This volume is dedicated to the chief-editor Hüseyin Özdikmen's grandfather

HÜSEYİN ÖZDİKMEN

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A NEW SPECIES OF *EUPHOLUS* BOISDUVAL (COLEOPTERA: CURCULIONIDAE: ENTIMINAE) FROM WEST NEW GUINEA

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[Grasso, M. 2020. A new species of *Eupholus* Boisduval (Coleoptera: Curculionidae: Entiminae) from West New Guinea. Munis Entomology & Zoology, 15 (1): 1-10**]**

ABSTRACT: In the present paper a new species of *Eupholus* Boisduval 1835 from Jayapura area of West New Guinea is described as new: *Eupholus bhaskarai* sp. nov. The adults and genitalia are depicted.

KEY WORDS: West New Guinea, Jayapura, *Eupholus, bhaskarai,* new species

Eupholus is one of the most beautiful and collected genus. The species usually show dense metallic and coloured scales. Many species were described in recent years (Porion, 2000; Riedel, 2010; Limoges & Le Tirant, 2019). The majority of specimens come from New Guinea. Sometimes specimens that belong to undescribed species are interspersed with more common ones. Here is described a species closely related to *Eupholus loriae* (Gestro, 1902); the type's locality is from Sentani lake environment, Jayapura district.

MATERIALS AND METHODS

This study is based on 19 specimens, ten of them purchased by the collector Kelly Price, Fabrizio Bortolussi and the author, in May 2019, from Faisal Latutuapraya, the export dealer who usually works in Bali and West Papua. The study of such specimens (presently preserved in the author's collection, later they will be deposited in different collections named as below) allowed to ascertain the presence of a new species of the genus *Eupholus* in Jayapura province. The Holotype will be deposited from author's collection to an official and renowned Natural History Museum collection.

Habitus illustrations were made using a Canon 5Ds (50.3 MP) equipped with MP-E 65 1-5x macro lens and a Hasselblad CFV 50c digital back (51.3 MP) equipped with 80mm CF and macro tubes. The pictures were taken at different focal levels and processed with Zerene stacker on MAC platform. Measurements were taken with Zeiss stemi 305 and pictures of genitalia were captured with integrated camera. All images were enhanced with Photoshop CC 2019.

Depositories are cited using the following codens:

MGC Matteo Grasso collection, Turin, IT
KPC Kelly Price collection, VT 05301, USA
FBC Fabrizio Bortolussi collection, San Daniele del Friuli, Udine, IT
LFC Leonardo Falletti collection, Buttigliera Alta, Turin, IT
MUC Marco Uliana collection, Venice, IT
STMI Stephane Le Tirant Montreal Insectarium, Quebec, CA

TAXONOMY

Eupholus loriae (Gestro)

(Plate 1: C; Figs. 5-8, 10, 12)

Material examined. Papua New Guinea, Morobe prov.: 1 male, Aseki, Hiyewini village, 18.V.2005, local collector (MUC); 1 female, Aseki, Hiyewini village, 16.II.2005, local collector (MUC); 1 male and 1 female, Aseki, Kamanea village, 24.V.2005, local collector (MGC, FBC); 4 males, Aseki, Hamoini village, 3.VII.1997 (LFC); Gulf prov.: 1 male, Kaintiba Kerema 3.V.1997 (LFC).

Diagnosis: an *Eupholus* species with a glabrous median ridge on the rostrum; the longitudinal glabrous area most often starts on pronotum and follows to the elytral suture as far as the apex. Two glabrous sidebands on pronotum are finely dispersed by points with reddish setae. Below a key is proposed to distinguish it from two others *Eupholus* species.

Original description by Gestro, 1902, Boll. Soc. Ent. Ital., pp. 48-49: "Questa specie si avvicina all'*humeridens* Heller. Ha il corpo ricoperto di squamette, le quali al disopra sono di un azzurro tendente al verde e al disotto, nonchè sui femori posteriori, sono azzurre. Le squamule del rostro e sopratutto quelle del funicolo delle antenne sono più chiare; la clava, eccettuata la base del primo articolo, è di un nero di velluto.

Il rostro è percorso nel mezzo da una linea longitudinale nera, che si continua sul capo fino al di là del margine posteriore degli occhi. Il torace presenta tre larghe striscie longitudinali, nere e opache, una mediana ed una per ciascun lato. Gli elitri hanno la sutura nel terzo basale, l'angolo omerale e la carena laterale che gli fa seguito e il tubercolo apicale, neri e lucenti. Il capo presenta in mezzo agli occhi un brevissimo solco longitudinale. Il torace ha i lati paralleli pei due terzi posteriori, convergenti e leggermente arrotondati nel terzo anteriore e con una lieve strozzatura presso gli angoli anteriori; nel mezzo del disco è fortemente depresso e liscio; ai lati della linea mediana è scolpito di punti scarsi ed irregolari, più appariscenti sulle due strisce nere laterali denudate di squame, e ciascuno di questi punti porta una setola brevissima rossastra.

Gli elitri sono percorsi da dieci serie regolari di punti piuttosto piccoli, delle quali sei fra la sutura e la carena laterale e quattro fra questa ed il margine laterale. La sporgenza omerale é molto marcata e sotto forma di un dente rivolto in addietro; la carena che si continua con essa è robusta, e va, diminuendo gradatamente, a terminare a livello del tubercolo apicale. Questo tubercolo è nero, lucente, conico e si trova nell'intervallo fra la quarta e la quinta serie di punti. I piedi sono squamulosi e sparsi di punti setigeri. L'unico esemplare che rappresenta il tipo di questa specie fu raccolto dal Dott. Lamberto Loria, nell'autunno del 1892 lungo il fiume Paumomu (S. Giuseppe)."

Distribution: Morobe province, Eastern Highlands province, Goilala district.

Key to species of *Eupholus* Boisduval with longitudinal stripe that starts from pronotum and follows to elytral suture in addition to two sidebands on pronotum that end at ½ elytra

1. Rostrum with a glabrous median line forming two barely hinted longitudinal subcylindrical protuberances, elytron without lateral carina 2
-. Rostrum with a glabrous median ridge, elytron with lateral carina 4
2(1). Pronotum with two not glabrous but violet blue lateral stripes .... *E. detanii* Limoges & Porion
-. Pronotum with two glabrous lateral stripes 3
3(2'). Elytra with elongated shape, no lateral carina and two glabrous lateral stripes which end around ½ elytra .... *E. faisali* Grasso
4(1'). Lateral glabrous stripes on pronotum with scattened points and reddish setae inside .... *E. loriae* Gestro
-. Lateral glabrous stripes on pronotum with small points and black setae inside ... . *E. bhaskarai* sp. nov.

Eupholus bhaskarai sp. nov.

(Plate 1: A-B; Figs. 1-4, 9, 11)

Holotype (male): [Indonesia], Irian Jaya, Jayapura province, Klaisu, South Gresi, V.2019 local collector, in MGC.
Paratypes (5 males, 4 females (one female marked as "allotype")): same date and location as holotype, in KPC, MGC and STMI.

Diagnosis: An *Eupholus* species with a large, vertical stripe that starts by pronotum and ends at 2/3 of the elytra. Sometimes the stripe appears just visible, because of this, is easy to confuse *Eupholus bhaskarai* sp. nov**.** with *Eupholus loriae* (Gestro, 1902).

Description: total length 19.92 mm; pronotum+elytron 14.82 mm.

Head dorsal surface covered with green and light blue metallic oval scales, sometimes milky except for glabrous areas located between and laterally behind the eyes. Distance between the eyes 2.12 mm.

Rostrum width at the base 1.68 mm, 3.50 mm height, maximum width in front of antennal insertion. Dorsal area densely covered with suboval light green and light blue scales, interspersed with subrecumbent setiform scales; medially with low glabrous costa. Antennal scrobe complete in not dilated pterigo. Apex of the rostrum with suberect yellowish colored setae. Epistome heart-shaped with no ridges and with elongated scales posteriorly, glabrous anteriorly.

Antenna with funicle+club 7.43 mm; scape and funicle densely covered with suboval green and light blue scales mixed with witish setae. Funicle slender and elongate. Scape retracted ends at 1/3 of the eye. Funicles covered with whitish setae. Club dark brown.

Pronotum base 4.81 mm, 3.68 mm height; characterized in the dorsal part by wide black glabrous median depression, more deep in median area. Two lateral glabrous stripes give way for two subequal areas covered by subrotund light blue and green scales.

Scutellum glabrous and almost covered by elytra.

Elytron distance between the humeri 6,30 mm, 11,14 mm height. Humeri callosity with rectangular projection; a glabrous ridge continue behind humeral callus to 1/3 of elytron. Almost completely absent apical calluses. Median longitudinal and glabra stripe, large at base and thinner towards the scutellum, likely to connect itself with the one wich starts at base of the pronotum; elytron densely covered with light blue-green circular scales, strial punctures deeply impressed and quite large, with subrotund shape.

Thoracic venter densely squamose with green and light blue, round to lanceolate and recumbent scales. Posteriorly, area between forecoxae process glabrous.

Legs evenly covered by green light blue round scales on femora and tibiae, scales become blue-violet and interspersed with setae, elongated and lying on the tarsi.

Genitalia. Aedeagus (Figs. 1-2) with subparallel sides until apical orifice, then in quite straight line converging to rounded apex. In lateral view somewhat of weakly swollen and quite truncate. Endophallus with symmetrical transfer apparatus as in picture 3. Tegmen with two thin and elongated paramers, barely rounded at apex (Fig. 4) .

Differential diagnosis: as mentioned *E. bhaskarai* sp. nov looks relationed to *E. loriae* (Gestro, 1902) from which often differs by the presence of the large glabrous median and longitudinal stripe on the elytra. A larger and deeper strial punctures, a glabrous elytral suture only up to 2/3 of elytra (*E. loriae* has all glabrous elytra suture) and a different genitalia as in figs. 1-4 and 5-8 with illustrated tegmen by both species as in figs. 4, 8 make possible to confirm validity of *E. bhaskarai* sp. nov. It is often possible to observe a glabrous transversal band in apical calluses for *E. bhaskarai* (as in plate 1: B) and could be easy to think it is barely hinted in apical calluses of *E. loriae* but this feature is never showed and as Gestro writes for this last species, both the glabrous stripes laterally on pronotum are dispersed with points which has reddish setae inside; instead *E. bhaskarai* has easy to see black setae in the same place.

Distribution: the new species is known from [Indonesia], Irian Jaya, Jayapura province, Klaisu, South Gresi.

Etymology: this species is named in honor of Edy Bhaskara (East Java, Indonesia) who helped the author to recognize the new species.

DISCUSSION

The habitus similarity between *E. loriae* (Gestro, 1902) and *E. bhaskarai* sp. nov. is analyzed more deeply. Both the species belong to *E. loriae*-group of *Eupholus* as suggested by Riedel (2002); the specimen of *E. loriae*, selected for dissection has the following data: [Papua New Guinea], Morobe province, Aseki, Kamanea village, 24.V.2005 (MGC). As we can see, besides some minor differences of habitus like stripes and bands, genitalia are quite different in shape (aedeagus apex more rounded in *E. loriae, as in fig. 5*) and tegments as in figs. 4, 8 and the distribution areas are definitely far. As reported in picture 13, by Gestro the type locality is situated in Goilala district (PNG), along the banks of the river Paumomu (S. Giuseppe). That river comes from Yule mount and Lamberto Loria, the collector of *E. loriae* holotype introduces us to his journey by way of correspondence. In plate 1: D is illustrated female Allotype of *Eupholus faisali* (Grasso, 2019); the belonging of this species to *E. schoenherii* group (Riedel, 2002) combined to a very different habitus (humeri projection, apical callosity and body shape) allow us to identify the two species without a close scrutiny. *E. bhaskarai* sp. nov. specimens could superficially resemble *E. detanii* (Limoges & Porion, 2004) but due to a far geographic distribution and its three different colours, no glabrous areas and lack of prominent humeral and apical calluses in *E. detanii* give to *E.* bhaskarai another status. The specimen illustrated in previous work (Grasso, M. 2019; Sugapa digital 12(1): figs. 2, 9-10) is now determined as *E. bhaskarai* because everything confirms the value of this new *Eupholus* species. In the same paper were cited the holotype humeri callosity of *Eupholus faisali* with a rectangular projection and genitalia without transfer apparatus (given as lost during dissection), both the statements are wrong: humeri callosity are little prominent with obtuse projection and transfer apparatus is intact. Furthermore female paratype of *E. fasali* and one male paratype of *E. casadioi* (Grasso, 2019) were marked as "allotype" at the time of description.

ACKNOWLEDGEMENTS

I have to thank Kelly Price for his enormous generosity and friendship, Dr. Maurizio Bollino for his help without which this work would not have been possible. Thanks to Stephane Le Tirant from Montreal Insectarium for his kindness and advices, to Marco Uliana from Natural History Museum of Venice for his help with some specimens' data and to Fabio Lena for the beautiful pictures of *E.* bhaskarai habitus. I thank Edy Bhaskara, to whom the species is dedicated, for his help and generosity out of the ordinary and last but not least Carlo Arrigo Casadio for the help and encouragement that he gives me every day, as a great master would.

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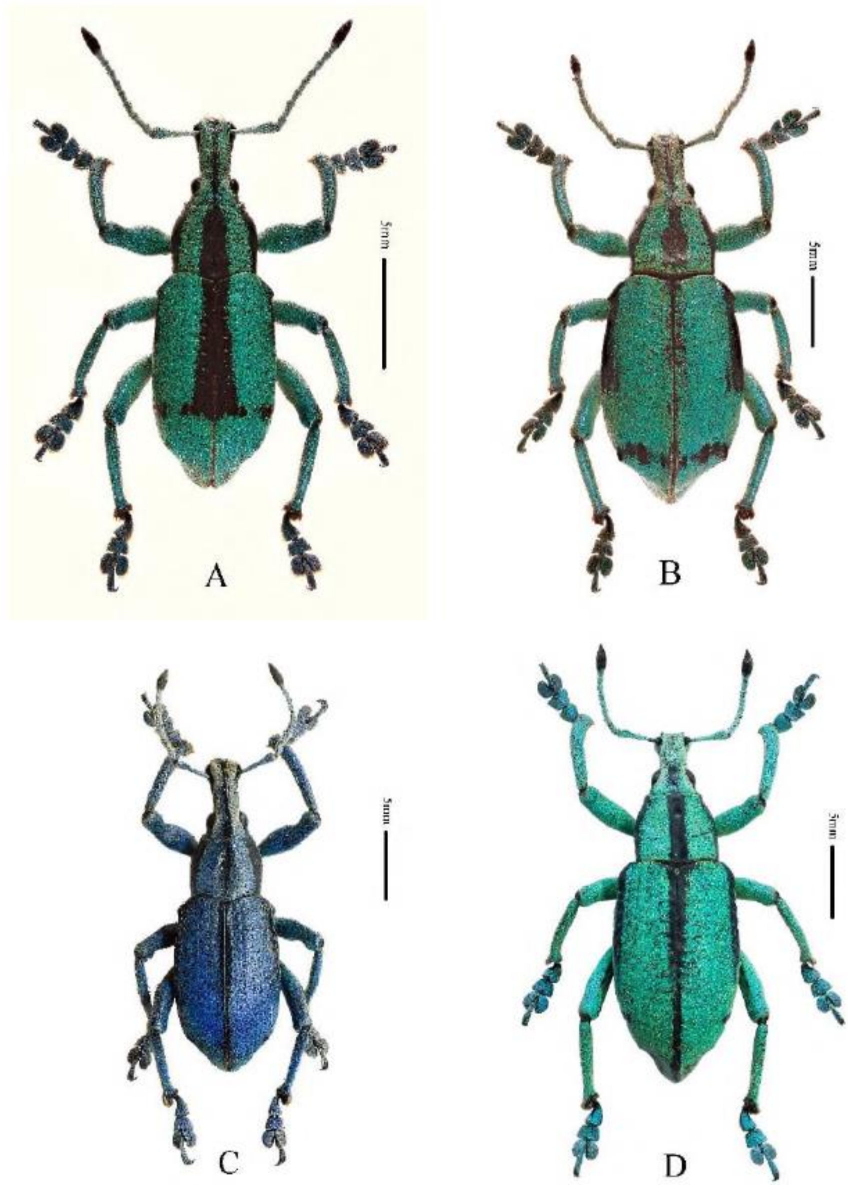
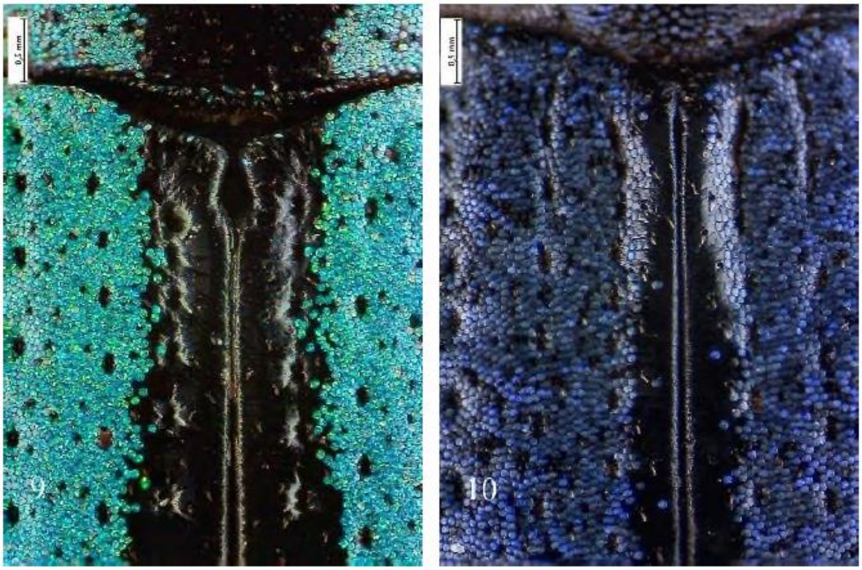


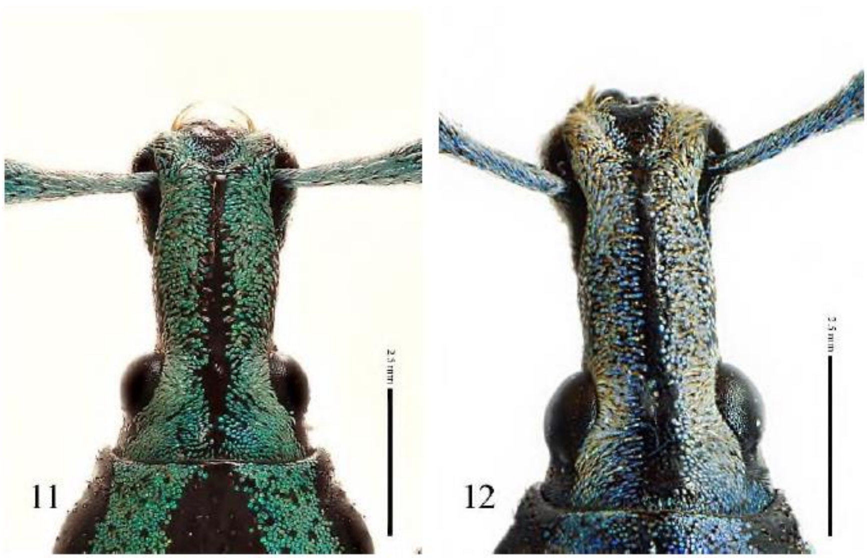
Plate 1. Habitus of *Eupholus species;* A: *Eupholus bhaskarai*, male holotype; B: *Eupholus bhaskarai*, female allotype; C: *Eupholus loriae* (Gestro, 1902), male; D: *Eupholus faisali*, female allotype.

Figures 1-4. Male genitalia of *Eupholus bhaskarai* sp. nov. holotype; 1. Aedeagus in dorsal view; 2. Aedeagus in lateral view; 3. Transfer apparatus, resting position; 4. Paramers of tegmen.

Figures 5-8. Male genitalia of *Eupholus loriae*; 5. Aedeagus in dorsal view; 6. Aedeagus in lateral view; 7. Transfer apparatus, resting position; 8. Paramers of tegmen.



Figures 9-10. Details of strial punctures of *Eupholus* species; 9. *Eupholus bhaskarai* sp. nov. holotype; 10. *Eupholus loriae*.



Figures 11-12. Head and rostrum of *Eupholus* species; 11. *Eupholus bhaskarai* sp. nov. holotype; 12. *Eupholus loriae*.

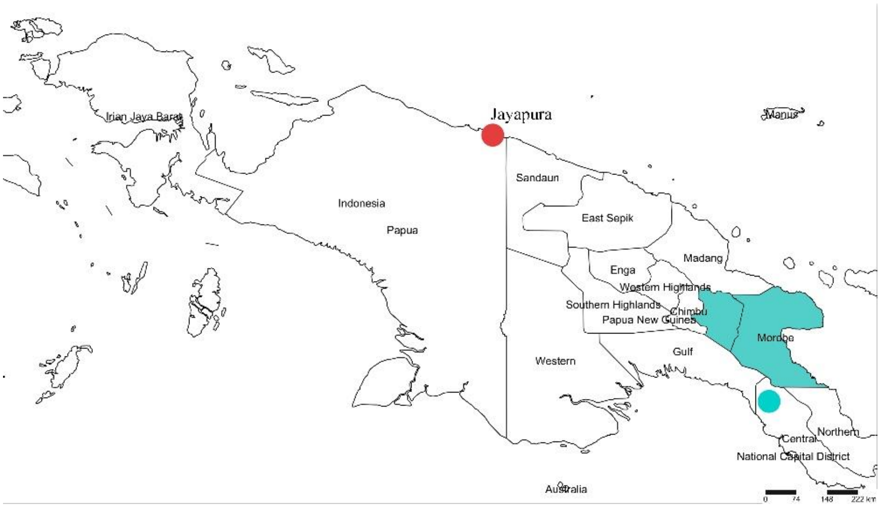


Figure 13. Locality of *Eupholus* species; *E. bhaskarai* (red dot); *E. loriae* (blue dot and blue areas).

A NEW *COTTIUSCULUS* FROM THE SEA OF JAPAN (TELEOSTEI: SCORPAENIFORMES: COTTIDAE)

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[**Prokofiev, A. M.** 2020. A new *Cottiusculus* from the Sea of Japan (Teleostei: Scorpaeniformes: Cottidae). Munis Entomology & Zoology, 15 (1): 11-14]

ABSTRACT: A new species of sculpins, *Cottiusculus primoricus*, is described from the Sea of Japan off Far Eastern Russia. It is similar to *C. gonez* in possession of the straight uppermost preopercular spine, short and simple nasal spines and lateral line not extending onto caudal fin, but differs from that species in the terminal point of the uppermost preopercular spine not barbed, dorsal-fin spines in males not distinctly elongated, in coloration and in some other minor details. A key for identification of all known species of *Cottiusculus* is presented.

KEY WORDS: Sculpins, new species, Far East of Russia

The genus *Cottiusculus* Jordan et Starks, 1904 can be distinguished from the related artedielline genera in the greatly depressed head and body, absence of bony plates, presence of four preopercular spines and two cusps on inner side of the uppermost preopercular spine. This genus has been revised by Kai & Nakabo (2009), who defined three species distributed in the north-western Pacific Ocean off Russia, Japan, Korea and North China: *C. gonez* Jordan et Starks, 1904, *C. nihonkaiensis* Kai et Nakabo, 2009 and *C. schmidti* Jordan et Starks, 1904. In addition, Neyelov (1979) reported an unidentified species of *Cottiusculus* possibly conspecific with *C. minor* Watanabe, 1958, which was not recognized by Kai & Nakabo (2009). The nominal species *Cottiusculus minor* does not belongs to this genus but is a member of *Artediellus* Jordan, 1887 as pointed out by Nakabo (2002). Sorting the cottid specimens housed in the Institute of Oceanology, Russian Academy of Sciences, Moscow (IOM) I discovered several specimens of *Cottiusculus* corresponding to the characters given for *Cottiusculus* sp. of Neyelov (1979). They are described as a new species in the present contribution.

Methods and terminology follow Neyelov (1979). All measurements were made point to point. Abbreviations: SL, standard length.

Cottiusculus primoricus Prokofiev, sp. nova

(Figs. 1-5)

Material examined: IOM, holotype (Fig. 1), male, 55 mm SL, Russia, Primorsky Krai, Sea of Japan, Peter the Great Bay, RPR-3098, trawl number 36, 20.07.2015, leg. Solomatov. Paratypes: IOM, 1 specimen, female, 50 mm SL, collected with holotype; IOM, 4 specimens, females, 58–66 mm SL, same data as for holotype, but trawl number 37.

Diagnosis: A species of *Cottiusculus* with short and simple nasal spines, terminal point of uppermost preopercular spine not barbed, dorsal-fin spines not conspicuously elongated in males, lateral line terminating at caudal-fin base, with

25–27 pores, medial row of blackish blotches on first dorsal fin in both sexes, single row of moderately small dark blotches below lateral line.

Description: Head and body markedly depressed (Figs. 1, 2). Dorsal-fin rays VII–VIII, 11–13, anal-fin rays 12–13, pectoral-fin rays 22–24, pelvic-fin rays I + 3. Spinous and soft portion of dorsal fin widely separated. Tips of dorsal-fin spines free from membrane, ending as small bulges (more pronounced in male) (Figs. 3, 4). Dorsal-fin spines somewhat longer in male than in females, but not considerably elongated. Pectoral fin reaching more or less behind anal-fin origin. Pelvic fin ending well before anus.

Nasal spines short, simple, posteriorly directed, shorter than the tube of anterior nostril. Mouth terminal, upper jaw reaching anterior third to middle of orbit. Preopercle with four spines; uppermost spine bifurcated at tip, with branches widely divergent (divaricate), with additional small cusp on inner side; terminal point not barbed. Maxillary cirrus always present. Supraocular cirri present, with one moderately long cirrus at mid-eye and 0 to 4 much smaller additional cirri in a row; upper surface of eyeball medially from cirri with several small fleshy bumps. A pair of parietal cirri rarely present. One or (usually) two pairs of small nuchal cirri present, sometimes reduced to a pair of minute bumps. Small cirri above two anteriormost lateral-line pores often present. Suborbital stay thin, rod-like, not expanded toward preopercle. Jaws, vomer and palatines with narrow band of small conical teeth.

First and third supraorbital pores absent; first supraorbital pore always replaced by a triangular fleshy protrusion as long as nasal spine. Some pore openings on dorsal surface of head (nasal, coronal and occipital pores) often replaced by fleshy bumps variably developed between the specimens. Eight infraorbital and ten preoperculo-mandibular pores. Posterior opening of ninth preoperculo-mandibular pore very large. First pair of mandibular pores well spaced. Lateral-line pores small, with a single (lower) opening each, 25–27 in number, not extending onto caudal fin (last pore situated at base of caudal-fin rays).

Dorsal surface of head and body (above lateral-line canal) indistinctly and irregularly mottled; a single row of moderately small dark blotches below lateral line (Fig. 5); ventral surface uniformly whitish. First dorsal fin with an oblique medial row of blackish blotches on interradial membranes; distal margin somewhat infuscated (Figs. 3, 4). Male: second dorsal, pectoral and caudal fin with several rows of bold dark spots, better developed on second dorsal and pectoral fin than in the females; anal fin blackish, pelvic fin somewhat infuscated. Female: second dorsal, pectoral and caudal fin with several rows of dark spots, larger and more pronounced on caudal fin; pelvic and anal fins unpigmented.

Measurements (in % of SL; data for male holotype are given first, followed by the female paratypes in parentheses): head length 38.2 (37.9–39.3), snout length 9.1 (7.4–9.1), horizontal diameter of orbit 8.2 (9.0–10.4), bony interorbital width 2.7 (2.6–3.8), upper jaw length 15.5 (12.1–14.8), first and second predorsal and preanal distances 32.7 (36.2–41.0), 50.9 (54.1–60.6) and 54.5 (54.0–60.6), respectively, pelvic-anal distance 25.5 (26.0–33.3), length of longest dorsal-fin spine 16.4 (9.0–10.6), pectoral-fin length 25.5 (25.0–31.2), pelvic-fin length 18.2 (16.4–18.0), length and least depth of caudal peduncle 9.1 (8.0–10.7) and 7.3 (6.0–6.6), respectively.

Etymology: The species epithet is given from Primorsky Krai of Russia; adjective.

Remarks: The studied specimens well agree with the description of *Cottiusculus* sp. in Neyelov (1979) except in average higher number of the lateral-line pores (25–27 vs. 23–26). Furthermore, some of the nasal, supraorbital, coronal and occipital pores can be replaced by fleshy bumps in certain specimens of the new species, which was not reported for *Cottiusculus* by Neyelov (1979). It is possible that some of the previous reports of *C. gonez* from the mainland coast may actually belong to this new species. For instance, Chang et al. (1955) reported the specimens of *C. gonez* from the Yellow Sea with three supraocular cirri, which is characteristic for the new species, not for the true *C. gonez*. The differences between the known species of *Cottiusculus* can be summarized in the following identification key.

1a. Uppermost preopercular spine upcurved; nasal spines long, usually bicuspid; lateral-line canal extending onto caudal fin **2**
1b. Uppermost preopercular spine straight; nasal spines short, always simple; lateral-line canal ending at base of caudal fin **3**

2a. Nasal spines deeply bicuspid; ventral lateral and lateral-line cirri absent; dorsal-fin spines elongated in males; five to eight brown blotches below lateral line .... ***C. schmidti***
2b. Nasal spines weakly bicuspid, sometimes simple; ventral lateral and lateral-line cirri present; dorsal-fin spines not elongated in males; two to four brown blotches below lateral line .... ***C. nihonkaiensis***

3a. Terminal point of uppermost preopercular spine barbed; supraocular cirrus single, long; suborbital stay broadened toward preopercle; dorsal-fin spines in males considerably elongated; lateral line with 27–32 pores; medial row of blackish blotches on first dorsal fin in males, blackish band along distal margin of first dorsal fin in females; numerous small dark dots below lateral line ....
.... ***C. gonez***
3b. Terminal point of uppermost preopercular spine not barbed; one moderately long and several small supraocular cirri; suborbital stay uniformly narrow; dorsal-fin spines in males only slightly elongated; lateral line with (23)25–27 pores; medial row of blackish blotches on first dorsal fin in both sexes; single row of moderately small dark blotches below lateral line .... ***C. primoricus***

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Figures 1–5. *Cottiusculus primoricus*, new species: (1) holotype, male, 55 mm SL, habitus, dorsal view; (2) paratype, female, 61 mm SL, habitus, dorsal view; (3) first dorsal fin, male; (4) first dorsal fin, female; (5) flank pigmentation, female, 61 mm SL. Scale bars: 10 mm (1, 2), 5 mm (3–5).

DORCADION (*MACULATODORCADION*) *TRISTE* FRIVALDSZKY, 1845 (COLEOPTERA: CERAMBYCIDAE: LAMIINAE): NEW FOR THE EUROPEAN FAUNA, WITH DESCRIPTION OF A NEW SUBSPECIES FROM GREECE

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ABSTRACT: In this work, a new subspecies, *Dorcadion* (*Maculatodorcadion*) *triste lesvicum* ssp. nov., is described from Lesvos island of Greece. Accordingly, the presence of *Dorcadion* (*Maculatodorcadion*) *triste* Frivaldszky, 1845 in Europe is documented for the first time. A pair was collected in April and May 2019, on Lesvos island of Greece. Information on the habitat it was found is given. Its distribution on the island is discussed.

