, PME= posterior median eye, TL= total length.

TAXONOMIC ACCOUNT

Genus *Evarcha* Simon

Evarcha Simon, 1902, *Ann. Soc. Ent. Fr.*, 71: 389-421.
Type species: *Araneus falcatus* Clerck, 1757.

Diagnosis: Medium-size salticids. Cephalothorax light yellow to brown, swollen but weakly wider, with horn like tuft of long, stiff, slightly curved bristles on the lateral sides of anterolateral eyes. Ocular quad broader than long, usually darker. Clypeus vertical and narrow, often covered with white scales. Chelicerae with 1 promarginal and 2 retromarginal teeth. Epigyne with a transverse chitinous plate and 2 pockets in front of it, receptacles strongly sclerotised, multi-chambered. Embolus usually short, sometimes with compound terminal apophysis.
Distribution: Throughout except Neotropical (Proszyński, 2009; Haddad and Wesolowska, 2011; Metzner, 2013; Platnick, 2013).

Evarcha flavocinta (C. L. Koch)
(Figs. 1-5 & 6)
Maevia flavocinta C. L. Koch, 1846, *Die Arachniden*: 74.
Evarcha flavocinta (C. L. Koch) Zabka, 1985, *Annls. Zool. Warsz.*, 39: 224.

Description: Female

CL - 3.43, CW - 2.46, AL - 3.43, AW - 2.09, TL - 7.06. Cephalothorax (Fig. 1) brown, longer than wide, elongate oval, clothed with brown hairs, cephalic region somewhat flat, transversely rectangular with ocular area brown black, sides vertical, thoracic region posteriorly depressed with distinct, medium, brown longitudinal fovea, radii faintly marked. Eyes 8, homogenous, transparent, basally ringed with black, arranged in 3 transverse rows, anterior row recurved as viewed dorsally, ocular quad trapezoid, a little wider behind, formed by posteromedian (PME) and posterolateral (PLE) eyes, anteromedians (AME) largest, anterolaterals (ALE) nearly 1/3rd of AME, 2nd row of eyes or PME smallest, both PME and PLE set on the slope of a single tubercle, PME slightly inward to the lateral margin of ocular quad, situated almost at the centre of ALE and PLE, PLE= ALE, set on tubercles, eye diameter AME> ALE≥ PLE> PME. Interocular distance: AME – AME= 0.71, ALE – AME= 0.60, ALE – ALE= 1.74, PME – PME= 1.77, PLE – PME= 0.49, PLE – PLE= 1.83, ALE – PLE= 1.09, AME – PME= 1.06. Clypeus narrow, margined with white, long hairs. Chelicerae (Fig. 2) moderately long, brown, more or less parallel, promargin with 2 and retromargin with 1 teeth, fang dark brown, curved, sharp, stout and stumpy. Labium (Fig. 3) brown, longer than wide, constricted sub-basally, apically truncate and scopulate. Maxillae (Fig. 3) brown, longer than wide, anteriorly bulged, pale yellowish, scopulate with dark brown hairs, both outer and inner margins concave. Sternum (Fig. 3) yellow brown, rebordered, longer than wide, clothed with long, sub marginal and fine, brown hairs, outer margins dark, slightly indented at each coxae, apical margins nearly straight, tip rounded. Legs moderately long, stout, yellow brown, clothed with hairs and spines, tarsal claws 2 with claw tufts, each with 4 pectination, femora I with 3-0-2(2) - 0, femora II with 3-0-2(2) – 2, femora III with 3-0-3(2-1) – 1, femora IV with 3-0-1 – 1, tibia I with 0-6(2-2-2)-2-0, tibia II with 0-5(2-2-1)-2-0 and tibia III-IV with 0-3(2-1)- 3-3 spination. Leg measurements**:** I 5.57 (1.71, 1.00, 1.29, 0.93, 0.64); II 5.00 (1.71, 0.79, 1.00, 0.93, 0.57); III 5.57 (2.00, 1.00, 1.14, 0.86, 0.57); IV 6.07 (2.07, 1.07, 1.36, 0.93, 0.64). Leg formula 41=32.

Abdomen (Fig. 1) hirsute, brown, anteriorly truncate, posteriorly narrowing, apical margins with long, erect, brown hairs. Dorsum decorated with 2 pairs of indistinct sigillae in anterior half, one pair of semilunar black patch posteriorly, ventral pale with black, median marking.

Epigynum - Internal genitalia (Figs. 4 & 5)**:** **S**permatheca tubular, fertilization duct short, downwardly directed, copulatory duct lateral, highly coiled.

Material examined: 2 females, Jaldapara Wild Life Sanctuary, Jalpaiguri, West Bengal, India, 12. iv. 2009, coll. D.C. Dhali; 1 female, Nepuchapur T. E., Jalpaiguri, West Bengal, India, 12. x. 2009, coll. T. K. Roy.; 1 female, Kailashpur T. E., Jalpaiguri, West Bengal, India, 24. viii. 2010, coll. T. K. Roy.
Distribution: India (New record): West Bengal; Bintan Island, China, Indonesia, Japan, Lombok, Malaysia, Singapore, Vietnam (Prószyn'ski, 2007; Metzner, 2013; Platnick, 2013).

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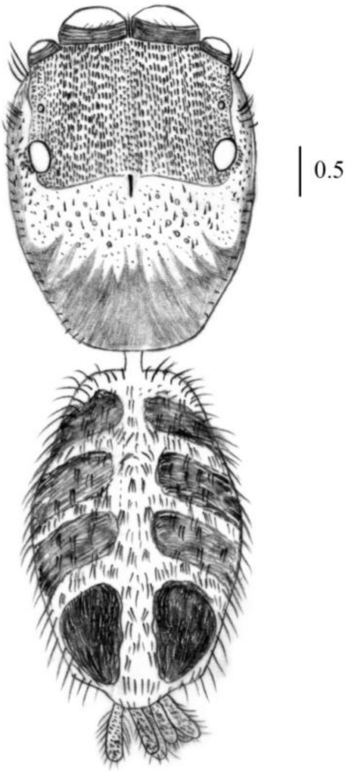

Fig. 1

Fig. 2

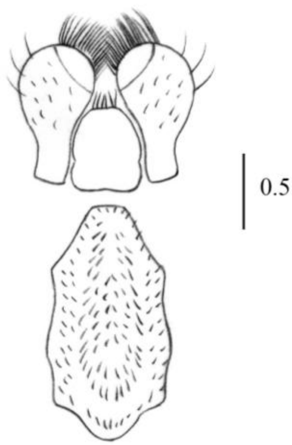

Fig. 3

Fig. 5

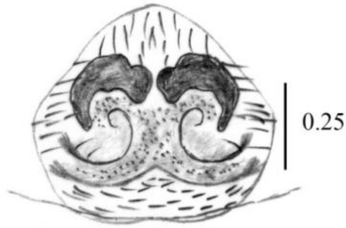

Fig. 4

Figure 1-5. *Evarcha flavocincta* (C. L. Koch, 1846); 1. Cephalothorax and abdomen, dorsal view; 2. Chelicerae, ventral view; 3. Maxillae, labium and sternum, ventral view, 4. Epigynum, ventral view, 5. Internal genitalia, dorsal view.

Figure 6. *Evarcha flavocincta* (C. L. Koch, 1846), General habitus.

TURKISH RED LIST CATEGORIES OF LONGICORN BEETLES (COLEOPTERA: CERAMBYCIDAE) PART III – SUBFAMILY LEPTURINAE: LEPTURINI

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[Özdikmen, H. 2014. Turkish Red List Categories of Longicorn Beetles (Coleoptera: Cerambycidae) Part III – Subfamily Lepturinae: Lepturini. Munis Entomology & Zoology, 9 (1): 384-417**]**

ABSTRACT: The aim of this study is to create a Turkish Red List of the longicorn beetles. Moreover, presence such a Red List is necessary for Turkey. Even governmental evaluations could cause some erroneous decisions due to absence such a Red List. Since, governmental evaluations at the present time are based on the works that are realized with respect to the European Red List. Furthernore, Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures. So, the status of European fauna and the status of Turkish fauna are not the same. Clearly, there is no any work that subjected to create a Turkish Red List except Parts I-II. Hence, a series work is planned with this purpose. This type of study is the third attempt for Turkey.

KEY WORDS: Red List, Conservation, Cerambycidae, Turkey

The purpose of the current study was to create a Turkish Red List of longicorn beetles similarly to "European Red List of Saproxylic Beetles" that was compiled by Ana Nieto & Keith N. A. Alexander and published by IUCN (International Union for Conservation of Nature) in collaboration with the European Union in 2010. "European Red List of Saproxylic Beetles" includes 153 species within the subfamilies Prioninae, Cerambycinae and Lamiinae of the European Cerambycidae. So, it does not include any members of the subfamily Lepturinae. In the future, I hope that the present work will be lead to preparation a more comprehensive "Turkish Red List".

Hence, a series work is planned with this purpose. The present study is attempted as the third step of this aim. The previous works are Özdikmen (2014a,b). It should be noted that the using information at the present work on Turkish longicorn beetles are on the base of my personal database. The data of distribution are given on base of Löbl & Smetana (2010, 2011), Danilevsky (2010a,b, 2012a,b,c,d, 2013), Özdikmen (2011) and Miroshnikov (2011). Identification of chorotypes is based on the chorotype classification of the Anatolian fauna, proposed by Vigna Taglianti et al. (1999).

The evaluations of Turkish longicorn beetles at the present work based on "The IUCN Red List Categories" that was presented in Part I (Özdikmen, 2014a).

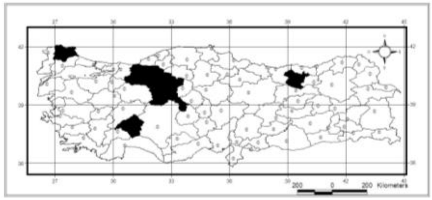
TURKISH RED LIST FOR LEPTURINAE (TRIBE LEPTURINI)

SUBFAMILY LEPTURINAE Latreille, 1802: 218
TRIBE LEPTURINI Latreille, 1802: 218
GENUS *GRAMMOPTERA* Audinet-Serville, 1835: 215
SUBGENUS *GRAMMOPTERA* Audinet-Serville, 1835: 215
SPECIES *G. abdominalis* (Stephens, 1831: 262)

The species is known only from N Turkey. So, Turkish Red List category of the species is **NT**.

Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

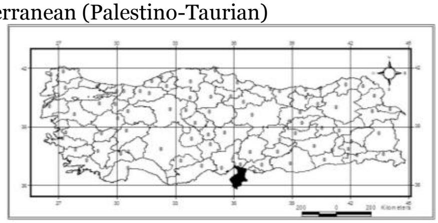
Chorotype: European



SPECIES *G. baudii* Sama, 1985: 97

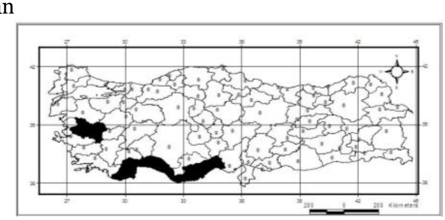
SUBSPECIES *G. b. pistacivora* Sama, 1996: 94

The species is known only from SC Turkey. It is represented only by the subspecies, *G. baudii pistacivora* in Turkey. So, Turkish Red List category of the subspecies is **VU**.
Range: Turkey, Syria, Lebanon, Israel, Jordan.
Chorotype: E-Mediterranean (Palestino-Taurian)



SPECIES *G. merkli* Frivaldszky, 1884: 4

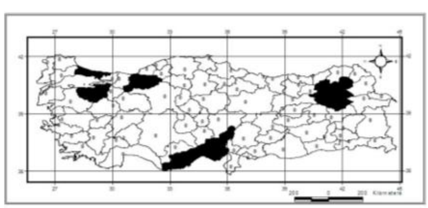
The species is known only from SW Turkey. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *G. ruficornis* (Fabricius, 1781: 247)

SUBSPECIES *G. r. ruficornis* (Fabricius, 1781: 247)

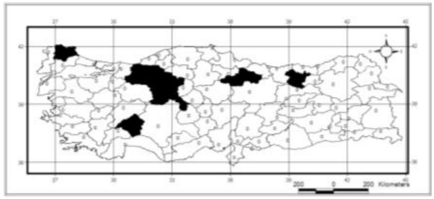
The species probably is rather widely distributed in Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the species is **DD**.
Range: Europe, Turkey.
Chorotype: European



SPECIES *G. ustulata* (Schaller, 1783: 298)

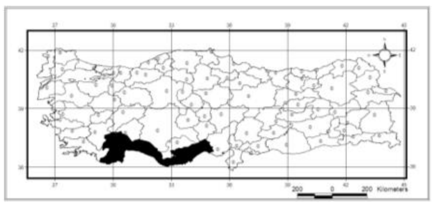
The species is known only from N Turkey. So, Turkish Red List category of the species is **NT**.
Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan), Iran, Turkey.

Chorotype: European



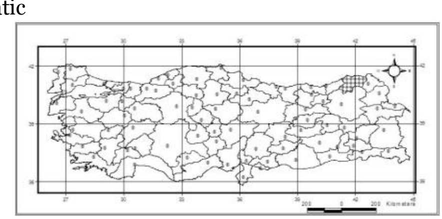
GENUS *ALOSTERNA* Mulsant, 1863: 576
SUBGENUS *ALOSTERNA* Mulsant, 1863: 576
SPECIES *A. anatolica* Adlbauer, 1992: 490

The species is known only from SW Turkey. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian



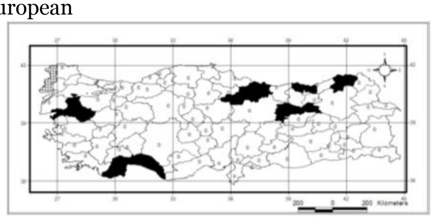
SPECIES *A. scapularis* (Heyden, 1878: 325)

The species is known only from the data of reference without any exact locality. It probably can occur in NE Anatolia. So, Turkish Red List category of the species is **NE**.
Range: Transcaucasia (Azerbaijan), Turkey, Iran, Turkmenistan.
Chorotype: SW-Asiatic



SPECIES *A. tabacicolor* (DeGeer, 1775: 139)

The species is known from both European Turkey and Anatolia. However, Turkish Red List category of the species is **DD**.
Range: Europe, West Siberia, Kazakhstan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: Sibero-European



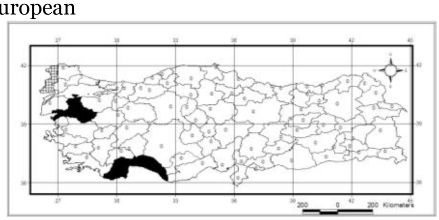
Moreover, the species is represented by three subspecies in Turkey as the nominative subspecies, *A. tabacicolor subvittata* Reitter, 1885 and *A. tabacicolor tokatensis* Pic, 1901.

SUBSPECIES *A. t. tabacicolor* (DeGeer, 1775: 139)

The subspecies is known from both European Turkey and Anatolia. However, Turkish Red List category of the subspecies is **DD**.

Range: Europe, West Siberia, Kazakhstan, Caucasus, Turkey.

Chorotype: Sibero-European

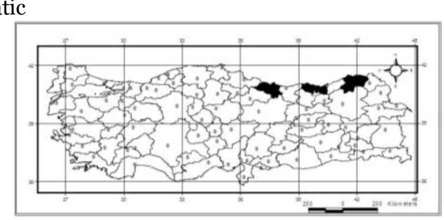


SUBSPECIES *A. t. subvittata* Reitter, 1885: 391

The subspecies is known only from NE Anatolia. So, Turkish Red List category of the species is **NT**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: SW-Asiatic

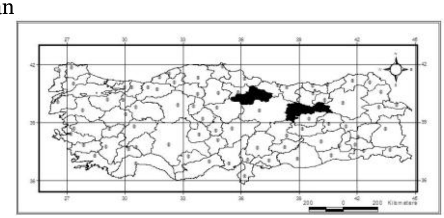


SUBSPECIES *A. t. tokatensis* Pic, 1901: 59

The endemic subspecies is known only from NCE Anatolia. So, Turkish Red List category of the subspecies is **VU**.

Range: Turkey.

Chorotype: Anatolian



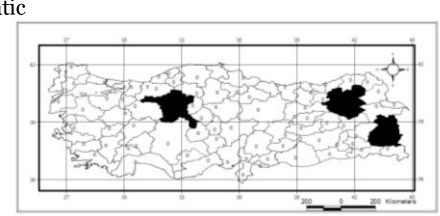
GENUS *VADONIA* Mulsant, 1863: 559

SPECIES *V. bicolor* (Redtenbacher, 1850: 50)

The species probably is distributed in N and E Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Transcaucasia (Azerbaijan), Iran, Turkey.

Chorotype: SW-Asiatic



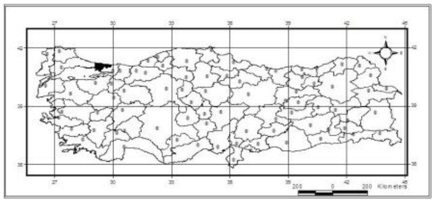
SPECIES *V. bipunctata* (Fabricius, 1781: 245)

SUBSPECIES *V. b. globicollis* (Desbrochers Des Loges, 1870: 127)

The species is known only from NW Anatolia for Turkey. It is represented only by the subspecies *V. bipunctata globicollis* in Turkey. So, Turkish Red List category of the subspecies is **DD**.

Range: E-Europe, Caucasus, Turkey.

Chorotype: E-European

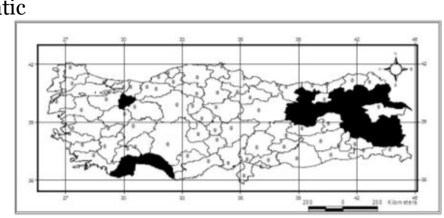


SPECIES *V. bitlisiensis* Chevrolat, 1882: 59

The species probably is rather widely distributed in S and E Anatolia. So, Turkish Red List category of the species is **LC**.

Range: Transcaucasia (Armenia, Azerbaijan), Turkey.

Chorotype: SW-Asiatic

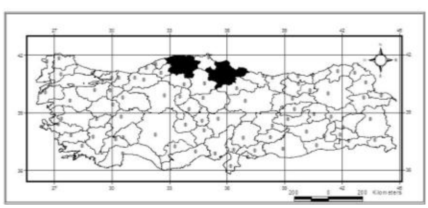


SPECIES *V. bolognai* Sama, 1982: 207

The endemic species is known only from NC Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian

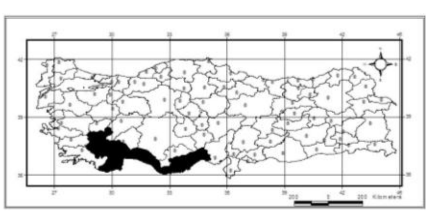


SPECIES *V. ciliciensis* (Daniel & Daniel, 1891: 13)

The endemic species is known only from SW Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

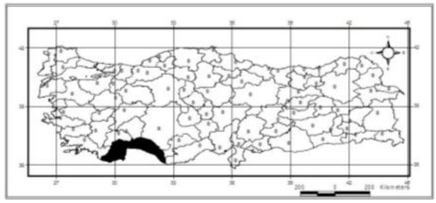


SPECIES *V. danielorum* Holzschuh, 1984: 142

The endemic species is known only from the type locality in SW Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian

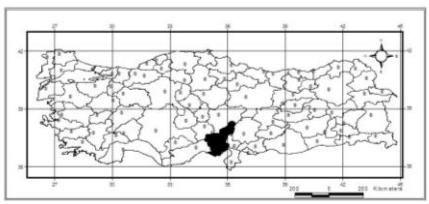


SPECIES *V. frater* Holzschuh, 1981: 96

The endemic species is known only from the type locality in SC Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian



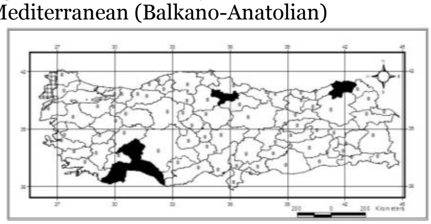
SPECIES *V. grandicollis* Mulsant & Rey, 1863: 182

SUBSPECIES *V. g. grandicollis* Mulsant & Rey, 1863: 182

The species is known from both European Turkey and Anatolia. So, Turkish Red List category of the species is **DD**.

Range: E-Europe (Bulgaria, Greece), Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)

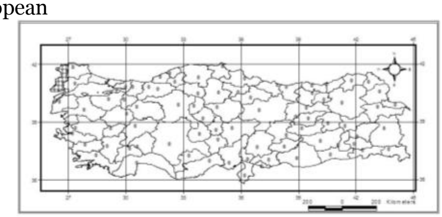


SPECIES *V. imitatrix* (Daniel & Daniel, 1891: 6)

The species is known only from the data of reference without any exact locality. It probably can occur in European Turkey only. So, Turkish Red List category of the species is **NE**.

Range: SE-Europe (Croatia, Italy), Turkey.

Chorotype: SE-European

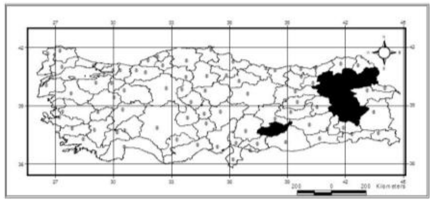


SPECIES *V. instigmata* Pic, 1890: CLXXVI

The endemic species is known only from E Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey.

Chorotype: Anatolian

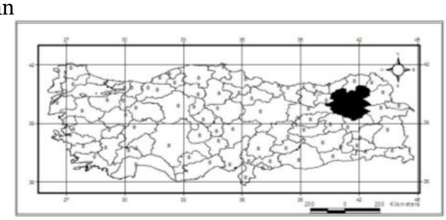


SPECIES *V. ispirensis* Holzschuh, 1993: 14

The endemic species is known only from NE Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey.

Chorotype: Anatolian

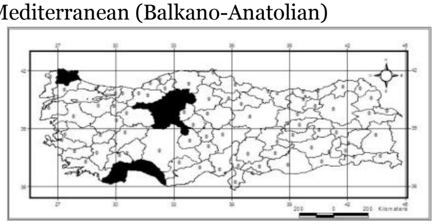


SPECIES *V. moesiaca* (Daniel & Daniel, 1891: 6)

The species is known from both European Turkey and Anatolia. So, Turkish Red List category of the species is **DD**.

Range: E-Europe, Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)

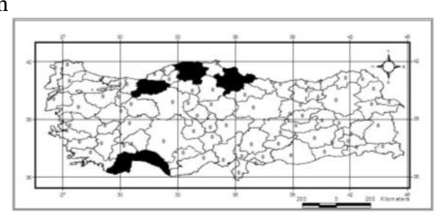


SPECIES *V. monostigma* (Ganglbauer, 1882: 29)

The endemic species is known only from NE Anatolia. So, Turkish Red List category of the species is **NT**.

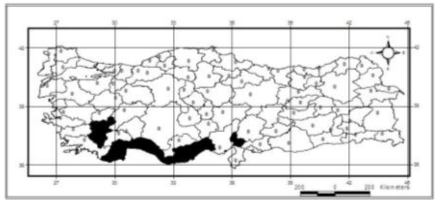
Range: Turkey.

Chorotype: Anatolian



SPECIES *V. soror* Holzschuh, 1981: 95

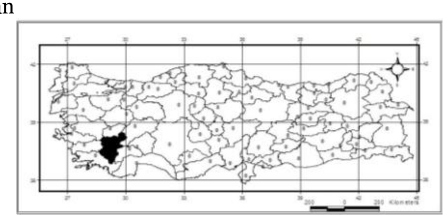
The endemic species is known only from SC and SW Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Turkey.
Chorotype: Anatolian



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *V. soror tauricola* Holzschuh, 1993.

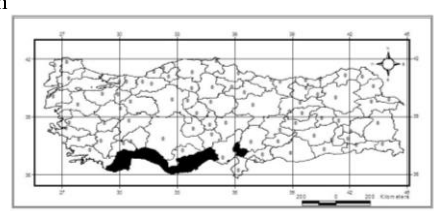
SUBSPECIES *V. s. soror* Holzschuh, 1981: 95

The endemic species is known only from SW Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian



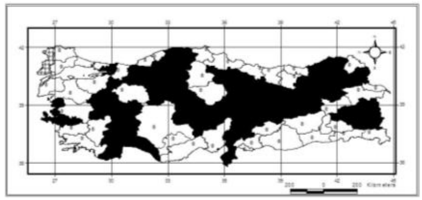
SUBSPECIES *V. s. tauricola* Holzschuh, 1993: 14

The endemic species is known only from SC and SW Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *V. unipunctata* (Fabricius, 1787: 157)
SUBSPECIES *V. u. unipunctata* (Fabricius, 1787: 157)

The species is widely distributed in Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Kazakhstan, Turkey.
Chorotype: European



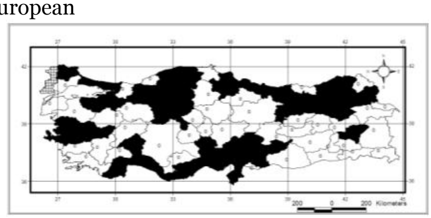
GENUS *PSEUDOVADONIA* Lobanov, Danilevsky & Murzin, 1981: 787

SPECIES *P. livida* (Fabricius, 1777: 233)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Kazakhstan, Kirgizia, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, ?Middle East.

Chorotype: Asiatic-European



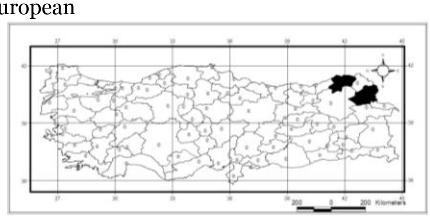
Moreover, the species is represented by three subspecies in Turkey as the nominative subspecies, *P. livida bicarinata* (Arnold, 1869) and *P. livida desbrochersi* (Pic, 1891). The distribution patterns of the subspecies, *P. livida bicarinata* and *P. livida desbrochersi* are still need to be confirmed especially.

SUBSPECIES *P. l. bicarinata* (Arnold, 1869: 137)

The subspecies is known only from NE Anatolia. So, Turkish Red List category of the subspecies is **DD**.

Range: E-Europe, Siberia, Kazakhstan, Kirgizia, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: Asiatic-European

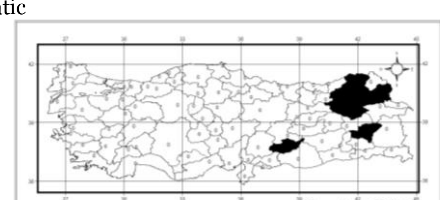


SUBSPECIES *P. l. desbrochersi* (Pic, 1891: XVI)

The subspecies is known only from E Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: SW-Asiatic

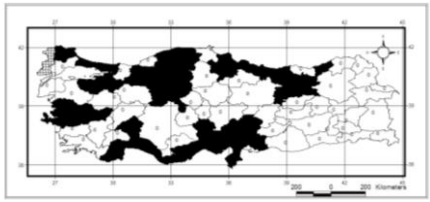


SUBSPECIES *P. l. livida* (Fabricius, 1777: 233)

The subspecies is known only from NE Anatolia. So, Turkish Red List category of the subspecies is **LC**.

Range: E-Europe, Turkey, ?Middle East.

Chorotype: European



GENUS *ANOPLODERA* Mulsant, 1839: 285

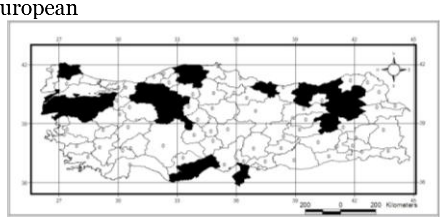
SUBGENUS *ANOPLODERA* Mulsant, 1839: 285

SPECIES *A. rufipes* (Schaller, 1783: 296)

The species probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Kazakhstan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: Sibero-European



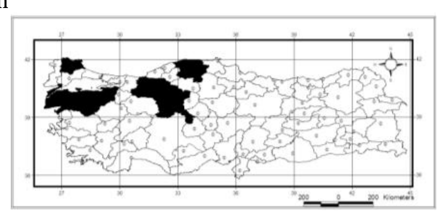
Moreover, the species is represented by three subspecies in Turkey as the nominative subspecies, *A. rufipes lucidipes* Sama, 1999 and *A. rufipes ventralis* Heyden, 1886. The distribution patterns of the subspecies, nominative subspecies and *A. rufipes ventralis* are still need to be confirmed especially.

SUBSPECIES *A. r. rufipes* (Schaller, 1783: 296)

The subspecies is known only from European Turkey and NW Anatolia now. So, Turkish Red List category of the subspecies is **NT**.

Range: E-Europe, Turkey.

Chorotype: European

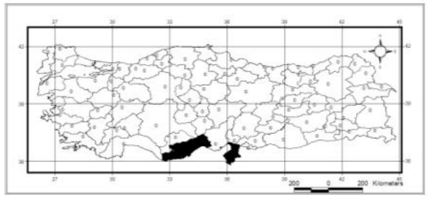


SUBSPECIES *A. r. lucidipes* Sama, 1999: 46

The endemic subspecies is known only from SC Anatolia. So, Turkish Red List category of the subspecies is **VU**.

Range: Turkey.

Chorotype: Anatolian

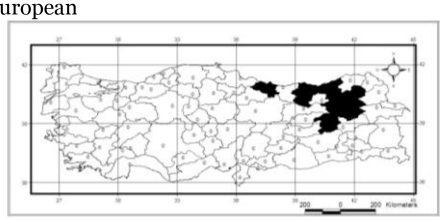


SUBSPECIES *A. r. ventralis* Heyden, 1886: 85

The subspecies probably is rather widely distributed in NE Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Europe, Siberia, Kazakhstan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: Sibero-European

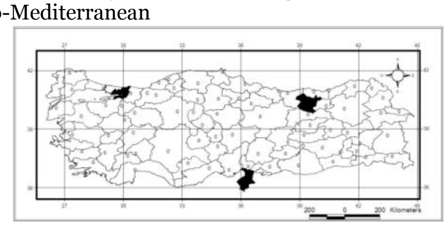


SPECIES *A. sexguttata* (Fabricius, 1775: 198)

The species probably is rather widely distributed in Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Europe, Caucasus, Turkey, North Africa (Algeria).

Chorotype: Europeo-Mediterranean



GENUS *STICTOLEPTURA* Casey, 1924: 280

SUBGENUS *AREDOLPONA* Nakane & Ohbayashi, 1957: 244

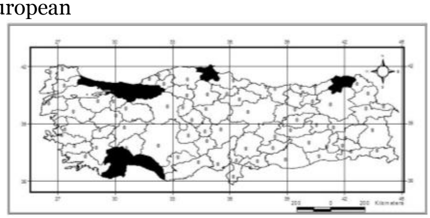
SPECIES *S. rubra* (Linnaeus, 1758: 398)

SUBSPECIES *S. r. rubra* (Linnaeus, 1758: 397)

The species probably is rather widely distributed especially in N Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the subspecies is **DD**.

Range: Europe, Siberia, Kazakhstan, Caucasus, Turkey.

Chorotype: Sibero-European



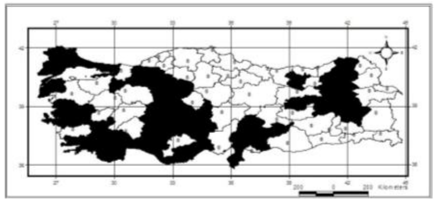
SUBGENUS *STICTOLEPTURA* Casey, 1924: 280

SPECIES *S. cordigera* (Fuessly, 1775: 14)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: S and SE Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Cyprus, Middle East (Syria, Lebanon, Israel, Iraq), North Africa (Libya).

Chorotype: Mediterranean



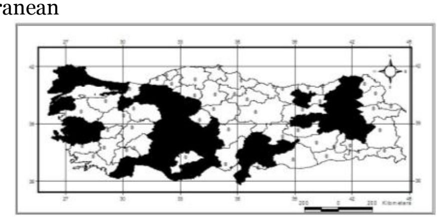
Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *S. cordigera anojiaensis* (Slama, 1982). The distribution pattern of the subspecies, *S. cordigera anojiaensis* is still need to be confirmed.

SUBSPECIES *S. c. cordigera* (Fuessly, 1775: 14)

The subspecies is widely distributed in Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: S and SE Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Cyprus, Middle East (Syria, Lebanon, Israel, Iraq), North Africa (Libya).

Chorotype: Mediterranean

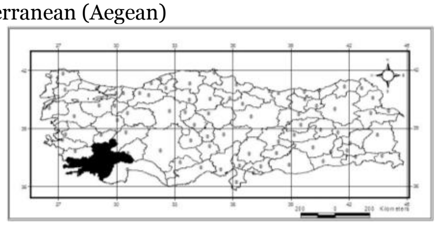


SUBSPECIES *S. c. anojiaensis* (Slama, 1982: 207)

The subspecies is known only from SW Anatolia. So, Turkish Red List category of the subspecies is **VU**.

Range: Greece (Crete), Turkey.

Chorotype: E-Mediterranean (Aegean)

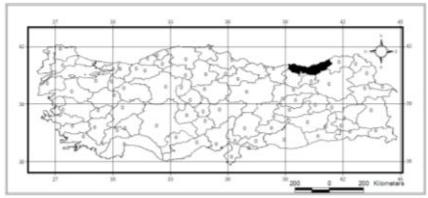


SPECIES *S. deyrollei* (Pic, 1895: 40)

The species is known only from NE Anatolia. So, Turkish Red List category of the species is **VU**.

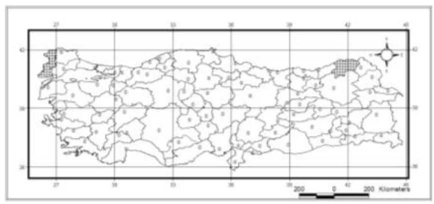
Range: Transcaucasia (Georgia), Turkey.

Chorotype: SW-Asiatic



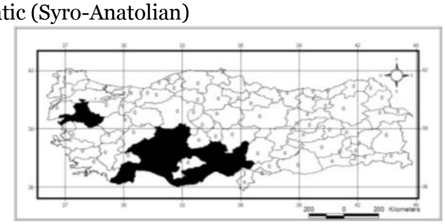
SPECIES *S. erythroptera* (Hagenbach, 1822: 7)

The species is known only from the data of references without any exact locality. It probably can occur in N Turkey only. So, Turkish Red List category of the species is **NE**.
Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: European



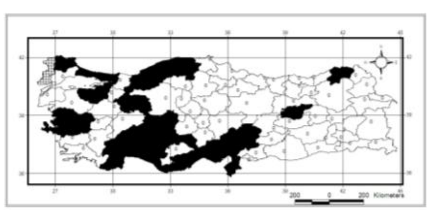
SPECIES *S. excisipes* (Daniel & Daniel, 1891: 6)

The species is known mostly from S and W Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Turkey, Syria.
Chorotype: SW-Asiatic (Syro-Anatolian)



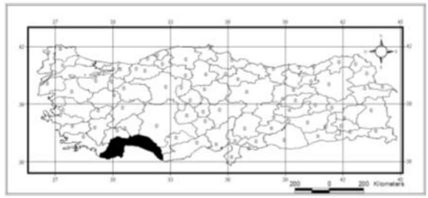
SPECIES *S. fulva* (DeGeer, 1775: 137)

The species probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Caucasus, Turkey.
Chorotype: European



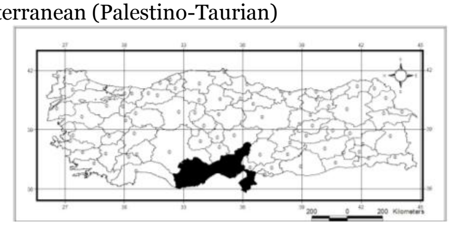
SPECIES *S. gevneensis* Özdikmen & Turgut, 2008: 549

The endemic species is known only from the type locality in SW Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian



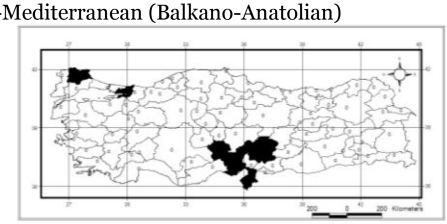
SPECIES *S. heydeni* (Ganglbauer, 1889: 469)

The species is known only from SC Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey, Syria, Lebanon, Israel.
Chorotype: E-Mediterranean (Palestino-Taurian)



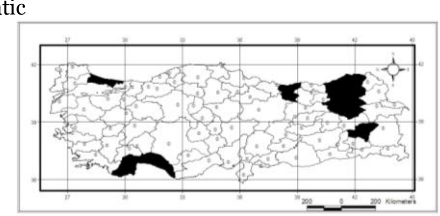
SPECIES *S. pallens* (Brullé, 1832: 264)

The species is known only from SC Anatolia. So, Turkish Red List category of the species is **VU**.
Range: SE-Europe, Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian)



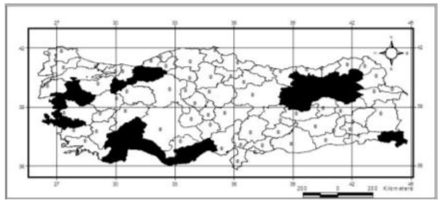
SPECIES *S. pallidipennis* (Tournier, 1872: 346)

The species is known mostly from N Anatolia. So, Turkish Red List category of the species is **NT**.
Range: Caucasus, Transcaucasia (Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic



SPECIES *S. rufa* (Brullé, 1832: 263)

The species probably is rather widely distributed in Anatolia. So, Turkish Red List category of the species is **LC**.
Range: SE-Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Iraq.
Chorotype: Turano-Mediterranean (Turano-Apenninian)



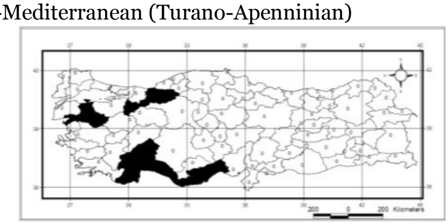
Moreover, the species is represented by five subspecies in Turkey as the nominative subspecies, *S. rufa attaliensis* (Daniel & Daniel, 1891), *S. rufa dimidiata* (Daniel & Daniel, 1891), *S. rufa nigropicta* (Fairmaire, 1866) and *S. rufa realis* Danilevsky, 2012. The distribution patterns of the subspecies are still need to be confirmed.

SUBSPECIES *S. r. rufa* (Brullé, 1832: 263)

The subspecies is widely distributed in Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: SE-Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Iraq.

Chorotype: Turano-Mediterranean (Turano-Apenninian)

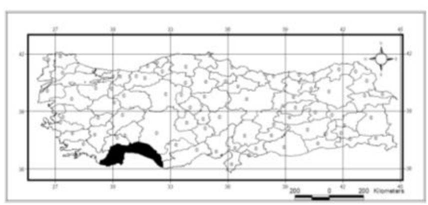


SUBSPECIES *S. r. attaliensis* (Daniel & Daniel, 1891: 11)

The endemic subspecies is known only from SW Anatolia. So, Turkish Red List category of the subspecies is **EN**.

Range: Turkey.

Chorotype: Anatolian

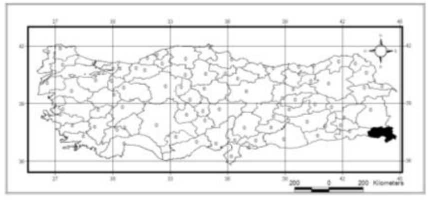


SUBSPECIES *S. r. dimidiata* (Daniel & Daniel, 1891: 11) IQ TR

The subspecies is known only from SE Anatolia for Turkey. So, Turkish Red List category of the subspecies is **VU**.

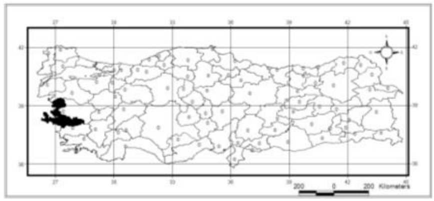
Range: Turkey, Iraq.

Chorotype: SW-Asiatic



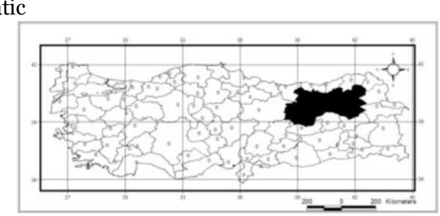
SUBSPECIES *S. r. nigropicta* (Fairmaire, 1866: 278)

The endemic subspecies is known only from W Anatolia. So, Turkish Red List category of the subspecies is **EN**.
Range: Turkey.
Chorotype: Anatolian



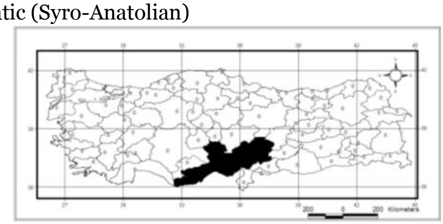
SUBSPECIES *S. r. realis* Danilevsky, 2012: 912

The subspecies is known only from NE Anatolia for Turkey. So, Turkish Red List category of the subspecies is **VU**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: SW-Asiatic



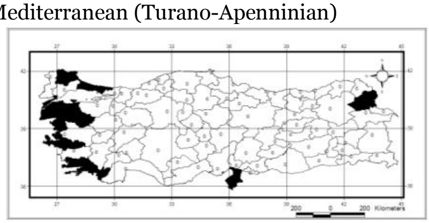
SPECIES *S. sambucicola* (Holzschuh, 1982: 65)

The species is known only from SC Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.
Range: Turkey, Syria.
Chorotype: SW-Asiatic (Syro-Anatolian)



SPECIES *S. scutellata* (Fabricius, 1781: 247)

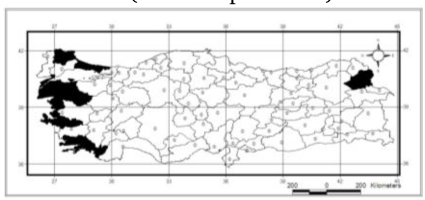
The species probably is rather widely distributed in Turkey. However, Turkish Red List category of the species is **NT** now.
Range: SE-Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Iraq.
Chorotype: Turano-Mediterranean (Turano-Apenninian)



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *S. scutellata inscutellata* (Pic, 1892). The distribution patterns of the subspecies are still need to be confirmed.

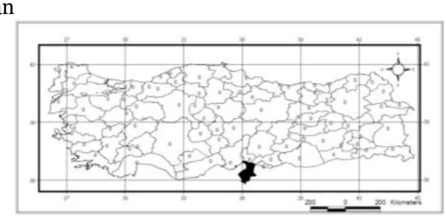
SUBSPECIES *S. s. scutellata* (Fabricius, 1781: 247)

The subspecies probably is rather widely distributed in Turkey. However, Turkish Red List category of the subspecies is **NT** now.
Range: SE-Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Iraq.
Chorotype: Turano-Mediterranean (Turano-Apenninian)



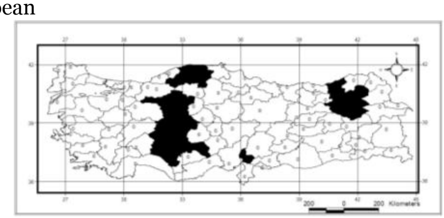
SUBSPECIES *S. s. inscutellata* (Pic, 1892: 415)

The endemic subspecies is known only from SC Anatolia. So, Turkish Red List category of the subspecies is **EN**.
Range: Turkey.
Chorotype: Anatolian



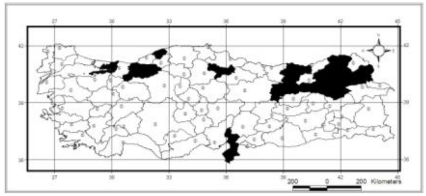
SPECIES *S. tesserula* (Charpentier, 1825: 227)

The species probably is rather widely distributed at least in Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.
Range: E-Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: E-European



SPECIES *S. tonsa* (Daniel & Daniel, 1891: 31)

The species probably is rather widely distributed in Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.
Range: E-Europe (Ukraine), Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.
Chorotype: SW-Asiatic

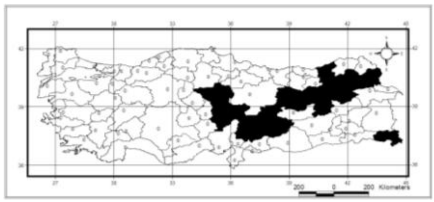


SPECIES *S. tripartita* (Heyden, 1889: 329)

The species probably is rather widely distributed in E half of Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Turkey, Iran, Iraq, Syria.

Chorotype: SW-Asiatic



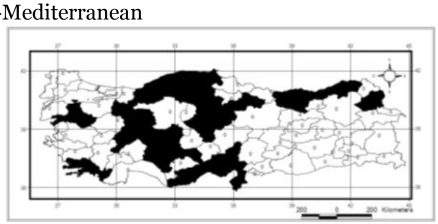
GENUS *ANASTRANGALIA* Casey, 1924: 280

SPECIES *A. dubia* (Scopoli, 1763: 47)

The species is widely distributed in Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, North Africa (Algeria).

Chorotype: Europeo-Mediterranean



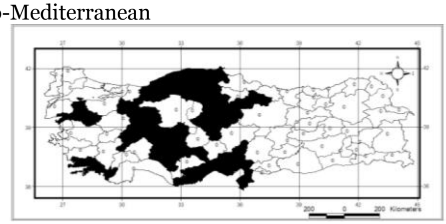
Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *A. dubia melonota* (Faldermann, 1837).

SUBSPECIES *A. d. dubia* (Scopoli, 1763: 47)

The subspecies is widely distributed in Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: Europe, Turkey, North Africa (Algeria).

Chorotype: Europeo-Mediterranean

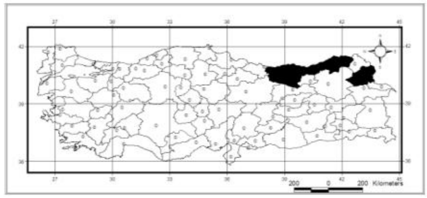


SUBSPECIES *A. d. melonota* (Faldermann, 1837: 315)

The subspecies is known only from NE Anatolia. So, Turkish Red List category of the subspecies is **VU**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: SW-Asiatic



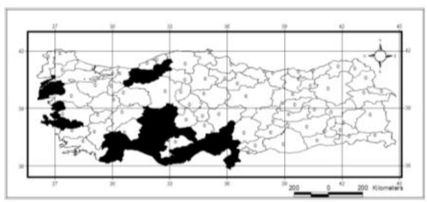
SPECIES *A. montana* (Mulsant & Rey, 1863: 179)

SUBSPECIES *A. m. montana* (Mulsant & Rey, 1863: 179)

The species is rather widely distributed in W half of Anatolia for Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: SE-Europe (Greece: Samos), Turkey, Cyprus, Syria.

Chorotype: E-Mediterranean

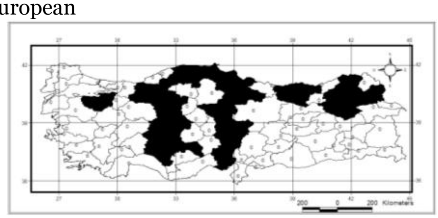


SPECIES *A. sanguinolenta* (Linnaeus, 1760: 196)

The species is rather widely distributed in Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, West Siberia, Kazakhstan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Sibero-European



GENUS *PEDOSTRANGALIA* Sokolov, 1897: 461

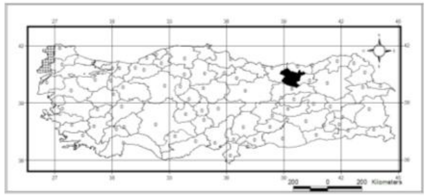
SUBGENUS *PEDOSTRANGALIA* Sokolov, 1897: 461

SPECIES *P. revestita* (Linnaeus, 1767: 638)

The species is known only from N Turkey. So, Turkish Red List category of the pecies is **DD**.

Range: Europe, Turkey.

Chorotype: European

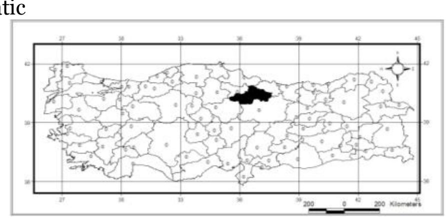


SPECIES *P. tokatensis* Sama, 1996: 103

The species is known only from NC Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Transcaucasia (Georgia), Turkey.

Chorotype: SW-Asiatic



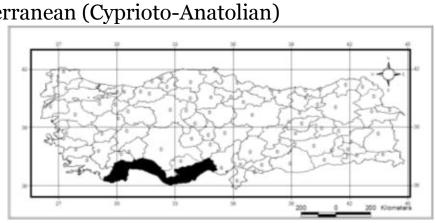
SUBGENUS *NEOSPHENALIA* Löbl, 2010: 110

SPECIES *P. adaliae* (Reitter, 1885: 390)

The species is known only from SCW Anatolia. So, Turkish Red List category of the species is **EN**.

Range: Turkey, Cyprus.

Chorotype: E-Mediterranean (Cyprioto-Anatolian)

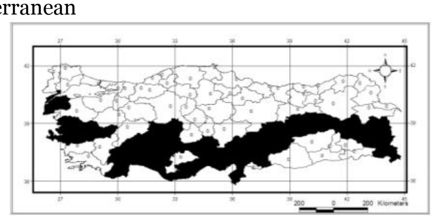


SPECIES *P. emmipoda* (Mulsant, 1863: 531)

The species is rather widely distributed in S half of Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: E-Europe (Greece: Rodos), Turkey, Syria, Lebanon.

Chorotype: E-Mediterranean

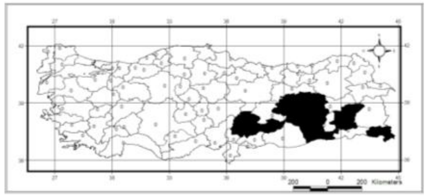


SPECIES *P. kurda* Sama, 1996: 104

The species is rather widely distributed in SE and E Anatolia for Turkey. However, Turkish Red List category of the species is **NT** now.

Range: Transcaucasia (Armenia, Georgia), Turkey, Iraq.

Chorotype: SW-Asiatic

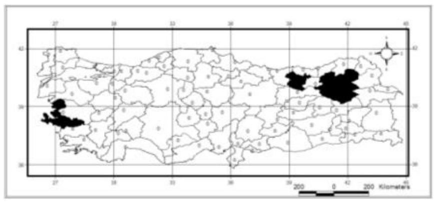


SPECIES *P. verticalis* (Germar, 1822: 9)

The species is known mostly from NE Anatolia. So, Turkish Red List category of the subspecies is **DD**.

Range: SE-Europe, Turkey.

Chorotype: SE European

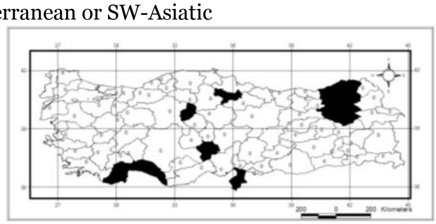


SPECIES *P. verticenigra* (Pic, 1892: 416)

The species probably is rather widely distributed in Anatolia for Turkey. However, Turkish Red List category of the species is **NT** now.

Range: SE-Europe (Greece: Samos), Transcaucasia (?Georgia), Turkey.

Chorotype: E-Mediterranean or SW-Asiatic



GENUS *ETOROFUS* Matsushita, 1933: 204

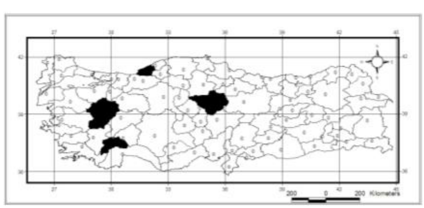
SUBGENUS *ETOROFUS* Matsushita, 1933: 204

SPECIES *E. pubescens* (Fabricius, 1787: 158)

The species probably is rather widely distributed in W half of Anatolia for Turkey. However, Turkish Red List category of the species is **NT** now.

Range: Europe, Caucasus, Turkey.

Chorotype: European



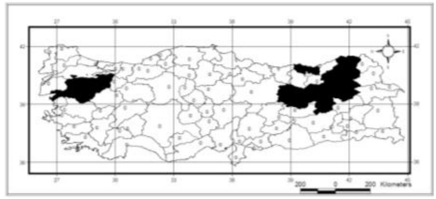
GENUS *JUDOLIA* Mulsant, 1863: 496

SPECIES *J. cerambyciformis* (Schrank, 1781: 154)

The species probably is rather widely distributed in N Anatolia for Turkey. However, Turkish Red List category of the species is **NT** now.

Range: Europe, Caucasus, Turkey.

Chorotype: European

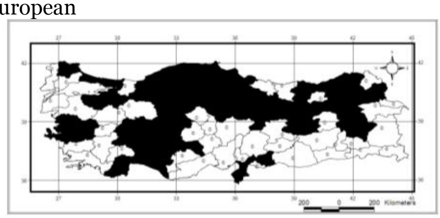


SPECIES *J. erratica* (Dalman, 1817: 490)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Kazakhstan, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria.

Chorotype: Sibero-European



GENUS *LEPTURA* Linnaeus, 1758: 397

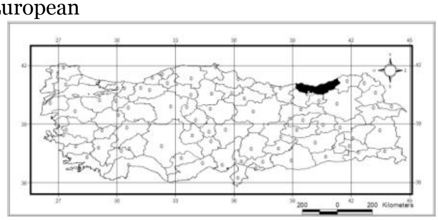
SUBGENUS *LEPTURA* Linnaeus, 1758: 397

SPECIES *L. aethiops* Poda, 1761: 38

The species is known only from NE Anatolia for Turkey. So, Turkish Red List category of the species is **DD** now.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Japan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Asiatic-European

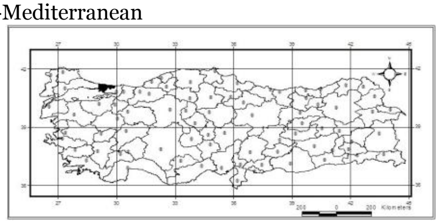


SPECIES *L. aurulenta* Fabricius, 1792: 348

The species is known only from NW Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.

Range: Europe, Caucasus, Turkey, North Africa (Algeria, Tunusia).

Chorotype: Europeo-Mediterranean

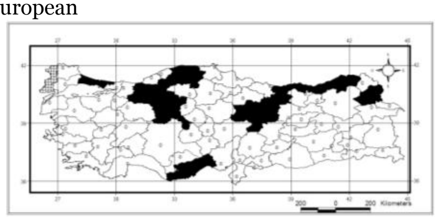


SPECIES *L. quadrifasciata* Linnaeus, 1758: 398

The species is widely distributed in N Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: Asiatic-European



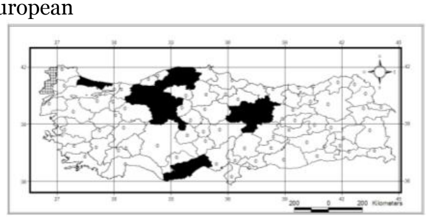
Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *L. quadrifasciata lederi* Ganglbauer, 1882.

SUBSPECIES *L. q. quadrifasciata* Linnaeus, 1758: 398

The subspecies is widely distributed in NC and NW Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Caucasus, Turkey.

Chorotype: Asiatic-European

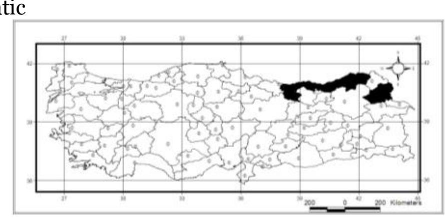


SUBSPECIES *L. q. lederi* Ganglbauer, 1882: 697

The subspecies is widely distributed in NE Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: SW-Asiatic



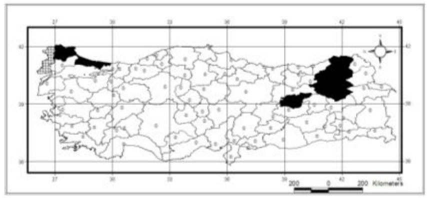
GENUS *STRANGALIA* Dejean, 1835: 355

SPECIES *S. attenuata* (Linnaeus, 1758: 398)

The species probably is rather widely distributed at least in N Turkey. So, Turkish Red List category of the species is **NT** now.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Japan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Asiatic-European



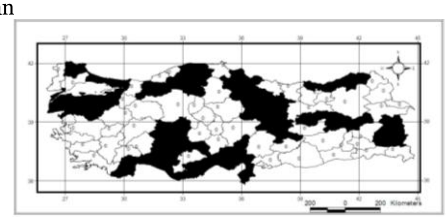
GENUS *RUTPELA* Nakani & Ohbayashi, 1957: 242

SPECIES *R. maculata* (Poda, 1761: 37)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Kazakhstan, Caucasus, Transcaucasus (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria.

Chorotype: European



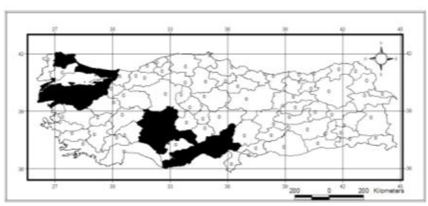
Moreover, the species is represented by three subspecies in Turkey as the nominative subspecies, *R. maculata manca* (Schaufuss, 1863) and *R. maculata irmasanica* Sama, 1996. The distribution patterns of the subspecies are still need to be confirmed.

SUBSPECIES *R. m. maculata* (Poda, 1761: 37)

The subspecies probably is rather widely distributed in NW Turkey and SC and SW Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: Europe, Kazakhstan, Caucasus, Turkey.

Chorotype: European

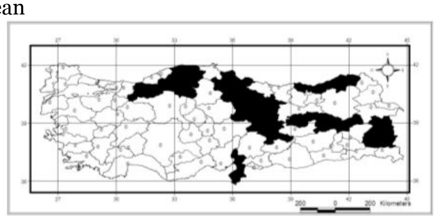


SUBSPECIES *R. m. manca* (Schaufuss, 1863: 121)

The subspecies is rather widely distributed in N, E and SC Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: S Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria.

Chorotype: S-European

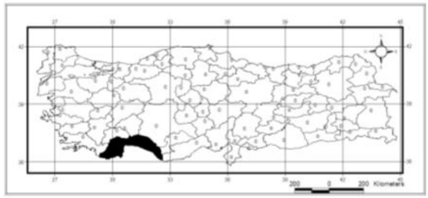


SUBSPECIES *R. m. irmasanica* Sama, 1996: 105

The endemic subspecies is known only from the type locality in SW Anatolia. So, Turkish Red List category of the subspecies is **DD**.

Range: Turkey.

Chorotype: Anatolian



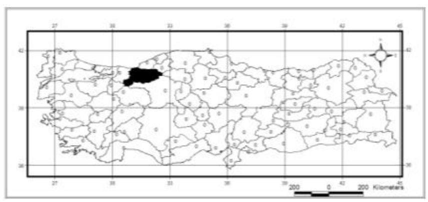
GENUS *SOLAIA* Sama, 2003: 69

SPECIES *S. antonellae* Sama, 2003: 71

The endemic species is known only from the type locality in NW Anatolia. So, Turkish Red List category of the subspecies is **DD**.

Range: Turkey.

Chorotype: Anatolian



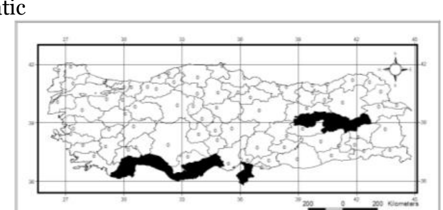
GENUS *CARLANDREA* Sama & Rapuzzi, 1999: 467

SPECIES *C. syriaca* (Pic, 1891: 1)

The species is known only from S and E Anatolia. So, Turkish Red List category of the species is **NT**.

Range: Turkey, Syria.

Chorotype: SW-Asiatic



GENUS *STENURELLA* Villiers, 1974: 217

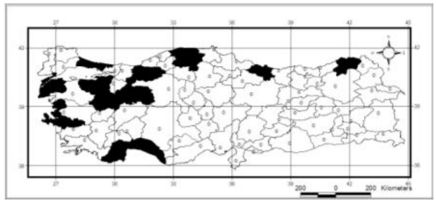
SUBGENUS *STENURELLA* Villiers, 1974: 217

SPECIES *S. melanura* (Linnaeus, 1758: 397)

The species is known mostly from N Anatolia. So, Turkish Red List category of the species is **NT**.

Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, China, Japan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Asiatic-European

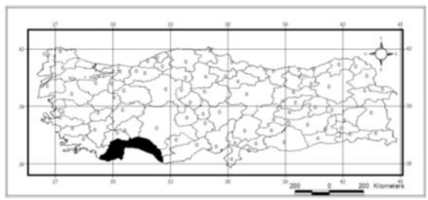


SPECIES *S. pamphyliae* Rapuzzi & Sama, 2009: 182

The endemic species is known only from the type locality in SW Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian



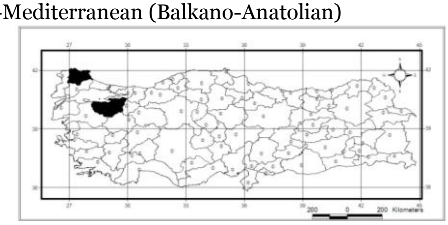
SPECIES *S. samai* Rapuzzi, 1995: 618

SUBSPECIES *S. s. samai* Rapuzzi, 1995: 618

The species is known only from NW Turkey. It is represented only by the nominative subspecies in Turkey. So, Turkish Red List category of the subspecies is **VU**.

Range: SE Europe (Bulgaria, Greece), Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)

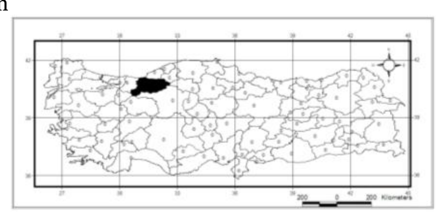


SPECIES *S. zehrae* Özdikmen, Mercan & Cihan, 2012: 18

The endemic species is known only from the type locality in NW Anatolia. So, Turkish Red List category of the species is **DD**.

Range: Turkey.

Chorotype: Anatolian



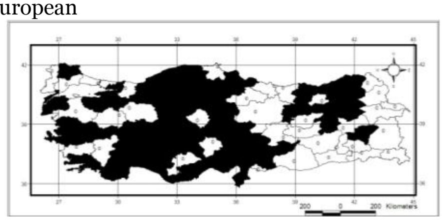
SUBGENUS *PRISCOSTENURELLA* Özdikmen, 2013: 516

SPECIES *S. bifasciata* (Müller, 1776: 93)

The species is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Kazakhstan, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Iraq, Turkey, Syria, Lebanon.

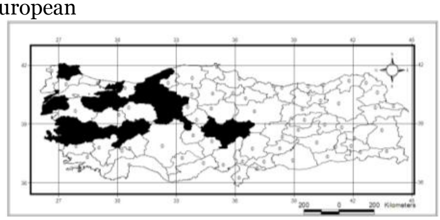
Chorotype: Sibero-European



Moreover, the species is represented by four subspecies in Turkey as the nominative subspecies, *S. bifasciata limbiventris* (Reitter, 1898), *S. bifasciata nigrosuturalis* (Reitter, 1895) and *S. bifasciata safronovi* Danilevsky, 2011. The distribution patterns of the subspecies are still need to be confirmed.

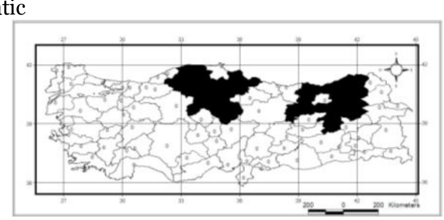
SUBSPECIES *S. b. bifasciata* (Müller, 1776: 93)

The subspecies is rather widely distributed at least in NW, W and C Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Europe, Siberia, Kazakhstan, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Iraq, Turkey.
Chorotype: Sibero-European



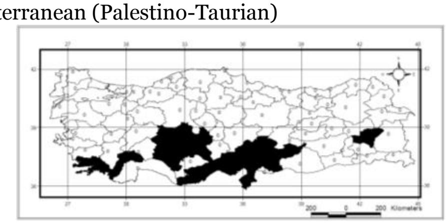
SUBSPECIES *S. b. limbiventris* (Reitter, 1898: 21)

The subspecies probably is rather widely distributed in N Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Transcaucasia (Georgia), Turkey.
Chorotype: SW-Asiatic



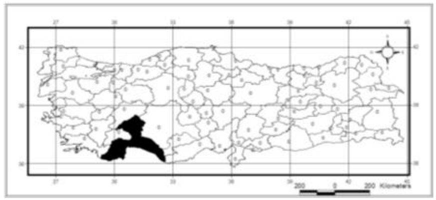
SUBSPECIES *S. b. nigrosuturalis* (Reitter, 1895: 88)

The subspecies is rather widely distributed in S Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Turkey, Syria, Lebanon.
Chorotype: E-Mediterranean (Palestino-Taurian)



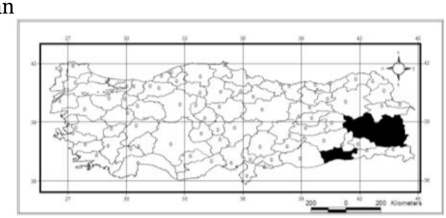
SUBSPECIES *S. b. safronovi* Danilevsky, 2011: 2

The endemic subspecies is known only from the type localities in SW Anatolia. So, Turkish Red List category of the subspecies is **DD**.
Range: Turkey.
Chorotype: Anatolian



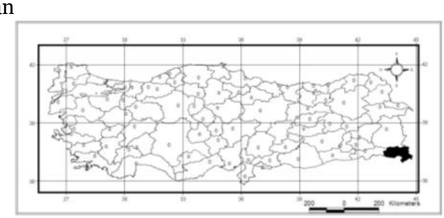
SPECIES *S. ferruginipes* (Pic, 1895: 76)

The endemic species is known only from E Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey.
Chorotype: Anatolian



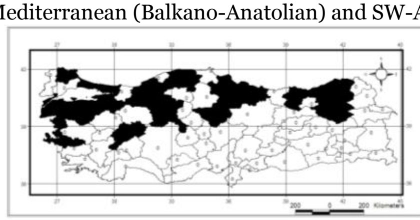
SPECIES *S. sabinae* Rapuzzi & Sama, 2012: 664

The endemic species is known only from the type locality in SE Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *S. septempunctata* (Fabricius, 1792: 346)
SUBSPECIES *S. s. latenigra* (Pic, 1915: 5)

The species is rather distributed in N half of Turkey. It is represented only by the subspecies *S. septempunctata latenigra*. So, Turkish Red List category of the subspecies is **LC**.
Range: SE Europe (Bulgaria), Caucasus, Transcaucasia (Armenia, Georgia), Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian) and SW-Asiatic



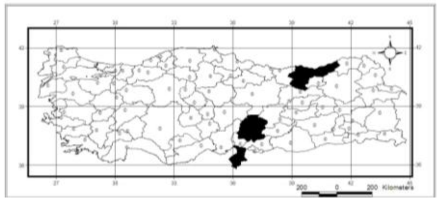
SUBGENUS *STENURELLOIDES* Özdikmen, 2013: 523

SPECIES *S. jaegeri* (Hummel, 1825: 68)

The species is known only from SC and NE Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: E Europe (Ukraine), Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: SW-Asiatic

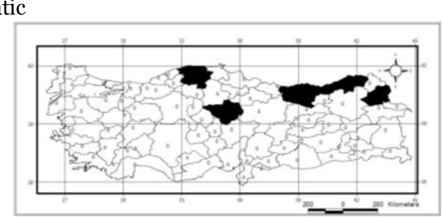


SPECIES *S. novercalis* Reitter, 1901: 78

The species is known only from N Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Caucasus, Transcaucasia (Georgia), Turkey.

Chorotype: SW-Asiatic



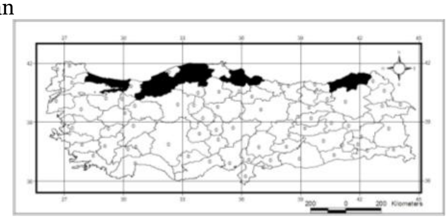
SUBGENUS *NIGROSTENURELLA* Özdikmen, 2013: 525

SPECIES *S. nigra* (Linnaeus, 1758: 398)

The species is known only from N Anatolia. So, Turkish Red List category of the subspecies is **NT**.

Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey.

Chorotype: European



CONCLUSION:

With the present work, "Turkish Red List Categories" for 161 Turkish species group taxa determined (Appendix 1,2).

For Turkish Lepturinae: The subfamily includes 161 species group taxa (100 species + 61 subspecies) in Turkey. Among them;

14 species and 5 subspecies are placed within "Endangered (EN)" Category.

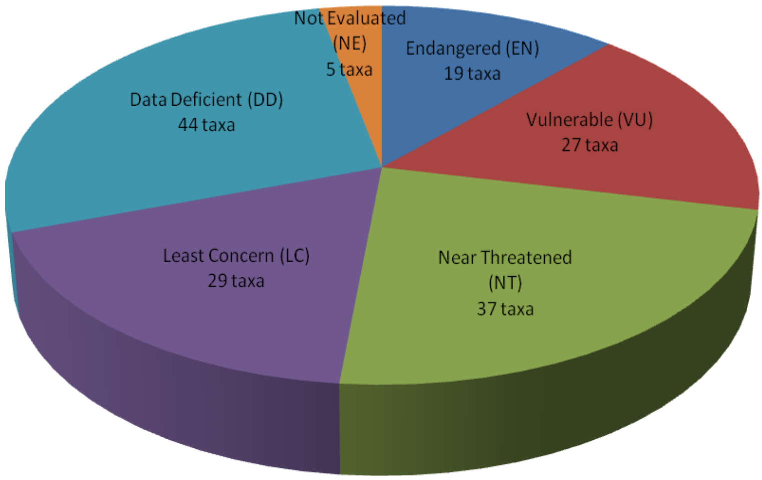
17 species and 10 subspecies are placed within "Vulnerable (VU)" Category.

25 species and 12 subspecies are placed within "Near Threatened (NT)" Category.

10 species and 19 subspecies are placed within "Least Concern (LC)" Category.

30 species and 14 subspecies are placed within "Data Deficient (DD)" Category.

5 species are placed within "Not Evaluated (NE)" Category.



Consequently, "European Red List Saproxylic Beetles" does not include any members of the subfamily Lepturinae. So, any comparison with "Turkish Red List" is impossible.

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Appendix 1. Red List Categories of Turkish longicorn beetles belonging to Lepturinae (Xylosteini, Enoploderini, Rhamnusiini, Oxymirini and Rhagiini) (from Part II).

TAXA	TURKISH RED LIST CATEGORY	EUROPEAN RED LIST CATEGORY	ENDEMISM FOR TURKEY
LEPTURINAE			
Xylosteus caucasicola	**VU**	---	---
Xylosteus kadleci	**EN**	---	**YES**
Xylosteus spinolae	**VU**	---	---
Leptorhabdium caucasicum	**NT**	---	---
Enoploderes sanguineus	**NE**	---	---
Rhamnusium bicolor	**LC**	---	---
R. bicolor juglandis	**LC**	---	**YES**
R. bicolor praeustum	**EN**	---	**YES**
R. bicolor testaceipenne	**DD**	---	---
Oxymirus cursor	**EN**	---	---
Oxymirus mirabilis	**VU**	---	---
Rhagium bifasciatum	**LC**	---	---
Rhagium caucasicum caucasicum	**VU**	---	---
Rhagium elmaliense	**EN**	---	**YES**
Rhagium fasciculatum	**NT**	---	---
Rhagium mordax	**NT**	---	---
Rhagium phrygium	**VU**	---	**YES**
Rhagium sycophanta	**NT**	---	---
Rhagium syriacum	**EN**	---	---
Rhagium inquisitor	**LC**	---	---
R. inquisitor fortipes	**NT**	---	**YES**
R. inquisitor inquisitor	**LC**	---	---
R. inquisitor schtschukini	**NT**	---	---
Akimerus berchmansi	**VU**	---	**YES**

Stenocorus brunnescens	**DD**	---	**YES**
Stenocorus heterocerus	**NT**	---	---
Stenocorus homocerus	**NT**	---	**YES**
Stenocorus quercus	**NT**	---	---
S. quercus aureopubens	**NT**	---	---
S. quercus quercus	**DD**	---	---
Stenocorus auricomus	**EN**	---	**YES**
Stenocorus insitivus insitivus	**NT**	---	---
Stenocorus meridianus	**DD**	---	---
Stenocorus serratus	**EN**	---	**YES**
Stenocorus vittidorsum	**NT**	---	---
Brachyta balcanica	**DD**	---	---
Brachyta delagrangei	**EN**	---	**YES**
Acmeops marginatus	**DD**	---	---
Gnathacmeops pratensis	**NE**	---	---
Dinoptera collaris	**LC**	---	---
Dinoptera concolor	**DD**	---	---
Cortodera aestiva	**DD**	---	**YES**
Cortodera aksarayensis	**DD**	---	**YES**
Cortodera alpina	**LC**	---	---
C. alpina armeniaca	**DD**	---	---
C. alpina xanthoptera	**NT**	---	**YES**
Cortodera cirsii	**VU**	---	**YES**
Cortodera colchica colchica	**LC**	---	---
Cortodera discolor	**NT**	---	---
Cortodera flavimana	**LC**	---	---
C. flavimana flavimana	**LC**	---	---
C. flavimana corallipes	**DD**	---	**YES**
Cortodera humeralis humeralis	**DD**	---	---
Cortodera imrasanica	**VU**	---	**YES**
Cortodera longipilis	**DD**	---	**YES**
Cortodera obscurans	**DD**	---	**YES**
Cortodera omophloides	**EN**	---	**YES**
Cortodera orientalis	**VU**	---	**YES**
Cortodera pseudomophlus	**DD**	---	---
Cortodera pumila	**LC**	---	---
C. pumila meltemae	**DD**	---	**YES**
C. pumila tournieri	**LC**	---	---
Cortodera ranunculi	**EN**	---	**YES**
Cortodera rubripennis	**VU**	---	**YES**
Cortodera rufipes	**LC**	---	**YES**
Cortodera semilivida	**DD**	---	**YES**
Cortodera simulatrix	**DD**	---	**YES**
Cortodera syriaca	**LC**	---	---
C. syriaca syriaca	**LC**	---	---
C. syriaca nigroapicalis	**EN**	---	---
Cortodera uniformis	**VU**	---	**YES**
Cortodera wewalkai	**DD**	---	**YES**
Cortodera wittmeri	**DD**	---	**YES**
Cortodera zoiai	**DD**	---	**YES**
Fallacia elegans	**NT**	---	---

Appendix 2. Red List Categories of Turkish longicorn beetles belonging to Lepturinae (Tribe Lepturini).

TAXA	TURKISH RED LIST CATEGORY	EUROPEAN RED LIST CATEGORY	ENDEMISM FOR TURKEY
LEPTURINAE			
Grammoptera abdominalis	**NT**	---	---
Grammoptera baudii pistacivora	**VU**	---	---
Grammoptera merkli	**VU**	---	**YES**
Grammoptera ruficornis ruficornis	**DD**	---	---
Grammoptera ustulata	**NT**	---	---
Alosterna anatolica	**EN**	---	**YES**
Alosterna scapularis	**NE**	---	---
Alosterna tabacicolor	**DD**	---	---
A. tabacicolor tabacicolor	**DD**	---	---
A. tabacicolor subvittata	**NT**	---	---
A. tabacicolor tokatensis	**VU**	---	**YES**
Vadonia bicolor	**DD**	---	---
Vadonia bipunctata globicollis	**DD**	---	---
Vadonia bitlisiensis	**LC**	---	---
Vadonia bolognai	**EN**	---	**YES**
Vadonia ciliciensis	**VU**	---	**YES**
Vadonia danielorum	**DD**	---	**YES**
Vadonia frater	**DD**	---	**YES**
Vadonia grandicollis grandicollis	**DD**	---	---
Vadonia imitatrix	**NE**	---	---
Vadonia instigmata	**VU**	---	**YES**
Vadonia ispirensis	**EN**	---	**YES**
Vadonia moesiaca	**DD**	---	---
Vadonia monostigma	**NT**	---	---
Vadonia soror	**NT**	---	**YES**
V. soror soror	**VU**	---	**YES**
V. soror tauricola	**NT**	---	**YES**
Vadonia unipunctata unipunctata	**LC**	---	---
Pseudovadonia livida	**LC**	---	---
P. livida bicarinata	**DD**	---	---
P. livida desbrochersi	**NT**	---	---
P. livida livida	**LC**	---	---
Anoplodera rufipes	**LC**	---	---
A. rufipes rufipes	**NT**	---	---
A. rufipes lucidipes	**VU**	---	**YES**
A. rufipes ventralis	**NT**	---	---
Anoplodera sexguttata	**DD**	---	---
Stictoleptura rubra rubra	**DD**	---	---
Stictoleptura cordigera	**LC**	---	---
S. cordigera cordigera	**LC**	---	---
S. cordigera anojiaensis	**VU**	---	---
Stictoleptura deyrollei	**VU**	---	---
Stictoleptura erythroptera	**NE**	---	---
Stictoleptura excisipes	**NT**	---	---
Stictoleptura fulva	**LC**	---	---
Stictoleptura gevneensis	**DD**	---	**YES**
Stictoleptura heydeni	**VU**	---	---
Stictoleptura pallens	**VU**	---	---

Stictoleptura pallidipennis	**NT**	---	---
Stictoleptura rufa	**LC**	---	---
S. rufa rufa	**LC**	---	---
S. rufa attaliensis	**EN**	---	**YES**
S. rufa dimidiata	**VU**	---	---
S. rufa nigropicta	**EN**	---	**YES**
S. rufa realis	**VU**	---	---
Stictoleptura sambucicola	**NT**	---	---
Stictoleptura scutellata	**NT**	---	---
S. scutellata scutellata	**NT**	---	---
S. scutellata inscutellata	**EN**	---	**YES**
Stictoleptura tesserula	**DD**	---	---
Stictoleptura tonsa	**LC**	---	---
Stictoleptura tripartita	**LC**	---	---
Anastrangalia dubia	**LC**	---	---
A. dubia dubia	**LC**	---	---
A. dubia melonota	**VU**	---	---
Anastrangalia montana montana	**LC**	---	---
Anastrangalia sanguinolenta	**LC**	---	---
Pedostrangalia revestita	**DD**	---	---
Pedostrangalia tokatensis	**EN**	---	---
Pedostrangalia adaliae	**EN**	---	---
Pedostrangalia emmipoda	**LC**	---	---
Pedostrangalia kurda	**NT**	---	---
Pedostrangalia verticalis	**DD**	---	---
Pedostrangalia verticenigra	**NT**	---	---
Etorofus pubescens	**NT**	---	---
Judolia cerambyciformis	**NT**	---	---
Judolia erratica	**LC**	---	---
Leptura aethiops	**DD**	---	---
Leptura aurulenta	**DD**	---	---
Leptura quadrifasciata	**LC**	---	---
L. quadrifasciata quadrifasciata	**LC**	---	---
L. quadrifasciata lederi	**NT**	---	---
Strangalia attenuata	**NT**	---	---
Rutpela maculata	**LC**	---	---
R. maculata maculata	**LC**	---	---
R. maculata manca	**LC**	---	---
R. maculata irmasanica	**DD**	---	**YES**
Solaia antonellae	**DD**	---	**YES**
Carlandrea syriaca	**NT**	---	---
Stenurella melanura	**NT**	---	---
Stenurella pamphyliae	**DD**	---	**YES**
Stenurella samai samai	**VU**	---	---
Stenurella zehrae	**DD**	---	**YES**
Stenurella bifasciata	**LC**	---	---
S. bifasciata bifasciata	**LC**	---	---
S. bifasciata limbiventris	**LC**	---	---
S. bifasciata nigrosuturalis	**LC**	---	---
S. bifasciata safronovi	**DD**	---	**YES**
Stenurella ferruginipes	**VU**	---	**YES**
Stenurella sabinae	**DD**	---	**YES**
Stenurella septempunctata latenigra	**LC**	---	---
Stenurella jaegeri	**NT**	---	---
Stenurella novercalis	**NT**	---	---
Stenurella nigra	**NT**	---	---

GALL MIDGES, *CELTICESIS* SPECIES, (DIPTERA: CECIDOMYIIDAE) ON HACKBERRIES, *CELTIS* SPP., (CANNABACEAE) OF TURKEY, WITH DESCRIPTION OF NEW SPECIES

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[Doğanlar, M. 2014. Gall midges, *Celticesis* species, (Diptera: Cecidomyiidae) on Hackberries, *Celtis* spp., (Cannabaceae) of Turkey, with description of new species. Munis Entomology & Zoology, 9 (1): 418-428**]**

ABSTRACT: In Turkey four species of gall midges, *Celticesis* spp. (Diptera: Cecidomyiidae) on Hackberies, *Celtis* spp., (Cannabaceae) were found in several parts of Turkey. The species are: *Celticecis caucasicae* Gagné on *Celtis caucasica* in Antakya, Hatay, *C. kayserinensis* n.sp. in Talas, and Melikgazi, Kayseri, *C. erzincanensis* n.sp. on *Celtis tournefortii* in Bahçeyazı village, Erzincan, *C. malatyanenesis* n.sp. on *Celtis glabrata* in Yaka village, Malatya. The new species and their galls were described and illustrated.

KEY WORDS: Gall midges, *Celticesis*, hackberries, *Celtis* spp., Turkey.

In Turkey three species of Hackberries, *Celtis* spp. (Cannabaceae) were recorded in the flora of Turkey by Davis (1984) from several parts of Turkey. Gayné (1983) described the genus *Celticecis* by combining 10 Nearctic species and stated that the Hackberries, *Celtis* spp. (Cannabaceae), are hosts in North America. They cause complex leaf and twig galls of sometimes bizarre shape on on *Celtis* spp. (Gayné, 1989).

In the eastern Palearctic, Moser (1965) firstly recorded *Celticecis* (as *Phytophaga*) known from Japanwhich extends the range of *Celticecis* into the Old World, and Yukawa & Tsuda (1987) described *Celticecis japonica* (Diptera: Cecidomyiidae) as leaf gall-inducer on *Celtis sinensis* Persoon var. *japonica* (Planchon) Nakai in Kagoshima Prefecture, Kyushu, Japan.

Gagné & Moser (1997) stated that *Celticecis* has not yet been found in relatively well-collected Europe may mean that it became extinct there during the Pleistocene, as might have the gall midges on beech in North America.

For presence of *Celticecis* in Turkey, Gagné & Moser (1997) stated that Dr. Moser obtained from Prof. K. Browicz of the Institute of Dendrology, Kornik, Polland, galled leaves of *Celtis thournefortii* Lam. collected in Hisarcık, Kayseri, Turkey. They described the gall as follow: on the upper surface of the leaf galls are about 1.5 mm in height and width and consist of an outer, raised ring and a central, rounded cone protruding from the center of the ring, andon the lower surface of the leaf the gall is a simple convexity about 1.0 mm in height by 1.5 mm in width. Second instars of a presumably undescribed species of *Celticecis* were extracted from these galls. This new record extends the natural range of *Celticecis* into the western Palearctic. The galls and the larvae excised from them are deposited in the National Museum of Natural History, Washington, DC.

Gagné & Moser (2013) stated the genus is well-represented in Japan by at least three species (S. Sato & J. Yukawa, in litt.), but was previously known elsewhere in the Palearctic Region only from *Celtis* leaf galls found in Turkey. Only second instar larvae from those galls were available, so nothing was done with them in Gagné & Moser (2013) beyond substantiating the presence of *Celticecis* in Turkey.

Recently, Gagné & Doğanlar (in press) described the first species, *Celticecis caucasicae* Gagné of the genus (Diptera: Cecidomyiidae) on *Celtis caucasica* (Cannabaceae) from Hatay, Turkey.

The aim of this work is the review of *Celticecis* species found in several parts of Turkey, including the species recorded as galls and larvae in Kayseri before, describe the new ones, and gave their distributions and some biological data.

MATERIAL AND METHOD

In 2012 and 2013, *Celtis* spp. and galls on them were surveyed in 12 regions of Turkey. The regions and dates are: Hatay: Altınözü, Hanyolu village and , Antakya, Şenköy village in the period from May to October, 2011-2013, Erzin, and Antakya from September-October, 2012; Adana: City center, in September, 2012; Kozan, Marankeçili village in 06. October, 2012; Mersin: Tarsus, Günyurdu village in 09 September, 2012; Kayseri: Talas, Çaybaşı Bağları on 25. July, and on 06.October, 2012, Melikgazi, Beğendik Bağları on 25. July, 2012; Erzincan: Bahçeyazı village, on 26. July, 2012, and on 03. November, 2012; Malatya: Kale, on 15. October, 2012; Center, Yaka village, 27. October, 2012 (Dr. Aziz Gül); Diyarbakır: Çermik on 15. October, 2012 (Dr. M. Duman); Sinop: Durağan, Kaplangu village on 05. November, 2012 (Mr. Abdullah Kılınçer). The galls of the *Celticecis* species were collected only from Hatay in 2011-2012, and from Kayseri, Erzincan and Malatya in 2012.

Some galls were measured and some of them dissected to obtain specimens of larvae and pupae. To rear adult midges, fallen galls containing mature larvae were collected in July from twigs of trees, and in October from the ground under host trees at several places in the collecting site recorded above, and they brought to laboratory. The galls were placed on the soil in a plastic pot (25 cm in diameter and 30 cm depth). The pots were placed on the soil in open condition through the following winter in the garden of Mustafa Kemal University. In March, 2011 and 2012 the overwintered galls were transferred from the pots to cages (30x30x70 cm in size) in the laboratory. Daily emerged midges were collected and put into vials with 96% ethyl alcohol.

Some of the galls, collected from different localities in September, were segregated each kind and wrap them together in soft paper sheets, put into a refrigerator at 2-3^{o} C and 60-70% relative humidity. They were left there until mid-March, when tree buds begin to burgeon, almost one month before the normal date of leafing. The galls were taken out from the refrigerator, given moisture slightly and placed into large clear plastic bags. Within 1-2 weeks the adults come out were collected by fine brush and put into vials with 96% ethyl alcohol (R. Gagné, 2012, in litt.).

The life history of the gall midges was studied by occasional dissection of the galls collected from the localities. The time of fall of mature galls was surveyed from September to November in 2011 and 2012 in Hanyolu, Hatay and in July and October in Kayseri, Erzincan and Malatya by detecting of fallen galls on leaves.

In preparing microscope slides, the xylene-Canadian balsam method was used. The Holotype and some paratypes were deposited in the Insect collection of Research Station of Biological Control, Adana; 3 females and 3 males paratypes were deposited in the National Museum of Natural History (USNM), Washington, D.C., USA.

Morphological terminology follows Gayné (1983 and 2009).

RESULTS AND DISCUSSION

Celticecis Gayné 1983

Celticecis Gayné, 1983: 436-438. Type species: *Celticecis celtiphyllia* (Felt). Proc. Entomol. Soc. Wash., 85 (3): 435-438.

Gayné (1983) gave the description of the genus in detail, and gave diagnostic characters distinguishing it from the genus, *Mayetiola* Kieffer, and listed 10 species from Nearctic Region.

By the work four species of *Celticesis*, three of which are new to science were found in Kayseri, Erzincan and Malatya, the other was recently described by Gagné & Doğanlar (in press). The Turkish species have the following characters: First through fourth tergites with anterior pair of trichoid sensilla, single row of posterior setae, 0 lateral setae, and scattered scales; an anterior pair of trichoid sensilla on each of the adult abdominal sternites absent; larval papillae have the loss of two dorsals, two ventrals and two pleurals on the abdomen, and also lost two laterals and two pleurals on the thoracic segments. The third instar spatula with one triangular point as that of species in the *spiniformis* group. Pupae with distinct antennal horns; clypeus with 4 papillae in the center of sclerite. Abdomen dorsally and ventraly setulose, except bare in inter segmental areas as stated by Gayné (1983).

The identification key for the species is provided as follows:

Key to species of *Celticecis* from Turkey

1-Galls covered with dense cottony fibers on upper side of leaf; 2nd instar larval spatula cruciate; anterior tooth large; the shaft broad, well-developed in mature second instars (Fig.2, I a); 3rd instar larval spatula reduced to narrow, acute tooth and narrow, indistinct, shaft barely wider and longer than tooth (Fig.2, I b); pupae having space between antennal horn about 3.3 times length of horn itself in ventral view (Fig. 3 b); male genitalia with gonocoxit having sparse long setae ventrally, dorsally almost bare, only with two long setae (fig.5, a); genital base broad as in Fig. 6, I,a,b,d; cerci short, almost as long as breadth; gonostyli with 2-3 setulae dorsally, 4-5 basally on venter; aedeagus blunt apically; male sternite 6-8 with two rows of setae, on anterior and posterior parts (Fig.7, a); female genitalia as in fig.8, I, with hypoproct longer than breadth...*C. caucasicae* Gagné, 2013

- Galls without dense cottony fibers; 2ndand 3rd instar larval spatula reduced to narrow, acute tooth, their shaft variable (Fig.2, II-IV); pupae having space between antennal horn at least 6 times length of horn itself in ventral view (Fig. 3 e, h, l); male genitalia with gonocoxit having dorsally and ventrally with some long setae; shape of genital base and cerci variable; male sternite 6-8 with more setae; female genitalia as in fig.8, II-IV, with hypoproct almost as long as breadth 2

2- Galls about 1.5 mm in height and width and consist of an outer, raised ring and a central, rounded cone protruding from the center of the ring on the upper surface of the leaf; 2nd instar larval spatula with spherical shaft, its diameter about twice length of tooth (Fig.2, II a); 3rd instar larval spatula with ellipsoidal shaft, about 2.3 times as long as tooth (Fig.2, II b);pupae having space between antennal horn about 9 times length of horn itself in ventral view (Fig. 3 e); male thorax and scutellum as fig. 5 e, f; male genitalia with gonocoxit having sparse setae dorsally and ventrally (Fig.5 b); genital base indistinct as in Fig. 6, II,a,b; cerci short, shorter than breadth (Fig. 6, II, c,e); male sternite 6-8 with many, dense, short setae, on anterior half (Fig.7, b); female genitalia as in fig. 8, II...*C. kayserinensis* **n. sp.**

- Galls conical, at least 5 mm in height and 1.5 mm width and consist of an outer, only slightly raised ring on the upper surface of the leaf;2nd and 3rdinstar larval spatulae with short conical shaft (Fig.2, III- IV); pupae having ratio between the space between antennal horn and length of horn itself in ventral view variable (Fig. 3 h, l); male genitalia with gonocoxit having dense setae dorsally and ventrally (Fig. c,d); setal pattern of male sternite 6-8 variable..3

3- 2nd instar larval spatula with short conical shaft, about half length of tooth (Fig.2, III a); 3rd instar larval spatula with short tooth, about 1.3 times as long as its basal breadth, shaft distinct, basally indistinct, about 2.3 times as long as tooth(Fig.2, III b); pupae having space between antennal horn at least 6 times length of horn itself in ventral view (Fig. 3 e, h); male genitalia with gonocoxit basally almost bare (Fig.5 c); genital base triangular as in Fig. 6, III,a,b,d; cerci long, almost 2.5 times as long as breadth (Fig. 6, III, c); male sternite 6-8 with only two rows of setae on anterior site (Fig.7, c);female genitalia as in fig. 8, III...*C. erzincanensis* **n. sp.**

-- 2nd instar larval spatula unknown; 3rd instar larval spatula with long tooth, about 1.5 times as long as its basal breadth, shaft narrow, indistinct basally, about as long as tooth (Fig.2, IV b); pupae having space between antennal horn at least 7 times length of horn itself in ventral view (Fig. 3, l); male genitalia with gonocoxit basally setose (Fig.5 d); genital base Y-shaped as in Fig. 6, IV,a; cerci long, almost twice as long as breadth (Fig.6, IV, f); male sternite 6-8 with some, sparse, long setae on anterior half (Fig.7, b); female genitalia as in fig. 8, IV...*C. malatyanensis* **n. sp.**

Celticecis caucasicae **Gagné**

(Figs. 1a-c; 2, Ia,b; 3b; 4a,b; 5, 1a; 6, Ia,b,d; 7a; 8, I)

Celticecis caucasicae Gagné, 2013: 312; Holotype. —Male, emerged III-2012 from *Celtis caucasica*, Hanyolu, Antakya, Hatay, Turkey, M. Doğanlar, deposited in USNM, Washington, D.C., USA. Other material examined, all deposited in USNM.

Diagnosis: Galls covered with dense cottony fibers on upper side of leaf; 2nd instar larval spatula cruciate; anterior tooth large; the shaft broad, well-developed in mature second instar (Fig. 2, Ia); 3rd instar larval spatula reduced to narrow, acute tooth and narrow, indistinct, shaft barely wider and longer than tooth (Fig. 2, Ib); pupae having space between antennal horn about 3.3 times length of horn itself in ventral view (Fig. 3b); male genitalia with gonocoxit having sparse long setae ventrally, dorsally almost bare, with only two long setae (Figs. 5, 1, a); genital base broad as in figs. 6, I,a,b,d; cerci short, almost as long as breadth; gonostyli with 2-3 setulae dorsally, 4-5 basally on venter; aedeagus blunt apically; male sternit 6-8 with two rows of setae, on anterior and posterior parts (Fig.7a); female genitalia as in fig. 8, I, with hypoproct longer than breadth.

Description:

Galls: Described by Gayné in Gayné & Doğanlar, 2013, and figured in this work as figs. 1,a-c.

Adults: Described in detail by Gayné in Gayné & Doğanlar, 2013. Some additional characters as follows: Male antenna as seen figs. 4a-b. Male genitalia with gonocoxit having sparse long setae ventrally, dorsally almost bare, only with two long setae (Fig. 5a); genital base broad as in figs. 6, I,a,b,d; cerci short, almost as long as breadth; gonostyli with 2-3 setulae dorsally, 4-5 basally on venter; aedeagus blunt apically; male sternit 6-8 with two rows of setae, on anterior and posterior parts (Fig. 7a); female genitalia as in fig. 8, I, with hypoproct longer than breadth.

Pupa: pupae having space between antennal horns about 3.3 times length of horn itself in ventral view (Fig. 3b).

Larva: 2nd instar larval spatula cruciate; anterior tooth large; the shaft broad, well-developed in mature second instar (Fig. 2, Ia); 3rd instar larval spatula reduced to narrow, acute tooth and narrow, indistinct, shaft barely wider and longer than tooth (Fig. 2, Ib).

Material examined: 20 females; 10 Males, 15-22. III. 2012,emerged from *Celtis caucasica*, Hanyolu, Antakya, Hatay, Turkey, M. Doğanlar; 27 females, 21 males, 20. III-02.IV.2013, same data stated in 2012; 10 pupae, 9 III. instar larvae, and many galls with II. instar larvae, collected from same locality in 2013. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Hanyolu, Altınözü and Şenköy, Antakya, Hatay, Turkey.

Hosts: *Celtis caucasica*.

Celticecis kayserinensis **Doğanlar n. sp.**

(Figs. 1g-i; 2, IIa,b; 3e; 4c-d; 5b; 6 IIa-e; 7b; 8 II)

Diagnosis: Galls about 1.5 mm in height and width and consist of an outer, raised ring and a central, rounded cone protruding from the center of the ring on the upper surface of the leaf; 2nd instar larval spatula with spherical shaft, its diameter about twice length of tooth (Fig. 2, IIa); 3rd instar larval spatula with ellipsoidal shaft, about 2.3 times as long as tooth (Fig. 2, IIb); pupae having space between antennal horn about 9 times length of horn itself in ventral view (Fig. 3e); male genitalia with gonocoxit having sparse setae dorsally and ventrally (Fig. 5b); genital base indistinct as in figs. 6, II,a,b; cerci short, shorter than breadth (Figs. 6, IIc, e); male sternite 6-8 with many, dense, short setae, on anterior half (Fig. 7b).

Description:

Gall (Figs. 1g-i). Galls about 1.5 mm in height and width and consist of an outer, raised ring and a central, rounded cone protruding from the center of the ring on the upper surface of the leaf.

Adult. Female: body 1.8-2.0 mm; wing 2.0 mm; male. body 1.6-1.7 mm, wing 1.7 mm Antenna with 12 flagellomeres in the both sexes (n=10). Male antenna as seen figs. 4c-d. Wing length: male, 1.7 mm (n=10); female, 2.0 mm (n=10). Male abdomen: First through fourth tergite with anterior pair of trichoid sensilla, single row of posterior setae, fifth though seventh tergite with two rows of posterior setae; male sternite 6-8 with many, dense, short setae, on anterior half (Fig. 7b); terminalia with gonocoxit having sparse setae dorsally and ventrally (Fig. 5b); genital base indistinct as in figs. 6, IIa,b; cerci short, shorter than breadth (Figs. 6, IIc, e). Female abdomen: similar to that of *C. caucasicae*, except hypoproct almost spherical, as long as breath (Figs. 8, IIa-e).

Pupa: pupae having space between antennal horn about 9 times length of horn itself in ventral view (Fig. 3e).

Larva: 2nd instar larval spatula with spherical shaft, its diameter about twice length of tooth (Fig. 2, IIa); 3rd instar larval spatula with ellipsoidal shaft, about 2.3 times as long as tooth (Fig. 2, IIb).

Material examined: Holotype, male, (on slide),Turkey: Kayseri, Talas, Çaybaşı Bağları,20. III. 2013, emerged from leaf gall on *Celtis thouneforti* (M. Doğanlar), deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 27 Females; 17 Males, same data as Holotype, 11.-25. III. 2013; Melikgazi, Beğendik Bağları, 8 females; 5 Males, 12-18. March, 2013, emerged from leaf gall on *Celtis glabrata* (M. Doğanlar). 8 pupae, dissected in March 2013; 12 III. instar larvae, and many galls with III. instar larvae collected from same locality in September 2012 and many galls with II. instar larvae, collected from same locality in July 2012. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Kayseri,Talas, Çaybaşı Bağları; Melikgazi, Beğendik Bağları.
Hosts: *Celtis thouneforti* (mainly), *Celtis glabrata* (rarely).

Celticecis erzincanensis Doğanlar n. sp.

(Figs. 1d-f; 2, IIIa,b; 4e-f; 3e,h; 5c; 6, IIIa-d; 7c; 8, III)

Diagnosis: Galls conical, at least 5 mm in height and 1.5 mm width and consist of an outer, only slightly raised ring on the upper surface of the leaf; 2nd instar larval spatula with short conical shaft, about half length of tooth (Fig. 2, IIIa); 3rd instar larval spatula with short tooth, about 1.3 times as long as its basal breadth, shaft distinct, basally indistinct, about 2.3 times as long as tooth (Fig. 2, IIIb); pupae having space between antennal horn at least 6 times length of horn itself in ventral view (Figs. 3e,h); male genitalia with gonocoxit basally almost bare (Fig. 5c); genital base triangular as in figs. 6, IIIa,b,d; cerci long, almost 2.5 times as long as breadth (Fig. 6, IIIc); male sternite 6-8 with only two rows of setae on anterior site (Fig. 7c); female genitalia as in fig. 8, III.

Description:

Gall (Figs. 1d-f). Galls conical, at least 5 mm in height and 1.5 mm width and consist of an outer, only slightly raised ring on the upper surface of the leaf.

Adult. Body: female: 1.5-1.6 mm; male: 1.3-1.4 mm. Wing: female:1.6 mm. male: 1.5 mm. Similar to *C. caucasicae,* except as follows: Male antenna as in figs. 4e-f; male genitalia with gonocoxit basally almost bare (Fig. 5c); genital base triangular as in figs. 6, IIIa,b,d; cerci long, almost 2.5 times as long as breadth (Fig. 6, IIIc); male sternite 6-8 with only two rows of setae on anterior site (Fig. 7c); female genitalia as in fig. 8, III.

Pupa: pupae having space between antennal horn at least 6 times length of horn itself in ventral view (Fig. 3e,h).

Larva: 2nd instar larval spatula with short conical shaft, about half length of tooth (Fig. 2, IIIa); 3rd instar larval spatula with short tooth, about 1.3 times as long as its basal breadth, shaft distinct, basally indistinct, about 2.3 times as long as tooth (Fig. 2, IIIb).

Material examined: Holotype, male, (on slide),Turkey: Erzincan, Bahçeyazı village. 18. III. 2013, emerged from leaf gall on *Celtis thouneforti* (M. Doğanlar), deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 9 females; 11Males, same data as Holotype, 11.-25. III. 2013;6 pupae, dissected in March 2013;4 II. instar larvae, dissected on July, 2012; 9III. instar larvae, dissected on March, 2013 and many galls with III. instar larvae collected from same locality in September 2012 and many galls with II. instar larvae, collected from same locality in July 2012. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Erzincan, Bahçeyazı village.
Hosts: *Celtis thouneforti*.

Celticecis malatyanensis Doğanlar n. sp.

(Figs. 1k-m; 2, IVb; 3l; 4g,h; 5d; 6, IVa,f; 7b; 8, IV)

Diagnosis: Galls conical, at least 5 mm in height and 1.5 mm width and consist of an outer, only slightly raised ring on the upper surface of the leaf; 2nd instar larval spatula unknown; 3rd instar larval spatula with long tooth, about 1.5 times as long as its basal breadth, shaft narrow, indistinct basally, about as long as tooth (Fig. 2, IVb); pupae having space between antennal horn at least 7 times length of horn itself in ventral view (Fig. 3l); male genitalia with gonocoxit basally setose

(Fig. 5d); genital base Y-shaped as in fig. 6, IVa; cerci long, almost twice as long as breadth (Fig. 6, IVf); male sternite 6-8 with some, sparse, long setae on anterior half (Fig. 7b); female genitalia as in fig. 8, IV.

Description:

Gall (Figs. 1k-m).Galls conical, at least 5 mm in height and 1.5 mm width and consist of an outer, only slightly raised ring on the upper surface of the leaf.

Adult. Body: female: 1.7-1.9 mm; male: 1.6-1.7 mm. Wing: female:1.7 mm. male: 1.6 mm. Similar to *C. caucasicae,* except as follows: Male antenna as in figs. 4g,h. Male genitalia with gonocoxit basally setose (Fig. 5d); genital base Y-shaped as in Fig. 6, IVa; cerci long, almost twice as long as breadth (Fig. 6, IVf); male sternite 6-8 with some, sparse, long setae on anterior half (Fig. 7b); female genitalia as in fig. 8, IV.

Pupa: pupae having space between antennal horn at least 7 times length of horn itself in ventral view (Fig. 3l).

Larva: 2nd instar larval spatula unknown; 3rd instar larval spatula with long tooth, about 1.5 times as long as its basal breadth, shaft narrow, indistinct basally, about as long as tooth (Fig. 2, IVb).

Material examined: Holotype, male, (on slide),Turkey: Malatya, Akyaka village, 22. III. 2013,emerged from leaf gall on *Celtis glabrata* (M. Doğanlar), deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes:7 females; 10 Males, same data as Holotype, 11.-25. III. 2013; 8 pupae and 9 III. instar larvae, dissected in March, 2013, and many galls with III. instar larvae collected from same locality in September 2012. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Malatya, Akyaka village.

Hosts: *Celtis glabrata.*

ACKNOWLEDGEMENTS

I thank Mr. Beşir Dağ for his help during collecting galls from several parts of Turkey and Drs. Aziz Gül and Özkan Bozkan for collecting materials from Malatya and Erzincan, respectively.

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Figure 1. Galls of *Celticecis* species in Turkey. a, d, g, k. upper side; b, e, h, l. lower side; c, f, I, m. galls with larva.

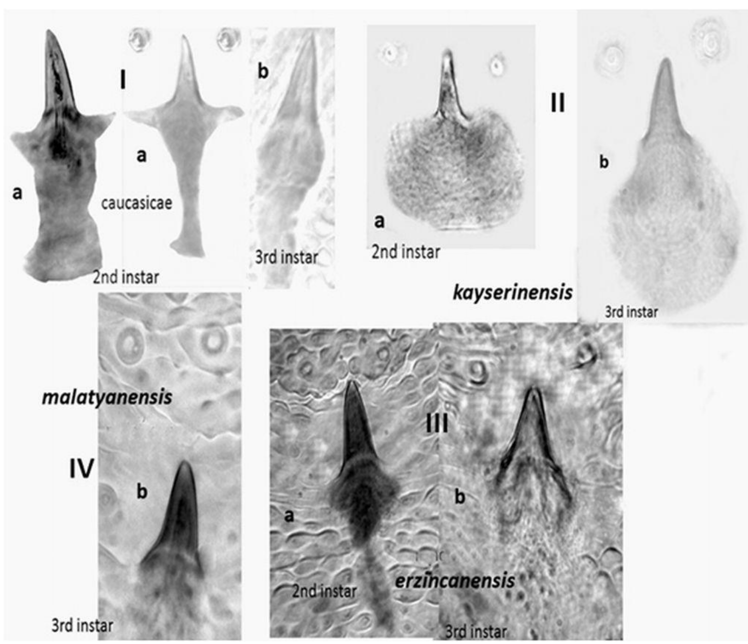

Figure 2. Larval spatulae and associated papillae of *Celticecis* species in Turkey. a. second instar larvae; b. 3rd instar larvae.

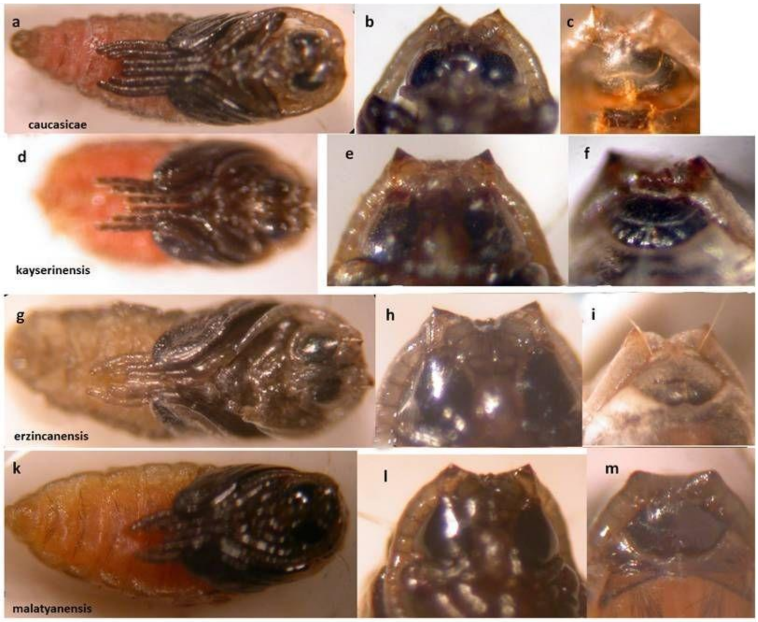

Figure 3. Pupae of *Celticecis* species in Turkey. a, d, g, k. pupae, in ventral view; b, e, h, l. antennal horn, in ventral view; c, f, I, m. antennal horn, in dorsal view.

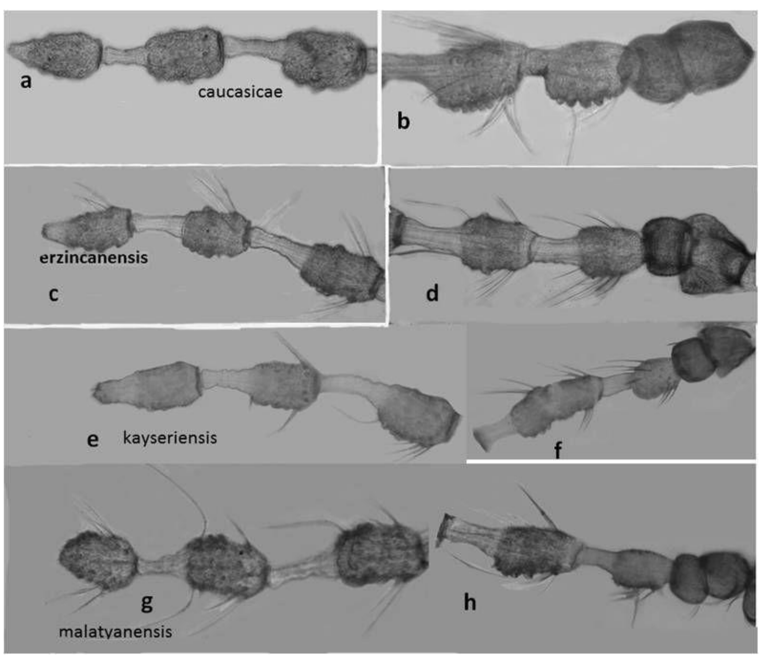

Figure 4. Male antennae of *Celticecis* species in Turkey. a, c, e, g. apical 3 segments; b, d, f, h. basal 4 segments.

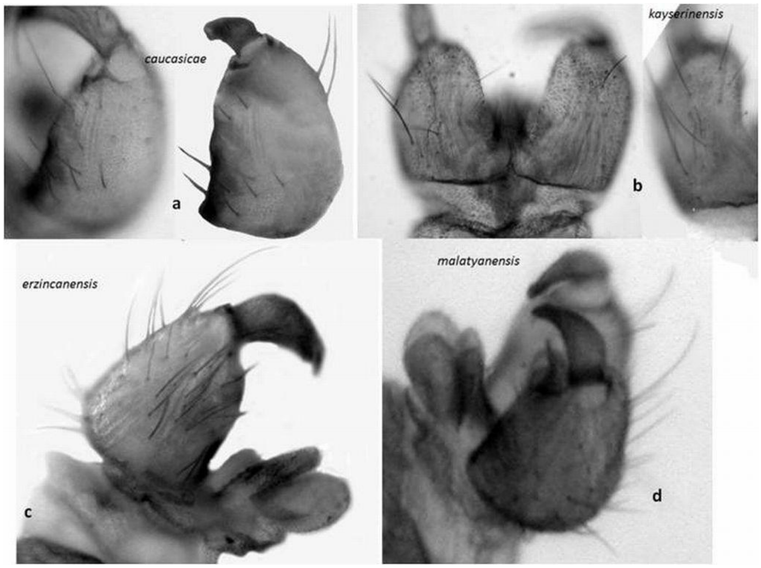

Figure 5. Male genitalia of *Celticecis* species in Turkey., setal pattern.

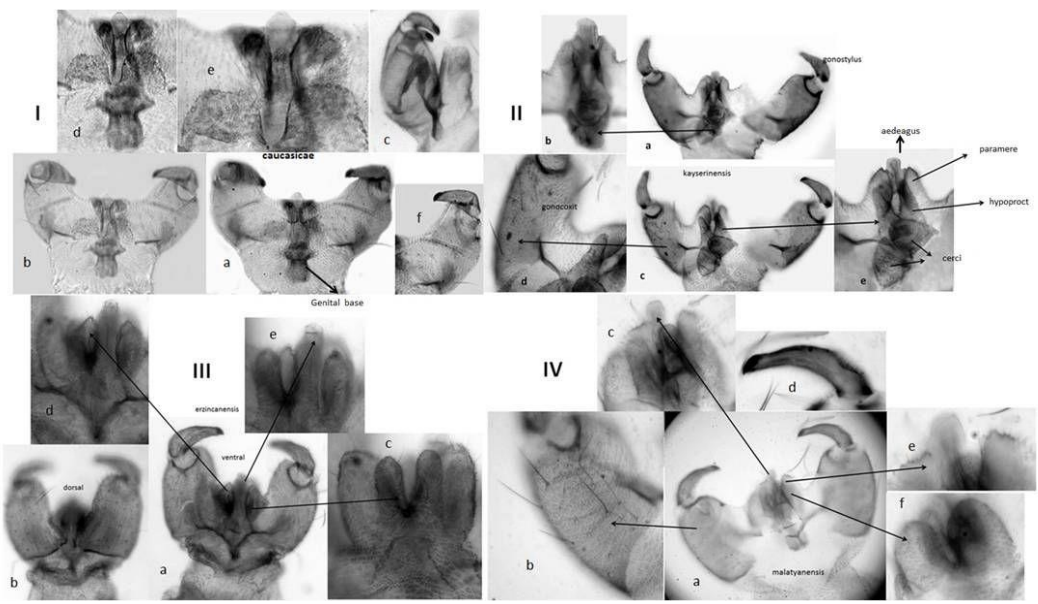

Figure 6. Male genitalia of *Celticecis* species in Turkey. I. *C. caucasicae* Gayné; II. *C. kayserinensis* n.sp.; III. *C. erzincanensis* n.sp.; IV. *C. malatyanensis* n.sp.

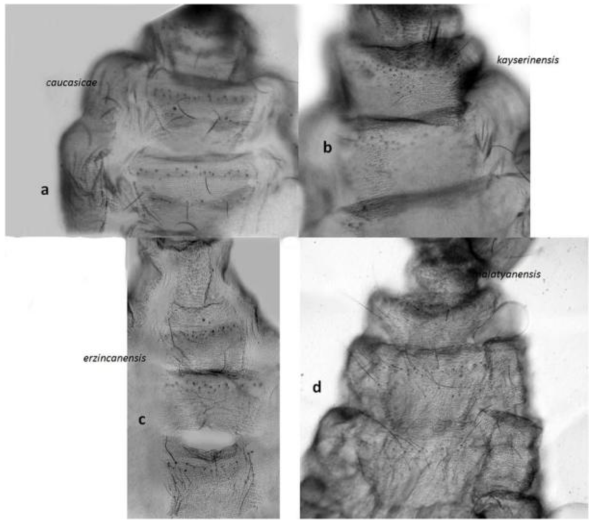

Figure 7. Male abdominal sterna of *Celticecis* species in Turkey. a. *C. caucasicae* Gayné; b. *C. kayserinensis* n.sp.; c. *C. erzincanensis* n.sp. ; d. *C. malatyanensis* n.sp.

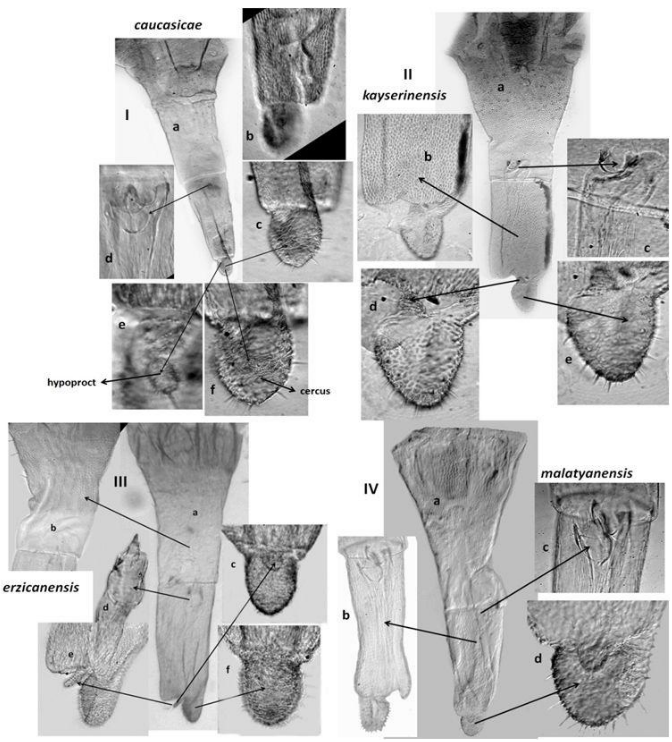

Figure 8. Female genitalia of *Celticecis* species in Turkey. I. *C. caucasicae* Gayné; II. *C. kayserinensis* n.sp.; III. *C. erzincanensis* n.sp.; IV. *C. malatyanensis* n.sp.

TOXICITY AND BIOCHEMICAL IMPACTS OF SPINOSAD ON THE PINK CORN STEM BORER *SESAMIA CRETICA* LED. (LEPIDOPTERA: NOCTUIDAE)

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ABSTRACT: The toxicity of Spinosad to different larval instars of the pink corn stem borer, *Sesamia cretica* Led. (Lepidoptera: Noctuidae), was evaluated under laboratory and field conditions. The impact of Spinosad on the protein content and glycogen level of larvae was also taken into consideration. Data indicated that Spinosad had toxic activity against the tested larval instar and the mortality was in the order of first instar > second instar > third instar > fourth instar > fifth instar with respective LC_{50} values of 0.008, 0.016, 0.028, 0.044 and 0.159 ml/l after 7 days of treatment. Also, the field experiment showed high efficiency of Spinosad at the highest three concentrations down to 25% FR (0.125 m/l) against *S. cretica* larvae, which resulted in significant reduction in the number of plants containing either perforated stem or dead hearted case, number of larvae, tunnels and excavated areas inside infested plants. Regarding the biochemical parameters, results proved that the protein content and glycogen level in the treated larvae was significantly lower than that of the control at all concentrations of exposure. The highest rate of decreasing in total protein content was -54.5% for 2nd instar larvae exposed to 50% FR (0.25ml/l). Also, the decrease in glycogen level in the treated larvae was concentration-dependent and reached -55.8% to 2nd instar larvae exposure to 50% FR (0.25 ml/l.).

KEY WORDS: Spinosad, *Sesamia cretica*, toxicity, biochemical impacts, protein contents, glycogen level.

Maize *Zea mays* L., also called corn, is the third most important cereal crops in the world agricultural economy after wheat and rice. Maize occupies a crucial place since it used for human and livestock's consumption and as a source of industrial raw material for the production of oil, alcohol and starch. In Egypt, the cultivated area in 2012 stood approximately 750,000 hectares with a total grain yield of 7 M.T. (FAO, 2012). However, this crop is subjected to sever attack by several insect pests causing considerable damage estimated about 25% annually (Setamou et al., 2000). Stem borers are one of the major limiting factors to maize production in the world (Tende et al., 2005). In Egypt, maize is infested by three stem borer species: the pink borer *Sesamia cretica* Led. (Lepidoptera: Noctuidae), the striped stem borer *Chilo agamemnon* Blesz. and European corn borer *Ostrinia nubilalis* Hbn. (Lepidoptera: Pyralidae) (Moyal et al., 2002).

The pink borer, *Sesamia cretica* Led. (Lepidoptera: Noctuidae), is a key pest damaging corn mainly in the eastern Mediterranean countries, and is also spread in Africa and Asia (Onukogu, 1984; Moyal et al., 2002). In Egypt, attacks by *S. cretica* are usually high especially on early maize crops, sown between late March and mid-May, in which the borer may cause severe damage (Semeada, 1988).

Stem borers affect maize yields by reducing the photosynthetic area of the leaves. Also, crop losses due to death of the growing point, early leaf senescence, reduced translocation, lodging and direct damage to ears. Secondary losses have been documented due to infections by bacterial and fungal pathogens via entry points created by the stem borers within the plant tissues (Ndiritu, 1999). The corn borer is estimated to cause significant and economic losses in yield production up to 20% in high infestation regions, where no insecticides are used (Bosque-Pérez, 1995).

Current control of this pest in highly infested plantations has relied for a long time on the extensive use of traditional pesticides. Unfortunately, insects developed resistance to pesticides after several generations of exposure. Also, these pesticides have negative impacts on the environment, especially on the beneficial organisms. Thus, the need to environmentally friendly products for pest control is in continues increase. Spinosad is a mixture of tetracyclic macrolide neurotoxins, spinosyn A and D, produced through the fermentation of the soil actinomycete, *Saccharopolyspora spinosa* Mertz & Yao (Thompson et al., 2000). As such, it may be considered as a bioinsecticide (Copping & Menn, 2000). It is a broad-spectrum insecticide with a very low mammalian toxicity and a favorable environmental profile with low persistence and low toxicity to several natural enemies (Miles & Dutton, 2000; Williams et al., 2003). Spinosad exhibits a high degree of selective toxicity towards several classes of insects, especially lepidopterous larvae and has a unique mode of action involving the postsynaptic nicotinic acetylcholine and GABA receptors (Watson, 2001). It is an alternative reagent to classic pesticides, acts primarily as a stomach (Sparks et al., 1998), and contact poison (Toews & Subramanyam, 2003), and degrades rapidly in the environment (Cisneros et al. 2002). Due to its unique mode of action, high selectivity, low toxicity to mammals, beneficial arthropods, Spinosad is classified as reduced-risk product (Cisneros et al., 2002). These advantages maximize its chance to be an integral part of the integrated pest management programs of certain key lepidopetrous pests (Thompson et al., 2000; Cisneros et al., 2002).

Lepidopteran larvae treated with Spinosad show unique symptoms of poisoning including feeding cessation, complete contraction paralysis and ultimately death (Tohnishi et al., 2005). Insecticides are reported to have the ability to influence the proportion of various biochemical components (Protein, Glycogen, lipids etc.) in the body of insects, thus disturbing the internal metabolism of the insect, causing their reduced activity or mortality. *S. cretica* represents a major lepidopteran pest of maize and extremely destructive if infestations exceed thresholds, it felt necessary to study the response of its protein and glycogen contents to such unique bioinsecticide.

Therefore, the objective of our study was to evaluate the efficacy of lethal and sub-lethal concentrations of Spinosad against the pink maize borer *S. cretica* under laboratory and field conditions. Also, determine the impact of this bioinsecticide on some biochemical aspects as the total protein contents and glycogen levels in different larval instars of *S. cretica*.

MATERIAL AND METHODS

Insect maintenance:

Larvae of maize borer, *Sesamia cretica* Led. were handily collected from untreated maize plants in Experimental Farm, Faculty of Agriculture, University of Suez Canal. The infested plants were detached and transferred to the laboratory to inspect and separate different larval instars of *S. cretica*. Maize borer *S. cretica* were reared for many generations under laboratory conditions of 27 ± 2°C; 60 ± 10% RH and photoperiod of 14: 10 (L : D) h. The collected larvae were reared inside plastic boxes (20 × 60 cm) with screen lids, fed on untreated maize plants until pupal stage. Pupae were collected and transferred to Petri dish inside wood cages (60 × 60 × 60 cm) with three screen sides, and supplied with saturated cotton piece by 10% sugar solution in another Petri dish. Upon emergence, adults of *S. cretica* were allowed to laying eggs on leaf sheathes of young maize plants (20-25 days old), which putted inside wood cages in the time of adults oviposition periods.

Bio-insecticide used:

A commercial formulation of Spinosad (Spinosad 12% EC) which was a gift from Dow Agro Science Inc, was used in all bioassays. It is registered in Egypt against several lepidopetran pests at a field rate of 0.5 ml/l (60 mg/l a.i). Solutions of tested compound in the present study were prepared in distilled water at the field rate concentration (0.5 ml/l.) 100% FR. The other tested concentrations of Spinosad were prepared via dilute the field rate with distilled water to serial concentrations of 50% FR, 25% FR, 12.5% FR, 6.25% FR, 3.12% FR and 1.56% FR using fresh concentrations prepared one hour prior to experiments.