KEY WORDS: *Dorcadion* (*Maculatodorcadion*) *triste*, new subspecies, first records, Cerambycidae, Lesvos

Species in the genus *Dorcadion* Dalman, 1817 are all wingless and inhabit grasslands, mainly at high altitudes, where they are local. Their larvae feed on the roots of grasses. Adult phenology is mainly in spring, and early summer. The systematics of the genus is very complicated, and quite many taxa are considered as not valid species by some authors. In Greece, the genus is well represented by about 75 species - an additional of 5 species in the genus *Neodorcadion* Ganglbauer, 1884 also occur in Greece – a large percentage of which are endemic.

From Lesvos island are known the species *Dorcadion* (*Cribridorcadion*) *divisum* Germar, 1839, *D.* (*C.*) *funestum* Ganglbauer, 1884 (a species in the *D. divisum* group, for the validity of which there is debate among authors), *D.* (*C.*) *pilosellum* Kraatz, 1873, *D.* (*C.*) *pilosipenne* Breuning, 1943, and *D.* (*Maculatodorcadion*) *quadrimaculatum* ssp. *nodicorne* Tournier, 1872. The last species is the only one from the subgenus *Maculatodorcadion* Breuning, 1943 known from Greece and generally from Europe. This subgenus contains three more species: *D.* (*M.*) *janssensi* Breuning, 1966, *D.* (*M.*) *triste* Frivaldszky, 1845, and *D.* (*M.*) *wolfi* Krätschmer, 1985, all known only from Turkey (Löbl & Smetana 2010, Özdikmen 2016).

MATERIAL AND METHODS – RESULTS

In April 2018, a picture of a male *Dorcadion* was posted in social media from local people of Lesvos, who asked for identification to species level, stating that it was found in the area of Pappados, a village in SE. Lesvos. Some entomologists suggested *D. divisum* and *D. funestum*, but then the first author of this paper identified it publicly as *D.* (*M.*) *triste*, a species known as endemic to W. Turkey (Özdikmen 2010, 2016), as the picture was quite clear and the characters visible.

Specifically, that pictured male had the characteristic of the subgenus *Maculatodorcadion* enlarged spines on the edges of the hind tibiae (especially in males) (Fig. 1b) and thickened apical parts of the first five antennomeres (Fig. 1e), and the distinctive black and whitish elytral pattern with black spots (Fig. 1a), which agree with the original description of *triste* by Frivaldszky (1845).

Then, next year, in late April and early May 2019, the second author collected specimens (Figs 1, 2) on the island and sent them to the first author, who examined and identified them as male (Fig. 1a-b) and female (Figs 1c-e, 2) of *D.* (*M.*) *triste*, due to the characters mentioned above. It is interesting that our female is androchromal. The females we know from Turkey are autochromal, of grey form. Specifically, both specimens were collected in Pirgi Thermis, a village in E. Lesvos. The male was found on May 2, 2019, at around 3:00 p.m., and the female on April 27, 2019, at around 2:00 p.m. Accordingly we accepted the specimens belong to a new subspecies of *Dorcadion* (*M.*) *triste* Frivaldszky, 1845. The new subspecies is named as *Dorcadion* (*M.*) *triste lesvicum* ssp. nov. after the type locality Lesvos island with androchromal female mainly. Thus the holotype of new subspecies is the female specimen.

Dorcadion (*M.*) *triste lesvicum* ssp. nov.

Types: Holotype (♀), Greece: E. Lesvos, Pirgi Thermis, April 27, 2019. Paratype (♂), Greece: E. Lesvos, Pirgi Thermis, May 2, 2019.

The new subspecies is diagnosed by following characters: The male of new subspecies is generally similar to the nominative form of *Dorcadion* (*Maculatodorcadion*) *triste* Frivaldszky, 1845, but the female is unusually androchromal. The females of nominotypical subspecies we know from Turkey are autochromal, of grey form. Besides humeral edges of elytra and lateral projections of pronotum in nominotypical subspecies are more protruded and more pointed respectively while they are less protruded and less pointed in both male and female of new subspecies. Body length in male: 18.5 mm, width: 5.8 mm; body length in female: 17.8 mm, width: 6.7 mm.

The habitat they were found (Fig. 3) is a zone next to the sea, especially rich in Poaceae (their hostplant) – a typical grassland biotope of *Dorcadion*. Specifically, these plant species are dominant in the area: *Anacamptis laxiflora, Arundo donax, Avena* sp., *Briza maxima, Bromus* sp., *Dasypyrum* sp., *Daucus carota, Ferula communis, Glebionis coronaria, G. segetum, Linum bienne, Lotus* sp., *Plantago lanceolata, Rubus sanctus, Serapias bergonii, Silene gallica, Spartium* sp., *Tamarix gallica, Trifolium* sp. and *Ulmus glabra*. There are shale rocks in the area.

As already mentioned, this species is until now known only from Turkey with records from Balıkesir, Bursa and İzmir provinces (Fig. 4). There it has two known subspecies, *D. t. triste* Frivaldszky, 1845 and *D. triste phrygicum* Peks, 1993 (Löbl & Smetana 2010). According to Özdikmen & Kaya (2015) and Özdikmen (2016), *phrygicum* should be treated as separate species. The specimens in the present paper, collected on E. Lesvos island, are the first documented records of *D. triste* from Greece and generally from Europe.

DISCUSSION

Both Pirgi Thermis, the area where we collected the specimens of *D. triste*, and Pappados, the place where local people of Lesvos claimed to have found a photographed male identified as *triste* by us, are located on the eastern part of the island. The species hasn't been found in other parts of Lesvos. It is not impossible to be more widespread on the island, however it seems that it has formed local populations on the eastern part only, close to W. Turkish coasts, given also the limited dispersal ability of the flightless beetles. Trade is known in Lesvos as early as 3000 B.C. Specifically, at the area of the village Pirgi Thermis where we found the species, there was the prehistoric settlement of Thermi, which had developed trading relationships with NW. Turkey – where *D. triste* is known to exist (Özdikmen & Kaya 2015, Özdikmen 2016) – up to about 2500 B.C. when it was destroyed. It is very possible that the species has been transferred in the area from Turkey since that period with trading ships, found favorable grassland habitat and formed local populations there. The time passed since that period could be enough for their subspeciation. Here we must mention that, trading relationships with Asia Minor had developed also other places of especially the eastern part of Lesvos, such as Mytilini or Plomari, and the activity stayed alive until the destruction of 1922. We think therefore that *D. triste* is possibly more widespread in E. Lesvos, but the degree of genetic differentiation could be different between potential local populations, and they can belong to different subspecies, as they may have been formed at different times, and in some cases the possible arrival of conspecifics from Turkey via marine transport could dilute the differentiating genes of a population. Nevertheless, more research is needed in order to obtain more knowledge on the actual distribution of *D. triste* on the island (and maybe also on more E. Aegean Greek islands), and to be clarified the exact taxonomic status of each potential population of this species. Finally, we think that more species of the Turkish insect fauna will be discovered also on E. Aegean Greek islands.

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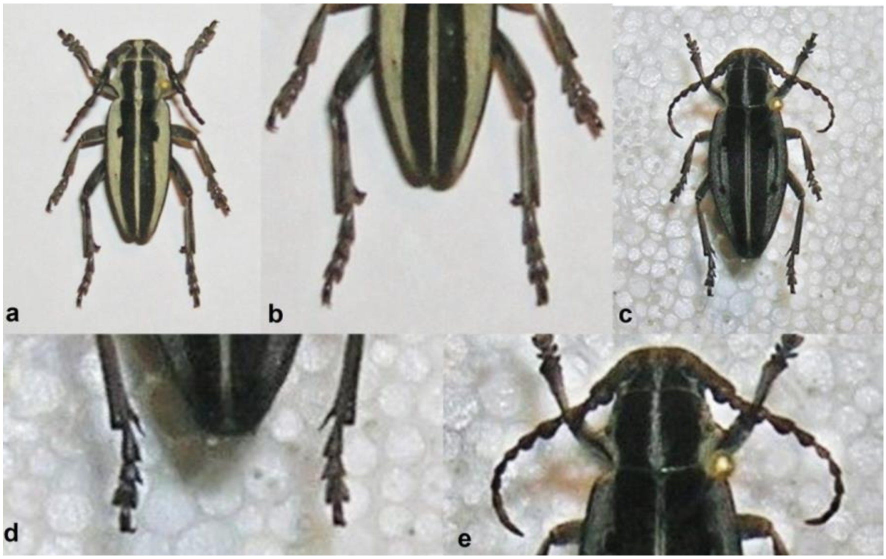

Figure 1. *Dorcadion (Maculatodorcadion) triste lesvicum* ssp. nov. from Lesvos island, a. ♂, b. male hind tibiae with enlarged spines, c. ♀, d. female hind tibiae with spines, e. female antennae, showing the thickened apical parts of the first five antennomeres.

Figure 2. *D. (M.) triste lesvicum* ssp. nov. (♀), Pirgi Thermis, E. Lesvos, April 27, 2019.

Figure 3. The habitat of *D. (M.) triste lesvicum* ssp. nov. in Pirgi Thermis, E. Lesvos.

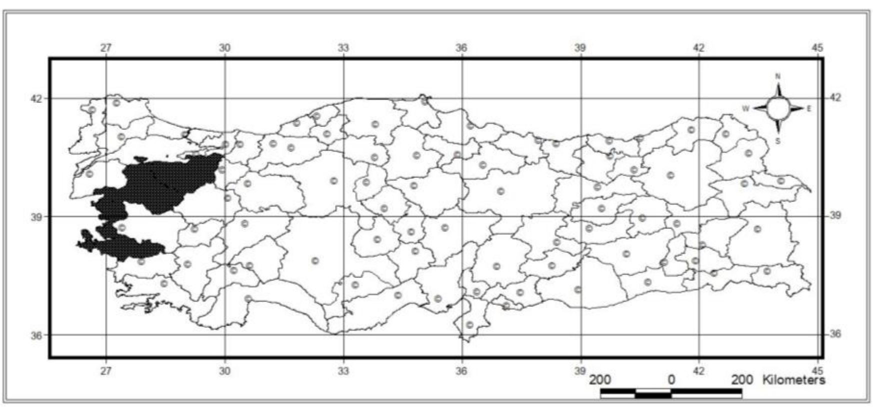

Figure 4. The distribution patterns of *D. (M.) triste triste* in Turkey.

EFFECT OF HOST PLANT ON DEVELOPMENT AND FECUNDITY OF *APHIS GOSSYPII* GLOVER (HEMIPTERA: APHIDIDAE)

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ABSTRACT: *Aphis gossypii* is considered as important and polyphagous species on many host plant all over the world. During the study, some biological aspect of this insect pest was evaluated under constant condition (T= 26 ± 1 °C, RH% = 60 ± 5, L:D = 16:8) on three detached cucumber and potato leaves in the laboratory of Seed and Plant Certification and Registration Institute Karaj, Iran. On cucumber (Mega-Sahra variety) the results showed that developmental period of immature stage was 4.75 and life cycle was assigned 9.90 days. Also, reproductive period with adult longevity were accounted 4.05 and 5.05 days. Net reproduction rate (R_o) and r_m (innate rate of increase) were estimated 60.40 and 0.481 at this temperature. Cotton aphid could not rear on potato varieties; Agria and Sante. Apparently, cucumber is better host than potato for studying developmental stages.

KEY WORDS: *Aphis gossypii*, potato, cucumber, fecundity, developmental time

Aphis gossypii Glover (Hemiptera: Aphididae) has been spread in different parts of Iran on Malvaceae, Solanaceae and Cucurbitaceae family (Khanjani, 2005; Forghani et al., 2018, 2009) fruit trees and citrus orchards (Gholamian et al., 2018) also, many other plants in worldwide as cosmopolitan aphid (van Emden & Harrington, 2007). The mentioned aphid showed considerable damages on vegetables and ornamentals in fields and green-house (Leaclant & Deguine, 1994) with a great deal of viral diseases in very large range of plants (Chan et al., 1991). These insects causing direct loss by sucking sap in the first attack (Takallozadeh, 2010) and may have negative role by transmitting viruses to plants principally (Fontes et al., 2006). In this pest, depend on temperature and host plant was clarified various development and fecundity related to geographical regions (Komazaki, 1982; Akey & Butler, 1989; Aldyhim & Khalil, 1993; Satar et al., 1998). Population parameters are mentioned as species growth capacity that use as bioclimatic indices in assessing of potential pest population growth (South-wood and Henderson, 2000) that have been showed different capacity in numerous pests (Gotoh, 1987; Bonato et al., 1995; Honarparvar et al., 2012). It is famous to say that fertility life table parameters are valuable data may use for dynamic population and estimating population growth in animals (Maia et al., 2000). Information fecundity and the other developmental time are considered precious findings which as some demographic parameters (Carey, 1993, 2001). In this regards, development cycle and reproductive parameters of *A. gossypii* may show various results with the host plant also, make changes in behavior and affecting fertility or other biology variable (Metcalf & Luckmann, 1994). Thus, the information life table parameters for *A. gossypii* on some host plants in a region may use to considering in crop management strategy (Akey & Bulter, 1989).

This research was aimed to provide information on developmental rate and fecundity of cotton aphid on potato with cucumber to evaluate host conditions for developmental times. Thus, two important potato varieties Agria and Sante with one of the most important cucumber Mega-Sahra were selected into the experiments.

MATERIAL AND METHODS

Rearing of cotton-aphid

Aphis gossypii were collected from green-house cucumber of Seed and plant Certification and Registration Institute Karaj, Iran. Aphids were reared in lab condition (T=26± 1 °C, Rh%= 60±5, L:D= 16:8) into the growth chamber. After few generations some females were selected for rearing in Petri-dish (Kindlmann & Dixon, 1989; Satar et al., 2005).

Experimental performance

The experiments were carried out on leaf-discs of potato and cucumber in Petri-dish (10cm in diameter) with 20 replications. Each Petri-dish was contained an upside-down leaf disc with cotton wool and solution of water agar (1%) with one newly hatched nymph. Around each 3 days, leaf discs and cotton wools with solution water agar were renewed moreover, observations and recording data was conducted daily.

Analysis of data

Developmental time, fecundity and longevity were compared using proc GLM and means (*ls* means) procedures (SAS, 2002). If the model was significant then, means comparison were made using the Tukey test ($p<0.05$). Since all data are whole number standard deviation may be proportional to the mean and their effects might be multiplicative, so they were logarithmically, transformed (Gomes & Gomes, 1983). Life table data were analyzed based on the age-stage, two-sex life table theories (Chi & Liu, 1985; Chi, 1988) using the TWOSEX – MS chart program. Population parameters were evaluated (the means and standard errors) using the Bootstrap method. Age specific survival rate (S_{xj}) (where x is the age and j is the stage, age-stage specific fecundity (f_{xj}), age specific survival rate (l_x), age-specific fecundity (m_x), and population parameters consist of intrinsic rate of increase (r_m), net reproduction rate (R_o) accordingly. The intrinsic rate of increase (r_m) is computed using interactive bisection method:

$$1= \sum_{x=0}^{\omega} L_x^{\infty}\, m_x\, e^{-r\, m(x)}$$

With age indexed from 0 (Goodman, 1982). To take stage differences into consideration, the l_x and m_x estimated by the subsequent formulae:

$$l_x= \sum_{j=1}^{k} S_{jx}$$

$$m_x = \sum_{j=1}^{k} S_{jx} f_{jx} \Big/ \sum_{j=1}^{k} S_{jx}$$

Where k is the number of stages (Chi & Liu, 1985). Since regarding this life table is extremely time consuming and replication is impractical, the Bootstrap method was used instead for calculating life table parameters. The mean generation time is clarified as the time, when a population needs to increase R_O-fold of its size ($e^{rT}=R_O$ or $\lambda^T=R_O$) at the stable age-stage distribution. Also, calculation life expectancy (e_x) is included in the raw data analysis ($e_x= T_x/l_x$) by the TWOSEX-MS chart program is available at http://140.120.197.172/ecology (Chi, 1988; Chi & Su, 2006).

RESULTS AND DISCUSSION

In present work, biological parameters were determined for *Aphis gossypii* at constant temperature close to temperature farms in Iran. The mean developmental times of this aphid was clarified in table 1. Our findings showed that *A. gossypii* in the laboratory circumstances rear on cucumber (Mega-sahra) and continue growth activity however, newly nymphs could not survive on potato hosts; Agria and Sante varieties, because of the fact that they died after 1-3 days of birth with no other growth activity. On Agria the nymphs survived just for 2.05 days also, on Sante with the same condition survived for 1.70 days averagely. A broad range of host plants with world-wide distribution of *A. gossypii* has been observed, however no consideration of host suitability was claimed (Ebert & Cartwright, 1997; Jones & Luchsinger, 1986). In our study, cotton aphid generated different stages and grew up until the death. This variety of cucumber against two varieties potato had more favorable circumstances. The nymph stage of *A. gossypii* at 26$^{\circ C}$ in comparison with Satar et al. (2005) was the same at temperatures 25 and 27.5 $^{\circ C}$ on cucumber moderately. This parameter was different partially on some cotton varieties Bakhtegan and Sealand (Razmjou et al., 2006) with BRS Rubi, BRS Safira and BRS Verde (Correa et al., 2013). Daily fecundity in our study was accounted little more than observation of Satar et al. (2005) on the same host (4.6 and 4.3 numbers at the same temperatures) also, further than cottons for Cukurova (2.3) in Turkey (Kersting et al., 1999) and PEACO-SL (3.0) in Brazil (Pessoa et al., 2004). Similarly, it was revealed in life cycle for the aphid on the same literatures.

Regarding, population parameters were present for cucumber Mega-Sahra variety in table 2. It can be clearly seen that intrinsic rate of increase (r_m) named quantification index is more proper indicator related to temperature affect on growth population and reflect on development and survival aphid. This parameter with R_O (Net reproduction rate) were computed at the same level by Satar et al. (2005) with Darvishzadeh & Jafari (2016) on Pierro with Super Pretty varieties, whereas higher than Correa et al., (2013) on cotton and Shirvani & Hoseini Naveh (2003) on Pumkin. Also, doubling time (*DT*) was presumed alike Darvishzadeh & Jafari (2016) on Pierro variety and had no significant difference in comparison with Correa et al. (2013) on cotton.

It was leveled out daily age-specific survival rate (l_x) on the first day's life, gradually declined up to 12th day and then, decreased from 13th to 24th day dramatically. The rate of daily egg was maximum on day 12 (Fig. 1) with 10.92 days in this aphid for life expectancy (*ex*) was accounted (Fig. 2). In addition, Darvishzadeh & jafari (2016) with Satar et al. (2005) obtained similar results on some varieties cucumber particularly on age-specific survival rate (l_x) with fecundity (m_x). In similar manners death of the last female happened for the some variety cucumbers; Pierro and Dominus (ps) were look like in present work at the age of 32 and subsequently, 34, 35 and 36 day for TN-94-203, Davos Π and Negin varieties (Darvishzadeh & jafari, 2016).

On the whole, biology or demographic parameters of *Aphis gossypii* has been studied on few plant hosts such as cotton, melon, chrysanthemum by many scholars. According to characteristics of host plant, fecundity or growth stages may clarify different results (Guldemond et al., 1994; Kersting et al., 1998; Vanlerberghe-Masutti & Chavigny, 1998). In this research, *Aphis gossypii* reared and produced offspring on cucumber, even though two potatoes were no suitable host for cotton aphid. In agreement with Forghani et al. (2019) and Forghani (2018) this study provides some information of demographic parameters of *Aphis gossypii* on cucumber. It seems that *Aphis gossypii* has been faced with variation performance and life cycle on different plants. As a case in point, non-genetic aspects e.g. physiological changes, nutrient materials and ecological environments may lead to various performance of this aphid during the generation (Schweissig & Wilde, 1979; Mackenzie, 1990). Moreover, this aphid is probably differentiated into few genotypes that have various adaptations (Jaenike, 1981; Diehl & Bush, 1984). As a result, Mega-Sahra cucumber is appropriate host for cotton aphid, but Agria and Sante potatoes are not suitable host to growth and development.

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Table 1. Means for some biological parameters of *Aphis gossypii* at constant condition in the lab (T=26± 1 °C, Rh%= 60±5, L:D= 16:8) on cucumber variety, Mega-Sahra.

Daily fecundity	Reproductive period	Total Mortality	Female Longevity	Nymphal stage	Life cycle
5.30± 1.56	4.05± 0.84	2.20%	5.05± 0.38	4.85± 0.77	9.90± 0.76

Table 2. Population parameters of *Aphis gossypii* at constant condition in the lab (T=26± 1 °C, Rh%= 60±5, L:D= 16:8) on cucumber variety, Mega-Sahra.

R_o aphids aphid^{-1}	R_m aphids aphid $^{-1}$ day^{-1}	DT day	λ
60.40	0.481	1.441	1.618

R_{o}= Reproduction rate, R_m=Intrinsic rate of increase, DT=Doubling time, λ= Finite rate of increase

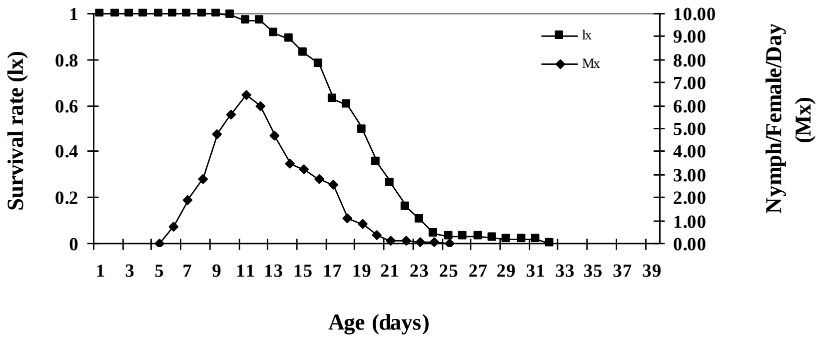

Figure 1. Age-specific fecundity and survivorship of *Aphis gossypii* at (T=26± 1℃) on cucumber (Mega-Sahra), l_x is the proportion of alive cotton aphids at age x; m_x is the mean number of nymphs per female at age x.

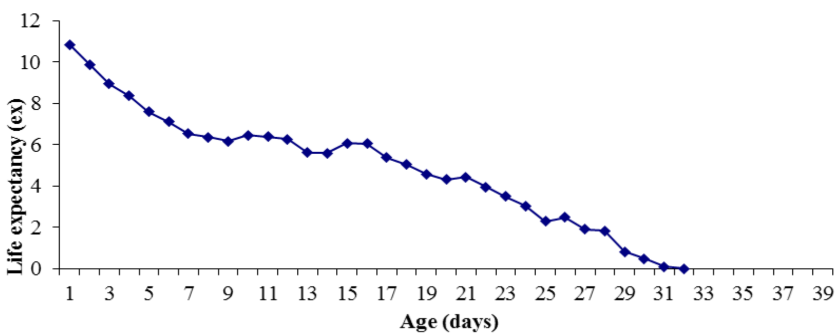

Figure 2. Life expectancy (e_x) of *Aphis gossypii* at (T=26± 1℃) on cucumber (Mega-Sahra).

MELOIDOGYNE JAVANICA TREUB, 1885 (CHITWOOD, 1949) AND SOME WEED HOSTS IN TOMATO (*SOLANUM ESCULENTUM* L.) FIELDS IN TEKİRDAĞ, TURKEY

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ABSTRACT: Nematode species from the genus *Meloidogyne* Göldi, 1989 are threatening agricultural production especially in greenhouses in Turkey by causing significant yield loss due to root damage and galling. Within a 2 year period of nematological surveys in Northwestern Turkey several *Meloidogyne* species were identified in vegetable fields and gardens. The majority were isolated from tomato fields and *M. javanica* was one of the most prevalent species. A further research was conducted in infested tomato fields to detemine weed hosts of *M. javanica*. As weeds were examined nematode damage and root galls were observed in 13 species. Galling was significant in *Portulaca oleraceae* L. with up to 30 galls per plant and least in *Lamium amplexicaule* L. and *Trifolium repens* L.

KEY WORDS: *Meloidogyne javanica* L., weed hosts, tomato fields, Turkey

Tomato (*Solanum lycopersicum* L.), is herbaceous annual plant from Solanaceae family. Ranked 4th in the world with 12.6 million tons annual production tomato is one of the most cultivated vegetable in Turkey. Due to favourable climate conditions and soil types tomato can be grown almost everwhere in the country. About 71.3% of produced tomato is used for table consumption and 29.7% is processed in the industry (Tatar & Pirinç, 2017).

Meloidogyne genus was first found on cucumber plants and described by Berkeley in 1855 (Hunt & Handoo, 2009). They are obligate parasites feeding on 5500 different plant species including monocotyledons and dicotyledons (Trudgill & Blok, 2001). Tomato is one of the main hosts of this genus. Until to day 101 species of *Meloidogyne* have been identified and the most destructive species were reported as *M. incognita* Kofoid & White, 1919 (Chitwood, 1949); *M. javanica* Treub, 1885 (Chitwood, 1949); *M. arenaria* Neal, 1889 (Chitwood, 1949); *M. hapla* Chitwood, 1949; *M. chitwoodi* Golden, O'Bannon, Santo and Finley, 1980 and *M. graminicola* Golden and Birchfield, 1965 (Mitkowski & Abawi, 2011; Seid et al., 2015). The damage potential of these nematodes were reported as 25-100% yield reduction (Wesemael et al., 2011) and global economic loss was estimated as $157 billion (Abad et al., 2008). In Western Anatolia Region of Turkey 80% crop losses were indicated in tomato growing areas (Kaşkavalcı, 2007). After feed of juveniles inside plant roots, giant cells is formed as a result of repeated cell division and root galls emerge after hypertrophy in cortical cells.

Due to damaged roots water uptake is restricted and plants start to wilt (Moens et al., 2009).

Many weed species were reported as food source for many root knot nematodes in the absence of crop hosts. Seven weed species, *Ageratum conyzoides* L., *Eleusine indica* (L.) Gaertn., *Portulaca oleracea* L., *Amaranthus* spp., *Cyperus rotundus* L., *Chenopodium album* L. and *Digitaria* spp. were reported as frequently encountered species parasitized by nematodes (Myers et al., 2004; Rich et al., 2008). Weeds produce hundreds of seeds which can survive in soil for several years and germinate under favourable conditions. Weeds present in cultivation areas during crop plant growth and fallow periods are always alternate host for nematodes to maintain populations. In addition variations in weed species and nematode densities depending on several factors such as climate conditions, cultural practices and cropping system may affect populations. The nematode number will be increase parallel to rise of density of weed hosts (Thomas et al., 2005). The control of root knot nematodes is always difficult because of wide host range and virulent races and presence of weeds will make these attempts harder.

The eradication of root-knot nematodes from coinfested areas involves several methods like crop rotation, chemical control and fallow. The main purpose in these management options are to decrease the population densities of the nematodes below damage thresholds prior to next cultivation season. Despite utilization of all these control strategies nematodes may survive and multiply in the presence of host weeds (Kutywayo & Been, 2006).

Although chemical control is most effective to control weed species it is not preferred due to cause significant increase of crop production expenditure. Furthermore herbicides are selective and each herbicide affect certain weeds. Chemical control may not be effective on each weed species under mixed cultivations and unkilled single weed plant in herbicide applied areas may be a host for nematode population. In addition, under low density conditions weed control is not a priority, although weeds may be a good host of plant parasitic nematodes (Rich et al., 2008).

The nematode population can be reduced by removing host weed species from infested areas. Therefore the determination of weed hosts of local Meloidogyne species is essential. Thus this study was carried out in tomato fields in Northwestern Marmara Region to evaluate weed hosts of major root knot nematode *Meloidogyne javanica*. A research covered observations in tomato fields, identification of root knot nematode and host weed species in laboratory and assesment of root galling severity of weeds.

MATERIAL AND METHOD

Survey and nematode identification

Within a period of 2015-2018 a survey has been carried out in Malkara, Süleymanpaşa and Şarköy districts of Tekirdağ province. Soil and tomato root samples were collected from 47 randomly selected tomato fields. Soil samples of approximately 1 kg were taken from 5 different points in each field from 0 - 30 cm soil depths. In order to isolate *Meloidogyne* juveniles centrifuge flotation method (Jenkins, 1963) was used while females were collected with the help of forceps under microscope.

During surveys *Meloidogyne javanica* was identified in several locations. *M. javanica* species present were identified by perineal pattern morphology of females. In addition molecular diagnosis of identified species were performed with Fjav (5'-GGTGCGCGATTGAACTGAGC-3') forward and Rjav (5'-CAGGCCCTTCAGTGGAACTATAC-3') reverse primers (Zijlstra et al., 2000).

In order to examine perinneal pattern adult females were collected from galled roots by crushing with a needle in a Petri dish filled with tap water. Extracted females were cut from posterior and the posterior part of the body were placed into glycerine and slides were prepared for further observation under microscope.

For molecular analysis nematode DNA was purified with Sigma Aldrich Extract N Tissue PCR kit. Juveniles of *M. javanica* were hand picked under microscope and placed into microcentrifuge tubes containing 2.5 µl tissue preparation and 10 µl extraction solution. This mixture was incubated at 55 °C for 10 minutes followed by 95°C for 3 minutes. The DNA concentration in extracted samples (A260/280 A260/230) were measured in spectrophmmeter.

All PCR reactions was prepared in a final volume of 20 µl (10 µl 2X PCR Ready Mix (Sigma Aldrich), 1 µl reverse primer, 1 µl forward primer, 2 µl template DNA, 6 µl ddH2O). PCR reaction was programmed as 95°C, 3 min; (95°C, 50 sec.; 59°C, 50 sec.; 72°C, 1 min) × 35; 72°C, 10 min. Final amplification products were seperated on a 1.5 % agarose gel the gel was run 50 minutes at 50V. At final the gel was stained with ethidium bromide and visualised UV transluminator.

Meloidogyne javanica was present in 11 tomato fields and the damage on tomato plants were evident. Stunting, yellowing and in some cases wilting was prevalent symptoms in tomato plants. Distinct root galling and egg masses were observed on the roots of tomato plants depending on susceptibility of tomato cultivar (Fig. 1).

Weed hosts of *Meloidogyne javanica*

A further study was conducted in *Meloidogyne javanica* infected 11 fields in order to determine weed hosts. Weed samples were collected by removing entire plants from soil without damaging roots. During weed sampling each plant roots were examined, presence of galls were recorded, galls on each root were counted. Galling severity per plant was graded based on the 0-5 scale described by Taylor and Sasser (1978). Samples were put seperately in a nylon bag and transferred to our Institute for further examination and species identifications. For species identification the herbarium of each species were prepared by slow drying of plant samples at room temperature. After complete drying each weed sample were sticked on to cardboard, covered by nylon and labeled. Collection site, province, collection date were recorded on each label. Weeds were identified by comparing plant morphology with published literatures.

RESULTS

Based on weed identifictions and field observations 13 of 18 weed species including *Lactuca serriola* L., *Heliotropium europaeum* L., *Portulaca oleracea* L., *Cynodon dactylon* (L.) Pers., *Amaranthus retroflexus* L., *Amaranthus viridis* L., *Chenopodium album* L., *Lamium amplexicaule* L., *Trifolium repens* L., *Anagallis arvensis* L., *Eleusine indica* (L). Gaertn, *Lepidium draba* L. and *Galium aparine* L., were found infected with *Meloidogyne javanica*. Females were present in galled roots of each weed species.