Laboratory Bioassay:

As a result of preliminary tests, serial concentrations of Spinosad 12% EC were prepared by dilution of water and used for each test to get larval mortality ranged between ≥ 25 - ≤75% for the lowest and highest concentration, respectively. In this experiment, the effect of fresh preparations of the field rate (FR) (0.5 ml/l), 50%FR (0.25 ml/l.), 25% FR (0.125 ml/l.), 12.5% FR (0.06 ml./l.), 6.25% RF (0.03 ml./l.), 3.12% FR (0.016 ml./l.) and1.563% FR (0.007 ml./l.) of Spinosad was studied against 1st, 2nd, 3rd, 4th and 5th instar larvae of *S. cretica*. Each treatment was replicated 6 times with 3 larvae each. Small stem pieces of maize plants (3 cm length) were transected and allowed to dip into the different concentrations for 30 second. The stem pieces were kept fresh then placed on a paper towel for at least 2 hour or until they dried out before being used in the experiments. The tested larvae of *S. cretica* were starved for at least 4 hours prior experiment. Larvae were removed gently by fine camel-hair brush and placed into glass vials (2×10 cm), which supplied with treated maize stem pieces. Glass vials were closed and kept in the laboratory under the abovementioned laboratory conditions. Control treatments were also conducted with the same protocol using distilled water. Three days after treatment, the surviving larvae were fed on untreated maize stem pieces for the rest of the experimental period. To record mortality, vials were daily inspected till the larvae developed into pupae. Rates of mortality in *S. cretica* larvae were recorded 1, 3 and 7 days post treatments.

Field Bioassay:

The field experiment was conducted at the Experimental Farm, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt to assess the field efficiency of Spinosad against *S. cretica*. The experimental field was grown during late summer season of 2011 with yellow corn hybrid plants and the normal agricultural practices were applied. Randomized complete block design was used in this experiment. The treatments were replicated four times. Each replicate contained 5 rows of corn plants (7 × 6 m square). Solutions containing different amounts of Spinosad (0.5, 0.25, 0.125, 0.06, 0.03, 0.016 and 0.007 ml/l) were sprayed two times. The first spray was done just two weeks after sowing, and the second spray was done after two weeks post the first one. The treated plants were investigated to record (the number of dead heart/50 plants, number of holes per plant, number of larvae per plant, number of tunnels inside stem per plant, percentage of excavated area of stem per plant) after 35 days of plants old.

Biochemical impacts:

Determination the total protein content and glycogen of *S. cretica* larvae

The biochemical parameters of 2nd, 3rd, 4th and 5th instar larvae of *S. cretica* were measured 72 hours after feeding on treated small corn stem pieces with sublethal concentrations (50, 25, 12.5, 6.25, 3.125 and 1.562% FR) of Spinosad. Total protein content of the supernatant was determined by dye binding method (Bradford, 1976) using bovine serum albumen as a standard. Glycogen level was determined using the method described by Carrol et al. (1956). Glycogen was separated from soluble sugars by precipitation in the presence of methanol. After centrifugation (15 min, 3000 rpm), precipitates were used for glycogen quantification with anthrone reagent according to the sulfuric acid method of Kemp & Heijningen (1954). Calibration was performed using standards of glucose ranging from 0 to 200 mg which received the same treatment as the samples.

Statistical analysis:

LC_{20}, LC_{50}, LC_{90} and slope values were calculated using the probit analysis program of Schoofs & Willhite (1984). All data were subjected to ANOVA (SAS Institute, 2009). If there were significant differences ($p \leq 0.05$), differences were compared using FLSD test.

RESULTS

Biological activity of Spinosad on different instars larvae of *S. cretica*:

Laboratory Bioassay:

Spinosad at its field rate (0.5 ml/l) showed high toxicity against first, second, third, fourth and fifth instar larvae of *S. cretica* (Table 1). Percent of larval mortality decreased gradually as Spinosad concentrations decreased. Moreover, mortality rates decreased as *S. certica* larvae aged, but increased with the increase of time post treatment. There were no significant differences among first three tested concentrations in their mortality rates in 1st, 2nd, 3rd, 4th and 5th instar larvae 1, 3 and 7 days post treatment.

A significant increase in percentages of mortality was observed in Spinosad treatments compared to control after 1 day ($F= 32.194$; $P< 0.0000$ for first instar, $F= 19.857$; $P< 0.0000$ for second instar, $F= 12.571$; $P< 0.0000$ for third instar, $F= 4.256$; $P< 0.0014$ for fourth instar, $F= 2.5$; $P< 0.0314$ for fifth instar). After 3 days ($F= 60.285$; $P< 0.0000$ for first instar, $F= 13.036$; $P< 0.0000$ for second instar, $F= 17.532$; $P< 0.0000$ for third instar, $F= 10.119$; $P< 0.0000$ for fourth instar, $F= 1.999$; $P< 0.0192$ for fifth instar), and after 7 days ($F= 13.809$; $P< 0.0000$ for first instar, $F= 23.771$; $P< 0.0000$ for second instar, $F= 16.547$; $P< 0.0000$ for third instar, $F= 14.513$; $P< 0.0000$ for fourth instar, $F= 12.455$; $P< 0.0000$ for fifth instar) after feeding on treated corn (Table 1).

The estimated slope, LC_{20}, LC_{50} and LC_{90}, of Spinosad toward 1st to 5thinstar larvae of *S. creticaare* presented in Table (2). Data confirmed high toxicity of Spinosad against all tested larval instars of *S. cretica*. The steepest slope of 9.466 was observed in fifth instar larvae while the flattest one was recorded in first instar at 2.755. Regarding LC_{20}, LC_{50} and LC_{90}, the highest values were recorded in *S. cretica* fifth instar larvae, followed by fourth, third, second instars whereas the lowest values were observed in first instar larvae. The 1st instar larvae were the most susceptible one to the toxic effect of Spinosad, where the respective values of LC_{20}, LC_{50} and LC_{90},s were 0.003, 0.008 and 0.030 cm/l, respectively.

These findings are in conformity with those reported earlier by Aydin & Gurkan (2006) and Elbarky et al. (2008), who found that Spinosad was very toxic effect to larvae of Cotton leafworm *Spodoptera littoralis*, and the highest toxicity was recorded against 2nd instar compared to 4th instar larvae. The same conclusion was reported by Mahmoud (2004) and Hussein et al. (2005) who observed that Spinosad was very toxic to earlier larval instars of Black cutworm *Agrotis ipsilon* compared to older ones. Also, Mandour et al. (2008) who confirmed high toxicity of Spinosad to the tested larval instars of Jasmine moth *Palpita unionalis* and mortality was in the order of first instar > third instar > fifth instar with respective LC_{50} values of 0.019, 0.025 and 0.040 ml/l. In the present study, mortality of *S. cretica* larvae increased with an increase in Spinosad concentration and the time after exposure. Such findings are consistent with those reported by Aydin & Gurkan (2006) who concluded that the third instar larvae of *S. littoralis* displayed a concentration-dependent response to Spinosad. Similar conclusion was reported by Mollaie et al. (2011) who revealed that the efficacy may vary by developmental stages of three stored product pests; red flour beetle *Tribolium castaneum*, Mediterranean flour moth *Ephestia kuehniella* and Indian meal moth *Plodia interpunctella,* and the mortality rate increased with an increase in Spinosad concentration and exposure time. Symptoms of poisoning in *S. cretica* larvae were consistent with typical effects of intoxication observed with insects including paralysis and cessation of feeding (Salgado, 1998). In all cases, no paralyzed or poisoned larvae were recovered.

Field Bioassay:

Efficacy of Spinosad on damage resulting from the larval activity:

The effect of different concentrations of Spinosad on the damage from the larval activity represented as number of corn plants with dead heart, number of holes per plant, number of larvae per plant, number of tunnels per plant and the excavation area of stem plant caused under natural infestation by larvae of *S. cretica* within maize plants are presented in (Table 3). Data indicated significant differences between Spinosad treatments and control in all investigated parameters.

On the percent of plants with dead heart:

Data in Table (3) indicated that the number of plants with dead heart under natural infestation considerably decreased with the increase of Spinosad concentrations. High level of reduction in the plants with dead heart (90.28) was recorded with the concentration of FR (0.5 ml/l), which decreased with decrease in concentrations of Spinosad. However, the reduction of plants with dead heart among the four highest treatment concentrations was not significantly different.

On the mean number of holes per infested plant:

All the insecticide treatments significantly decreased the mean number of holes. However the lowest mean number of holes per plant was 0.5 in treatment of field rate (0.5 ml/l), followed by 1.25, 2.5 and 2.75 in the treatment of 50, 25 and 12.5% FR, with no significant differences among them compared to control with an average of 6.25 holes per plant (Table 3).

On the mean number of larvae, tunnels and excavated area per infested plant:

Data presented in Table (3) showed that the mean number of larvae per plant varied from 1 to 5 larvae per infested plant. The plots treated with Spinosad in higher concentrations of 100, 50, 25% FR caused significantly decrease in the mean number of larvae per plant at 1, 1 and 2, respectively compared to control at 5 larvae per plant. Likewise, the mean number of tunnels formed by *S. cretica* larvae inside stem per plant and the percent of excavated area were significantly decreased as a result of decrease in the number of larvae in the three highest treatment concentrations of Spinosad.

The above mentioned results revealed that Spinosad at concentrations down to 25% FR showed high efficacy against *S. cretica* under field conditions, in which there were significant reduction in the number of plants containing either perforated stem or dead hearted case, number of larvae, tunnels and excavated areas inside infested plants. These findings are in agreement with those of Ahmed et al. (2002) who studied the field efficacy of some biopesticides (Spinosad one of them) against Jower stem borer *Chilo partellus* (Pyralidae: Lepidoptera) and found that in Spinosad treated plots, the infestation was reduced from 10.72% before spray to 3.05% after seven days of first spray and to 0.74% on seventh day of second spray, which was done one week after first spray. Also, Sabbour & Abdel-Rahman (2013) recorded significantly decreased in the infestation number of corn pests when treated with the Spinosad under laboratory and field conditions. Moreover, Abd El-Mageed & Elgohary (2007) suggested the possibility of replacing the conventional insecticides with safety environmental compounds as Spinosad for controlling two corn borers *S. cretica* and *Ostrinia nubilalis*.

Biochemical activity of Spinosad on different instars larvae of *S. cretica*:

Effect of Spinosad on total protein content:

In control larvae, the concentration of soluble protein remained stable throughout the experiments (1450.34 ± 24.34 µg.g FW-1 to 70.45 ± 16.98 µg.g FW-1 Table 4). In exposed larvae, the protein content was significantly ($P<0.05$) lower than that of the control at all concentrations of exposure (Table 4). The highest rate of decreasing was -54.5% for 2nd instar larvae exposed to 50% FR (0.25ml/l). The significantly decrease of total protein contents were also reported in earlier studies on the 6th instar larvae of *Spodoptera littoralis* when treated with pyrethroid (Shaaban et al., 1985), cypermethrin and spinosad compounds (El-Sheikh, 2012). The reduction of protein content may be ascribed to a catabolism of protein in response to larvae energy demand as suggested for an isopod in response to parathion (Ribeiro et al., 2001). Several authors have shown that the reduction of worm protein content was one of the primary toxic effects of various pesticides; this decrease of protein content appeared to be an early defense reaction to the pesticides stress in insects. Mosleh et al. (2003) found that the reduction of total protein of earthworms (*Aporrectodea caliginosa*) might be the primary effect of chlorfluazuron, while it comes as a secondary effect for other pesticides (cypermethrin, aldicarb, profenofos, atrazine and metalaxyl). The decrease in protein content might be due to a mechanical lipoprotein formation, which will be used to repair damaged cells, tissues, and organs (Saravana Bhavan & Geraldine, 2001; Ribeiro et al., 2001; Mosleh et al., 2003).

Effect of Spinosad on glycogen content:

Similarly to protein, the glycogen level in the treated larvae was significantly lower than those in control larvae which were approximately 11.4 ± 0.09 µg.g FW-1, this decrease was concentration-dependent and reached -55.8% to 2nd instar larvae exposed to 50% FR (0.25 ml/l) (Table 4). Similar results were obtained by Elbarky et al. (2008) who estimated the reduction in carbohydrate contents of 4th instar larvae of *S. littoralis* after treatment by LC_{50} of Spinosad (Radiant) by -65.06%, and -26.7% as compared to untreated control. A decrease in glycogen in response to pesticides was also observed in isopods (Vink et al., 1995; Ribeiro et al., 2001), albino mice (Ksheerasagar & Kaliwal, 2003), and snails (Rambabu & Rao, 1994). The depletion of glycogen may be due to direct utilization of this compound for energy generation, as a result of pesticide-induced hypoxia (Saravana Bhavan & Geraldine, 2001). Glycogen is rapidly catabolized, resulting in an important decrease in this energy reserve.

In conclusion, results of the present study highlighted the toxicity and biochemical impacts of Spinosad to the pink corn borer. Results showed that the target insect pests were susceptible to treatments with different concentrations of Spinosad. The high efficacy of the sublethal concentrations of Spinosad indicated its high biological activity and possibility for the reduction of the recommended concentrate. Under field conditions, the percentages of infestation were significantly decreased among the plots treated with different concentrations of Spinosad down to 25% FR, which merits further attention toward more cost saving in control management. Based on the biochemical studies, Spinosad at the sub-lethal concentrations altered some biochemical cycles, the level of carbohydrate (glycogen) was reduced and the protein content was found to be decreased in the treated larvae of *S. cretica*. This fact, in turn, can confirm the reasons that adversely affect the growth, and development, thus the expected damage of this serious pest.

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Table 1. Mortality percentage of *Sesamia cretica* larvae fed on corn stem treated with serial concentrations of Spinosad one, three and seven days post treatment.

Concentration	% Mortality														
	1st instar			2nd instar			3rd instar			4th instar			5th instar		
	Post 1 day	Post 3 days	Post 7 days	Post 1 day	Post 3 days	Post 7 days	Post 1 day	Post 3 days	Post 7 days	Post 1 day	Post 3 days	Post 7 days	Post 1 day	Post 3 days	Post 7 days
FR*	88.89 a	100 a	100 a	77.78 a	77.78 a	100 a	77.77 a	100 a	100 a	44.44 a	66.67 a	88.89 a	11.11 a	22.22 a	66.67 a
% FR	88.89 a	100 a	100 a	66.67 a	77.78 a	100 a	44.44 b	55.55 b	100 a	33.33 ab	55.55 a	88.89 a	0 a	11.11 a	55.55 ab
25% FR	77.78 a	100 a	100 a	66.67 a	66.67 a	100 a	33.33 bc	44.44 bc	88.89 a	33.33 ab	44.44 ab	66.67 ab	0 a	11.11 a	55.55ab
12.5% FR	44.43 b	88.89 a	100 a	33.33 b	44.44 ab	88.89 a	11.11 cd	22.22 cd	77.77 a	22.22 ab	22.22 bc	44.44 bc	0 a	11.11 a	33.33 bc
6.25% FR	22.22 c	33.33 b	88.89 a	0 c	22.22 bc	77.78 a	11.11 cd	11.11 d	33.33 b	11.11 ab	22.22 bc	44.44 bc	0 a	0 a	22.22 cd
3.125% FR	11.11 c	33.33 b	66.67 ab	0 c	11.11 c	33.33 b	0 d	11.11 d	33.33 b	0 b	11.11 c	33.33 c	0 a	0 a	11.11 cd
1.563% FR	11.11 c	11.11 c	55.56 b	0 c	0 c	33.33 b	0 d	0	22.22 b	0 b	11.11 c	22.22 cd	0 a	0 a	11.11 cd
Control	0 c	0 c	11.11 c	0 c	0 c	11.11 b	0 d	0	0 b	0 b	0 c	0 d	0 a	0 a	0 d
F	32.194	60.285	13.809	19.857	13.036	23.771	12.571	17.532	16.547	4.256	10.119	14.513	2.5	1.999	12.455
P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000	0.0314	0.0192	0.0000
LSD	18.788	15.879	24.599	22.457	26.57	21.304	22.457	23.552	27.503	24.599	21.304	23.553	7.101	14.203	20.085

Means followed with the same letters (column wise) are not significantly different (Tukey' HSD; P≤0.05)
* = Field Rate 0.5 ml/l (60 mg/l a.i.).

Table 2. The toxic effect of Spinosad to different developmental stages of *Sesamia cretica*.

Larval instars of *Sesamia cretica*	Slope	LC20 (95% CI)*	LC50 (95% CI)	LC90 (95% CI)
1st instar larvae	2.775	0.003 (0.001-0.008)	0.008 (0.005-0.013)	0.030 (0.018-0.048)
2nd instar larvae	2.716	0.007 (0.004-0.012)	0.016 (0.012-0.033)	0.059 (0.036-0.094)
3rd instar larvae	3.262	0.010 (0.006-0.017)	0.028 (0.020-0.039)	0.129 (0.076-0.219)
4th instar larvae	7.411	0.008 (0.003-0.019)	0.044 (0.027-0.071)	0.577 (0.212-1.568)
5th instar larvae	9.466	0.024 (0.011-0.049)	0.159 (0.086-0.293)	8.74 (0.589-14.017)

- Confidence interval cm/l
- Data for larval instars are based on the mortality rates 7 days post treatment.

Table 3. Effect of various concentrations of Spinosad on the damage caused by the infestation activity *S. critica* larvae.

Spinosad concentrations	Dead heart/50 plants		No. of holes/infested plant	No. of larvae/ infested plant	No. of tunnels/infested plant	% Excavated area of stem/infested plant
	Average	% reduction				
% FR	1.75±0.48 d	90.28 a	0.5±0.29 e	1.0±0.41 b	0.75±0.48 c	5.0±1.19 c
25% FR	2.25±0.25 d	87.50 a	1.25±0.25 de	1.0±0.41 b	1.0±0.00 c	6.11±0.65 c
12.5% FR	4.25±0.75 d	76.39 a	2.5±0.65 cd	2.0±0.41ab	1.75±0.25bc	7.77±1.22 c
6.25% FR	5.0±0.71 d	72.22 a	2.75±0.25 cd	3.25±0.65ab	2.75±0.25ab	11.66±1.71 c
3.125% FR	10.75±1.65 c	40.28 b	4.25±0.25bc	3.25±0.48ab	3.25±0.48 a	20.55±2.33 b
1.563% FR	13.5±0.65bc	25.00 b	4.25±0.75bc	4.25±0.85 a	4.0±0.58 a	18.88±1.73 b
% FR	14.5±1.04 b	19.44 b	5±0.82 b	5.0±0.91 a	4.0±0.71 a	27.5±3.42 a
Control	18.0±1.47 a	-	6.25±0.48 a	5.0±1.08 a	4.0±0.00 a	31.94±2.53 a
F	39.93	19.06	15.71	5.57	10.46	20.34
P	0.000	0.000	0.000	0.001	0.000	0.000
	***	***	***	***	***	***
LSD	2.873	20.56	1.512	2.031	1.228	5.909

Means followed with the same letters (column wise) are not significantly different (Tukey' HSD; P≤0.05.

Table 4. Effect of different concentrations of Spinosad on the total soluble protein (µg.g FW-1) and glycogen level (µg.g FW-1) concentrations on 2nd, 3rd, 4th and 5th instar larvae of *Sesamia cretica.*

Concentrations	2nd instar		3rd instar		4th instar		5th instar	
	Total Soluble Protein (µg.g FW-1)	Glycogen (µg.g FW-1)	Total Soluble Protein (µg.g FW-1)	Glycogen (µg.g FW-1)	Total Soluble Protein (µg.g FW-1)	Glycogen (µg.g FW-1)	Total Soluble Protein (µg.g FW-1)	Glycogen (µg.g FW-1)
% FR	659.56 ± 15.34	5.03 ± 0.03	723.56 ± 15.65	6.21 ± 0.12	731.12 ± 14.21	6.56 ± 0.56	757.34 ± 9.12	7.02 ± 0.38
25% FR	723.34 ± 21.23	5.65 ± 0.07	759.21 ± 21.12	7.25 ± 0.10	792.21 ± 9.34	7.12 ± 0.67	789.21 ± 7.98	7.79 ± 0.21
12.5% FR	769.45 ± 14.43	6.78 ± 0.09	823.23 ± 15.34	8.45 ± 0.93	821.31 ± 11.78	8.49 ± 0.98	821.54 ± 12.11	8.69 ± 0.76
6.25% FR	887.56 ± 17.34	7.56 ± 0.15	873.43 ± 21.12	9.13 ± 1.01	891.16 ± 11.21	9.38 ± 0.67	878.32 ± 9.98	9.49 ± 0.58
3.125% FR	885.56 ± 14.32	8.54 ± 0.45	859.56 ± 15.34	10.56 ± 0.98	932.76 ± 10.65	10.49 ± 0.95	921.12 ± 21.10	10.69 ± 0.93
1.563% FR	922.45 ± 153	10.94 ± 0.83	920.12 ± 12.13	11.43 ± 1.26	989.34 ± 15.53	11.79 ± 0.74	1012.98 ± 18.87	12.28 ± 1.3
Control	1450.34 ± 24.34	11.4 ± 0.09	1467.34 ± 0.32	12.12 ± 0.12	1521.34 ± 9.87	12.98 ± 0.34	1565.45 ± 9.98	13.87 ± 0.54

TURKISH RED LIST CATEGORIES OF LONGICORN BEETLES (COLEOPTERA: CERAMBYCIDAE) PART IV – SUBFAMILIES NECYDALINAE, ASEMINAE, SAPHANINAE, SPONDYLIDINAE AND APATOPHYSEINAE

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[**Özdikmen, H.** 2014. Turkish Red List Categories of Longicorn Beetles (Coleoptera: Cerambycidae) Part IV – Subfamilies Necydalinae, Aseminae, Saphaninae, Spondylidinae and Apatophyseinae. Munis Entomology & Zoology, 9 (1): 440-450]

ABSTRACT: The aim of this study is to create a Turkish Red List of the longicorn beetles. Moreover, presence such a Red List is necessary for Turkey. Even governmental evaluations could cause some erroneous decisions due to absence such a Red List. Since, governmental evaluations at the present time are based on the works that are realized with respect to the European Red List. Furthernore, Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures. So, the status of European fauna and the status of Turkish fauna are not the same. Clearly, there is no any work that subjected to create a Turkish Red List except Part I-III. Hence, a series work is planned with this purpose. This type of study is the fourth attempt for Turkey.

KEY WORDS: Red List, Conservation, Cerambycidae, Turkey

The purpose of the current study was to create a Turkish Red List of longicorn beetles similarly to "European Red List of Saproxylic Beetles" that was compiled by Ana Nieto & Keith N. A. Alexander and published by IUCN (International Union for Conservation of Nature) in collaboration with the European Union in 2010. "European Red List of Saproxylic Beetles" includes 153 species within the subfamilies Prioninae, Cerambycinae and Lamiinae of the European Cerambycidae. So, it does not include any members of the subfamilies Necydalinae, Aseminae, Saphaninae, Spondylidinae and Apatophyseinae. In the future, I hope that the present work will be lead to preparation a more comprehensive "Turkish Red List".

Hence, a series work is planned with this purpose. The present study is attempted as the fourth step of this aim. The previous works are Özdikmen (2014a,b,c). It should be noted that the using information at the present work on Turkish longicorn beetles are on the base of my personal database. The data of distribution are given on base of Löbl & Smetana (2010, 2011), Danilevsky (2010a,b, 2012a,b,c,d, 2013), Özdikmen (2011) and Miroshnikov (2011). Identification of chorotypes is based on the chorotype classification of the Anatolian fauna, proposed by Vigna Taglianti et al. (1999).

The evaluations of Turkish longicorn beetles at the present work based on "The IUCN Red List Categories" that was presented in Part I (Özdikmen, 2014a).

TURKISH RED LIST FOR NECYDALINAE, ASEMINAE, SAPHANINAE, SPONDYLIDINAE AND APATOPHYSEINAE

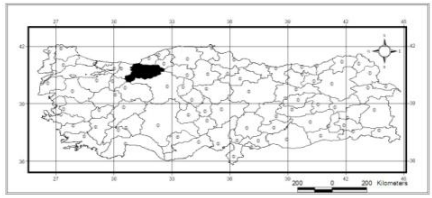
SUBFAMILY NECYDALINAE Latreille, 1825: 401
TRIBE NECYDALINI Latreille, 1825: 401
GENUS *NECYDALIS* Linnaeus, 1758: 421
SUBGENUS *NECYDALIS* Linnaeus, 1758: 421

SPECIES *N. sabatinelli* Sama, 1994: 10

The endemic species is known only from "Bolu prov." in NW Anatolia. Apparently is distributed only in a local area. So, Turkish Red List category of the species is **EN**.

Range: Turkey

Chorotype: Anatolian

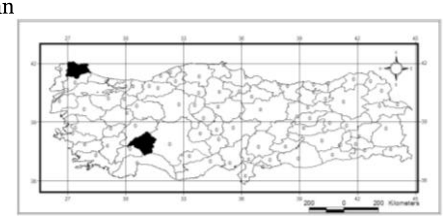


SPECIES *N. ulmi* Chevrolat, 1838: unnumb. [NP]

The species is known only from W half of Turkey. So, Turkish Red List category of the species is **DD**.

Range: Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran.

Chorotype: European



SUBFAMILY ASEMINAE Thomson, 1861: 139

TRIBE ASEMINI Thomson, 1861

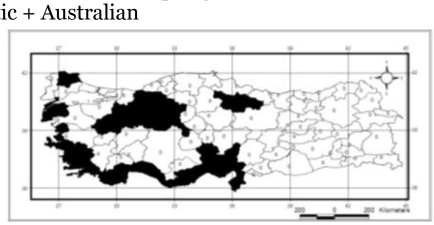
GENUS *ARHOPALUS* Audinet-Serville, 1834: 77

SPECIES *A. ferus* (Mulsant, 1839: 64)

The species probably is widely distributed in both European Turkey and Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Far East Russia, Kazakhstan, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Cyprus, Middle East (Syria, Israel, Jordan), North Africa (Algeria, Morocco, Madeira Archipelago, Tunisia), Australia (introduced).

Chorotype: Palaearctic + Australian



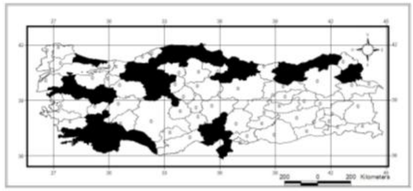
SPECIES *A. rusticus* (Linnaeus, 1758: 395)

SUBSPECIES *A. r. rusticus* (Linnaeus, 1758: 395)

The species is represented only by the nominative subspecies in Turkey. It probably is widely distributed in both European Turkey and Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Far East Russia, Japan, Kazakhstan, China, Korea, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, North Africa (Morocco), Australia (introduced), Neotropical Region (introduced).

Chorotype: Palaearctic + Australian + Neotropical

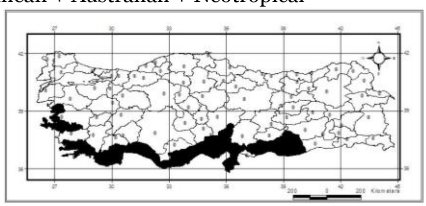


SPECIES *A. syriacus* (Reitter, 1895: 86)

The species probably is widely distributed in S Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: S Europe, Turkey, Cyprus, Middle East (Syria, Lebanon, Israel, Jordan), North Africa (Algeria, Canary Islands, Morocco, Tunusia), Australia (introduced), Neotropical Region (introduced).

Chorotype: Mediterranean + Australian + Neotropical



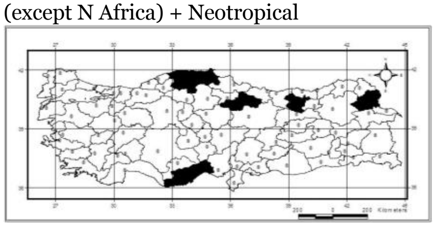
GENUS ASEMUM Eschscholtz, 1830: 66

SPECIES *A. striatum* (Linnaeus, 1758: 396)

The species probably is widely distributed in Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Siberia, Far East Russia, Japan, Kazakhstan, Kirgizia, Mongolia, Korea, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Neartctic and Neotropical Regions.

Chorotype: Holarctic (except N Africa) + Neotropical

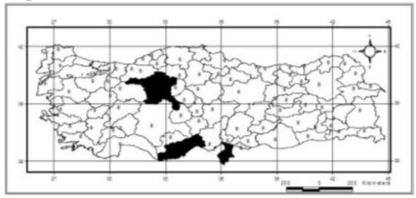


SPECIES *A. tenuicorne* Kraatz, 1879: 97

The very rare species with scattered distribution is known from Anatolia for Turkey only with a few records. So, Turkish Red List category of the species is **DD**.

Range: S and E Europe, Caucasus, Transcaucasia (Georgia), Turkey.

Chorotype: S and E European



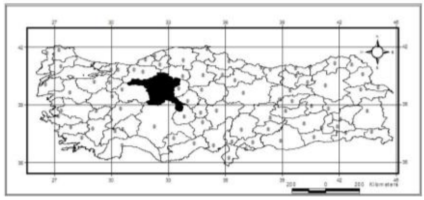
Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *A. t. claricostulatum* Özdikmen & Aytar, 2012.

SUBSPECIES *A. t. tenuicorne* Kraatz, 1879: 97

The subspecies probably is distributed only in N Anatolia for Turkey. So, Turkish Red List category of the subspecies is **DD**.

Range: S and E Europe, Caucasus, Transcaucasia (Georgia), Turkey.

Chorotype: S and E European

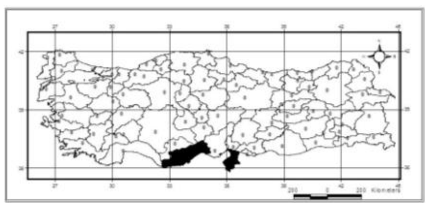


SUBSPECIES *A. t. claricostulatum* Özdikmen & Aytar, 2012: 1253

The endemic subspecies probably is distributed only in SC Anatolia for Turkey. So, Turkish Red List category of the subspecies is **EN**.

Range: Turkey.

Chorotype: Anatolian



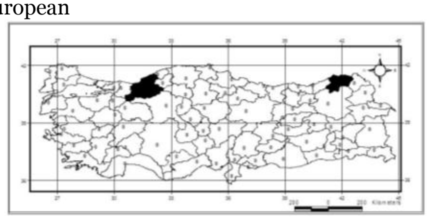
GENUS *TETROPIUM* Kirby, 1837: 174

SPECIES *T. castaneum* (Linnaeus, 1758: 396)

The species probably is distributed only in N Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.

Range: Europe, Siberia, Far East Russia, Japan, Kazakhstan, Mongolia, Korea, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Sibero-European

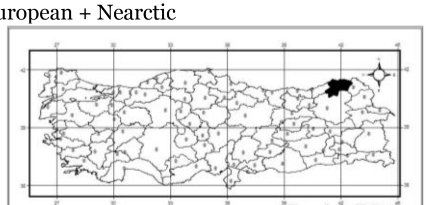


SPECIES *T. fuscum* (Fabricius, 1787: 154)

The species probably is distributed only in NE Anatolia for Turkey. So, Turkish Red List category of the species is **VU**.

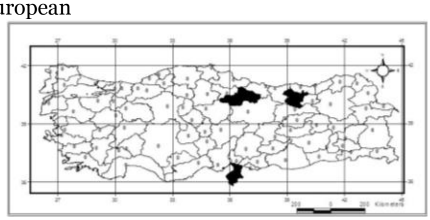
Range: Europe, Kazakhstan, China, Caucasus, Transcaucasia (Georgia), Turkey, Neartctic Region.

Chorotype: Asiatic-European + Nearctic



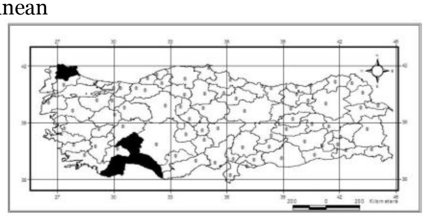
TRIBE NOTHORHININI Zagajkevich, 1991: 110
GENUS *NOTHORHINA* Redtenbacher, 1845: 109
SPECIES *N. punctata* (Fabricius, 1798: 149)

The species probably is distributed only in Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.
Range: Europe, W Siberia, Kazakhstan, Japan, Caucasus, Turkey.
Chorotype: Sibero-European



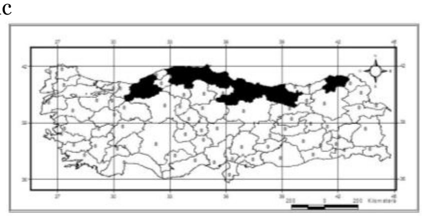
SUBFAMILY SAPHANINAE Gistel, 1848: [1]
TRIBE ANISARTHRINI Mamaev & Danilevsky, 1973: 1260
GENUS *ALOCERUS* Mulsant, 1862: 127
SPECIES *A. moesiacus* (Frivadszky, 1837: 177)

The species is distributed in both European Turkey and Anatolia for Turkey. However, Turkish Red List category of the species is **DD**.
Range: S Europe, Turkey, Iran, Cyprus, Middle East (Syria, Lebanon, Israel, Jordan, Iraq), North Africa (Algeria, Morocco, Tunusia).
Chorotype: Mediterranean



TRIBE SAPHANINI Gistel, 1848: [1]
GENUS *DRYMOCHARES* Mulsant, 1847: 518
SPECIES *D. cavazzutii* Sama & Rapuzzi, 1993: 288

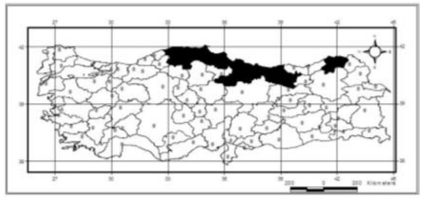
The species is known only from N Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.
Range: Transcaucasia (Armenia, Georgia), Turkey.
Chorotype: SW-Asiatic



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *D. c. ivani* Sama & Rapuzzi, 1993.

SUBSPECIES *D. c. cavazzutii* Sama & Rapuzzi, 1993: 288

The subspecies probably is distributed only in N Anatolia for Turkey. So, Turkish Red List category of the subspecies is **LC**.
Range: Transcaucasia (Armenia, Georgia), Turkey.
Chorotype: SW-Asiatic

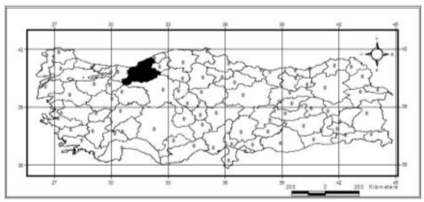


SUBSPECIES *D. c. ivani* Sama & Rapuzzi, 1993: 287

The endemic subspecies probably is distributed only in NW Anatolia for Turkey. So, Turkish Red List category of the subspecies is **VU**.

Range: Turkey.

Chorotype: Anatolian



GENUS *SAPHANUS* Audinet-Serville, 1834: 81

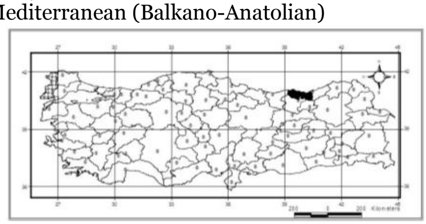
SPECIES *S. piceus* (Laicharting, 1784: 56)

SUBSPECIES *S. p. ganglbaueri* Brancsik, 1886: 71

The species is represented only by the subspecies *S. piceus ganglbaueri* in Turkey. It is known from both European Turkey and N Anatolia for Turkey. However, Turkish Red List category of the species is **DD**.

Range: SE Europe, Turkey.

Chorotype: Turano-Mediterranean (Balkano-Anatolian)



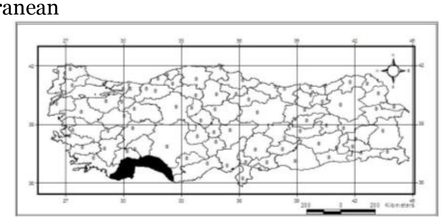
GENUS *OXYPLEURUS* Mulsant, 1839: 57

SPECIES *O. nodieri* Mulsant, 1839: 57

The species is known only from S Anatolia for Turkey. So, Turkish Red List category of the species is **DD**.

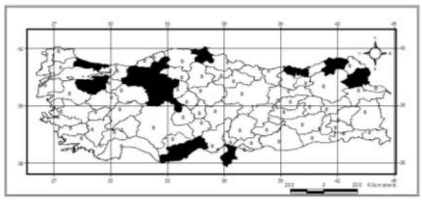
Range: S Europe, Transcaucasia (Georgia), Turkey, North Africa (Algeria, Canary Islands, Morocco, Madeira Archipelago, Tunusia).

Chorotype: Mediterranean



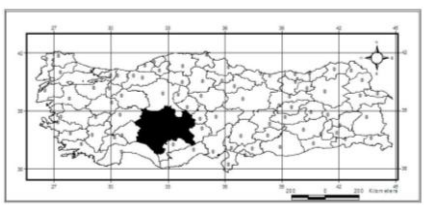
SUBFAMILY SPONDYLIDINAE Audinet-Serville, 1832: 123
TRIBE SPONDYLIDINI Audinet-Serville, 1832: 123
GENUS *SPONDYLIS* Fabricius, 1775: 159
SPECIES *S. buprestoides* (Linnaeus, 1758: 388)

The species probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Siberia, Far East Russia, Japan, Kazakhstan, Mongolia, Korea, China, Taiwan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, North Africa (Morocco).
Chorotype: Palaearctic



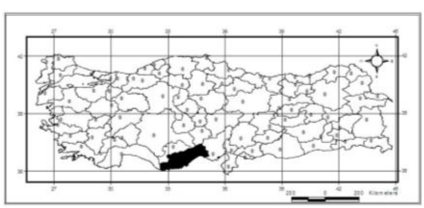
SUBFAMILY APATOPHYSEINAE Lacordaire, 1869: 234
TRIBE APATOPHYSEINI Lacordaire, 1869: 234
GENUS *APATOPHYSIS* Chevrolat, 1860: 95
SUBGENUS *APATOPHYSIS* Chevrolat, 1860: 95
SPECIES *A. anatolica* Heyrovsky, 1938: 93

The endemic species is distributed only in CS Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian



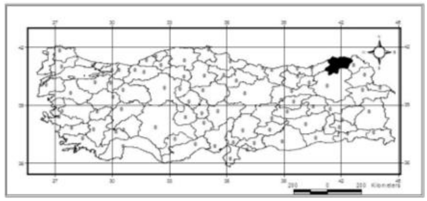
SPECIES *A. kadleci* Danilevsky, 2008: 29

The endemic species is distributed only in SC Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian



SPECIES *A. karsica* Danilevsky, 2008: 28

The endemic species is distributed only in NE Anatolia. So, Turkish Red List category of the species is **EN**.
Range: Turkey.
Chorotype: Anatolian

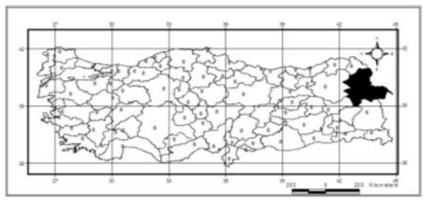


SPECIES *A. vedica* Danilevsky, 2008: 26

The species is distributed only in NE Anatolia for Turkey. So, Turkish Red List category of the species is **EN**.

Range: Trancaucasia (Armenia), Turkey.

Chorotype: SW-Asiatic



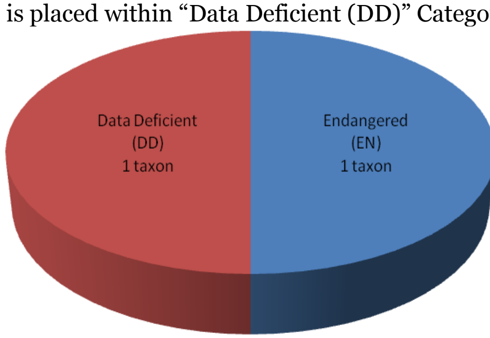
CONCLUSION:

With the present work, "Turkish Red List Categories" for 21 Turkish species group taxa determined (Appendix 1).

For Turkish Necydalinae: The subfamily includes only 2 species in Turkey.

Only 1 species is placed within "Endangered (EN)" Category.

Only 1 species is placed within "Data Deficient (DD)" Category.



For Turkish Aseminae: The subfamily includes 9 species group taxa (6 species + 3 subspecies) in Turkey. Among them;

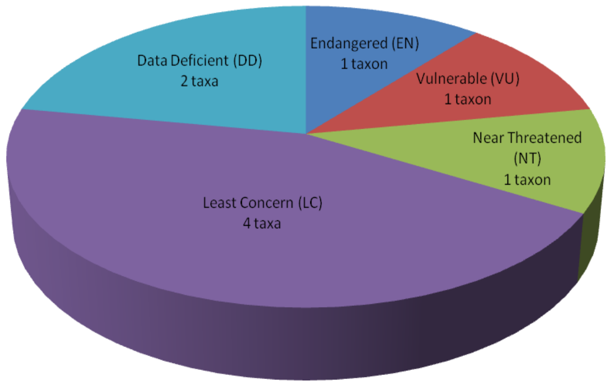
Only 1 subspecies is placed within "Endangered (EN)" Category.

Only 1 species is placed within "Vulnerable (VU)" Category.

Only 1 species are placed within "Near Threatened (NT)" Category.

3 species and 1 subspecies are placed within "Least Concern (LC)" Category.

1 species and 1 subspecies are placed within "Data Deficient (DD)" Category.

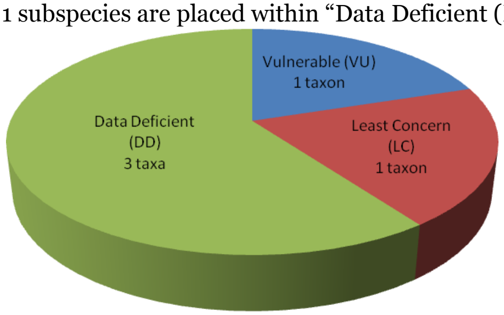


For Turkish Saphaninae: The subfamily includes 5 species group taxa (2 species + 3 subspecies) in Turkey. Among them;

Only 1 subspecies is placed within "Vulnerable (VU)" Category.

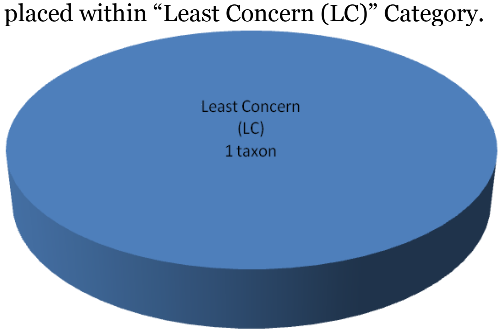
Only 1 subspecies are placed within "Least Concern (LC)" Category.

2 species and 1 subspecies are placed within "Data Deficient (DD)" Category.



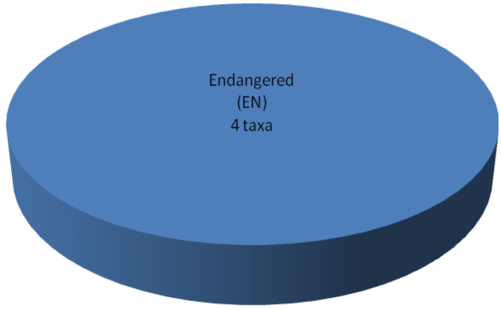
For Turkish Spondylidinae: The subfamily includes only 1 species in Turkey.

The species is placed within "Least Concern (LC)" Category.



For Turkish Apatophyseinae: The subfamily includes 4 species in Turkey. All of them;

4 species is placed within "Endangered (EN)" Category.



Consequently, "European Red List Saproxylic Beetles" does not include any members of the subfamilies Necydalinae, Aseminae, Saphaninae, Spondylidinae and Apatophyseinae. So, any comparison with "Turkish Red List" is impossible.

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Appendix 1. Red List Categories of Turkish longicorn beetles belonging to Necydalinae, Aseminae, Saphaninae, Spondylidinae and Apatophyseinae.

TAXA	TURKISH RED LIST CATEGORY	EUROPEAN RED LIST CATEGORY	ENDEMISM FOR TURKEY
NECYDALINAE			
Necydalis sabatinelli	**EN**	**---**	**YES**
Necydalis ulmi	**DD**	**---**	**---**
ASEMINAE			
Arhopalus ferus	**LC**	**---**	**---**
Arhopalus rusticus rusticus	**LC**	**---**	**---**
Arhopalus syriacus	**LC**	**---**	**---**
Asemum striatum	**LC**	**---**	**---**
Asemum tenuicorne	**DD**	**---**	**---**
A. tenuicorne tenuicorne	**DD**	**---**	**---**
A. tenuicorne claricostulatum	**EN**	**---**	**YES**
Tetropium castaneum	**NT**	**---**	**---**
Tetropium fuscum	**VU**	**---**	**---**
Nothorhina punctata	**DD**	**---**	**---**
SAPHANINAE			
Alocerus moesiacus	**DD**	**---**	**---**
Drymochares cavazzutii	**LC**	**---**	**---**
D. cavazzutii cavazzutii	**LC**	**---**	**---**
D. cavazzutii ivani	**VU**	**---**	**YES**
Saphanus piceus ganglbaueri	**DD**	**---**	**---**
Oxypleurus nodieri	**DD**	**---**	**---**
SPONDYLIDINAE			
Spondylis buprestoides	**LC**	**---**	**---**
APATOPHYSEINAE			
Apatophysis anatolica	**EN**	**---**	**YES**
Apatophysis kadleci	**EN**	**---**	**YES**
Apatophysis karsica	**EN**	**---**	**YES**
Apatophysis vedica	**EN**	**---**	**---**

PROBLES MICROCEPHALUS (GRAVENHORST, 1829) A NEW RECORD FOR THE TURKISH FAUNA (HYMENOPTERA: ICHNEUMONIDAE: TERSILOCHINAE)

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** University of Plovdiv, Faculty of Pedagogy, 24 Tsar Assen Str., 4000 Plovdiv, BULGARIA. E-mail: jkolarov@uni-plovdiv.bg

[Çoruh, S., Kolarov, J. & Çoruh, İ. 2014. *Probles microcephalus* (Gravenhorst, 1829) a new record for the Turkish fauna (Hymenoptera: Ichneumonidae: Tersilochinae). Munis Entomology & Zoology, 9 (1): 451-456**]**

ABSTRACT: *Probles* (*Microdiaparsis*) *microcephalus* (Gravenhorst, 1829), a new record for the Turkish fauna was found from Eastern Black Sea Region in Turkey. The species is redescribed and figured in detail and a key for the Turkish species of the subgenus *Microdiaparsis* Horstmann is proposed.

KEY WORDS: Hymenoptera, Ichneumonidae, Tersilochinae, new records, Turkey.

Ichneumonidae is the biggest hymenopteran family with 51 generally recognized subfamilies 1579 genera and 24.281 described species (Yu et al., 2012). Townes (1969) estimated that there could be about 60.000 Ichneumonidae species in the world, but because of the poor knowledge of the tropical faunas the present investigators estimate that the size of the family could be higher than 100.000 (Gauld, 1997). The number of species Ichneumonidae increases rapidly in the world.

Studies on Ichneumonidae of Turkey have gained acceleration, particularly, since the last one and a half decades. Çoruh et al. (2013) reported 975 species in 282 genera for Turkey Ichneumonidae fauna. With the below mentioned contributions (Çoruh et al., 2013; Çoruh & Kolarov, 2013), the numbers of Ichneumonidae fauna of Turkey reached to 981 species and 282 genera.

Tersilochinae is a medium-sized cosmopolitan ichneumonid subfamily with over 330 described species in the World fauna. The subfamily is best represented in the Holarctic region whereas tropical faunas are still poorly studied. About 160 species from 13 genera occur in Europe (Horstmann, 1971, 1981; Khalaim, 2002; 2004a,b; 2005, Khalaim et al., 2009; Khalaim & Blank, 2011).

The genus *Probles* Förster, 1869 is moderately large group with about 38 species in Europe and Caucasus and 3 species from Eastern Asia. They are divided into 5 subgenera. Key for the subgenera of the genus was proposed by Horstmann (1981), Khalaim & Yurtcan (2011) and Çoruh & Khalaim (2012).

Microdiaparsis Horstmann, 1971 is a small subgenus with 8 species distributed in different parts of Palaearctic region (Yu et al., 2012). It parasitize on the species *Crioceris duodecimpunctata* (Linnaeus, 1758) (Chrysomelidae, Coleoptera) and *Luffia lapidella* (Goeze, 1783) (Psychidae, Lepidoptera).

Until now 4 species of the subgenus was known from Turkey: *Probles* (*Microdiaparsis*) *anatolicus* Horstmann, 1981 (Horstmann, 1981); *P.* (*M.*) *caudiculatus* Khalaim, 2007, (Khalaim, 2007); *P.* (*M.*) *neoversutus* (Horstmann, 1967) (Khalaim & Yurtcan, 2001) and *P.* (*M.*) *versutus* (Holmgren, 1860) (Eroğlu, Kıraç & Birol, 2011). After studying the materials, collected from Eastern Black Sea Region in Turkey, a new record for Turkey fauna, *Probles* (*Microdiaparsis*) *microcephalus* (Gravenhorst, 1829) was found. The species was briefly redescribed by Horstmann (1971).

In the present paper the species is redescribed and figured in detail and a key for the Turkish species of the subgenus *Microdiaparsis* Horstmann is proposed.

MATERIAL AND METHODS

Study area

İkizdere (Rize) which is situated in Eastern Black Sea Region of Turkey (40° 42′ N 40° 36′ E), covers an area from sea level to 570 m. a. s. l. The town of İkizdere is on the river bank, 56 km from the city of Rize on the road to Erzurum. The climate is typical of the Black Sea region it rains all the time. There is snow on the high peaks and lots of glacial formation. This is hilly countryside inland from the Black Sea, forest-covered steep mountainside separated by narrow valleys, with areas of high pastureThere is broad-leaf forest at lower elevations and pine higher up. İkizdere has Anzer pasture and Ovit mointain (Http).

Vegetation: *Daucus carota* L., *Heracleum platytaenium* Boiss., *Conyza canadensis* (L.) Cronquist., *Erigeron acer* L., *Erigeron annuus* (L.) Pers., *Equisetum palustre* L., *Geranium asphodeloides* Burm. fil., *Geranium ibericum* Cav., *Geranium sylvaticum* L., *Pteridium aquilinum* (L.) Kuhn, *Prunella vulgaris* L., *Salvia forskahlei* L., *Salvia verticillata* L., *Linum hypericifolium* Salisb., *Epilobium parviflorum* Schreber, *Plantago media* L., *Alopecurus myosuroides* Hudson, *Cynodon dactylon* (L.) Pers., *Lolium temulentum* L., *Lolium perenne* L., *Sorghum halepense* (L.) Pers., *Digitaria sanguinalis* (L.) Scop., *Paspalum dilatatum* Poiret, *Paspalum paspalodes* (Michx.) Scribner, *Seteria glauca* (L.) P. Beauv., *Poa annua* L., *Poa trivialis* L., *Festuca pratensis* Hudson, *Phleum phyleoides* (L.) Karsten, *Polygonum persicaria* L., *Anagallis arvensis* L., *Delphinium formosum* Boiss. & Huet, *Fragaria vesca* L., *Rubus discolor* Weihe & Nees, *Rubus hirtus* Waldst. et Kit., *Galium verum* L., *Rhinanthus angustifolius* C.C. Gmelin, *Pedicularis comosa* L., *Veronica gentianoides* Vahl. and *Urtica dioica* L.

Sampling method and collection

Material was collected by sweeping on flowering plants in the Eastern Black Sea Turkish provinces (Rize-İkizdere) in 2003. Collected sample was transferred into a handmade aspirator and were killed with ethyl acetate. Conventional standard method (Çoruh and Özbek, 2008) was used for preparation of the samples. Material is preserved in Collection of University Plovidv (Bulgaria). Plant specimens were collected by hand and were pressed and they were deposited at the Herbarium of Plant Protection Department (Erzurum). Plant specimens were identified according to Davis (1965-1988) and Herbaryum of Ataturk University, Faculty of Agriculture, Department of Plant Protection by İrfan Çoruh.

RESULTS

Subfamily Tersilochinae
Genus *Probles* Förster, 1869
Subgenus *Microdiaprasis* Horstmann, 1971

Microdiaparsis Horstmann, 1971. Veröffentlichungen der Zoologischen Staatssammlung (München). 15: 78.

The subgenus is easy recognizable from other *Probles* subgenera by the follow: Malar space length no more than basal width of mandible; upper tooth of mandible longer than lower tooth; thyridia more 2.0 as long as wide; ovipositor tip distinctly sinuate, without distinct dorsal apical notch (Fig. 1).

Key for the Turkish species of subgenus *Microdiaparsis* Horstmann

1. Head moderately narrowed behind eyes (Figs. 2, 3). Temple as long as transversal diameter of eye. **2**

-. Head weakly or roundly narrowed behind eyes (Figs. 4, 5). Temple longer than transversal diameter of eye. **3**

2. Flagellum with about 30 segments, first segment 1.6 as long as wide (Fig. 6). Second recurrent vein almost interstitial (Fig. 7). Legs entirely red colored. .... ***P.* (*M.*) *microcephalus* (Grav.)**

-. Flagellum with 34-40 segments, first segment shorter (Fig. 8). Second recurrent vein distinctly postfurcal (Fig. 9). Al least hind coxa black.. ***P.* (*M.*) *anatolicus* Horstmann**

3. Ovipositor sheath 1.5-2.0 as long as first metasomal segment. .... ***P.* (*M.*) *caudiculus* Kalaim**

-. Ovipositor sheath at least 3.0 as long as first metasomal segment........................**4**

4. Mesopleuron smooth, distinctly punctured. First metasomal segment smooth laterally. Glymma small, situated on hind part of petiolus. Ovipositor strongly sinuated apically (Fig. 10). .... ***P.* (*M.*) *neoversutus* Horstmann**

-. Mesopleuron granulated (sometimes partly smooth in central part), not punctured, seldom with very fine and rare punctures on mat surface. Ovipositor moderately sinuated apcally (Fig. 11). .... ***P.* (*M.*) *versutus* (Holmgr.)**

Probles (*Microdiaparsis*) *microcephalus* (Gravenhorst, 1829)

Porizon microcephalus Gravenhorst, 1829. Ichneumonologia Europaea. Pars III. Vratislaviae, 3: 1097.
Microdiaparsis microcephalus: Horstmann, 1971: 78.
Material examined: TR, Rize, Ikizdere, 24.06.2013, 1 female.
Distribution: Europe.
Redescription: Front wing 4.7 mm, body 5.6 mm, ovipositor sheath 4.2 mm long. Head weakly narrowed behind eyes (Fig. 3). Flagellum with 31 segments. First segment 1.6 as long as wide (Fig. 6), the last but one square. Frons convex in the middle and posteriorly, strongly concave behind base of each antenna. Ocelli small, its diameter 0.6 as ling as distance between lateral ocellus and eye. Face convex in central part, 0.36 as high as wide. Clypeus large, 0.4 as high as wide. Clypeal fovea well visible. Upper mandible tooth longer than lower tooth. Malar space 0.66 as long as basal width of mandible. Lower part of occipital carina wide, lamelliform, connected with hypostomal carina far from base of mandibula. Head moderately coarse and dense punctured on fine mat surface, clypeus with rare and coarse punctures, the distance between points longer than their diameter.

Notaulus shallow, sternaulus well developed. Scutellum carinated only in the base. Pronotum laterally and sternauli striated transversally. Speculum very small. Front wing with large pterostigma. Radius originated from its middle. Metacarp as long as fist radial vein. Second recurrent vein (2m-cu) almost interstitial, with one large bulla. Nervulus distinctly postfurcal. Parallel vein reaching postnervulus below its middle (Fig. 7). Nervellus in hind wing distinctly reclivous, not intercepted. Hind wing with 3 distal hamuli. Legs slender, hind femur 4.4 as long as wide. Tibial spurs short, almost straight. Corelation between hind tarsal segments as 40:16:10:8:11. Propodeum areolated. Middle longitudinal carinae limiting basal area and areola partly obsolescent. Combined basal area and areola twice as short as petiolar area length. Propodeal spiracle touching pleural carina. Mesosoma and petiolar area of propodeum with fine mat surface, mesonotum with fine punctures. Msopleuron and mesosternum shine and distinctly punctured.

Metasoma luscious, not punctured, IV-VII terga concave apically in the middle. Glymma small, situated on the apical part of petiolus. Thyridia more 2.0 as long as wide. Ovipositor tip sinuate.

Black; mandible except teeth, palpi, tegulaq legs entirely and metasoma except first segment red coloured, ovipositor sheath dark.

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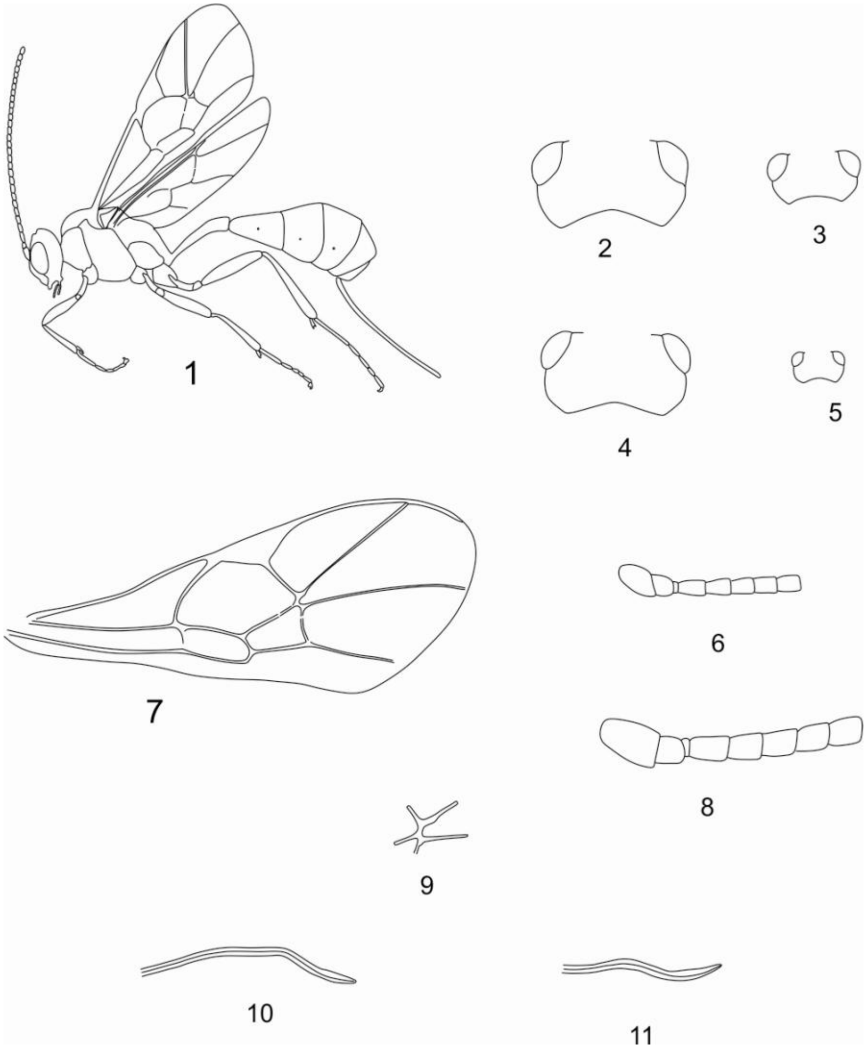
Figure 1. Map of collected areas.



Figures 1-11. 1, 10 - *Probles* (*Microdiaparsis*) *neoversutus* Horstmann; 1 – total view; 10 – ovipositor tip; 2, 8, 9 - *P.* (*M*) *anatolicus* Horstmann; 2 – head from above; 8 – base of antenna; 9 – second recurrent vein; 3, 6, 7- *P.* (*M*) *microcephalus* (Grav.); 3 - head from above; 6 - base of antenna; 7 – front wing; 4 - *P.* (*M*) *caudiculus* Kalaim, head from above; 5, 11 - *P.* (*M*) *versutus* (Holmgr.); 5 - head from above; 11 - ovipositor tip.

IMPACT OF WEATHER FACTORS ON SEASONAL ABUNDANCE ANDPOPULATION DYNAMICS OF YELLOW MITE, *POLYPHAGOTARSONEMUSLATUS* (BANKS) ON DIFFERENT VARIETIES OF JUTE, *CORCHORUSOLITORIUS* L. UNDER NET HOUSE CONDITION

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[Kamruzzaman, A. S. M., Alam, M. Z. & Miah, M. R. U. 2014. Impact of weather factors on seasonal abundance and population dynamics of Yellow Mite, *Polyphagotarsonemuslatus* (Banks) on different varieties of Jute, *Corchorusolitorius* L. under net house condition. Munis Entomology & Zoology, 9 (1): 457-467**]**

ABSTRACT: The outbreak of yellow mite, *Polyphagotarsonemus latus* population almost regularly as one of the most serious pests of jute crop (*Corchorus olitorius* L.) in Bangladesh. The experiment was conducted to ascertain the effect of weather factors on incidence and population development of yellow mite, (*Polyphagotarsonemus latus*; Acari: Tarsonemidae).The objective of this study was to determine effects of rainfall and mean temperature on the abundance and the seasonal dynamics of yellow mite stages of four jute varieties (O-9897, O-72, OM-1 and O-795). Population fluctuation at all stages of yellow mite at 7 days interval after infestation observed highest fluctuation peak for egg (117.67±24.64) at June 10, larva (87.33±4.67) at June 17, pupa (87.33±4.67) at May 6, female (35.00±5.13) at June 17 and male (11.67±1.67) at May 6 in the variety of OM-1 among others varieties under net house condition. Yellow mite stages varied significantly among varieties of jute plants at all sampling dates. All stages of the mite preferred the undersides of the leaves than its upper-sides. Among the different environmental factors mean temperature and weekly total rainfall was positively correlated with the different stages of *P. latus* population. The determination of the effects of different weather factors on population and incidence of *P.latus* in jute is essential for effective pest management. This study not only helpful in forecasting outbreaks of *P.latus* but also effective pest management strategies in formulation.

KEY WORDS: *Polyphagotarsonemus latus*, weather factors, correlation, seasonal abundance, varieties.

Among the non-insect pests of agricultural crops, mites are probably the most notorious ones and gaining tremendous importance in the recent years due to their devastating nature. In Bangladesh, the genus Corchorus is the most important family Tiliaceae, highlighting the jute as the culture of higher expression economy. Yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) is one of the major and destructive pests of jute (*Corchorus olitorius* L.). Infest the young leaves and shoots, causing significant losses, especially the stoppage of growth or atrophy of the branches (Haji et al., 2001). Its population builds up continual increase, reaches a peak in mid-June and again during the third week of July. The years of most serious mite infestation of jute are those of dry periods prevailing in these months (Kabir, 1975). The damage is often termed as 'Telenga' or 'Telchita' disease in Bangladesh. It appears at the end of April but more active in mid May (Kabir, 1975). Generally, they suck the sap from the apical leaves of the plants, as a result, the young leaves wrinkle and curl down, color changes to copper or purplish, finally dry up and fall down (Siddique & Kabir, 1979). Due to the attack of this pest, the vertical growth of the internodes is suppressed thereby side branches are enhanced (Kabir, 1975). Moreover, they attack flower buds, thus, flowers cannot bloom properly, and infested pods fail to form seeds (Kabir, 1975). The combined yield and quality of fibre are reduced due to the attack of this pest.

Higher atmospheric humidity resulted in increased incidence of the mite (Schoonhoven et al., 1978). In contrast, semi humid condition (Kabir, 1979) and dry weather (Sanap et al., 1985) were found to be more favourable for this mite. Conflicting reports are available with the effect of temperature on the development of *P. latus*. Anderson (1975) reported that lower temperature affected the development favourably in California. Schoohoven et al. (1978) opined that outbreak of the mite occurred exceptionally in warm weather whereas; high temperature adversely affected the population of *P. latus* mite. In contrast, Kabir (1979) and Sanap et al. (1985) reported the role of high temperature in the development and population buildup of the mite. Temperature ranging from 26.8 to 26.90C and relative humidity of 60 to 75 per cent were congenial for multiplication. Borah (1987) and Lingeri et al. (1998) observed that the mite population is favoured by higher temperature coupled with lower humidity having lesser intensity of rainfall. Heavy rains washed out *P. latus* there by completely reducing its population (Kabir, 1979). The correlation between the mite population and weather parameters is negative with maximum and mean temperature (-0.744 and -0.409) whereas, sunshine (0.460) is positively correlated (Ram et al., 1998). Similar observations are done by Mohammed et al. (1999). Patil (2003) recorded significant positive correlation of mite with biotic factors. Yellow mite, *P. latus* is not only destructive pest in Bangladesh but also worldwide reported by some researchers (Das & Roychaudhuri, 1979; Das and Singh, 1985a,b; Nair, 1986; Pradhan & Saha, 1997). It sucks the sap from younger leaves and therefore the leaves curl ventrally, and the colour turns from green to brown. The vertical vegetative growth of the crop is arrested and significantly yield loss occurred regularly. In view of the above facts and scarcity of related information on mites infesting jute crop with special reference, the present investigations were undertaken with the following objectives: to quantify the abundance and the seasonal dynamics of mite, *P. latus* in relation to various weather factors on fibre crop *viz.,* jute (*Corchorus olitorius* L.).

MATERIALS AND METHODS

The experimental works were conducted in the net house of the Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) of Gazipur during the period from March to July 2009.

Collection and rearing yellow mite

Polyphagotarsonemus latus were collected from the infested jute plant of the research field of Bangladesh Jute Research Institute, Dhaka in March, 2009. The collected mites from infested leaves were transferred into the potted jute plants kept outside the laboratory. Fifteen plants were infested to have constant supply of mite for these study purpose.

Mite dynamics related to day after infestation

Jute plants of tossa, *Corchorus olitorius* L varieties (O-9897, O-72, OM-1 and O-795) were grown organically without pesticide application in earthen pots (5 plant/pot). Plants were fertilized with a spoonful of 15-2-3-4 NPKS and sprinkle irrigation twice daily. When the jute plants age as about 28 days, yellow mite (12 pairs female and male) infestation were allowed to build up by artificial inoculation. The experiment was laid out in a completely randomized design (CRD) with three replication under net house condition (100% shaded by 0.05 mash white colored net). Young 3rd leaf by each plant from the tip (from 5 plants/pot) described by Alagarmalai et al. (2009) were collected 7 days after exposure to each variety and thereafter every 7th day of exposure until harvest during 15 April to 8 July (during jute growing season) in 2009, and the number of mite stages per cm^2 leaf (mean±SE) was counted under a stereomicroscope. The data on abiotic factors i.e., temperatures and rainfall were recorded from the net house during March to July 2009.

Data analysis

Descriptive analysis was used to calculate mean and standard error of yellow mite population densities. The mean differences within varieties of plants, the effect of sampling dates were analyzed of variances by Tukey's test. Pearson's correlations ($P \leq 0.05$) were used to test relationships between mean temperature and weekly total rainfall numbers of mite stages on jute plants using the SAEG (Euclides, 1983).

RESULTS AND DISCUSSION

The results of different stages (egg, larva, pupa, female and male) of yellow mite incidence on different jute (*C.olitorius*) varieties (O-9897, O-72, OM-1 and O-795) were counted every 7 days interval after infestation from April 15 to July 8 since 2009. Studies on the seasonal abundance of *P.latus* in relation to weather factors indicated that the activity of *P.latus* was showed by average temperature (maximum and minimum) and rainfall in Figure 1. The incidence of *P.latus* population fluctuation was recorded during 13 meteorological weeks with corresponding mean temperature ranged from 26.25±1.36^{o}C to 32±1.26 ^{o}C and weekly total rainfall ranged from 6.24 mm to 84.12 mm. Accordingly, we may conclude that *P. latus* favors warm and humid conditions of autumn or late summer rather than low temperature and heavy rains of winter months. During summer months, higher incidence of mite population infesting lime (Pena, 1989), potato (Fernandez & Ramos, 1995) and jute (Zaman & Karimullah, 1987; Sarma & Borah, 2009) was also observed. It was also reported that the jute yellow mite becomes active in mid-May, though the damage of the terminal shoot is seldom visible before June. Initial mite attacks are usually seen near dwellings and shady places (Kabir, 1975).

Effect of *P.latus* on *C.olitorius* varieties

The effect of varieties on the incidence of *P. latus* stages was studied. Significant seasonal pattern was found in the overall abundance (i.e. all varieties) yellow mite stages ($P>0.05$). Population fluctuation of *P.latus* eggs on *C. olitorius* varieties (O-9897, O-72, OM-1 and O-795) was found more or less increased the mean number of eggs at certain level (63rd DAI) and then decreased as shown in Figure 2. The significant peak of egg abundance

(117.67±24.64) was recorded at June 10 in the variety OM-1 followed by O-795 (95.67±3.53), O-72 (91.66±14.50) and O-9897 (71.67±11.70).

The incidence of *P.latus* larvae found more or less increased at 70th DAI, after that decreased (Figure 3). The highest significant peak of larval abundance (87.33±4.67) was recorded at June 17 in the variety OM-1 followed by O-795 (41.33±2.91), O-72 (29.33±2.03) and O-9897 (23.33±2.19).

The *P.latus* pupal population fluctuation was found more or less increased at 28th DAI, later starting decreased (Figure 4). The significant peak of pupal abundance (12.00±3.21) was recorded at May 6 in the variety OM-1 followed by O-795 (9.67±2.19), O-72 (5.33±0.33) and O-9897 (3.33±0.33).

Population fluctuation of *P.latus* females found more or less increased at 70th DAI and then decreased (Figure 5). The female population became more abundant and reached its peak at June 17 significantly in the variety OM-1 (35.00±5.13) followed by O-795 (26.67±4.33), O-72 (17.33±1.86) and O-9897 (12.00±1.15).

The *P.latus* male population fluctuation on *C.capsularis* varieties were found more or less increased at 28th DAI after that decreased (Figure 6). Peak of male abundance was highest in the variety OM-1 (11.67±1.67) followed by O-72 (5.67±0.67), O-795 (4.00±1.00) and O-9897 (3.00±0.58) at May 6, which was statistically significant among the varieties.

Weekly mean weather and population growth of *P.latus*

Maximum and minimum temperature of the study site was almost steady in the sampling period. Correlation (r) coefficient between mean number of yellow mite stages and different environmental factors for jute varieties have been evaluated and presented in Table 1. Among the environmental factors the mean temperature that affected the abundance of *P. latus* stages was positively correlated for all varieties, where effect was significance except larva and pupal stage OM-1 & O-795 and OM-1 for female & O-72 & OM-1 for male stage. The correlation between population of *P. latus* stages and weekly total rainfall was positively correlated among all varieties, where effects was non-significant except variety of O-9897 and O-72 for female and O-9897 for male stage showed significantly effect on the population build up of yellow mite in shown Table 1. It was showed that weather factors had more or less significant influence of incidence of *P. latus* population.

This is the first time reported that concentrates on Tarsonemidae mites on jute in Bangladesh. Population fluctuation patterns may have different between the years and places. Higher densities of *P. latus* were observed in Gazipur, where the occurrence of higher total rainfall. It seems to be an indirect relationship with temperature due to the rainy season (convective rain) occurs during periods of high temperature in this area. This fluctuation is probably physical factors such as the amount of rainfall and/or biological factors including the changing of plant stage as well as the presence of other arthropods or interactions between the different factors. As shown in this study, increasing broad mite density was related to the time and amount of rainfall during April till July since 2009. In contrast, Leite et al. (2003) found that densities of mite pests on eggplant positively correlated with mean temperature and total rainfall. Nevertheless, the rain may dislodge thrips from plants but not broad mite. Our results also supported with Peña (1990) who reported the density of broad mites to be high during the rainy period in spring and summer. Phompanjai et al. (2005) planted sesame at different times of the year and mentioned that if the plants emerged later in the rainy season, a higher infestation broad mites was observed at the peak population density. Additional rainfall, the population peak is reached in the season could not prevent a reduction in mites reported by Pena's (1990) and also supported our studies. These results suggested that the rain might never cause the negative impact on broad mites' density and also not the major factor of direct promote their population growth. However, the rain might indirectly manipulate broad mites *via* the impact on the other biological factors related to them such as host plant suitability.

In our results indicated that broad mite infestation period occurred during vegetative to fruiting stage under net house conditions. This result is in agreement with De Coss-Romero and Peña (1998) for the population fluctuation of chili pests under greenhouse conditions.

Broad mite population also increased from the vegetative to the flowering stages and reached the highest peak in young pod stage in sesame (Phompanjai et al., 2005). Jovicich et al. (2004) stated that the population growth of broad mites is more rapid on bell pepper seedlings since there are more leaves available to feed upon than in the cotyledon stage. However, mite populations declined after partly due to plant age, as in the case of young cucumber leaves that are preferred by broad mites over older cucumber leaves (Alagarmalai et al., 2009). However, the plants are injured by the mites as in the case of *Tetranychus urticae* Koch feeding on beans (Nachman & Zemek, 2002). In addition, the seasonal change in leaf quality may be responsible for population reduction as in *Tetranychus kanzawai* Kishida populations on hydrangea (Gotoh & Gomi, 2000).Various environmental factors are important for regulating the population density of plant feeding mite. Li & Li (1986) mentioned that the increase of population density was influenced by temperature, rainfall, initial population and the growth condition of food plants. Results of the present study are almost similar to those obtained in potato (Sontakke et al., 1989), aubergines (Misra et al., 1990) and jute (Somchoudhury et al., 2008). However, the present results are not in the same direction to those obtained by Ahuja (2000), who found that maximum temperature showed negative and significant correlation and minimum temperature showed negative and none significant correlation with mite population infesting sesame. This may be due to different leaf morphological features between these plants.

Accordingly, we may conclude that the temperature-rainfall combination is an important regulatory factor affecting arthropod development and that the warm and humid conditions prevailing during april to july months is more suitable for the increase of population densities of *P. latus*. The progressive increase in mite population in the months suggests the need for initiating control of *P. latus* after planting and the peak of *P. latus* population period. This study will help to identify which predatory mite is available in that period for biological control at future.

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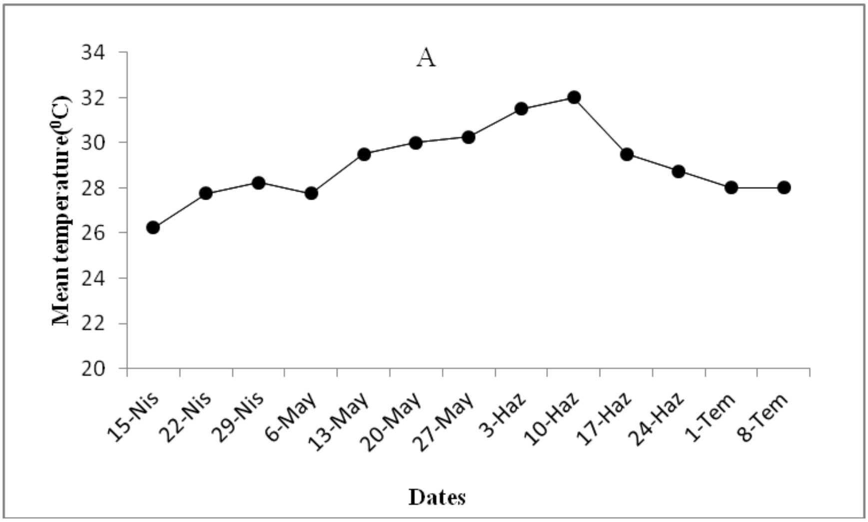

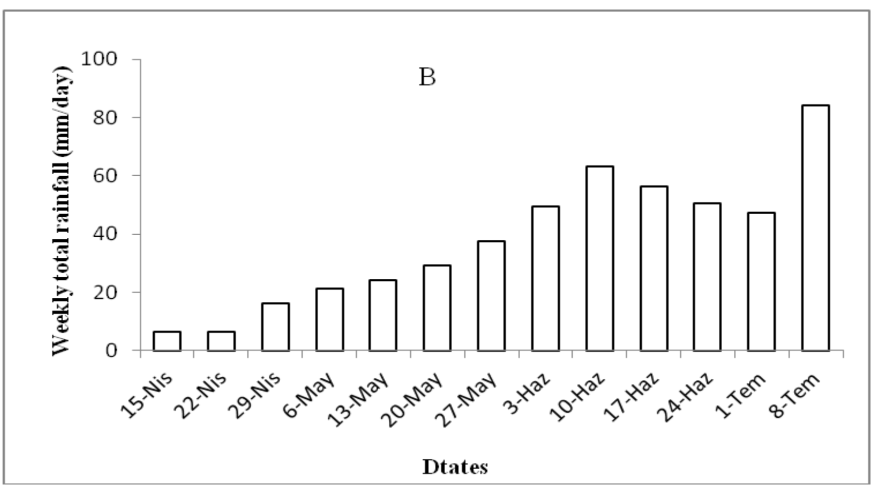

Figure 1. Mean temperature ((minimum+maximum)/2) (A) and Weekly total rainfall (B) distribution during 15April to 8 July in 2009.

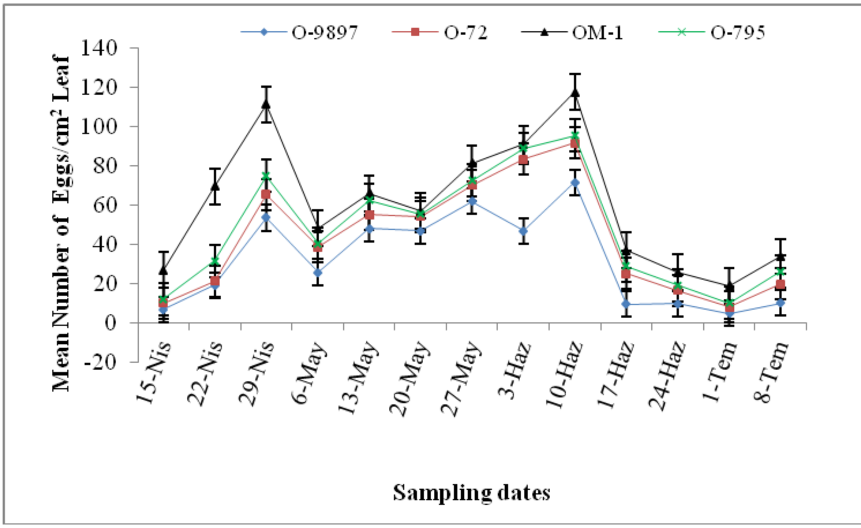

Figure 2. Population fluctuation of *P. latus* eggs on different varieties of *C. olitorius* leaves/cm² ((adaxial+abaxial)/2) during April 15 to July 8, 2009.

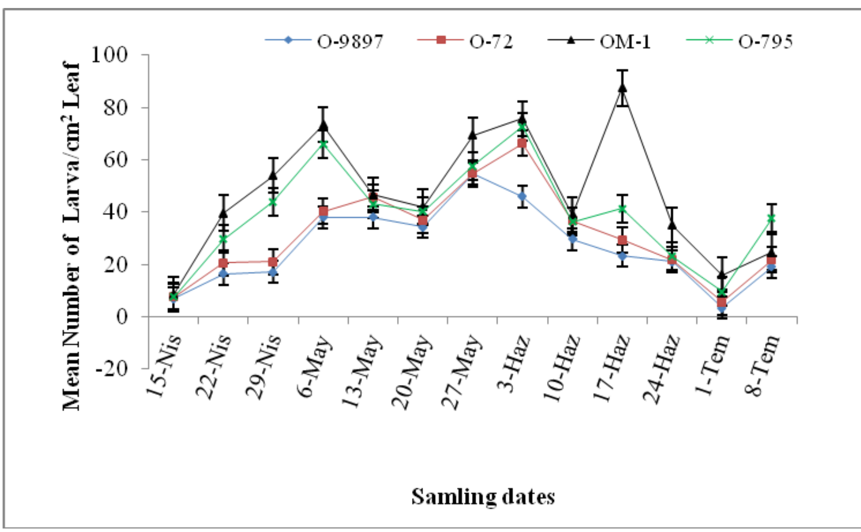

Figure 3. Population fluctuation of *P.latus* larvae on different varieties of *C. olitorius* leaves/cm² ((adaxial+abaxial)/2) during April 15 to July 8, 2009.

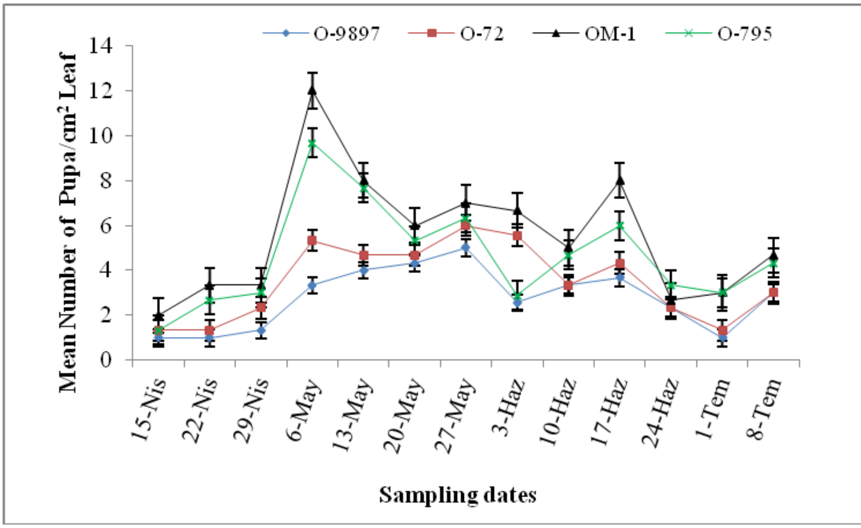

Figure 4.Population fluctuation of *P.latus* pupae on different varieties of *C. olitorius* leaves/cm² ((adaxial+abaxial)/2) during April 15 to July 8, 2009.

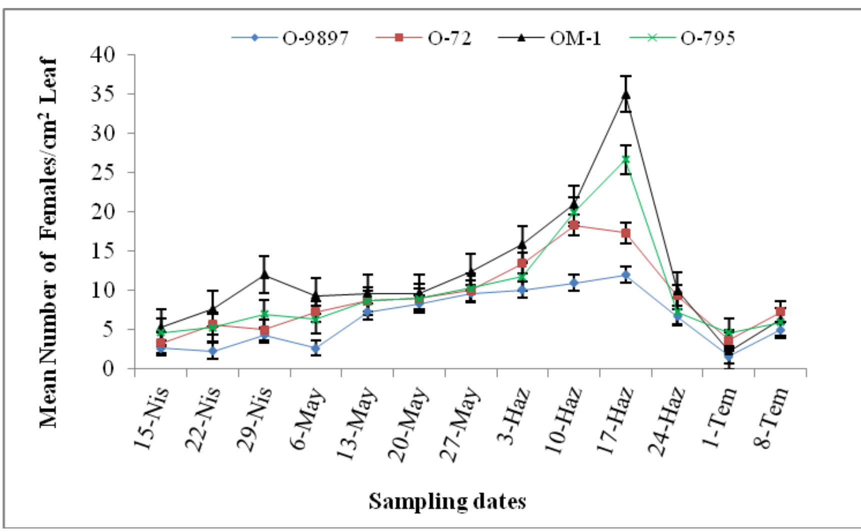

Figure 5. Population fluctuation of *P.latus* females on different varieties of *C. olitorius* leaves/cm² ((adaxial+abaxial)/2) during April 15 to July 8, 2009.

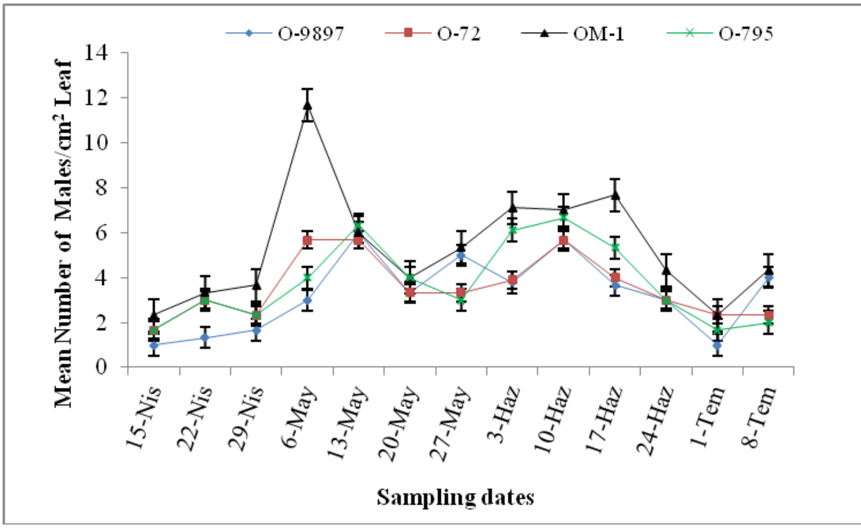

Figure 6. Population fluctuation of *P.latus* males on different varieties of *C. olitorius* leaves/cm^2 ((adaxial+abaxial)/2) during April 15 to July 8, 2009

Table 1. Correlation coefficient (r) between the incidence of yellow mite in varieties and various weather factors.

Variety	Egg population		Larval population		Pupal population		Female population		Male population	
	Mean temp. (^{0}C)	Rainfall (mm)	Mean temp. (^{0}C)	Rainfall (mm)	Mean temp. (^{0}C)	Rainfall (mm)	Mean temp. (^{0}C)	Rainfall (mm)	Mean temp. (^{0}C)	Rainfall (mm)
O-9897	.732**	.112	.671*	.188	.593*	.449	.858**	.573*	.735**	.573*
O-72	.824**	.193	.747**	.179	.611*	.238	.823**	.588*	.551	.104
OM-1	.623*	.022	.478	.079	.294	.035	.542	.366	.356	.129
O-795	.802*	.170	.530	.114	.210	.100	.633*	.474	.785**	.201

* Significant at 0.05 level, ** Significant at 0.01 level, Mean temp. – (Maximum temperature + Minimum temperature)/2

NEW SPECIES OF THE GENUS *GEHOLASPIS* BERLESE, 1918 (ACARI: MESOSTIGMATA: MACROCHELIDAE) FOR TURKISH FAUNA FROM KELKIT VALLEY

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[Özbek, H. H. & Bal, D. A. 2014. New species of the genus *Geholaspis* Berlese, 1918 (Acari: Mesostigmata: Macrochelidae) for Turkish fauna from Kelkit valley. Munis Entomology & Zoology, 9 (1): 468-472**]**

ABSTRACT**:** *Geholaspis longispinosus* (Kramer, 1876) collected from Kelkit Valley were described as a new species for Turkish fauna. Females, deutonymphs and protonymphs of *G. longispinosus* are presented here with diagnosis, descriptions and original drawings.

KEY WORDS**:** Acari, Mesostigmata, Macrochelidae, *Geholaspis*, Kelkit valley, Turkey.

The family Macrochelidae was created by Vitzthum (1930) and included 470 species in the world (Emberson, 2010). It is a predatory and cosmopolitan mesostigmatic mite feeding on other small invertebrates (Krantz, 1998). Macrochelid mites are not well known in Turkey but are represented by four genera (*Longicheles* Valle, *Macrocheles* Latreille, *Nothrholaspis* Berlese, *Glyptholaspis* Filipponi and Pegazzano) and 15 species have been determined up to now (Bayram and Çobanoğlu, 2005; Erman et al., 2007; Kılıç et al. 2012; Özbek and Bal, 2012, 2013).

The genus *Geholaspis* created by Berlese (1918) and widely distributed in the Palearctic region, especially in Europe, but also recorded in New Zealand by human agency (Emberson, 1973). Eleven species of macrochelid mites belong to the genus *Geholaspis* (Emberson, 2010). *G. longispinosus* is the most recognised species throughout the European zone, but it has not been mentioned in Turkey for about 140 years. We determined that it has a very common species throughout valley.

MATERIALS AND METHODS

Mites were extracted from samples of decomposing matter, debris and moss using compound Berlese funnels. After clearing in lactic acid or Nesbitt's solution, examples of each species were dissected for detailed examination of some structures and mounted in Hoyer's medium for identification. Drawings and examination were attained with drawing tube Nikon Y-IDT and Nikon E-600 type research microscopes. Measurements were made using a Leica DM 4000 B phase-contrast microscope. All type specimens are deposited in the Erzincan University's Acarology Laboratory, Turkey. Notation of the dorsal setae follows Halliday (1986, 1987).

RESULTS AND DISCUSSION

Family Macrochelidae Vitzhum, 1930
Subfamily Macrochelinae Vitzhum, 1930
Tribe Geholaspini Emberson, 2010

Genus *Geholaspis* Berlese, 1918

Type species *Geholaspis longispinosus* (Kramer, 1876)

Dorsal shield having 28 pairs of simple or distally pilose setae; j1 short and densely pilose; some medial dorsal setae aciculate or simple (*e.g.* j5, j6, z5, z6 and J2). Setae j5 displaced normal position. Sternal shields well sclerotised. Metasternal shields free. Ventrianal shield longer than wide and bearing five pairs of preanal setae. Cheliceral digits short and having fewer than six teeth. Epistome unipart, triangular and apically furcated. Males mostly unknown. (Valle, 1953; Mašán, 2003; Emberson, 2010).

***Geholaspis longispinosus* (Kramer, 1876)**

Examined materials: Ten females and two deutonymphs from moss, Gümüşhane, Köse, 40° 16' 962" N, 39° 37' 858" E, alt. 1867 m, 01 May 2012; five females from moss and grass Gümüşhane, Köse, 40° 16' 618" N, 39° 37' 96"2 E, alt. 1767 m, 10 May 2012; two females from moss near stream, Gümüşhane, Köse, 40° 18' 562" N, 39° 38' 196" E, alt. 1866 m, 19 May 2012; twelve females and deutonymphs, and a protonymph from moss near stream, Gümüşhane, Köse, 40° 17' 345" N, 39° 38' 316" E, alt. 1899 m, 19 May 2012; twelve females and four deutonims from moss in water Gümüşhane, Köse, 40° 17' 342" N, 39° 38' 313" E, alt. 1897 m, 19 May 2012; two females and deutonims from grass, Gümüşhane, Köse, 40° 16' 969" N, 39° 37' 866" E, alt. 1862 m, 19 May 2012.

Diagnosis: Dorsal setae j2, j5, j6, z1, z5, z6, s2, J2 and J5 smooth and spine-like, other setae pilose; preanal setae Jv1 short, other preanal setae long; deutosternal groove with six row denticles.

Description. Females (Figure 1. A-F)

Dorsal shield 940-1040 µm long, 500-600 µm wide at the level setae r4, rounded, posteriorly reticulated and bearing 28 pairs of setae. Dorsal setae j2, j5, j6, z1, z5, z6, s2, J2 and J5 simple and spine-like, other setae distally pilose (Figure 1. A). Sternal shield ornamented with polygonal pattern and small punctuates. Shield bearing three pairs of simple setae. Metasternal shield small, oval, free and carrying single simple seta. Genital shield ornamented with small cavities, helmet-like and having a pair of simple setae. Ventrianal shield 395-450 µm long, 490-570 µm wide, reticulated with lines, preanal setae Jv1 short, other preanal setae fairly long, all of the preanal setae simple and spine like (Figure 1. B). Gnathosoma having three pairs of hypostomatic setae and a pair of palpcoxal setae present, all simple; *h1* longest, *h2* equal length to *pc*, corniculus slim and long, horn-like (Figure 1. C). Epistome unipart, median process distally furcated (Figure 1. D). Chelicerae well developed, movable digit of chelicerae 85-90 µm long, fixed digit 80-85 µm long at the level base of cheliceral dorsal seta; fixed digit with pilus dentilis and a simple dorsal seta. Arthrodial brush densely pilose (Figure 1. E). Tarsus II as in Figure 1. F.

Male: Unknown

Deutonymphs (Figure 2. A-B)

Dorsal shield 655-690 µm long, 375-395 µm wide at the level setae r4, oblong, posteriorly reticulated with punctuate and having 28 pairs of setae. Setae j5, j6, z1, z5, z6, J2 and J5 simple and spine-like, other setae distally pilose (Figure 2. A). Sternal shield narrow, long, bearing a pair of pores and four pairs of setae, setae st1 and st2 distally pilose, other sternal setae simple. Anal shield with a pair of anal setae and a postanal seta (Figure 2. B).

Protonymphs (Figure 3. A-B)
Dorsal shield separated with podonotal and opistosomal shields. Podonotal shield 280-290 µm long, 260-270 µm wide and having 11 pairs of distally pilose setae. Opistosomal shield 170-190 µm long, 230-240 µm wide and having 8 pairs of setae, J2 and J5 simple, other opistosomal setae distally pilose (Figure 3. A). Anal shield with a pair of anal setae and a postanal seta (Figure 3. B).
Distribution: *G. longispinous* widely distributed in Europe (Valle, 1953; Balogh, 1958; Bregetova and Koraleva, 1960; Krantz, 1972; Hyatt and Emberson, 1988; Mašán, 2003) and recorded in New Zealand (Emberson, 1973).
Notes: *G. longispinosus* is an edaphic mite with widely ecological tolerance (Mašán, 2003). This species is widely distributed in Europe (Valle, 1953) and very common in moss, litter and humus (Evans and Browning, 1956). It has also been recorded in the nests of small mammals (Bregetova and Koraleva, 1960). In Kelkit Valley, this species is one of very common macrochelid mites found in stream deposits and moss in localities at altitudes between 1700 and 1900 m.

ACKNOWLEDGEMENTS

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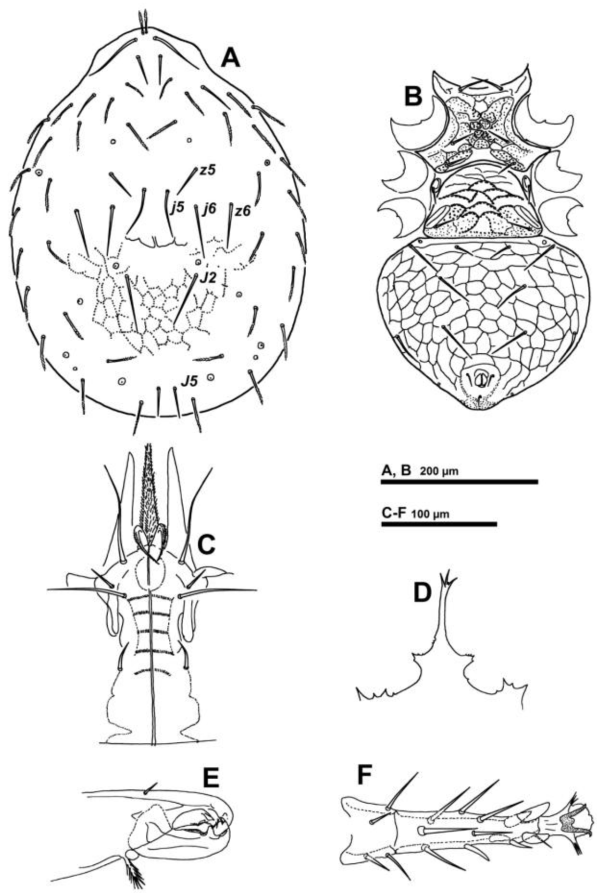

Figure 1. *Geholaspis longispinosus,* Female. A. Dorsal shield, B. Ventral shields, C. Epistome, D. Gnathosoma, E. Chelicera, F. Tarsus II

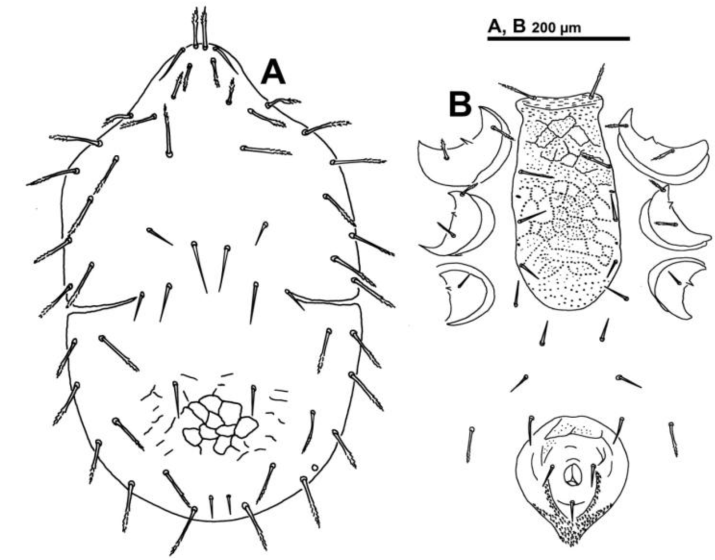

Figure 2. *Geholaspis longispinosus*, deutonymph. A. Dorsal shield, B. Ventral shields.

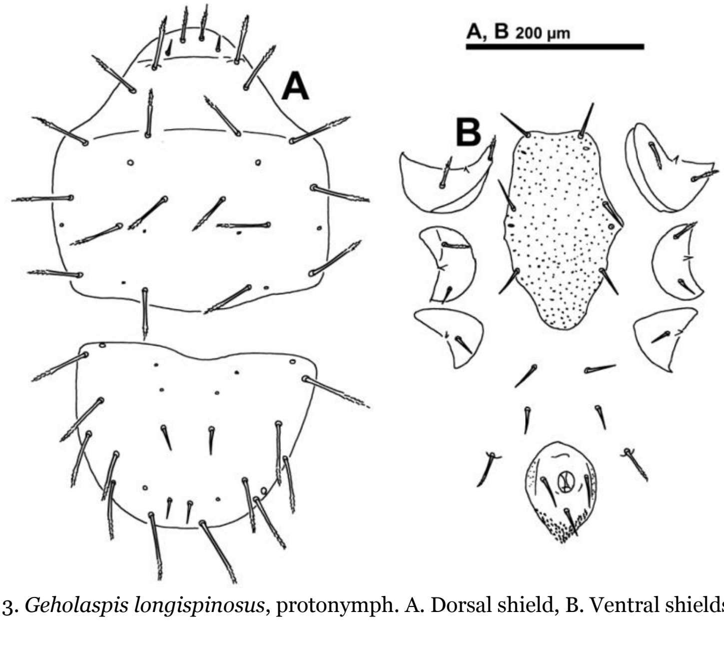

Figure 3. *Geholaspis longispinosus*, protonymph. A. Dorsal shield, B. Ventral shields.

FIRST RECORD OF *DOLICHOGNATHA LONGICEPS* (THORELL, 1895) FROM INDIA (ARANEAE: TETRAGNATHIDAE)

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[Sunil Jose, K. 2014. First record of *Dolichognatha longiceps* (Thorell, 1895) from India (Araneae: Tetragnathidae). Munis Entomology & Zoology, 9 (1): 473-477**]**

ABSTRACT: *Dolichognatha longiceps* (Thorell, 1895) is a recorded from India for the first time. Detailed illustration and description of *D. longiceps* is provided. This species is characterized by the absence of posterior median eyes.

KEY WORDS: *Dolichognatha longiceps* (Thorell, 1895), Western Ghats, new species.

The Western Ghats, one of the 25 biodiversity hot-spots identified in the world is well known for its rich and unique assemblage of flora and fauna. However, the diversity of the invertebrate fauna is poorly studied from these regions. The family Tetragnathidae is strikingly diverse in the Indian subcontinent, with multiple species occurring in different states. The family contains 1020 species and 56 genera in the world (Platnick, 2013). Until 2009 only 47 species in 10 genera species had been described from this family in India (Sebastian & Peter, 2009). The important genera found in India are *Dyschiriognatha, Herennia, Leucauge, Nephila, Nephilengys, Opadometa, Orsinome, Tetragnatha, and Tylorida*. The studies on Indian tetragnathidae were limited to the works of Gravely (1921-22), Pocock (1900), Sheriff (1919-1929), Tikader (1970, 1977) and Jose (2004). The family is most diverse in the tropical regions and many species from India still remain unknown to science. In this study, I record the occurrence of a rare tetragnathid spiders namely *Dolichognatha longiceps* (Thorell, 1895) from Western Ghats of India.

MATERIALS AND METHODS

The spiders were collected during a study on the diversity of tetragnathids spiders in Western Ghats, India. Collected spiders were preserved in 70% ethyl alcohol and studied under Stereomicrosocope, Leica S4E. Digital images of the specimens were taken in alcohol with Canon Power Shot S40 digital camera mounted on a Leica S4E stereoscopic microscope. All pencil drawings were scanned and further improved with the help of the Adobe Photoshop CS2 programs. All measurements are in mm. Eye measurements are taken with an ocular micrometer. The status of the species was confirmed by referring to Dimitrov (2010).

Gross morphological features were investigated using a dissecting microscope and illustrated using a Camera Lucida attachment. For each individual examined, measurements were taken of the separation between each of the eyes, tooth pattern on the chelicerae, fang structure, and form and pattern of the dorsum and venter of the abdomen, the carapace and sternum. Scanning electron microscopic images were taken at IISC using JEOL- JSM-5600 scanning electron microscope at an accelerating voltage of 4-10 V. The type material is preserved in 80% alcohol and deposited in a reference collection housed at the Department of Zoology, Deva Matha College, Kuravilangad, Kerala, India. (Voucher No AR00106).

Abbreviations used are as follows: AME = Anterior median eyes, ALE = Anterior lateral eyes, D = Dorsal Teeth, H = Height, IISC = Indian Institute of Science, L = Length, PME = Posterior median eyes, PLE = Posterior lateral eyes, V = Ventral teeth, W = Width.

TAXONOMY

Fam: Tetragnathidae Menge, 1866
Gen. *Dolichognatha* O. P.-Cambridge, 1869
Type sp.: *Dolichognatha nietneri* O. P. Cambridge, 1869.

Diagnosis: The genus *Dolichognatha* can be most easily distinguished from close relatives (Meta and Metellina) by the very long male chelicerae and the characteristic shape and coloration of the prosoma. Cephalic region rectangular and elongated with dark sides, aggregate spigots not embracing the flagelliform spigot, PME and PLE without canoe tapetum, PME smaller than PLE, abdomen with anterior tubercles, and web horizontal with closed web hub close to the substrate (Dimitrov et al., 2010).

Distribution: India, Thailand, East Africa, Sri Lanka, Congo, Comoro Is., Venezuela, Borneo, Brazil, New Guinea, Queensland, Guyana, Sumatra, USA to Venezuela, Peru, Samoa, Panama, West Indies, northern South America, Taiwan, Okinawa Is.

Dolichognatha longiceps (Thorell, 1895)

(Figs. 1-2)

Prolochus longiceps Thorell, 1895: 122.
Prolochus longiceps Simon, 1895a: 932, f. 1004.
Dolichognatha longiceps Dimitrov, Álvarez-Padilla & Hormiga, 2010: 15.

Material examined: 1 female, Idamalayar, 10°13′18″N 76°42′21″E, 2 November 2003, Elevation 900m, Coll. Sunil Jose K.

Description: Female from Idamalayar, Kerala. Total length: 6 L, Cephalothorax: 2.5 L, 1.4 W; Abdomen: 3.5 L, 2.3 W, AME= 0.069, ALE= 0.125, PLE= 0.125, AME-ALE=0.045, AME-AME= 0.050, PLE-PLE=0.212. Morphometry of legs and palp are given in Table 1.

Colour in life: Carapace darker at the cephalic region and lateral margins of thorax. Mid dorsal dark band till foveae. Abdomen pale yellowish with dorsal chalk white patterns. Legs pale yellowish, with dark bands at the ends and middle of each segment.

CARAPACE: Longer than wide, anterior half narrower, and raised at cephalic region medially. Lateral margins and median area darker, the area between it yellowish. Fovea deeper, pointed anteriorly. The cephalic area contains two small yellowish patches in the dark brown area. *Eyes*: Six eyes, PME absent, ALE=PLE, both rows slightly recurved, ocular region wider than long, all eyes encircled with black surrounds. *Sternum*: Longer than wide, heart shaped, tapering to coxae IV. Ventral surface bears a median black broad line and three pairs of black patches on the lateral margins. *Labium*: Shorter, wider than long, yellowish. *Maxillae*: Yellowish, blackish patches present on the lower half, anterior margin truncated. *Chelicerae*: Yellowish, outer margin bears three teeth, inner margin without teeth. *Legs*: Longer, yellowish brown, spiny, provided with dark brown bands, metatarsi of all legs with dark bands on distal and proximal ends and in the middle. First leg longer than second, leg formula 1423.

ABDOMEN: Longer than broad, stouter, much higher than cephalothorax, anterior margin overhangs the cephalothorax, dorsum with whitish patches. Ventrum with a large whitish patch. *Epigyne*: Medially broad, copulatory openings located near to the posterior margin.

Distribution: *INDIA*: Idamalayar, Kerala; Myanmar; Thailand.

ACKNOWLEDGEMENTS

I thank Dr. Joy Jacob, Principal, Deva Matha College, for facilities and encouragement. I am also very much indebted to Mr. K. R. Kannan and Mr. Satyanarayan of Indian Institute of Science, Bangalore for SEM images. Financial assistance received from University Grants Commission is gratefully acknowledged.

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Table 1. Measurements of the leg and pedipalp segments ♀.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	5.0	0.6	3.0	5.2	1.4	15.20
II	3.0	0.5	2.1	3.0	1.0	09.60
III	2.0	0.4	1.1	1.7	0.7	05.90
IV	3.8	0.5	3.5	4.0	1.1	12.90
Palap	0.8	0.4	1.1	1.7	0.7	04.70

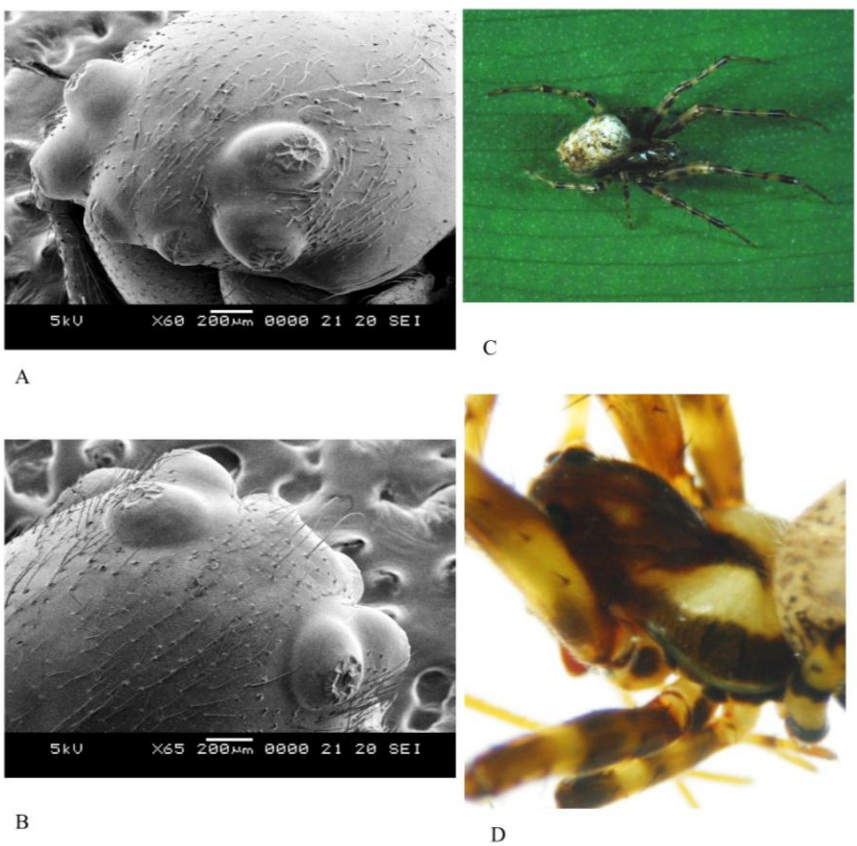

Figure 1. *Dolichognatha longiceps* (Thorell, 1895).

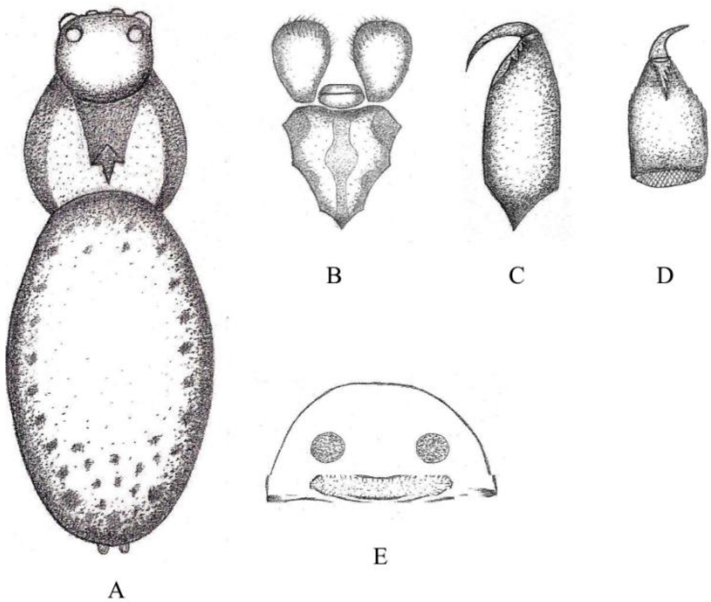

Figure 2. *Dolichognatha longiceps* (Thorell, 1895).

THE OCCURRENCE OF THE SUBGENUS *METHYDRUS* REY, 1885 IN TURKEY (COLEOPTERA: HYDROPHILIDAE), WITH TAXONOMIC AND DISTRIBUTIONAL NOTES

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[Taşar, E. T. 2014. The occurrence of the subgenus *Methydrus* Rey, 1885 in Turkey (Coleoptera: Hydrophilidae, *Enochrus*) with taxonomic and distributional notes. Munis Entomology & Zoology, 9 (1): 478-482**]**

ABSTRACT: The species of the subgenus *Methydrus* Rey, 1885 (Coleoptera: Hydrophilidae, *Enochrus*) that known from Turkey is presented. The first precise locality data of *Enochrus affinis,* (Thunberg) is given from the country. *Enochrus coarctatus,* (Gredler) is recorded for the first time from the South-eastern Anatolian Region. Diagnostic characters of some species as well as the photographs of their aedeagophores are provided. Distributional data of Turkey and also world of these species are presented.

KEY WORDS: Coleoptera, Hydrophilidae, *Enochrus*, *Methydrus*, distribution, Turkey.

27 species belonging to the subgenus *Methydrus* Rey (Coleoptera: Hydrophilidae, *Enochrus*) are known from The Palaearctic Region Hansen (2004). And only four species known belonging to this subgenus from Turkey Darılmaz & İncekara (2011). *E. affinis* was reported by Peyron in 1858. *E. nigritus* was recorded by Schödl (1997), *E. tetraspilus* was recorded by Hebaur & Ryndevich (2005) and *E. coarctatus* was recorded by Mart et al. (2009) from Turkey for the first time. The aim of this study was to make a contribution to the knowledge of the subgenus, including the first precise locality data of *E. affinis* and the first record of *E. coarctatus* from South-eastern Anatolian Region, Turkey.

MATERIALS AND METHODS

The specimens were collected from freshwater habitats with sieves that having 3,15x1 mm mesh size. The beetles were killed with ethyl acetate and were stored in small bottles until identification. Specimens were cleaned with brush before identification. Aedeagophore of collected specimens were dissected under a stereo microscope in the laboratory. The identified species have been converted into museum material. Maps that including distributional data of each species are presented (Fig. 4).

RESULTS AND DISCUSSION

Subgenus *Methydrus* Rey, 1885

Diagnosis: The genus *Enochrus* Thomson has 14 species belonging to three subgenus (*Enochrus*, *Lumetus*, *Methydrus*) in Turkey Darılmaz & İncekara (2011). In subgenus *Methydrus*, Rey; the last segment of maxillary palpi distinctly shorter than penultimate (Fig. 2) and posterior margin of last visible abdominal sternite has a small semicircular emarginate in middle with a fringe of stiff golden bristles in the emargination (Fig. 1) Gundersen (1978).

Enochrus (*Methydrus*) *affinis* (Thunberg, 1794)

Synonyms: *Hydrophilus affinis* Thunberg, 1794; *Hydrophilus marginellus* var. *affinis* Thunberg, 1794; *Hydrophilus minutus* Fabricius, 1801; *Philhydrus marginellus* var. *minutus* Fabricius, 1801

Diagnosis: The body is 3,4-4,4 mm length and oval. Head is black. Pronotum and elytra are yellow-brownish or dark-brownish in colour, lighter on the sides and apex. The middle of the pronotum is widely dark. Maxillary palpi are yellow-brownish or dark-brownish in colour; second segment widely darkened in middle; last segment almost orderly dark, brownish to black, much darker than penultimate (Fig. 2). The whole dorsal side of the body is rather finely and densely punctuate. The elytra are without stronger point-rows. Legs are brownish. Posterior margin of last visible abdominal sternite has a small semicircular emarginate (Fig. 1). Aedeagophore has a long narrow median lobe, apex of parameres sharply pointed and evidently bending outwards (Fig. 3).

Remarks: A synonym of *E. affinis* is *Philhydrus marginellus*. This synonym was reported by Peyron (1858) from Tarsous, İçel, Turkey. After this first report in 1858, no researchers found this species again. Whereas many researchers have been studied in İçel and Adana province until this year. According to the last checklist of Hydrophiloidea of Turkey by Darılmaz & İncekara (2011); his record is in need of confirmation. Consequently, this study is giving the first precise locality data of *E. affinis* from Turkey.

Ecology: They populates at the edges of stagnant, usually well vegetated fresh water.

Material examined: Turkey, South-eastern Anatolia, Adıyaman, Gölbaşı, Azaplı Lake, 37°43”37N 37°30”25E, 880m, 20.06.2013, 29 males; 37°45”34N 37°33”22E, 880m, 24.06.2013, 3 males; 37°43”37N 37°30”26E, 881m, 24.06.2013, 2 males 2 females; 37°43”35N 37°30”18E, 881m, 24.06.2013, 10 males 10 females; 37°45”34N 37°33”30E, 880m, 18.08.2013, 3 males.

Distribution in Turkey: İçel Peyron (1858) (Fig. 4).

Note: The above mentioned localities are the first precise distributional data for Turkey (Fig. 4).

Distribution in World: Armenia, Austria, Belarus, Belgium, Britain, Bosnia-Herzegovina, Bulgaria, Croatia, Denmark, Estonia, Finland, France, Germany, Italy, Kazakhstan, Latvia, Lithuania, Netherlands, Norway, Poland, Russia, Sweden, Switzerland and Ukraine Hansen (2004).

Enochrus (*Methydrus*) *coarctatus* (Gredler, 1863)

Synonyms: *Philhydrus coarctatus* Gredler, 1863; *Philhydrus marginellus* Schwarz, 1872; *Philhydrus suturalis* Sharp, 1872; *Philhydrus coarctatus* var. *fulvipennis* Westhoff, 1881; *Philhydrus labiatus* Kuwert, 1888.

Diagnosis: Body is 3.9 mm length. Head is black, pronotum is dark brownish colour. Elytra are dark brownish and black colour in the middle. Maxillary palpi are yellowish-light brown. Median lobe of aedeagus is wide and paramers are arched inwards (Fig. 3.3).

Remarks: *E. coarctatus* is known from two province (Afyon and Ordu) in Turkey. With this study, third province (Adıyaman) was given for the country. And also this species is new to the South-eastern Anatolian Region.

Ecology: They populates at the edges of stagnant, usually well vegetated fresh water.

Material examined: Turkey, South-eastern Anatolia, Adıyaman, Gölbaşı, Azaplı Lake, 37°43"37N 37°30"26E, 881m, 24.06.2013, 1 male.
Distribution in Turkey: Afyon and Ordu (Fig. 4) Darılmaz & İncekara (2011).
Note: Newly recorded from South-eastern Anatolian Region.
Distribution in World: Austria, Belarus, Belgium, Britain, Bosnia-Herzegovina, Bulgaria, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Russia, Sweden, Switzerland and Turkey Hansen (2004); Darılmaz & İncekara (2011).

Enochrus (*Methydrus*) *nigritus* (Sharp, 1872)

Synonyms: *Philhydrus nigritus* Sharp, 1872; *Enochrus isotae* Hebauer, 1981.
Remarks: *Enochrus affinis* is similar to *E. nigritus*. The aedeagophore of both species has a long narrow median lobe, but the apex of the parameres is more bluntly rounded in *E. nigritus* (Fig. 3.2) and characteristically bending outwards in *E. affinis* (Fig. 3.1).
Distribution in Turkey: Afyon, İstanbul and Kırklareli (Fig. 4) Darılmaz & İncekara (2011).
Distribution in World: Albania, Armenia, Azerbaijan, Belgium, Britain, Bulgaria, Croatia, France, Greece, Iran, Italy, Kazakhstan, Macedonia, Morocco, Netherlands, Portugal, Romania, Russia, Spain and Turkey Hansen (2004).

Enochrus (*Methydrus*) *tetraspilus* (Régimbart, 1903)

Synonyms: *Philhydrus tetraspilus* Régimbart, 1903.
Remarks: According to Hebauer & Ryndevich (2005), *E. tetraspilus* was recorded for the first time from The Palaearctic Region and in Turkey. But this species has already been recorded from The Palaearctic Region in Egypt in 1976 Yano et al. (1983).
Distribution in Turkey: Adana, Antalya and Gaziantep (Fig. 4) Darılmaz & İncekara (2011).
Distribution in World: Bhutan, Egypt, Nepal, Saudi Arabia, Thailand, Turkey and Yemen Hansen (2004); Fikacek et al. (2010); Hebauer & Ryndevich (2005); Sites & Vitheepradit (2010); Yano et al. (1983).

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Figure 1. *E. affinis*, last visible abdominal sternite.

Figure 2. *E. affinis*, maxillary palpus.

Figure 3. *Enochrus* spp. 1, 2 and 3, aedeagus dorsal view. 1, *E. affinis*; 2, *E. nigritus* Darılmaz & Kıyak (2009); 3, *E. coarctatus*.

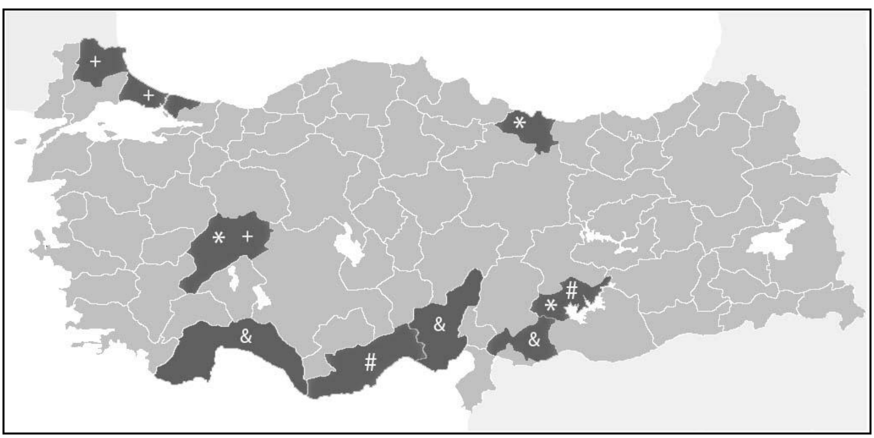

Figure 4. Distributional map of the species of subgenus *Methydrus* Rey in Turkey. #; *E. affinis*, *; *E. coarctatus*, +; *E. nigritus*, &; *E. Tetraspilus*.

TURKISH RED LIST CATEGORIES OF LONGICORN BEETLES (COLEOPTERA: CERAMBYCIDAE) PART V – SUBFAMILY STENOPTERINAE

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[Özdikmen, H. 2014. Turkish Red List Categories of Longicorn Beetles (Coleoptera: Cerambycidae) Part V – Subfamily Stenopterinae. Munis Entomology & Zoology, 9 (1): 483-493**]**

ABSTRACT: The aim of this study is to create a Turkish Red List of the longicorn beetles. Moreover, presence such a Red List is necessary for Turkey. Even governmental evaluations could cause some erroneous decisions due to absence such a Red List. Since, governmental evaluations at the present time are based on the works that are realized with respect to the European Red List. Furthernore, Turkey appears a continental property changeable in very short distances in terms of climatical features and field structures. So, the status of European fauna and the status of Turkish fauna are not the same. Clearly, there is no any work that subjected to create a Turkish Red List except Parts I-IV. Hence, a series work is planned with this purpose. This type of study is the fifth attempt for Turkey.

KEY WORDS: Red List, Conservation, Cerambycidae, Turkey

The purpose of the current study was to create a Turkish Red List of longicorn beetles similarly to "European Red List of Saproxylic Beetles" that was compiled by Ana Nieto & Keith N. A. Alexander and published by IUCN (International Union for Conservation of Nature) in collaboration with the European Union in 2010. "European Red List of Saproxylic Beetles" includes 153 species within the subfamilies Prioninae, Cerambycinae (including Stenopterinae) and Lamiinae of the European Cerambycidae. In the future, I hope that the present work will be lead to preparation a more comprehensive "Turkish Red List".

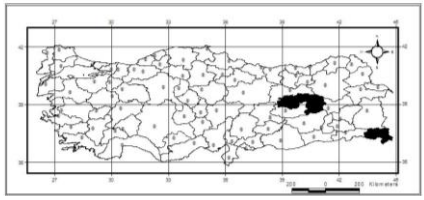
Hence, a series work is planned with this purpose. The present study is attempted as the fourth step of this aim. The previous works are Özdikmen (2014a,b,c,d). It should be noted that the using information at the present work on Turkish longicorn beetles are on the base of my personal database. The data of distribution are given on base of Löbl & Smetana (2010, 2011), Danilevsky (2010a,b, 2012a,b,c,d, 2013), Özdikmen (2011) and Miroshnikov (2011). Identification of chorotypes is based on the chorotype classification of the Anatolian fauna, proposed by Vigna Taglianti et al. (1999).

The evaluations of Turkish longicorn beetles at the present work based on "The IUCN Red List Categories" that was presented in Part I (Özdikmen, 2014a).