Females of our *M. javanica* perineal pattern had rounded dorsal arch and lateral lines that seperate dorsal and ventral parts. Population had slender, vermiform juveniles. The juveniles had slender body with continuous body contour. The spear was short, knobs were enlarged transversely. The tail was tapering with rounded tail tip. These characteristics were similar with original description of Chitwood (1949). The morphopetrics of J2 match the values of Özaslandan & Elekcioğlu (2010) and Whithead (1968).

There were significant variations between weed species in the point of gall size index. Within these weed species *Portulaca oleraceae* and other weeds supported moderate to small root galls while *Lamium amplexicaule, Amaranthus retroflexus* and *Lepidium draba* had slightly large galls. Approcimately 21 galls were counted in *Chenopodium album* while this number increased to 28 in *Portulaca oleraceae*. The lowest gall number was counted as 7 and 3 galls in *Trifolium repens* and Lamium amplexicaule respectively. The lowest gall number was counted on roots of *Trifolium repens* and *L. amplexicaule* which has almost 4-5 galls. In contrast *Capsella bursa-pastoris*, *Euphorbia helioscopia, Geranium dissectum, Sinapis arvensis* and *Solanum nigrum* had no galls despite they were present in all nematode infected fields.

DISCUSSION

Several weed species including *Amaranthus retroflexus* L., *Echinochloa crus-galli* (L.) P. Beauv., *Malva sylvestris* L., *Portulaca oleraceae* L., *Rumex chryspus* L, *Avena sterilis* L., *Chenopodium album* L., *Ecballium elaterium* (L.) A. Rich., *Solanum nigrum* L., and *Sorghum halepense* L. were reported in tomato fields all around the world (Brito et al., 2008). In our study 18 weed species were identified in tomato fields located in Tekirdağ.

There are several weed hosts of these nematodes with different susceptibility levels. Highly susceptible weeds have the possibility of maintaining higher nematode populations even when cultivated crops were harvested. The *Meloidogyne javanica* is confirmed as a good host for several weed species all around the world including *Amaranthus hybridus, Bidens pillosa, Sesbania aculeata, Digitaria horizontalis, Euphorbia heterophylla, Chenopodium album, Gutenbergia cordifolia, Melilotus alba, Amaranthus hybridus, Solanum americanum, Portulaca oleracea* (Desaeger & Rao, 2000; Lorenzo et al., 2002; Walker et al., 2002; Khan & Murmu, 2004; Gharabadiyan et al., 2012).

After our extensive plant observations *M. javanica* infection was detected in 13 weed species and severity of infection was highest in three species including *C. album, A. arvensis* and *P. oleracea*.

Being among major pests competing for water, light, and nutrients these weeds are good hosts for many nematode species. They have many impacts on nematode populations by reducing the effect of nematode management strategies, protection of nematodes from bad soil conditions and pesticide applications (Thomas et al., 2005). In addition the survival and feed of nematodes on weed roots may result in development of resistance - breaking strains (Samaliev & Stoyanov, 2007). In our study areas nematode populations were still higher even when tomato plants were removed and new infections was observed in the following growing seasons.

According to our gall index results 9 weed species were found to have moderate to high rates. It is considered that *M. javanica* juveniles prefer these plants to feed and maintain its populaton. Our findings suggest that under heavy nematode infestations especially management of these weeds is essential for the the appropriate nematode population suppression.

This report was first which describes root-knot species and host status of some weeds in Northwestern Marmara Region Turkey.

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Table 1. Root galling index of Taylor and Sasser (1978).

Grade	Presence of gall %
0	No gall
1	1-20%
2	21-40%
3	41-60%
4	61-80%
5	81-100%

Table 2. Comparative measurements of J2 of *Meloidogyne javanica* In addition PCR technique using Fjav and Sjav primer pair of *M. javanica* was yielded DNA fragment of 670 bp (Fig. 3).

	J2 Tekirdağ	**Özaslandan& Elekcioğlu, 2010**	**Whithead, 1968**
n	**10**	**10**	**10**
Body length (L)	430 (423.5-456.2)	408.0-454.4	387-459
Tail lenght	51.7 (49.6-57.3)	46.40-59.20	36-56
Hyaline terminus lenght	12.28 (11.6-15.3)	11.20-15.20	-
Spear lenght	12.5 (12.1-12.7)	11.20-14.40	9.4-11.4
DGO-stylet knob	3.21 (3.1-3.5)	3.2-4.0	4
a	31.2	30.33	27.1-35.9
c	7.95-8.31	8.33	7.3-1.1

Table 3. Name of all weeds identified in tomato fields and *Meloidogyne javanica* gall index rates in infected weed species.

Weed species	Common name	Family	Lifespan	Gall index
Amaranthus retroflexus L.	Pig weed	Amaranthaceae	Annual	2
Amaranthus viridis L.	Slender Amaranth	Amaranthaceae	Annual	1
Anagallis arvensis L.	Scarlet pimpernel	Primulaceae	Annual	3
Capsella bursa-pastoris L.	Shepherd's purse	Brassicaceae	Annual	0
Cynodon dactylon L	Bermuda grass	Poaceae	Annual/ Perannual	2
Chenopodium album L.	Lambs quarters	Chenopodiaceae	Annual	3
Eleusine indica (L.) Gaertn	Goosegrass	Poaceae	Annual	2
Euphorbia helioscopia L.	Sun spurge	Euphorbiaceae	Annual	0
Gallium aparine L.	Stickwilly	Rubiaceae	Annual	2
Geranium dissectum L.	Cutleaf geranium	Geraniaceae	Annual	0
Heliotropium europaeum L.	Heliotrope	Boraginaceae	Annual	1
Lepidium draba L.	Hoary cress	Brassicaceae	Biannual	2
Lamium amplexicaule L.	Henbit	Lamiaceae	Annual	1
Solanum nigrum L.	Black nightshade	Solanaceae	Annual/ perannual	0
Sinapis arvensis L.	Charlock mustard	Brassicaceae	Annual	0
Lactuca serriola L.	Pricky lettuce	Asterceae	Biaannual	2
Portulaca oleraceae L.	Common purslane	Portulacaceae	Annual	3
Trifolium repens L.	White clower	Fabaceae	Perannual	1

Figure 1. Root damage on highly susceptible and moderate susceptible tomato cultivars.

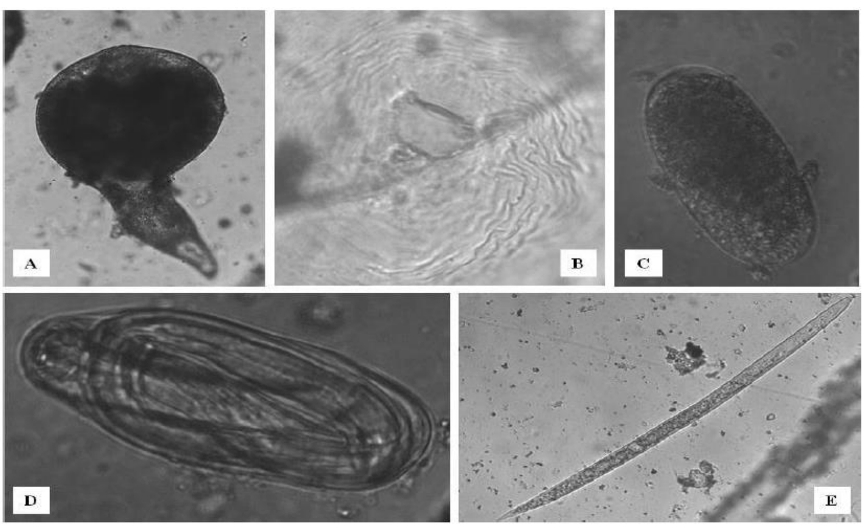

Figure 2. A) *Meloidogyne javanica* female B) *M. javanica* female perineal pattern C) *M. javanica* egg D) J1 inside *M. javanica* egg E) *M. javanica* J2 Morphometric measurements of J2 individuals were given in Table 2.

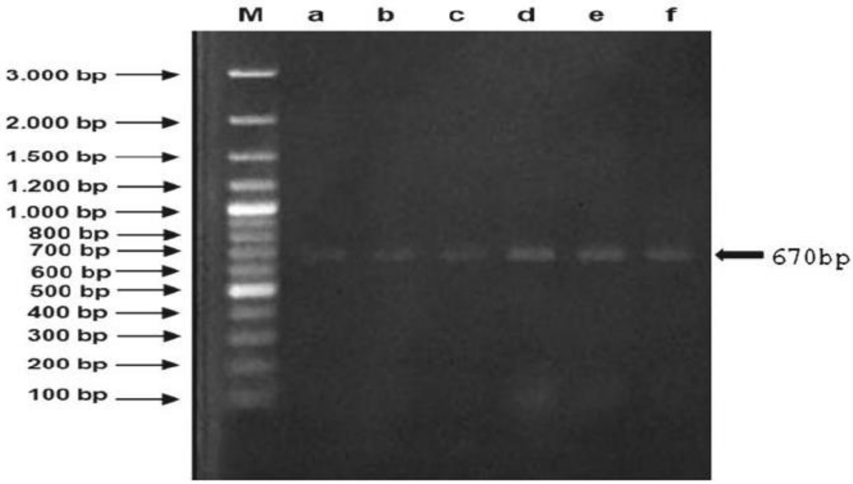

Figure 3. Electrophoresis of the amplified products of *Meloidogyne javanica*.

Figure 4. Weed roots infected with *Meloidogyne javanica*.

TRICHOGRAMMA BRASSICAE BEZDENKO (HYMENOPTERA: TRICHOGRAMMATIDAE), NEWLY RECORDED EGG PARASITOID FROM CORN FIELDS IN SAKARYA, TURKEY

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ABSTRACT: The paper presents the egg parasitoid, *Trichogramma brassicae* Bezdenko (Hymenoptera: Trichogrammatidae) which occurrence in Sakarya/Turkey was first confirmed. The parasitized eggs were collected from European corn borer eggs in corn fields in April-June 2018 and identified by molecular methods. This species can be candidates for biological control programs of lepidopterous pests in North-Western Region of Turkey.

KEY WORDS: Corn, new record, *Ostrinia nubilalis*, *Trichogramma brassicae,* Sakarya

The egg parasitoid *Trichogramma* species (Hymenoptera: Trichogrammatidae) are important biological control agents and have been found on a wide range of lepidopterous hosts (Orr et al., 2000). To date, eleven *Trichogramma* species identified in Turkey, and *Trichogramma evanescens* Westwood has been identified in European corn borer eggs in Marmara and Black Sea Region so far (Ozpinar et al., 1996; Oztemiz, 2007; Oztemiz et al., 2013). Considering the agricultural areas, climatic conditions and biodiversity of our country, the number of species is very low. Therefore, the number of species is thought to be much more. Fort this reason, to identify the species of *Trichogramma* naturally associated with eggs of pest lepidopterous in corn fields of Sakarya, Turkey was aimed in the study.

MATERIAL AND METHODS

Sampling place

Sakarya is located in the Marmara Region, in Northwestern Turkey, between the Black Sea and Sapanca Lake. The GPS-coordinates of Sakarya are: 40° 46' 23.066" N 30° 23' 41.341" E. The field work was carried out in the Arifiye, Sapanca, Adapazarı, Erenler, Serdivan, Akyazi, Karasu, Kocaali, Hendek, Kaynarca, Sogutlu, Ferizli, Taraklı, Geyve, Pamukova districts of Sakarya (Fig. 1).

Sapling method

Parasitized eggs of the European corn borer, *Ostrinia nubilalis* (Lepidoptera: Noctuidae) were collected from the corn fields in North-Western of Turkey (Fig. 2). Samples were collected by random sampling method from twelve districts (Arifiye, Sapanca, Adapazarı, Erenler, Serdivan, Akyazi, Karasu, Kocaali, Hendek, Kaynarca, Sogutlu, Ferizli) of Sakarya province (Fig. 1) during April-June 2018. The collections of eggs or egg masses of pest were made by visual inspection. The collected eggs or egg masses of pest were transported to the Entomology Laboratory at the Duzce University, Faculty of Agriculture and Natural Science, campus in the city of Konuralp, Duzce. The collected eggs or egg masses of pest were cultured in the laboratory under room conditions. Observations were made on a daily until the parasitoid wasps had emerged. Females that emerged from parasitized corn borer eggs were used to initiate isofemale lines, which were subsequently maintained on eggs of *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae) at 24 ± 1 ^{o}C, 70 ± 5% RH, and under a light regime of 14h L:10 h D (Tuncbilek et al. 2009). Cultures are reared on eggs of *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae).

Identification of samples

The molecular identification of the parasitoids was made by Assoc. Prof. Dr. Fahriye Ercan (Ahi Evran University, Faculty of Agriculture Sciences and Technology, Plant Protection Department, Kirsehir,Turkey).

RESULTS AND DISCUSSION

The parasitoids collected from 12 districts were defined as *Trichogramma brassicae* Bezdenko (Hymenoptera: Trichogrammatidae). This is the first report of parasitism by *T. brassicae* from *O. nubilalis* eggs in Sakarya (Fig. 3). Specimens have been deposited in the insect museum unit of the Duzce University, Faculty of Agriculture and Natural Science, Duzce, Turkey. With this study, the number of *Trichogramma* species increased in Marmara region of Turkey. These results may contribute to better knowledge of Trichogrammatids fauna in Turkey and have the potential to provide information on the biological control to be carried out in the integrated pest management programs in the future (Li et al., 1994; Bohinc et al., 2015; Jalali et al., 2016). *Trichogramma brassicae* was first found in the former soviet republic of Moldavia and described by Bezdenko (1968). *T. brassicae* may parasitize several species of lepidopterous pests, one of them is *O. nubilalis* eggs naturally parasitized by *T. brassicae* in corn fields (Fig. 4) (Maini et al., 1982; Uzun, 1995). Besides *T. brassicae* was used to control *O. nubilalis* in European countries such as Switzerland (Bigler, 1983, 1986), France, Italy, Austria and the Netherlands (Van Schelt & Ravensberg, 1991; Burgio & Maini, 1995), Slovenia (Bohinc et al., 2015). The result obtained in this study are expected to contribute to biological control of the pest in corn fields.

CONCLUSION

As a result of the study, a new species was added to the *Trichogramma* fauna of Sakarya Province, North western of Turkey. The possibilities of using this species in biological control should be studied in corn fields of Sakarya province where corn planting is high.

ACKNOWLEDGEMENTS

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Figure 1. Surveyed districts of Sakarya province.

Figure 2. Survey made Turkey's place in the province.

Figure 3. Egg masses of *Ostrinia nubilalis* Hbn.

Figure 4. Eggs collected from the corn fields.

CATALOGUE OF LONGHORNED BEETLES OF LEMT (LODOS ENTOMOLOGICAL MUSEUM, TURKEY) (COLEOPTERA: CERAMBYCIDAE) PART I: PRIONINAE, LEPTURINAE, ASEMINAE, SAPHANINAE, SPONDYLIDINAE, CERAMBYCINAE AND STENOPTERINAE

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[**Tezcan, S., Karsavuran, Y., Pehlivan, E. & Özdikmen, H.** 2020. Catalogue of Longhorned Beetles of LEMT (Lodos Entomological Museum, Turkey) (Coleoptera: Cerambycidae) Part I: Prioninae, Lepturinae, Aseminae, Saphaninae, Spondylidinae, Cerambycinae and Stenopterinae. Munis Entomology & Zoology, 15 (1): 39-65]

ABSTRACT: In this study, material belonging to seven subfamilies of Cerambycidae housed in the collection of Lodos Entomological Museum, Turkey (LEMT) have been evaluated. A total of 46 species and 42 subspecies belonging to 50 genera have been presented. Among those *Chlorophorus damascenus* (Chevrolat, 1854) is a new record for European Turkey (Thracia) and *Stenocorus meridianus* (Linnaeus, 1758), *Cortodera alpina tatvanensis* Danilevsky, 2015, *Gracilia minuta* (Fabricius, 1781) are the second reports for Turkey. Additional new provincial and regional records for many species have been given.

KEY WORDS: Fauna, Cerambycidae, the longhorned beetles, Turkey, biodiversity

The Cerambycidae fauna of Turkey has been studied by many foreign and native scientists. Recent studies of Özdikmen (2007, 2008a, 2008b, 2011, 2013, 2014a, 2014b, 2014c, 2014d, 2014e, 2014f, 2014g, 2014h), Löbl & Smetana (2010), Özdikmen & Ali (2016), Özdikmen & Cihan (2016), Özdikmen et al. (2013, 2017) and Danilevsky (2015, 2019) have great importance for Cerambycidae fauna of Turkey. The aim of the present paper is to present new locality records of preserved material in the Lodos Entomological Museum, Turkey (LEMT) to researchers and relevant persons.

MATERIAL AND METHOD

Most of the material have been collected within the research projects by the researchers of Department of Plant Protection, Faculty of Agriculture, University of Ege (Lodos et al., 1978, 1983, 1989 and others) between the years of 1945-1995. Rest of the material collected and given as a gift to the LEMT, Ege University, İzmir, Turkey, by researchers, students and amateurs. Material have been determined by N. Lodos, C. V. Demelt, C. Holzschuh and C. Pesarini. Material housed in LEMT and evaluated in the publications of Tezcan & Rejzek (2002), Karaca et al. (2006), Tezcan & Can (2009), Özdikmen & Tezcan (2011), Balbakan et al. (2019) and Öncül Abacıgil et al. (2019) have not been included in this catalogue.

RESULTS AND DISCUSSION

In this study 46 species and 42 subspecies of 50 genera belong to seven subfamilies of Cerambyidae were given.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

SUBFAMILY PRIONINAE Latreille, 1802: 212

TRIBE REMPHANINI Lacordaire, 1868: 103
GENUS *RHAESUS* Motschulsky, 1875: 153 [RN]
SPECIES *R. serricollis* (Motschulsky, 1838: 187)
Material examined: İzmir: Bornova, 24.VI.1971, det. Lodos, 4 exs.; Kemalpaşa, 10.VIII.1982, *Salix* sp., det. Lodos, 1 ex.. This E-Mediterranean species was previously recorded from İzmir province.

TRIBE AEGOSOMATINI Thomson, 1861: 308
GENUS *AEGOSOMA* Audinet-Serville, 1832: 162
SPECIES *A. scabricorne* (Scopoli, 1763: 54)
Material examined: Denizli: Çivril, 15.VII.1962, *Salix* sp., det. Holzschuh as *Megopis scabricornis*, 2 exs.. This Turano-European species is the first record to Denizli province and hereby for Aegean region of Turkey.

TRIBE PRIONINI Latreille, 1802: 212
GENUS *MESOPRIONUS* Jakovlev, 1887: 323
SPECIES *M. besikanus* (Fairmaire, 1855: 318)
Material examined: İzmir: Bornova, 10.VI.1961, det. Demelt as *Prionus besicanus*, 1 ex.; 23.VI.1962, det. Demelt as *P.besicanus*, 1 ex.; Karaburun, Mordoğan, VII.1973, light, det. Holzschuh as *P.besicanus*, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species was previously recorded from İzmir province.

SUBFAMILY LEPTURINAE Latreille, 1802: 218

TRIBE RHAGIINI Kirby, 1837: 178
GENUS *RHAGIUM* Fabricius, 1775: 182
SUBGENUS *RHAGIUM* Fabricius, 1775: 182
SPECIES *R. inquisitor* (Linnaeus, 1758: 393)
SUBSPECIES *R. inquisitor inquisitor* (Linnaeus, 1758: 393)
Material examined: Bolu: Abant, VIII.1945, *Abies* sp., det. Lodos, 1 ex.. This Asiatic-European + Nearctic subspecies was previously recorded from Bolu province.

GENUS *STENOCORUS* Geoffroy, 1762: 221
SUBGENUS *ANISORUS* Mulsant, 1862: 467
SPECIES *S. heterocerus* (Ganglbauer, 1882: 139)
Material examined: Antalya: 31.V.1961, *Paliurus spina-christi*, det. Holzschuh, 2 exs.; Güllük Mountain, 24.V.1986, *Quercus* sp., det. Pesarini, 1 ex.. This SW-Asiatic (Syro-Anatolian) species was previously recorded from Antalya province.

SUBGENUS *STENOCORUS* Geoffroy, 1762: 221
SPECIES *S. insitivus* (Germar, 1824: 520)

SUBSPECIES *S. insitivus insitivus* (Germar, 1824: 520)
Material examined: Rize: Kaçkar Mountains, 22.VIII.1973, weed, det. Holzschuh, 1 ex.. This SW-Asiatic subspecies is the first record to Rize province.
SPECIES *S. meridianus* (Linnaeus, 1758: 398)
Material examined: Samsun: 12.VII.1957, det. Lodos as *Toxotus meridianus*, 1 ex.. This Sibero-European species is the first record to Samsun province and hereby the second record for Anatolia.

GENUS *DINOPTERA* Mulsant, 1863: 494
SUBGENUS *DINOPTERA* Mulsant, 1863: 494
SPECIES *D. collaris* (Linnaeus, 1758: 398)
Material examined: Isparta: Eğirdir, 27.V.1961, det. Lodos, 1 ex.. This Sibero-European species was previously recorded from Antalya province.

GENUS *CORTODERA* Mulsant, 1863: 572
SPECIES *C. alpina* (Ménétries, 1832: 230)
SUBSPECIES *C. alpina tatvanensis* Danilevsky, 2015: 1065
Material examined: Bingöl: 18.V.1977. 1300 m, det. Lodos as *Cortodera umbripennis*, 1 ex.; Muş: Buğlan Pass, 13-16.VI.1976, 1900 m, det. Holzschuh as *C.umbripennis*, 1 ex.. This taxon was identified by Holschuh and Lodos as *C. alpina umbripennis* Reitter, 1890: 280. It should be attributed to *C. alpina tatvanensis* Danilevsky, 2015. Because, according to Danilevsky (2019), *C. alpina umbripennis* is unknown from Turkey. So, this Turkish endemic subspecies is the first record to Bingöl and Muş provinces and hereby the second record for Anatolia after its original description.
SPECIES *C. colchica* Reitter, 1890: 246
SUBSPECIES *C. colchica colchica* Reitter, 1890: 246
Material examined: Bitlis: 24.VI.1977, 2200 m, det. Holzschuh, 1 ex.; Van: Kuzgunkıran Pass, 24.VI.1977, 2000 m, det. Holzschuh, 1 ex.. This SW-Asiatic subspecies is the first record to Bitlis and Van provinces.
SPECIES *C. discolor* Fairmaire, 1866: 277
SUBSPECIES *C. discolor ankarensis* Danilevsky, 2015: 1063
Material examined: Ankara: Kızılcahamam, 24-25.V.1969, det. Holzschuh as *C. discolor,* 1 ex.. This taxon was identified by Holschuh as *C. discolor* Fairmaire, 1866. It should be attributed to *C. concolor ankarensis* Danilevsky, 2015. So, this Turkish endemic subspecies was previously recorded from Ankara province.
SPECIES *C. flavimana* (Waltl, 1838: 471)
SUBSPECIES *C. flavimana angorensis* Danilevsky, 2015: 1051
Material examined: Ankara: Kızılcahamam, 24.V.1969, det. Holzschuh as *Cortodera flavimana*, 1 ex.. This taxon was identified by Holschuh as *C. flavimana* (Waltl, 1838: 471). It should be attributed to *C. flavimana angorensis* Danilevsky, 2015. So, this Turkish endemic subspecies was previously recorded from Ankara province.
SUBSPECIES *C. flavimana flavimana* (Waltl, 1838: 471)
Material examined: Balıkesir: Dursunbey, 16.IV.1968, det. Lodos as *Cortodera flavimana brachialis* Ganglbauer, 1 ex.. This taxon was identified by Lodos as *C.flavimana brachialis* Ganglbauer, 1897. It should be attributed to *C. flavimana flavimana* (Waltl, 1838). So, this C and E-European subspecies is the first record to Balıkesir province.
SUBSPECIES *C. flavimana torosensis* Danilevsky, 2015: 1055
Material examined: Adana: Saimbeyli, 04.V.1986, weeds, det. Pesarini as *Cortodera flavimana,* 2 exs.. This taxon was identified by Pesarini as *C.flavimana*

(Waltl, 1838: 471). It should be attributed to *C. flavimana torosensis* Danilevsky, 2015. So, this Turkish endemic subspecies was previously recorded from Adana province.

SUBSPECIES *C. flavimana rufipes* (Kraatz, 1876: 344)

Material examined: Isparta: Eğirdir, 26.V.1961, det. Lodos as *Cortodera flavimana brachialis*, 1 ex.; İzmir: Kemalpaşa, 3.V.1962, weed, det. Demelt as *C.flavimana brachialis*, 1 ex.; Ödemiş, 13.V.1969, weed, det. Lodos as *C.flavimana brachialis*, 1 ex.. This taxon was identified by Demelt and Lodos as *C.flavimana brachialis* Ganglbauer, 1897. It should be attributed to *C. flavimana rufipes* (Kraatz, 1876: 344). So, this Turkish endemic subspecies was previously recorded from İzmir province. However, it is the first record to Isparta province and hereby for Mediterranean region of Turkey.

TRIBE LEPTURINI Latreille, 1802: 218

GENUS *GRAMMOPTERA* Audinet-Serville, 1835: 215

SUBGENUS *GRAMMOPTERA* Audinet-Serville, 1835: 215

SPECIES *G. merkli* Frivaldszky, 1884: 4

Material examined: Isparta: Eğirdir, 27.IV.1972, *Pistacia terebinthus*, det. Holzschuh, 1 ex.. This Turkish endemic species is the first record to Isparta province.

SPECIES *G. ruficornis* (Fabricius, 1781: 247)

SUBSPECIES *G. ruficornis ruficornis* (Fabricius, 1781: 247)

Material examined: İzmir: Ödemiş, 04.IX.1975, *Rubus idaeus*, det. Lodos, 1 ex.. This European subspecies is the first record to İzmir province and hereby for Aegean region of Turkey.

GENUS *VADONIA* Mulsant, 1863: 559

SPECIES *V. unipunctata* (Fabricius, 1787: 157)

SUBSPECIES *V. unipunctata unipunctata* (Fabricius, 1787: 157)

Material examined: Kütahya: Altıntaş, 18.VI,1975, weed, det. Holzschuh, 1 ex.. This European subspecies was previously recorded from Kütahya province.

GENUS *PSEUDOVADONIA* Lobanov, Danilevsky & Murzin, 1981: 787

SPECIES *P. livida* (Fabricius, 1777: 233)

SUBSPECIES *P. livida livida* (Fabricius, 1777: 233)

Material examined: Antalya: 31.V.1961, *Paliurus austrialis*, det. Lodos as *Pseudallosterna livida*, 2 exs.; 19.V.1986, *Thymus* sp., det. Pesarini as *P.livida*, 1 ex.; Burdur: 15.VI.1973, weeds, det. Holzschuh as *P.livida*, 2 exs.; Çanakkale: Kilitbahir, 21.V.1975, *Quercus* sp., det. Lodos as *P.livida,* 1 ex.; Isparta: Eğirdir, 10.VI.1973, weed, det. Lodos as *P.livida*, 1 ex.; Kovada, 11.VI.1973, *Verbascum* sp., det. Lodos as *P.livida*, 1 ex.; Kocaeli: İzmit, 03.VI.1971, weeds, det. Lodos as *P.livida*, 2 exs.; Muğla: Dalaman, 24.V.1962, *Paliurus spina-christi*, det. Lodos as *P.livida*, 1 ex.. This European subspecies was previously recorded from Antalya, Isparta and Kocaeli provinces. However, it is the first record to Burdur, Çanakkale and Muğla provinces.

SUBSPECIES *P. livida desbrochersi* (Pic, 1891: XVI)

Material examined: Muş: Varto, Gümgüm, det. Holzschuh as *Leptura livida,* 1 ex.. This taxon was identified by Holzschuh as *L.livida*. It should be attributed to *P. livida desbrochersi* (Pic, 1891). So, this SW-Asiatic subspecies is the first record to Muş province.

GENUS *ANOPLODERA* Mulsant, 1839: 285
SUBGENUS *ANOPLODERA* Mulsant, 1839: 285
SPECIES *A. rufipes* (Schaller, 1783: 296)
SUBSPECIES *A. rufipes rufipes* (Schaller, 1783: 296)
Material examined: Çanakkale: Çan, 22.IV.1975, *Platanus* sp., det. Pesarini, 1 ex.. This European subspecies was previously recorded from Çanakkale province.

GENUS *STICTOLEPTURA* Casey, 1924: 280
SUBGENUS *STICTOLEPTURA* Casey, 1924: 280
SPECIES *S. cordigera* (Fuessly, 1775: 14)
SUBSPECIES *S. cordigera cordigera* (Fuessly, 1775: 14)
Material examined: Bilecik: Pazaryeri, 28.VI.1974, *Triticum aestivum*, det. Lodos as *Leptura cordigera*, 4 exs.; Denizli: 17.VI.1970, *Ulmus* sp., det. Lodos as *Brachyleptura cordigera*, 1 ex.; İzmir: Bornova, IV.1973, weed, det. Lodos as *B.cordigera*, 1 ex.; 26.VII.1977, weed, det. Lodos as *B.cordigera*, 1 ex.; Ödemiş, 19.VI.1962, det. Holzschuh as *B.cordigera*, 1 ex.; 19.VI.1962, det. Lodos as *L.cordigera*, 2 exs.; Selçuk, Pamucak, 14.VI.1977, weed, det. Lodos as *B.cordigera*, 1 ex.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Lodos as *B.cordigera*, 1 ex.; 26.V.1962, apiaceous plants, det. Lodos as *L.cordigera*, 8 exs.. This Mediterranean subspecies was previously recorded from all mentioned provinces.
SPECIES *S. rufa* (Brullé, 1832: 263)
SUBSPECIES *S. rufa rufa* (Brullé, 1832: 263)
Material examined: Muğla: Fethiye, 24.V.1962, det. Demelt as *Leptura rufa,* 1 ex.; 25.VIII.1979, det. Pesarini as *Corybia rufa,* 1 ex.. This European subspecies is the first record to Muğla province and hereby for Aegean region of Turkey.

SUBGENUS *PARACORYMBIA* Miroshnikov, 1998: 587
SPECIES *S. excisipes* (Daniel & Daniel, 1891: 6)
Material examined: İzmir: Ödemiş, 19.VI.1962, det. Holzschuh as *Brachyleptura excisipes*, 2 exs.. This SW-Asiatic (Syro-Anatolian) species is the first record to İzmir province.
SPECIES *S. fulva* (DeGeer, 1775: 137)
Material examined: Aydın: Kuşadası, 09.VI.1977, weeds, det. Lodos as *Brachyleptura fulva*, 3 exs.; İzmir: Ödemiş, 19.VI.1962, det. Demelt as *Leptura fulva*, 2 exs.. This European species was previously recorded from all mentioned provinces.

GENUS *ANASTRANGALIA* Casey, 1924: 280
SPECIES *A. dubia* (Scopoli, 1763: 47)
SUBSPECIES *A. dubia dubia* (Scopoli, 1763: 47)
Material examined: Osmaniye: Zorkun Plateau, 13.VII.1986, *Juniperus* sp., det. Pesarini as *Anastrangalia dubia,* 2 exs.. This Europeo-Mediterranean species was previously recorded from Osmaniye province.
SUBSPECIES *A. dubia melonota* (Faldermann, 1837: 315)
Material examined: Rize: Kaçkar Mountain, 22.VIII.1973, weed, det. Holzschuh as *Anastrangalia dubia,* 1 ex.. This taxon was identified by Holzschuh as *A.dubia*. It should be attributed to *A. dubia melonota* (Faldermann, 1837). So, this SW-Asiatic subspecies was previously recorded from Rize province.