TURKISH RED LIST FOR STENOPTERINAE

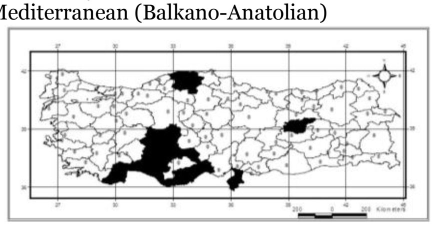
SUBFAMILY STENOPTERINAE Gistel, 1848: [9] (unnumbered section)
TRIBE STENOPTERINI Gistel, 1848: [9]
GENUS *STENOPTERUS* Illiger, 1804: 120
SPECIES *S. adlbaueri* Sama, 1995: 408

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from E Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey
Chorotype: Anatolian



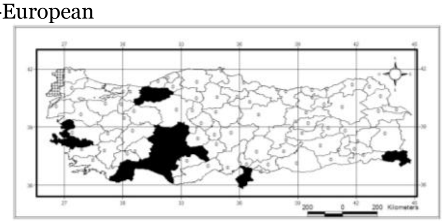
SPECIES *S. atricornis* Pic, 1891: 102

According to European Red List of Saproxylic Beetles, the species was placed in a “Threatened Category” as **VU**. It probably is widely distributed in Anatolia for Turkey. However, Turkish Red List category of the species is **NT**.
Range: Europe (Greece), Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian)



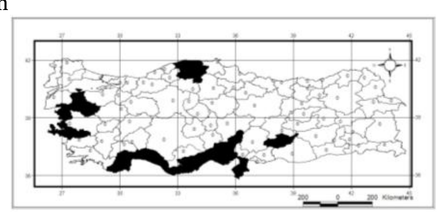
SPECIES *S. flavicornis* Küster, 1846: 75

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: C and E Europe, Turkey, Middle East (Syria, Israel, Jordan).
Chorotype: C and E-European



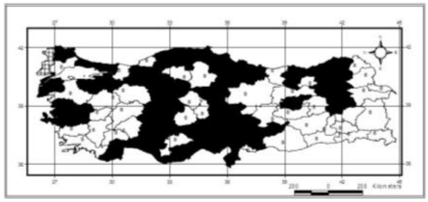
SPECIES *S. kraatzi* Pic, 1892: 21

European Red List of Saproxylic Beetles does not include the endemic species rightly. It probably is widely distributed in Anatolia. So, Turkish Red List category of the species is **LC**.
Range: Turkey
Chorotype: Anatolian



SPECIES *S. rufus* (Linnaeus, 1767: 642)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Turkmenistan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran, Middle East (Syria, Lebanon, Israel).
Chorotype: Turano-European



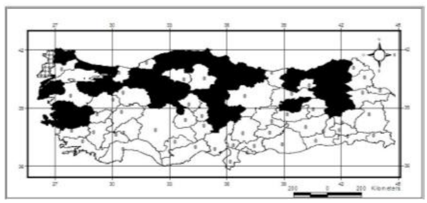
Moreover, the species is represented by two subspecies in Turkey as *S. r. geniculatus* Kraatz, 1863 and *S. r. syriacus* Pic, 1892. However, European Red List of Saproxylic Beetles does not include the subspecies of *S. rufus* (Linnaeus, 1767).

SUBSPECIES *S. r. geniculatus* Kraatz, 1863: 104

The subspecies is distributed mostly in N Turkey. So, Turkish Red List category of the subspecies is **LC**.

Range: SE Europe, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: SE-European

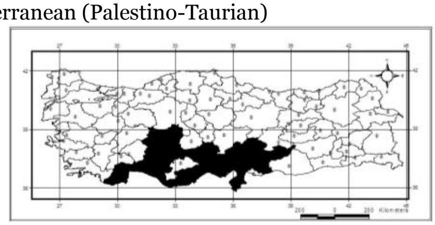


SUBSPECIES *S. r. syriacus* Pic, 1892: 22

The subspecies is distributed only in S Anatolia for Turkey. So, Turkish Red List category of the subspecies is **NT**.

Range: Turkey, Middle East (Syria, Israel, Lebanon).

Chorotype: E-Mediterranean (Palestino-Taurian)



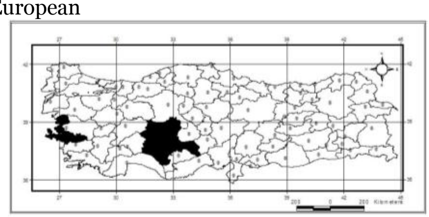
GENUS *CALLIMOXYS* Kraatz, 1863: 105

SPECIES *C. gracilis* (Brullé, 1832: 257)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. However, Turkish Red List category of the species is **DD** now.

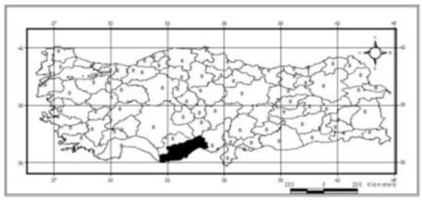
Range: C and E Europe, Turkmenistan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran.

Chorotype: Turano-European



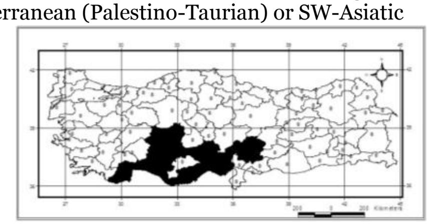
TRIBE MOLORCHINI Gistel, 1848: [9] (unnumbered section)
GENUS *MOLORCHUS* Fabricius, 1792: 356
SUBGENUS *CAENOPTERA* Thomson, 1859: 150
SPECIES *M. abieticola* Holzschuh, 2007: 218

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from the type locality İçel prov. in SC Anatolia now. So, Turkish Red List category of the species is **DD**.
Range: Turkey
Chorotype: Anatolian



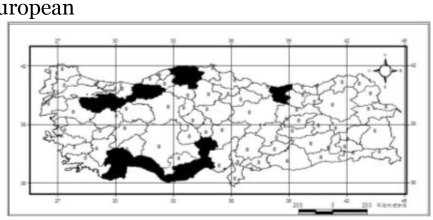
SPECIES *M. juglandis* Sama, 1982: 219

European Red List of Saproxylic Beetles does not include the species. It is known only from SC Anatolia for Turkey. So, Turkish Red List category of the species is **NT**.
Range: Turkey, Israel, Lebanon and ?Transcaucasia (?Georgia).
Chorotype: E-Mediterranean (Palestino-Taurian) or SW-Asiatic



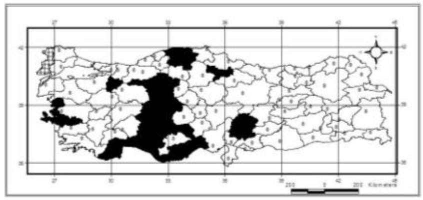
SPECIES *M. minor* (Linnaeus, 1758: 421)
SUBSPECIES *M. m. minor* (Linnaeus, 1758: 421)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It is represented only by the nominative subspecies in Turkey. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, China, Caucasus, Turkey.
Chorotype: Asiatic-European



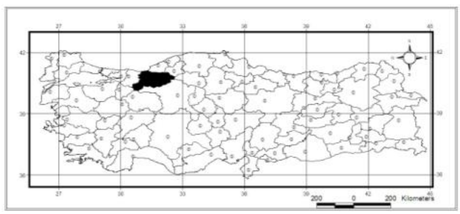
SUBGENUS *MOLORCHUS* Fabricius, 1792: 356
SPECIES *M. kiesenwetteri* Mulsant & Rey, 1861: 189
SUBSPECIES *M. k. hircus* Abeille de Perrin, 1881: 133

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It is represented only by the subspecies *M. kiesenwetteri hircus* in Turkey. The subspecies probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey, Iran.
Chorotype: SW-Asiatic



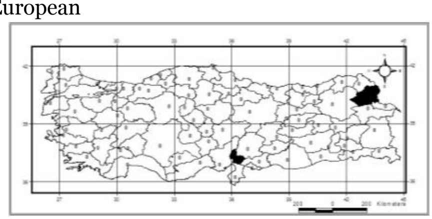
SPECIES *M. malmusii* (Sama, 1995: 370)

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from “Bolu prov.” in NW Anatolia. Apparently is distributed only in a local area. So, Turkish Red List category of the species is **EN**.
Range: Turkey
Chorotype: Anatolian



SPECIES *M. marmottani* (Brisout, 1863: 118)

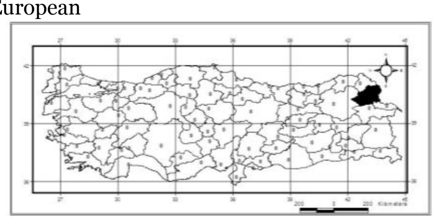
According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It is very local species. So, Turkish Red List category of the species is **DD**.
Range: C and S Europe, Turkey.
Chorotype: C and S European



Moreover, the species is represented by two subspecies in Turkey as the nominative subspecies and *M. m. frischi* (sama, 1995). European Red List of Saproxylic Beetles does not include the subspecies of *M. marmottani* (Brisout, 1863).

SUBSPECIES *M. m. marmottani* (Brisout, 1863: 118)

The subspecies is known only NE Anatolia (Kars prov.) from Turkey. However, it probably occurs at least some additional localyties in N Turkey. So, Turkish Red List category of the subspecies is **DD**.
Range: C and S Europe, Turkey.
Chorotype: C and S European

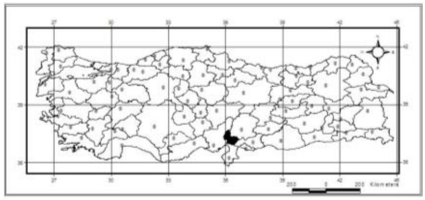


SUBSPECIES *M. m. frischi* (Sama, 1995: 373)

The endemic subspecies is known only SC Anatolia (Osmaniye prov.) from Turkey. So, Turkish Red List category of the subspecies is **EN**.

Range: Turkey.

Chorotype: Anatolian

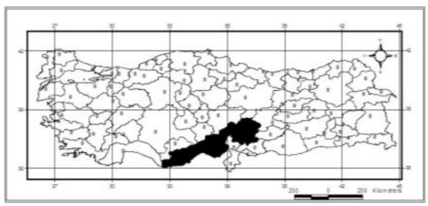


SPECIES *M. tenuitarsis* Holzschuh, 1981: 97

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from SC Anatolia. So, Turkish Red List category of the species is **VU**.

Range: Turkey

Chorotype: Anatolian

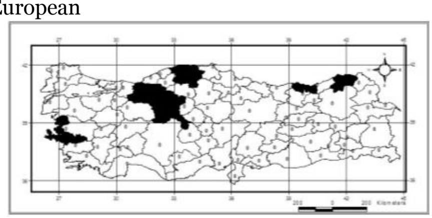


SPECIES *M. umbellatarum* (Schreber, 1759: 9)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed at least in N Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

Range: Europe, Turkmenistan, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.

Chorotype: Turano-European



TRIBE PSEBIINI Lacordaire, 1868: 479

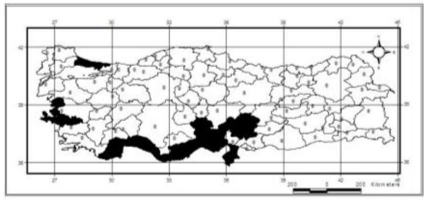
GENUS *NATHRIUS* Brèthes, 1916:

SPECIES *N. brevipennis* (Mulsant, 1839: 105)

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It probably is widely distributed at least in W and S Anatolia for Turkey. So, Turkish Red List category of the species is **LC**.

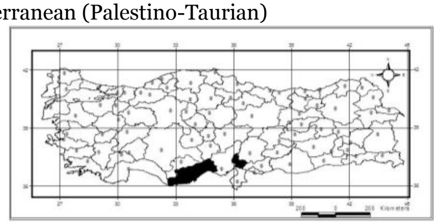
Range: Europe, Kazahstan, China, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Cyprus, Middle East (Syria, Lebanon, Israel), North Africa (Algeria, Egypt, Libya, Morocco, Tunusia), Nearctic Region (introduced), Neotropic Region (introduced).

Chorotype: Holarctic



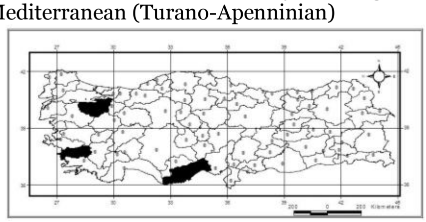
TRIBE BRACHYPTEROMATINI Sama, 2008: 229
GENUS *DOLOCERUS* Mulsant, 1862: 230
SPECIES *D. holtzi* (Pic, 1905: 114)

European Red List of Saproxylic Beetles does not include the species. It is known only from SC Anatolia. So, Turkish Red List category of the species is **VU**.
Range: Turkey, Syria, Lebanon
Chorotype: E-Mediterranean (Palestino-Taurian)



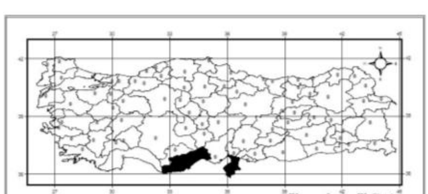
SPECIES *D. reichii* Mulsant, 1862: 231

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It probably is widely distributed in Turkey. However, Turkish Red List category of the species is **DD**.
Range: SE Europe, Transcaucasia (Armenia, Azerbaijan, Georgia), Turkey.
Chorotype: Turano-Mediterranean (Turano-Apenninian)



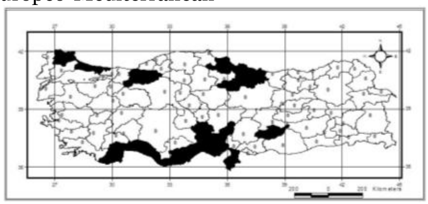
TRIBE HYBODERINI Linsley, 1840: 367
GENUS *CALLIMUS* Mulsant, 1846: [5]
SUBGENUS *CALLIMUS* Mulsant, 1846: [5]
SPECIES *C. akbesianus* Pic, 1892: CXI

European Red List of Saproxylic Beetles does not include the endemic species rightly. It is known only from SC Anatolia. Apparently is distributed only in a local area. So, Turkish Red List category of the species is **EN**.
Range: Turkey
Chorotype: Anatolian



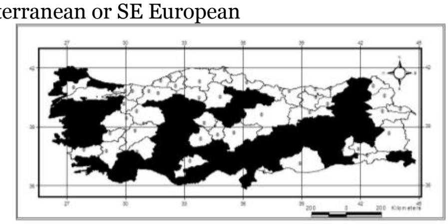
SPECIES *C. angulatus* (Schrank, 1789 77)
SUBSPECIES *C. a. angulatus* (Schrank, 1789 77)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It is represented only by the nominative subspecies in Turkey. It probably is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: Europe, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Syria, North Africa (Algeria, Morocco).
Chorotype: Turano-Europeo-Mediterranean



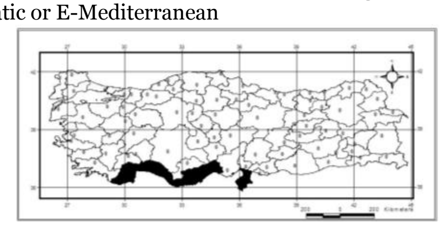
SUBGENUS *LAMPROPTERUS* Mulsant, 1862: 214
SPECIES *C. femoratus* (Germar, 1824: 519)

According to European Red List of Saproxylic Beetles, the species was placed in **LC**. It is widely distributed in Turkey. So, Turkish Red List category of the species is **LC**.
Range: SE Europe, Caucasus, Transcaucasia (Armenia, Azerbaijan, Georgia), Iran, Turkey, Cyprus, Middle East (Syria, Lebanon, Israel).
Chorotype: E-Mediterranean or SE European



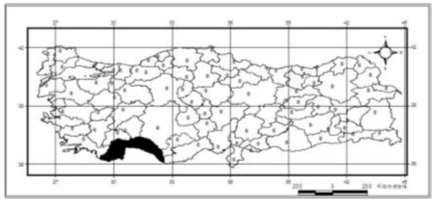
SUBGENUS *PROCALLIMUS* Pic, 1907: 7
SPECIES *C. egregius* Mulsant & Rey, 1863: 146

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It is known only from SC Anatolia. So, Turkish Red List category of the species is **NT**.
Range: E Europe (Ukraine), Caucasus, Transcaucasia (Georgia), Turkey, Syria, Lebanon.
Chorotype: SW-Asiatic or E-Mediterranean



SPECIES *C. semicyaneus* Pic, 1905: 187

According to European Red List of Saproxylic Beetles, the species was placed in **DD**. It is known only from SW Anatolia. So, Turkish Red List category of the species is **DD**.
Range: Europe (Greece), Turkey.
Chorotype: Turano-Mediterranean (Balkano-Anatolian) or E-Mediterranean (Aegean)



CONCLUSION:

With the present work, "Turkish Red List Categories" for 24 Turkish species group taxa determined (Appendix 1).

For Turkish Stenopterinae: The subfamily includes 24 species group taxa (17 species + 7 subspecies) in Turkey. Among them;

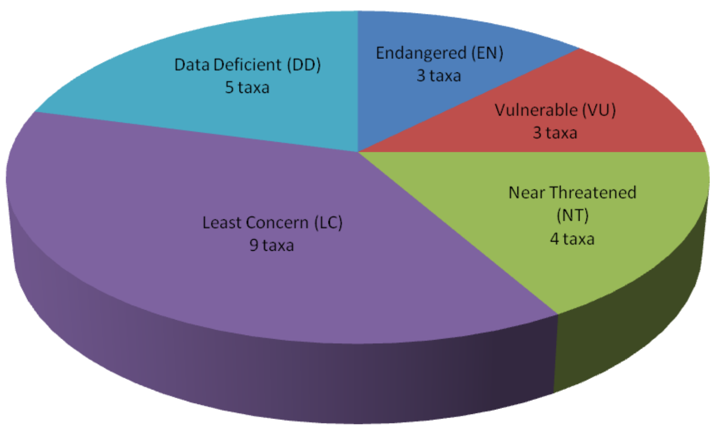
2 species and 1 subspecies is placed within "Endangered (EN)" Category.

3 species is placed within "Vulnerable (VU)" Category.

3 species and 1 subspecies are placed within "Near Threatened (NT)" Category.

5 species and 4 subspecies are placed within "Least Concern (LC)" Category.

4 species and 1 subspecies are placed within "Data Deficient (DD)" Category.



Consequently, only a total of 15 species of Stenopterinae were evaluated in "European Red List Saproxylic Beetles". Among them, the Red List Categories of 6 species were changed in "Turkish Red List".

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Appendix 1. Red List Categories of Turkish longicorn beetles belonging to Stenopterinae.

TAXA	TURKISH RED LIST CATEGORY	EUROPEAN RED LIST CATEGORY	ENDEMISM FOR TURKEY
STENOPTERINAE			
Stenopterus adlbaueri	**VU**	---	**YES**
Stenopterus atricornis	**NT**	**VU**	---
Stenopterus flavicornis	**LC**	**LC**	---
Stenopterus kraatzi	**LC**	---	**YES**
Stenopterus rufus	**LC**	**LC**	---
S. rufus geniculatus	**LC**	---	---
S. rufus syriacus	**NT**	---	---
Callimoxys gracilis	**DD**	**LC**	---
Molorchus abieticola	**DD**	---	**YES**
Molorchus juglandis	**NT**	---	---
Molorchus minor minor	**LC**	**LC**	---
Molorchus kiesenwetteri hircus	**LC**	**DD**	---
Molorchus malmusii	**EN**	---	**YES**
Molorchus marmottani	**DD**	**DD**	---
M. marmottani marmottani	**DD**	**DD**	---
M. marmottani frischi	**EN**	---	**YES**
Molorchus tenuitarsis	**VU**	---	**YES**
Molorchus umbellatarum	**LC**	**LC**	---
Nathrius brevipennis	**LC**	**DD**	---
Dolocerus holtzi	**VU**	---	---
Dolocerus reichii	**DD**	**LC**	---
Callimus akbesianus	**EN**	---	**YES**
Callimus angulatus angulatus	**LC**	**LC**	---
Callimus femoratus	**LC**	**LC**	---
Callimus egregius	**NT**	**DD**	---
Callimus semicyaneus	**DD**	**DD**	---

A NEW SPECIES OF THE GENUS *HAPLOCLASTUS* FROM WESTERN GHATS, INDIA (ARANEAE: THERAPHOSIDAE)

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[Prasanth, M. T. & Sunil Jose, K. 2014. A new species of the genus *Haploclastus* from Western Ghats, India (Araneae: Theraphosidae). Munis Entomology & Zoology, 9 (1): 494-500**]**

ABSTRACT: A new species namely *Haploclastus devamatha* (Theraphosidae) is described from Western Ghats of Kerala, India. Detailed morphological characters and illustrations of body and copulatory organs of the species are presented.

KEY WORDS: *Haploclastus devamatha* sp. nov., new species, Kerala, India.

Family Theraphosidae is characterized by larger spiders which live in burrows in the trees or ground. 800 species in 13 subfamilies are recorded from different parts of the world. In India, 41 species of theraphosids are recorded from various regions. The genus *Haploclastus* is endemic to India and is represented by six species, namely, *Haploclastus cervinus* Simon, 1892, *H. kayi* Gravely, 1915, *H. nilgirinus* Pocock, 1899, *H. satyanus* Barman, 1978, *H. tenebrosus* Gravely, 1935 and *H. validus* Pocock, 1899 (Siliwal et al., 2005; Siliwal & Raven, 2010; Platnick, 2013). The *Haploclastus* can be distinguished by the presence of a distinct maxillary heel, the digitiform nature of apical segments of the PLS, the presence of claw tufts and absence of a rastellum (Dippenaar-Schoeman 2002). The present species is collected during our studies on the theraphosid spiders of Western Ghats from Kulathupuzha reserve forest of Western Ghats.

MATERIALS AND METHODS

Taxonomic description style follows Siliwal et al. (2007). All measurements are given in millimeters. Specimens were collected by excavating the burrow by digging. Live images were taken with a Canon EOS 600D Digital Camera, with EF10mm f/2.8 macro USM. Microphotographs were taken by Canon EOS 600D Digital Camera attached to a Labomed CZM6 Stereo zoom Microscope using Remote Capture Software.

Leg and pedipalp measurements were taken from their dorsal aspect. The eyes measurements were taken by calibrated ocular micrometer and expressed in millimeters. Claws are not included in the measurement of tarsi. Total body length excludes chelicerae.

Abbreviations: ALE= anterior lateral eye; AME= anterior median eye; PME= posterior median eye; PLE= posterior lateral eye; MOQ= median ocular quadrangle; PLS= posterior lateral spinnerets; PMS= posterior median spinnerets.

TAXONOMY

THERAPHOSIDAE Thorell, 1869
HAPLOCLASTUS Simon, 1892

Type species: *Haploclastus validus* Pocock, 1899

Diagnosis: Fovea deep and slightly procurved; numerous horizontally aligned thorn-like setae in two to three rows above and below the maxillary suture along with long tapering modified setae aligned vertically in diffuse pattern on prolateral side of maxilla (Raven 1985).

Haploclastus devamatha sp. nov.

(Figs. 1-4)

Material examined: Holotype female, 2 paratypes from Kulathupuzha, Kollam District, Kerala, 31 July 2013, 8°54' 29.63"N, 77°3' 19.86"E, Elevation 45 m, Coll. Prasanth M.T and Sunil Jose K; 4 females, Achenkovil, Kollam District, Elevation 160 m, Coll. Prasanth M.T and Sunil Jose K.
Diagnosis: Bluish reflections on the dorsum of carapace, chelicerae and coxa to tibia of all legs. Dorsum of abdomen dark brown with pinkish reflections. Prolateral face of maxillae with 1 or 2 rows of longitudinally arranged thorn setae below suture, few scattered and 2 longitudinal rows above the suture. Chelicerae with 10 promarginal teeth and 13 basomesal teeth.
Etymology: The specific epithet is obtained from the name of the college, Deva Matha College, Kuravilangad.

DESCRIPTION:
Female from Kulathupuzha: Total length: 20 long. Carapace 9 long, 7 wide; chelicerae 5.5 long, abdomen 10.1 long, 7.2 wide. Spinnerets: PMS 4.3 long, 0.6 wide, 1.3 apart. PLS 3.3 total length (1.1 basal, 0.8 middle, 1.4 apical, mid width 0.58, 0.48, 0.432 respectively). Morphometry of legs and palp given in Table 1.
Colour in life (Fig. 1): Dorsum of carapace and chelicerae bluish. The margin of carapace, dorsal side of chelicerae and ocular tubercle dark brown. Sternum brown with three pairs of reddish brown sigilla. Bluish reflections on coxae to femur of all legs. Patella to tarsus of legs III and IV more pinkish than bluish. Dorsum of abdomen dark brown with pinkish reflections, ventrum yellowish brown.
Carapace (Fig. 2A): Carapace longer than wide, length to width ratio 1.19, reddish brown, anteriorly darker and posteriorly lighter. Iridescent bluish pubescence present all over the carapace, concentrated along fovea and striae, margin of carapace, and caput. Short, curved black hairs on the posterior and marginal area of carapace. Long curved brown hairs on the posterior and lateral margin of carapace. 10 long and 5 short bristles on clypeus edge; 7 long, 5 short bristles between PLE. Caput slightly higher than thoracic and cephalic region. Fovea deep, slightly procurved, with dense mat of iridescent bluish pubescence along the periphery.
Eyes (Figs. 2B, 3A): Ocular tubercle wider than long dark brown, anteriorly lighter. ALE clearly larger than rest; PME smaller than rest, PME and PLE elliptical. Iridescent bluish pubescence on posterior ocular area; a few long bristles present between MOQ. Ocular region occupies 2.5 of head width; ratio of ocular width to length 1.5. Eye diameter: ALE, 0.480; AME, 0.32; PLE. 0.18; PME, 0.144. Distance between eyes: AME-AME 0.29, AME-ALE 0.272; PME-PLE 0.048; PME-PME 0.104. MOQ: length 0.18; front width 0.304; back width 1.04.
Maxillae (Figs. 2H-I, 4A-B): Maxillae 3.1 long in front, 4.1 long in back, 2.5 wide. Posterior edge near heel concave, anterior lobe distinct, long bristles present, cuspules arranged in triangular patch in the posterior corner, serrula absent. Cuspules Ca. 135-150 sparsely arranged in a triangular patch in the anterior corner. Prolateral face with 1 or 2 rows of longitudinally arranged thorn setae

below suture, few scattered and 2 longitudinal rows above the suture. Retrolateral face reddish brown, glabrous in centre. Distal margin contains long dark brown bristles.

Labium (Figs. 2C, 4C): 1.3 long, 1.9 wide dark brown posteriorly, anterior 1/3rd portion lighter with a band of cuspules. Basal groove shallow, distinct, labiosternal groove concave. One pair of large, reddish brown sigilla present in labiosternal groove but not meeting in centre. Retrolateral face glabrous.

Chelicerae (Figs. 2E,G, 3B-D)**:** Intercheliceral spines absent, cheliceral lyra present. Long and short bristles along with bands of iridescent pubescence present on the dorsal surface. Retrolateral face reddish brown, glabrous; prolateral face with fine pallid hairs. 10 promarginal teeth, 13 basomesal teeth. Rastellum absent.

Sternum (Fig. 2C): 4.2 long, 3.8 wide, oval shape, longer than wide, high in centre, covered with long and short hairs. Posterior angle short, blunt and not separating coxae IV. Mat of reflecting hairs present over the sternum. 1-2 rows of long black bristle like hairs present on margins. Pedicel easily seen from above. Three pairs of sigilla, reddish brown in colour; posterior oval, 0.304 diameter, 1.44 apart, larger than rest; middle oval, 0.24 diameter, Ca. 2.7 apart, distance from margin,0.12; anterior, small, round , marginal.

Legs: Leg formula: 1423, first leg thicker than fourth. Coxa, trochanter and femur of legs I and II with a thick mat of bluish reflecting pubescence than legs III and IV. Metatarsus I, 1.3 times longer than tarsus; metatarsus II, 1.3 times longer than tarsus; metatarsus III, 1.25 times longer than tarsus; metatarsus IV, 1.8 times longer than tarsus. Tarsi of all the leg contains clavate, long and short filiform trichobothria.

Coxa with brown short hairs and long brown bristles having bluish reflections, anterior legs more densely covered than posterior. Coxae I and II slopping forward and III and IV slopping backwards. Coxae I widest with anterior corner distinct, edges curved dorsally. Ventral side with short brown hairs, weak thorns present on the prolateral surface of coxae.

Leg pilosity: Legs covered with mat of brown short hairs along with bluish and pinkish pubescence. Coxae to femur with a thick mat of bluish pubescence, fewer on remaining segments of legs. Patella to tarsus of leg III and IV contain more pinkish pubescence than bluish. Dorsally a band of golden brown hairs present on the distal half of patella to the proximal end of metatarsus of leg I and II, up to tarsus of leg III and IV. Leg IV with thick hairs. One or two dorsal and ventral rows of long hairs on all femur.

Scopulae: Tarsi I-IV scopulate, denser in leg I and II, confined to tarsi and 1/4thof metatarsi, not divided in leg I, partially divided in leg II. Scopulae on tarsus III and distal half of metatarsus III not denser; one-third of tarsal scapulae divided by 1-2 rows of setae. Scopulae on tarsus IV not thick, divided by thick dark brown setae; scopulae on metatarsus IV confined to lateral regions of distal end.

Claws: Paired claws, without dentition, single inferior claw in leg IV; palp with a single bare claw; claw tufts well developed, obscuring claws of legs I-II, and not in III-IV.

Abdomen pilosity: Cuticle not exposed dorsally and ventrally; dorsal and lateral sides of abdomen covered with a thick mat of pinkish pubescence intermixed with brown hairs with a pale tip. Ventrum covered with thick mat of pale hairs intermixed with golden brown hairs.

Spinneret (Figs. 2D, 4D)**:** Two pairs, digitiform, yellowish with brown hairs.

Spermathecae (Fig. 2F)**:** Two, diverging from each other.

Natural History: The spiders were collected from burrows of 10-30cms deep built in road side mud bunds. The burrows are located usually at the base of trees in between tangles of roots. The spider usually occupies the mouth of the burrow, waiting for prey. Even at the slight disturbance it moves inside the burrow. The sides of burrow are strengthened by lining with silk. More than 10- 15 small and large burrows can be found in 10 m^2 area.

Distribution: INDIA: Kulathupuzha, Achenkovil, Kollam District, Kerala.

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Table 1. Leg and palp morphometry.

Parts of leg	I	II	III	IV	palp
Femur	7.3	6.5	5.1	7	5.3
Patella	4.1	3.3	3	3.9	2.6
Tibia	6.1	4.8	3.2	4.3	3.9
Metatarsus	4.6	4	3.5	5.4	-
Tarsus	3.5	3	2.8	3	3.7
Total	35.6	21.6	17.6	23.6	14.5
Mid width					
Femur	2.1	2	1.7	1.6	1.8
Tibia	1.8	1.6	1.2	1.4	1.2

Figure 1. *Haploclastus devamatha* sp. nov. from Kulathupuzha.

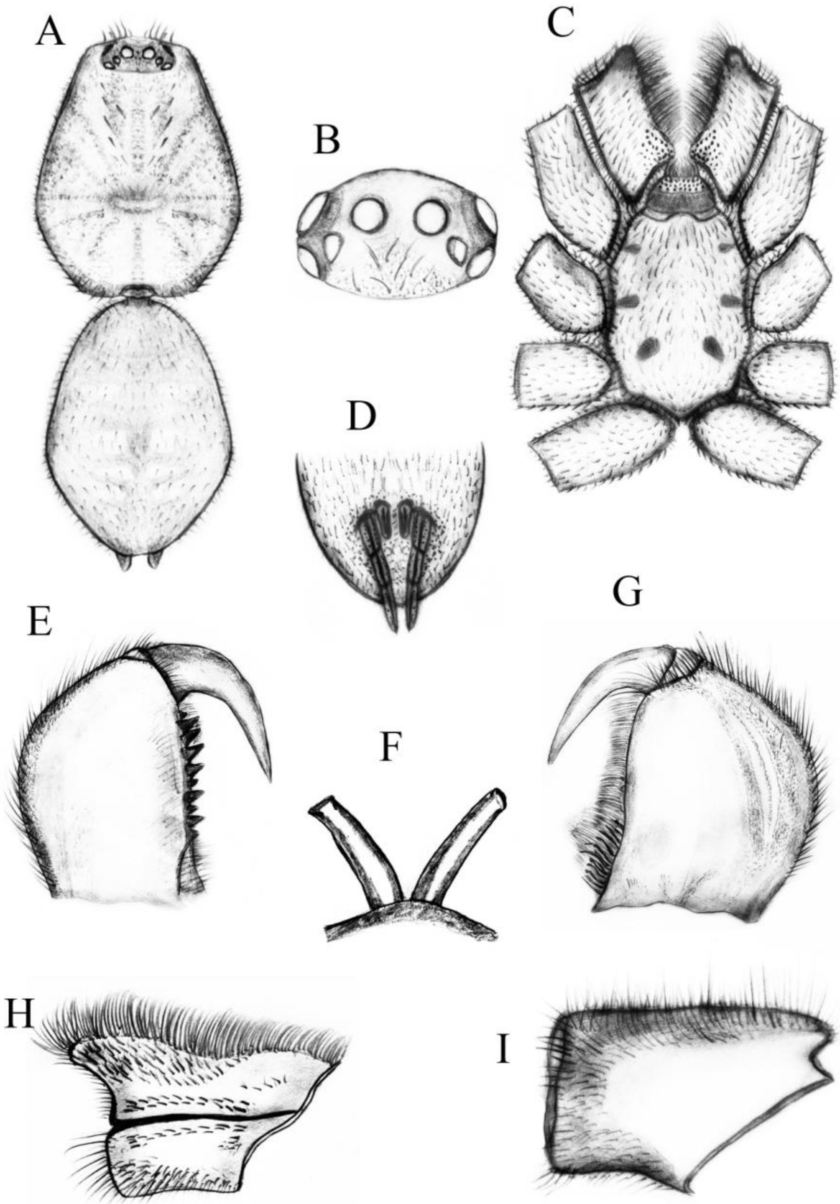

Figure 2. Diagramatic sketch of Female: A- Dorsal view; B- Eye; C- sternum, maxillae, labium; D- spinnerets; E- Chelicerae prolateral view; F. Spermatheca; G-Chelicerae retrolateral view; H- Maxillae, prolateral view; I- Maxillae retrolateral view.

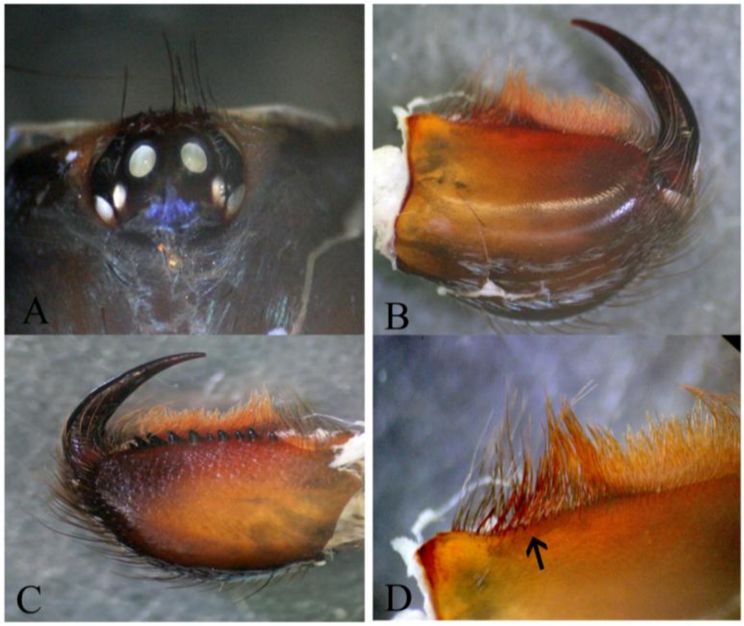

Figure 3. Microphotographs. A - Eyes, B - Chelicerae retrolateral view, C - Chelicerae prorolateral view, D. Cheliceral lyra.

Figure 4. Microphotographs. A. Maxillae - Retrolateral view, B. Maxillae – Prolateral view, C- Labium, D - Ventrum showing spinnerets.

PRELIMINARY CHECKLIST OF SPIDERS OF KEOLADEO NATIONAL PARK, BHARATPUR, RAJASTHAN WITH FIRST RECORD OF *PTOCASIUS STRUPIFER* SIMON, 1901 (ARANEAE: SALTICIDAE) FROM INDIA

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[Kaur, M., Das, S. K., K. R. Anoop & Siliwal, M. 2014. Preliminary checklist of spiders of Keoladeo National Park, Bharatpur, Rajasthan with first record of *Ptocasius strupifer* Simon, 1901 (Araneae: Salticidae) from India. Munis Entomology & Zoology, 9 (1): 501-509**]**

ABSTRACT: A preliminary checklist of spiders of the Keoladeo National Park (KNP), Bharatpur, Rajasthan is provided here based on a short term study undertaken in June-July, 2011. A total 30 species belonging to 26 genera and 11 families were recorded from the area, which forms a baseline information for spiders of KNP. Among these, Salticidae, Araneidae and Lycosidae families were found to be dominant in the area. *Ptocasius strupifer* Simon, 1901 was first time reported from India during the study, for which we provide taxonomic description in this paper. The study also revealed association of a red mite exclusively on bodies of particular spider species during the period.

KEY WORDS: Spider, Bharatpur, first report, Keoladeo National Park, *Ptocasius strupifer*, Rajasthan, Salticidae.

India is one of the megadiverse countries with only 2.4% of world's land area, and accounting about 7.43% (91,212 species) of the world's total faunal species (12,28,103 species) (Arora & Bhatt, 2008). Spiders (Arachnida: Araneae) are one of the diverse and functionally important predators regulating the terrestrial arthropod populations (Coddington & Levi, 1991). India is also rich in spider fauna, being represented by 1729 species and 437 genera in 61 families (based on Platnick, 2013). In India, major study on spiders had been concentrated in southern, eastern, central and north-easten part (Sebastein & Peter, 2009). But little is known about spiders of arid and semiarid region of this country, the major part of which comes under the state Rajasthan. After Pocock (1900) and Tikader (1966, 1987), spider fauna of this state is limited to a very few short term studies *viz.*, Sivaperuman & Rathore (2004), Singh & Sihag (2007), Chauhan et al. (2009) and Saini et al. (2012a,b).

Keoladeo National Park (KNP) is located in Bharatpur district of Rajasthan and represents both Ramsar site as well as World Heritage site (Anon, 2003; Garg et al., 2008). According to Mehra et al. (2009), the park supports more than 30 species of spiders which is based on mere speculation and till date no information is available on spiders of this area. Keeping this in mind the present study was undertaken to provide baseline information about spider fauna of this area.

STUDY AREA

The study area was Keoladeo National Park (27°7'6"N – 27°12'2"N & 77°29'5" E – 77°33'9"E; Map. 1), Bharatpur district, Rajasthan. Once being part of erstwhile state of Bharatpur which had been managed as a duck shooting reserve, in 1956 this area was declared as a Protected Area and a bird Sanctuary. Formerly known as the Ghana Bird Sanctuary, the area was upgraded into a National Park in 1981 comprising an area of 29 sq. km. at the confluence of the rivers Gambhir and Banganga (Anon, 2003). The area comes under the Biogeographic Zone 4 (Semi-Arid) (Rodgers et al. 2002) and represents a unique mosaic ecosystem supporting a rich biodiversity. The entire area is almost a flat land with a central depression of about 8.5 sq. km and that is the main submerged area of the park. The soil is alluvial with saline patches at many places and the overall climate is sub-humid to semi-arid. The vegetation of the area has been classified as Northern Tropical Thorn Forest (6B) (Champion & Seth, 1968).

METHODOLOGY

The study was carried out from 1st June to 31st July, 2011 in Keoladeo National Park and its immediate surroundings. Random survey was made during early morning hours (6 hours to 9 hours) and day time (16 hours to 18 hours) through visual encounter search in different possible microhabitats for spiders - under rocks, fallen trees and logs, in leaf litter, in canopy, on bark and on ground. Spiders were examined in the field, photographed and released back in their natural habitat after identification. Specimens which could not be identified in the field were collected in collection vials, preserved in 70% alcohol and later identified examining under microscope (Olympus MSZ Sterozoom microscope was used for this purpose). Female epigynes and male palps were dissected using a sharp entomological needle and transferred to concentrate KOH for 10 to 30 minutes in order to clear the non-chitinous tissues. All measurements were made with a calibrated ocular micrometer and are in millimeters. Identifications were done using manuals of Peckham & Peckham (1885), Pocock (1900), Tikader (1987), Tikader (1980 a, b); Tikader & Malhotra (1980), Barrion & Litsinger (1995), Song et al. (1999), Peng et al. (2002), Gajbe (2008), Sebastian & Peter (2009) and Prószyński (2012).

Abbreviations: ALE = anterior lateral eye, AME = anterior median eye, M = male, OQ = ocular quadrate, MK = Mandeep Kaur, PLE = posterior lateral eye, PME = posterior median eye, KNP= Keoladeo National Park, fe = femur, mt = metatarsus, pa = patella, ta = tarsus, ti = tibia.

RESULTS AND DISSCUSSION

A total of 30 species (Table 1) belonging to 26 genera and 11 families were recorded from the study area. Among these, high diversity was observed in families Salticidae (8 species), Araneidae (6 species) and Lycosidae (4 species) (Fig. 1). However, Mehra et al. (2009) speculated that more than 30 species of spiders occurs in KNP but till date no species information is available on spiders of this area. Hence, the present investigation provides the baseline information about spider fauna of this area.

Two interesting Salticid spiders, *viz.*, *Bianor albobimaculatus* (Lucas, 1846) (Plate 1. D-F) and *Ptocasius strupifer* Simon, 1901 (Plate 2. A-G) were recorded during the present study from KNP. Though, *Bianor albobimaculatus* is reported from India earlier (Logunov*,* 2000*;* Siliwal et al., 2005) but it's occurrence in India is not updated in the global spider database by Prószyński (2012) and Platnick (2013) as well as in the latest checklist of Indian spiders by Keswani et al. (2012). Hence, its occurrence in India is confirmed through this paper. And *Ptocasius strupifer* Simon, 1901 is reported here for the first time from India and taxonomic details for the species is provided here.

The study also revealed association of a red mite exclusively on bodies of *Oxyopes pankaji* and *Hyllus semicupreus* (Plate 1. A-C). Association of mites as ectoparasites to spiders is supported by similar reports by Banks (1896), Eason et al. (1967) and Welbourn & Young (1988). But association of mites with particular spider species as observed during this study is presumed to be by chance as the study was a very short term study and subjected to further investigation.

Since the study was carried out in summer, relatively low diversity was observed. However, we expect many more species from the area if the surveys in future are carried out during post monsoon season. Despite of summer, some interesting spiders were recorded during the study. Further, there is need of systematic long surveys in this area to understand overall species diversity of the region as well as seasonal variations in spider abundance, which otherwise cannot be detected by short term results, such as shown here.

TAXONOMY

Genus *Ptocasius* Simon, 1885

Diagnosis: The genus *Ptocasius* resembles genus *Hasarius*, the cephalothorax being almost the same, integuments covered with simple hairs and the fangs having two promarginal teeth, but eyes of the second row are more widely removed from the posterior than from the anterior eyes and the ocular area being a little longer above and wider behind. Equally near to the genus *Cytaea* but differing from it in having the cephalothorax shorter and higher, fangs with two promarginal teeth, as in *Hasarius* and finally by the integument being covered with simple hairs, while in *Cytaea* the hairs are scale-like (Peckham & Peckham, 1885) (www. *salticidae.org/).*

Ptocasius strupifer Simon, 1901

(Plate-2. A-G; Table-2)

Material examined: 1 male collected from KNP, Bharatpur, Rajasthan, India, 8 June, 2011, coll. M. Kaur, IPU-ARACH-53.

Description (all measurements in mm): Total length 9.00. Carapace length 4.00, width 3.75. Abdomen length 5.00, width 3.00. Morphometry of legs and palp is given in Table 2.

The cephalothorax is high with a rounded upper surface entirely covered with hairs, inclined in both directions from the rear eyes and has a somewhat truncated posterior margin. In live specimens it is grey brown in color with white border except OQ that is dull white with two dark brown stumpy extensions from base of the PLE to ALE. Ocular area a little wider behind than in front and almost equal to cephalic width. Eight eyes in three rows, transparent and with black bases, the eyes of the second row (PME) are a little nearer to the ALE of first row than the third row (PLE), and are separated from the ALE by deep depressions. Fovea present, clypeus brown, chelicera feathery with brown axis covered with thick white hairs. Elongated and strong reddish brown fangs with two promarginal teeth and one unequally bifid retromarginal teeth (fissidentati), sternum light brown, oval and slightly truncated towards posterior end, maxilla and labium dark brown with creamy white top and dense hairs. Legs grey brown with dense spines and hairs, the first leg is darker than the rest of the legs, leg formula 1423. Abdomen elongated oval, truncated anteriorly and slightly pointed near spinnerets; dorsum greyish brown with white border, anterior end with chalk white patch and posterior end near spinnerets with small white spot; ventrally yellowish brown, mid-ventrally yellowish brown with 2 longitudinal lines formed by light yellowish dots and surrounded by yellow and greyish brown longitudinal patches on either side. Cribellum absent and spinnerets brown. Palp organ with blunt tips, embolus of palpal organ long and originating at base of bulb.

Remark: *Ptocasius* is very close to and possibly synonymous with the much larger genus *Yaginumaella* (www. *salticidae.org/).*

Distribution: India (present record), China, Taiwan, Vietnam.

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Table 1. Checklist of spiders recorded from KNP.

FAMILY	GENUS/SPECIES	M/F
Araneidae Simon, 1895	*Argiope aemula* Walckenaer, 1842	F
	Cyrtophora citricola Forskal, 1775	F
	Eriovixia excelsa (Simon, 1889)	F
	Larinia chloris (Audouin, 1826)	M
	Neoscona mukerjei Tikader, 1980	F
	Zygeilla indica Tikader and Bal, 1980	F
Hersiliidae Thorell, 1870	*Hersilia savignyi* Lucas, 1836	M & F
Lycosidae Sundevall, 1833	*Hippasa madhuae* Tikader and Malhotra, 1980	F
	Hippasa pisaurina Pocock, 1900	F
	Pardosa songosa Tikader and Malhotra, 1976	F
	Pardosa birmanica Simon, 1884	F
Oxyopidae Thorell, 1870	*Peucetia viridana* Stoliczka, 1869	F
	Oxyopes pankaji Gajbe and Gajbe, 2001	F
Pholcidae CL Koch, 1851	*Artema atlanta* Walckenaer, 1837	F
	Pholcus phalangioides Fuesslin, 1775	F
Pisauridae Simon, 1890	*Pisaurina* sp.	M (J)
Salticidae Blackwall, 1841	*Hasarius adansoni* (Audouin, 1826)	F
	Hyllus semicupreus Simon, 1885	F
	Phintella vittata CL Koch, 1846	M & F
	Plexippus paykulli Audouin, 1826	M & F
	Telamonia dimidiata Simon, 1899	F
	Bianor albobimaculatus (Lucas, 1846)	F
	Bianor pseudomaculatus Logunov, 2001	F
	Ptocasius strupifer Simon, 1901 *	M
Sparassidae Bertkau, 1872	*Olios milleti* Pocock, 1901	F
Tetragnathidae Menge, 1866	*Leucauge decorata* (Blackwall, 1864)	F
	Tetragnatha sp.	F (J)
Thomisidae Sundevall, 1833	*Thomisus lobosus* Tikader, 1965	F
	Thomisus pugilis Stoliczka, 1869	F
Uloboridae Thorell, 1869	*Uloborus* sp.	F (J)

N.B. * First report from India; M= Male, F= Female, J=Juvenile

Table 2. Morphometry of legs of *P. weyersi* Simon, 1885 (in mm).

	Leg I	**Leg II**	**Leg III**	**Leg IV**	**Male Palp**
Fe	3.50	2.50	3.00	3.00	2.00
Pa	3.00	2.00	1.75	1.25	1.25
Ti	3.50	2.00	2.00	2.00	2.00
Mt	2.00	1.25	2.00	1.50	0.00
Ta	1.00	0.75	1.00	1.00	1.10
Total	13.00	8.50	9.75	8.75	5.35

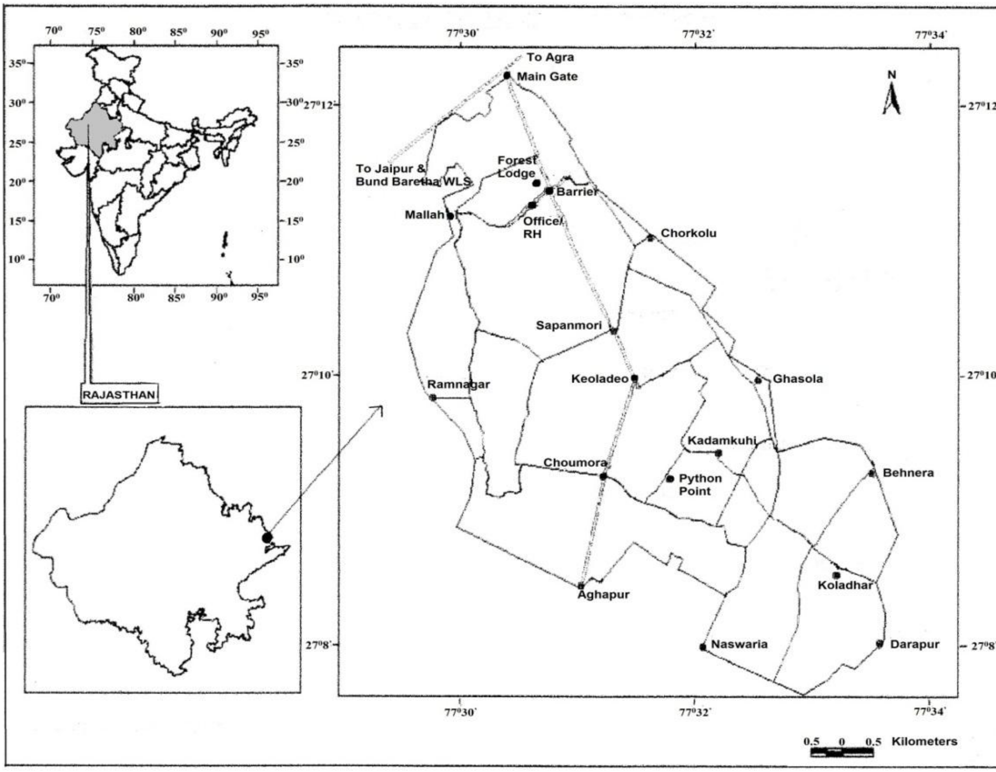

Figure 1. Map of Keoladeo National Park.

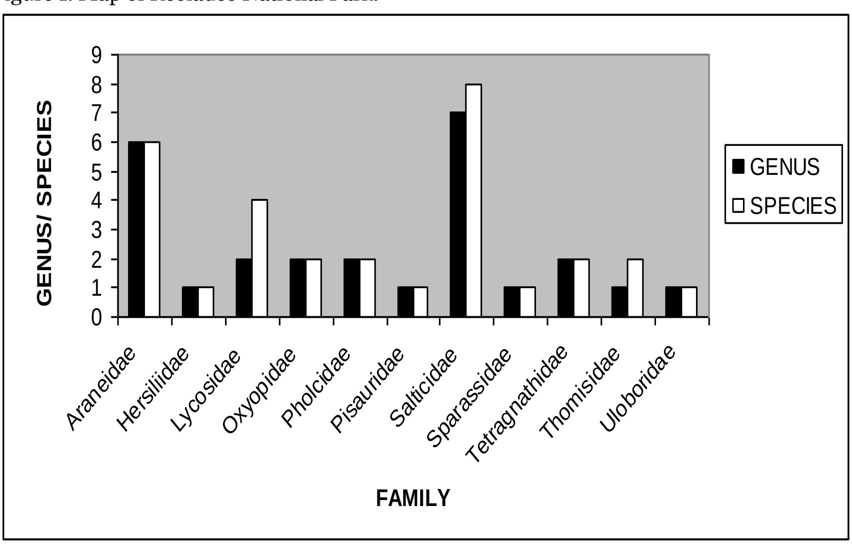

Figure 2. Spider diversity of KNP.

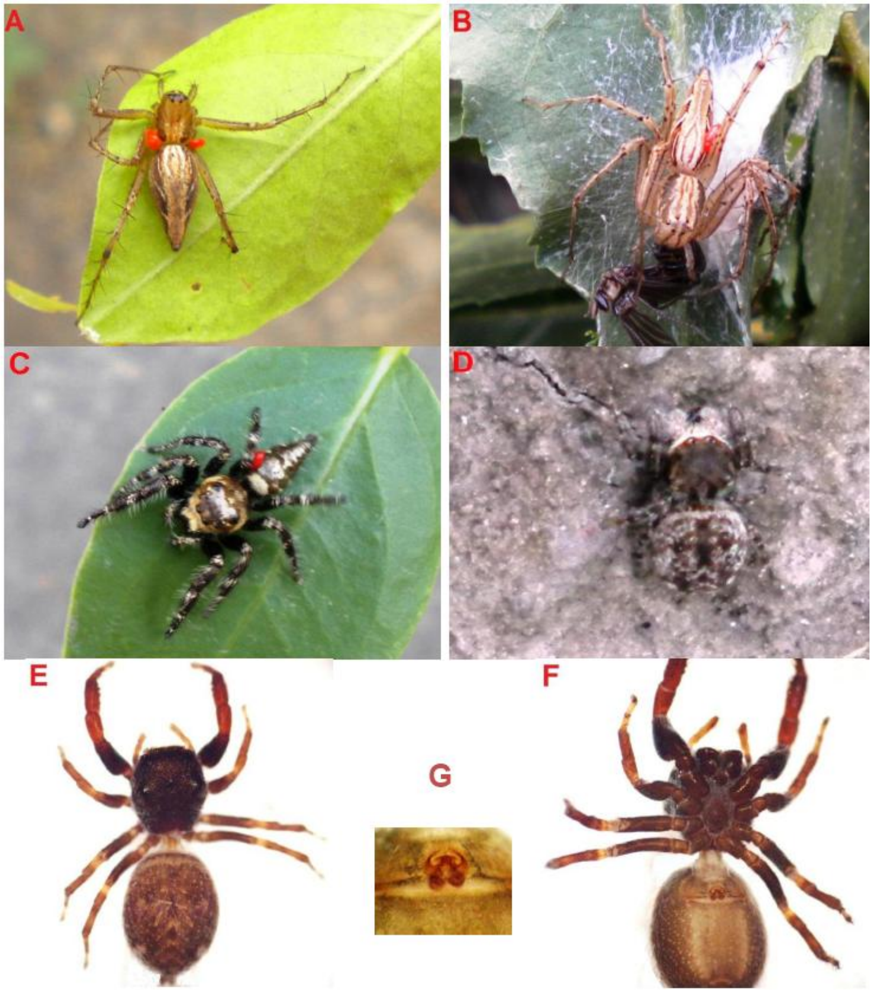

Plate 1. Spiders recorded from KNP. A, B, C (field photo): *Oxyopes pankaji* ♀ (A, B), *Hyllus semicupreus* ♀ (C); D, E, F: *Bianor albobimaculatus* ♀, Field photo (D), Dorsal view (E), Ventral view (F), Epigyne (G)

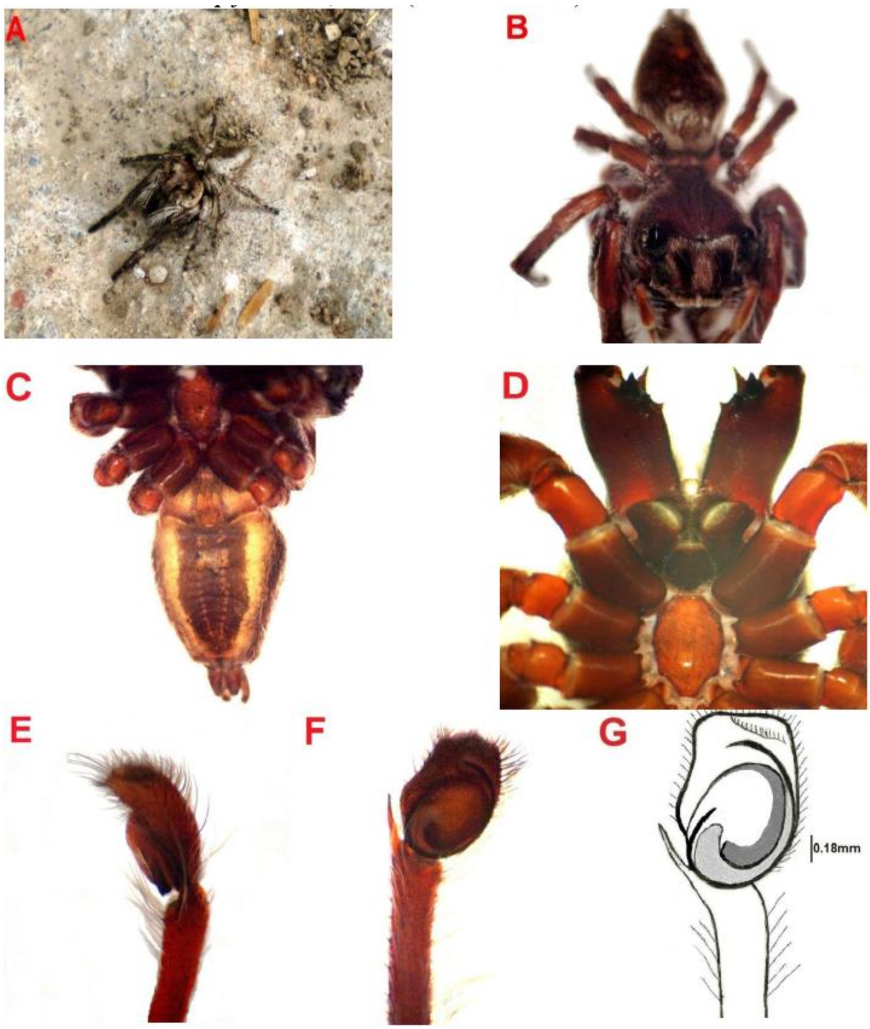

Plate-2. *Ptocasius strupifer* Simon, 1901♂ (IPU-ARACH-53) Plate 2. A: Field photo; B: Carapace and abdomen dorsal view; C: Abdomen ventral view-legs omitted; D: Sternum, maxillae, labium, chelicearae; E, F, G: Palp, Retrolateral (E), Ventral view (F, G).

SCREENING AND IDENTIFICATION OF SILKWORM BREEDS OF *BOMBYX MORI* L. FOR THEIR RESISTANT AND SUSCEPTIBLE AGANIST WHITE MUSCARDINE

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ABSTRACT: Silkworm breeds are highly unpredictable and pathogens are the main cause of diseases in silkworm rearing, diseases are more prevalent in winter and rainy seasons. The major silkworm diseases in India are grasserie, flacherie, muscardine and pebrine. Susceptibility of silkworm breeds mainly due to influence of environmental and nutritional factors. The disease résistance mechanism of a genotype has immense value, since the disease resistance results in stability of crop performance and increase in productivity. Fungal diseases are recognized as muscardine or mycoses. Silkworm attacked by more than dozen genera of fungi and white muscardine caused by entomopathogenic fungi of *Beauveria bassiana*. In Karnataka, white muscardine is named as Sunnakaddi or Sunnakattu roga and Chuna-Kete in West Bengal. The Italian names Calcino, Agostino Bassi, Italian entomologist discover the name of muscardine in 1835. White muscardine disease is rampant in all sericultural areas during winter and rainy seasons, as the humidity increases with the decreases in temperature there is possibility in increase in the spread of muscardine disease in silkworm rearing. The present study was conducted systematically to screen the multivoltine and bivoltine silkworm breeds of *Bombyx mori* L. and higher dose of conidial *B. bassiana* concentration 1×10^7 suspension was used for identify the resistant and susceptible against white muscardine disease. Out of 27 silkworm breeds, the multivoltine breed 2000H and bivoltine CSR6 exhibited relatively more resistant and susceptible breeds. The detail procedure and screening techniques, results and discussion have been dealt in the paper.

KEY WORDS: *B. bassiana, Bombyx mori* L., humidity, multivoltine and bivoltine breeds, temperature, white muscardine disease.

The silkworm, *Bombyx mori* L. is a delicate and sensitive, completely domesticated insect animal and classic model organisms for lepidoptera. Silkworm rearing is a vital aspect, which in turn decides the quality of cocoon production. The success of cocoon production depends on disease management. Diseases are prevalent throughout the year incidence exhibit differs between winter, rainy seasons and humidity is considered as one of the crucial factor. Silkworm *Bombyx mori* L. is susceptibe to various diseases caused by different microbial pathogens such as Bacteria, Fungus, Protozoan and Virus. The environmental factors of temperature and humidity largely determine the growth of the silkworm and success of a rearing reported by (Kenten, 1955; Tazima, 1978). Identification of resistant silkworm breed against particular disease plays major task, silkworm breeds show difference in their susceptibility to infectious various pathogen and pathogenic sensitivity in silkworm varies greatly depending upon larval age, moulting, metamorphosis and rearing condition. But fundamental resistance is determined by genetically. India has a long traditional and experience in the production and utilization of silk. The production of raw silk is about 15, 236 MT (Anonymus, 1999a), which earns a foreign exchange of Rs. 1,086 corers (Anonymus, 1999b). The annual crop losses due to silkworm diseases are to an extent of 35-40%, out of 5to6 cocoon crops and every year two crops are lost completely or partially due to silkworm diseases (Patil et al., 1993). Silkworm races have long been observed to be susceptibility to different diseases caused by various micro-organisms (Yokoyama, 1962; Steinhaus, 1963). All the known silkworm diseases are endemic and periodically one disease or the other occurs on as epizootic scale (Samson, 1987). Muscardine is the most virulent and contagious disease caused by fungi, it prevails in all sericultural countries (Steinhaus, 1949). In 1974 and 1975 Karnataka an estimated that, cocoon crop loss worth Rs. 3.5 crores was white muscardine disease (Anonymus, 1975). The severity of the disease is very high under conditions of incomplete disinfections and hygiene (Prasad, 1999).