SPECIES *A. montana* (Mulsant & Rey, 1863: 179)
SUBSPECIES *A. montana montana* (Mulsant & Rey, 1863: 179)
Material examined: Isparta: Eğirdir, 11.VI.1973, *Salix* sp., det. Lodos, 1 ex.; Osmaniye: Zorkun Plateau, 08.VI.1984, *Onopordum* sp., det. Pesarini, 1 ex.. This E-Mediterranean subspecies was previously recorded from all mentioned provinces.

GENUS *PEDOSTRANGALIA* Sokolov, 1897: 461
SUBGENUS *NEOSPHENALIA* Löbl, 2010: 110
SPECIES *P. emmipoda* (Mulsant, 1863: 531)
Material examined: Isparta: Kovada, 11.VI.1973, *Platanus* sp., det. Lodos, 1 ex.; İzmir: Tire, 14.IV,1967, weeds, det. Lodos as *Strangalia emmipoda*, 2 exs.; Mardin: Mazıdağı, 05.VI.1976, fruit tree, det. Lodos, 1 ex.; Muğla: Dalaman, 22.V.1962, *Paliurus spina-christi*, det. Lodos, 7 exs.; 24.V.1962, *P.spina-christi,* det. Lodos as *S.emmipoda*, 7 exs.; Tunceli: 18-19.VI.1972, det. Holzschuh as *S.emmipoda*, 1 ex.. This E-Mediterranean species was previously recorded from Isparta, İzmir and Tunceli provinces. However, it is the first record to Mardin and Muğla provinces.
SPECIES *P. verticalis* (Germar, 1822: 9)
Material examined: Çanakkale: Gökçeada, 26-29.V.1975, weed, det. Holzschuh, 1 ex.. This SE-European species is the first record to Çanakkale province and hereby for Marmara region of Turkey.

GENUS *JUDOLIA* Mulsant, 1863: 496
SPECIES *J. erratica* (Dalman, 1817: 490)
Material examined: İzmir: Ödemiş, 19.VI.1962, det. Demelt, 2 exs.; 19.VI.1962, det. Lodos, 1 ex.; Rize: Kaçkar Mountain, 22.VIII.1973, weeds, det. Holzschuh as *Pachytodes erraticus*, 2 exs.. This Sibero-European species was previously recorded from all mentioned provinces.

GENUS *STENURELLA* Villiers, 1974: 217
SUBGENUS *PRISCOSTENURELLA* Özdikmen, 2013: 516
SPECIES *S. bifasciata* (Müller, 1776: 93)
SUBSPECIES *S. bifasciata nigrosuturalis* (Reitter, 1895: 88)
Material examined: Adana: Gavurdağı, 08.VI.1985, *Spartium junceum*, det. Lodos, 1 ex.; Aydın: Germencik, 04.VII.1975, weeds, det. Holzschuh, 3 exs.; Kuşadası 09.VI.1977, weed, det. Lodos, 1 ex.; İzmir: Bornova, 09.IV.1982, *Corylus avellana*, det. Lodos, 1 ex.; Bornova, Pınarbaşı, 25.VI.1983, weed, det. Pesarini, 1 ex.; Kemalpaşa, 21.VI.1961, det. Demelt as *Strangalia bifasciata,* 21 ex.; 23.VI.1961, det. Lodos, 5 exs.; Ödemiş, Bozdağ, 26.VII.1971, det. Lodos as *S.bifasciata,* 1 ex.; Mersin: 23.IV.1969, on the ground, det. Lodos as *S.bifasciata,* 1 ex.; Silifke 29.V.1984, *Mentha* sp., det. Lodos, 1 ex.; Muğla: Dalaman, 24.V.1962, *Paliurus spina-christi*, det. Lodos, 1 ex.; Osmaniye: Zorkun Plateau, 13.VII.1986, *Pinus* sp., det. Lodos, 1 ex.. This E-Mediterranean subspecies was previously recorded from all mentioned provinces except for Aydın province. It is the first record to Aydın province.
SPECIES *S. septempunctata* (Fabricius, 1792: 346)
SUBSPECIES *S. septempunctata latenigra* (Pic, 1915: 5)
Material examined: İzmir: Ödemiş, 19.VI.1962, det. Lodos, 1 ex.; Kütahya: Domaniç, 19.VI.1975, *Urtica* sp., det. Lodos, 1 ex.; Muğla: Milas, 25.V.1962, det. Holzschuh, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) and SW-

Asiatic subspecies was previously recorded from İzmir province. It is the first record to Kütahya and Muğla provinces.

SUBGENUS *STENURELLA* Villiers, 1974: 217
SPECIES *S. melanura* (Linnaeus, 1758: 397)
SUBSPECIES *S. melanura melanura* (Linnaeus, 1758: 397)
Material examined: İzmir: Kemalpaşa, 23.VI.1961, det. Lodos, 1 ex.. This Asiatic-European subspecies was previously recorded from İzmir province.

SUBFAMILY ASEMINAE Thomson, 1861: 139

TRIBE ASEMINI Thomson, 1861
GENUS *ARHOPALUS* Audinet-Serville, 1834: 77
SPECIES *A. ferus* (Mulsant, 1839: 64)
Material examined: Antalya: Alanya, 24.VII.1975, det. Lodos, 1 ex.; Balıkesir: Ayvalık, 30.VIII.1971, det. Lodos, 1 ex.; İzmir: Bornova, 02.V.1962, det. Lodos, 2 exs.; 28.VI.1962, det. Lodos, 1 ex.; İzmir: Karşıyaka, Yamanlar, 18.VII.1981, det. Pesarini, 1 ex.; 16.VIII.1983, det. Lodos, 1 ex.. This Palaearctic + Australian species was previously recorded from İzmir province. It is the first record to Balıkesir province.

GENUS *CEPHALOCRIUS* Sharp, 1905: 148
SPECIES *C. syriacus* (Reitter, 1895: 86)
Material examined: İzmir: Bornova, 02.V.1962, det. Lodos as *Arhopalus syriacus*, 1 ex.. This Mediterranean + Australian + Neotropical species was previously recorded from İzmir province.

SUBFAMILY SAPHANINAE Gistel, 1848: [1]

TRIBE SAPHANINI Gistel, 1848: [1]
GENUS *OXYPLEURUS* Mulsant, 1839: 57
SPECIES *O. nodieri* Mulsant, 1839: 57
Material examined: Mersin: Mut, 21.IV.1985, *Pinus* sp., det. Pesarini, 1 ex.. This Mediterranean species was previously recorded from Mersin province.

SUBFAMILY SPONDYLIDINAE Audinet-Serville, 1832: 123

TRIBE SPONDYLIDINI Audinet-Serville, 1832: 123
GENUS *SPONDYLIS* Fabricius, 1775: 159
SPECIES *S. buprestoides* (Linnaeus, 1758: 388)
Material examined: İzmir: Bornova, 10.VIII.1962, det. Lodos, 2 exs.. This Palaearctic species is the first record to İzmir province and hereby for Aegean region of Turkey.

SUBFAMILY CERAMBYCINAE Latreille, 1802: 211

TRIBE ACHRYSONINI Lacordaire, 1868: 203
GENUS *ICOSIUM* Lucas, 1854: VIII
SPECIES *I. tomentosum* Lucas, 1854: IX
SUBSPECIES *I. tomentosum atticum* Ganglbauer, 1882: 743
Material examined: İzmir: Bornova, 28.VI.1961, det. Lodos as *Icosium tomentosum,* 1 ex.; 28.VI.1961, weed, det. Demelt, 1 ex.; 15.V.1970, weed, det.

Lodos, 1 ex.; 26.V.1975, det. Holzschuh as *I.tomentosum,* 1 ex; Karaburun, 06.VII.1977, light, det. Lodos, 1 ex.; Karaburun, Mordoğan, VII.1973, on the ground, det. Holzschuh, 1 ex.. This Turano-Mediterranean subspecies was previously recorded from İzmir province.

TRIBE HESPEROPHANINI Mulsant, 1839: 61

GENUS *HESPEROPHANES* Dejean, 1835: 328

SPECIES *H. sericeus* (Fabricius, 1787: 152)

Material examined: Ankara: Esenboğa, 20.VIII.1981, det. Lodos, 1 ex.; Kayaş, 20.VIII.1981, det. Lodos, 1 ex.; İzmir: Bornova, 20.VI.1962, light, det. Demelt, 1 ex.; Menemen, 23.IX.1983, house, det. Lodos, 1 ex.; Ödemiş, 11.VII.1981, on the ground, det. Lodos, 1 ex.; Manisa: Akhisar, 13.VIII.1983, light, det. Lodos, 1 ex.; Siirt: 11.V.1972, weed, det. Holzschuh, 1 ex.. This Turano-Mediterranean species was previously recorded from İzmir province. It is the first record to Ankara, Manisa and Siirt provinces and hereby for Central Anatolian region and South-Eastern Anatolian region of Turkey.

GENUS *TRICHOFERUS* Wollaston, 1854: 427

SPECIES *T. griseus* (Fabricius, 1792: 325)

Material examined: İzmir: Ödemiş, Hamam, 16.VIII.1984, *Castanea sativa*, det. Lodos, 3 exs.; Tire, 07.VIII.1984, *C.sativa*, det. Lodos, 1 ex.. This Mediterranean species was previously recorded from İzmir province.

SPECIES *T. kotschyi* (Ganglbauer, 1883: 300)

Material examined: Antalya: 10.VII.1975, light, det. Lodos, 1 ex.. This E-Mediterranean species was previously recorded from Antalya province.

GENUS *STROMATIUM* Audinet-Serville, 1834: 80

SPECIES *S. auratum* (Böber, 1793: 135)

Material examined: Ankara: Gölbaşı, Mogan Lake, 16.VIII.1982, *Veronica officinalis,* det. Lodos as *Stromatium fulvum,* 1 ex.; Antalya: IX.1987, *Quercus* sp., det. Lodos as *S.fulvum,* 2 exs.; İzmir: Bornova, 20.VI.1962, light, det. Holzschuh as *S.fulvum,* 2 exs.; 04.VI.1982, weed, det. Lodos as *S.fulvum,* 1 ex.; Gaziemir, 15.V.1977, weed, det. Lodos as *S.fulvum,* 1 ex.; Karaburun, 07.VII.1978, det. Lodos as *S.fulvum,* 1 ex.; Karaburun, Mordoğan, VII,1973, light, det. Holzschuh as *S.fulvum,* 1 ex.; 12.VIII.1976, light, det. Lodos as *S.fulvum,* 10 exs.; Konak, Hatay, 11.VII.1983, house, det. Lodos as *S.fulvum,* 1 ex.; Manisa: Turgutlu, 15.VIII.1970, det. Holzschuh as *S.fulvum,* 1 ex.. This Turano-Europeo-Mediterranean species was previously recorded from all mentioned provinces.

TRIBE PHORACANTHINI Newman, 1840: 2

GENUS *PHORACANTHA* Newman, 1840: 19

SPECIES *P. semipunctata* (Fabricius, 1775: 180)

Material examined: Adana: 08.VII.1977, det. Lodos, 1 ex.; Karataş, 03.VI.1984, *Eucalyptus camaldulensis*, det. Lodos, 1 ex.. This Subcosmopolitan species was previously recorded from Adana province.

TRIBE CERAMBYCINI Latreille, 1802: 211

GENUS *CERAMBYX* Linnaeus, 1758: 388

SUBGENUS *CERAMBYX* Linnaeus, 1758: 388

SPECIES *C. carinatus* (Küster, 1845: 46)

Material examined: Ankara: Kızılcahamam, 09.VIII.1950, det. Holzschuh, 3 exs.; İzmir: Bornova, Doğanlar, VI.1978, *Prunus persica*, det. Lodos, 1 ex.. This

Turano-Mediterranean species was previously recorded from all mentioned provinces.
SPECIES *C. cerdo* Linnaeus, 1758: 392
SUBSPECIES *C. cerdo acuminatus* Motschulsky, 1853: 79
Material examined: Adana: Kozan, 26.VI.1985, *Prunus persica*, det. Lodos as *Cerambyx cerdo acuminatus,* 1 ex.; Artvin: Murgul, 22.VIII.1973, light, det. Holzschuh as *C.cerdo acuminatus*, 1 ex.; Denizli: 13.VII.1962, *Salix* sp., det. Lodos as *C.cerdo acuminatus*, 2 exs.; 13.VII.1962, *Salix* sp., det. Demelt, 1 ex.; İzmir: Bornova, 26.VI.1976, det. Lodos as *C.cerdo acuminatus*, 1 ex.. This SW-Asiatic subspecies was previously recorded from all mentioned provinces.
SPECIES *C. nodulosus* Germar, 1817: 220
SUBSPECIES *C. nodulosus nodulosus* Germar, 1817: 220
Material examined: Denizli: 13.VII.1962, *Salix* sp., det. Holzschuh, 1 ex.; İzmir: Bayraklı, 07.V.1982, det. Lodos, 1 ex.; Ödemiş, Pirinççi, 05.VI.1969, *Prunus avium*, det. Holzschuh, 1 ex.. This Turano-Mediterranean subspecies was previously recorded from İzmir province. It is the first record to Denizli province.

SUBGENUS *MICROCERAMBYX* Mikšic & Georgijevic, 1973: 22
SPECIES *C. scopolii* Fuessly, 1775: 12
SUBSPECIES *C. scopolii scopolii* Fuessly, 1775: 12
Material examined: Kırklareli: 24.VII.1973, apiaceous plants, det. Holzschuh, 1 ex.. This European subspecies was previously recorded from Kırklareli province.

TRIBE COMPSOCERINI Thomson, 1864: 260
GENUS *ROSALIA* Audinet-Serville, 1834: 561
SUBGENUS *ROSALIA* Audinet-Serville, 1834: 561
SPECIES *R. alpina* (Linnaeus, 1758: 392)
SUBSPECIES *R. alpina alpina* (Linnaeus, 1758: 392)
Material examined: Samsun: 30.VI.1949, det. Demelt, 1 ex.. This European subspecies is the first record to Samsun province.

TRIBE PURPURICENINI J. Thomson, 1861
GENUS *PURPURICENUS* Dejean, 1821: 105
SPECIES *P. budensis* (Götz, 1783: 72)
Material examined: Ankara: Nallıhan, Sarıyar, 04.VII.1975, det. Lodos, 2 exs.; Antalya: 31.V.1961, *Paliurus* sp., det. Lodos, 20 exs.; Aydın: Samsun Dağı, 02.VII.1973, *Rubus* sp., det. Lodos, 5 exs.; Balıkesir: 12.VII.1972, *Centaurea* sp., det. Lodos, 1 ex.; Bigadiç, 08.VI.1970, *Pyrus elaeagnifolia*, det. Lodos, 1 ex.; Burhaniye, Çamtepe, 09.VI.1972, weeds, det. Lodos, 2 exs.; Çanakkale: Gökçeada, 26.IX.1975, weed, det. Lodos, 1 ex.; Denizli: Tavas, Kızılcabölük, 19.VII.1976, det. Lodos, 1 ex.; Isparta: Eğirdir, 11.VI.1973, *Paliurus spina-christi*, det. Lodos, 7 exs.; İzmir: Bergama, Kozak, 21.VI.1969, weed, det. Lodos, 1 ex.; Ödemiş, Gölcük, 03.VII.1973, weed, det. Lodos, 1 ex.; Urla, Balıklıova, 18.VI.1974, *Spartium junceum*, det. Lodos, 4 exs.; Mardin: Ömerli, 12.VI.1972, *Prunus armeniaca*, det. Lodos, 1 ex.; Muğla: Dalaman, 24.V.1962, *Paliurus* sp., det. Demelt, 13 exs.; Samsun: 14.VI.1977, *Spartium junceum*, det. Lodos, 2 exs.. This Sibero-European species was previously recorded from all mentioned provinces except for Mardin province. It is the first record to Mardin province.
SPECIES *P. dalmatinus* Sturm, 1843: 353
Material examined: Bilecik: Bozüyük, 23.V.1971, *Quercus* sp., det. Lodos, 1 ex.; Isparta: Eğirdir, 11.VI.1979, *Paliurus spina-christi*, det. Lodos, 1 ex.; İzmir: Bornova, 20.V.1983, det. Lodos, 1 ex.; Selçuk, 26.V.1962, *Quercus* sp., det. Lodos,

1 ex.; Muğla: 05.V. 1972, *Prunus dulcis*, det. Lodos, 1 ex.; Dalaman, 04.V.1972, det. Lodos, 1 ex.. This E-Mediterranean species was previously recorded from all mentioned provinces except for Bilecik province. It is the first record to Bilecik province and hereby for Marmara region of Turkey.
SPECIES *P. desfontainii* (Fabricius, 1792: 258)
SUBSPECIES *P. desfontainii inhumeralis* Pic, 1891: 24
Material examined: Antalya: 20.V.1961, *Paliurus spina-christi*, det. Lodos, 7 exs.; Aydın: Karacasu, 14.V.1972, *Trifolium* sp., det. Lodos, 1 ex.; İzmir: Balçova, 11.V.1971, *Mespilus germanica*, det. Lodos, 1 ex.; Bornova, 06.VI.1975, *Populus* sp., det. Lodos, 1 ex.; Urla, Balıklıova, 18.VI.1974, *Spartium junceum*, det. Lodos, 1 ex.; Samsun: 02.VII.1973, *Rubus* sp., det. Lodos, 1 ex.. This E-Mediterranean subspecies was previously recorded from Antalya and İzmir provinces. It is the first record to Aydın and Samsun provinces.

GENUS *CALCHAENESTHES* Kraatz, 1863: 97
SPECIES *C. primis* Özdikmen, 2013: 150
Material examined: Siirt: Şirvan, 28.IV.1976, *Pistacia vera*, det. Holzschuh, 1 ex.. This E-Mediterranean species was known from Siirt province as *C. oblongomaculata*.

TRIBE CALLICHROMATINI Swainson & Shuckard, 1840: 293
GENUS *AROMIA* Audinet-Serville, 1834: 559
SPECIES *A. ambrosiaca* (Steven, 1809: 40)
SUBSPECIES *A. ambrosiaca ambrosiaca* (Steven, 1809: 40)
Material examined: Antalya: 31.V.1961, *Salix* sp., det. Demelt, 4 exs.; Artvin: Şavşat, Değirmen, 02.VI.1973, det. Lodos, 1 ex.; Denizli: 13.VII.1962, *Populus* sp., det. Lodos, 15 exs.; Kütahya: 18.VII.1962, det. Lodos as *A. moschata thoracica,* 8 exs.. This Turano-Mediterranean subspecies is the first record to Denizli and Kütahya provinces.
SPECIES *A. moschata* (Linnaeus, 1758: 391)
SUBSPECIES *A. moschata moschata* (Linnaeus, 1758: 391)
Material examined: İzmir: Tire, 14.IV.1967, det. Lodos, 1 ex.; Sakarya: Adapazarı, 28.VII.1976, *Nicotiana tabacum*, det. Lodos, 1 ex.; Samsun: 24.VII.1962, *Populus* sp., det. Lodos, 2 exs.; 12.VIII.1975, *Helianthus annuus*, det. Lodos, 1 ex.; 08.VII.1977, *Zea mays*, det. Lodos, 1 ex.. This Sibero-European species is the first record to Sakarya province.

GENUS *OSPHRANTERIA* Redtenbacher, 1850: 50
SPECIES *O. coerulescens* Redtenbacher, 1850: 50
Material examined: Diyarbakır: 05.IV.1967, det. Holzschuh, 3 exs.; Sur, Karabaş, 08.IV.1975, det. Lodos, 2 exs.; Malatya: Doğanşehir, 13.VII.1983, weed, det. Pesarini, 1 ex.. This Turanian species was previously recorded from Diyarbakır province. It is the first record to Malatya province.

TRIBE GRACILIINI Mulsant, 1839: 99
GENUS *GRACILIA* Audinet-Serville, 1834: 81
SPECIES *G. minuta* (Fabricius, 1781: 235)
Material examined: Balıkesir: Bandırma, Edincik, 10.VI.1970, *Prunus avium*, det. Holzschuh, 1 ex.; Çanakkale: Lapseki, 12.VI.1970, *Prunus dulcis*, det. Lodos, 1 ex.. This Subcosmopolitan species is the first record to Balıkesir and Çanakkale provinces. These records are the second record for Turkey.

GENUS *PENICHROA* Stephens, 1839: 270
SPECIES *P. fasciata* (Stephens, 1831: 250)
Material examined: Mersin: Silifke 03.VI.1972, *Citrullus* sp., det. Holzschuh, 1 ex.. This Mediterranean species was previously recorded from Mersin province.

GENUS *AXINOPALPIS* Dejean, 1835: 332
SPECIES *A. gracilis* (Krynicki, 1832: 162)
SUBSPECIES *A. gracilis gracilis* (Krynicki, 1832: 162)
Material examined: Muğla: Dalaman, 04.V.1972, det. Holzschuh, 1 ex.. This C and E-European subspecies is the first record to Muğla province and hereby for Aegean region of Turkey.

TRIBE OBRIINI Mulsant, 1839: 95
GENUS *OBRIUM* Dejean, 1821: 110
SPECIES *O. cantharinum* (Linnaeus, 1767: 637)
SUBSPECIES *O. cantharinum cantharinum* (Linnaeus, 1767: 637)
Material examined: Kütahya: 17.VII.1962, weed, det. Lodos, 1 ex.. This Asiatic-European + Neotropical subspecies is the first record to Kütahya province and hereby for Aegean region of Turkey.

TRIBE CERTALLINI Fairmaire, 1864: 149
GENUS *CERTALLUM* Dejean, 1821: 111
SPECIES *C. ebulinum* (Linnaeus, 1767: 637)
Material examined: Bilecik: Gölpazarı, 06.V.1973, *Vicia sativa*, det. Lodos as *Cartallum ebulinum*, 1 ex.; Söğüt, 6.V.1973, *V.sativa*, det. Lodos as *Cartallum ebulinum*, 1 ex.; Gaziantep: Oğuzeli, 24.IV.1986, weed, det. Pesarini as *Cartallum ebulinum*, 1 ex.; Isparta: Eğirdir, 27.V.1961, det. Lodos as *Cartallum ebulinum*, 1 ex.; İzmir: Bayındır, 24.IV.1973, *Centaurea* sp., det. Lodos as *Cartallum ebulinum*, 1 ex.; Bornova, 30.III.1962, weeds, det. Lodos as *Cartallum ebulinum*, 4 exs.; 29.IV.1962, weeds, det. Lodos as *Cartallum ebulinum*, 3 exs.; 01.IV.1975, poaceous plants, det. Lodos as *Cartallum ebulinum*, 2 exs.; 13.V.1976, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; 22.V.1976, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; 12.III.1977, weeds, det. Lodos as *Cartallum ebulinum*, 2 exs.; 06.IV.1977, weeds, det. Lodos as *Cartallum ebulinum*, 2 exs.; 04.V.1977, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; 26.V.1977, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; 13.VI.1977, weeds, det. Lodos as *Cartallum ebulinum*, 2 exs.; 19.IV.1983, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; 12.VI.1978, weeds, det. Lodos as *Cartallum ebulinum*, 2 exs.; Karaburun, Mordoğan 16.V.1969, weed, det. Demelt as *Cartallum ebulinum*, 1 ex.; Konak, Gültepe, 06.V.1971,weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; Menderes, Gümüldür, 09.IV.1973, weed, det. Lodos as *Cartallum ebulinum*, 1 ex.; Menemen, 10.V.1962, det. Lodos as *Cartallum ebulinum*, 3 exs.; Narlıdere, 11.IV.1973, *Medicago sativa*, det. Holzschuh as *Cartallum ebulinum*, 4 exs.. This Turano-Mediterranean species was previously recorded from all mentioned provinces.
SPECIES *C. thoracicum* (Sharp, 1880: 247)
Material examined: Diyarbakır: 11.VI.1976, det. Lodos, weed, 1 ex.. This SW-Asiatic species is the first record to Diyarbakır province.

TRIBE DEILINI Fairmaire, 1864: 154
GENUS *DEILUS* Audinet-Serville, 1834: 73

SPECIES *D. fugax* (Olivier, 1790: 253)
Material examined: İzmir: Bergama, Zeytindağ, 14.V.1971, *Pyrus elaeagnifolia*, det. Lodos, 1 ex.; Menderes, Gümüldür, 09.IV.1973, fabaceous plants, det. Holzschuh, 1 ex.. This Europeo-Mediterranean species was previously recorded from İzmir province.

TRIBE STENHOMALINI Miroshnikov, 1989: 742
GENUS *STENHOMALUS* White, 1855: 243
SUBGENUS *OBRIOPSIS* Müller, 1948: 65
SPECIES *S. bicolor* (Kraatz, 1862: 126)
SUBSPECIES *S. bicolor bicolor* (Kraatz, 1862: 126)
Material examined: Antalya: 31.V.1961, apiaceous plant, det. Lodos as *Obrium bicolor*, 1 ex.. This C and E-European subspecies was previously recorded from Antalya province.

TRIBE HYLOTRUPINI Zagajkevich, 1991: 67
GENUS *HYLOTRUPES* Audinet-Serville, 1834: 77
SPECIES *H. bajulus* (Linnaeus, 1758: 396)
Material examined: Adana: 05.V.1995, det. Lodos, 1 ex.; Artvin: Murgul, 22.VIII.1973, *Malus domestica*, det. Lodos, 1 ex.; Bilecik: Söğüt, 06.VI.1974, light, det. Lodos, 1 ex.; Bolu: Bolu Mountain, 14.V.1961. *Pinus* sp., det. Lodos, 2 exs.; İzmir: V.1959, det. Lodos, 1 ex.; 18.VI.1970, wood, det. Lodos, 1 ex.; Bornova, VII.1959, det. Lodos, 2 exs.; 24.V.1961, det. Lodos, 1 ex.; 26.V.1961, det. Lodos, 4 exs.; 02.V.1962, det. Lodos, 1 ex.; 01.VI.1962, det. Lodos, 1 ex.; 02.VI.1962, light, det. Lodos, 1 ex.; 12.VI.1962, light, det. Demelt, 1 ex.; 02.VI.1969, det. Lodos, 2 exs.; 25.VI.1970, det. Lodos, 3 exs.; 24.V.1971, det. Lodos, 1 ex.; 25.V.1971, det. Lodos, 2 exs.; 15.V.1977, weed, det. Lodos, 1 ex.; 25.V.1977, house, det. Lodos, 1 ex.; 30.V.1977, weed, det. Lodos, 1 ex.; 12.V.1982, weed, det. Lodos, 1 ex.; 25.V.1987, det. Lodos, 2 exs.; 21.V.2006, weed, det. Lodos, 1 ex.; Karaburun, Mordoğan, 15.VII.1971, on the ground, det. Holzschuh, 1 ex.; 25.V.1985, det. Lodos, 1 ex.; Karşıyaka, 25.V.1962, det. Lodos, 4 exs.; Narlıdere, 14.VI.1969, light, det. Lodos, 1 ex.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Lodos, 1 ex.; Fethiye, 12.XI.2005, det. Lodos, 3 exs.; Nevşehir: Hacıbektaş, 26.VI.1980, *Verbascum* sp., det. Lodos, 1 ex.; Sakarya: Hendek, 08.VI.1971, *Nicotiana tabacum*, det. Lodos, 1 ex.. This Cosmopolitan species was previously recorded from Adana, Artvin, Bilecik, Bolu and İzmir provinces. It is the first record to Muğla, Nevşehir and Sakarya provinces.

TRIBE CALLIDIINI Kirby, 1837: 170
GENUS *ROPALOPUS* Mulsant, 1839: 40
SUBGENUS *ROPALOPUS* Mulsant, 1839: 40
SPECIES *R. clavipes* (Fabricius, 1775: 188)
Material examined: Antalya: 31.V.1961, det. Lodos, 2 ex.; Aydın: 29.IV.1977, weed, det. Lodos, 1 ex.; Balıkesir: Bandırma, 30.VI.1966, weed, det. Lodos, 1 ex.; Bandırma, Edincik 10.VI.1970, *Malus domestica*, det. Holzschuh, 1 ex.; Bilecik: Pazaryeri, 28.VI.1974, det. Lodos, 1 ex.; Isparta: Eğirdir, 10.VI.1973, *Paliurus spina-christi*, det. Holzschuh, 1 ex.; İzmir: Bergama, Kozak, 21.VI.1969, weed, det. Lodos, 1 ex.; Bornova, 01.V.1981, det. Lodos, 2 exs.; Kemalpaşa, 16.V.1989, *Prunus avium*, det. Lodos, 1 ex.; Kınık, 14.V.1989, *M.domestica*, det. Lodos, 1 ex.; Kütahya: 17.VII.1962, *Salix* sp., det. Lodos, 2 exs.; Manisa: Yunusemre, Sultanyaylası, 29.V.1970, *Rosa* sp., det. Lodos, 1 ex.; Muğla: 21.VI.1962, det. Lodos, 2 exs.; Uşak: 10.VI.1972, *M.domestica*, det. Holzschuh, 1 ex.; Yalova:

04.VI.1971, det. Lodos, 1 ex.. This Sibero-European species was previously recorded from Balıkesir, İzmir, Kütahya and Manisa, provinces. It is the first record to Antalya, Aydın, Bilecik, Isparta, Muğla and Yalova provinces.

GENUS *SEMANOTUS* Mulsant, 1839: 54
SPECIES *S. russicus* (Fabricius, 1777: 232)
SUBSPECIES *S. russicus russicus* (Fabricius, 1777: 232)
Material examined: Antalya: Elmalı, 07.IV.1981, *Malus domestica*, det. Pesarini, 1 ex.. This C and E-European subspecies was previously recorded from Antalya province.

GENUS *PYRRHIDIUM* Fairmaire, 1864: 133
SPECIES *P. sanguineum* (Linnaeus, 1758: 396)
Material examined: İzmir: Bornova, III.1981, *Pinus* sp., det. Pesarini, 3 exs.. This Turano-Europeo-Mediterranean species is the first record to İzmir province and hereby for Aegean region of Turkey.

TRIBE CLYTINI Mulsant, 1839: 70
GENUS *PLAGIONOTUS* Mulsant, 1842: 1
SUBSPECIES *P. arcuatus tastani* Özdikmen et al., 2017: 89
Material examined: Bilecik: Pazaryeri, 18.VI.1976, *Humulus lupulus*, det. Lodos, 1 ex.; Bilecik: Pazaryeri, 14.VI.1977, *H.lupulus*, det. Lodos, 1 ex.; İzmir: 12.VI.1981, *Quercus* sp., det. Lodos, 3 exs.; Karşıyaka, Şemikler, 05.VI.1977, *Corylus avellana*, det. Pesarini, 1 ex.; Muş: Buğlan Pass, 13-16.VI.1976, 1900 m., det. Holzschuh, 1 ex.. This Turkish endemic subspecies was previously recorded from Bilecik and Muş provinces. It is the first record for İzmir province and hereby for Aegean region of Turkey.