White muscardine caused by *Beauveria bassiana* (Bals.) Vulli. is the most devasting silkworm disease. The Karnataka, which is the major silk producing state in the country and climatic condition in the tropics, plays a congenial for the incidence and easy spread of fungal diseases. The spread of muscardine due to high humidity and low temperature (Samson et al., 1990; Anonymus, 1992). Exploitation of the resistant/tolerant of silkworm breeds towards different diseases causing pathogens is a better option for managing the crop loss due to diseases. Certain stress factors have been identified to be most crucial influencing the disease development in silkworm rearing. (Nataraju & Datta, 1995) worked on muscardine in silkworm and reported that, it could be prevented by reducing the humidity in silkworm rearing bed and use a quality bed disinfectant.

Silkworm have adopted to a temperature of 25°C ±1°C and humidity 75±1°C and any increase or decrease in temperature and humidity cause for susceptibility in silkworm. (Steinhaus, 1958; Watanabe, 1964) reported that, temperature acting as one of stress factor. Crowding exerts a stress on the members of the population also influence the incidence of the diseases. Success of silkworm crop determined by nutrient quality and its maturity of mulberry leaf and **g**enerally bivoltine silkworm are comparatively more susceptible to multivoltine breeds. There are many reports available in literature regarding susceptibility and tolerance of different races to various diseases of silkworm (Tanada, 1967; Liu Shi Xian, 1984; Samson, 1987; Chinnaswamy; Devaiah, 1984; Nataraju, 1995; Sudhakara et al., 2008; Chandrasekharan & Nataraju, 2008). In view of the above, the present attempt has been made to understand the screening and identification of resistance and susceptibility status of silkworm breeds against fungi white muscardine disease.

MATERIAL AND METHODS

The present study was undertaken to screening and identifying the resistance and susceptibility status of different silkworm breeds against white muscardine disease of *Beauveria bassiana*. Twenty seven available productive silkworm breeds of *Bombyx mori* L. were received from germ plasm bank of multivoltine and bivoltine breeding laboratory, CSRTI, Mysore. and were screened three times. Out of twenty seven silkworm breeds, 15 multivotine silkworm breeds namely, ND5, NDV6, NP1, L14, 2000H , 96A, Diazo, MAD, BL24, BL69, PM, AGL3, AGL5, 96E, ND7. And 12 bivoltine breeds namely, CSR6, CSR53, CSR51, CSR5, CSR2, CSR16, CSR19, CSR50, CSR27, CS26, CS52 and CSR202(SL) were utilized for conducting experiment.

Preparation of PDA and inoculum of *Beuveria bassiana* dilutions:

Potato Dextrose Agar medium was used for isolation of fungus pathogen from silkworm mummified dead larva of muscardine. Fungus was cultured and purified by monohyphal tip method, under aseptic condition of Laminar Air Flow Chamber and burner was flamed till completion of whole experiments. The inoculum was prepared by a fresh conidium of fungus, which was harvested by scrapping the surface of pure PDA 14 days old culture in sterilized distilled water and drop of Tween-20. The conidial suspension was prepared and stock was again diluted in sterilized distilled water to get required high concentration of $1x10^7$ dose. The stock inoculum was quantified by following standard procedure of Neubauer haemocytometer and counting the conidia followed by (Cantwell, 1973). Silkworm layings of different breeds were collected, incubated and hatched larvae were brushed and standard rearing was followed up to 2nd moult. Experimental inoculation was done on newly ecdysed IInd moult out of 1st day 3rd instar larvae. The suspension/concentration of infective dose $1x10^7$ conidial stock/1ml (1000ul)/100 larvae were inoculated per cuteneous, sprayed on the body of larvae and two feeding was maintained/day with mulberry leaves, wet paper folds kept inside the rearing trays for increase the humidity in rearing bed in the treatment/inoculated batches. And larvae were reared under temperature at 25^{o}c±1^{o}c and relative high humidity 90 to 95%. Three replicates of 100 larvae were maintained separately in each breed. Silkworm breeds were reared in plastic trays with blue polythine sheets. The rearing was continued up to 10 days after inoculation. Progressive mortality due to white muscardine disease was observed in silkworm larvae, mortality and survival rate recorded daily in both multivoltine and bivoltine breeds up to 10 days.

The cumulative mortality and survival rate % from the data obtained in three consecutive trials of the screening data indicates the 15 multivoltine and 12 bivoltine silkworm breeds in response to fungi pathogen of *B.bassiana* have been given in the Table 1. and 2.

The mortality was calculated as per the formula given below.

$$\% \text{ Mortality} = \frac{\text{Number of dead larvae in batch}}{\text{Total number of larvae in the batch}} \times 100$$

RESULTS AND DISCUSSION

The study of resistant and susceptibility status of different silkworm breeds results indicated that, all the tested multi and bivoltine breeds are found to be differs in their susceptible. Most of the breeds are susceptible to disease as compared to resistant. Only two breeds exhibited resistant against muscardine and 52 to 54% mortality values was recorded in multivoltine breeds of 2000H and 96A. As well as higher mortality values of 69 to 71% was noticed in four bivoltine breeds. Usually mortality rate was varies in different breeds based on their genetic variability and susceptibility varies according to stage of the silkworm. Newly moultout /ecdysed larvae are more susceptible to diseases was noticed, the infection was observed from the 2nd day and rate of mortality started after 5th day of inoculation. Maximum mortality was found in 5th and 6th day and later gradually decreases. Survival batch was continued up to cocooning. 100% mortality was noticed at pupal stage. The percentage of larval mortality and survival data were recorded in silkworm breeds. Most of the breeds showed difference in their mortality and survival.

The data was statically pooled for identifying the resistant and susceptible breed based on their mortality and survival percentage. Among the 15 multivoltine silkworm breeds, 2000H and out of 12 bivoltine breeds, CSR6 were found to be more resistant and susceptible against white muscardine disease and scored average mortality rate 52.3 and 70.6 % respectively. How ever, maximum survival rate recorded 46.7 to 47.7% in between 96A and 2000H, the rate was gradually decreased 38.7 to 33.4 % as compared to other multivoltine breeds. As well as minimum survival 29.4% was noticed in CSR6 and it ranged up to 37.7% in bivoltine breeds.

The variation in the susceptibility in silkworm breeds to *Beauveria bassiana* is genetically determined by two major genes respondible for muscardine infection in silkworm. One is 'mus' gene located in the 11th chromosome and the other is 'cal' gene located in the 7th chromosome (Shimada, 1999). Similarly, this muscardine genes susceptibility may also be related to several polygenes. Early instars/young age silkworms are more susceptible to infection by microbial pathogen and it decreased with larval ageing from first to fourth instars (Aruga & Watanabe, 1964; Kobaara et al., 1967).

In India most of the farmers are unable to follow complete disease management practices due to their poor socio economical problems. Under these conditions, resistance breeds are better options. Although the disease resistance for fungi *B. bassiana* of white muscardine is controlled by polygene. The susceptibility of silkworm to different pathogens is a polygenic character (Aratake, 1973b). The susceptibility to muscardine disease varies from different silkworm breeds (Aratake, 1961).The genetic materials having strong disease resistance can form the substantial basis for breeding disease resistance. The genotypes with disease resistance gene always have better chance to survive. The resistant and susceptibility percentage ratio was calculated between multivoltine and bivoltine silkworm breeds. Three trials average % values of mortality and survival rate given in the Table 1. and 2. And Indo-Stat comparison of SD. data at 5 % level has been presented in the Table 3. and 4.

Success in sericulture industry involves two significant aspects namely prevention to disease and breeding of high yielding and disease tolerant silkworm breeds. Available genetic stock of silkworm breeds were screened systematically for their resistant and susceptibility to white muscardine. The fungal disease is influenced by several environmental conditions, such as temperature, relative humidity and light (Alves, 1988).

Identifying resistant breed will provide the genetic base for further improving productivity of high yielding genotype through various breeding programme. Screening of silkworm breed against particular pathogen possibility of covering their isolation and purification infectivity and evaluation. Screening of genotype to various diseases and identification of resistant races for various dieases has been achieved in both China and Japan (Xian, 1984).

In 1987 (Kuberappa and Jayaramaiah) have reported that, high humidity and low temperature are most congenial for the growth of *Beauveria bassiana*, which cause white muscardine disease in silkworm. **(**Fargues et al., 1997) stated that, *B. bassiana* can develop with in a wide range of temperatures, but in rearing bed temperature may not be playing a crucial role for diseases. Hat and MacLeod in 1955, identified that, germination of *B. bassian* conidial development at relative humidities above 94 % . Developing a disease resistant breeds and their genetically determined difference in silkworm has been studied by (Tanada & Kaya, 1993). In 1997, Sen et al., reported that, to develop disease reistant/tolerant breeds, the genetic mechanism underlying it should be properly understood so as to efferively transgress the tolerance in to productive breeds. (Watanabe, 1965) studied the disease resistance regard to CPV, based on genetics and IFV by (Funada, 1968). Also DNA by (Watanbe & Maeda, 1981; Eguchi et al., 1986). In

India breeding for disease resistance has received great attention. Understanding the principle and its techniques of screening of silkworm breeds against particular pathogens will form the basis and benefit to the sericulturiest as well as farmer.

The study revealed that, ten days morality data was ranged from 52.3 to 66.6% in multivoltine breeds. Similarly, it was 62.3 to 70.6% found in bivoltine breeds. Larvae suffering from white muscardine do not show any external difference to healthy ones at the primary stage but as the day progressed all the breeds succumbed to the infection. Mortality was started on 5th day after inoculation, and mortality rate was recorded another 5 days for identify the relatively resistance and susceptible to white muscardine. most of the silkworm breeds are differ in their susceptibility and only two breeds are showed more resistant level towards white muscardine. Results clearly showed silkworms are sensitive, and there may be different genetic mechanism responsible for their resistant and susceptible to fungi *Beauveria bassiana* in silkworm breeds. High mortality and low survival may be due to low level of defense mechanism, this makes silkworm weak and more susceptible to diseases in silkworm rearing. But over all results confirmed that, multivoltine 2000H and bivoltine CSR6 breeds were identified as relatively resistant and most susceptible. The Indo-Stat comparison statement of Anova L.S.D. mortality data analysis at 5 % value was revealed that, multivoltine breeds are comparatively higher significant than bivoltine breeds. Resistant breed could be utilized for the development of diseases resistant breed for developing hybrids. Further work will be carried out studies on biochemical, molecular and histopatholgical aspects of the resistant and susceptible breed to understand the mechanism of muscardine disease in silkworm.

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Table 1. Screening multivoltine silkworm breeds of *Bombyx mori,* L. (dose 1x10^7 /ml/100 larvae).

Sl No	Multivoltine Breeds	Total No. of larvae treated in each trail	Average % cumulative mortality due to white muscardine			3trails total average Mortality %	3trails total average Survival %
			1st trail	2nd trail	3rd trial		
1	ND5	300	60	63	67	63.3	36.7
2	NDV6	300	65	60	68	64.3	35.7
3	NP1	300	64	67	69	66.6	33.4
4	L14	300	64	65	60	63	37
5	2000H	300	52	50	55	52.3 **	47.7 **
6	96A	300	51	55	54	53.3	46.7
7	Diazo	300	65	60	67	64	36
8	MAD	300	64	68	63	65	35
9	BL24	300	65	67	64	65.3	34.7
10	BL69	300	63	64	61	62.6	37.4
11	PM	300	62	63	60	61.6	38.4
12	AGL3	300	60	62	65	62.3	37.7
13	AGL5	300	63	66	61	63.3	36.7
14	96E	300	62	65	64	63.6	36.4
15	ND7	300	59	64	61	61.3	38.7

** Indicated highly resistant breed.

Table 2. Screening bivoltine silkworm breeds of *Bombyx mori,* L. (dose 1x10^7/ml/100 larvae).

Sl No	Bivoltine Breeds	Total No. of larvae treated in each trail	Average%cumulative mortality due to white muscardine			3 trails total average Mortality %	3 trails total average Survival % rate
			1st trail	2nd trail	3rd trail		
1	CSR6	300	70	72	70	70.6*	29.4*
2	CSR53	300	59	64	63	62.3	37.7
3	CSR51	300	68	70	71	69.6	30.4
4	CSR5	300	68	71	69	69.3	30.7
5	CSR2	300	66	68	72	68.6	31.4
6	CSR16	300	60	65	71	65.3	34.7
7	CSR19	300	65	68	70	67.6	32.4
8	CSR50	300	72	65	69	68.6	31.4
9	CSR27	300	71	70	68	69.6	30.4
10	CSR26	300	64	67	69	66.6	33.4
11	CSR52	300	61	64	67	64	36
12	CSR202 (SL)	300	68	65	63	65.3	34.7

* Indicates highly susceptible breed.

Table 3. Mean mortality in Multivoltine breeds SD, SE and CV comparisons at 5 % level.

Sl No	Multivoltine Breeds	Mean ±SD	S.E	C.V
1	ND5	63.33±3.51	2.028	3.201
2	NDV6	64.33±4.04	2.333	3.627
3	NP1	66.67±2.52	1.453	2.179
4	L14	63.00±2.65	1.528	2.425
5	2000H	52.33±2.52	1.453	2.776
6	96A	53.33±2.08	1.202	2.253
7	Diazo	64.00±3.61	2.082	3.253
8	MAD	65.00±2.65	1.528	2.350
9	BL24	65.33±1.53	0.882	1.350
10	BL69	62.67±1.53	0.882	1.407
11	PM	61.67±1.53	0.882	1.430
12	AGL3	62.33±2.52	1.453	2.331
13	AGL5	63.33±2.52	1.453	2.294
14	96E	63.67±1.53	0.882	1.385
15	ND7	61.33±2.52	1.453	2.369

Table 4. Mean mortality in Bivoltine breeds SD, SE and CV comparisons at 5 % level.

Sl No	Bivoltine breeds	Mean ±SD	S.E	C.V
1	CSR6	70.67±1.16	0.667	0.943
2	CSR53	62.30±2.65	1.528	2.464
3	CSR51	69.67±1.53	0.882	1.266
4	CSR5	69.33±1.53	0.882	1.272
5	CSR2	68.67±3.06	1.764	2.569
6	CSR16	65.33±5.51	3.180	4.867
7	CSR19	67.67±2.52	1.453	2.147
8	CSR50	68.67±3.51	2.028	2.953
9	CSR27	69.67±1.52	0.882	1.266
10	CSR26	66.67±2.52	1.453	2.179
11	CSR52	64.00±3.00	1.732	2.706
12	CSR202(SL)	65.33±2.52	1.453	2.224

Comparison	Std. Error	S.E. Diff	t value 5%	C.V. %	C. Diff
Multivoltine	1.67	2.30	2.06	4.18	4.75
Bivoltine	1.50	2.12	2.04	4.17	4.33

STUDIES ON CROSS INFECTIVITY OF PEBRINE DISEASE FROM MUGA TO ERI SILKWORM

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[Das, K., Das, R., Bora, A. & Rajan, R. K. 2014. Studies on cross infectivity of pebrine disease from Muga to Eri silkworm. Munis Entomology & Zoology, 9 (1): 518-520**]**

ABSTRACT: The causal organism of Pebrine disease *Nosema antheraea* was inoculated in second instar healthy eri silkwom larvae in ambient temperature and relative humidity. The data showed that pebrine disease caused significantly highest larval mortality in September-October (13.7%) followed by May-June (7.5%) and July-August (5.3%). Highest pupal mortality was recorded in July-August (13.2%) followed by May-June (9.6%). Significantly highest infection in adult moths was recorded in May-June (63.72%) followed by September-October (60.25%) and July-August (56.80%) which confirmed the cross infectivity of pebrine disease from muga to eri silkworm.

KEY WORDS: Eri silkworm, microsporidian, mugasilkworm, nosema, pebrin.

Pebrine is an insidious and chronic disease in muga silkworm, *Antheraea assamensis*, Helfer, caused by highly virulent microsporidian parasite *Nosema antheraea*. Most of the entomopathogenic microsporidia occur in the genus *Nosema* and more than 150 described species have been reported in 12 orders of insects (Becnel & Andreadis, 1999). Canning, (1977) reported that microsporidian are the most important protozoan pathogens of insects and fishes and over seven hundred species of them were recorded from these hosts. In mulberry silkworm, *Nosema bombycis, Nosema* sp. *Pleistophora* sp. *Thelohania* sp. and *Leptomonus* sp. causes microsporidiosis, commonly known as pebrine disease (Jolly, 1986: Abe, 1978). Different mulberry pests and lepidopterans were known to harbour microsporidian (Sharma et al., 1987). Ishihara & Iwano, (1991) reported that the perpetual incidence of microsporidian infection in silkworm may be due to various sources of secondary contamination or crossed infection from the alternate hosts. The periodic occurrence of pebrine disease in the rearing field indicates the possibility of cross infection of pebrine spore from the other alternate host. It was observed that most of the farmers raised their plantations such as, som, soalu castor, kesseru in the same farm and conducted muga silkworm rearing in the som and soalu plants and at the same time harvest castor, kesseru leaves for eri silkworm rearing which have a possibility for chances of transmit of pebrine pathogen from muga to eri silkworm.

In view of this, the present investigation was carried out to ascertain the cross infectivity of pathogen of pebrine disease from muga to eri silkworm.

MATERIALS AND METHODS

Purification of pebrine pathogen from muga silkworm:

Pebrine infected muga silkworm larvae were collected from the farmer's field of Jorhat district and killed by anesthetic (chloroform) and homogenized in 0.5% K_2CO_3 containing 0.85% NaCl solution. The homogegenate was allowed to settle for 3min and filter through muslin cloth. The filtrate was centrifuged at 3000rpm for 5mim and the pellet was suspended in water. The smear was observed under microscope (40x 15) for pebrine spores. The shape, size, luster and Brownian movement were used as a indices for the identification of pebrine spore.

Infectivity test in Eri silkworm:

The stock of purified pebrine spores was diluted to 1x106 spores/ml smeared on castor leaves. The smeared leaves were fed to second instar healthy eri silkworms during may-June, 2004, July-August.2004 and September-October, 2004. Ten replications of each treatment containing 100 larvae in each were maintained under CRD design. The rearing was conducted in ambient temperature and humidity in the rearing house. The larvae were reared up to spinning stage and the mortality occurred in larval and pupal stage due to pebrine as well as others was recorded. All the adult moths were microscopically examined individually in each crops and percentage of infection of pebrine were calculated and analyzed the data statistically.

RESULTS AND DISCUSSIONS

The analysis data on mortality of larvae due to pebrine, others and infection in adult moths were recorded and present in the table 1.

The morphological character of pebrine spores which was observed in inoculated eri silkworm larvae was identical in size, luster and Brownian movement and designated as *Nosema antheraea*. The data showed that pebrine disease caused significantly highest larval mortality in September-October (13.7%) followed by May-June (7.5%) and July-August (5.3%). Highest pupal mortality was recorded in July-August (13.2%) followed by May-June (9.6%). Significantly highest infection in adult moths was recorded in May-June (63.72%) followed by September-October (60.25%) and July-August (56.80%) which confirmed the cross infectivity of pebrine disease from muga to eri silkworm.

The present study revealed that the causal organism pebrine disease of muga silkworm infect eri silkworm and alarmingly higher percentage of infection 56.8 to 63.72 was recorded in adult moth. Similar results obtained in *Nosema mensili* isolated from *Pieris rapae* Crucivora (Abe & Kawarbata, 1988) and *Nosema* sp. isolated from *Tribolium* sp. (Fisher & Sanborn, 1962) reported to be cross infective to the silkworm. Ishihara and Iwano (1991) isolated *Nosema bombycis* from *Spodoptera depravata* which was infected to *Bonbyx morie* and confirmed the cross infection.

From the present study it is concluded that it was first time study on cross infectivity of pebrine disease from muga to eri silkworm and more than 60% cross infection was recorded in eri silkworm in adult moths which confirmed the cross infection.

As the pathogen is same it is advisable to take utmost care during rearing and grainage period of muga and eri silkworms.

Leaves of castor and kesseru grown near by muga silkworm rearing field should be avoided for feeding to eri silkworm rearing.

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Table 1. Cross infectivity of pebrine disease inoculated from muga to eri silkworm.

Treatment	Mortality (%)						Live moth		
	Pebrine Disease								
	May-June		July-Aug		Sept-Oct		May-June	July-Aug	Sept-Oct
	L	P	L	P	L	P	Adult Moth (%)		
Inoculated	7.5 (15.89)	9.6 (18.05)	5.3 (13.31)	13.2 (21.30)	13.7 (21.72)	0.00 (4.05)	63.72 (52.96)	56.80 (48.91)	60.25 (50.91)
Control	-	-	-	-	-	-	-	-	-
SD (p= 0.05)	L= 1.48 P= 3.20								

Data in parentheses are arcsine transformed value
L: Larvae, P: Pupae

DEVELOPMENT OF DIFFERENT EGG PRESERVATION SCHEDULES FOR "BARPAT", AN UNIVOLTINE RACE OF THE MULBERRY SILKWORM, *BOMBYX MORI* L.

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[Singh, R., Reddy, G. V., Rajanna, K. L., Vijayakumari, K. M., Angadi, B. S. & Sivaprasad, V. 2014. Development of different egg preservation schedules for "Barpat", an univoltine race of the Mulberry Silkworm, *Bombyx mori* L.. Munis Entomology & Zoology, 9 (1): 521-524**]**

ABSTRACT: A study was conducted at Silkworm Seed Technology Laboratory, Kodathi, Bangalore, to evaluate a tropical univoltine race "Barpat" by preserving the eggs for 4, 6, 8 and 10 months preservation schedules following 10, 20, 40 and 60 days aestivation period respectively. The results indicated that fecundity ranged from 406 to 566, hatching ranged from 77 to 85%, effective rate of rearing (ERR) ranged from 8855 to 9800, pupation from 92.18 to 93.19%, cocoon weight from 1.243 to 1.374 g, cocoon shell weight from 0.203 to 0.224 g and cocoon shell percentage ranged from 15.13 to 17.37 %. Further studies are in progress to utilize the univoltine race as male parent with indigenous multivoltine races namely, Pure Mysore, Sarupat and Nistari to know the feasibility of utilization of univoltine race in order to get sustainable cocoon crops in the field.

KEY WORDS: Barpat, *Bombyx mori*, Egg preservation, Evaluation, Multivoltine, Univoltine.

"Barpat" or Borpolu is the only tropical univoltine silkworm race in the world available in northeastern part of India. Unlike other univoltine races, "Barpat" does not possess high quantitative characters but it has some important features like resistant to various silkworm diseases, tolerant to high temperature, no double cocoons, silk is free from lousiness ensuring best quality silk yielding among indigenous races and survival even in severe weather conditions (Chowdhury, 2004; 2005). "Barpat" is almost restricted to spring season and is being reared in a limited scale by some farmers particularly in Majuli River Island in Jorhat district of Assam. It was thought that Barpat has been extinct but it has been retrieved. Farmers generally face the problem regarding the hatching of "Barpat". Chowdhury (1989) has observed higher response towards artificial parthenogenesis as compared to bivoltine breeds. Recently, salient features of "Barpat" have been studied (Singh et al., 2012). This study has been undertaken to know the performance of the univoltine race following 4, 6, 8 and 10 months egg preservation schedules in order to facilitate the farmers for increased quality silk production in the northeastern regions of India.

MATERIALS AND MEHODS

A tropical univoltine race "Barpat" was collected from Jammu and Kashmir during June, 20012 and first rearing was conducted during July, 2012. Eggs generated were preserved for 4, 6, 8 and 10 months preservation schedules following 10, 20, 40 and 60 days aestivation period. Different preservation schedules have been depicted in Fig. 1 - 4. Eggs were released and rearings were conducted as per the schedule. Three replications were maintained with 300 larvae in each replication. Data were recorded for seven economic characters *viz*., fecundity, hatching percentage, effective rate of rearing, pupation rate, cocoon weight, cocoon shell weight and cocoon shell percentage.

RESULTS AND DISCUSSION

Performance of “Barpat” during 4, 6, 8 and 10 months preservation schedules has been given in Table 1. Maximum fecundity of 566 was observed following 6 months preservation schedule. Hatching percentage ranged from 77.28 to 85.01%. Effective rate of rearing (ERR) ranged from 8855 to 9022 whereas pupation varied from 92.18 to 93.19 %. Cocoon weight ranged from 1.243 to 1.374 g, cocoon shell weight ranged from 0.203 to 0.224 g and cocoon shell percentage ranged from15.13 to 17.37 %.

Presently, the main challenge before Indian sericulture is to increase the quality silk in the domestic markets. Exploitation of the tropical univoltine race “Barpat” possessing quality silk coupled with hardiness character will not only improve the quality of silk but also will be useful to increase temperature tolerance and disease resistance in silkworm crops. Study on egg preservation schedule of the univotlne “Barpat” would be an added advantage in order to obtain silkworm eggs as and when required to get sustainable silkworm crops. Studies on long-term preservation schedules have been carried out in bivoltine (Reddy et al., 2004; Rajanna et al., 2008) and non - diapause eggs (Kumareshan et al., 2004; Singh et al., 2010; Rajanna et al., 2009; 2011) of the mulberry silkworm. Further studies are needed utilize “Barpat” with other indigenous multivoltine silkworm races such as Pure Mysore, Sarupat and Nistari to obtain higher cocoon yield.

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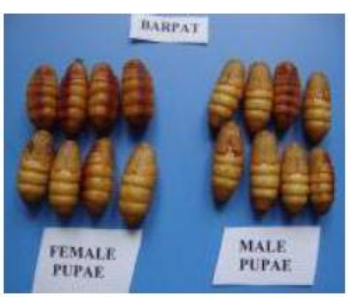
Table 1. Performance of univoltine race “Barpat” during different hibernation schedules.

Preservation schedule	Fecundity (No.)	Hatching %	Effective Rate of Rearing (ERR)	Pupation (%)	Cocoon weight (g)	Cocoon shell weight (g)	Cocoon shell %
4 months	406 ± 10	80.93 ± 3.58	9122 ± 84	92.96 ± 0.32	1.243 ± 0.001	0.216 ± 0.002	17.37 ± 0.16
6 months	566 ± 21	77.28 ± 3.46	9800 ± 262	92.18 ± 0.93	1.340 ± 0.05	0.203 ± 0.01	15.13 ± 0.42
8 months	458 ± 43	82.72 ± 2.19	8855 ± 277	93.01 ± 0.55	1.374 ± 0.09	0.224 ± 0.01	16.29 ± 0.09
10 months	528 ± 24	85.01 ± 1.97	9022 ± 422	93.19 ± 0.97	1.347 ± 0.05	0.204 ± 0.008	15.17 ± 0.07

Data mean ± SD of three replications.

1

2



3

4

Plate I. Photographs of univoltine race “Barpat”: 1. Eggs, 2. Larvae, 3. Pupae and 4. Cocoons.

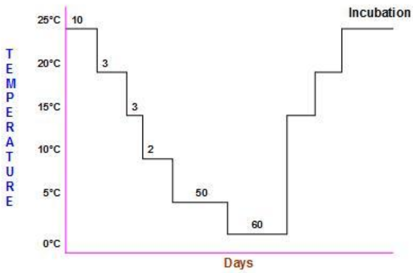


Fig.1. 4 months preservation schedule

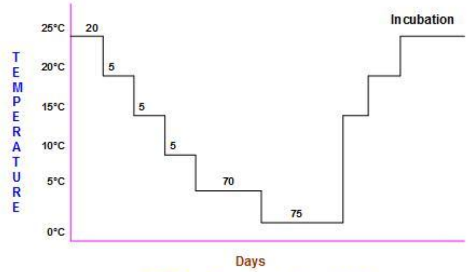


Fig.2. 6 months preservation schedule

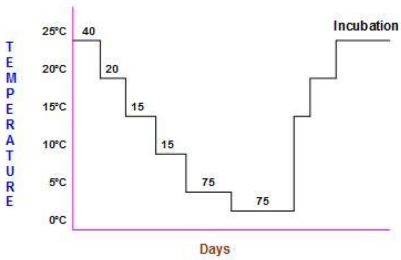


Fig.3. 8 months preservation schedule

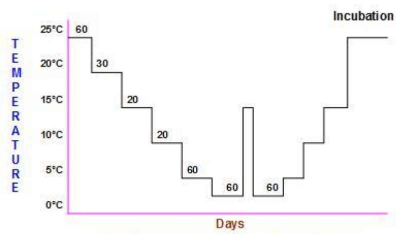


Fig.4. 10 months preservation schedule

NEW RECORDS OF HEMIPTERA (INSECTA) FROM TAWANG DISTRICT, ARUNACHAL PRADESH INDIA

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[Chandra, K. & Kushwaha, S. 2014. New records of Hemiptera (Insecta) from Tawang District, Arunachal Pradesh India. Munis Entomology & Zoology, 9 (1): 525-529**]**

ABSTRACT: Tawang district is located in western part of Arunachal Pradesh, bordering Bhutan and China covering approximately 2085 sq. km. area, having the forest covers of 1230 sq. km. The district is divided into 3 subdivisions viz. Tawang, Lumla and Jang. While working on faunal diversity of the district by the first author, the specimens of true bugs were also collected. The identification yielded the record of 17 species of order Hemiptera belonging to 15 genera representing 9 families. All these species are new addition to the fauna of Tawang district, Arunachal Pradesh.

KEY WORDS: Faunal diversity, new addition and true bugs.

The name Tawang derives from some bearings on surroundings. district is roughly located around latitude 27° 45' N and longitude 90° 15' E. The district is divided into 3 subdivisions Tawang, Lumla and Jang. Tawang subdivision is divided into 2 administrative circles Tawang and Kitpi. Lumla subdivision is divided into 4 administrative circles: Bongkhar, Dudunghar, Lumla and Zemithang. Jang subdivision is divided into 4 administrative circles Jang, Mukto, Thingbu and Lhou.

Hemiptera is a large diverse group of insects. Earlier authorities recognize the two orders of these insects, the Hemiptera or true bugs and the Homoptera including cicadas, hoppers, aphids and their allies. Earlier classification had the Homoptera divided into two suborders, the Auchenorrhyncha, containing the cicads and hoppers and the Sternorrhyncha, including the psyllids, whiteflies, aphids and scale insects. There are 133 families of Hemiptera found worldwide, consisting about 184000-193000 species (Hodkinson & Casson, 1991). Present study describes 15 genera of order Hemiptera representing 17 species belonging to 9 families of suborder Hetroptera and Auchenorrhyncha. Earlier work on Hemipteran insects In Arunanchal Pradesh was done by Singh et al. (2010).

MATERIALS AND METHODS

Bugs were collected by local surveys undertaken by the scientific team of Dr. Kailash Chandra Zoological Survey of India, Jabalpur from various localities of Tawang District of Arunanchal Pradesh state India in month of October and November in the year 2009. Examples of bugs were collected by using the light trap, net-sweep and hand picking methods various local spots. Collected bugs were sorted out, pinned and identified with the help of reference collection and literature present in ZSI (Jabalpur Centre and HQs Kolkata) and Fauna of British India (Distant 1902, 1904 and 1916). Microscopy and photography was done by Leica M205-A Stereo zoom microscope (Plate 1 and 2).

RESULTS AND DISCUSSION

Present investigation reports altogether 17 species pertaining to 9 families of order Hemiptera, 3 species belonging to suborder Auchenorrhyncha and 14 species from suborder Heteropterodea from Tawang District of Arunanchal Pradesh India. More investigation is needed to draw the faunastic profile of order Hemiptera of Arunanchal Pradesh India. All the 17 species are new record to Tawang District of Arunanchal Pradesh India.

ACKNOWLEDGEMENTS

Authors are grateful to Dr. K. Venkataraman, Director, Zoological Survey of India for his kind support, encouragement and institutional facilities. Thanks are also due to Officer-in-Charge of Hemiptera section, ZSI, Kolkata for the support in identification of specimens.

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Table 1. Showing the distribution of New records of Hemiptera fauna from Tawang district.

S. No.	Suborder/Infraorder/Superfamily /Family/Species	No. of Exp.	Locality (Local Area)	Date of Collection
	Order:Hemiptera			
	Suborder:Auchenorrhyncha			
	Infraorder: Cicadomorpha			
	Superfamily:Cicadelloidea			
	Family: Cicadellidae			
1	*Atkinsoniella mungphuensis* (Distant)	1	Lumla	04. X. 2009
2	*Bothrogonia ferruginea* Fabricius			
	Infraorder: Fulgoromorpha			
	Superfamily: Fulgoroidea			
	Family: Dictyophoridae			
3	*Oliarus indicus* Distant	1	Zimmithang	30. IX. 2009
	Suborder: Heteropterodea			
	Infraorder: Cimicomorpha			

	Superfamily: Cimicoidea			
	Family: Reduviidae			
4	*Coranus fuscipennis* Reuter	1	BTK, Zimmithang	11.X.2009
	Family: Nabidae			
5	*Dodonaeus humeralis* Distant	1	Lumla CH	02.X.2009
	Infraorder: Pentatomorpha			
	Superfamily: Pyrrhocoroidea			
	Family: Phyrrhocoridae			
6	*Physopelta gutta* (Burmeister)	1 2	Lumla Zimmithang	02. X. 2009 30. IX. 2009
	Superfamily: Coreoidea			
	Family: Alydidae			
7	*Riptortus pedestris* (Fabricius)	1	Lumla	02. X. 2009
8	*Riptortus fuscus* (Fabricius)	1 1	Lumla Zimmithang	02. X. 2009 10. X. 2009
	Family: Coreidae			
9	*Cletus punctulatus* (Westwood)	3	BTK, Zimmithang	11.X.2009
	Superfamily: Pentatomoidea			
	Family: Pentatomidae			
10	*Apodiphus pilipes,* Horváth	1	Sela	05. X. 2009
11	*Nezara viridula,* (Linnaeus)	1	Thrillum	03. X. 2009
12	*Urostylis gracilis,* Dallas	2	Zimmithang	11.X.2009
13	*Urochela bimaculata* Dallas	1	Thrillum	03. X. 2009
14	*Urochela guttulata,* Stål	3	Zimmithang CH	30.IX.209
15	*Tropicoris* punctipes Stål	1	Lumla	01.X.2009
16	*Prionaca lata* Dallas	1	Lumla	01.X.2009
	Family: Plataspidae			
17	*Captosoma contectum* Montand	6	Lumla	01. X. 2009

Plate 1

Atkinsoniella mungphuensis (Distant)

Bothrogonia ferruginea Fabricius

Oliarus indicus Distant

Physopelta gutta (Burmeister)

Riptortus pedestris (Fabricius)

Apodiphus pilipes, Horváth

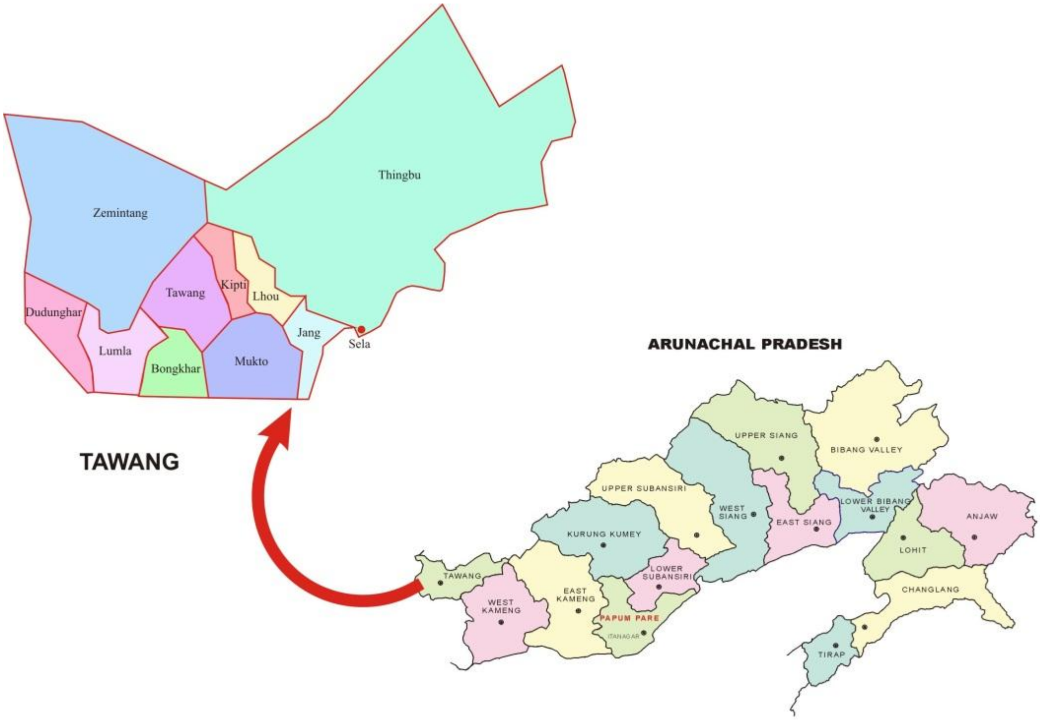
Plate 2

Captosoma contectum Montand

Urochela bimaculata Dallas

Nezara viridula, (Linnaeus)

Cletus punctulatus (Westwood)



District Map of Tawang District of Arunanchal Pradesh state, India covered for this study.

CHOROTYPE IDENTIFICATION FOR TURKISH CHRYSOMELOIDEA (COLEOPTERA) PART IX – MEGALOPODIDAE AND ORSODACNIDAE

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[**Özdikmen, H.** 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part IX – Megalopodidae and Orsodacnidae. Munis Entomology & Zoology, 9 (1): 530-534]

ABSTRACT: The paper gives chorotype identifications for Turkish Megalopodidae and Orsodacnidae (Coleoptera: Chrysomeloidea). In association with this, some zoogeographical remarks are also given in the text.

KEY WORDS: Megalopodidae, Orsodacnidae, Chrysomeloidea, Fauna, Zoogeography, Turkey.

Works on Turkish leaf beetles began in late 19th century. Especially since the last century, they were increased as chiefly faunistic and taxonomic works. Recently, they continue with an increased speed.

Clearly, there is no any work on zoogeographical regionalisation of Turkish Chrysomeloidea related the whole territories of Turkey or regions of Turkey (see Part I for regions in Turkey) at the present.

As known, a series work was planned that is aim to expose zoogeographical regionalisations of Turkish Chrysomeloidea fauna. Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014), Özdikmen & Kavak (2014), Özdikmen & Topcu (2014) and Özdikmen (2014a,b) are the previous works for this aim. The present study is attempted as the nineth step of this aim.

ARRANGEMENT OF INFORMATION

Information in the present text is given in the following order:

The subfamily, genus, species and subspecies names are given simply.

For each genus, species and subspecies are presented with the author name and date of description.

The data, **Range**, **Records in Turkey**, **Remarks** and **Chorotype** under the title for each taxon is given.

Range. In these parts, the whole distribution areas in world are provided for each taxon as in Löbl & Smetana (2010) (see the cited reference for the abbreviations).

Records in Turkey. In these parts, the whole distribution areas in Turkey are provided for each taxon as in Ekiz et al. (2013) (see the cited reference for the abbreviations).

Remarks. In these parts, regional and general distribution in Turkey are given chiefly.

Chorotype. The present zoogeographical characterization.

The present zoogeographical characterization is based on the chorotype classification of Anatolian fauna, recently proposed by Vigna Taglianti et al. (1999). In the text, as far as possible one chorotype description can be identificated for each taxon. But this kind of description can not be possible for some taxa, so two or more chorotypes are used for them.

With this purpose, Löbl & Smetana (2010) for the range in the world, Ekiz et al. (2013) for the provincial distribution in Turkey and Özdikmen et al. (2014) for the fauna of Turkey are used chiefly.

According to Özdikmen et al. (2014), Turkish Megalopodidae comprises of 3 species of 2 genera and Turkish Orsodacnidae comprises of 3 species of 1 genus.

Family MEGALOPODIDAE
Subfamily MEGALOPODINAE

Genus *Temnaspis* Lacordaire, 1845
***T. nigropunctata* (Pic, 1896)**
Range: A: SY TR **Records in Turkey:** TR-A: ADA, HAT **Remarks:** The species has been recorded only from Mediterranean Region in Turkey until now. **Chorotype:** SW-Asiatic (Syro-Anatolian)

Subfamily ZEUGOPHORINAE

Genus *Zeugophora* Kunze, 1818
Subgenus *Zeugophora* Kunze, 1818
***Z. scutellaris* Suffrian, 1840**
Range: E:AU BE BY CZ DE FI FR GE HU IT LA LT NL NR NT PL SK SV SZ **A:** ES GAN HEB HEI IN IS JIL KI KZ LIA NMO SY TD TR WS XIN **NAR Records in Turkey:** TR-A: KON **Remarks:** The species has been recorded only from Central Anatolian Region in Turkey until now. **Chorotype:** Holarctic

***Z. subspinosa* (Fabricius, 1781)**
Range: E: AU BE BU BY CT CZ DE EN FI FR GB GE HU IT LA LT NL NR NT PL SK ST SV SZ TR UK YU **A:** ES FE KZ MG WS **Records Records in Turkey:** TR-E: IST **Remarks:** The species has been recorded only from Marmara Region in Turkey until now. **Chorotype:** Sibero-European

Family ORSODACNIDAE
Subfamily ORSODACNINAE

Genus *Orsodacne* Latreille, 1802
***O. cerasi* (Linnaeus, 1758)**
Range: E: AB AU BE BU BY CR CT CZ DE EN FI FR GB GE HU IT LA LS LT MD NL NR NT PL RO SK SP ST SV SZ UK YU **A:** ES TR WS **Records in Turkey:** TR-A: IZM **Remarks:** The species has been recorded only from Aegean Region in Turkey until now. **Chorotype:** Sibero-European

***O. humeralis* Latreille, 1804**
Range: E: AB AU BH BU CR CZ FR GB GE GR HU IT MC MD PL PT RO SK SL SP SZ UK **A:** CY TR **Records in Turkey:** TR-A: ANK – TR-E **Remarks:** The species has been recorded only from 2 Turkish regions as Central Anatolian Region and Marmara Region until now. **Chorotype:** European

***O. variabilis* Bally, 1877**
Range: A: “Kurdistan” **Records in Turkey:** TR-A: AYD, ISP, IZM **Remarks:** The species has been recorded only from 2 Turkish regions as Aegean Region and Mediterranean Region until now. **Chorotype:** SW-Asiatic (Irano-Anatolian)

ZOOGEOGRAPHICAL ANALYSIS

Turkish Megalopodidae includes 3 species of 2 genera. Each of the species has a different chorotype. One species, namely about 33.33 % of the taxa has "Holarctic" chorotype. One species, namely about 33.33 % of the taxa has "Sibero-European" chorotype. One species, namely about 33.33 % of the taxa has "SW-Asiatic" chorotype (Fig. 1).

For zoogeographical evaluation, the all known species of Turkish Megalopodidae are presented as follows:

One species as *Z. scutellaris* has "Holarctic" chorotype.
One species as *Z. subspinosa* has "Sibero-European" chorotype.
One species as *T. nigropunctata* has "SW-Asiatic" chorotype.

On the other side, the regional distributions of all known species of Megalopodidae in Turkey are presented as follows (Table 1):

For the subfamily Megalopodidae:
1 species are represented in Marmara Region (33 %)
0 species are represented in Aegean Region (0 %)
1 species are represented in Mediterranean Region (33 %)
1 species are represented in Central Anatolian Region (33 %)
0 species are represented in Black Sea Region (0 %)
0 species are represented in Eastern Anatolian Region (0 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

So Turkish Megalopodidae that includes only 3 species are distributed only in western half of Turkey.

Turkish Orsodacnidae includes 3 species of 1 genus. Each of the species has a different chorotype. One species, namely about 33.33 % of the taxa has "European" chorotype. One species, namely about 33.33 % of the taxa has "Sibero-European" chorotype. One species, namely about 33.33 % of the taxa has "SW-Asiatic" chorotype (Fig. 2).

For zoogeographical evaluation, the all known species group taxa of Turkish Orsodacnidae are presented as follows:

One species as *O. humeralis* has "European" chorotype.
One species as *O. cerasi* has "Sibero-European" chorotype.
One species as *O. variabilis* has "SW-Asiatic" chorotype.

On the other side, the regional distributions of all known species of Orsodacnidae in Turkey are presented as follows (Table 1):

For the subfamily Orsodacnidae:
1 species are represented in Marmara Region (33 %)
2 species are represented in Aegean Region (66 %)
1 species are represented in Mediterranean Region (33 %)
1 species are represented in Central Anatolian Region (33 %)
0 species are represented in Black Sea Region (0 %)
0 species are represented in Eastern Anatolian Region (0 %)
0 species are represented in South-Eastern Anatolian Region (0 %)

So Turkish Orsodacnidae that includes only 3 species are distributed only in western half of Turkey.

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Özdikmen, H. & Topcu, N. N. 2014. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part VI – Chrysomelidae: Galerucinae. Munis Entomology & Zoology, 9 (1): 214-226.

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Özdikmen, H. 2014b. Chorotype identification for Turkish Chrysomeloidea (Coleoptera) Part VIII – Chrysomelidae: Alticinae. Munis Entomology & Zoology, 9 (1): 297-347.

Özdikmen, H., Mercan, N., Cihan, N., Kaya, G., Topcu, N. N. & Kavak, M. 2014. The importance of superfamily Chrysomeloidea for Turkish biodiversity (Coleoptera). Munis Entomology & Zoology, 9 (1): 17-45.

Table 1. The regional distribution of all known species group taxa of Megalopodidae and Orsodacnidae in Turkey.

TAXON	**R**	**E**	**G**	**I**	**O**	**N**	**S**
	MAR	**AER**	**MER**	**CAR**	**BSR**	**EAR**	**SEAR**
FamilyMEGALOPODIDAE							
SubfamilyMEGALOPODINAE							
T. nigropunctata	-	-	+	-	-	-	-
Z. scutellaris	-	-	-	+	-	-	-
Z. subspinosa	+	-	-	-	-	-	-
FamilyORSODACNIDAE							
SubfamilyORSODACNINAE							
O. cerasi	-	+	-	-	-	-	-
O. humeralis	+	-	-	+	-	-	-
O. variabilis	-	+	+	-	-	-	-

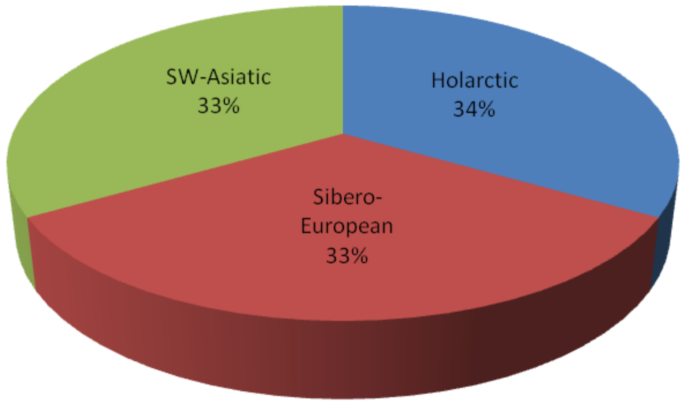

Figure 1. Chorotypical distribution of Turkish Megalopodidae.

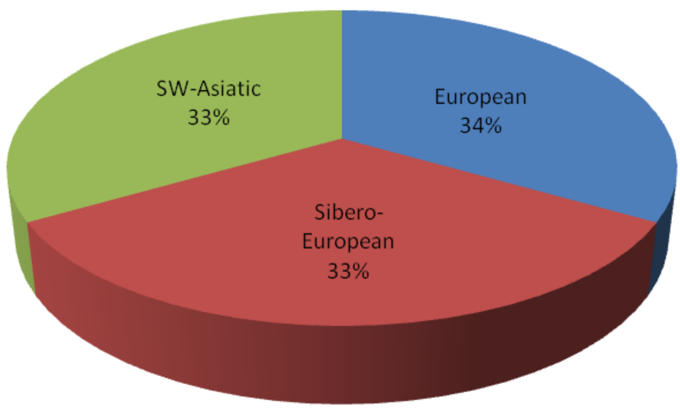

Figure 1. Chorotypical distribution of Turkish Orsodacnidae.

GROUND BUGS (HEMIPTERA: LYGAEIDAE) OF MADHYA PRADESH, WITH THEIR DISTRIBUTION IN INDIA

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[**Chandra, K. & Kushwaha, S.** 2014. Ground bugs (Hemiptera: Lygaeidae) of Madhya Pradesh, with their distribution in India. Munis Entomology & Zoology, 9 (1): 535-539]

ABSTRACT: The present investigation deals with the study of family Lygaeidae of Madhya Pradesh, which includes 18 species belonging to 13 genera representing five subfamilies. Of these, 11 species are new records from Madhya Pradesh.

KEY WORDS: Lygaeidae, New record, Madhya Pradesh.

Most species the family Lygaeidae are known as seed bugs and are usually brown to red colour. Members are characterized by the hard, elongated body ranging from 4 to 20 millimeters in length. The forewing's front section is slightly sclerotized and the back section membranous and hind wings always membranous. They are well-known pest species occurring in many parts of the country. These small bugs grow to less than 4 millimeters in length but can build up in such numbers that they cause serious damage to fruit and vegetable crops. They are cosmopolitan in distribution, they usually occur on moist surface, beneath stone or plants.

There is mention of family Lygaeidae from Central India by Distant (1902, 1910 and 1918). Earlier Ramakrishna et al. (2006) reported six species from various protected of Madhya Pradesh and Chhattisgarh. Chandra (2008 and 2009) four species and two species from Jabalpur and Pachmarhi Biosphere Reserve respectively. Chandra et al. (2010, 2011, 2012a, 2012) reported Lygaeidae from various localities. Chandra & Kushwaha (2012, 2013) further reported two species and four species respectively from Madhya Pradesh. Altogether six species of Lygaeidae are reported so far from Madhya Pradesh.

About 4000 species under 500 genera are known from globally (Schuh & Slater) and 250 species belonging to 100 genera was known from the India (Ghosh, 2008). The present investigation focused predominantly on Lygaeidae of Madhya Pradesh. The unidentified collection of family Lygaeidae present was worked out, which revealed the identification of 18 species belonging to 13 genera representing five subfamilies. Of these, eleven species are new addition to the fauna of state of Madhya Pradesh.

TAXONOMIC ACCOUNT

ORDER: HEMIPTERA
SUBORDER: HETEROPTERODEA
INFRAORDER: PENTATOMORPHA
SUPERFAMILY: LYGAEOIDEA
FAMILY: LYGAEIDAE
SUBFAMILY: RHYPAROCHROMINAE
TRIBE: PLINTHISINI

Metochus uniguttattus (Thunberg, 1822)

Material examined: SWLS, Bamhori R.H., 31.iii.2011(1 ex),Coll. S. Sambath & Party; Jabalpur, ZSI office, 1.ix.1970(1ex), Coll. H. Khajuria; Hoshangabad, Paraspani, 26.xii.1964(1ex), Coll. H. Khajuria; Damoh, VDWLS, Giri Darsan, 13.iii.2011(1 ex), Coll. D. K. Harshey & Party.

Distribution: India: Madhya Pradesh (Jabalpur, Raisen, Damoh and Hoshangabad) (Chandra, 2008), Assam, Karnataka, Maharashtra, Meghalaya, Andaman Islands and West Bengal. *Elsewhere:* Myanmar, China and Sri Lanka.

***_Metochus_ (_Dieuches_) _femoralis_ Dohrn, 1860**

Material examined: Bhind Bus Stand, 28.vi.2011 (1 ex.), Coll. Sandeep and Devanshu.

Distribution: India: Madhya Pradesh (Bhind), Uttarakhnad, Assam, Kashmir, Nagaland, Sikkim, West Bengal (Saha & Bal, 2010). *Elsewhere:* Myanmar and Sri Lanka.

***_Paromius pallidus_ Montrousier, 1865**

Material examined: Sidhi, Mohania, 25.vii. 1999 (1 ex.), Coll. K.Chandra.

Distribution: India: Madhya Pradesh (Sidhi), West Bengal and Chhattisgarh (Ramakrishna et al., 2006). *Elsewhere:*Australia.

Elasmolomus sordidus (Fabricius, 1787)

Material examined: SWLS, Kartholi, 25.ii.10 (1ex.), Coll. J. Thilak & Party; Jabalpur, ZSI office,1.ix.1970 (4 ex), Coll. H. Khajuria.

Distribution: India: Madhya Pradesh (Raisen and Jabalpur) (Chandra & Kushwaha, 2013), Delhi, Uttarakhand, Bihar, Maharashtra, Andaman Islands Meghalaya, Nagaland and West Bengal. *Elsewhere*: Myanmar, Guiana, Sri Lanka and China.

***_Stigmatonotum minutum_ Malipatil, 1778**

Material examined: Gwalior, Gol Pahariya, 23.iv.2011(1 ex.), Coll. Sandeep and Devanshu; Jabalpur, Vijay Nagar, 13.vii.2009 (4 exs.), Coll. Rajesh; Raisen, SWLS, Kartholi, 25.ii.10 (1 ex.), Coll. J. Thilak & Party.

Distribution: India; Madhya Pradesh (Gwalior, Raisen and Jabalpur), West Bengal and Chhattisgarh (Ghosh & Biswas, 1995). *Elsewhere*: Australia.

***_Paromius pallidus_ Montrousier, 1865**

Material examined: Raisen, SWLS, Bhagedi, 9.xii.2010 (1 ex.), Coll. S. S. Talmale and Party; Hoshangabad, PBR, Paras Pani, 25.x.2002 (4 exs.),Coll. Y. N. Gupta.

Distribution: India; Madhya Pradesh (Raisen and Hoshangabad), Chhattisgarh and West Bengal (Ghosh & Biswas, 1995). *Elsewhere*: Australia.

***_Paraeucosmetus_ (_Pamera_) _pallicornis_ (Dallas, 1852)**

Material examined: Jabalpur, ZSI, Office,1.iv.1970 (1 ex.), Coll. Y. N. Gupta.

Distribution: India: Madhya Pradesh (Jabalpur), Meghalaya and West Bengal (Chakrabarty & Ghosh, 1994). *Elsewhere*: Sri Lanka, Myanmar and Japan.

***_Paraeucosmetus_(_Eucosmetus_) _insignis_ (Distant, 1901)**

*Material examined:*Chhindiwada, PTR, Totladoh,1.iv.1970 (1ex.), Coll. H.K. Khajuriya.

Distribution: India; Madhya Pradesh (Chhindwada), Assam and West Bengal (Chakrabarty & Ghosh,1994). *Elsewhere*: Australia.

Pseudopachybrachius (_Rhyparochromus_) _guttus_ (Dallas, 1852)

Material examined: Chhindwada, PTR, Totladoh, 17.viii. 2001(1 ex.), Coll. Y. N. Gupta.

Distribution: India; Madhya Pradesh (Chhindwara), Bihar and West Bengal (Chakrabarty & Ghosh, 1994). *Elsewhere*: Myanmar and South Africa.

SUBFAMILY : LYGAEINAE

TRIBE: LYGAEINI

Spilostethus hospes (Fabricius, 1794)

Material examined: Raisen, SWLS, Purulia, 24.xi.11 (1 ex.), Coll. S. Sambath; Damoh, VDWLS, Singorhgarh, 21.xi.09 (1ex.), Coll. J. Thilak & party; Jabalpur, ZSI Vijay Nagar Colony, (1 ex), 8.xii.2012 (1 ex.), Coll. Sandeep Kushwaha.

*Distribution:*India: Madhya Pradesh (Raisen, Damoh and Jabalpur), Maharashtra, Orissa, Tamil Nadu and West Bengal (Ghosh, 2008) and (Chandra et al., 2011). *Elsewhere*: Australia, China, Malayan Archipelago, Pakistan, Sri Lanka and New Caledonia.

Spilostethus pandurus militaris (Fabricius, 1775)

Material examined: Raisen, SWLS, Purulia, 24.xi.11, (3 exs.) Coll. S. Sambath; Jabalpur, ZSI Vijay Nagar Colony, 27.vi.2010 (1ex.), Coll. Rajesh; Damoh, VDWLS, Danital, 18.vi.2009 (1ex.), Coll. J. Thilak.
Distribution: India: Madhya Pradesh (Damoh, Jabalpur and Raisen) (Ramakrishna et al., 2006), (Chandra et al., 2011, 2012) and (Chandra & Kushwaha, 2013). Karnataka, Maharashtra, Orissa, Punjab, Uttar Pradesh, and West Bengal. *Elsewhere*: Australia, Pakistan.

**Spilostethus simla* (Distant, 1909)

Material examined: Seoni, PTR, Dudhiya, 8.xi.2002 (1ex.), Coll. M. L. Khosta.
Distribution: India; Madhya Pradesh (Seoni), Himachal Pradesh and Punjab (Ghosh et al., 2005). *Elsewhere*: Australia.

Graptostethus servus Fabricius, 1868

Material examined: Jabalpur, Katanga Colony, 26.x.1998 (2 exs.), Coll. K. Chandra; Dhar, Sardarpur, 27.ii.1999 (1ex.), Coll. K. Chandra; Hoshangabad, PBR, 5.vi.1999 (1ex.), Coll. K. Chandra.
Distribution: India; Madhya Pradesh (Jabalpur, Dhar and Hoshangabad), Delhi, Uttarakhand, Kerala, Maharashtra, Meghalaya and West Bengal (Chandra, 2008). *Elsewhere*: Australia, Myanmar, China, South Africa and Sri Lanka.

**Consivius collinus* Distant 1909

Material examined: Jabalpur, ZSI Residential colony, 14.x.2008 (8 exs.), Coll. Rajesh.
Distribution: India; Madhya Pradesh (Jabalpur), Himachal Pradesh (Distant, 1910) and Jammu & Kashmir.

SUBFAMILY: GEOCORINAE
TRIBE: GEOCORINI

Geocoris tricolor Fabricius, 1798

Material examined: Jabalpur, Medical college, 13.ix.1966, (3 exs.), Coll. H. P. Agarawal; Jabalpur, Sehora, Hiran river,5.viii.1966(1ex.), Coll.V.V.Rao.
Distribution: India: Madhya Pradesh (Jabalpur), Andhra Pradesh, Maharashtra, Karnataka and West Bengal (Chandra, 2008). *Elsewhere*: Myanmar and Sri Lanka.

SUBFAMILY: ORSILLINAE
TRIBE: ORSILLINI

**Nysius ceylanicus* Motschulsky, 1863

Material examined: Jabalpur,Vijay Nagar, 16.viii.2012 (1ex.), Coll. Rajesh; Bhopal, BWLS, Kolukhedi (1ex.), 18.vi.2006, Coll. Dr. J. Thilak & Party.
Distribution: India; Madhya Pradesh (Jabalpur), Sikkim, Jharkhand (Ramakrishna et al., 2006). *Elsewhere*: Sri Lanka and Australia.

**Nysius lacustrinus* Distant, 1909

Material examined: Chhindwara, PTR, Parasia,25.x.2002 (1ex.), Coll. Y. N. Gupta.
Distribution: India; Madhya Pradesh (Chhindwara), Uttarakhand, Delhi, Haryana and Himachal Pradesh (Ramakrishna et al., 2006). *Elsewhere*: United Kingdom.

SUBFAMILY:PACHYGRONTHINAE
TRIBE:PACHYGRONTHINI

**Pachygrontha bipunctata* Stål, 1865

Material examined: Jabalpur, Napier Town, 05.v.2002 (1 ex.), Coll. K. Chandra.
Distribution: India; Madhya Pradesh (Jabalpur), West Bengal and Chhattisgarh (Ramakrishna et al., 2006). *Elsewhere*: Australia, Namibia, Senegal, Sri Lanka and Japan, United Kingdom.

Abbreviation used: PTR- Pench Tiger Reserve; PBR- Pachmarhi Biosphere Reserve; SWLS- Singhori Wildlife Sanctuary; VDWLS- Veerangana Durgavati Wildlife Sanctuary; BWLS Bhoj Wet Land Sanctuary; ZSI- Zoological Survey of India; * - New record to state.

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PLATE 1

Spilostethus hospes (Fabricius, 1794)

Spilostethus pandurus militaris (Fabricius, 1775)

Spilostethus simla (Distant, 1909)

Graptostethus servus Fabricius, 1868

Consivius collinus Distant 1909

Elasmolomus sordidus (Fabricius, 1787)

PLATE 2

Geocoris tricolor Fabricius, 1798

Pseudopachybrachius (*Rhyparochromus*) *guttus* (Dallas, 1852)

Metochus (*Dieuches*) *femoralis* Dohrn, 1860

Metochus uniguttattus (Thunberg, 1822)

Paraeucosmetus (*Pamera*) *pallicornis* (Dallas, 1852)

A NEW RECORD FOR TURKISH CERAMBYCINAE (COLEOPTERA: CERAMBYCIDAE)

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[Özdikmen, H., Özbek, H. & Aytar, F. 2014. A new record for Turkish Cerambycinae (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 9 (1): 540-541**]**

ABSTRACT: The paper gives *Phymatodes* (*Paraphymatodes*) *fasciatus* (Villers, 1789) as the first record for Turkey with exact localities.

KEY WORDS: *Phymatodes fasciatus*, Cerambycinae, Cerambycidae, new record, Turkey

During the study on interesting cerambycid collection of the third author, Fatih Aytar, we found 7 specimens of the species, *Phymatodes fasciatus* (Villers, 1789). The materials studied here were collected from Adana, İçel and Niğde provinces in the years 2007-2009. They have been deposited in Entomology Department of Eastern Mediterranean Forestry Research Institute (İçel province, Turkey).

As a result of the work, the species is the first record for Adana, İçel and Niğde provinces and thereby Mediterranean Region and Central Anatolian Region of Turkey. Moreover, it also is the first record for Turkey with exact localities. Since, the species has not been reported from any exact locality in Turkey yet. Only Sama (2002) mentioned that it occurs in southern Turkey without any exact locality. The record of Turkey in Löbl & Smetana (2010) based on the Sama's unpublished information.

FAMILY CERAMBYCIDAE
SUBFAMILY CERAMBYCINAE
GENUS *PHYMATODES* Mulsant, 1839: 47
SUBGENUS *PARAPHYMATODES* (Plavilstshikov, 1934: 215)
SPECIES *Phymatodes fasciatus* (Villers, 1789: 257)

Type loc.: "Gallia Aust." (France)
Orig. comb.: *Cerambyx fasciatus* Villers, 1789: 257
Synonyms: *unifasciatum* Olivier, 1790: 269 (*Callidium*), *unifasciatum* Rossi, 1790: 343 (*Callidium*)

Material examined: Adana: Pozantı, 03.VI.2008, with net, 1 specimen; **İçel:** Tarsus, Melemez, 15.V.2007, *Vitis vinifera,* 1 specimen; Silifke, Değirmendere, 30.IV.2009, *Vitis vinifera,* 2 specimens; **Niğde:** Alihoca, 27.IV.2007, from wood of *Vitis vinifera,* 1 specimen; Alihoca, 21.V.2007, from wood of *Vitis vinifera,* 1 specimens; Çiftehan, 09.VI.2008, with net, 1 specimen.

Range: Europe (Spain to South European Russia), Turkey, Cyprus, Israel.

Chorotype: S and E-European.

Bionomics: The species is a forester. The **host plants** of the species are especially *Vitis* and deciduous trees (*Populus, Quercus, Salix, Clematis, Parthenocitisus*). **Adults and larvae** of the species can obtain from the host plants in lowlands and foothills. **Life cycle** of the species is 1 year. **Overwintering stage** is larva. **Larvae feed** subcortically (under the bark) and in the sapwood of dry twigs and branches. **Pupation** is in the wood in spring. **Adults** are diurnal, crepuscular and nocturnal. **Adults fly** in late spring-summer (between May-July) (Svacha & Danilevsky, 1988, Bense, 1995, Jenis, 2001, Sama, 2002).

Note: This work based on a part of the Master Thesis of the second author.

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Figure 1. *Phymatodes fasciatus* (Villers, 1789).

THREE NEW SPECIES OF TRICHOPTERA (ODONTOCERIDAE, LEPTOCERIDAE) AND THE FAUNISTIC LIST FOR ZONGULDAK AND KARABÜK PROVINCES IN NORTHWESTERN TURKEY

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[Sipahiler, F. 2014. Three new species of Trichoptera (Odontoceridae, Leptoceridae) and the faunistic list for Zonguldak and Karabük provinces in northwestern Turkey. Munis Entomology & Zoology, 9 (1): 542-553**]**

ABSTRACT: Three new species of Trichoptera from Turkey are described and illustrated: *Odontocerum turcicum* sp. n. (Odontoceridae), *Adicella hadimensis* sp. n., and *A. kayserica* sp. n. (Leptoceridae). The faunistic list of Trichoptera for Zonguldak and Karabük provinces in northwestern Turkey including 47 species is given. Among them *Potamophylax pallidus* Klapalek, 1899 is newly recorded for Turkey.

KEY WORDS: Taxonomy, faunistic, new species, new record, Trichoptera, Zonguldak, Karabük, northwestern Turkey.

The genus *Odontocerum* Leach 1815 has three species in the west Plearctic Region. *O. albicorne* Scopoli 1763 was the first described species found in Europe; later *O. hellenicum* Malicky 1972 (Malicky, 1972) was described from Greece and *O. lusitanicum* Malicky 1975 (Malicky, 1975) from Portugal. In Turkey *O. hellenicum* was recorded from Kazdağ in western Anatolia, and later from Giresun and Ordu provinces (Sipahiler, 2010).

The genus *Adicella* is represented in Turkey by 10 species including the new species *A. hadimensis* sp. n. and *A. karserica* sp. n. described in the present paper.

The Trichoptera fauna in Zonguldak and Karabük provinces is represented by 47 species belonging to 32 genera and 19 families. Among them, 17 species are endemic to Turkey (36 %). *Potamophylax pallidus* Klapalek, 1899 is new record for Turkey.

MATERIALS AND METHODS

Materials collected from northern Turkey between 1982 and 2013 were studied. The specimens were collected by hand net and light trap with a blacklight tube (6 W), and preserved in alcohol (80%). Unless otherwise stated, the materials were collected by the author and deposited in her collection at the Biology Education Department, Hacettepe University.

DESCRIPTIONS

ODONTOCERIDAE
Odontocerum turcicum sp. n.
(Figs. 1-9)

Material. Holotype male and paratype female: Turkey, Zonguldak, Alaplı, Gedikli, Bölüklü Yaylası, Tavuk Village direction, 917 m, 41° 02' N/31° 37' E, 16.8.2013, leg. and coll. Sipahiler.

Antennae yellow, maxillary palps dark brown-blackish; fore legs are blackish, only the tarsal segments are yellow; tarsi and tibia of the middle legs and femur, tibia, and tarsi of the hind legs yellow, the rest blackish; the wings dark grayish; the length of the anterior wings of male is 15 mm, of female 18 mm. The hind wing of male is excised on the anal edge and forms a blunt projection, not rounded; the costa is not straight, dilated near the base and near the distal end; the cross vein between R3 and R4 is persistent (Fig. 1).

Male genitalia (Figures 2-6). In lateral view the anterior edge of segment IX expands and forms a broad triangle with a rounded apex, dorsal part of segment narrower, in dorsal view, the dorsomedian lobe of segment IX is broad at the base, from the sides protrude triangular projections forming almost trapezoidal shape at the base, becoming narrower towards the tip. The median process of segment X is located beneath the dorsomedian lobe of segment IX, which is broader and longer, possessing a small additional lobe at the tip; the side parts of segment X are long, laterally broad at the base, the ventral margin is roundly and deeply excised subdistally, the distal part directed somewhat towards ventral; in dorsal view each side of segment X has a strongly sclerotized triangular projection near the middle, the rest of the side margins are smooth, without small projections. The preanal appendages are long and oval. In lateral view, the coxopodite of the inferior appendages is somewhat dilated near the base, the distal projection is long, reaching almost the half of the harpago; the harpago is short, covered apically with short and black spines. In lateral view, the phallic apparatus is narrower at the base and dilated subdistally towards dorsal; in dorsal view, the apex is broadly bilobed, inside possesses two pairs of sclerotized spines in the middle and a broad V-shaped sclerotized spine with a curved sclerotized band directed dorsally.

Female genitalia (Figures 7-9). Segment IX is blackish, the side margins are sclerotized; segment X has broadly triangular lobes dorsally; in ventral view, the posterior edge of the vulvar scale is dilated, forming a narrow and rounded lobe in the middle.

Remarks. *Odontocerum turcicum* sp. n. is closely related to *O. hellenicum* Malicky 1972 (Malicky, 1972) and *O. albicorne* Scopoli 1763 (Malicky, 2004) differs from these species by the following features: the hind wing of the males of *O. hellenicum* is rounded on the anal edge; in *O. turcicum* sp. n. the anal edge is excised and forms a projection, resembling that of *O. albicorne*; in *O. albicorne* the excision is deeper and the projection has an acuter tip than the new species; in *O. hellenicum* and *O. albicorne* a rounded lobe protrudes from the anterior edge of segment IX laterally, in *O. turcicum* sp. n. the sides of segment IX are almost triangular with rounded tips; in both related species the dorsomedian lobe of segment IX is triangular at the base, in *O. turcicum* sp. n. it has triangular projections on each side; segment X has a projection on each side of the middle of the ventral margin in both related species, which is not found in *O. turcicum* sp. n.; the distal prolongation of the coxopodite of the inferior appendage is long, a little shorter than the harpago in *O. albicorne* and very short in *O. hellenicum*, whereas in *O turcicum* sp. n., it is long, reaching the half of the length of the harpago; in the new species the phallic apparatus is dilated dorsally on the subdistal portion and apical lobes are large and rounded, which are not prominent in the related species, and the phallic apparatus is narrower. The main differences in the female genitalia are seen in the shape of the vulvar scale, which is rather flat in *O. albicorn*e, slightly rounded in *O. hellenicum* (Malicky, 2004), and is a narrow and rounded lobe in *O. turcicum* sp. n.

LEPTOCERIDAE

Adicella hadimensis sp. n.

(Figs. 10-13)

Material. Holotype: Turkey, Konya, Hadim, Yerköprü, Göksu River, 37° 05' N/ 32° 48' E, 6.6.1998, 1 male, leg. and coll. Sipahiler.

Antennae, maxillary palps, and legs, yellowish, wings pale brown; scapus and the maxillary palps are without scales; the length of the anterior wing is 6 mm.

Male genitalia (Figures 10-13). In lateral view, segment IX is very broad, somewhat narrowing on the dorsal part; in dorsal view the dorsomedian part is trapezoidal, the sides are rounded. The preanal appendages are rounded dorsally, possessing short hairs; laterally short and broad, the posterior edge is almost vertical; the dorsal lobe of segment X is broad, laterally shorter than the ventral part, ventral part is long, the dorsal edge is almost smooth, rounded on the posteroventral corner, the ventral edge roundly excised near the base; in dorsal view, the side parts of segment X diverge, the median lobe is short and broad. The inferior appendage laterally is long, broad at the base; the ventral edge is roundly dilated ventrally and narrower on the posterior portion; in ventral view, the inner edge of the basal portion is straight, the apical part is large and almost rounded, the inner edge of the apical part possesses long and thick yellowish setae, directed ventrally. The phallic apparatus has a long strip at the base, the phallotheca is prominent, long, ending subdistally, the posterior margin vertically truncated; the aedeagus is slightly dilated and rounded at the tip, possessing a small sclerite, which appears U-shaped in dorsal view.

Remarks. *Adicella hadimensis* sp. n. closely resembles *A. hakkariensis* Malicky 1987 (Malicky, 1987). The following differences are seen in the male genitalia: in *A. hakkariensis* segment IX is rather narrower on the sides, only the ventral part is broader, the dorsomesal part of segment IX is triangular with a pointed apex, while in *A. hadimensis* sp. n. segment IX is very broad, only the dorsal portion is narrower, and the dorsomesal part is trapezoidal; the preanal appendage of *A. hakkariensis* is larger and longer than that of the new species; the dorsal lobe of segment X of *A. hakkariensis* is broader and laterally as long as the ventral part of segment X, while in *A hadimensis* sp. n. the dorsal lobe is narrower and the ventral part of the segment longer; the inferior appendage of the related species has a roundly dilated inner edge in ventral view, while in the new species the inner edge is straight; the phallic apparatus of *A. hakkariensis* is without a prominent phallotheca, is strongly curved near the base, and the tip is tapering, while in *A. hadimensis* sp. n. the phallic apparatus has a phallotheca and the aedeagus has a rounded tip.

Adicella kayserica sp. n.

(Figs. 14-20)

Material. Holotype male and paratypes (3 male, 1 female): Turkey, Kayseri, Pınarbaşı, Sarız, Elbistan direction, Büyük Gümüşgün Village, 38° 43' N/ 36° 24' E, 1400 m, 16.6.2008; leg. and coll. Sipahiler.

Antennae pale brown yellowish, maxillary palps without scales, wings pale brown, legs, thorax, and dorsal head brown; inner surface of the scapus with black scales (Fig. 14); the length of the anterior wing of males 6.5-7 mm, of female 7 mm.

Male genitalia (Figs. 15-18). In lateral view, the anterior edge of segment IX is roundly dilated on the ventral portion; in dorsal view, the median part is long, roundly triangular, with two small triangular projections located each side of the tip. The preanal appendages are dorsally long, almost oval; in lateral view, segment X has a finger-shaped lobe dorsally, which is long, rather broad, slightly longer than the ventral part of segment X, the ventral margin is sclerotized near the base; in dorsal view, the sides of segment X are pointed. In ventral view, the apical part of the inferior appendage is rather long and narrow, slightly dilated at the tip. The phallic apparatus is curved near the base, almost equal in breadth possessing subdistally two pair of sclerites and two long and thin sclerites, located beneath these sclerites.

Female genitalia (Figs. 19, 20). Dorsomedian part of segment IX is prolonged, narrow, and long triangular, the apex is pointed; both sides with small triangular projections; in lateral view, the median portion of segment X is broad, slightly excised in the middle; the side lobes are almost equal in breadth, rounded.

Remarks. *Adicella kayserica* sp. n. resembles *A. hakopi* Mey & Jung 1986 described from Armenia (Mey & Jung, 1986); both species have an area of scales on the scapus and no scales on the maxillary palps. The following differences are seen in the male genitalia: in *A. hakopi* the anterior edge of segment IX is slightly dilated and almost smooth on the ventral portion and the dorsomedian part is short, triangular with a pointed apex; in the new species the ventral portion of segment IX is roundly dilated on the anterior edge, dorsomedian part is long broadly triangular, with two small pointed projections on each side of the tip; in *A. hakopi* the dorsomedian lobe of segment X is as long as the ventral part of segment X and thin, in *A. kayserica* sp.n. it is long and broad, longer than the ventral part of segment X; the inner margin of the inferior appendage of *A. hakopi* is roundly dilated subdistally while in *A. kayserica* sp.n. the subdistal part is rather narrow and not dilated on the inner margin. The differences in female genitalia are as follows: in dorsal and lateral view, in *A. hakopi* segment IX is short and broadly triangular, in *A. kayserica* sp. n. segment IX is long, the median portion is narrow and long triangular, with additional small triangular projections; the side lobes of segment X are unequal in breadth in the related species, of which the dorsal lobe is small, while in the new species both lobes are broad and equal in width.

FAUNISTIC LIST OF ZONGULDAK AND KARABÜK PROVINCES

RHYACOPHILIDAE

***Rhyacophila alaplica* Sipahiler, 2013**

Distribution: Endemic to Turkey.

Distribution in Turkey: Zonguldak.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, south direction, 41° 42' N/ 31° 39' E, 1176 m, 12.7.2011, 1 male; same place, Bacaklı Yaylası direction, spring, 41° 02' N/ 31° 40' E, 1085 m, 20.9.2011, 2 males; Zonguldak, Alaplı, Bölüklü Yaylası, Bacaklı Yaylası direction, 1115 m, 41° 02' N/ 31° 40' E, 20.9.2011, 3 males, 1 female.

***Rhyacophila clavalis* Martynov, 1913**

Distribution: Caucasus, Turkey.

Distribution in Turkey: Northeastern and northwestern Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 24.6.2011,1 male.

***Rhyacophila fasciata fasciata* Hagen, 1859**

Distribution: Europe,Turkey.

Distribution in Turkey: Northeastern and Northwestern Turkey; new for Zonguldak province.

Localities: Karabük, Yenice direction, Subatan, Bolkuş district, 41° 09' N/ 32° 27' E, 226 m, 13.7. 2011, 1 male, 1 female pupa, 11 prepupae, 4 larva.; : Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 635 m, 14.7.2011, 1 female, 1 prepupa; Karabük, Safranbolu, Bulak, Mencilis Cave, 41° 16' N/ 32° 27' E, 690 m, 21.9.2011, (light), 2 males, 4 females; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 20.9.2011,2 females (pupae).

***Rhyacophila tristis* Pictet, 1834**

Distribution: Europe, Turkey.

Distribution in Turkey:northwestern Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, south, 41° 42' N/ 31° 39' E, 1176 m, 12.7.2011, 1 male; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı direction, 41° 02' N/ 31° 40' E, 1170 m, 12.7.2011, 1 male, same place, 1115 m, 41° 02' N/ 31° 40' E, 20.9.2011, 1 male pupa.

GLOSSOSOMATIDAE

***Glossosoma yigilca* Sipahiler, 1996**

Distribution: Endemic to Turkey.

Distribution in Turkey: Bolu, Yığılca; new for Zonguldak and Karabük provinces.

Localities: Karabük, Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 22.6.2011, 1 larva; Zonguldak, Alaplı, Gümeli direction, 41° 05' N/ 31° 35' E, 240 m, 21.8.2011, 1 male; Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 21.8.2011, larva, pupa; Karabük, Kapullu, Baklabostan, Büyükdüz direction, 950 m, 41° 16' N/ 32° 32' E, 23.8.2011, 1 male, 2 larva; Karabük, Yenice direction, Karakaya 41° 13' N/ 3° 2 28' E, 958 m, 20.9.2011, 1 male pupa, 1 female pupa, 3 females and larva; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 20.9.2011, 2 larvae.

***Synagapetus anatolicus* Çakın, 1983**

Distribution: Endemic to Turkey.

Distribution in Turkey: Northwestern Turkey, Bolu, Yedigöller (types), Sinop, Samsun, northeastern Turkey, Ordu; southern Turkey, Beyşehir; new for Zonguldak and Karabük provinces.

Localities: Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/3°1 59' E, 130 m, 23.6.2011, 1 male; Zonguldak, Devrek-Ereğli, direction 41° 14' N/ 31° 50' E, 195 m, source, 23.6.2011, 1 larva; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 03' N/ 31° 40' E, 1030 m, 24.6.2011, many larvae and pupae; same place, 12.7.2011, 3 pupae, 1 larva; same place, Bacaklı Yaylası direction, 41° 02' N/ 31° 40' E, 1170 m, 12.7.2011, 2 males, 1 female, 3 prepupae, 2 larvae; Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 635 m, 14.7.2011, 6 males, 12 females, larva, pupa; Karabük, Safranbolu, Bulak, Mencilis Cave, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, 1 male, 14 pupae; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, south, 41° 42' N/ 31° 39' E, 1176 m, 20.9.2011, 2 males, 1 female; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, 41° 02' N/ 31° 40' E, 1085 m, 20.9.2011, 1 male.

HYDROPTILIDAE

***Hydroptila atargatis* Malicky, 1997**

Distribution: Lebanon, Turkey.

Distribution in Turkey: Southern, eastern and northern Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli direction, Alaplı Stream, 41° 06’ N/ 3°1 34’ E, 198 m, (light), 12.7.2011, 21 males, 114 females.

***Hydroptila occulta* Eaton, 1873**

Distribution: Europe, central Asia, Turkey.

Distribution in Turkey: southern, eastern, northeastern Turkey; new for Zonguldak and Karabük provinces.

Localities: Karabük, Yenice direction, Subatan, Bolkuş, 41° 09' N/ 32° 27' E, 226 m, 13.7. 2011, 1 female; Zonguldak, Alaplı-Gümeli direction, Alaplı Stream, 41° 06' N/ 3°1 34' E, 198 m, (light), 12.7.2011, 6 females; Zonguldak, Alaplı, Gümeli direction, 41° 05' N/ 31° 35' E, 240 m, 21.8.2011,1 male.

***Stactobia alaplica* Sipahiler, 2012**

Distribution: Endemic to Turkey.

Distribution in Turkey: Zonguldak.

Localities: Turkey, Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 39' E, 690 m, 12.7.2011, 5 males, 1 female; same place, 21.8.2011, 4 males, 3 females; 20.9.2011, 1 female.

Stactobia yenicensis **Sipahiler, 2012**

Distribution: Endemic to Turkey.

Distribution in Turkey: Karabük.

Localities: Karabük, Yenice, Karakaya, 41° 13' N / 32° 28' E, 958 m, 21.9.2011, 1 male, 1 female.

PTILOCOLEPHIDAE

Ptilocolepus colchicus **Martynov, 1913**

Distribution: Caucasus, Iran, Turkey.

Distribution in Turkey: Northern Turkey; new for Zonguldak and Karabük provinces.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, source, 41° 02 'N/ 31° 40' E, 1290 m, 12.7.2011, 2 males; Karabük, Yenice direction, Subatan, Bolkuş district, 41° 09' N/ 32° 27' E, 226 m, 13.7. 2011, 3 males, 2 females; Zonguldak, Alaplı, Gümeli direction, 41° 05' N/ 31° 35' E, 240 m, 21.8.2011, 1 male; Karabük, Kapullu, Baklabostan, 41 17 N/ 32 33 E, source, 1207 m, 23.8.2011, 1male; Zonguldak, Alaplı, Gedikli, 21.8.2011, 3 males, 8 females.

Ptilocolepus dilatatus **Martynov, 1913**

Distribution: Caucasus, Turkey.

Distribution in Turkey: Northern Turkey.

Localities: Zonguldak, Devrek-Ereğli direction, 41° 14' N/ 31° 50' E, 195 m, source, 23.6.2011, 3 males, 1 females; Zonguldak, Alaplı, Gümeli direction, 41° 05' N/ 31° 35' E, 240 m, 21.8.2011, 1. male, Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 21.8.2011, 1 male; Karabük, Kapullu, Baklabostan, Büyükdüz direction, 950 m, 41° 16' N/ 32° 32' E, 23.8.2011, 2 males, Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 25.6.2011, 1 male; Zonguldak, Alaplı, Gedikli, 21.8.2011, 7 males; Karabük, Kapullu, Yenice direction, Başköy, 41° 16' N/ 32° 33' E, 830 m, 23.8.2011, 5 males, 4 females; Alaplı, Bölüklü, 20.9.2011, 1 male.

PHILOPOTAMIDAE

Philopotamus montanus **(Donovan, 1813)**

Distribution: Europe, Turkey.

Distribution in Turkey: Marmara region; new for Zonguldak and Karabük provinces.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, 41° 02' N/ 31° 40' E, 1170 m, 12.7.2011, 1 larva; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 03' N/ 31° 40' E, 1030 m, 24.6.2011, 1 male, same place, 12.7.2011:1 male, 1 female pupa; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, 41° 02' N/ 31° 40' E, 1075 m, 24.6.2011, 1 erkek, 1 female pupa, larva; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 20.9.2011, 1 female.

Wormaldia balcanica **Kumanski, 1979**

Distribution: Balkans, Turkey.

Distribution in Turkey: Marmara Region; northern Turkey; new for Zonguldak and Karabük provinces.

Localities Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 03' N/ 31° 40' E, 910 m, 24.6.2011, 2 males, 1 female; Karabük, Yenice, Yenice Forest, a tributary of Şimşir Stream, 41° 08' N/ 32° 21' E, 486 m, 22.6.2011, 1 male.

POLYCENTROPODIDAE

Polycentropus flavomaculatus **(Pictet, 1834)**

Distribution: Europe, Turkey.

Distribution in Turkey: Marmara region; northern Turkey, new for Karabük province.

Localities: Karabük, Yenice, Karakaya, 41° 13' N / 32° 28' E, 958 m, 21.9.2011, 1 male.

Plectrocnemia latissima **Martynov, 1913**

Distribution:Caucasus, Iran, Turkey.

Distribution in Turkey: Northern and eastern Turkey, new for Karabük province.

Localities: Karabük, Safranbolu, Bulak, Mencilis Stream, 41° 16' N/ 32° 27' E, 690 m, 24.8.2011, 1 male; same place, 21.9.2011 (light), 5 males, 2 females.

PSYCHOMYIIDAE

Lype reducta **(Hagen, 1868)**

Distribution: Europe, Iran, Turkey.

Distribution in Turkey: Marmara region; northern Turkey, new for Zonguldak province.
Localities: , Zonguldak, Çaycuma, Çayır Village, Çayır Stream, 41° 27' N/3°1 59' E, 130 m, 22,8.2011, 1 male.

***Psychomyia mengenensis* Sipahiler, 2006**
Distribution: Endemic to Turkey.
Distribution in Turkey: North western, western and southern Turkey.
Localities: Zonguldak, Devrek, Karasu, 23.9.2003 (Sipahiler, 2006).

***Psychomyia pusilla* (Fabricius, 1781)**
Distribution: Europe to Iran, North Africa, Levant, Turkey.
Distribution in Turkey: Largely distributed in Turkey. , new for Zonguldak and Karabük provinces.
Localities: Karabük, Yenice, Karakaya, 41° 13' N / 32° 28' E, 958 m, 21.9.2011, 1 male, 1 female; Zonguldak, Alaplı, Gümeli direction, 41° 05' N/ 31° 35' E, 240 m, 21.8.2011, 1 male, 7 female.

***Tinodes yuecelaskini* Sipahiler, 1995**
Distribution: Endemic to Turkey.
Distribution in Turkey: North western Turkey.
Localities: Karabük, Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 11' N/ 32° 21' E, 534 m, 22.6.2011, 1 male; same place, 21.8.2011, 3 males, 1 female; Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/ 31° 59' E, 130 m, 23.6.2011, 1 male, 5 females; same place, 22,8.2011, 1 male.

HYDROPSYCHIDAE

***Diplectrona atra* McLachlan, 1878**
Distribution: Europe, Turkey.
Distribution in Turkey: Western and central Turkey, new for Zonguldak and Karabük provinces.
Localities: Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/3°1 59' E, 130 m, 23.6.2011, 2 males, 1 female; Zonguldak, Devrek, Ereğli direction, 41° 14' N/ 31° 50' E, 195 m, source, 23.6.2011, 1 male; Karabük, Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, 3 males; Karabük, Kapullu, Yenice direction, Başköy, 41° 16' N/ 32° 34' E, 940 m, 14.7.2011, 1 male; Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 21.8.2011, 2 females; Karabük, Kapullu, Baklabostan district, Büyükdüz direction, 950 m, 41° 16' N/ 32° 32' E, 23.8.2011, 1 female.

***Hydropsyche pellucidula* (Curtis, 1834)**
Distribution: Europe, Turkey.
Distribution in Turkey: Northern Turkey, new for Zonguldak and Karabük provinces.
Localities: Zonguldak, Alaplı, Gedikli, 21.8.2011, (light), 1 male.

***Hydropsyche contubernalis* McLachlan, 1865**
Distribution: Europe to Siberia, central Asia, Turkey.
Distribution in Turkey: Northern Turkey.
Localities: Zonguldak, Devrek, Devrek Stream, 220 m, 18.4.2004 (Sipahiler, 2007).

***Hydropsyche kebab* Malicky, 1974**
Distribution: Endemic to Turkey.
Distribution in Turkey: Largely distributed in Turkey, new for Karabük province.
Localities: Karabük, Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 22.8.2011, (light), 1 male; same place, 24.8.2011, 2 males, 2 females; 21.9.2011, (light), 1 male, 5 females.

***Hydropsyche mahrkusha* Schmid, 1959**
Distribution: Iran, Turkey.
Distribution in Turkey: Northeastern Turkey. , new for Karabük province.
Localities: Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 600 m, 14.7.2011, 1 male.

BACHYCENTRIDAE

***Micrasema mencilis* Sipahiler, 1995**
Distribution: Endemic to Turkey.
Distribution in Turkey: Northwestern Turkey.
Localities: Karabük, Safranbolu, Bulak, Mencilis, (types) (Sipahiler, 1995).

UENOIDAE

***Thremma anomalum* McLachlan, 1876**

Distribution: Southeast Europe, Turkey.

Distribution in Turkey: Northern Turkey, new for Karabük province.

Localities: Karabük, Safranbolu, Bulak, Mencilis Cave, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, 4 males.

GOERIDAE

***Lithax musaca* Malicky, 1972**

Distribution: Bulgaria, Turkey.

Distribution in Turkey: Northern and southern Turkey.

Localities: Karabük, Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 22.6.2011, larvae; Zonguldak, Çaycuma, Çayır Village, stream of Çayır Cave, 41° 27' N/ 31° 59' E, 130 m, 23.6.2011, 1 male; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, 41° 02' N/ 31° 40' E, 1075 m, 24.6.2011, 1 female; same place: 12.7.2011, 1 male; Karabük, Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, larvae.

LIMNEPHILIDAE

DRUSINAE

***Drusus demirsoyi* Cakın, 1983**

Distribution: Endemic to Turkey.

Distribution in Turkey: Northwestern Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 03' N/ 31° 40' E, 1030 m, 24.6.2011, 1 male, 1 female; same place, 12.7.2011, 1 larva; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, spring, 41° 02' N/ 31° 40' E, 1085 m, 20.9.2011, 1 male.

LIMNEPHILINAE

***Limnephilus ponticus* McLachlan, 1898**

Distribution: Endemic to Turkey.

Distribution in Turkey: Largely distributed in Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, 41° 02' N/ 31° 40' E, 1075 m, 24.6.2011, 1 male, 1 female, same place, 12.7.2011, 1 male, 2 females.

***Limnephilus hirsutus* (Pictet, 1834)**

Distribution: Europe, Turkey.

Distribution in Turkey: Largely distributed in Turkey; new for Zonguldak province.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, 41° 02' N/ 31° 40' E, 1075 m, 12.7.2011, 2 females.

***Potamophylax latipennis* (Curtis, 1834)**

Distribution: Europe, Turkey.

Distribution in Turkey: Northeastern, eastern Anatolia, Marmara region; new for Karabük province.

Localities: Turkey, Karabük, Baklabostan, 41° 17' N/ 32° 33' E, 1223 m, 23.8.2011, 1 female pupa.

***Potamophylax pallidus* Klapalek, 1899**

Distribution: Europe, Turkey.

Distribution in Turkey: Zonguldak, Alaplı, Bacaklı. New record for Turkey.

Localites: Zonguldak, Alaplı, Bacaklı, 21.8.2011, 1 female pupa.

CHAETOPTERYGİNİ

***Chaetopteryx nalanae* Sipahiler, 1996**

Distribution: Endemic to Turkey.

Distribution in Turkey: Northwestern Turkey, new for Zonguldak province.

Localities: Karabük, Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 22.10.2011, 1 female; Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 635 m, 22.10.2011, 2 females.

SERICOSTOMATIDAE

***Schzopelex yenicensis* Sipahiler & Pauls, 2012**

Distribution: Endemic to Turkey.

Distribution in Turkey: Karabük.

Localities: Karabük, Yenice yolu, Subatan, Bolkuş district, 41° 09' N/ 32° 27' E, 226 m, 13. 7. 2011, 1 male (Holotype), leg. S. Pauls, coll. Senckenberg Museum, Germany.

ODONTOCERIDAE

***Odontocerum turcicum* sp. n.**

Distribution: Endemic to Turkey.
Distribution in Turkey: Zonguldak.
Localities: Zonguldak, Alaplı, Gedikli, Bölüklü Yaylası, Tavuk Villace direction, 917 m, 41° 02' N/31° 37' E, 16.8.2013, 1 male, 1 female (Types).

LEPTOCERIDAE

***Adicella altandroconia* Botosaneanu & Novak, 1965**

Distribution: Bulgaria, Turkey.
Distribution in Turkey: Northwestern Turkey; new for Zonguldak province.
Localities: Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/3°1 59' E, 130 m, 23.6.2011, 3 males, 3 females; Zonguldak, Devrek, Beycuma direction, Yılanlıca, Yılanlıca Stream, 41° 16' N/31° 58' E, 96 m, 23.6.2011, 1 female; Zonguldak, Devrek, Beycuma, a tributary of Yılanlıca Stream, 41° 16' N/31° 58' E, 140 m, 23.6.2011, 1 male; Zonguldak, Devrek-Ereğli direction, Vakıf Village, 41° 14' N/ 31° 50' E, 195 m, spring, 23.6.2011, 1 female; same place, 13.7.2011, 3 males, 1 female.

***Adicella syriaca* Ulmer, 1907**

Distribution: Bulgaria, Greece, Levant, Turkey.
Distribution in Turkey: Northwestern, northeastern, southern, western and central Turkey; new for Zonguldak province.
Localities: Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/3°1 59' E, 130 m, 23.6.2011, 1 female; Zonguldak, Devrek, Beycuma, Yassıören, Yılanlıca direction, a tributary of Devrek Stream, 41° 15 N/ 31° 58 E, 87 m, 23.6.2011, 1 male, 1 female.

***Athripsodes bilineatus* (Linnaeus, 1758)**

Distribution: Europe, Turkey.
Distribution in Turkey: Marmara Region; new for Zonguldak and Karabük provinces.
Localities: Zonguldak, Çaycuma, Çayır Village, Çayır Cave, 41° 27' N/3°1 59' E, 130 m, 23.6.2011, 1 male; Karabük, Kapullu, Yenice direction, Başköy, 41° 15' N/ 32° 36' E, 600 m, 14.7.2011, 5 males, 2 females.

BERAEIDAE

***Beraea walteri* Malicky, 1975**

Distribution: Cyprus, Turkey.
Distribution in Turkey: Northwestern, northeastern and southern Turkey.
Localities: Karabük, Yenice direction, 540 m, 41° 06' N / 32° 22' E, 22. 6. 2011, 1 male, 1 female, 1 larva.

***Beraea tschundra* Malicky, 1977**

Distribution: Cyprus, Turkey.
Distribution in Turkey: Western Turkey; new for Zonguldak province.
Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 04' N/ 31° 40' E, 775 m, 24.6.2011, 2 males.

***Beraeamyia devrekensis* Sipahiler, 2005**

Distribution: Endemic to Turkey.
Distribution in Turkey: Northwestern Turkey.
Localities: Bolu, near Zonguldak province border, 20 km south of Devrek, Karasu II, 400 m, 11.VII.2003, 41° 10' N / 31° 54' E, 1 male (Sipahiler, 2005).

***Ernodes abanticus* Sipahiler, 1983**

Distribution: Endemic to Turkey.
Distribution in Turkey: Northwestern Turkey.
Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası direction, 41° 03' N/ 31° 40' E, 910 m, 24.6.2011, 1 male; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, 41° 03' N/ 31° 39' E, 1197 m, 12.7.2011, 2 males, 1 female; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, source, 41° 02 'N/ 31° 40' E, 1290 m, 12.7.2011, 4 males.

***Ernodes anatolicus* Sipahiler, 1983**

Distribution: Endemic to Turkey.
Distribution in Turkey: Central Anatolia; new for Zonguldak and Karabük provinces.
Distribution in Turkey: Northwestern Turkey.
Localities: Karabük, Yenice direction, Subatan, Bolkuş district, 32° 27' E, 226 m, 13.7. 2011, 35 males, 5 females; Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, 1

male; Zonguldak, Alaplı, Gümeli, Bölüklü Yaylası, Bacaklı Yaylası direction, spring, 41° 02' N/ 31° 40' E, 1085 m, 12.7.2011, 2 males pupae, 8 dişi pupa, 3 prepupa.

HELICOPSYCHIDAE

***Helicopsyche bacesqui* Orghidan & Botosaneanu, 1953**

Distribution: Southeastern Europe, Turkey.

Distribution in Turkey: Marmara Region, Northwestern Turkey; new for Zonguldak and Karabük provinces.

Localities: Karabük, Yenice, Yenice Ormanı, tributary of Şimşir Stream, 41° 08' N/ 32° 21' E, 486 m, 22.6.2011, 1 male, 9 pupae; Karabük, Yenice, Yenice Forest, Şeker Kanyonu direction, 41° 06' N/ 32° 22' E, 540 m, 22.6.2011, 2 males, 3 pupae; : Zonguldak, Devrek-Ereğli direction, 41° 14' N/ 31° 50' E, 195 m, source, 23.6.2011, 1 female; Karabük, Kapullu, Yenice direction, Başköy, 41° 16' N/ 32° 34' E, 940 m, 14.7.2011, 1 male, 1 female.

LEPIDOSTOMATIDAE

***Dinarthrum iranicum* Schmid, 1959**

Distribution: Iran, Turkey.

Distribution in Turkey: Northwestern Turkey; new for Zonguldak and Karabük provinces.

Localities: Zonguldak, Alaplı, Gümeli, Bölüklü Yaylasıdirection, 41° 03' N/ 31° 40' E, 910 m, 24.6.2011, 1 male; Karabük, Safranbolu, Bulak, Mencilis, 41° 16' N/ 32° 27' E, 690 m, 13.7.2011, 5 females; Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 635 m, 14.7.2011, 1 female.

CALAMOCERATIDAE

***Calamoceras illiesi* Malicky & Kumanski, 1974**

Distribution: Balkans, Carpathians Turkey.

Distribution in Turkey: Northwestern Turkey; new for Karabük province.

Localities:Karabük, Yenice, Karakaya 41° 13' N, 32° 28' E, 23.8.2011, 958 m, 1 larva; Karabük, Kapullu, Yenice direction, Başköy, 41° 16' N/ 32° 33' E, 830 m, 23.8.2011, 1 male; Karabük, Kapullu, Baklabostan Külocağı Stream, 21.9.2011, 940 m, 3 larvae, 3 pupae, 2 males; same place, 21.9.2011, 1 larva; 22.10.2011, 1 larva; Karabük, Kapullu, Yenice direction, 41° 15' N/ 32° 36' E, 635 m, 14.7.2011, 1 female.

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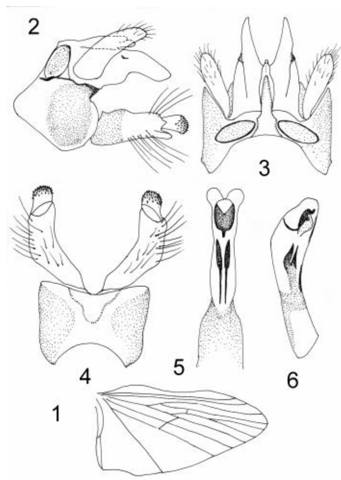
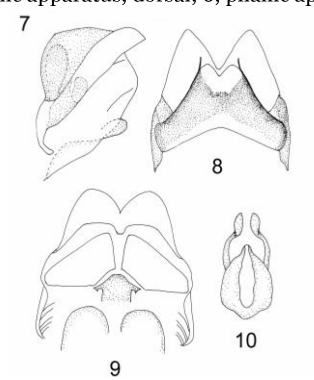
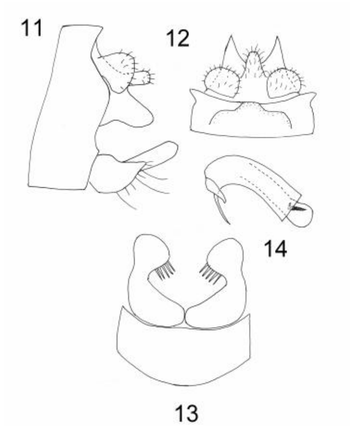


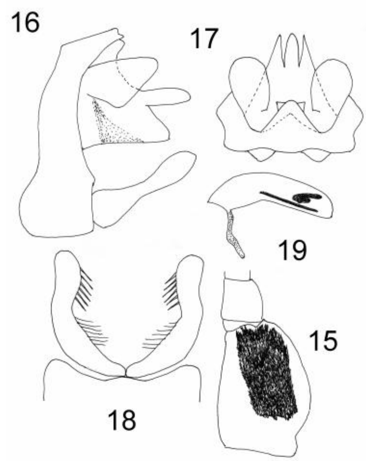
Figures 1–6: *Odontocerum turcicum* sp. n. 1, male fore wing; 2-6: Male genitalia: 2, lateral, 3, dorsal; 4, ventral; 5, phallic apparatus, dorsal; 6, phallic apparatus, lateral view.



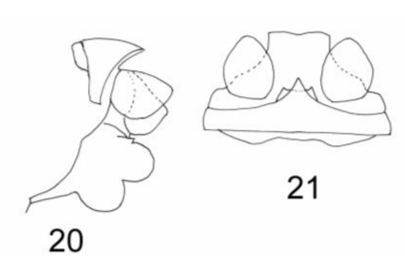
Figures 7–10: *Odontocerum turcicum* sp. n. female genitalia: 7, lateral; 8, dorsal; 9, ventral; 10, bursa copulatrix, ventral view.



Figures 11–14: *Adicella hadimensis* sp. n. male genitalia: 11, lateral; 12, dorsal; 13, ventral; 14, phallic apparatus, lateral view.



Figures 15–19: *Adicella kayserica* sp. n. 15: male right scapus; 16–19: Male genitalia: 16, lateral; 17, dorsal; 18, ventral; 19, phallic apparatus, lateral view.



Figures 20, 21: *Adicella kayserica* sp. n. female genitalia: 20, lateral; 21 dorsal view.

A SYNOPSIS OF TURKISH CALLICHROMATINI (COLEOPTERA: CERAMBYCIDAE: CERAMBYCINAE)

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[**Özdikmen, H.** 2014. A synopsis of Turkish Callichromatini (Coleoptera: Cerambycidae: Cerambycinae). Munis Entomology & Zoology, 9 (1): 554-563]

ABSTRACT: The paper gives the members of Turkish Callichromatini with certain records of *Aromia moschata moschata* (Linnaeus, 1758) from Anatolia. The subspecific composition is discussed and a short key for the subspecies of *Aromia moschata* (Linnaeus, 1758) is also given in the text. Moreover, distribution maps are presented for all Turkish Callichromatini taxa on the base of provinces in Turkey.

KEY WORDS: Coleoptera, Cerambycidae, Cerambycinae, Callichromatini, Turkey

The tribe Callichromatini includes 21 genera in Palaearctic Region now. Most of them are distributed only Eastern or South-eastern Palaearctic Region and Oriental Region (see below).

The Palaearctic genera of tribe Callichromatini Swainson, 1840 as follows alphabetically:

Anubis J. Thomson, 1864 (SE Palaearctic Region (Pakistan to Taiwan) and Oriental Region), *Aphrodisium* J. Thomson, 1864 (E Palaearctic Region (E Siberia, Mongolia, Korea and India to Taiwan) and Oriental Region), *Aromia* Audinet-Serville, 1834 (Palaearctic Region), *Aromiella* Podaný, 1971 (SE Palaearctic Region (China) and Oriental Region), *Cataphrodisium* Aurivillius, 1907 (SE Palaearctic Region (China to Taiwan) and Oriental Region), *Chelidonium* J. Thomson, 1864 (E Palaearctic Region (Far East Russia to Japan and India to Taiwan) and Oriental Region), *Chloridolum* J. Thomson, 1864 (E Palaearctic Region (Far East Russia to Korea and Japan, and India to Taiwan) and Oriental Region), *Embrikstrandia* Plavilstshikov, 1931 (SE Palaearctic Region (China to Taiwan) and Oriental Region), *Gestriana* Podaný, 1971 (SE Palaearctic Region (China) and Oriental Region), *Helymaeus* J. Thomson, 1865 (Endemic to Yemen), *Ipothalia* Pascoe, 1867 (SE Palaearctic Region (India to China) and Oriental Region), *Laosaphrodisium* Bentanachs, 2012 (SE Palaearctic Region (China) and Oriental Region) *Osphranteria* L. Redtenbacher, 1850 (C Palaearctic Region or Turano-Anatolian (Pakistan and Afghanistan to Turkey and Iraq)), *Pachyteria* Audinet-Serville, 1834 (SE Palaearctic Region (Nepal to Taiwan) and Oriental Region), *Polyzonus* Dejean, 1835 (E Palaearctic Region (East Siberia and Far East Russia, and India to Taiwan) and Oriental Region), *Pseudopolyzonus* Bentanachs, 2012 (SE Palaearctic Region (China) and Oriental Region), *Scalenus* Gistel, 1848 (SE Palaearctic Region (India to Taiwan) and Oriental Region), *Schmidtiana* Podaný, 1971 (SE Palaearctic Region (China) and Oriental Region), *Schwarzerium* Matsushita, 1933 (E Palaearctic Region (Korea and Japan to China and Taiwan)), *Turkaromia* Danilevsky, 1993 (E Palaearctic Region (Central Asia to China)), *Zonopterus* Hope, 1842 (SE Palaearctic Region (India to China) and Oriental Region).

The genus, *Helymaeus* J. Thomson, 1865, is endemic to Yemen. The widest distributed genus is *Aromia* Audinet-Serville, 1834 that has Palaearctic chorotype. In Europe, only the genus, *Aromia* Audinet-Serville, 1834, has been represented among the genera of the tribe Callichromatini. After all, only the genera *Aromia* Audinet-Serville, 1834 and *Osphranteria* L. Redtenbacher, 1850, are represented in Turkey.

Subfamily Cerambycinae Latreille, 1802
Tribe Callichromatini Swainson, 1840

Genus *Aromia* Audinet-Serville, 1834: 559
Type sp.: *Cerambyx moschatus* Linnaeus, 1758
Terambus Gistel, 1848: [2] [unnecessary substitute name]
The Palaearctic genus includes only 4 species as *Aromia bungii* Faldermann, 1835 (Korea and China, newly introduced to Germany), *Aromia japonica* Podaný, 1971 (Endemic to Japan), *Aromia moschata* (Linnaeus, 1758) (Europe, Siberia, Central Asia, Caucasus, Turkey, Iran, Middle East (Syria, Lebanon, Jordan, Iraq), North Africa (Algeria, Morocco, Tunusia)), *Aromia orientalis* Plavilstshikov, 1932 (Eastern Siberia, Far East Russia, Mongolia, Korea, Japan, China). As seen above, only the species, *Aromia moschata* (Linnaeus, 1758), is distributed in Turkey among the members of *Aromia* Audinet-Serville, 1834.

Species *Aromia moschata* (Linnaeus, 1758)
According to Löbl & Smetana (2010), the species *Aromia moschata* (Linnaeus, 1758) has 6 subspecies as

- The nominative subspecies *A. moschata moschata* (Linnaeus, 1758) (Europe, Caucasus, European Turkey, Kazahstan, Siberia, Mongolia),
  odorata DeGeer, 1775: 63 (*Cerambyx*)
  chlorophana Fischer von Waldheim, 1823: pl. xlviii [= 1824: 237] (*Cerambyx*)
  alata A. Costa, 1855: 25
  auctumnalis Westhoff, 1882: 241
  thea Reitter, 1894: 306
  cupricollis Pic, 1941: 5
  perroudi Pic, 1941: 5
- *A. moschata ambrosiaca* (Steven, 1809) (South Europe, Caucasus, Turkey, Iran, Middle East (Syria, Lebanon, Jordan, Iraq), North Africa (Algeria, Morocco, Tunusia)),
  thoracica Fischer von Waldheim, 1823: tab. 48, figs 3, 4. [1824: 236] (*Cerambyx*)
  rosara P. H. Lucas, 1847: pl. 41
  rosara A. Costa, 1855: 26 [HN]
  melancholica Reitter, 1895: 210
  notaticollis Pic, 1928: 9
- *A. moschata cruenta* Bogatchev, 1962 (Kirgizia and Tadjikistan),
- *A. moschata jankovskyi* Danilevsky, 2007 (only Kirgizia),
- *A. moschata sumbarensis* Danilevsky, 2007 (only Turkmenistan),
- *A. moschata vetusta* Bogatchev, 1962 (only Kazakhstan).

According to Löbl & Smetana (2010), only two subspecies as *Aromia moschata moschata* that recorded only for European Turkey, and *A. moschata ambrosiaca* that recorded only for Anatolia (Asian Turkey), are represented in Turkey.

Apparently, *Aromia moschata* is represented by two subspecies in Turkey. The nominate *Aromia moschata moschata* and *Aromia moschata ambrosiaca* (= *thoracica* Fischer, 1824). The subspecies status of *A. moschata ambrosiaca* populations depends on the percentage of red colored pronotum of specimens.

My studies on Turkish specimens that some specimens have totally blue-green pronotum and some specimens have red pronotum, clearly confirm that both subspecies are present in Turkey.

Moreover, with respect to voucher specimens from Artvin and Bursa provinces in NE and NW Anatolia respectively and reliable old references, the nominative *Aromia moschata moschata* is also represented in Anatolia (Asian Turkey). Anyway, the nominative subspecies has been reported by Çanakçıoğlu (1956), Villiers (1967), Öymen (1987), Adlbauer (1992), Tozlu et al. (2002), Özdikmen et al. (2005) and Özdikmen & Şahin (2006) from different localities in Anatolia (Asian Turkey) until now.

So, Turkish records of the subspecies *Aromia moschata moschata* and *Aromia moschata ambrosiaca* are presented as follows:

***Aromia moschata moschata* (Linnaeus, 1758)** (Map 1)

European Turkey:

İstanbul prov.: Belgrad Forest (Acatay, 1943); European Turkey (Althoff & Danilevsky, 1997; Löbl & Smetana, 2010).

Anatolia (Asian Turkey):

Bursa prov.: near Soğukpınar / Baraklı village (bank of Nilüfer sream) (Çanakçıoğlu, 1956); Tokat prov.: Arguslu (Niksar) (Villiers, 1967); Balıkesir prov.: Kuşcenneti National Park (Öymen, 1987); Tunceli prov.: Pülümür (Adlbauer, 1992); Erzurum prov.: University Campus, Samsun prov.: Central (Tozlu et al., 2002); Ankara prov. (Özdikmen, et al., 2005); Turkey: 2 specimens without label (Özdikmen, 2006); Kocaeli prov.: İzmit (Özdikmen & Şahin, 2006); Artvin prov.: Hopa and Bursa prov.: Gemlik (personal data).

***Aromia moschata ambrosiaca* (Steven, 1809)** (Map 2)

Anatolia (Asian Turkey):

Hatay prov.: Akbez (Pic, 1892); Bilecik prov. as *A. moschata* var. *thoracica* (Bodemeyer, 1906); Turkey (Acatay, 1948, 1961, 1963, 1968; Bodenheimer, 1958; Önder et al., 1987); Antalya prov.: Central as *A. moschata* var. *thoracica* (Demelt & Alkan, 1962; Demelt, 1963); Adana prov., Artvin prov. as *A. moschata ambrosiaca* (Villiers, 1967); İzmir prov.: Central / Kınık, Manisa prov.: Demirci as *A. moschata* var. *ambrosiaca* (Gül-Zümreoğlu, 1972); Adana prov. (Gül- Zümreoğlu, 1972); İzmir prov. : Bergama (Tuatay et al., 1972); Aydın prov.: Nazilli, İzmir prov. : Bergama (Kınık) as *A. moschata* ssp. *ambrosiaca* m. *thoracica* (Gül-Zümreoğlu, 1975); Antalya prov., Aydın prov., İzmir prov. (Erdem & Çanakçıoğlu, 1977; Çanakçıoğlu, 1983); İzmir prov.: Selçuk, Antalya prov.: Elmalı as *A. moschata ambrosiaca* (Adlbauer, 1992); Kahramanmaraş prov. (Kanat, 1998); Adıyaman prov.: Karadut village env. as *A. moschata* ssp. *ambrosiaca* (Rejzek & Hoskovec, 1999); Isparta prov. as *A. moschata thoracica* (Tauzin, 2000); South and East Turkey as *A. moschata ambrosiaca* (Jenis, 2001); Antalya prov.: Central / Arapsuyu / Manavgat / Korkuteli / Serik, Bingöl prov.: Solhan (Buğlan pass), Burdur prov.: Bucak (Çamlık), Çanakkale prov.: Pazarköy, Kahramanmaraş prov.: Central as *A. moschata ambrosiaca* (Tozlu et al., 2002); Manisa prov.: Muradiye, İzmir prov. : Kemalpaşa (Ören) as *A. moschata ambrosiaca* (Tezcan & Rejzek, 2002); Turkey as *A. moschata ambrosiaca* (Sama, 2002); Antalya prov.: Elmalı (near Çalpınar), Yozgat prov.: Çamlık National Park (Özdikmen & Çağlar, 2004); İzmir prov.: Bergama as *A. moschata ambrosiaca* (Özdikmen, et al., 2005); Antalya prov.: Manavgat as *A. moschata ambrosiaca* (Özdikmen & Demir, 2006); Artvin prov. as *A. moschata ambrosiaca* (Özdikmen & Şahin, 2006); Kahramanmaraş prov.: Pazarcık (Bağdınısağır) / Başkonuş forest area / Andırın (Haştırın village) / Nurhak (Tatlar) as *A. moschata ambrosiaca* (Özdikmen & Okutaner, 2006); Konya prov.: Taşkent (Turgut & Ozdikmen, 2010); Osmaniye prov.: Düziçi (Ozdikmen, Güven & Gören, 2010); Düzce prov.: Central (Özdikmen, Mercan & Tunç, 2012); Balıkesir prov.: Erdek (personal data).

As seen above, the subspecies *Aromia moschata moschata* is represented in both European Turkey and Anatolia (Asian Turkey), while the subspecies *Aromia moschata ambrosiaca* only in Anatolia (Asian Turkey). The nominative subspecies is distributed only in Northern territories of Turkey (European Turkey + Asian Turkey). In case the subspecies *Aromia moschata ambrosiaca* is distributed mostly in other parts of Anatolia (Asian Turkey). However, the records of Bilecik, Artvin, Çanakkale, Yozgat, Düzce and Balıkesir provinces are showed that the subspecies is also distributed in Northern Anatolia. From this point of view, it can say that known distribution patterns of these subspecies are not available the rule of nonoverlapping ranges theorically in North Anatolia.

Also, the same status exists in Spain and Italy. The species is represented by two subspecies as *Aromia moschata moschata* and *Aromia moschata ambrosiaca* in the countries as in Turkey. For each country (Spain, Italy, Turkey), *Aromia moschata ambrosiaca* is regarded predominant. The nominative subspecies is distributed only in Northern parts of the countries: For Spain: only in Northern parts (Pyrenees and the Cantabrian coast), for Italy: North to Central parts and for Turkey: only Northern parts (European Turkey and Asian Turkey). The other subspecies *Aromia moschata ambrosiaca* is distributed in other parts of the countries.

On the other side, I found some specimens that are in my personal collection of the subspecies *Aromia moschata ambrosiaca* from Turkey, more or less resemble *A. moschata jankovskyi* Danilevsky, 2007 that described from Kirgizia (Figs. 1, 2A,B). I decided that these specimens do not describe a new subspecies due to some specimens were collected from the same locality and date with the specimens of clearly *Aromia moschata ambrosiaca* (Steven, 1809) that have totally red pronotum.

However, *Aromia moschata ambrosiaca* has at least two forms based on different coloration of pronotum in each country. Typical form has totally red colored pronotum except anterior and posterior dark colored transverse bands (e.g. Vives, 2001) and the other has red with more or less wide central blue-green line on disc of pronotum (Figs. 1, 3A,B,C, 4A,B). The later is the same as the Turkish specimens that more or less resemble *A. moschata jankovskyi*. Even, these forms are more or less available for populations of *Aromia moschata ambrosiaca* in Caucasus (Armenia and Azerbaijan). So, as stated by Danilevsky (2007), the status of *A. moschata jankovskyi* Danilevsky, 2007 is doubtful now to the future investigation.

Moreover, I prepared male genitaliae from both forms in Turkey. As a result of this, the genitaliae of both forms are the same (Fig. 5). So, I decided that both forms should be belonging to the same subspecies.

A short key for the subspecies of *Aromia moschata* Linnaeus, 1758

1. Pronotum totally blue, green or blue-green colored..**2**
-. Pronotum more or less red colored...**3**

2. Pronotum totally blue or blue-green colored; in male, antennae never protruding beyond elytral apices by 4 apical joints completely, central area of pronotum almost unpunctuated..***moschata moschata*** **Linnaeus, 1758**
-. Pronotum totally green with slight golden lustre; in male, antennae protruding beyond elytral apices by 4 apical joints, central area of pronotum with deep dense punctuation.......... ....***moschata sumbarensis*** **Danilevsky, 2007**

3. Antennae and legs always totally red...................***moschata cruenta*** **Bogatchev, 1962**
-. Antennae and legs always totally blue or blue-green..**4**

4. Pronotum with greenish lustre and small red areas, so from the first view looks totally green..***moschata vetusta*** **Bogatchev, 1962**

-. Pronotum totally red or red with wide central blue-green line on disc except anterior and posterior dark colored transverse bands..two subspecies
....***moschata ambrosiaca* (Steven, 1809)**
....***moschata jankovskyi* Danilevsky, 2007**

Genus *Osphranteria* L. Redtenbacher, 1850: 50
Type sp.: *Osphranteria suaveolens* L. Redtenbacher, 1850
Quettania Schwarzer, 1931: 62
Type sp.: *Quettania coeruleipennis* Schwarzer, 1931

The Palaearctic genus includes only 3 species as *O. coerulescens* L. Redtenbacher, 1850 (Turkey, Iran, Iraq and Pakistan), *O. lata* Pic, 1956 (Iran and Afghanistan) and *O. suaveolens* L. Redtenbacher, 1850 (Iran and Afghanistan). As seen above, only the species, *O. coerulescens* L. Redtenbacher, 1850, is distributed in Turkey among the members of *Osphranteria* L. Redtenbacher, 1850.

Species *Osphranteria coerulescens* L. Redtenbacher, 1850
coeruleipennis Schwarzer, 1931: 63 (*Quettania*)
mirabilis Podany, 1980: 231 (*Polyzonus*)
inaurata Holzschuh, 1981: 98

According to Löbl & Smetana (2010), the species has 2 subspecies as

- The nominative subspecies *O. coerulescens coerulescens* L. Redtenbacher, 1850 (Iran, Iraq, Pakistan),
- *O. coerulescens inaurata* Holzschuh, 1981 (Turkey and Iran).

Also according to Löbl & Smetana (2010), the species is represented only by *O. coerulescens inaurata* Holzschuh, 1981 in Turkey. However, *O. coerulescens inaurata* Holzschuh, 1981 was recently regarded by Bentanachs (2012) as a synonym of *Osphranteria coerulescens*, not a subspecies. On the other side, the endemic genus *Quettania* for Pakistan was established by Schwarzer (1931) with the type species *Quettania coeruleipennis* Schwarzer, 1931. Recently, Bentanachs (2012) stated that the type species *Quettania coeruleipennis* Schwarzer, 1931 and *Polyzonus mirabilis* Podany, 1980 are synonyms of *Osphranteria coerulescens*. So, the genus *Quettania* also is a synonym of the genus *Osphranteria*.

From this point of view, Turkish records of the species *Osphranteria coerulescens* L. Redtenbacher, 1850 are presented as follows:

***Osphranteria coerulescens* L. Redtenbacher, 1850** (Map 3)
Anatolia (Asian Turkey):
Diyarbakır prov. (İren & Ahmed, 1973); Hakkari prov.: Sat Mountain, Oramar (Dağlıca) as the type locality of *O. coerulescens inaurata* (Holzschuh, 1981); Siirt prov.: Kuzluca, Hakkari prov.: Çığlısuyu valley, Suvarihalil pass (Adlbauer, 1992); Elazığ prov.: Harput, Hakkari prov.: Şemdinli (Central, Derecik), Yüksekova (Önalp, 1988b); Adıyaman prov.: Nemrut Mt., Karadut village (Rejzek & Hoskovec, 1999); Van prov.: Çatak (Özdikmen, et al., 2005); Erzincan prov.: Eğin (personal data).

As seen above, the species is represented only in South-eastern and Eastern Anatolia (Asian Turkey) for Turkey.

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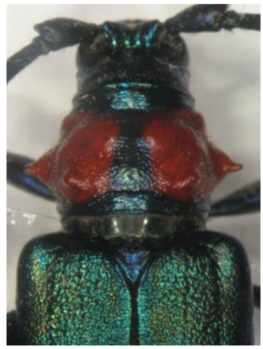


Figure 1. A female specimen of *Aromia moschata ambrosiaca* from Kahramanmaraş province in Turkey.

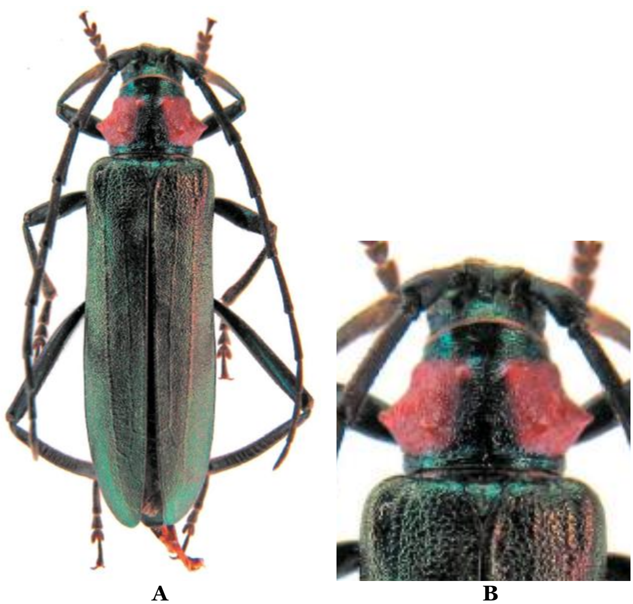


Figure 2. *Aromia moschata jankovskyi*, A. Habitus, B. Pronotal coloration (from Danilevsky, 2007).

A B C

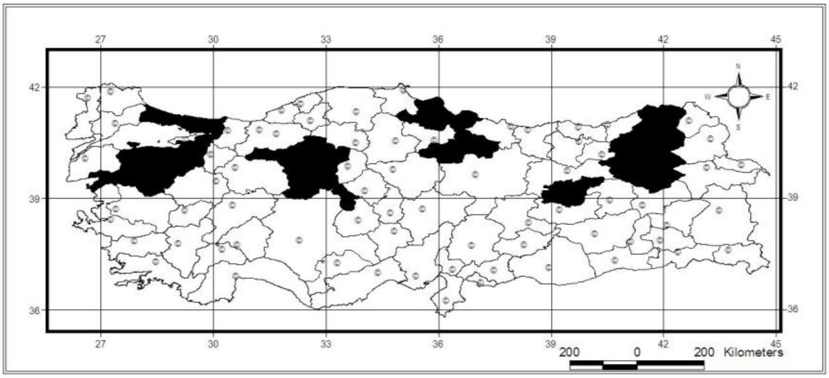
Figure 3. Spanish *Aromia moschata ambrosiaca* A. Male, B. Female, C. Male & female (from http://www.biodiversidadvirtual.org).