GENUS *ECHINOCERUS* Mulsant, 1862: 143
SPECIES *E. floralis* (Pallas, 1773: 724)
Material examined: Adıyaman: Kahta, 07.VI.1976, weeds, det. Lodos, 2 exs.; Afyonkarahisar: Emirdağ, 14.VI.1972, *Vicia sativa*, det. Lodos, 4 exs.; Amasya: 14.VI.1981, *Medicago sativa*, det. Lodos, 1 ex.; 14.VI.1989, *M.sativa*, det. Lodos, 2 exs.; Antalya: 20.V.1969, det. Lodos, 1 ex.; Bitlis, 14.VII.1972, det. Lodos, 1 ex.; Bursa: Karacabey, 10.VI.1988, weed, det. Lodos, 1 ex.; Mustafakemalpaşa, Tepecik, 14.VI.1989, *M.sativa*, det. Lodos, 33 exs.; Çanakkale: Eceabat, 21.V.1975, weed, det. Holzschuh, 1 ex.; Gökçeada, 02.VI.1975, weed, det. Lodos, 1 ex.; Diyarbakır: Aras, 19.VI.1972, weed, det. Lodos, 1 ex.; Edirne: 17.VI.1976, det. Lodos, 1 ex.; Erzincan, 16.VI.1973, weeds, det. Lodos, 2 exs.; Eskişehir: Mahmudiye, 08.VII.1979, weed, det. Pesarini, 1 ex.; Isparta: 12.VI.1973, weed, det. Lodos, 1 ex.; Keçiborlu, 10.VII.1963, weeds, det. Lodos, 2 exs.; İzmir: Bornova, 26.V.1975, *Carthamus* sp., det. Lodos, 1 ex.; Kemalpaşa, 06.V.1961, det. Lodos, 1 ex.; Kınık, 15.VI.1969, weed, det. Lodos, 1 ex.; Kahramanmaraş: Göksun, 14.VI.1985, 1410 m., weeds, det. Lodos, 3 exs.; Kırklareli: Pınarhisar, 03.VI.1975, weed, det. Lodos, 1 ex.; Vize.03.VI.1975, weeds, det. Lodos, 2 exs.; Konya: Beyşehir, 05.VII.1980, *Matricaria chamomilla*, det. Lodos, 1 ex.; Kütahya: Simav, 19.VI.1972, *Vicia sativa*, det. Lodos, 2 exs.; Malatya: 09.VI.1976, weeds, det. Lodos, 2 exs.; Manisa: Muradiye, 07.VIII.1975, *Triticum aestivum*, det. Lodos, 1 ex.; Mardin: Ömerli, 03.VI.1976, apiaceous plants, det. Lodos, 1 ex.; Mersin: Güzeloluk, 06.VII.1987, weed, det. Lodos, 1 ex.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Lodos, 1 ex.; Muş, 02.VII.1976, *M.sativa*, det. Lodos, 4 exs.; Şırnak: Cizre, 16.VI.1976, weed, det. Lodos, 1 ex.; Uşak: 16.VI.1975, *Euphorbia*

sp., det. Lodos, 2 exs.; Uşak: Bölme, 11.VI.1972, weed, det. Lodos, 1 ex.. This Central Asiatic-European species is the first record for Diyarbakır, Kütahya, Manisa, Mardin, Muğla and Şırnak provinces.

GENUS *NEOPLAGIONOTUS* Kasatkin, 2005: 51
SPECIES *N. bobelayei* (Brullé, 1832: 253)
SUBSPECIES *N. bobelayei bobelayei* (Brullé, 1832: 253)
Material examined: İzmir: Bornova, 06.VI.1970, det. Pesarini, 1 ex.; Kahramanmaraş: Araban, 07.VI.1985, weed, det. Lodos as *Plagionotus speciosus*, 1 ex.; Niğde, 30.VI.1980, *Onopordum* sp., det. Lodos as *P.speciosus*, 1 ex.; Siirt: 16.VI.1972, *Pistacia vera*, det. Holzschuh as *P.speciosus*, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) subspecies was previously recorded from İzmir province. It is the first record for Kahramanmaraş, Niğde and Siirt provinces.

GENUS *ISOTOMUS* Mulsant, 1862: 143
SPECIES *I. speciosus* (Schneider, 1787: 125)
SUBSPECIES *I. speciosus speciosus* (Schneider, 1787: 125)
Material examined: İzmir: Buca, Şirinyer, 26.V.1985, det. Pesarini, 1 ex.; Sakarya: Geyve, 27.VII.1976, *Nicotiana tabacum*, det. Lodos, 1 ex.; Trabzon: 19.V.1950, det. Holzschuh, 1 ex.. This European subspecies is the first record for İzmir, Sakarya and Trabzon provinces and hereby for Aegean and Marmara regions of Turkey.

GENUS *CHLOROPHORUS* Chevrolat, 186: 290
SUBGENUS *CHLOROPHORUS* Chevrolat, 1863: 290
SPECIES *C. damascenus* (Chevrolat, 1854: 483)
Material examined: Bursa: Keles, 18.VII.1972, *Vitis vinifera*, det. Lodos, 1 ex.; Çorum: Laçin, 05.IX.1979. apiaceous plants, det. Lodos, 1 ex.; İzmir: 12.V.1961, det. Lodos, 32 exs.; Bornova, 16.VI.1961, det. Lodos, 3 exs.; 30.VI.1961, det. Lodos, 3 exs.; 15.V.1976, det. Lodos, 2 exs.; Sakarya: Geyve, 16.VII.1972, *Centaurea* sp., det. Lodos, 1 ex.; Tekirdağ: 28.VI.1972, weed, det. Lodos, 1 ex.; 26.VII.1973, weeds, det. Lodos, 2 exs.; Yozgat: 19.VIII.1979, weed, det. Lodos, 1 ex.. This E-Mediterranean species is the first record for Sakarya, Tekirdağ and Yozgat provinces and hereby for European part (Thracia) of Turkey.
SPECIES *C. varius* (Müller, 1766: 188)
Material examined: Antalya: Güllük Mountain, 27.VII.1985, *Onopordum* sp., det. Pesarini, 1 ex.. *Prunus dulcis*, det. Lodos, 1 ex.; Burdur: 13-14.VII.1963, weed, det. Lodos, 1 ex.; Bursa: 17.VII.1972, weed, det. Lodos, 1 ex.; Diyarbakır: 19.VI.1972, weed, det. Lodos, 1 ex.; Silvan, 10.VIII.1971, weed, det. Lodos, 1 ex.; Edirne: 04.VII.1972, weeds, det. Lodos, 2 exs.; Gaziantep: Oğuzeli, 15.VII.1984, weeds, det. Lodos, 2 exs.; Isparta: Eğirdir, 08.VIII.1985, det. Lodos, 2 exs.; İstanbul: Erenköy, 05.VII.1975, det. Lodos, 1 ex.; İzmir: 18.VI.1970, weeds, det. Lodos, 3 ex.; Bergama, Kozak, 21.VI.1969, weed, det. Lodos, 1 ex.; Bornova, 26.V.1975, weed, det. Lodos, 1 ex.; 25.V.1977, weed, det. Lodos, 1 ex.; 16.VI.1983, weed, det. Lodos, 1 ex.; Bornova, Doğanlar, 1975, weed, det. Lodos, 1 ex.; Kınık, 15.VI.1969, weed, det. Lodos, 1 ex.; 13.VII.1977, weeds, det. Lodos, 2 exs.; Narlıdere, 25.VI.1961, det. Lodos, 1 ex.; 18.VII.1971 apiaceous plants, det. Lodos, 1 ex.; 17.VII.1972, *Quercus* sp., det. Lodos, 1 ex.; Tire, 07.VIII.1984, *Castanea sativa*, det. Lodos, 3 exs.; Kocaeli: Gebze, 16.VII.1972, *Centaurea* sp., det. Lodos, 1 ex.; Manisa: 1972, det. Lodos, 1 ex.; Alaşehir, 10.VII.1975, weed, det. Holzschuh, 1 ex.; Muğla: Fethiye, 24.V.1962, apiaceous plants, det. Lodos, 3 exs.; Sakarya:

Adapazarı, 15.VII.1972, *Matricaria chamomilla*, det. Lodos, 1 ex.; Şanlıurfa: Ceylanpınar, 05.III.1965, det. Lodos, 2 exs.. This Sibero-European species is the first record for Diyarbakır and Edirne provinces.

SUBGENUS *CRASSOFASCIATUS* Özdikmen, 2011: 538
SPECIES *C. aegyptiacus* (Fabricius, 1775: 194)
Material examined: Amasya: 14.VI.1989, *Medicago sativa*, det. Lodos as *Chlorophorus nigripes*, 1 ex.; Çanakkale: 11.VIII.1961, det. Demelt as *C.nigripes*, 3 exs.; Eceabat, 27.VII.1973, weed, det. Holzschuh as *C.nigripes*, 1 ex.; Muğla: Bodrum, 29.VI.1972, *Citrus reticulata*, det. Holzschuh as *C.nigripes*, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species was previously recorded from all mentioned provinces.
SPECIES *C. hungaricus* Seidlitz, 1891: 828
Material examined: İzmir: Dikili, Killik, 30.V-10.VI.1968, det. Holzschuh, 1 ex.. This C and E-European species is the first record to İzmir province and hereby for Aegean region of Turkey.
SPECIES *C. trifasciatus* (Fabricius, 1781: 244)
Material examined: Adana: Yumurtalık, 09.VI.1984, poaceous plant, det. Pesarini, 1 ex.; İzmir: Gaziemir, 28.V.1978, weed, det. Lodos, 1 ex.. This Mediterranean species is the first record to İzmir province.

SUBGENUS *PERDEROMACULATUS* Özdikmen, 2011: 537
SPECIES *C. sparsus* (Reitter, 1886: 67)
Material examined: Antalya: 8-9.VI.1970, *Paliurus spina-christi*, det. Holzschuh, 1 ex.; Bey Dağları, 16-22.V.1961, det. Lodos, 6 exs.; Korkuteli, 25.IX.1980,*Cupressus* sp., det. Lodos, 3 exs.; Gümüşhane: 10.VII.1978, weed, det. Lodos, 1 ex.. This E-Mediterranean species is the first record to Gümüşhane province and hereby for Black Sea region of Turkey.
SPECIES *C. sartor* (Müller, 1766: 188)
Material examined: Ankara: Nallıhan, 09.VII.1979, weed, det. Lodos, 1 ex.; Antalya: 20.V.1961, apiaceous plants, det. Lodos, 17 exs.; Alanya, 29.VI.1980, *Alnus glutinosa*, det. Lodos, 1 ex.; Aydın: Kuşadası, 09.VI.1977, weeds, det. Lodos, 2 exs.; Samsun Mountain, 14. VI.1977, weeds, det. Lodos, 2 exs.; Söke, 02.VI.1973, *Capparis* sp., det. Lodos, 2 exs.; Balıkesir: Dursunbey, 13.VII.1972, *Rubus* sp., det. Lodos, 1 ex.; Çanakkale: Gelibolu, 05.VII.1972, *Pyrus elaeagnifolia*, det. Lodos, 1 ex.; Hatay: Hassa, Akbez, 02.VI.1985, weeds, det. Lodos, 2 exs.; İzmir: Bornova, 29.V.1973, *Origanum creticum*, det. Lodos, 1 ex.; Çeşme, Germiyan, 18.VI.1978, *Pimpinella anisum*, det. Lodos, 3 exs.; Çeşme, Ovacık, 30.VI.1966, *P.anisum*, det. Lodos, 1 ex.; Ödemiş, Bozdağ, 11.VII.1967, *Matricaria chamomilla*, leg. F. Önder, det. Lodos, 1 ex.; Selçuk, Pamucak, 14, VI,1977, weeds, det. Lodos, 6 exs.; Konya: Akşehir, 06.VII.1980, weed, det. Lodos, 1 ex.; Mersin: Toroslar, Arslanköy, 08.VII.1986, *Cirsium* sp., det. Lodos, 2 exs.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Lodos, 12 exs.; 04,VI.1979, *M.chamomilla*, det. Lodos, 2 exs.; Sivas: Suşehri, 12.VII.1978, *Crataegus* sp., det. Lodos, 2 exs.; Tekirdağ: Saray, 02.VII.1972, weed, det. Lodos, 1 ex.; Tokat: Almus, 02.VII.1978, *Verbascum* sp., det. Lodos, 1 ex.. This Sibero-European species is the first record to Mersin and Sivas provinces.
SPECIES *C. wewalkai* Holzschuh, 1969: 77
Material examined: Van: Reşadiye, 24-26.VI.1977, det. Holzschuh, 1 ex.. This Turkish endemic species is the first record to Van province.

SUBGENUS *HUMEROMACULATUS* Özdikmen, 2011: 537
SPECIES *C. nivipictus* (Kraatz, 1879: 91)
Material examined: Bitlis: Mutki, 08.IV.1975, *Corylus avellana*, det. Lodos, 1 ex.; Hatay: Belen, Soğukoluk, 30.V.1985, *Prunus domestica*, det. Lodos, 1 ex.; Osmaniye: Zorkun Plateau, 12.VII.1986, det. Lodos, 2 exs.; Şırnak: Beytüşşebap, 15.VI.1976, det. Holzschuh, 1 ex.. This SW-Asiatic species is the first record to Bitlis and Şırnak provinces.

GENUS *XYLOTRECHUS* Chevrolat, 1860: 456
SUBGENUS *XYLOTRECHUS* (Chevrolat, 1860: 456)
SPECIES *X. arvicola* Olivier, 1795: 64
SUBSPECIES *X. arvicola arvicola* Olivier, 1795: 64
Material examined: Tekirdağ: 01.VI.1975, *Asphodelus* sp., det. Holzschuh, 1 ex.. This Europeo-Mediterranean subspecies was recorded from Tekirdağ province.

SUBGENUS *RUSTICOCLYTUS* Vives, 1977: 130
SPECIES *X. rusticus* (Linnaeus, 1758: 398)
Material examined: Bursa: İznik: 01.VI.1971, fabaceous plants, det. Holzschuh as *Xylotrechus rusticus,* 1 ex.. This Palaearctic species is the first record to Bursa province.

GENUS *CLYTUS* Laicharting, 1784: 88
SUBGENUS *CLYTUS* Laicharting, 1784: 88
SPECIES *C. arietis* (Linnaeus, 1758: 399)
SUBSPECIES *C. arietis arietis* (Linnaeus, 1758: 399)
Material examined: Bilecik: Pazaryeri, 25.V.1971, *Humulus lupulus*, det. Holzschuh, 2 exs.. This Europeo-Mediterranean subspecies is the first record to Bilecik province.
SPECIES *C. rhamni* Germar, 1817: 223
SUBSPECIES *C. rhamni temesiensis* (Germar, 1824: 519)
Material examined: Adana: Gavurdağı, 08.VI.1985, weed, det. Lodos, 1 ex.; Antalya: 20.V.1961, det. Lodos, 4 exs.; 20.I.1981, weed, det. Pesarini, 1 ex.; Bilecik: Pazaryeri, 13.VII.1977, weeds, det. Lodos, 2 exs.; Çanakkale: Gelibolu, 31.V.1975, *Matricaria chamomilla*, det. Lodos, 1 ex.; Gökçeada, 25.IX,1975, weed, det. Lodos, 1 ex.; Kırklareli: Demirköy, İğneada, 01.VII.1972, weed, det. Lodos, 1 ex.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Holzschuh, 2 exs.; Osmaniye: Zorkun Plateau, 13.VII.1986, det. Lodos, 1 ex.. This Turano-European subspecies is the first record to Muğla province.
SPECIES *C. schneideri* Kiesenwetter, 1878: 313 [= 1879: 57]
SUBSPECIES *C. schneideri inapicalis* Pic, 1895: 38
Material examined: Artvin: 12.VI.1973, weed, det. Lodos as *Clytus schneideri,* 1 ex.; Giresun: Alucra, 12.VII.1978, *Euphorbia* sp., det. Pesarini as *C.schneideri*, 1 ex.; Ordu: Mesudiye, 13.VII.1978, weed, det. Lodos as *C.schneideri,* 1 ex.. This Turkish endemic subspecies is the first record to Giresun and Ordu provinces.

SUBFAMILY STENOPTERINAE Gistel, 1848: [9]
(unnumbered section)

TRIBE HYBODERINI Linsley, 1840: 367
GENUS *CALLIMUS* Mulsant, 1846: [5]
SUBGENUS *CALLIMUS* Mulsant, 1846: [5]
SPECIES *C. angulatus* (Schrank, 1789 77)

SUBSPECIES *C. angulatus angulatus* (Schrank, 1789 77)
Material examined: Bilecik: Bozüyük, 05.V.1973, *Quercus* sp., det. Lodos as *Callimellum angulatus* , 1 ex.. This Turano-Europeo-Mediterranean subspecies is the first record to Bilecik province.

SUBGENUS *LAMPROPTERUS* Mulsant, 1862: 214
SPECIES *C. femoratus* (Germar, 1824: 519)
Material examined: Antalya: 31.V.1961, det. Lodos as *Callimus femoratus*, 2 exs.; Artvin: 12.VI.1973, weed, det. Lodos, 1 ex.; Diyarbakır: 12.VI.1972, weeds, det. Holzschuh, 4 exs.; Gaziantep, 08.V.1972, *Urtica dioica*, det. Lodos, 1 ex.; İzmir: Kemalpaşa, 27.VI.1961, det. Lodos as *C.femoratus*, 1 ex.; Mardin: Derik, 05.VI.1976, *Quercus* sp., det. Lodos, 1 ex.; Muğla: Bodrum, 26.V.1962, apiaceous plants, det. Lodos, 5 exs.; Seki, 09.VI.1973, *Triticum aestivum*, det. Lodos, 1 ex.; Osmaniye: Hasanbeyli, Almanpınarı, 8.VI.1972, *Quercus* sp., det. Holzschuh as *C.femoratus*, 1 ex.. This Turano-European species was recorded from all mentioned provinces.

As a result of this study, totally 46 species and 42 subspecies of 50 genera of seven subfamilies were determined in Turkey. New records for 39 provinces and six regions were given in List 1 for Cerambycidae. In addition to this, a new record for European part of Turkey and some second records for Turkey were included in the same list as family level. Provincial and regional new records were also given at subfamily level in List 2.

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List 1. Provincial and regional new records of Cerambycidae material, housed in LEMT according to family level.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

PROVINCIAL NEW RECORDS

Ankara province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)

Antalya province
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Aydın province
SUBSPECIES *Stenurella bifasciata nigrosuturalis* (Reitter, 1895: 88)
SUBSPECIES *Purpuricenus desfontainii inhumeralis* Pic, 1891: 24
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Balıkesir province
SUBSPECIES *Cortodera flavimana flavimana* (Waltl, 1838: 471)
SPECIES *Arhopalus ferus* (Mulsant, 1839: 64)
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

Bilecik province
SPECIES *Purpuricenus dalmatinus* Sturm, 1843: 353
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)
SUBSPECIES *Clytus arietis arietis* (Linnaeus, 1758: 399)
SUBSPECIES *Callimus angulatus angulatus* (Schrank, 1789 77)

Bingöl province
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065

Bitlis province
SUBSPECIES *Cortodera colchica colchica* Reitter, 1890: 246
SPECIES *Chlorophorus nivipictus* (Kraatz, 1879: 91)

Burdur province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)

Bursa province
SPECIES *Xylotrechus rusticus* (Linnaeus, 1758: 398)

Çanakkale province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)
SPECIES *Pedostrangalia verticalis* (Germar, 1822: 9)
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

Denizli province
SPECIES *Aegosoma scabricorne* (Scopoli, 1763: 54)
SUBSPECIES *Cerambyx nodulosus nodulosus* Germar, 1817: 220
SUBSPECIES *Aromia ambrosiaca ambrosiaca* (Steven, 1809: 40)

Diyarbakır province
SPECIES *Certallum thoracicum* (Sharp, 1880: 247)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SPECIES *Chlorophorus varius* (Müller, 1766: 188)

Edirne province
SPECIES *Chlorophorus varius* (Müller, 1766: 188)

Giresun province
SUBSPECIES *Clytus schneideri inapicalis* Pic, 1895: 38

Gümüşhane province
SPECIES *Chlorophorus sparsus* (Reitter, 1886: 67)

Isparta province
SUBSPECIES *Cortodera flavimana rufipes* (Kraatz, 1876: 344)
SPECIES *Grammoptera merkli* Frivaldszky, 1884: 4
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

İzmir province
SUBSPECIES *Grammoptera ruficornis ruficornis* (Fabricius, 1781: 247)
SPECIES *Stictoleptura excisipes* (Daniel & Daniel, 1891: 6)
SPECIES *Spondylis buprestoides* (Linnaeus, 1758: 388)
SPECIES *Pyrrhidium sanguineum* (Linnaeus, 1758: 396)
SUBSPECIES *Plagionotus arcuatus tastani* Özdikmen et al., 2017: 89
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus hungaricus* Seidlitz, 1891: 828
SPECIES *Chlorophorus trifasciatus* (Fabricius, 1781: 244)

Kahramanmaraş province
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Kütahya province
SUBSPECIES *Stenurella septempunctata latenigra* (Pic, 1915: 5)
SUBSPECIES *Aromia ambrosiaca ambrosiaca* (Steven, 1809: 40)
SUBSPECIES *Obrium cantharinum cantharinum* (Linnaeus, 1767: 637)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)

Malatya province
SPECIES *Osphranteria coerulescens* Redtenbacher, 1850: 50

Manisa province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)

Mardin province
SPECIES *Pedostrangalia emmipoda* (Mulsant, 1863: 531)
SPECIES *Purpuricenus budensis* (Götz, 1783: 72)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)

Mersin province
SPECIES *Chlorophorus sartor* (Müller, 1766: 188)

Muğla province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)
SUBSPECIES *Stictoleptura rufa rufa* (Brullé, 1832: 263)
SPECIES *Pedostrangalia emmipoda* (Mulsant, 1863: 531)
SUBSPECIES *Stenurella septempunctata latenigra* (Pic, 1915: 5)
SPECIES *Axinopalpis gracilis* (Krynicki, 1832: 162)
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SUBSPECIES *Clytus rhamni temesiensis* (Germar, 1824: 519)

Muş province
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065
SUBSPECIES *Pseudovadonia livida desbrochersi* (Pic, 1891: XVI)

Nevşehir province
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)

Niğde province
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Ordu province
SUBSPECIES *Clytus schneideri inapicalis* Pic, 1895: 38

Rize province
SUBSPECIES *Stenocorus insitivus insitivus* (Germar, 1824: 520)

Sakarya province
SUBSPECIES *Aromia moschata moschata* (Linnaeus, 1758: 391)
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

Samsun province
SPECIES *Stenocorus meridianus* (Linnaeus, 1758: 398)
SUBSPECIES *Rosalia alpina alpina* (Linnaeus, 1758: 392)
SUBSPECIES *Purpuricenus desfontainii inhumeralis* Pic, 1891: 24

Siirt province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Sivas province
SPECIES *Chlorophorus sartor* (Müller, 1766: 188)

Şırnak province
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SPECIES *Chlorophorus nivipictus* (Kraatz, 1879: 91)

Tekirdağ province
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

Trabzon province
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)

Van province
SUBSPECIES *Cortodera colchica colchica* Reitter, 1890: 246
SPECIES *Chlorophorus wewalkai* Holzschuh, 1969: 77

Yalova province
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Yozgat province
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Aegosoma scabricorne* (Scopoli, 1763: 54)
SUBSPECIES *Grammoptera ruficornis ruficornis* (Fabricius, 1781: 247)
SUBSPECIES *Stictoleptura rufa rufa* (Brullé, 1832: 263)

SPECIES *Spondylis buprestoides* (Linnaeus, 1758: 388)
SPECIES *Axinopalpis gracilis* (Krynicki, 1832: 162)
SUBSPECIES *Obrium cantharinum cantharinum* (Linnaeus, 1767: 637)
SPECIES *Pyrrhidium sanguineum* (Linnaeus, 1758: 396)
SPECIES *Plagionotus arcuatus tastani* Özdikmen et al., 2017: 89
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus hungaricus* Seidlitz, 1891: 828

Black Sea region of Turkey
SPECIES *Chlorophorus sparsus* (Reitter, 1886: 67)

Central Anatolian region of Turkey
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)

Marmara region of Turkey
SPECIES *Pedostrangalia verticalis* (Germar, 1822: 9)
SPECIES *Purpuricenus dalmatinus* Sturm, 1843: 353
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)

Mediterranean region of Turkey
SUBSPECIES *Cortodera flavimana rufipes* (Kraatz, 1876: 344)

South-Eastern Anatolian region of Turkey
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)

TURKISH NEW RECORDS

Second record for Turkey
SPECIES *Stenocorus meridianus* (Linnaeus, 1758: 398)
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

New record for European Turkey (Thracia)
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

List 2. Provincial and regional new records of Cerambycidae material, housed in LEMT according to subfamilies.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

SUBFAMILY PRIONINAE Latreille, 1802: 212

PROVINCIAL NEW RECORDS

Denizli province
SPECIES *Aegosoma scabricorne* (Scopoli, 1763: 54)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Aegosoma scabricorne* (Scopoli, 1763: 54)

SUBFAMILY LEPTURINAE Latreille, 1802: 218

PROVINCIAL NEW RECORDS

Aydın province
SUBSPECIES *Stenurella bifasciata nigrosuturalis* (Reitter, 1895: 88)

Balıkesir province
SUBSPECIES *Cortodera flavimana flavimana* (Waltl, 1838: 471)

Bingöl province
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065

Bitlis province
SUBSPECIES *Cortodera colchica colchica* Reitter, 1890: 246

Burdur province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)

Çanakkale province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)
SPECIES *Pedostrangalia verticalis* (Germar, 1822: 9)

Isparta province
SUBSPECIES *Cortodera flavimana rufipes* (Kraatz, 1876: 344)
SPECIES *Grammoptera merkli* Frivaldszky, 1884: 4

İzmir province
SUBSPECIES *Grammoptera ruficornis ruficornis* (Fabricius, 1781: 247)
SPECIES *Stictoleptura excisipes* (Daniel & Daniel, 1891: 6)

Kütahya province
SUBSPECIES *Stenurella septempunctata latenigra* (Pic, 1915: 5)

Mardin province
SPECIES *Pedostrangalia emmipoda* (Mulsant, 1863: 531)

Muğla province
SUBSPECIES *Pseudovadonia livida livida* (Fabricius, 1777: 233)
SUBSPECIES *Stictoleptura rufa rufa* (Brullé, 1832: 263)
SPECIES *Pedostrangalia emmipoda* (Mulsant, 1863: 531)
SUBSPECIES *Stenurella septempunctata latenigra* (Pic, 1915: 5)

Muş province
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065
SUBSPECIES *Pseudovadonia livida desbrochersi* (Pic, 1891: XVI)

Rize province
SUBSPECIES *Stenocorus insitivus insitivus* (Germar, 1824: 520)

Samsun province
SPECIES *Stenocorus meridianus* (Linnaeus, 1758: 398)

Van province
SUBSPECIES *Cortodera colchica colchica* Reitter, 1890: 246

REGIONAL NEW RECORDS

Aegean region of Turkey
SUBSPECIES *Grammoptera ruficornis ruficornis* (Fabricius, 1781: 247)
SUBSPECIES *Stictoleptura rufa rufa* (Brullé, 1832: 263)

Marmara region of Turkey
SPECIES *Pedostrangalia verticalis* (Germar, 1822: 9)

Mediterranean region of Turkey
SUBSPECIES *Cortodera flavimana rufipes* (Kraatz, 1876: 344)

TURKISH NEW RECORDS

Second record for Turkey
SPECIES *Stenocorus meridianus* (Linnaeus, 1758: 398)
SUBSPECIES *Cortodera alpina tatvanensis* Danilevsky, 2015: 1065

SUBFAMILY ASEMINAE Thomson, 1861: 139

PROVINCIAL NEW RECORDS

Balıkesir province
SPECIES *Arhopalus ferus* (Mulsant, 1839: 64)

SUBFAMILY SPONDYLIDINAE Audinet-Serville, 1832: 123

PROVINCIAL NEW RECORDS

İzmir province
SPECIES *Spondylis buprestoides* (Linnaeus, 1758: 388)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Spondylis buprestoides* (Linnaeus, 1758: 388)

SUBFAMILY CERAMBYCINAE Latreille, 1802: 211

PROVINCIAL NEW RECORDS

Ankara province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)
Antalya province
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Aydın province
SUBSPECIES *Purpuricenus desfontainii inhumeralis* Pic, 1891: 24
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Balıkesir province
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

Bilecik province
SPECIES *Purpuricenus dalmatinus* Sturm, 1843: 353
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)
SUBSPECIES *Clytus arietis arietis* (Linnaeus, 1758: 399)

Bitlis province
SPECIES *Chlorophorus nivipictus* (Kraatz, 1879: 91)

Bursa province
SPECIES *Xylotrechus rusticus* (Linnaeus, 1758: 398)

Çanakkale province
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

Denizli province
SUBSPECIES *Cerambyx nodulosus nodulosus* Germar, 1817: 220
SUBSPECIES *Aromia ambrosiaca ambrosiaca* (Steven, 1809: 40)

Diyarbakır province
SPECIES *Certallum thoracicum* (Sharp, 1880: 247)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SPECIES *Chlorophorus varius* (Müller, 1766: 188)

Edirne province
SPECIES *Chlorophorus varius* (Müller, 1766: 188)

Giresun province
SUBSPECIES *Clytus schneideri inapicalis* Pic, 1895: 38

Gümüşhane province
SPECIES *Chlorophorus sparsus* (Reitter, 1886: 67)

Isparta province
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

İzmir province
SPECIES *Pyrrhidium sanguineum* (Linnaeus, 1758: 396)
SUBSPECIES *Plagionotus arcuatus tastani* Özdikmen et al., 2017: 89
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus hungaricus* Seidlitz, 1891: 828
SPECIES *Chlorophorus trifasciatus* (Fabricius, 1781: 244)

Kahramanmaraş province
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Kütahya province
SUBSPECIES *Aromia ambrosiaca ambrosiaca* (Steven, 1809: 40)
SUBSPECIES *Obrium cantharinum cantharinum* (Linnaeus, 1767: 637)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
Malatya province
SPECIES *Osphranteria coerulescens* Redtenbacher, 1850: 50

Manisa province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)

Mardin province
SPECIES *Purpuricenus budensis* (Götz, 1783: 72)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)

Mersin province
SPECIES *Chlorophorus sartor* (Müller, 1766: 188)

Muğla province
SPECIES *Axinopalpis gracilis* (Krynicki, 1832: 162)
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SUBSPECIES *Clytus rhamni temesiensis* (Germar, 1824: 519)

Nevşehir province
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)

Niğde province
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Ordu province
SUBSPECIES *Clytus schneideri inapicalis* Pic, 1895: 38

Sakarya province
SUBSPECIES *Aromia moschata moschata* (Linnaeus, 1758: 391)
SPECIES *Hylotrupes bajulus* (Linnaeus, 1758: 396)
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

Samsun province
SUBSPECIES *Rosalia alpina alpina* (Linnaeus, 1758: 392)
SUBSPECIES *Purpuricenus desfontainii inhumeralis* Pic, 1891: 24

Siirt province
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)
SUBSPECIES *Neoplagionotus bobelayei bobelayei* (Brullé, 1832: 253)

Sivas province
SPECIES *Chlorophorus sartor* (Müller, 1766: 188)
Şırnak province
SPECIES *Echinocerus floralis* (Pallas, 1773: 724)
SPECIES *Chlorophorus nivipictus* (Kraatz, 1879: 91)

Tekirdağ province
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

Trabzon province
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)

Van province
SPECIES *Chlorophorus wewalkai* Holzschuh, 1969: 77

Yalova province
SPECIES *Ropalopus clavipes* (Fabricius, 1775: 188)

Yozgat province
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Axinopalpis gracilis* (Krynicki, 1832: 162)
SUBSPECIES *Obrium cantharinum cantharinum* (Linnaeus, 1767: 637)
SPECIES *Pyrrhidium sanguineum* (Linnaeus, 1758: 396)

SUBSPECIES *Plagionotus arcuatus tastani* Özdikmen et al., 2017: 89
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)
SPECIES *Chlorophorus hungaricus* Seidlitz, 1891: 828

Black Sea region of Turkey
SPECIES *Chlorophorus sparsus* (Reitter, 1886: 67)

Central Anatolian region of Turkey
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)

Marmara region of Turkey
SPECIES *Purpuricenus dalmatinus* Sturm, 1843: 353
SUBSPECIES *Isotomus speciosus speciosus* (Schneider, 1787: 125)

South-Eastern Anatolian region of Turkey
SPECIES *Hesperophanes sericeus* (Fabricius, 1787: 152)

TURKISH NEW RECORDS

second record for Turkey
SPECIES *Gracilia minuta* (Fabricius, 1781: 235)

New record for European Turkey (Thracia)
SPECIES *Chlorophorus damascenus* (Chevrolat, 1854: 483)

SUBFAMILY STENOPTERINAE Gistel, 1848: [9] (unnumbered section)

PROVINCIAL NEW RECORDS

Bilecik province
SUBSPECIES *Callimus angulatus angulatus* (Schrank, 1789 77)

DISTRIBUTION AREA AND NATURAL PARASITISM OF *APANTELES BRUNNISTIGMA* ABDINBEKOVA (HYMENOPTERA: BRACONIDAE) ON THE OLIVE LEAF MOTH

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[Kaçar, G. 2020. Distribution area and natural parasitism of *Apanteles brunnistigma* Abdinbekova (Hymenoptera: Braconidae) on the olive leaf moth. Munis Entomology & Zoology, 15 (1): 66-72**]**

ABSTRACT: Olive leaf moth, *Palpita unionalis* Hübner (Lepidoptera: Carambidae) is an important pest in olive groves in Mediterranean countries. It feeds on leaves, shoots, and later green fruits of olive trees. The native larva parasitoid *Apanteles brunnistigma* Abdinbekova (Hymenoptera: Braconidae) was found a solitary endoparasitoid on *P. unionalis* in the eastern Mediterranean and southeastern Anatolia regions. In this study, the distribution and natural parasitism by *A. brunnistigma* on *P. unionalis* were determined in seven provinces (Adana, Gaziantep, Hatay, Kahramanmaraş, Kilis, Osmaniye, and Mersin of Turkey). *P. unionalis* larvae were collected all provinces over its period of occurrence from May to December. The collected larvae were reared until adult parasitoids or moths emerged in the laboratory. The parasitism rate and the number of *A. brunnistigma* per *P. unionalis* larva were estimated for each grove. A total of 2903 *P. unionalis* larvae were collected for two years. The highest natural parasitism rate (58.3%) was observed in Gaziantep and (30%) in Hatay. The parasitism was observed in “summer” (during the period of June through December), with a mean of 9.2-17.6% in 2014-2015, respectively. These findings highlight the need for improved biological control of *P. unionalis* through introduction, augmentation and releasing of the solitary parasitoid *A. brunnistigma*.

KEY WORDS: *Apanteles brunnistigma*, olive, *Palpita unionalis*, parasitism rate

Olive (*Olea europaea* L.), a plant species specific to the Mediterranean climate, is extensively grown along the Mediterranean coasts. It was cultivated about 8000 years ago in Anatolia from where it spreads to the Middle East, North Africa and Southern Europe (Efe et al., 2011). The olive tree has significant socio-economic importance in the Eastern basin where 98% of the world olive production was produced. Turkey holds the fourth country in world olive production with approximately 175.000 thousand trees producing 2.100 thousand ton production of olive fruits after Spain, Italy, and Greece (Faosat, 2016; Tuik, 2018). The olive trees are largely grown in the Aegean, Marmara and Mediterranean Regions, respectively (Tuik, 2018). Biological control agents have increased recently due to inadequate crop management and to avoid hazards of insecticides. Although pesticides are primarily used for olive pests' control, biological control agents are becoming a viable option. Olive trees are attacked by numerous insect pests such as olive the fruit fly, olive moth, olive scales and etc. in Turkey. Among those, the olive leaf moth *Palpita unionalis* Hüb. (Lepidoptera: Crambidae) dramatically causes reduction of green parts of trees especially leaves and green fruits of olive cultivars (*Olea europea* L.) (Oleaceae) in the Mediterranean countries. During the last decade, *P. unionalis* has recently considered as a common pest on young olive trees and in irrigated olive groves. The olive leaf moth is one of the important olive pests in the Mediterranean region and is now distributed in Italy, Spain, Sweden, Poland, Portugal, Greece, Turkey, and Iran, Egypt, North Africa, India, the tropical regions of the Americas, and Japan (Avidov & Harpaz, 1969; Balachowsky, 1972; Santorini & Vessiliana-Alexopoulou, 1976; Sevensson, 1988; Kitri & Rose, 1992; Saieb, 1999; Athanassiou et al., 2004; Kovancı & Kumral, 2004; Hertz et al., 2005). This species has recently been known the most common in the Mediterranean region. *P. unionalis* has four and five generations per year; the adults emerge from June to October, mate and oviposit on the fresh leaves (Kaçar & Ulusoy, 2012a). Their larvae feed first on tender leaves and shoots, later green fruits, causing the reduction of green parts.

Cultural and insecticide-based pest management is the suggested method of control (Kaçar & Ulusoy, 2012b). However, due to the ecological and health-related problems of insecticide application, alternative methods based on biological control have been recommended. The native hymenopteran parasitoid, *Apanteles brunnistigma* Abdinbekova (Braconidae) and *Trichogramama evenescens* Westwood. (Trichogrammatidae) were found to have the highest impact on *P. unionalis* populations (Kaçar et al., 2017). They are a particularly significant component in many biological control programs and have been utilized as biocontrol agents into almost every country in the world. *A. brunnistigma* was first recorded in Gökçeada for the Turkish fauna (Inanç & Beyarslandan, 2001), but host species were unknown by 2011. It was determined in Azerbaidzhan, England, Hungary, Italy, Bulgaria, Caucasus, and Western Siberia (Papp, 1980; Tobias, 1995). *A. brunnistigma* ws been detected on larvae of *P. unionalis* in south Turkey in the last decade (Kaçar & Ulusoy, 2011). Solitary endoparasitoid, *A. brunnistigma* parasitizes the larvae of *P. unionalis* in the olive groves in the eastern Mediterranean and southeastern Anatolia regions.

Little is known about bio-ecological characteristics and host species of *A. brunnistigma*. The goal of this study was to estimate the parasitism rates larvae by *A. brunnistigma* on *P. unionalis* in the main olive grove producing areas of Mediterranean and southeastern Anatolia.

MATERIALS AND METHODS

Study areas and collection of insects

The study areas cover regions of the Eastern Mediterranean and South Anatolia. Provinces prolongation roughly 20-180 km at its widest point from east to west, with the working area located at an altitude of 12-907 m elevation between 30 and 45 degrees north and south of the equator. These are two of the largest commercial olive growing areas in southern Turkey, where natural surroundings and territory use traditions make the olive view. In the eastern Mediterranean region, the conventional and dense agricultural systems are widespread, whereas the surrounding olive orchards in south Anatolia region are cultivated under traditional farming systems. The generality of the areas with Mediterranean climates have relatively light winters and very warm summers. However, winter and summer temperatures can vary thoroughly different regions with a Mediterranean climate, where is characterized by warm and rainy winters under prevailing westerly winds and calm, hot and dry summer. Temperatures also change from year to year with winter temperatures falling to as low as zero and may rise to as high as over 50 °C in dry areas.

Apanteles brunnistigma was field-surveyed in seven provinces (Adana, Gaziantep, Kilis, Hatay, Kahramanmaraş, Mersin, Osmaniye of Turkey). Samples were collected from olive trees 2014 and December 2015 from 60 areas in Gaziantep (Araban, Oğuzeli, İslahiye, Karkamış, Nizip, Nurdağı, Şahinbey, Şehitkamil and Yavuzeli), Kilis (Elbeyli, Central, Musabeyli and Polateli) in south Anatolia region, Adana (Aladağ, Ceyhan, Feke, Karaisalı, Karataş, Kozan, Sarıçam, Seyhan, İmamoğlu, Yüreğir and Yumurtalık), Hatay (Altınözü, Belen, Dörtyol, Erzin, Hassa, İskenderun, Kırıkhan, Kumlu, Central, Reyhanlı, Samandağ and Yayladağı), Mersin (Aydıncık, Bozyazı, Çamlıyayla, Erdemli, Gülnar, Central, Mezitli, Mut, Silifke, Tarsus, Toroslar and Yenice), Kahramanmaraş (Andırın, Central, Pazarcık and Türkoğlu), and Osmaniye (Bahçe, Düziçi, Hasanbeyli, Kadirli, Central, Sumbas and Toprakkale) in the eastern Mediterranean region.

Olive growing locations were visited in seven provinces monthly with varying intervals between months. Olive leaves and fruits which were infested by the olive leaf moth were collected from olive groves across the provinces (Fig. 1). Sampling was performed according to Lazarov and Grigorov (1961) (Table 1). Each tree was sampled randomly from four main directions (northern, southern, western and eastern) for each sample. At least a hundred twigs with 30 cm length of 25 olive trees from each grove were sampled at each location. The samples consisted of fresh olive branches with larvae of *P. unionalis*, which were removed and placed in paper bags. Samples were transferred to the laboratory in tight closed double paper and a plastic bag in an ice box. Numbers of *P. unionalis* larvae were counted on twigs and separated in the laboratory. The larvae were supplied by clean-fresh host twigs as needed and kept in a bottle of water until emerging all adult wasps. Parasitoids were inspected daily and upon emergence, the date was noted and adults were collected. Olive twigs with *P. unionalis* larvae were reared in growth room maintained at 25±1 C, 16: 8-h light: dark photoperiod, and 70% RH for 4-6 weeks. All *A. brunistigma* adults emerging from each container were collected and recorded.

Parasitism rate and analysis

100 branch pieces of 30 cm each from 25 trees (four shots per tree) for each grove were visually inspected for the presence of *P. unionalis* larvae. The shoots were collected two per each month from all locations. The shoots bearing larvae were gently cut by using a scissor, placed in plastic bags, and were brought to the laboratory where larvae were counted. The shoots with larvae were put in 0.50 l glass cups and given water for each cup. Then they were placed into 20 l clear plastic containers and covered with firm muslin to allow air circulation and prevent escaping the parasitoid adults. Cups were checked the water in cups for two times a week and added water to cups. Cups were checked every day for the emergence of adult moths or parasitoids. After three months, when the containers weren't seen any activity, it could be checked to determine larvae occupation. Alive larvae were returned to their pods and wrapped with moist paper towels to finish development**.**

Parasitism rate was calculated as the percent of *Palpita* larvae that produced a parasitic wasp (*Palpita* larvae that died of unknown causes before adults emerged were not included). It was calculated according to Russell (1987).

RESULTS AND DISCUSSION

The total of 2903 *P. unionalis* larvae was collected during the study, of which 695 larvae (23.8%) were parasitized by *A. brunistigma* in seven provinces from 163 olive groves. Parasitism rates totally ranged from 30% in Kahramanmaraş and to 100% in Kilis (only one location) for two years (Table 1). The distributions of samples in the provinces and between years are listed in Table 1.

The parasitoid *A. brunnistigma* was thoroughly distributed in Mediterranean olive groves and was determined in 42% of the samples, indicating a mean parasitism rate of 46.2%. In 2015, the samples were not collected in Gaziantep, Kahramanmaraş and Kilis because parasitized larvae were slightly less than in the other four provinces in 2014. In the second year, the funding was not enough to get the samples from Gaziantep, Kahramanmaraş and Kilis. Also, only one parasitoid was determined from Kilis samples, which was not available on a study to keep going the samples from groves. The highest parasitism rate was determined in summer (from June through December), with a mean of 9.2-17.6% in 2014-2015, respectively (Fig. 1). In 2014 and 2015 the percentages of parasitism were higher from May to September in 2015.

Palpita unionalis is present across the Mediterranean area (Egypt, France, Greece, Italy, Israel, Turkey, and Spain), Asia and North Africa (Avidov & Harpaz, 1969; Balashowsky, 1972; Badawi et al., 1976; Fodale et al., 1990; Mazomenos et al., 2002; Kovancı et al., 2006; Kaçar & Ulusoy, 2012b). It is a serious pest of Oleaceae (especially *Olea europaea* L., after that comes the hosts *Jasminum* sp., *Ligustrum* sp., and *Phillyrea media* L.) and Ericaceae (*Arbutus unedo*), as its larvae attack leaves of these plant species (Badawi et al., 1976; Balachowsky, 1972; Hegazi et al., 2007). *P. unionalis* larvae may damage fresh leaves and shoots, causing a dwarf growth of plants and in severe infestations, feed the fruits, thereby heavily affecting the obtained yield. Fruit yield may also be reduced by severe infestations; the reduction rate reaches 30% in late summer and autumn during ripening (Arambourg, 1986; López-Villalta, 1999). *P. unionalis* has recently known as an important pest in commercial olive groves in Turkey. *P. unionalis* adult males and females are active from June to late October and this pest species has 4 to 5 generations per year in the Mediterranean region (Kaçar & Ulusoy, 2012a).

Apanteles brunnistigma Abdinbekova (Hymenoptera: Braconidae) and *Trichogramma evanescens* Westwood (Hymenoptera: Trichogrammatidae) were found as important parasitoids (Kaçar & Ulusoy, 2011). *A. brunnistigma,* was a larval parasitoid of *P. unionalis* activated from late May to November around six months and, the *A. brunnistigma*' parasitism rate was determined from 0.5 to 100% in four locations (Kaçar & Ulusoy, 2017). It was newly reported as a parasitoid of *A. brunnistigma* on *P. unionalis* in the world (Kaçar & Ulusoy, 2011). In the other countries were recorded as larval hymenopteran parasitoids; Eulophidae family, Perilampidae family, Formicidae family, Ichneumonidae family, Chalcididae family, *Chelonus* sp., *Apanteles* sp., *A. obscurus, A. xanthostigma, A. syleptae, A. lacteicolor, A. laevigatus, A. xanthostigmus* and *Dolichogenidea trachalus* from Braconidae family (Avidov &Rosen, 1961; Triggiani, 1972; Badawi et al., 1976; El-Sherif et al., 1977; El-Hakim et al., 1985; Fodale et al., 1990; Fodale & Mule, 1990; Pinto et al., 1994; Pinto et al., 1995; El-Khawas et al., 2000; Nasr et al., 2002; Shehata et al., 2002; Lababidi & Haj Hammoud, 2008).

As a result, I investigated the seasonal abundance and rate of parasitism of *A. brunistigma* in different olive growing areas of the eastern Mediterranean region having a Mediterranean climate with hot summer and warm winter and the southeastern Anatolian region having a continental climate with rainy and cold winter. The native larval parasitoid *A. brunnistigma* was thoroughly distributed in olive produce areas and was found the mean parasitism rate of 46.2%. The highest parasitism rate was appeared in summer months, with a mean of 9.2-17.6% for two years. These findings highlight the need for improved biological control of *P. unionalis* through introduction, augmentation and releasing of the solitary parasitoid *A. brunnistigma*.

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Table 1. A total number of *Palpita unionalis* Hb. larvae collected and proportion parasitized larvae by Apanteles brunistigma in seven provinces, Turkey.

Location	N. of larvae	2014		2015		Total	
		N	%	N	%	N	%
Adana	Collected	298		221		519	
	Parasitized	73	24.5	93	42.1	166	33.3
Gaziantep	Collected	24		-		24	
	Parasitized	14	58.3	-	-	14	58.3
Hatay	Collected	808		253		1061	
	Parasitized	257	31.8	73	28.9	330	30.4
Kahramanmaraş	Collected	80	¤	-		80	
	Parasitized	24	30	-	-	24	30
Kilis	Collected	1		-		1	
	Parasitized	1	100	-	-	1	100
Mersin	Collected	131		48		179	
	Parasitized	54	41.2	17	35.4	71	38.3
Osmaniye	Collected	243		101		344	
	Parasitized	70	28.8	19	18.8	89	33.2

*In 2015, the samples were not collected in Gaziantep, Kahramanmaraş, and Kilis.

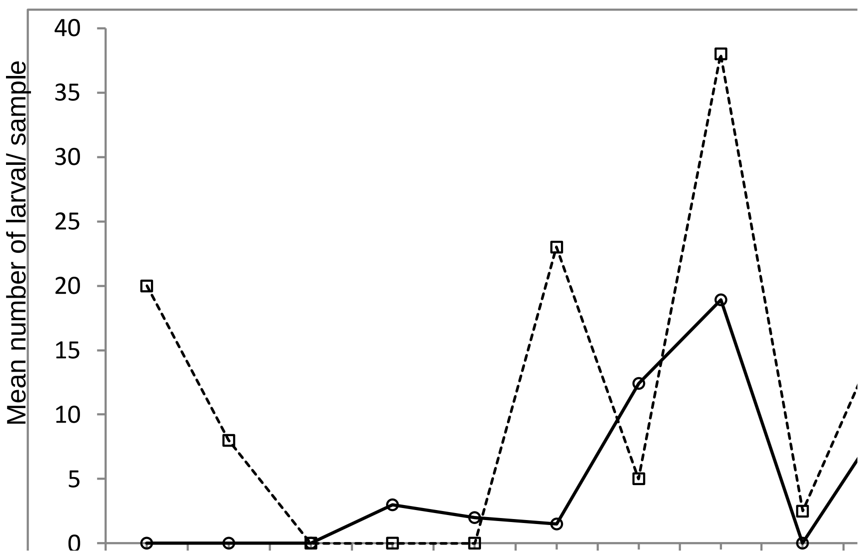

Figure 1. Mean a number of *Palpita unionalis* Hb. larval sample from olive groves in seven locations during the 2014/ 2015.

ORIBATID MITES (ACARI: ORIBATIDA) OF JIROFT COUNTY, KERMAN PROVINCE, IRAN: INTRODUCTION OF FIFTY-SIX SPECIES, NEW RECORDS FOR THE FAUNA OF THE PROVINCE

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[**Akrami, M. A. & Salehi Sarbizhan, A. R.** 2020. Oribatid mites (Acari: Oribatida) of Jiroft County, Kerman province, Iran: Introduction of fifty-six species, new records for the fauna of the province. Munis Entomology & Zoology, 15 (1): 73-84]

ABSTRACT: During 2015-16, fauna of oribatid mites (Acari: Oribatida) in Jiroft County (Kerman Province, southeast Iran) was studied. Totally, 81 species belonging to 61 genera and 41 families were collected and identified. Of which, one genus and one species are reported for the first time from Iran and one species from Asia. Fifty-six species are reported for the first time from Kerman Province and all species are new for the county.

KEY WORDS: Mite, Oribatida, Kerman, Iran, fauna

Oribatid mites (superorder Acariformes; order Sarcoptiformes; suborder Oribatida), commonly known as beetle mites or armored mites, were formerly called the Cryptostigmata. They range in size from 200 to 1400 micrometers, comprise more than 11,000 named species and subspecies (excluding members of the cohort Astigmatina) representing 163 families. Most oribatid mites inhabite the soil-litter system, although many are arboreal and a few are aquatic. They are often the dominant arthropods in highly organic soils and mostly known as saprophages and mycophages and some are predators of soil microorganisms such as nematodes. Oribatid mites actively involved in decomposition of organic matters and their roles as vector of tapeworms (Cestoda) and bioindicatore in ecotoxicological experiments are remarkable (Denegri, 1993; Lebrun & van Straalen, 1995; Norton & Behan-Pelletier, 2009; Subías, 2018).

Kerman is one of the few completely uninvestigated provinces of Iran in relation to the taxonomic study on its oribatid mite fauna and only fourteen species reported from this wide province (Akrami, 2015; Kun & Latifi, 2016). During 2015- 2016, oribatid mite fauna of Jiroft County in Kerman Province was studied. Kerman Province is situated in southeast Iran (Figure 1), to the southwest of the Kavir-e Lut (Desert), covering an area of 182,000 km² (70,000 square miles). Kerman is the largest province in Iran, constituting 11 percent of its area. The province lies between latitudes 26°29′ and 31°58′ north and longitudes 54°20′ and 59°34′ east. The province is bounded in the southwest by Hormozgan and Fars Provinces, in the northwest and north by Yazd Province, in the northeast by Southern Khorasan Province, and in the east by Sistan va Baluchestn Province. One of the counties of Kerman Province is Jiroft, that is located 230 kilometres (140 mi) south of the city of Kerman (capital of Kerman Province). In the past it was also called Sabzevaran, and on account of its being very fertile land it is famous as Hend-e-Koochak (the little India). Jiroft is located in a vast plain, Halil River (Halilrood), on the southern outskirts of the Jebal Barez Mountain chain, surrounded by two rivers. The mean elevation of the city is about 650 meters above sea level. The weather of the city is very warm in summer and it is one of the hottest places in Iran, and temperatures are moderate in winter. There is a large dam (Jiroft Dam) upstream the city on the Halil River, irrigates 14200 hectares of the downstream lands.

No information was available on the oribatid fauna of Jiroft before this research, and the present study is the first work to identify the oribatid mites in this area.

MATERIALS AND METHODS

Soil and litter samples were taken from different locations of Jiroft, during 2015- 2016, and were transferred to the Acarological laboratory of the College of Agriculture, Shiraz University. The mites were extracted by Berlese funnel. Oribatid mites were removed, cleared in lactophenol and mounted in Hoyer's medium on glass microscope slides for identification. The slides were placed in an oven at 45°C for two weeks and then the specimens were examined using a light microscope (Zeiss Standard 20). All specimens deposited in the Acarological Collection of the Department of Plant Protection, School of Agriculture, Shiraz University, Iran.

RESULTS

During this study, 81 species belonging to 61 genera and 41 families of oribatid mites from various habitats of Jiroft County were collected and identified, of which one genus and one species are reported for the first time from Iran and one species for Asia, and 34 families, 53 genera and 56 species are reported for the first time from Kerman Province.

List of species according to their families is as follows:

Eniochthoniidae Grandjean, 1947

***Hypochthoniella minutissima* (Berlese, 1903)**

Sample code: D1-6. (refer to Table 1 for sampling information)

Distribution: Cosmopolitan (except Antarctic) (Subías, 2018); Iran: Mazandaran Province (Akrami, 2015).

Notes: This is the first record of this species for Kerman Province.

Cosmochthoniidae Grandjean, 1947

***Cosmochthonius* (*Cosmochthonius*) *reticulatus* Grandjean, 1947**

Sample code: S1-1.

Distribution: southern Palaearctic, Oriental (south-east China and India: west Bengal) and Neotropical (Brazil and Cuba) (Subías, 2018); Iran: Fars (Ebrahimi & Akrami, 2015; Iranpoor & Akrami, 2016) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.

Notes: This is the first record of this species for Kerman Province.

***Cosmochthonius* (*Cosmochthonius*) *zanini* Penttinen & Gordeeva, 2003**

Sample code: S1-1, S2-3.

Distribution: eastern Mediterranean and Iran (Subías, 2018); Iran: Fars Province (Iranpoor & Akrami, 2016).

Notes: This is the first record of this species for Kerman Province.

Sphaerochthoniidae Grandjean, 1947

***Sphaerochthonius splendidus* (Berlese, 1904)**

Sample code: S1-2.

Distribution: Pantropical: Oriental (southeast China and Vietnam), Australian (Australia and Polynesia), Neotropical, Ethiopian, and Subtropical (southern Holarctic) (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).

Notes: This is the first record of this species for Kerman Province.

Brachychthoniidae Thor, 1934

***Sellnickochthonius* sp. nr. *gracilis* (Chinone, 1974)** (*Brachychthonius*)

Sample code: J2-1, J2-2, J3-1, J4-1, J4-2, KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20.

Epilohmanniidae Oudemans, 1923

***Epilohmannia* (*Epilohmannia*) *cylindrica cylindrica* (Berlese, 1904)**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-1, J4-2, J3-1, J2-1.
Distribution: Cosmopolitan (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

***Epilohmannia* (*Epilohmannia*) sp. nr. *styriaca* Schuster, 1960**

Sample code: T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-1, KH1-20, J4-2, J3-1, J2-1.

Lohmanniidae Berlese, 1916

***Cryptacarus promecus* Grandjean, 1950**

Sample code: S3-1, S3-2, S3-3, S3-4, S3-5, S3-6, S4-1, S4-2, S4-3.
Distribution: southern Palaearctic (Mediterranean and west-central Asia) and Ethiopian (Subías, 2018); Iran: Fars and Khuzestan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Papillacarus* (*Papillacarus*) *aciculatus* (Berlese, 1904)**

Sample code: KH1-20, T1-20, A1-20, J2-1, D1-3, D1-8, J4-1, J4-2.
Distribution: southern Palaearctic, western Palaearctic (except north) and Vietnam and Iran (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Lohmannia* (*Lohmannia*) *paradoxa* (Haller, 1884)**

(= *L. loebli* Mahunka, 1974)
Sample code: KH1-20, T1-20, SH1-20, ME1-20, A1-20, J3-1, J2-1.
Distribution: western Palaearctic (Mediterranean and Germany) and Iran (Subías, 2018); Iran: Yazd, Esfehan, East Azarbaijan, Fars (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

***Heptacarus supertrichus* Piffl, 1967**

Sample code: D1-4, D1-6, D1-7, D1-8.
Distribution: southern Palaearctic: Mediterranean (Iraq and Tunisia) and Iran, and northern Neotropical (Subías, 2018); Iran: Fars Province (Ebrahimi & Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Thamnacarus longisetosus* Bulanova-Zachvatkina, 1978**

Sample code: S3-1, S3-2, S3-3, S3-4, S3-5, S3-6, S4-1, S4-2.
Distribution: southern Palaearctic (Subías, 2018); Iran: Fars Province (Ebrahimi & Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Perlohmanniidae Grandjean, 1954

***Perlohmannia* (*Perlohmannia*) *dissimilis* (Hewitt, 1908)**

Sample code: D1-2.
Distribution: Palaearctic (south-central Europe, west-central Asia and east of Asiatic Russia) and Hawaii (Subías, 2018); Iran: Gilan (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Euphthiracaridae Jacot, 1930

***Acrotritia sinensis* Jacot, 1923**

Sample code: T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-1, KH1-20.
Distribution: Pantropical (excluding Neotropical) and Subtropical (southern Palaearctic) (Subías, 2018); Iran: Khuzestan Province (Akrami, 2015).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

Phthiracaridae Perty, 1841
***Phthiracarus* (*Phthiracarus*) *lentulus* (Koch, 1841)**
Sample code: KH1-20, T1-20, SH1-20, D1-1, D1-3, D1-9, S3-8.
Distribution: Holarctic (Palaearctic and Neartic) and Ethiopian (Angola and Madagascar) (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.
***Notophthiracarus pavidus* (Berlese, 1913)**
Sample code: KH1-20, T1-20, SH1-20, A1-20, D2-1, S3-7.
Distribution: southern Palaearctic and India (Subías, 2018); Iran: Mazandaran (Akrami, 2015) and Fars (Iranpoor & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.
***Atropacarus striculus* (Koch, 1835)**
Sample code: D1-9, D1-1, D1-2, D1-3, D1-4, D1-6, D1-7, D1-8.
Distribution: semicosmopolitan (Holarctic, Oriental, Central America, Australian and Madagascar) (Subías, 2018); Iran: Mazandaran, East Azarbaijan, Fars (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Nothridae Berlese, 1896
***Nothrus anauniensis* Canestrini & Fanzago, 1877**
Sample code: S3-1, S3-2, S3-4, S3-5, S3-8, M1-1, M1-2.
Distribution: cosmopolitan (except Antarctic): common in Palaearctic (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).
***Nothrus perezinigoi* Mahunka, 1980**
Sample code: D2-1, KH1-20, T1-20, M1-20, H1-20, ME1-20, A1-20, S1-4, J1-1.
Distribution: Holarctic (central-western Europe and east of U.S.A.) (Subías, 2018).
Notes: This is the first record of this species for Asia.

Crotoniidae Thorell, 1876
***Camisia* (*Camisia*) *horrida* (Hermann, 1804)**
Sample code: S1-1, S1-2, S1-3, S3-9, . M1-2, M1-3, S2-6.
Distribution: Holarctic, north of Oriental, Ethiopian (Ethiopia) and north of Neotropical (Subías, 2018); Iran: Alborz, Fars (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Hermanniellidae Grandjean, 1934
***Hermanniella picea* (Koch, 1839)**
(= *H. punctulata* Berlese, 1908)
Sample code: KH1-20, T1-20.
Distribution: Holarctic (Palaearctic and U.S.A.: Virginia) and Oriental (Subías, 2018); Iran: Fars Province (Akrami & Behmanesh, 2015).
Notes: This is the first record of this species for Kerman Province.

Neoliodidae Sellnick, 1928
***Poroliodes farinosus* (Koch, 1839)**
Sample code: S2-3.
Distribution: Palaearctic (frequent in western Palaearctic) and Nepal (Subías, 2018).
Notes: This is the first record of the genus and species for Iran.

Licnodamaeidae Grandjean, 1954
***Licnodamaeus* sp. nr. *pulcherrimus* (Paoli, 1908)**
Sample code: M1-4, M1-5, M1-3, M1-4, M1-5.
***Licnodamaeus* sp.**
Sample code: M1-1, M1-3, M1-4.

Licnobelbidae Grandjean, 1965
***Licnobelba latiflabellata* (Paoli, 1908)**

(=*L. alestensis* Grandjean, 1931)
Sample code: KH1-20, T1-20, SH1-20, ME1-20, A1-20.
Distribution: western Palaearctic (except north) and west of eastern Palaearctic (Subías, 2018); Iran: Mazandaran, Golestan, Fars (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Gymnodamaeidae Grandjean, 1954
***Jacotella frondeus* (Kulijev, 1979)**

(= *Plesiodamaeus ornatus* Mahunka, 1979)
Sample code: M1-4, M1-5, S3-1, S3-7.
Distribution: eastern Mediterranean and Iran (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

Aleurodamaeidae Paschoal & Johnston, 1985
***Aleurodamaeus* sp.**

Sample code: S2-1, S2-2.

Damaeidae Berlese, 1896
***Belba* (*Belba*) *dubinini* Bulanova-Zachvatkina, 1962**

Sample code: S4-1, S4-2, S4-3.
Distribution: Palaearctic (central-eastern Europe and eastern Palaearctic) (Subías, 2018); Iran: Fars Province (Iranpoor & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

Zetorchestidae Michael, 1898
***Zetorchestes* sp. nr. *phyllosetus* Mahunka, 1977**

Sample code: S2-3, S2-4.

Eremaeidae Oudemans, 1900
***Eueremaeus* sp. nr. *foveolatus* (Hammer, 1952)**

Sample code: D1-4, S1-3.