A B

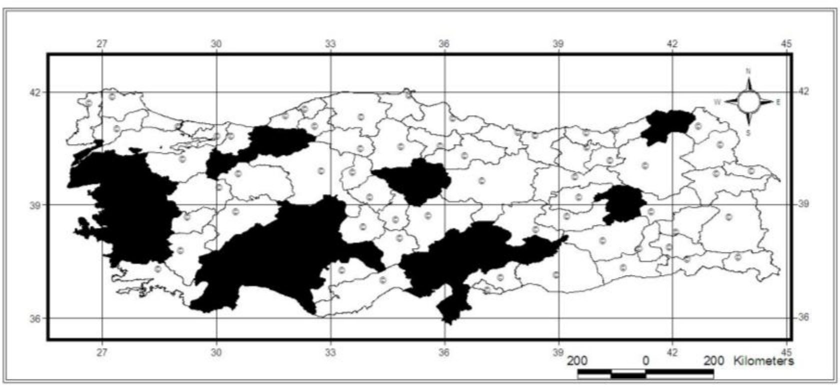
Figure 4. Italian *Aromia moschata ambrosiaca* A. Male, B. Female (from http://www.entomologiitaliani.net).

A B C D

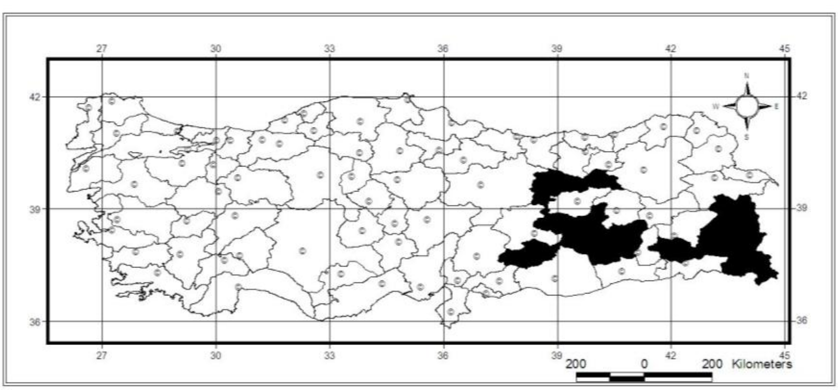
Figure 5. Male genitalia of *Aromia moschata ambrosiaca* A. Aedeagus (dorsal view), B. Aedeagus (ventral view), C. Paramers (dorsal view), D. Paramers (ventral view).



Map 1. Distribution map of *Aromia moschata moschata* in Turkey.



Map 2. Distribution map of *Aromia moschata ambrosiaca* in Turkey.



Map 3. Distribution map of *Osphranteria coerulescens* in Turkey.

A SHORT NOTE ON THE NOCTUIDAE (LEPIDOPTERA) FAUNA COLLECTED BY BAIT TRAPS IN POMEGRANATE ORCHARD OF HAVRAN (BALIKESIR PROVINCE) OF TURKEY

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[Okyar, Z., Öncül Abacıgil, T., Varlı, S. V. & Tezcan, S. 2014. A short note on the Noctuidae (Lepidoptera) fauna collected by bait traps in pomegranate orchard of Havran (Balıkesir province) of Turkey. Munis Entomology & Zoology, 9 (1): 564-567**]**

ABSTRACT: In this study, information is given on 12 species belonging to Noctuidae (Lepidoptera) fauna collected by bait traps in pomegranate orchard in Havran (Balıkesir province) of Western Turkey.

KEY WORDS: Noctuidae, Fauna, Bait trap.

Pomegranate (*Punica granatum* Linnaeus, 1758) (Mytales: Lythraceae) is an important fruit tree in Turkish agriculture. In the previous studies (Mart & Altın, 1992; Öztop et al., 2002; Öztürk et al., 2005; Tezcan, 2008; Yıldırım & Başpınar, 2011), important pests and natural enemies of pomegranate orchards of Turkey were evaluated.

In order to supply an additional information on the biodiversity of these agroecosystems this paper was prepared. In this paper, materials belonging to Noctuidae (Lepidoptera) family collected in pomegranate orchard in Havran (Balıkesir province) of Western Turkey were evaluated.

MATERIAL AND METHODS

This study was conducted in pomegranate (*Punica granatum*) orchard in Havran (Balıkesir province) of Western Turkey during the months of June-October in 2009. Noctuids were collected by bait traps. A total of ten bait traps containing 100 ml wine, 900 ml water, 25 gr sugar and 25 ml vinegar per litre were hung for monitoring the adults of noctuids (Lepidoptera: Noctuidae). The traps were emptied at two-week intervals from June to October in 2009. This paper deals with the noctuids which were captured as a by-catch. The material was collected by second author and was determined by the first author. Material is deposited in the Museum of Biology Department, Faculty of Arts and Sciences, Trakya University, Edirne, and the Prof. Dr. Niyazi Lodos Museum (LEMT) of Plant Protection Department, Faculty of Agriculture, Ege University, Izmir, Turkey. As some of the material was damaged in the liquid of the bait trap, which resulted in the loss of some taxonomic characters, identification was based on genital characteristics. This was done using papers by Pierce (1967, 1978), Fibiger

(1997), Hacker (1989), Hacker et al. (2002), Ronkay et al. (2001), Goater et al. (2003), Fibiger & Hacker (2007).

RESULTS

Material evaluated in this study is listed below in alphabetical order, by subfamilies and by genera within each subfamily (Fibiger, 1997; Hacker et al., 2002; Fibiger & Hacker, 2007).

Acronictinae

Acronicta psi (Linnaeus, 1758)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001).

It is a polyphagous species on deciduous trees. Adults of this species collected by bait traps in this study in June, July and August.

Noctuinae

Agrotis ipsilon (Hufnagel 1766)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001).

It is a polyphagous species. Adults of this species collected by bait traps in this study in June and October.

Agrotis segetum ([Denis & Schiffermüller], 1775)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) and cited from organic vineyard, pear, plum and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a polyphagous species. Adults of this species collected by bait traps in this study in June and September.

Noctua orbona (Hufnagel, 1766)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) and cited from organic vineyard, pear, plum and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a polyphagous species. Adults of this species collected by bait traps in this study in September and October.

Noctua pronuba (Linnaeus, 1758)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) and cited from organic vineyard and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a polyphagous species on grasses and herbaceous plants. Adults of this species collected by bait traps in this study in September.

Xestia xanthographa ([Denis & Schiffermüller], 1775)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) and cited from organic vineyard, plum and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a graminivorous species on grasses. Adults of this species collected by bait traps in this study in September and October.

Hadeninae

Mythimna congrua (Hübner, [1817])

Note: This species collected by bait traps and reported from organic vineyard, pear and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a graminivorous species on grasses. Adults of this species collected by bait traps in this study in September.

Mythimna unipunctata (Haworh, 1809)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) as *Pseudaletia unipuncta* and cited from organic vineyard, pear, plum and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a graminivorous species on grasses. Adults of this species collected by bait traps in this study in October.

Mythimna vitellina (Hübner, 1808)

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001) and cited from organic vineyard, pear and peach orchards in Kemalpaşa (İzmir) by Tanyeri et al. (2010).

It is a graminivorous species on grasses. Adults of this species collected by bait traps in this study in October.

Xyleninae

Anthracia eriopoda (Herrich-Schaffer, [1851])

Note: This species collected by bait traps and reported from organic cherry orchards in Muradiye (Manisa) and Ören (İzmir) by Okyar & Tezcan (2001).

The larvae which are full grown in March-April feed by night on leaves *Salix* spp., *Rubia olivieri*, *Ephedra campyloda, Caprifolium* spp. and *Rosmarius* spp. (Fibiger & Hacker, 2007). Adults of this species collected by bait traps in this study in June and October.

Caradrina clavipalpis (Scopoli, 1763)

Note: There is not any previous record on collection of this species from vineyards or orchards in Turkey.

It is a polyphagous species. Adults of this species collected by bait traps in this study in September.

Mesapamea secalella Remm, 1983

Note: There is not any previous record on collection of this species from vineyards or orchards in Turkey.

It is a graminivorous species on grasses. Adults of this species collected by bait traps in this study in October.

At the end of this study a total of twelve species were evaluated. In the following studies, it is hoped that further studies on the feeding habits of species and their roles in pomegranate orchards will be realised.

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THE PRESENCE OF A NEW SPECIES FOR TURKISH *CORTODERA* MULSANT, 1863 (COLEOPTERA: CERAMBYCIDAE)

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[Özdikmen, H., Cihan, N. & Kaya, G. 2014. The presence of a new species for Turkish *Cortodera* Mulsant, 1863 (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 9 (1): 568-569**]**

ABSTRACT: In this study, *Cortodera flavimana rufipes* (Kraatz, 1876) is upgraded the species rank.

KEY WORDS: *Cortodera flavimana, Cortodera rufipes*, Cerambycidae, Lepturinae, Turkey.

Species *Cortodera rufipes* (Kraatz, 1876: 344) stat. nov. (Fig. 1)
?fulvipes Reitter, 1890: 245 ["Kleinasien"]

The type locality of *Cortodera flavimana* was rightly accepted by Danilevsky (2012) as İstanbul province in NW Turkey. Moreover, he stated that "*Cortodera flavimana var. rufipes Kraatz, 1876 was described from "Smyrna" on the base of all legs red. Such form is unknown in Europe, so the name is valid for a local subspecies*".

In addition, the subspecies *C. flavimana corallipes* was described by Pesarini & Sabbadini (2009) from Erzurum province in NE Anatolia. So, Turkish *Cortodera flavimana* was represented with three subspecies as the nominative subspecies, *C. flavimana rufipes* (Kraatz, 1876) and *C. flavimana corallipes* Pesarini & Sabbadini, 2009.

As seen above, Danilevsky (2012) accepted the subspecies, *C. flavimana rufipes,* as a local taxon. To determinate the real distribution patterns of *C. flavimana rufipes* in Anatolia, we examined many individuals of *C. flavimana* in our collection. We saw that the taxon is rather widely distributed in Anatolia (at least in Aksaray, Ankara, Bursa, Çankırı, İzmir, Kahramanmaraş, Kayseri and Konya) (Map 1). Furthermore, we also saw that the taxon with the nominative subspecies is distributed in the same localities for each province (Map 1,2).

Consequently, we decided *C. flavimana rufipes* should be accepted as a separate species necessarily.

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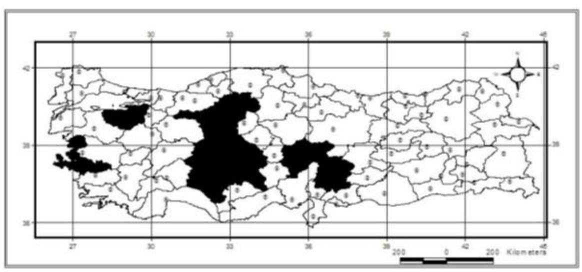
Figure 1. *Cortodera rufipes* (Kraatz, 1876) from Kahramanmaraş prov..



Map 1. The distribution patterns of *Cortodera rufipes*.

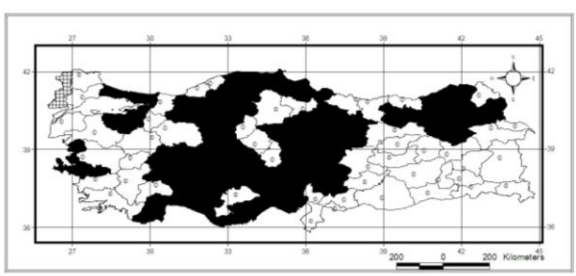


Figure 1. The distribution patterns of *Cortodera flavimana*.

CHECK LIST OF TURKISH FLOWER FLIES (DIPTERA: SYRPHIDAE)

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[Sarıbıyık, S. 2014. Check list of Turkish Flower Flies (Diptera: Syrphidae). Munis Entomology & Zoology, 9 (1): 570-585**]**

ABSTRACT: A revised present list is the first attempt to register all modern taxa of flower flies distributed to the whole territory of Turkey. It includes 73 genera and 315 taxa. The list of used literature includes mostly contemporary publications.This list is based on studies on syrphids of Turkey and individual studies between the years 1902 and 2011.

KEY WORDS: Diptera, Syrphidae, flower flies, Turkey, checklist, review.

As in the whole world, flower flies are the most crowded insects group in Turkey as well. Syrphid flies constitute a dominant group of insects flying on day of the Diptera team within these insects. They constitute a bridge among three continents. Furthermore, Turkey has territories diversity and a wide variety of minerals, landscapes and rocks in topographic and climate structure. Therefore, it has numerous plants and insect species depending on this plant diversity. Turkey is very rich in terms of insects; however, there is little knowledge about insects because insects have not been studied sufficiently in Turkey. There are few samples and scientists and there is little accumulation of knowledge about insects in Turkey. Therefore, it will take long years to reveal insect fauna of Turkey.

The oceanic climate prevails in the sections of the East Anatolian Mountains overlooking sea, Mediterranean climate in Marmara, Agean and Mediterranean regions and continental climate in the Middle, East and Southeast Anatolia in Turkey. Three different phytogeography regions are seen in control of different climate conditions, which are the North Anatolia (Europe-Siberia) phytogeography region, the Mediterranean (Aegean-Mediterranean) phytogeography region and the Iran-Turan phytogeograpy region (Şişli, 1996).

Turkey is a country which has the richest biological diversity in Europe and Middle East and ranks 9 in terms of biological diversity. Each of the 7 geographical regions of the country exhibits different flora and fauna properties and it has the most important three ecological regions in the world. Turkey houses the % 75 of plant species present in the European continent and one third of these species constitutes endemic plants. The Anatolian fauna stands out with its richness of over 80000 animal species. The % 33 of the plant species in Turkey are endemic. In its flora comprising over 9000 plant species, approximately 3000 of which are endemic, Turkey is known for bulbous plants over 500; *Galanthus* (snowdrop), *Leucojum* (snowflakes), *Cyclamens* (cyclamens), *Tulipa* (tulips), and *Colchicum* (colchicums) species in international flower bulb trade. The Turkish flora, which has high endemism, is quite rich in terms of medical and aromatic plants (Demirayak, 2002).

The adults are among the most abundant and conspicuous of Diptera. All adult Syrphinae and Eristalinae visit flowers and feed on polen and nectar. They are therefore significant pollinators of many plants, but their role as such has been little studied (Vockeroth & Thompson, 1987).

Syrphid flies are of great economic importance as larvae of the subfamily Syrphinae, are voracious pradators, and devour large number of aphids, besides attacking coccids, scale insects, psyllids, aleurodids and cicadellids. The adult are also beneficial to agriculture as pollinators. The larvae of some cenera like *Microdon* and *Eumerus* are harmful as they attack and destroy bulbous plants like tulips, daffodils and narcissus. (Kohli et al,, 1988).

Although syrphids of Turkey have been known for over 100 years, there is not a list including studies which have been done up to present. Studies on syrphids of Turkey are put on the page of syrphids of Turkey by making use of publications of authors who did research by going on excursion.

Many of the studies were actually performed to determine the predator of agricultural harmful insects. Meanwhile, syrphids are also recorded in predator list. The faunistic works of syrhids have been done at most in recent years.

The first record on the syrphids of Turkey was made by Bischof (1902), the researcher recorded 11 syrphid species as a result of the survey conducted in Erciyes Mountain.

The first comprehensive study on syrphids of Turkey was recorded in the written work “Syrphidae”. In: Lindner, E. “Die Fliegen der paläarktischen Region” by Sack [published in fascicles between 1928 and 1932] as 56 species of syrphids of Turkey “Asia Minor”. 42 syrphid species were recorded in “Syrphidae In: A. Soos & Papp (eds.) Catalogue of Palearctic Diptera. Volume 8” by Peck (1988).

In the above mentioned studies carried out by native and foreign researchers it is seen that a total of 308 species were identified in Turkey. Not a complete list of syrphids has been published up to present. The faunistic and individual studies carried out by the above mentioned researchers indicate the presence of a rich fauna of syrhids in Turkey. This list will be a useful document for other researchers. Furthermore, future studies will contribute to revelation of syrphids of Turkey and the number of species will increase. The habitats and spreading areas of the species determined will have been identified.

In this study 314 species under 73 genera belonging to syrphid family were recorded in Turkey.

As a result of the checking of the below literatures, it has been established that there are the species contained in the checklist of the syrphids of Turkey.

“Bischof (1902), Sack (1932), Gadeau De Kerville (1939), Bodenheimer (1958), Séguy 1968), Shiraki (1930, 1968), Gül-Zümreoğlu (1972), Tuatay et. al. (1967, 1972), Violovich (1974), Atak (1975), Goeldlin (1976), Soydanbay-Tunçyürek (1976), Soylu & Urel (1977), Goeldlin & Lucas (1981), Düzgüneş et. al. (1982), Kovancı & Kılınçer (1982), Erkin (1983), Zeren & Düzgüneş (1983, 1984), Zeren (1985), Özgür (1986a, 1986b, 1987), Alaoğlu & Özbek (1987), Zeren & Yabaş (1987), Hurkmans (1987, 1988), Claussen & Lucas (1988), Peck (1988), Hayat & Alaoğlu (1990a, 1990b), Hurkmans (1993), Dirickx (1994), Yumruktepe & Uygun (1994), Aktaş & Sarıbıyık (1996), Sarıbıyık & Aktaş (1996), Hurkmans et al. (1997), Hurkmans & Hayat (1997), Claussen & Hayat (1997a, 1997b), Hayat & Claussen (1997), Hayat (1997), Sarıbıyık & Hasbenli (1997), Weyer (2000), Steenis (2000), Stuke & Claussen (2000), Sarıbıyık (1998, 1999a, 1999b 2000a, 2000b), Sarıbıyık & Özgür (2000), Sarıbıyık (2001), Aktaş & Sarıbıyık (2001), Özgür & Sarıbıyık (2002), Sarıbıyık (2003a, 2003b, 2003c, 2003d, 2003e, 2003f, 2004), Candemir & Kara (2003), Nielsen (2004), Reemer et al. (2005), Sarıbıyık & Hasbenli (2006), Şahbaz & Uysal (2006), Marcos-García et al. (2007), Reemer & Smit (2007), Speight (2008), Bayrak & Hayat (2008), Sarıbıyık (2008a, 2008b, 2009a, 2009b), Mirceni & Pârvu (2009), Vujić et.al. (2011), Özkan & Çalışkan (2010, 2011), Sarıbıyık, 2011a, b, c).

The abbreviations of the provinces of Turkey in the present text (in DIT):

Adana (AD)	Gaziantep (GA)	Niğde (NI)
Adıyaman (ADY)	Giresun (GI)	Osmaniye (OS)
Afyon (AF)	Hakkari (HA)	Rize (RI)
Ağrı (AG)	Hatay (HT)	Siirt (SI)
Aksaray (AK)	Isparta (IP)	Sinop (SN)
Ankara (AN)	İstanbul (IS)	Şırnak (SK)
Antalya (ANT)	İzmir (IZ)	Tokat (TO)
Artvin (ART)	Kahramanmaraş (KA)	Trabzon (TB)
Aydın (AY)	Karabük (KR)	Tunceli (TU)
Bartın (BR)	Karaman (KM)	Uşak (US)
Bayburt (BY)	Kars (KAR)	Van (VA)
Bingöl (BN)	Kastamonu (KS)	Yozgat (YO)
Bolu (BO)	Kayseri (KY)	Zonguldak (ZO)
Burdur (BU)	Kırklareli (KK)	Akdeniz Kıyı Şerisi (AKS)
Bursa (BS)	Konya (KN)	Asia minor (ASM)
Çanakkale (CA)	Malatya (MA)	Batı Karadeniz Bölgesi (BKB)
Çankırı (CN)	Manisa (MN)	Çukurova (CUO)
Denizli (DE)	Mersin(ME)	Doğu Akdeniz Bölgesi (DAB)
Erzurum (EZ)	Muğla (MG)	Marmara Bölgesi (MAB)
Eskişehir (ES)	Nevşehir (NE)	Türkiye (TUR)

CHECKLIST OF TURKISH FLOWER FLIES

(Genera and Species arranged alphabetically in the year 2012).

Family SYRPHIDAE

ANASIMYIA Schiner, 1864
***Anasimyia transfuga* (L., 1758)** DIT: IP, KA

ARCTOPHILA Schiner, 1860
***Arctophila bequaerti* Herve-Bazin, 1913** DIT: KS
***Arctophila bombiforme* (Fallén, 1810)** DIT: TB, KS

BACCHA Fabricius, 1805
***Baccha elongata* (Fabricius, 1775)** DIT: CN, KS, KA

BRACHYPALPOIDES Hippa, 1978
***Brachypalpoides lentus* (Meigen, 1822)** DIT: IP, MG

BRACHYPALPUS Macquart, 1834
***Brachypalpus chrysites* Egger, 1859** DIT: KS
***Brachypalpus laphriformis* (Fallén, 1816)**

CALIPROBOLA Rondani, 1845
***Caliprobola speciosa* (Rossi, 1790)** DIT: AN, KS

CALLICERA Panzer, 1809
***Callicera aurata* (Rossi, 1790)** DIT: ME

***Callicera fagesii* Guerin-Meneville 1844** DIT: HA
***Callicera macquarti* Rondani, 1844** DIT: IS, KY

CERIANA Rafinesque, 1815
***Ceriana conopsoides* (L., 1758)** DIT: AN, CN, IZ, KA, MG, NE
***Ceriana vespiformis* (Latreille, 1804)** DIT: BS, MG

CHALCOSYRPHUS Curran, 1925
***Chalcosyrphus eunotus* (Loew, 1873)** DIT: KS
***Chalcosyrphus nemorum* (Fabricius, 1805)** DIT: MG, TB
***Chalcosyrphus piger* (Fabricius, 1794)** DIT: KS
***Chalcosyrphus rufipes* (Loew, 1873)** DIT: KA

CHAMAESYRPHUS*:* see under ***PELECOCERA***

CHEILOSIA Meigen, 1822
***Cheilosia aerea* Dufour, 1848** DIT: AN, BR, KA, KS, KY, MG, NI
***Cheilosia albitarsis* (Meigen, 1822)** DIT: AK, AN, ANT, BO, CN, EZ, IP, KS, KY, NE, ZO
***Cheilosia antiqua* (Meigen, 1822)** DIT: HA
***Cheilosia bracusi* Vujic&Claussen, 1994** DIT: KS
***Cheilosia brunnipennis* Becker, 1894** DIT: BS
***Cheilosia canicularis* (Panzer, 1801)** DIT: ART, BO, CN, EZ, KS, SN, TB, BKB
***Cheilosia himantopus* (Panzer, 1798)** DIT: CN, KS, SN
***Cheilosia illustrata* (Harris, 1776)** DIT: BO, CN, KS, BKB
***Cheilosia laticornis* Rondani, 1857** DIT: AN, CN, BO, BS, KN, KS
***Cheilosia latifrons* (Zetterstedt, 1843)** DIT: TUR
***Cheilosia mutabilis* (Fallén, 1817)** DIT: KS, ZO
***Cheilosia nigripes* (Meigen, 1822)** DIT: BS, KS, KY
***Cheilosia pagana* (Meigen, 1822)** DIT: BO
***Cheilosia proxima* (Zetterstedt, 1843)** DIT: BO, BR, HT, KS, KY
***Cheilosia schnabli* Becker, 1894** DIT: TB
***Cheilosia scutellata* (Fallén, 1817)** DIT: AD, AN, BO, BR, KA, KS, OS, KN
***Cheilosia soror* (Zetterstedt, 1843)** DIT: AD, AK, AN, ANT, BO, BR, CN, KA, KS, KY, MG, ZO, BKB
***Cheilosia sulcifrons* Kaplan in Kaplan and Thompson, 1981** DIT: GA
***Cheilosia transcaucasica* Stackelberg, 1960** DIT: AN, KS
***Cheilosia urbana* (Meigen, 1822)** DIT: AN, KS, KY
***Cheilosia variabilis* (Panzer, 1798)** DIT: BO, CN, EZ, KS, SN, BKB
***Cheilosia vernalis* (Fallén, 1817)** DIT: TUR
***Cheilosia vicina* (Zetterstedt, 1849)** DIT: KS
***Cheilosia vulpina* (Meigen, 1822)** DIT: CN, KS

CHRYSOGASTER Meigen, 1803
***Chrysogaster coemiteriorum* (L., 1758)** DIT: AK, AN, CN, KA, KS, KY
***Chrysogaster mediterraneus* Vujik, 1999** DIT: MG
***Chrysogaster simplex* Loew, 1843** DIT: MG
***Chrysogaster solstitialis* (Fallén, 1817)** DIT: BO, EZ, KA, KS
***Chrysogaster tumescens* (Loew, 1873)** DIT: EZ

CHRYSOTOXUM Meigen, 1803
***Chrysotoxum bicinctum* (L., 1758)** DIT: AK, CN, KS, KN, IP
***Chrysotoxum cautum* (Haris, 1776)** DIT: AK, ANT, BO, BS, EZ, KM, KR, KS, KY, ME, MG, NE, TO, ZO
***Chrysotoxum elegans* Loew, 1841** DIT: TUR
***Chrysotoxum fasciolatum* (de Geer, 1776)** DIT: KS
***Chrysotoxum festivum* (L., 1758)** DIT: AK, AN, ANT, BR, BO, CN, EZ, IP, KN, KR, KS, KY, VA
***Chrysotoxum impressum* Becker, 1921** DIT: TUR
***Chrysotoxum intermedium* Meigen, 1822** DIT: AD, AK, AN, ANT, BO, ES, HT, IP, IZ, ME, MG, KA, KS, KN, KY, NI, OS, TO

***Chrysotoxum lessonae* (Giglio-Tos, 1890)** DIT: BO, CN, KS
***Chrysotoxum octomaculatum* Curtis, 1837** DIT: EZ, KY
***Chrysotoxum parmense* Rondani, 1845** DIT: AD, AK, AN, ANT, BO, EZ, IP, KN, KS, KY, ME, NI, TO
***Chrysotoxum vernale* Loew, 1841** DIT: EZ

CONOSYRPHUS Frey, 1915
***Conosyrphus volucellinus* (Portschinsky, 1881)** DIT: CN, KAR, KS, TB

CRIORHINA Meigen, 1822
***Criorhina berberina* (Fabricius, 1775)** DIT: KS
***Criorhina floccosa* (Meigen, 1822)** DIT: KS

DASYSYRPHUS Enderlein, 1838
***Dasysyrphus albostriatus* (Fallén, 1817)** DIT: ES, KS
***Dasysyrphus pinastri* (de Geer, 1776)** DIT: BO, KS, KY, SN
***Dasysyrphus tricinctus* (Fallén), 1817** DIT: KS, SN

DIDEA Macquart, 1843
***Didea fasciata* Macquart, 1843** DIT: CN, KS
***Didea intermedia* Loew, 1854** DIT: KS

DOROS Meigen, 1803
***Doros destillatorius* Mik, 1885** DIT: TUR

EPISTROPHE Walker, 1852
***Epistrophe eligans* (Haris, 1780)** DIT: AD, AN, HT, IZ, KS, ME, US
***Epistrophe grossulariae* (Meigen, 1822)** DIT: BO, KS
***Epistrophe ochrostoma* (Zetterstedt, 1849)** DIT: ME

EPISYRPHUS Matsumura & Adachi, 1917
***Episyrphus balteatus* (de Geer, 1776)** DIT: AD, AK, AN, ANT, BO, BR, BU, CN, DE, ES, EZ, IP, IZ, HT, KA, KN, KR, KS, KY, ME, MG, OS, SN, TO, ZO, CUO, MAB

ERISTALINUS Rondani, 1845
***Eristalinus aeneus* (Scopoli, 1763)** DIT: AD, AK, AN, ANT, BO, CN, ES, HT, IP, IZ, KA, KR, KN, KS, KY, ME, MG, TO, ZO
***Eristalinus megacephalus* (Rossi, 1794)** DIT: IP, KY, MG

***Eristalinus sepulchralis* (L., 1758)** DIT: AD, AF, AK, AN, ANT, BO, CN, ES, HT, IZ, KA, KN, KR, KS, KY, MG
***Eristalinus taeniops* (Wiedemann, 1818)** DIT: AD, AN, ANT, EZ, HT, IP, IZ, KA, KY, ME, MG

ERISTALIS Latreille, 1804
***Eristalis alpina* (Panzer, 1798)** DIT: CN, KS
***Eristalis arbustorum* (L., 1758)** DIT: AD, AF, AN, AK, ANT, BR, BO, BU, CN, ES, EZ, HT, IP, IZ, KA, KN, KR, KS, KY, ME, MG, SN, TO, ZO
***Eristalis horticola* (de Geer, 1776)** DIT: AN
***Eristalis jugorum* Egger, 1858** DIT: EZ, KS, TO
***Eristalis nemorum* (L., 1758)** DIT: KS
***Eristalis pertinax* (Scopoli, 1763)** DIT: AN, BO, CN, KA, KR, KS
***Eristalis rupium* Fabricius, 1805** DIT: AN, CN, KS
***Eristalis similis* (Fallén, 1817)** DIT: AD, AN, ANT, BO, CN, ES, HT, IP, KA, KR, KS, KY, ME, MG, SN
***Eristalis tenax* (L., 1758)** DIT: AD, AF, AK, AN, ANT, CN, ES, EZ, HT, IP, IZ, KA, KN, KS, KY, MA, ME, MG, TB,TO, US

EUMERUS Meigen, 1822
***Eumerus amoenus* Loew, 1848** DIT: IZ
***Eumerus angustifrons* Loew, 1848** DIT: ANT
***Eumerus argyropus* Loew, 1848** DIT: TUR

***Eumerus barbarus* (Coquebert, 1804)** DIT: IZ
***Eumerus basalis* Loew, 1848** DIT: IZ
***Eumerus falsus* Becker, 1922** DIT: TUR
***Eumerus graecus* Becker, 1921** DIT: TUR
***Eumerus hissaricus* Stackelberg, 1949** DIT: EZ
***Eumerus nudus Loew,* 1848** DIT: TUR
***Eumerus ornatus* Meigen, 1822** DIT: TUR
***Eumerus pulchellus* Loew, 1848** DIT: AD, ANT, ME, OS
***Eumerus pusillus* Loew, 1848** DIT: AD, ME, OS
***Eumerus rusticus* Sack, 1932** DIT: TUR
***Eumerus sogdianus* Stackelberg, 1952** DIT: KY
***Eumerus strigatus* (Fallén, 1817)** DIT: AD, ANT, BO, BU, CN, HT, KS, KY, MN, ME, OS, SN, TO
***Eumerus sulcutibius* Rondani, 1868** DIT: HA
***Eumerus tricolor* (Fabricius, 1798)** DIT: BU, KA, KN, KR, KS, KY

EUPEODES Osten Sacken, 1877
***Eupeodes bucculatus* (Rondani, 1857)** DIT: ANT, ME
***Eupeodes corollae* (Fabricius, 1794)** DIT: AD, AF, AK, AN, ANT, BR, BO, BU, CN, ES, EZ, HT, IP, IZ, KA, KN, KR, KS, KY, ME, MG, NE, OS, SN, ZO, CUO, DAB, MAB
***Eupeodes flaviceps* (Rondani, 1857)** DIT: AD, AF, NE, CUO
***Eupeodes latifasciatus* (Macquart, 1829)** DIT: AD, AN, BO, HT, IZ, KA, KS, ME, MG
***Eupeodes luniger* (Meigen, 1822)** DIT: AD, AN, BO, CN, IZ, KR, KS, MG
***Eupeodes nuba* (Wiedemann, 1830)** DIT: MG

FERDINANDEA Rondani, 1844
***Ferdinandea cuprea* (Scopoli, 1763)** DIT: KA, KN

HELOPHILUS Meigen, 1822
***Helophilus continuus* Loew, 1854** DIT: EZ, KY, TO
***Helophilus hybridus* Loew, 1846** DIT: AN, BO, KR, KY
***Helophilus trivittatus* (Fabricius, 1805)** DIT: AD, AK, AN, ANT, BR, ES, EZ, IZ, KA, KN, KR, KS, KY, MG, ZO

HERINGIA Rondani, 1856
***Heringia brevidens* (Egger, 1865)** DIT: KS
***Heringia heringi* (Zetterstedt, 1843)** DIT: AD, AK, ANT, BO, HT, KS, ME, NE, ZO

LAPPOSYRPHUS Dusek & Laska1967
***Lapposyrphus lapponicus* (Zetterstedt, 1838)** DIT: BO, CN, KN, KR, KS, SN

LEJOGASTER Rondani, 1857
***Lejogaster metallina* (Fabricius, 1776)** DIT: EZ
***Lejogaster tarsata* ((Megerle in Meigen, 1822)** DIT: AD, AF, AK, AN, ANT, BO, CN, KA, KN, KR, KS, KY, MG, ZO

LEJOPS Rondani, 1857
***Lejops vittata* (Meigen, 1822)** DIT: AN, ANT, KY

LEUCOZONA Schiner, 1860
***Leucozona glaucia* (L., 1758)** DIT: TUR
***Leucozona laternaria* (Mueller, 1776)** DIT: TUR

MALLOTA Meigen, 1822
***Mallota cimbiciformis* (Fallén, 1817)** DIT: BO
***Mallota tricolor* Loew, 1871** DIT: TUR

***MELANGYNA* Verrall, 1901**
***Melangyna lasiophthalma* (Zetterstedt, 1843)** DIT: KS
***Melangyna metatarsata* (Becker, 1921)** DIT: TUR
***Melangyna umbellatarum* (Fabricius, 1794)** DIT: KS

MELANOGASTER Rondani, 1857
***Melanogaster aerosa* (Loew, 1843)** DIT: AD, AK, AN, ANT, CN, KA, KR, KS, KY
***Melanogaster hirtella* Loew, 1843** DIT: EZ
***Melanogaster nuda* (Macquart, 1829)** DIT: MG, OS

MELANOSTOMA Schiner, 1860
***Melanostoma mellinum* (L., 1758)** DIT: AD, AK, AN, ANT, AY, BO, CA, CN, ES, EZ, HT, IP, IZ, KA, KN, KR, KS, KY, ME, MG, SN,TO, ZO, CUO, DAB
***Melanostoma scalare* (Fabricius, 1794)** DIT: AN, BO, KA, KR, KS, MG

MELIGRAMMA Frey, 1946
***Meligramma cincta* (Fallén, 1817)** DIT: TUR
***Meligramma guttata* (Fallén, 1817)** DIT: CN

MELISCAEVA Frey, 1946
***Meliscaeva auricollis* (Meigen, 1822)** DIT: AD, AN, ANT, BO, CN, ES, HT, IZ, KA, KR, KS, KY, ME, OS, SN, ZN, CUO, DAB
***Meliscaeva cinctella* (Zetterstedt, 1843)** DIT: AD, BO, HT, KS, SN, TO

MERODON Meigen, 1803
***Merodon aberrans* Egger, 1860** DIT: ANT, BN, BO, EZ, HA, IZ, KAR, KA, KY, RI, SI, SK
***Merodon aeneus* Megerle in Meigen, 1822** DIT: MG
***Merodon alagoezicus* Paramonov, 1925** DIT: ADY, AN, EZ, HA, KAR, KN, KY, MA
***Merodon albifrons* Meigen, 1822** DIT: AN, IP, KN, MG, ZO
***Merodon altinosus* Hurkmans, 1993** DIT: HA
***Merodon armipes* Rondani 1843** DIT: CN, KS
***Merodon auronites* Hurkmans 1993** DIT: KA
***Merodon avidus* (Rossi, 1790)** DIT: AD, ADY, AN, ANT, BS, ES, EZ, HA, KA, KAR, KR, KN, KS, KY, MG, SK, VA, ZO
***Merodon bessarabicus* Paramonov 1924** DIT: KS
***Merodon biarcuatus* Curran, 1939** DIT: EZ, HA, SK, TU
***Merodon caucasicus* Portschinsky, 1877** DIT: TUR
***Merodon caudatus* Sack, 1913** DIT: ASM
***Merodon chalybeatus* Sack 1913** DIT: IP
***Merodon cinereus* (Fabricius, 1794)** DIT: TUR
***Merodon clavipes* (Fabricius, 1781)** DIT: HA
***Merodon clunipes* Sack, 1913** DIT: ADY, AN, ANT, BO, BS, IP, IZ
***Merodon crassifemoris* Paramonow, 1925** DIT: SK
***Merodon cupreus* Hurkmans, 1993** DIT: HA, KAR
***Merodon dimorphus* (Szilady, 1940)** DIT: BS
***Merodon distinctus* Palma, 1863** DIT: BS, VA
***Merodon eques* (Fabricius, 1805)** DIT: TUR
***Merodon equestris* (Fabricius), 1794** DIT: TUR
***Merodon erivanicus* Paramonow, 1925** DIT: ANT, BO, EZ, HA, KAR, SK, VA
***Merodon femoratoides* Paramonov, 1925** DIT: EZ, HA, KAR
***Merodon femoratus* Sack, 1913** DIT: ANT, KN, SK, VA
***Merodon fractipes* Paramonow, 1936** DIT: MG
***Merodon fulcratus* (Becker, 1913)** DIT: TUR
***Merodon funestus* (Fabricius, 1794)** DIT: TUR
***Merodon geniculatus* Strobl, 1909** DIT: IZ, MG
***Merodon hamifer* Sack, 1913** DIT: ANT, IP, KN
***Merodon hayati* Hurkmans in Hurkmans and Hayat, 1997** DIT: EZ
***Merodon hikmeti* Hurkmans in Hurkmans and Hayat, 1997** DIT: AN, CN, EZ, KS
***Merodon hypochrysos* Hurkmans, 1993** DIT: ADY, HA
***Merodon ilgazense* Vujić, Marcos-Garcia, Saribiyik & Ricarte, 2011** DIT: KS
***Merodon italicus* Rondani 1845** DIT: AK, AN, ADY, ANT, BO, BS, EZ, IP, KA, KR, KS, MG, SK
***Merodon loewi* van der Goot, 1964** DIT: AK, AN, BO, CN, ES, EZ, KA, KAR, KN, KR, KS, KY, NE, ZO

***Merodon lucasi* Hurkmans 1993** DIT: EZ, HA, KAR, KN
***Merodon minutus* Strobl, 1893** DIT: MG
***Merodon murinus* Sack, 1913** DIT: KY
***Merodon nanus* (Sack, 1931)** DIT: AN, AK, BO, CN, ES, EZ, KA, KS, KY, ME
***Merodon nigritarsis* Rondani, 1845** DIT: ADY, AN, ANT, BO, BS, CN, EZ, HA, KAR, KN, KS, YO
***Merodon nitidifrons* Hurkmans, 1993** DIT: HA
***Merodon obscuritarsis* Strobl, 1909** DIT: TUR
***Merodon oidipous* Hurkmans, 1993** DIT: HA
***Merodon ottomanus* Hurkmans, 1993** DIT: ANT, EZ, HA
***Merodon planiceps* Loew 1862** DIT: CN, EZ, GI, KS, TB
***Merodon pruni* (Rossi, 1790)** DIT: BO, IZ, KS, ZO
***Merodon quadrinotatus* (Sack, 1931)** DIT: HA
***Merodon ruficornis* Meigen, 1822** DIT: BS
***Merodon satdagensis* Hurkmans, 1993** DIT: HA
***Merodon schachti* Hurkmans, 1993** DIT: HA
***Merodon serrulatus* Wiedemann in Meigen, 1822** DIT: EZ, KA, ME, MG
***Merodon spinipes* (Fabricius, 1794)** DIT: AK, AN, ANT BR, BO, BU, CN, IP, KA, KN, KR, KS, KY, NI, ZO
***Merodon spinitarsis* Paramonow, 1929** DIT: AN, BO, BU, CN, KA, KY, MG
***Merodon taniniensis* Hurkmans, 1993** DIT: HA, MA
***Merodon telmateia* Hurkmans, 1988** DIT: AG, AN, CN, EZ, KAR, MG
***Merodon testaceus* Sack, 1913** DIT: BS
***Merodon trebevicensis* Strobl, 1900** DIT: KS
***Merodon tricinctus* Sack, 1913** DIT: TUR
***Merodon vandergooti* Hurkmans, 1993** DIT: ADY, AN, HA, IP
***Merodon velox* Loew, 1869** DIT: AD, AN, ANT, BO, BU, BS, EZ, HA, IZ, KA, KAR, KS, KY, MG, ZO
***Merodon warnckei* Hurkmans, 1993** DIT: HA, VA

MESEMBRIUS Rondani, 1857
***Mesembrius peregrinus* (Loew, 1846)** DIT: AF, MG

MICRODON: see under Microdontidae, following the species accounts of Syrphidae.

MILESIA Latreille, 1804
***Milesia crabroniformis* (Fabricius, 1775)** DIT: ANT, BS, HA, KA, MG
***Milesia semiluctifera* (Villers, 1789)** DIT: ANT, IP, KA, KS, MG, ZO

MYATHROPA Rondani, 1845
***Myathropa florea* (L., 1758)** DIT: AD, AN, ANT, BO, BR, CN, ES, HT, KA, KN, KR, KS, KY, MG, SN, TO, ZO

MYOLEPTA Newmann, 1838
***Myolepta dubia* (Fabricius, 1805)** DIT: AD, BO, KA, KS, KY, ZO
***Myolepta nigritarsis* Coe, 1957** DIT: TUR
***Myolepta potens* (Harris, 1780)** DIT: TUR
***Myolepta trojana* Reemer, Hauser and Speight, 2005** DIT: ME, MG, ZO
***Myolepta vara* (Panzer, 1798)** DIT: BO

NEOASCIA Williston, 1886
***Neoascia annexa* (Müler, 1776)** DIT: MG
***Neoascia dispar* Meigen, 1822** DIT: TUR
***Neoascia interrupta* (Meigen, 1822)** DIT: KY
***Neoascia pavlovskii* Stackelberg, 1955** DIT: EZ
***Neoascia podagrica* (Fabricius, 1775)** DIT: AD, AK, AN, ANT, BO, BS, CN, IP, KA, KS, KY, ME, MG, NI, TO
***Neoascia subannexa* Claussen & Hayat, 1997** DIT: ART, RI
***Neoascia tenur* (Harris, 1780)** DIT: TUR

NEOCNEMODON: see ***HERINGIA***

ORTHONEVRA Macquart, 1829
***Orthonevra frontalis* (Loew, 1843)** DIT: AK, AN, HT, KY, ME, MG, NI, OS
***Orthonevra fumipennis* (Loew, 1843)** DIT: IZ
***Orthonevra nobilis* (Fallén, 1817)** DIT: AK, AN, CN, IP, KN, MG

PALUMBIA Rondani, 1865
***Palumbia eristaloides* (Portschinsky, 1887)** DIT: EZ

PARAGUS Latreille, 1804
***Paragus abrogans* Goeldlin, 1971** DIT: EZ, MG
***Paragus absidatus* Goeldlin, 1971** DIT: EZ
***Paragus albifrons* (Fallén), 1817)** DIT: AN, KS, KY, TO
***Paragus antoinettae* Goeldlin & Lucas, 198** DIT: EZ, IZ
***Paragus azureus* Hull, 1949** DIT: ER
***Paragus bicolor* (Fabricius), 1794** DIT: AK, AN, ANT, BO, CN, EZ, IP, KN, KA, KR, KS, KY, MG, NE, NI, TO, ZO, AKS
***Paragus coadunatus* Rondani, 1847** DIT: EZ
***Paragus compeditus* Wiedemann, 1830** DIT: AN, IZ, KY, ME, MG, AKS, CUO, DAB
***Paragus constrictus* Simic, 1986** DIT: EZ
***Paragus faesi* Weyer, 2000** DIT: ANT
***Paragus haemorrhous* Meigen, 1822** DIT: EZ, MG
***Paragus kopdagensis* Hayat & Claussen, 1997** DIT: BY
***Paragus majoranae* Rondani, 1857** DIT: IZ
***Paragus oltenicus* Stanescu, 1977** DIT: ADY
***Paragus pecchiolii* Rondani, 1857** DIT: MG
***Paragus quadrifasciatus* Meigen, 1822** DIT: AF, AN, ANT, CN, ES, IZ, KN, KY, MG, TO, DAB
***Paragus romanicus* Stanescu 1992** DIT: EZ, MG
***Paragus tibialis* (Fallén, 1817)** DIT: AD, AK, AN, ANT, BO, CN, HT, IP, EZ, ME, KA, KN, KR, KS, KY, MG, NI, TO, ZO, CUO

PARASYRPHUS Matsumura, 1917
***Parasyrphus punctulatus* (Verrall, 1873)** DIT: KS

PARHELOPHILUS Girschner, 1897
***Parhelophilus versicolor* (Fabricius, 1794)** DIT: AF, MG

CHAMAESYRPHUS*:* see under ***PELECOCERA***

PELECOCERA Meigen, 1822
***Pelecocera pruinosomaculata* Strobl, 1906** DIT: AD, ANT, HT
***Pelecocera scaevoides* (Fallén, 1817)** DIT: KS
***Pelecocera tricincta* Meigen, 1822** DIT: KN, SN

PIPIZA Fallén, 1810
***Pipiza festiva* Meigen, 1822** DIT: ME
***Pipiza noctiluca* (L., 1758)** DIT: KS

PIPIZELLA Rondani, 1856
***Pipizella annulata* (Macquart, 1829)** DIT: EZ
***Pipizella bayburtica* Claussen & Hayat, 1997** DIT: BY
***Pipizella caucasica* Skufjin, 1976** DIT: EZ, KK, VA
***Pipizella curvitibia* Stackelberg, 1960** DIT: EZ, VA
***Pipizella divicoi* (Goeldlin, 1974)** DIT: ART, BY, EZ
***Pipizella elegantissima* Lucas, 1976** DIT: EZ
***Pipizella maculipennis* (Meigen, 1822)** DIT: BO, CN, EZ, KA, KS, KY
***Pipizella virens* (Fabricius, 1805)** DIT: AN, CN, KS

PYROPHAENA see under ***PLATYCHEIRUS***

PLATYCHEIRUS Lepeletier & Serville, 1828
***Platycheirus albimanus* (Fabricius, 1781)** DIT: BO, CN, KA, KS, KY, NE

***Platycheirus ambiguus* (Fallén, 1817)** DIT: ES, KS, KN
***Platycheirus angustatus* (Zetterstedt, 1843)** DIT: AN
***Platycheirus aurolateralis* Stubbs, 2002** DIT: CN, KS
***Platycheirus clypeatus* (Meigen, 1822)** DIT: TUR
***Platycheirus fulviventris* (Macquart, 1829)** DIT: MG
***Platycheirus immaculatus* Ôhara, 1980** DIT: KS
***Platycheirus manicatus* (Meigen, 1822)** DIT: KS
***Platycheirus nielseni* Vockeroth, 1990** DIT: KS
***Platycheirus occultus* Goeldlin, Maibach and Speight, 1990** DIT: KS
***Platycheirus peltatus* (Meigen, 1822)** DIT: KS
***Platycheirus rosarum* (Fabricius, 1787)** DIT: KS
***Platycheirus scutatus* (Meigen, 1822)** DIT: KS, MG
***Platycheirus tarsalis* (Schummel, 1836)** DIT: KN

PSARUS Latreille, 1805
***Psarus abdominalis* (Fabricius, 1794)** DIT: KY

RHINGIA Scopoli, 1763
***Rhingia campestris* Meigen, 1822** DIT: BO, KS

RIPONNENSIA Mainbach, Goeldlin & Speight, 1994
***Ripponnensia insignis* (Loew, 1843)** DIT: AD, AN, HT, ME, MG
***Ripponnensia longicornis* (Loew, 1843)** DIT: AD, AK, IZ, MG
***Riponnensia splendens* (Meigen, 1822)** DIT: IZ, KS

SCAEVA Fabricius, 1805
***Scaeva albomaculata* (Macquart, 1842)** DIT: AD, AK, AN, EZ, GA, HT, IP, KA, KN, KS, KY, ME, OS, TO, CUO
***Scaeva dignota* (Rondani, 1857)** DIT: EZ, HA, SI, TO
***Scaeva pyrastri* (L., 1758)** DIT: AD, AK, AN, ANT, CN, ES, EZ, HT, IP, IZ, KA, KN, KS, ME, OS, TO, US, CUO, MAB
***Scaeva selenitica* (Meigen, 1822)** DIT: AD, AN, ANT, BO, CN, ES, HT, IZ, KA, KS, ME, OS, SN, TO, DAB

SERICOMYIA Meigen, 1803
***Sericomyia silentis* (Haris, 1776)** DIT: BO, KS

SIMOSYRPHUS Bigot, 1882
***Simosyrphus aegyptius* (Wiedemann, 1830)** DIT: AD, CUO
***Simosyrphus scutellaris* (Fabricius, 1805)** DIT: AD, AN, HT, KA, CUO

SPAZIGASTER Rondani, 1843
***Spazigaster ambulans* (Fabricius, 1798)** DIT: AF, AK, AN, ANT, BO, BU, CN, ES, EZ, IP, KA, KN, KS, KY, MG

SPHAEROPHORIA Lepeletier & Serville, 1828
***Sphaerophoria laurae* Goeldlin, 1989** DIT: SN
***Sphaerophoria loewi* Zetterstedt, 1843** DIT: KY
***Sphaerophoria rueppelli* Wiedemann, 1830** DIT: AD, AK, AN, ANT, BO, CA, CN, HT, IP, IZ, KA, KN, KS, KY, ME, MG, OS, TO, ZO, AKS, CUO, MAB
***Sphaerophoria scripta* (L., 1758)** DIT: AD, AF, AK, AN, ANT, ART, BO, BU, CN, ES, EZ, HT, IP, IZ, KA, KN, KR, KS, KY, ME, MG, OS, SN, TB, TO ZO, AKS, CUO, MAB
***Sphaerophoria turkmenica* Bańkowska, 1964** DIT: EZ, GA, KY, TO

SPHEGINA Meigen, 1822
***Sphegina alaoglui* Hayat, 1997** DIT: ART
***Sphegina clavata* (Scopoli, 1763)** DIT: KS
***Sphegina clunipes* (Fallén, 1816)** DIT: BO, ART, KA, KS, KY
***Sphegina elegans* Schummel, 1843** DIT: KS
***Sphegina sibirica* Stackelberg, 1953** DIT: KS, TB

SPIXIMORPHA Rondani, 1850
***Spiximorpha euprosopa* (Loew, 1869)** DIT: IZ
***Spiximorpha subsessilis* (Illiger in Rossi, 1807)** DIT: ME, MG
***Spiximorpha worelli* (Brădescu, 1972)** DIT: KS

SPILOMYIA Meigen, 1803
***Spilomyia digitata* (Rondani, 1865)** DIT: AN
***Spilomyia diopthalma* (L., 1758)** DIT: EZ
***Spilomyia graciosa* Violovitsh, 1985** DIT: HA
***Spilomyia saltuum* (Fabricius, 1794)** DIT: AN, EZ, KA
***Spilomyia triangulata* van Steenis, 2000** DIT: EZ

SYRITTA Lepeletier & Serville, 1828
***Syritta flaviventris* Macquart, 1842** DIT: ANT, KA, MG
***Syritta pipiens* (L., 1758)** DIT: AD, AF, AK, AN, ANT, AY, BR, BO, CA, CN, DE, ES, EZ, HT, IP, IZ, KA, KN, KR, KS, KY, ME, MG, OS, SN, TO, ZO

SYRPHOCHEILOSIA Stackelberg, 1964
***Syrphocheilosia claviventris* (Strobl, 1910)** DIT: TUR

SYRPHUS Fabricius, 1775
***Syrphus ribesii* (L., 1758)** DIT: AN, BO, CN, EZ, IP, IZ, ME, KA, KR, KS, KY, SN, TO
***Syrphus torvus* Osten-Sacken, 1875** DIT: TUR
***Syrphus vitripennis* Meigen, 1822** DIT: AD, AN, ANT, BO, CN, ES, IZ, KA, KR, KS, KY, ME, ZO

TEMNOSTOMA Lepeletier & Serville, 1828
***Temnostoma vespiforme* (L., 1758)** DIT: KS

TRICHOPSOMYIA Williston, 1888
***Trichopsomyia flavitarsis* (Meigen, 1822)** DIT: KN
***Trichopsomyia lucida* (Meigen, 1822)** DIT: AN

TROPIDIA Meigen, 1822
***Tropidia scita* (Haris, 1776)** DIT: KY

VOLUCELLA Geoffroy, 1762
***Volucella bombylans* (L., 1758)** DIT: CN, KS, TB
***Volucella inanis* (L., 1758)** DIT: AN, BO, KA, KS, KY, ME, SN
***Volucella pellucens* (L., 1758)** DIT: AN, CN, KS, TB
***Volucella zonaria* (Poda, 1761)** DIT: AD, AK, AN, ANT, BO, CN, ES, EZ, IP, KA, KN, KS, KY, ME, MG, OS, SN, US

XANTHANDRUS Verrall, 1901
***Xanthandrus comtus* (Haris, 1776)** DIT: ANT, KS, SN

XANTHOGRAMMA Schiner, 1860
***Xanthogramma citrofasciatum* (de Geer, 1776)** DIT: EZ
***Xanthogramma pedissequum* (Haris, 1780)** DIT: AK, AN, BO, BU, ES, IP, KA, KS, KY, ME, MG, SN, TB

XYLOTA Meigen, 1822
***Xylota ignava* (Panzer, 1798)** DIT: ART, KS, SN
***Xylota segnis* (L., 1758)** DIT: AD, BO, CN, IP, KA, KS, ME, MG
***Xylota sylvarum* (L., 1758)** DIT: AN, BO, KA, KS, MG, SN
***Xylota tarda* Meigen, 1822** DIT: BO, KS

MICRODON Meigen, 1803
***Microdon devius* (L., 1761)** DIT: HT, TB
***Microdon major* Andries, 1912** DIT: AN
***Microdon mutabilis* (L., 1758)** DIT: AN

DISCUSSION

As result of this study, a revised checklist of Turkish Syrphidae species comprising 314 taxa is compiled.

8 % of these species are endemic, and type localities 16% of these species are in Turkey. 20% of these 308 species are predators, 7% of them are phytophagous, and 18% are saprophagous. No information has been obtained about the larval life of the rest 55% of these species (Speight, 2008).

Turkey is very rich in terms of ecosystem diversity. Our country is situated among the three different continents (Europe, Asia, Africa), on a transition zone. Anatolia has various ecosystems which bear their different properties in varying degrees. There are arid and semi-arid steppes as those in Africa on the one hand, and on the other hand foliar and coniferous forests resembling those in Europe. The topographical structure of Turkey presents rare possibilities in terms of ecosystem diversity. In the west of Turkey lie large and marshy plains. The large river valleys, which were formed by Gediz, Küçük Menderes and Büyük Menderes connect these plains to the Middle Anatolia step by step. These valleys rising gradually from the Aegean coasts towards east turn to a large Anatolian plateau in the Middle Anatolia, and high uplands in the East Anatolia. These high uplands may meet with towering mountain summits exceeding 5000 meters on the one hand and deep and dim valleys on the other hand. Each of the big and small rivers rising from carstic lands right in the south of the Toros Mountains form rare habitats for various plants and animals, in springs where they rise and in the valleys and valley slopes where they flow. Turkey covers various ecosystems ranging from coasts with palm trees to mountains covered with glaciers, from deep valley bases to towering mountain summits, from fertile alluvium plains to arid and rocky slopes, from soft sand hills to steep cliff rocks. These land structures form various habitats in this land mosaic (Işık, 1996).

When the geographical position of Turkey, its consisting of many diverve ecosystems and being a region having a high endemism is taken into account, the Turkish syrphidae fauna will increase over 500 species as a result of detailed surveys.

The aim of this list is to compile the native and foreign scientists who studied the Turkish syrphiadae from 1902 up to present and the identified sryphidae species in a single source of study. I hope this list will be beneficial for those who will study the Turkish sryphidae.

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SCIENTIFIC NOTE

FIRST RECORD ON INCIDENCE OF BEAN SEED FLY, *DELIA PLATURA* MEIGEN (ANTHOMYIIDAE: DIPTERA) IN AUTUMN SOWN BEANS IN KASHMIR VALLEY (INDIA)

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[Singh, S., Baba, Z. A., Abas Shah, M., Kumar, R. 2014. First record on incidence of Bean Seed Fly, *Delia platura* Meigen (Anthomyiidae: Diptera) in Autumn Sown Beans in Kashmir valley (India). Munis Entomology & Zoology, 9 (1): 586-587**]**

Delia platura (Diptera: Anthomyiidae) (Figs. A to F) was observed damaging germinating autumn sown beans in Wadura area of Sopore district in Kashmir Valley in March 2008. This is the first record of this pest attacking beans in India. The pest was very serious on the germinating seeds with about one to seven maggots recorded on the single germinating seeding. The attacked seedlings became weak and the turned rusty brown and ultimately dried off. The maggots were creamish in colour and 10 to 15 mm in length. The pupation was in the soil from which blackish fly emerged.

D. platura characterized with the following characters: In males, in the hind femur, only around 3-5 posteroventral setae are present. In females, common arrangement of mid-tibial setae, though may be any combination of 1-2 anterodorsal, (1-)2 posterodorsal and 2(-3) posteroventral setae. The specimens were photographed through Stereoscopic Zoom Microscope (RSMr 10) with the help of software View7 at CMERTI, Lahdoigarh (Figs. A to F). Field photograph were taken at crop field, Agriculture and Regional Research Station, Sopore, Jammu & Kashmir (Fig. G).

Bean seed fly, seed corn maggot polyphagous, attacks beans, maize, crucifers, cucurbits, cotton. Information is given on the geographical distribution in Europe, Albania, Austria, Azores, Balearic Islands, Belgium, Bulgaria, Channel Islands, Corsica, Crete, Cyprus, Czechoslovakia, Denmark, Faroe Islands, Finland, France, Germany, East Germany, West Greece, Hungary, Iceland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Sicily, Spain, Switzerland, Turkey, United Kingdom, Yugoslavia, USSR, Azerbaijan, Byelorussia, Republic of Georgia, Kazakhstan, Russian SFSR, Ukraine, Uzbekistan, Africa, Algeria, Canary Islands, Egypt, Ethiopia, Kenya, Libya, Madagascar, Madeira, Morocco, Rwanda St. Helena, South Africa, Sudan, Tanzania, Tunisia, Uganda, Zimbabwe, ASIA, China, India, Iran, Iraq, Israel, Japan, Korea, Lebanon, Nepal, Pakistan, Saudi Arabia, Sri Lanka, Syria, Taiwan, Yemen, Australasia and Pacific Islands, Australia, Hawaii, New Zealand, North America, Canada, Greenland, Mexico, USA, Central America and Caribbean, Bermuda, South America, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay, Venezuela (Anon. 1985; Chaudhary, 1989) and now first time in the Kashmir valley on beans. It may be concluded that such migrations and shift in the host plant can be used as indicators of climate change.

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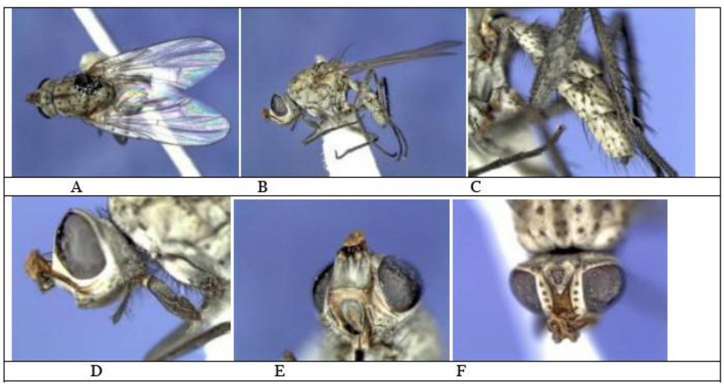

Figures A-F. A. Dorsal View, B. Lateral View, C. Enlarged abdomen, D. Lateral view of mouth parts, E. Ventral View of mouth part, and F. Dorsal view of mouth parts.

Figure G. Damaged seedlings due to maggots of *Delia platura*.

SCIENTIFIC NOTE

AN OBJECTIVE JUNIOR SYNONYM OF A RIBBON-WORM GENUS NAME (NEMERTEA: HETERONEMERTEA)

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[Kajihara, H. 2014. An objective junior synonym of a ribbon-worm genus name (Nemertea: Heteronemertea). Munis Entomology & Zoology, 9 (1): 588-588**]**

Genus *YININEMERTES* Sun & Lu, 2008

Yinia Sun & Lu, 1998: 176 (non *Yinia* Li, 1994, nec *Yinia* Liu & Li, 1995)
Novoyinia Özdikmen, 2009: 606 **syn. nov.**

Remarks: Sun & Lu (1998) established the genus *Yinia* for the heteronemertean *Yinia pratensis* Sun & Lu, 1998 from the Changjiang (Yangtze) River Estuary. This generic name was preoccupied by *Yinia* Li, 1994 (Insecta: Psocoptera), which also had another junior homomym, *Yinia* Liu & Li, 1995 (Insecta: Orthoptera). Accordingly, Sun & Lu (2008) replaced *Yinia* Sun & Lu, 1998 with *Yininemertes* Sun & Lu, 2008. Not knowing the latter name, however, Özdikmen (2009) proposed the replacement name *Novoyinia* Özdikmen, 2009 for *Yinia* Sun & Lu, 1998. Therefore, *Novoyinia* Özdikmen, 2009 is herein regarded as an objective junior synonym of *Yininemertes* Sun & Lu, 2008.

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