Damaeolidae Grandjean, 1965
***Fosseremus laciniatus* (Berlese, 1905)**

(= *F. quadripertitus* Grandjean, 1965)
Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-2, J4-1, J3-1, J2-2, J1-2.
Distribution: cosmopolitan (except Antarctic) (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

Oppiidae Sellnick, 1937
***Lasiobelba* (*Lasiobelba*) *pori* (Vasiliu & Ivan, 1995)**

(= *L. neonominata* Subías,, 2004)
Sample code: S2-5, S2-7, S3-6, S4-1, D1-4.
Distribution: southern Palaearctic (Mediterranean and Iran), Ethiopian and Hawaii (Subías, 2018); Iran: Mazandaran, Khuzestan, Alborz and Fars Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Graptoppia* (*Graptoppia*) *sundensis acuta* Ayyildiz, 1989**

Sample code: D1-3, D1-8.
Distribution: eastern Mediterranean and Iran (Subías, 2018); Iran: East Azarbaijan (Akrami, 2015) and Fars (Iranpoor & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

***Ramusella* (*Ramusella*) sp. nr. *persica* Akrami, Behmanesh & Subías, 2015**

Sample code: S4-2, S4-3.

Ramusella (_Ramusella_) _puertomonttensis_ Hammer, 1962

Sample code: KH1-20 ،T1-20 ،M1-20 ،SH1-20 ،ME1-20 ،A1-20 ،J2-1
Distribution: Tropical (India: West Bengal, Melanesia: I. Fiji, and Neotropical: Chile and Brazil) and Subtropical: southern Palaearctic (Mediterranean, Iran and east of Asian Russia) (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

Ramusella (_Ramusella_) sp. nr. _sengbuschi_ Hammer, 1968

Sample code: S4-2, S4-1.

Ramusella (Rectoppia) damavandica Akrami & Subías, 2008

Sample code: KH1-20 ،T1-20 ،M1-20 ،SH1-20 ،ME1-20 ،A1-20 ،J3-1
Distribution: Iran (Subías, 2018): many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Multioppia (Hammeroppia) wilsoni laniseta Moritz, 1966

Sample code: D1-4, D1-6, D1-8.
Distribution: western Palaearctic, eastern Palaearctic (except East), U.S.A. and Neotropical (Venezuela and Cuba) (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Anomaloppia iranica Bayartogtokh & Akrami, 2000

Sample code: S3-3, S3-4, S3-5, S3-8, S3-9.
Distribution: Iran (Akrami et al., 2015): Yazd, Alborz, East Azarbaijan, Zanjan (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Anomaloppia mazandranica Akrami & Subías, 2007

Sample code: S3-3, S3-4, S3-5, S3-8, S3-9.
Distribution: southern Palaearctic (Caucasus and Iran) (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Discoppia (_Cylindroppia_) _cylindrica_ (Pérez-Íñigo, 1965)

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-2, J4-1, J3-1, J1-1, J1-2.
Distribution: southern Palaearctic, Oriental and Central America (Subías, 2018); Iran: Mazandaran, Khuzestan and Fars Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Oxyoppia (_Oxyoppiella_) sp.

Sample code: A3, A4, A13, A14, A20, B1, B3.

Rhinoppia (_Rhinoppia_) _obsoleta_ (Paoli, 1908)

Sample code: D1-4, D1-2, S2-8, S3-2, S3-4.
Distribution: Palaearctic (excluding eastern Palaearctic), Greenland and Australian (New Zealand and Hawaii) (Subías, 2018); Iran: Mazandaran, Alborz, East Azarbaijan and Fars Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Rhinoppia (Rhinoppia) subpectinata (Oudemans, 1900)

Sample code: S3-5, S3-3, D1-8, D1-4.
Distribution: Holarctic: except east of eastern Palaearctic (common in western Palaearctic) and Senegal (Subías, 2018); Iran: Mazandaran, Gilan, Alborz, East Azarbaijan (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Oppiella (_Oppiella_) _nova_ (Oudemans, 1902)

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, S3-1, S3-2.
Distribution: cosmopolitan (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

Suctobelbidae Jacot, 1938

Suctobelbellba (_Suctobelbellba_) _italica_ (Mahunka, 1966)

(=*Suctobelbella diffissa* Moritz, 1974)
Sample code: D1-4.
Distribution: Palaearctic: western Palaearctic (except north) and Iran (Subías, 2018); Iran: Mazandaran Province (Akrami & Mortazavi, 2016).
Notes: This is the first record of this species for Kerman Province.

***Suctobelba aliena* Moritz, 1970**

Sample code: S4-3.
Distribution: Europe and Iran (Subías, 2018); Iran: East Azarbaijan Province (Mirzaie & Akrami, 2012).
Notes: This is the first record of this species for Kerman Province.

Carabodidae Koch, 1837
***Carabodes* sp.**

Sample code: S4-3.

Tectocepheidae Grandjean, 1954
***Tectocepheus velatus* (Michael, 1880)**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, S4-1, J3-1, M1-2, S3-8, S3-4, S3-2, S2-7, S2-4, D1-7, S1-2.
Distribution: cosmopolitan (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

Compactozetidae Luxton, 1988
***Eupterotegaeus ornatissimus* (Berlese, 1908)**

Sample code: S1-1.
Distribution: Holarctic (southern Palaearctic, I. Sakhalin, and Canada) (Subías, 2018); Iran: West Azarbaijan Province (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Amerobelbidae Grandjean, 1961
***Amerobelba* sp.**

Sample code: KH1-20, ME1-20.

Passalozetidae Grandjean, 1954
***Passalozetes* (*Passalozetes*) *africanus* Grandjean, 1932**

Sample code: D1-4.
Distribution: south-central Palaearctic and Equatorial, Guinea (Subías, 2018); Iran: Mazandaran, Yazd, Fars, Zanjan and East Azarbaijan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Microzetidae Grandjean, 1936
***Berlesezetes brazilozetoides* Balogh & Mahunka, 1981**

Sample code: KH1-20, T1-20, A1-20.
Distribution: Neotropical; India (Kerala) and Iran (Subías, 2018); Iran: Ardabil, East Azarbaijan (Akrami, 2015) and Fars (Iranpoor & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Achipteriidae Thor, 1929
***Parachipteria* sp.**

Sample code: S2-2, S2-3.

Ceratozetidae Jacot, 1925
***Euzetes globulus* (Nicolet, 1855)**

Sample code: J1-2, D1-1.
Distribution: Palaearctic (western and eastern Palaearctic) and Neotropical (Argentina) (Subías, 2018); Iran: East Azarbaijan Province (Azimi et al., 2017).
Notes: This is the first record of this species for Kerman Province.

Chamobatidae Thor, 1937
***Chamobates* (*Xiphobates*) *sergienkoae* Shaldybina, 1980**

Sample code: KH1-20, T1-20, M1-20.

Distribution: southern Palaearctic (Mediterranean and Iran) (Subías, 2018); Iran: Mazandaran, Gilan (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Punctoribatidae Thor, 1937

***Punctoribates* (*Punctoribates*) *liber* Pavlitchenko, 1991**

Sample code: S4-1, S4-2, S4-3.
Distribution: southern Palaearctic (Mediterranean and Iran) (Subías, 2018); Iran: Mazandaran, Gilan, Fars and East Azarbaijan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Zetomotrichidae Grandjean, 1934

***Zetomotrichus* (*Zetomotrichus*) *persicus* Akrami & Behmanesh, 2013**

Sample code: S4-1, S4-2, S3-8, D1-4.
Distribution: Iran (Subías, 2018): Kohgiluyeh va Boirahmad and Fars Provinces (Akrami, 2015)
Notes: This is the first record of this species for Kerman Province.

***Zetomotrichus* (*Zetomotrichus*) *lacrimans* Grandjean, 1934**

Sample code: S4-1, S4-2, S3-8, D1-4.
Distribution: southern Palaearctic (Mediterranean and Iran) and Tropical: Ethiopian (South Africa and Ethiopia), Philippines and Cuba (Subías, 2018); Iran: Markazi, Fars and Khuzestan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Ghilarovus hispanicus hispanicus* Subías & Pérez-Íñigo, 1977**

Sample code: S1-4, S1-3.
Distribution: southern Palaearctic (Spain, Caucasus and Iran) (Subías, 2018); Iran: Fars Province (Ebrahimi & Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Oribatulidae Thor, 1929

***Oribatula* (*Oribatula*) *tibialis tibialis* (Nicolet, 1855)**

Sample code: D1-9, J1-1, J1-3, J2-2, J3-1.
Distribution: Holarctic, India (Sikkim) and northern Neotropical (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

***Oribatula* (*Oribatula*) *tibialis caliptera* Berlese, 1902**

(= *Oribatula* (*O.*) *tibialis allifera* Subías, 2000)
Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-1, J2-1.
Distribution: Holarctic (Mediterranean, Iran and northern Nearctic). (Subías, 2018); Iran: Mazandaran, Gilan and East Azarbaijan Provinces (Akrami, 2015).
Notes: This is the first record of this subspecies for Kerman Province.

***Oribatula* (*Zygoribatula*) *exarata* Berlese, 1916**

Sample code: S3-2, S3-3, D1-7, M1-2.
Distribution: southern Palaearctic (Subías, 2018); Iran: Mazandaran, Gilan and Razavi Khorasan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Oribatula* (*Zygoribatula*) *connexa* Berlese, 1904**

Sample code: S3-7, S2-3, S2-5, D1-6, D2-1.
Distribution: Subtropical (Austral and southern Palaearctic) (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Oribatula* (*Zygoribatula*) *undulata* Berlese, 1916**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, S3-4, D1-3.
Distribution: Pantropical (except Neotropical) and Subtropical (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

***Oribatula* (*Zygoribatula*) *skrjabini* (Bulanova-Zachvatkina, 1967)**

Sample code: D1-3.

Distribution: southern Palaearctic (eastern Mediterranean and central-western Asia) (Subías, 2018); Iran: Mazandaran, Markazi, Fars, Zanjan, East Azarbaijan (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

Scheloribatidae Grandjean, 1933

***Scheloribates* (*Scheloribates*) *fimbriatus* Thor, 1930**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, D1-2, S3-4.
Distribution: Pantropical and Subtropical (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: This is the first record of this species for Kerman Province.

***Scheloribates* (*Scheloribates*) *praeincisus* (Berlese, 1910)**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, S3-5, D1-7, S3-3, J4-2, S4-2, S1-2.
Distribution: Tropical (Oriental, Pacific Islands, Ethiopian (Ethiopia and Cameroon) and Neotropical) and southern Holarctic (Egypt, Iran and U.S.A.: Texas) (Subías, 2018); Iran: Yazd, Bushehr, Mazandaran, Gilan, Fars and Zanjan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Scheloribates* (*Scheloribates*) sp.1**

Sample code: S3-4.

***Scheloribates* (*Scheloribates*) sp.2**

Sample code: S2-7.

Protoribatidae J. & P. Balogh, 1984

***Protoribates* (*Protoribates*) *paracapucinus* (Mahunka, 1988)**

Sample code: S3-3, S3-5, S3-8.
Distribution: Oriental, eastern Palaearctic (Iran), Ethiopian (Congo and Cameroon), Neotropical and Australiana (New Hebrides [Vanuatu]) (Subías, 2018); Iran: many provinces (Akrami, 2015; Farzaneh & Akrami, 2016).
Notes: Previously cited for Kerman Province by Kun & Latifi (2016).

Haplozetidae Grandjean, 1936

***Indoribates* (*Haplozetes*) *fusifer* (Berlese, 1908)**

Sample code: KH1-20, T1-20, M1-20, SH1-20, ME1-20, A1-20, J4-1.
Distribution: southern Palaearctic (Mediterranean and Iran) and India (Tripura) (Subías, 2018); Iran: western Iran and Hamadan, Fars, Zanjan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Peloribates* sp.**

Sample code: S3-3, S3-5, S3-8.

Galumnidae Jacot, 1925

***Acrogalumna lanceolata* Bayartogtokh & Akami, 2014**

Sample code: D1-4.
Distribution: Iran (Subías, 2018): Mazandaran, Fars (Akrami, 2015) and Razavi Khorasan (Farzaneh & Akrami, 2016) Provinces.
Notes: This is the first record of this species for Kerman Province.

***Allogalumna* sp. nr. *pellucida* Wallwork, 1965**

Sample code: S1-3.

***Allogalumna dentirostrata* Bayartogtokh & Akrami, 2014**

Sample code: D1-1.
Distribution: Iran (Subías, 2018): Mazandaran and Fars Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Galumna* (*Galumna*) *iranensis* Mahunka & Akrami, 2001**

Sample code: S2-8.
Distribution: Iran (Subías, 2018): Yazd, Khuzestan, Mazandaran, East Azarbaijan, Fars and Zanjan Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Galumna* (*Galumna*) *karajica* Mahunka & Akrami, 2001**

Sample code: S1-2, S1-3, J1-3.
Distribution: Iran and Caucasus (Subías, 2018); Iran: many provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

***Galumna* (*Galumna*) *flabellifera* Hammer, 1958**

Sample code: S3-2.
Distribution: Pantropical and Subtropical (Subías, 2018); Iran: Alborz Province (Akrami & Keshavarz Jamshidian, 2019).
Notes: This is the first record of this species for Kerman Province.

***Pilogalumna tenuiclava* (Berlese, 1908)**

(= *Allogalumna boevi* Krivolutskaja, 1952)
Sample code: S2-6, S3-3.
Distribution: Holarctic (Subías, 2018); Iran: Yazd, Fars and Markazi Provinces (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Parakalummidae Grandjean, 1936

***Neoribates* (*Neoribates*) *granulatus* Akrami & Behmanesh, 2012**

Sample code: S2-8.
Distribution: Iran (Subías, 2018): Fars Province (Akrami, 2015).
Notes: This is the first record of this species for Kerman Province.

Phenopelopidae Petrunkevitch, 1955

***Eupelops* sp. nr. *acromios* (Hermann, 1804)**

Sample code: D1-3.

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Table 1. Sampling information.

Code	Latitude		Longitude		Altitude (m)	Habitat (soil of)	Sampling date	Sampling location	
	Degree	Minutes	Degree	Minutes					
S1-1	28	43	57	35	2745	Sour cherry *Prunus* sp.	5.V.2015	Garden	Sarbizhan
S1-2	28	07	57	32	2811	Juniper *Juniperus* sp.	5.V.2015	Hillside	Sarbizhan
S1-3	28	07	57	33	2807	*Juniperus* sp.	5.V.2015	Hillside	Sarbizhan
S1-4	28	07	57	31	2795	Walnut *Juglans* sp.	5.V.2015	Hillside	Sarbizhan
J1-1	28	38	57	46	565	Alfalfa *Medicago sativa*	5.V.2015	Farm	Jiroft
J1-2	28	32	57	35	567	Date palm *Phoenix dactylifera*	5.V.2015	Farm	Jiroft
J1-3	28	32	57	35	567	Persian clover *Trifolium resupinatum*	5.V.2015	Farm	Jiroft
D1-1	28	38	57	46	1915	Plane *Platanus orientalis*	7. VI. 2015	Garden	Dalfard
D1-2	28	38	57	46	1910	Fig *Ficus carica*	7. VI. 2015	Garden	Dalfard
D1-3	28	32	57	35	1910	Mulberry *Morus* sp.	7. VI. 2015	Garden	Dalfard
D1-4	28	00	57	35	1917	Mount Atlas pistache *Pistacia atlantica*	7. VI. 2015	Hillside	Dalfard
D1-6	28	57	57	39	1529	Orange tree *Citrus sinensis*	7. VI. 2015	Garden	Dalfard
D1-7	28	57	57	38	1713	*Prunus* sp.	7. VI. 2015	Hillside	Dalfard
D1-8	28	57	57	37	1645	Poppy *Papaver* sp.	7. VI. 2015	Raz Shirin Valley	Dalfard
D1-9	28	58	57	38	1719	*Ficus carica*	7. VI. 2015	Hillside	Dalfard
S2-1	28	11	57	23	2587	*Prunus* sp.	12.VII. 2015	Garden	Polpiran
S2-2	28	11	57	23	2587	Apricot tree *Prunus* sp.	12.VII. 2015	Garden	Polpiran
S2-3	28	14	57	20	2638	White poplar *Populus alba*	12.VII. 2015	Garden	Darb Behesht
S2-4	28	13	57	22	2564	*Prunus persica*	12.VII. 2015	Garden	Darb Behesht
S2-5	28	06	57	31	2846	Daffodil *Narcissus* sp.	12.VII. 2015	Hillside	Darb Behesht
S2-6	28	06	57	32	2935	*Juniper* sp.	12.VII. 2015	Hillside	Sarbizhan
S2-7	28	06	57	33	2955	Berberry *Berberis* sp.	12.VII. 2015	Hillside	Sarbizhan
S2-8	28	06	57	33	2969	Willow *Salix* sp.	12.VII. 2015	Garden	Sarbizhan
S3-1	28	38	57	09	1767	Weeds	4. VIII. 2015	Around the river	Sargaz
S3-2	28	38	57	09	1767	Common reed *Phragmites australis*	4. VIII. 2015	Around the river	Sargaz
S3-3	28	38	57	09	1767	*Salix* sp.	4. VIII. 2015	Garden	Sargaz
S3-4	28	38	57	09	1767	Chirst's thorn *Ziziphus spina-chirsti*	4. VIII. 2015	Garden	Sargaz
S3-5	28	38	57	09	1767	Apple tree *Malus* sp.	4. VIII. 2015	Garden	Sargaz
S3-6	28	38	57	09	1767	Pomegranate *Punica granatum*	4. VIII. 2015	Garden	Sargaz

S3-7	28	38	57	08	1772	*Prunus* sp.	9. VIII. 2015	Garden	Esfandagheh
S3-8	28	38	57	08	1772	Apricot tree	9. VIII. 2015	Garden	Esfandagheh
S3-9	28	38	57	18	1837	Harmel peganum *Peganum harmala*	9. VIII. 2015	Hillside	Esfandagheh
J2-1	28	38	57	47	640	*Medicago sativa*	14. VIII. 2015	Farm	Jiroft
J2-2	28	36	57	49	653	*Medicago sativa*	14. VIII. 2015	Farm	Jiroft University
M1-1	28	52	57	52	1866	*Prunus* sp.	19. IX. 2015	Hillside	Jabalbarez
M1-2	28	52	57	52	1866	Locoweed *Astragalus* sp.	19. IX. 2015	Hillside	Jabalbarez
M1-3	28	52	57	52	1866	Weeds	19. IX. 2015	Forest Park	Jabalbarez
M1-4	28	52	57	52	1866	*Phragmites australis*	19. IX. 2015	Forest Park	Jabalbarez
M1-5	28	52	57	52	1866	Tamarix *Tamarix* sp.	19. IX. 2015	Forest Park	Jabalbarez
J3-1	28	35	57	51	667	*Citrus sinensis*	8.XI.2015	Garden	Dosari
J4-1	28	44	57	39	827	*Tamarix* sp.	4.XII. 2015	Road	Jiroft
J4-2	28	44	57	39	827	*Ziziphus spina-christi*	4.XII. 2015	Road	Jiroft
S4-1	28	38	57	09	1767	*Tamarix* sp.	3. IV.2016	Around the river	Sargaz
S4-2	28	38	57	09	1767	*Salix* sp.	3. IV.2016	Garden	Sargaz
S4-3	28	38	57	09	1767	*Ficus carica*	3. IV.2016	Garden	Sargaz
D2-1	28	00	57	35	1917	*Pistacia atlantica*	5. V. 2016	Hillside	Dalfard
KH1-20	28	38	57	46	649	*Medicago sativa*	4. VI. 2016	Farm	Sarjaz
T1-20	28	38	57	46	649	*Medicago sativa*	6. VII. 2016	Farm	Sarjaz
M1-20	28	38	57	46	649	*Medicago sativa*	5. VIII. 2016	Farm	Sarjaz
SH1-20	28	38	57	46	649	*Medicago sativa*	5. IX. 2016	Farm	Sarjaz
ME1-20	28	38	57	46	649	*Medicago sativa*	8. X. 2016	Farm	Sarjaz
A1-20	28	38	57	46	649	*Medicago sativa*	8. XI. 2016	Sarjaz	Jiroft

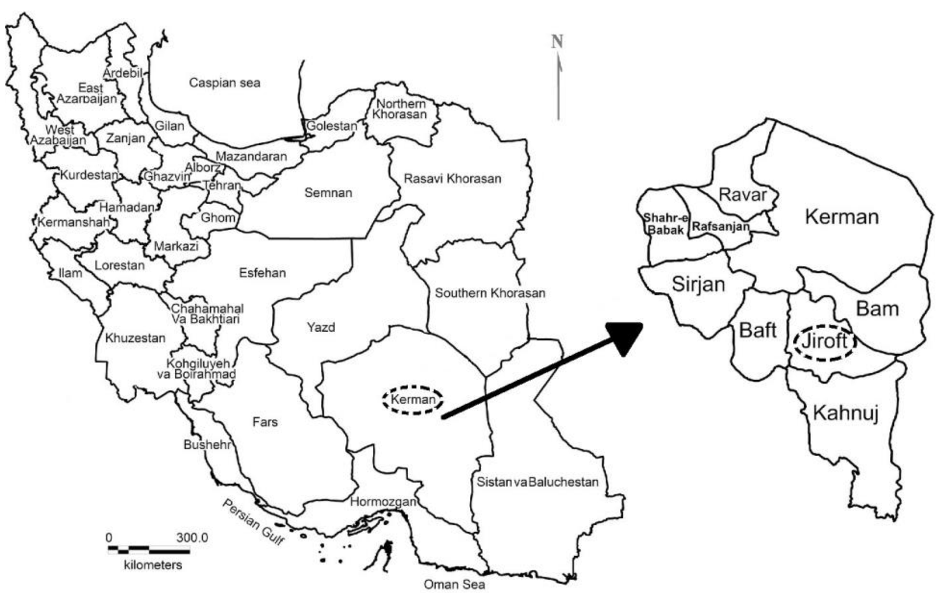

Figure 1. Map of Iran (left), specifying Kerman Province (left and right) and Jiroft County (right).

A NEW SUBSPECIES OF *CHRYSOLINA SANGUINEOCINCTA* (CROTCH, 1871) FROM TURKEY (COLEOPTERA: CHRYSOMELIDAE: CHRYSOMELINAE)

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[**Özdikmen, H., Coral Şahin, D. & Bal, N.** 2020. A new subspecies of *Chrysolina sanguineocincta* (Coleoptera: Chrysomelidae: Chrysomelinae) from Turkey. Munis Entomology & Zoology, 15 (1): 85-90]

ABSTRACT: A new leaf-beetle subspecies of *Chrysolina* (*Chalcoidea*) *sanguineocincta* (Crotch, 1871) is described: *Chrysolina* (*Chalcoidea*) *sanguineocincta pinarbasiense* subsp. nov. from Kayseri province in SE Central Anatolian region of Turkey. The habitus and aedeagus of the subspecies is given in the text. Its aedeagus is compared to the related taxa in the subgenus.

KEY WORDS: *Chrysolina* (*Chalcoidea*) *sanguineocincta*, new subspecies, first record, Chrysomelidae, Chrysomelinae, Turkey

According to Özdikmen et al. (2014) and Özdikmen (2014), Turkish Chrysomelinae comprises of 102 species group taxa (50 species + 52 subspecies) of 15 genera including *Chrysolina* Motschulsky, 1860.

Chrysolina Motschulsky, 1860 is a very large and diverse genus of leaf-beetles. Most species are distributed in Europe, Asia and Africa. A small number of species inhabits N. America (including introduced European ones). Some species were introduced into Australia (Bienkowski, 2001). The genus is represented with 47 species of 23 subgenera including *Chalcoidea* Motschulsky, 1860 in Turkey. Also Turkish *Chrysolina* (*Chalcoidea*) Motschulsky, 1860 includes 5 species (as following list) (Ekiz et al., 2013; Özdikmen et al., 2014; Özdikmen, 2014).

Genus *Chrysolina* Motschulsky, 1860
Subgenus *Chalcoidea* Motschulsky, 1860
Species *Chrysolina analis* (Linnaeus, 1767)
  lomata (Herbst, 1783)
  prasina (Suffrian, 1851)
  schach (Fabricius, 1792)
Species *Chrysolina marginata* (Linnaeus, 1758)
 Subspecies *Chrysolina marginata marginata* (Linnaeus, 1758)
  cinctella (Gyllenhal, 1827)
  marginicollis (Derenne, 1949)
  portai Bechyné, 1948
  purini (Jakobson, 1896)
  roubali Bechyné, 1946
  rugosopunctata (Roubal, 1917)
  solitaria (Weise, 1884)
  trebinjensis (Roubal, 1917)
 Subspecies *Chrysolina marginata unificans* Bechyné, 1950
Species *Chrysolina sellata* Weise, 1894
  bruneli (Demaison, 1896)
  cilissa (Jakobson, 1924)

nebulosa (Demaison, 1896)

Species *Chrysolina songarica* Gebler, 1843

amasiensis (Weise, 1894)

circumducta (Menétriés, 1839)

chalybea (Brancsik, 1899)

cyanescens (Jakobson, 1894)

hyrcana (Weise, 1884)

Species *Chrysolina tesari* Roubal, 1936

Subspecies *Chrysolina tesari tesari* Roubal, 1936

kulzeri Bechyné, 1950

As seen in the list above, the species *Chrysolina* (*Chalcoidea*) *sanguineocincta* (Crotch, 1871) has not been known from Turkey up to now. This species and included two subspecies was formerly considered as subspecies of *Chrysolina* (*Chalcoidea*) *marginata* (Linnaeus, 1758) (Bienkowski, 2001, 2007). According to Kippenberg (2010), this species has two subspecies as *Chrysolina sanguineocincta sanguineocincta* (Crotch, 1871) and *Chrysolina sanguineocincta bodemeyeri* (Weise, 1910). The E-Mediterranean nominotypical subspecies is distributed in Iran, Iraq, Syria, Egypt (Bienkowski, 2001), Jordan, Egypt (Bienkowski, 2007), Israel and Jordan (Kippenberg, 2010). The other Turano-Mediterranean subspecies *C. sanguineocincta bodemeyeri* (Weise, 1910) is distributed in Iran, Iraq, Syria (Bienkowski, 2001), Iran, Kazakhstan, Syria, Turkmenistan, Uzbekistan (Kippenberg, 2010).

Examination of an interesting material from Kayseri and Aksaray provinces in Central Anatolian region of Turkey has revealed a new subspecies of the leaf-beetle species *Chrysolina sanguineocincta* (Crotch, 1871). So that this species is recorded from Turkey for the first time.

The holotype and paratypes of the new subspecies are deposited at Nazife Tutay Plant Protection Museum (NTM) (Ankara, Turkey).

***Chrysolina* (*Chalcoidea*) *sanguineocincta pinarbasiense* subsp. nov.**

(Figs. 1-6)

Material. Holotype: ♂, Turkey: Kayseri prov.: Pınarbaşı, Kılıçkışla, 38°39’48” N 36°12’37” E, 05.VI.2018, 1433 m (leg. D. Coral Şahin and N. Bal). Paratype: ♂, Turkey: Kayseri prov.: Pınarbaşı, Kılıçkışla, 38°39’48” N 36°12’37” E, 05.VI.2018, 1433 m (leg. D. Coral Şahin and N. Bal). Paratype: ♂, Turkey: Aksaray prov.: Kocaş, 11.V.2007, (leg. E. Koçak). Paratype: ♂, Turkey: Afyonkarahisar prov.: Emirdağ, 10.VI.1998, (leg. M. Özdemir).

Male (holotype). Length of body 5.75 mm, width 3.25 mm.

Male (paratype). Length of body 6.50 mm, width 3.75 mm.

This new subspecies differs from the nominotypical one and the other one body length and aedeagal characters chiefly (Figs. 3-6).

The new subspecies is relatively small one than the others. According to Warchalowski (2010), body length is about 7.0 mm in the subspecies *Chrysolina sanguineocincta sanguineocincta* (Crotch, 1871) and *Chrysolina sanguineocincta bodemeyeri* (Weise, 1910). Body length is 5.75-6.50 mm in the new subspecies.

In dorsal and ventral view, apex of aedeagus is suddenly narrowed. Narrowed apical part of aedeagus is relatively elongated in *Chrysolina marginata*

(Linnaeus, 1758) while narrowed apical part of aedeagus is moderately long and relatively shorter in *Chrysolina sangineocincta* (Crotch, 1871).

In the new subspecies, aedeagus is stouter than the other two subspecies of *Chrysolina sanguineocincta* (Crotch, 1871) in general view. Sudden narrowing before the apical part is the most sharp, so that a prominent shoulder-like structure is formed on both sides in the new subspecies. This character is much weaker in *Chrysolina sanguineocincta sanguineocincta* (Crotch, 1871) and it is rounded in *Chrysolina sanguineocincta bodemeyeri* (Weise, 1910), so does not exist (Fig. 5).

Female: Unknown.

Distribution: The new subspecies is known only from Kayseri province (Pınarbaşı: Kılıçkışla), Aksaray province (Kocaş) in Central Anatolian region of Turkey and Afyonkarahisar province (Emirdağ) in Aegean region of Turkey. For the time being, the subspecies is endemic to the Turkey.

Etymology: Named after locus typicus, Pınarbaşı county in Kayseri province.

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A B C

Figure 1. Habitus of holotype of *Chrysolina sanguineocincta pinarbasiense* subsp. nov., A. Dorsal view, B. Ventral view, C. Lateral view.

A B C

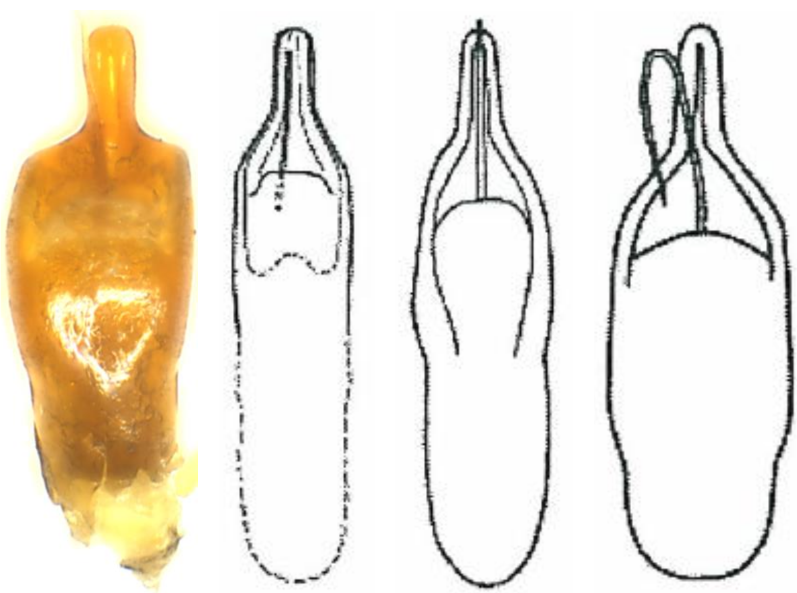
Figure 2. Habitus of paratype of *Chrysolina sanguineocincta pinarbasiense* subsp. nov., A. Dorsal view, B. Ventral view, C. Lateral view.

A B C

Figure 3. Aedeagus of holotype of *Chrysolina sanguineocincta pinarbasiense* subsp. nov., A. Dorsal view, B. Ventral view, C. Lateral view.

A B

Figure 4. Aedeagus of paratype of *Chrysolina sanguineocincta pinarbasiense* subsp. nov., A. Ventral view, B. Lateral view.



A B C D

Figure 5. Aedeagus in dorsal view, A. *Chrysolina sanguineocincta pinarbasiense* subsp. nov., B. *Chrysolina sanguineocincta sanguineocincta* (Crotch, 1871), C. *Chrysolina sanguineocincta bodemeyeri* (Weise, 1910), D. *Chrysolina marginata* (Linnaeus, 1758).

A **B** **C** **D**

Figure 6. Aedeagus in lateral view, A. *Chrysolina sanguineocincta pinarbasiense* subsp. nov., B. *Chrysolina sanguineocincta sanguineocincta* (Crotch, 1871), C. *Chrysolina sanguineocincta bodemeyeri* (Weise, 1910), D. *Chrysolina marginata* (Linnaeus, 1758).

AN ANALYSIS ON *CANTHARIS LIVIDA* LINNAEUS, 1758 AND *RHAGONYCHA FULVALIENA* SVIHLA, 1995 (COLEOPTERA: CANTHARIDAE) COLLECTED BY DIFFERENT METHODS IN ORGANIC SWEET CHERRY ORCHARDS FROM WESTERN TURKEY

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ABSTRACT: In this paper, information is presented on different collection methods for two species of soldier beetle [*Cantharis livida* Linnaeus, 1758 and *Rhagonycha fulvaliena* Svihla, 1995] (Coleoptera: Cantharidae) have been given in organic sweet cherry orchards (*Cerasus avium* (L.)) located in Ören (İzmir-Kemalpaşa), Armutlu (İzmir-Kemalpaşa) and Muradiye (Manisa-Central province), western Turkey.

KEY WORDS: *Cantharis livida*, *Rhagonycha fulvaliena*, Cantharidae, Collection methods, Sampling methods, Organic sweet cherry, Turkey

Some data on the Cantharidae fauna of Turkey has been given by Sahlberg (1912-1913); Wittmer (1967-1968, 1971, 1972, 1975); Gül-Zümreoğlu (1972); Tuatay et al. (1972); Švihla (1993, 1994, 1995, 1998, 1999, 2002, 2004, 2009); Lodos (1998); Sayan (2010); Ertop & Özpınar (2011); Yıldırım et al. (2011) and Silkin (2012). A total number of 249 species / subspecies of soldier beetles (Cantharidae) have been recorded from Turkey in the literature (Kazantsev & Brancuçci, 2007).

So far, five species, namely *Cantharis decipiens* Baudi, 1871 by Ertop & Özpınar (2011); *C. delagrangei* Delkeskamp, 1939, *C. livida* Linnaeus, 1758, *C. prusiensis* Marseul, 1864 and *Rhagonycha fulvaliena* Svihla, 1995 belonging to Cantharidae (Coleoptera) have been reported from sweet cherry orchards in western Turkey (Onaral & Tezcan, 2017).

In this paper, there is an analysis based on the different collection methods in organic sweet cherry orchards for *Cantharis livida* and *Rhagonycha fulvaliena* have been given.

MATERIAL AND METHODS

Studies were conducted in three organic sweet cherry orchards in Ören (Izmir-Kemalpaşa), Armutlu (Izmir-Kemalpaşa) and Muradiye (Manisa-Central province) of western Turkey. Insects were sampled by insect net (50/orchard), beating tray (50/orchard) and sticky yellow trap (12/orchard) methods at one week intervals. In each orchard a total of three pitfall traps and nine bait traps containing wine, sugar, vinegar and water were used (Tezcan et al., 2007). The traps were cleared at two weeks intervals. All insects were collected by the authors and were identified by the first author.

RESULTS

During the course of this study, a total of two species, *Cantharis livida* and *Rhagonycha fulvaliena* were sampled. The results obtained by applying five different trapped methods in the orchards of three different regions in two different sequential years can be seen in Tables 1 and 2.

Table 1 shows that samples of *Cantharis livida* were sampled by insect net, beating tray, bait trap and pitfall trap methods. It was noted that this species could not be sampled with sticky yellow traps. At the end of the two-year studies, a total of 214 specimens were caught and 55.61% of them were sampled from Ören, 23.83% from Armutlu and 20,56% from Muradiye. When the distribution of samples according to the collection methods was examined, 94 specimens (43.93%) by beating tray, 58 specimens (27.10%) by insect net, 47 specimens (21.96%) by bait trap, 15 specimens (7, 01%) collected by pitfall traps, respectively. When the samples were evaluated according to years, it was observed that a total of 79 (36.92%) samples were caught in the first year and 135 (63.08%) samples in the second year.

When the results of *Rhagonycha fulvaliena* given in Table 2 were examined, it is seen that this species is trapped by all methods including sticky yellow trap. At the end of the two-year studies, a total of 554 specimens of this species were captured, this value is 2.59 times higher than that of *Cantharis livida*. In this study 47.83% of the captured samples are from Ören, 27.98% from Armutlu, 24.19% from Muradiye were obtained. When the distribution of the collected samples according to the methods was examined, it is understood that 317 specimens (57.22%) by sticky yellow traps, 132 specimens (23.83%) by beating tray, 44 specimens (7.94%) by bait traps, 38 specimens (6.86%) by insect net and 23 specimens (4.15%) by pitfall trap method were collected. When this study is evaluated according to years, it seen that 265 specimens (47,83%) in the first year, 289 specimens (52,17%) were collected in the second year. It has attracted attention that there is no significant difference between the years.

When the results obtained from Tables 1 and 2 were evaluated as a whole, it was observed that both *Cantharis livida* and *Rhagonycha fulvaliena* were caught by insect net, beating tray, bait trap and pitfall trap methods. Although *Cantharis livida* could not be caught with the sticky yellow trap method, about 57% of the specimens of *Rhagonycha fulvaliena* were caught by this method and sticky yellow trap has come foward the most effective method.

The studies were carried out in organic sweet cherry orchards in three different regions and the number of specimens caught in the orchard in Ören was higher than the other orchards in both years.

Samples of *Cantharis livida* were found in nature since the beginning of April and reached the highest level in the period covering the end of April to mid-May and decreased at the end of May, and insects could not be caught in June (Table 1).

Rhagonycha fulvaliena was not sampled in April, but generally increased from mid-May and decreased from mid-June (Table 2). In late may-early june period, when this species was common in nature, corresponds to the harvest period of the varieties of Kemalpaşa Napolyon and 0900 Ziraat (Salihli) widely grown in this area. This species was caught by the yellow sticky traps because of their orientation hanging in the garden for the European cherry fruit fly (*Rhagoletis cerasi*).

Feeding of the *Rhagonycha fulvaliena* in ripening cherry fruits may decrease the market value of fruits. Observations on this subject have previously been reported by Onaral and Tezcan (2017). In addition to the European cherry fruit fly (*Rhagoletis cerasi*), especially in the orchards containing late maturing varietes, the yellow sticky traps to be hung may also be effective in reducing the population of *Rhagonycha fulvaliena*.

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Table 1. Results of different collection methods of *Cantharis livida* in two years at organic sweet cherry orchards at three different localities in western Turkey.

Localities	Months	Weeks	Insect net		Beating tray		Bait trap		Pitfall trap		Sticky yellow trap		Total	
			1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
Ören	April	14	0	0	0	4	-	-	-	-	0	0	0	4
	April	15	0	2	0	11	4	6	0	0	0	0	4	19
	April	16	1	5	1	16	-	-	-	-	0	0	2	21
	April	17	4	16	4	5	8	4	1	1	0	0	17	26
	May	18	3	2	1	3	-	-	-	-	0	0	4	5
	May	19	1	1	2	1	3	3	1	1	0	0	7	6
	May	20	1	1	0	1	-	-	-	-	0	0	1	2
	May	21	0	1	0	0	0	0	0	0	0	0	0	1
	June	22	0	0	0	0	-	-	-	-	0	0	0	0
	Total		**10**	**28**	**8**	**41**	**15**	**13**	**2**	**2**	**0**	**0**	**35**	**84**
			38		**49**		**28**		**4**		**0**		**119**	
	Rate (%)		**31,93**		**41,18**		**23,53**		**3,36**		**0,00**		**55,61**	
Armutlu	April	14	0	0	0	0	-	-	-	-	0	0	0	0
	April	15	0	0	0	0	0	0	0	0	0	0	0	0
	April	16	0	2	0	1	-	-	-	-	0	0	0	3
	April	17	1	1	2	2	1	1	1	1	0	0	5	5
	May	18	2	1	5	7	-	-	-	-	0	0	7	8
	May	19	1	1	2	3	2	3	1	1	0	0	6	8
	May	20	1	0	2	2	-	-	-	-	0	0	3	2
	May	21	0	0	1	1	1	1	0	0	0	0	2	2
	June	22	0	0	0	0	-	-	-	-	0	0	0	0
	Total		**5**	**5**	**12**	**16**	**4**	**5**	**2**	**2**	**0**	**0**	**23**	**28**
			10		**28**		**9**		**4**		**0**		**51**	
	Rate (%)		**19,61**		**54,90**		**17,65**		**7,84**		**0,00**		**23,83**	
Manisa	April	14	0	0	0	0	0	0	0	0	0	0	0	0
	April	15	0	1	0	1	0	0	0	1	0	0	0	3
	April	16	0	0	1	2	-	-	-	-	0	0	1	2
	April	17	1	1	2	2	2	1	2	2	0	0	7	6
	May	18	1	1	2	1	-	-	-	-	0	0	3	2
	May	19	2	0	1	2	2	3	1	1	0	0	6	6
	May	20	1	1	1	1	-	-	-	-	0	0	2	2
	May	21	0	1	1	0	1	1	0	0	0	0	2	2
	June	22	0	0	0	0	-	-	-	-	0	0	0	0
	Total		**5**	**5**	**8**	**9**	**5**	**5**	**3**	**4**	**0**	**0**	**21**	**23**
			10		**17**		**10**		**7**		**0**		**44**	
	Rate (%)		**22,72**		**38,64**		**22,73**		**15,91**		**0,00**		**20,56**	

Table 2. Results of different collection methods of *Rhagonycha fulvaliena* in two years at organic sweet cherry orchards at three different localities in western Turkey

Localities	Months	Weeks	Insect net		Beating tray		Bait trap		Pitfall trap		Sticky yellow trap		Total	
			1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
Ören	May	18	0	0	0	0	0	0	0	0	0	0	0	0
	May	19	0	0	1	1	0	0	0	0	0	0	1	1
	May	20	0	1	1	2	-	-	-	-	1	1	2	4
	May	21	1	4	7	9	2	4	2	3	17	18	29	38
	June	22	3	4	19	18	-	-	-	-	40	43	62	65
	June	23	1	1	11	6	3	3	2	1	13	15	30	26
	June	24	1	1	1	1	-	-	-	-	2	1	4	3
	June	25	0	0	0	0	0	0	0	0	0	0	0	0
	Total		**6**	**11**	**40**	**37**	**5**	**7**	**4**	**4**	**73**	**78**	**128**	**137**
			17		**77**		**12**		**8**		**151**		**265**	
	Rate (%)		**6,42**		**29,06**		**4,53**		**3,02**		**56,98**		**47,83**	
Armutlu	May	18	0	0	0	0	-	-	-	-	0	0	0	0
	May	19	0	0	1	0	0	0	0	0	0	0	1	0
	May	20	0	1	2	1	-	-	-	-	1	2	3	4
	May	21	1	2	1	2	3	3	2	2	13	17	20	26
	June	22	2	1	7	5	-	-	-	-	21	28	30	34
	June	23	2	1	4	3	4	5	2	2	4	5	16	16
	June	24	1	0	1	1	-	-	-	-	1	1	3	2
	June	25	0	0	0	0	0	0	0	0	0	0	0	0
	Total		**6**	**5**	**16**	**12**	**7**	**8**	**4**	**4**	**40**	**53**	**73**	**82**
			11		**28**		**15**		**8**		**93**		**155**	
	Rate (%)		**7,10**		**18,06**		**9,68**		**5,16**		**60,00**		**27,98**	
Manisa	April	17	0	0	0	0	0	0	0	0	0	0	0	0
	May	18	0	0	0	1	-	-	-	-	0	0	0	1
	May	19	0	0	1	1	0	0	0	0	0	0	1	1
	May	20	0	1	1	3	-	-	-	-	1	1	2	5
	May	21	1	1	3	5	4	5	2	2	11	8	21	21
	June	22	2	1	5	2	-	-	-	-	15	21	22	24
	June	23	2	1	2	1	4	4	1	2	6	7	15	15
	June	24	1	0	1	1	-	-	-	-	1	2	3	3
	June	25	0	0	0	0	0	0	0	0	0	0	0	0
	Total		**6**	**4**	**13**	**14**	**8**	**9**	**3**	**4**	**34**	**39**	**64**	**70**
			10		**27**		**17**		**7**		**73**		**134**	
	Rate (%)		**7,46**		**20,15**		**12,69**		**5,22**		**54,48**		**24,19**	

FIRST REPORT OF THE COB-WEB SPIDER *COLEOSOMA BLANDUM* O. PICKARD-CAMBRIDGE (ARANEAE: THERIDIIDAE) WITH COMMENTS ON ITS DISTRIBUTION FROM INDIA

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[**Prasad, P., Tyagi, K. & Kumar, V.** 2020. First report of the cob-web spider *Coleosoma blandum* O. Pickard-Cambridge (Araneae: Theridiidae) with comments on its distribution from India. Munis Entomology & Zoology, 15 (1): 96-99]

ABSTRACT: *Coleosoma blandum* O. Pickard-Cambridge is reported first time from India, based on the male specimen. A species description is provided along with the habitus and illustration of the palp and checklist of the genus *Coleosoma*.

KEY WORDS: Checklist, new record, Odisha, Theridiidae

The family Theridiidae is represented by 2514 species under 124 genera worldwide. The theridiid genus *Coleosoma* O. Pickard-Cambridge, 1882 was erected with the description of female, *Coleosoma blandum* O. Pickard-Cambridge, 1882 from SriLanka, comprising of 10 valid species worldwide (World Spider Catalog, 2019), (Table 1), of which only one species *Coleosoma floridanum* Banks, 1900 is known from India (Srinivasulu et al., 2013). The species of the genus shows sexual dimorphism and the males are believed to be ant mimics (Saaristo, 2006). These are small theridiid spiders with no colulus. While studying the spiders from Odisha state of India, we found that the species is new record to India. This species was previously reported from the neighbouring regions such as Bangladesh, Burma, Thailand, Philippines, China, Japan, Seychelles.

In this paper, we report the new distribution of the species along with its habitus and illustration of palp. A checklist is also provided for the distribution of the genus *Coleosoma* O. Pickard-Cambridge, 1882 all over world.

MATERIALS AND METHODS

The specimen was collected by vegetation beating and preserved in 70% alcohol. The specimen was studied under a Leica EZ4 HD stereomicroscope and images were processed with the aid of LAS core software (LAS EZ 3.0). Specimen was identified by diagnostic provided by Saaristo, 2010. The male genitalia were dissected with a help of surgical blade for morphological study. All measurements are in millimeters. The studied specimen is deposited in the National Zoological Collections, Zoological Survey of India, Kolkata.

TAXONOMY

Coleosoma blandum O. Pickard-Cambridge, 1882

Coleosoma blandum O. Pickard-Cambridge, 1882: 427, fig. 3.

Material examined: 1 Male, (ZSI-AA-1850), India: Odisha: KIIT campus, Bhubaneshwar (N20.3547 E85.8152), 55 m, 16.03.2018, coll. Priya Prasad.

Diagnosis: The male can be recognized by the presence of broad cymbium and bulbus and sickle-shaped embolus.

Description: Total length: 1.82; carapace: 0.64 long, 0.49 wide; abdomen: 1.12 long, 0.48 wide. Cephalothorax brown. Cephalic region high, fovea indistinct with three pairs of radial furrows, Eyes small. Legs yellow. Maxillae, and labium brown, Chelicerae yellow. Sternum brown tapering towards the end. Abdomen black, elongated, with a long neck-like constriction, a large white area present at the middle of the abdomen laterally and ventrally. Legs measurements: I 3.24 (0.94, 0.23, 0.93, 0.80, 0.34), II 2.43 (0.81, 0.21, 0.62, 0.57, 0.22), III 1.9 (0.66, 0.12, 0.43, 0.50, 0.19), IV 2.79 (1.00, 0.14, 0.60, 0.74, 0.31). Leg formula 1423. Palp brown, Embolus long circling around the tegulum, and embolar base with elongated round structure, terminal apophysis with two apical processes.

Distribution: Seychelles, Bangladesh, Burma, Thailand, Philippines, China and Japan (World Spider Catalog, 2019).

Comments: Patel & Pillai (1988) reported *C.blandum*, from groundnuts field in Gujarat and later on Sebastian (2009) have also reported that the genus is new to India. Although no photographic documentation have been provided by any of the authors. So, this is the first scientific report of the species from India.

Checklist of *Coleosoma* species:

SL.NO	Species name	World distribution	India
1.	*Coleosoma acutiventer* (Keyserling, 1884)	USA to Argentina.	-
2.	*Coleosoma africanum* Schmidt & Krause, 1995	Cape Verde Is.	-
3.	*Coleosoma blandum* O. Pickard-Cambridge, 1882	Seychelles, Bangladesh, Burma, Thailand, Philippines, China, Japan.	Odisha (new record)
4.	*Coleosoma caliothripsum* Barrion & Litsinger, 1995	Philippines.	-
5.	*Coleosoma floridanum* Banks, 1900	North, Central and South America. Europe, Macaronesia, West Africa, Seychelles, Pacific Is.	Andhra Pradesh (Srinivasulu et al., 2013)
6.	*Coleosoma matinikum* Barrion & Litsinger, 1995	Philippines.	-
7.	*Coleosoma normale* Bryant, 1944	USA to Brazil.	-
8.	*Coleosoma octomaculatum* (Bösenberg & Strand, 1906)	China, Korea, Taiwan, Japan, New Zealand.	-
9.	*Coleosoma pabilogum* Barrion & Litsinger, 1995	Philippines.	-
10.	*Coleosoma pseudoblandum* Barrion & Litsinger, 1995	Philippines.	-

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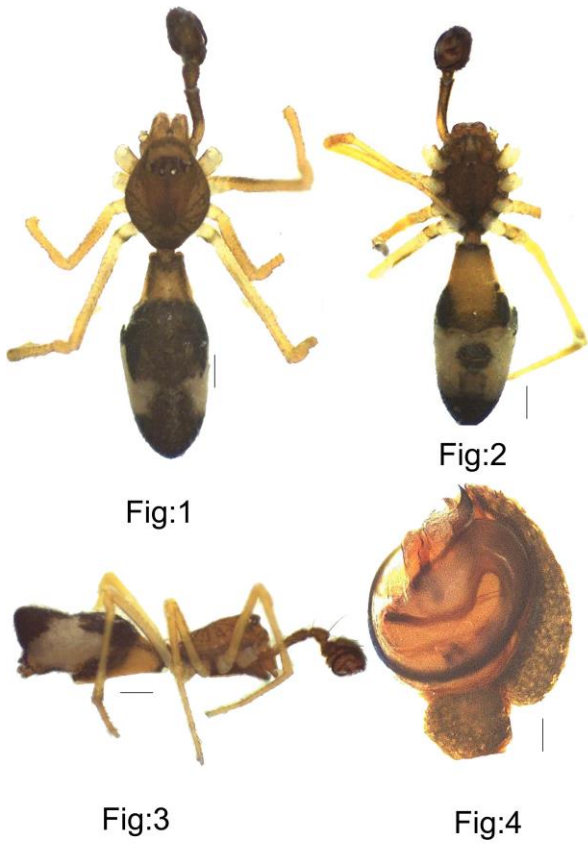

Figures 1-4. *Coleosoma blandum* 1-Male habitus, dorsal view, 2-same, ventral view, 3-same, lateral view, 4-Palp, ventral view, scale bar- 0.5 mm.

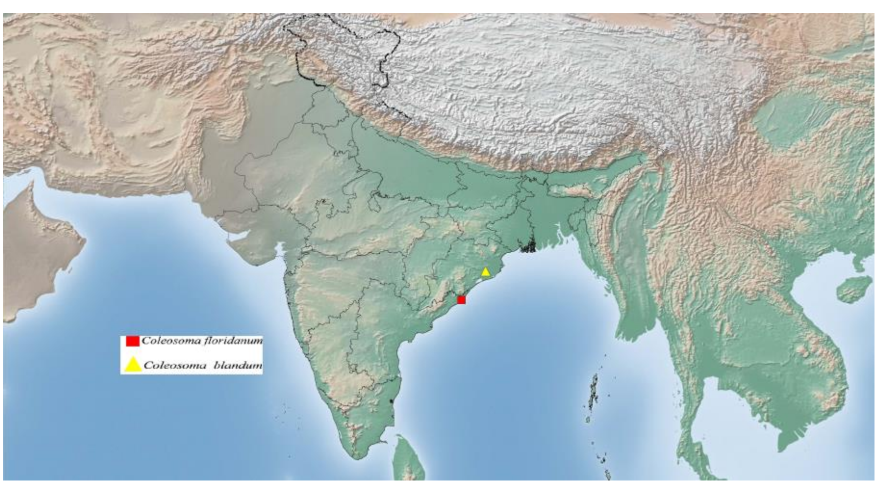

Figure 5. Distribution map of *Coleosoma* sp. in India.

CONTRIBUTION TO THE KNOWLEDGE OF THE CRABRONIDAE (HYMENOPTERA: APOIDEA) FAUNA OF TUNISIA. PART 1: ASTATINAE, CRABRONINAE AND PEMPHREDONINAE

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ABSTRACT: Based on newly collected materials from different localities in Tunisia between 2017 and 2018, a first contribution to knowledge of Tunisian Crabronidae fauna is established. As result, 1 species from 1 genus of Astatinae, 18 species from 9 genera of Crabroninae and 3 species from 2 genera of Pemphredoninae are identified. In total, 22 species belonging to 3 subfamilies and 12 genera are listed. All identified species have new provincial records. For each identified species general distribution and distributional map in Tunisia are provided.

KEY WORDS: Hymenoptera, Astatinae, Crabroninae, Pemphredoninae, New record, Distribution, Tunisia

Crabronid wasps are small to medium sized hymenopteran insects with color variation of their body from the yellow and red color to black completely. They are fossorial but they can nest in plant stems and various pre-existing cavities (Bohart & Menke, 1976). They are known as bioindicators of biodiversity thank to their predation behaviour (Vieira et al., 2011). For example, twelve orders of insects serve as prey for species belonging to Crabroninae, but Diptera predominate (Bohart & Menke, 1976). Also, Pemphredonid species predate Hemiptera and Homoptera but rarely Thysanoptera and Collembola (Bitsch et al., 2007).

According to the large synthetic work done by Pulawski (2019) on the world fauna of the Spheciforms wasps, summarizing the results up to date, the family Crabronidae includes 9005 species divided into 8 subfamilies and 243 genera. Among them, Crabroninae is the most diversified subfamily with 4838 species (Pulawski, 2019). In Tunisia, which is belonging to the West Palaearctic region, faunistic and systematic studies on Crabronidae are limited and most of them are conducted by foreigen researchers and included in others studies and not specified for Tunisian fauna such as Schulz (1905), Graeffe (1906), von Schulthess (1926), Guichard (1991), Dollfuss (2004, 2006, 2008), and de Beaumont (1949).

For this reason, we aim in this study to firstly contribute to the knowledge of Tunisian Crabronidae fauna.

MATERIAL AND METHODS

The material of Crabronidae were collected by the first author from different localities in Tunisia during spring and Summer of 2017 and 2018 using insect nets. They were preserved in 70 % alcohol prior to identification. Then they were pinned, mounted and labelled. For each specimen, collected place, date, altitude and name of collector were mentioned on the label.

Specimens were identified using Leica EZ4 stereomicroscope following diverse identification keys proposed in the literature and then confirmed identification by comaparison with well identified species hosted in the Museum Nationale d'Histoire Naturelle (MNHN), Paris, France.

Provinces of the collected specimens are given in alphabetical order in the following list. For each identified species, records cited in the literature and general distribution are given and distributional maps in Tunisia using DIVA-GIS program are established. Systematic and nomenclature follow mainly Pulawski (2019).

Identified materials are deposited in the personal collection of BEN KHEDHER, Entomology Museum, Erzurum, Turkey (EMET) and laboratory of Entomology and Insect Ecology in Regional Research Center for Horticulture and Oragnic Agriculture in Chott Meriem (CRRHAB Chott Meriem-Sousse, Tunisia).

RESULTS

Family Crabronidae Latreille, 1802
Subfamily Astatinae Lepeletier de Saint Fargeau, 1845
Genus *Astata* Latreille, 1797
Astata costae A. Costa, 1867 (Fig. 2.1)

Published records: It is cited in Tunisia by Costa (1893) but without specific locality.

New records: Kebili: Douz, Douz center, N 33°27'19.1", E 09°01'27.3", 70 m, 19.V.2018, 1 female; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 1 male, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 2 females, South Oued Beja, N 35°18'25.6", E 10°50'09.5", 110 m, 22.III.2018, 1 male; **Monastir**: Jammel, Bir Ettaib, N 35°38'16.1", E 10°41'22.1", 36 m, 11.VII.2017, 1 female.

General distribution: Western Europe, Southern Europe, Eastern Europe, North Africa, Turkey, Iran, Turkmenistan, Tajikistan, Uzbekistan, Kazakhstan (Antropov et al., 2017).

Subfamily Crabroninae Latreille, 1802
Entomognathus Dahlbom 1844
Entomognathus euryops (Kohl, 1899) (Fig. 2.2)

Published records: Beja (Leclercq, 1996), Ben Arous (Kohl, 1915), Jendouba (Dollfuss, 2006), Tunis (Graeffe, 1906).

New records: Mahdia: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 1 female, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 1 female.

General distribution: Tunisia (Leclercq, 1996; Pulawski, 2019).

Genus *Crossocerus* Lepeletier de Saint Fargeau and Brullé, 1835
Crossocerus elongatulus (Vander Linden, 1829) (Fig. 2.3)

Published records: Nabeul, Siliana (Dollfuss, 2006), Sfax (Leclercq, 1993).

New records: Mahdia: Sidi Alouane, Oued Beja, N 35°20'01.3", E 10°53'32.6", 51 m, 30.III.2018, 19 males.

General distribution: North Africa, Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Azerbaijan, Turkey, Iran, Turkmenistan, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia, Japan, North America, South America (Antropov et al., 2017).

Genus *Ectemnius* Dahlbom, 1845
***Ectemnius hypsae* (De Stefani Perez, 1884) (Fig. 2.4)**

Published records: Jendouba (Leclercq, 1993), Sousse, Zaghouan (Dollfuss, 2004), Tunis (Graeffe, 1906; Leclercq, 1993).

New records: Beja: Mjez Elbeb, South Mjez Elbeb, N 36°38'14.7", E 09°35'54.3", 53 m, 15.VIII.2018, 1 male, 1 female, Slouguia, N 36°35'24.6", E 09°31'08.9", 60 m, 17.VIII.2018, 2 males, 1 female, Testour, Elghanima, N 36°33'08.8", E 09°23'35.2", 84 m, 16.VIII.2018, 2 females, Oued Jidra, N 36°32'54.4", E 09°22'14.9", 100 m, 16.VIII.2018, 2 males; **Kairouan**: South Kairouan, Barouta, N 35°34'28.1", E 10°02'44.3", 95 m, 27.VIII.2018, 1 male; **Le Kef**: Le Kef West, Semmena, N 36°06'11.6", E 08°43'21.3", 555 m, 25.IV.2018, 2 females; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 2 males, 06.IV.2018, 6 males, 3 females, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 1 female, Oued Beja, N 35°20'01.3", E 10°53'32.6", 51 m, 29.IV.2018, 1 male; **Nabeul**: Korba, N 36°34'01.9", E 10°50'38.7", 12 m, 06.IX.2017, 1 male, Mida, Libna, N 36°42'27.5", E 10°55'34.3", 20 m, 05.IX.2017, 1 male, Zaouiet Jdidi, N 36°37'44.5", E 10°34'02.0", 45 m, 08.VI.2018, 1 female.

Additional records: Sousse: Bouficha, Salloum, N 36°18'12.3", E 10°28'29.1", 5 m, 14.VII.2017, 2 males, Bir Elhaj Ammar, N 36°18'34.8", E 10°25'04.4", 17 m, 28.VII.2017, 8 males, 3 females, Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 29.VII.2017, 1 female, Sidi Khalifa, Bir Bou Cheikh, N 36°15'49.7", E 10°22'11.9", 94 m, 21.VII.2017, 1 male, 2 females.

General distribution: North Africa, Russia, Western Europe, Southern Europe, Eastern Europe, Turkey, Israel (Antropov et al., 2017).

Genus *Lestica* Billberg, 1820
***Lestica clypeata* (Schreber, 1759) (Fig. 2.5)**

Published records: Jendouba (Gadeau de Kerveille, 1908), Tunis (Graeffe, 1906).

New records: Le Kef: Le Kef West, Semmena, N 36°06'11.6", E 08°43'21.3", 555 m, 25.IV.2018, 1 male; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 1 female, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 3 males, 2 females, Oued Beja, N 35°20'01.3", E 10°53'32.6", 51 m, 29.IV.2018, 3 males; **Nabeul**: Mida, Libna, N 36°42'27.5", E 10°55'34.3", 20 m, 05.IX.2017, 1 male, 1 female, Tekelsa, Baddar, N 36°44'49.5", E 10°36'58.1", 63 m, 08.VI.2018, 1 male; **Sousse**: Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 22.VII.2017, 1 male, 29.VII.2017, 2 males, 4 females, Kalaa Sghira, Ennagr, N 35°48'55.3", E 10°31'28.6", 37 m, 30.V.2017, 1 male.

General distribution: North Africa, Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Georgia, Turkey, Syria, Lebanon, Israel, Iraq, Iran, Turkmenistan, Uzbekistan, Kyrgyzstan, Kazakhstan (Antropov et al., 2017).

Genus *Lindenius* Lepeletier de Saint Fargeau and Brullé, 1835
***Lindenius hannibal* (Kohl, 1898) (Fig. 2.6)**

Published records: Beja (Leclercq, 1989), Gafsa (Dollfuss, 2006), Tunis (Graeffe, 1906; de Beaumont, 1956).

New records: Kairouan: Sbikha, Aouled Mbarek, N 35°57'21.9", E 10°08'18.1", 52 m, 25.V.2017, 1 female, 26.V.2017, 3 females; **Zaghouan**: Bir Halima, N 36°24'15.2", E 10°01'32.4", 173 m, 17.V.2017, 8 males, 1 female, N 36°24'05.8", E

10°01'32.4", 178 m, 17.V.2017, 1 female, N 36°23'58.4", E 10°01'25.9", 181 m, 17.V.2017, 1 female.
General distribution: North Africa, Spain (Pulawski, 2019).

***Lindenius hasdrubal* de Beaumont, 1956 (Fig. 2.7)**
Published records: Beja (Dollfuss, 2006), Ben Arous (Leclercq, 1989).
New records: Zaghouan: Bir Halima, N 36°23'30.9", E 10°02'05.5", 190 m, 20.IV.2018, 1 female.
General distribution: Algeria, Tunisia (de Beaumont, 1956; Dollfuss, 2006).

***Lindenius pygmaeus pygmaeus* (Rossi, 1794) (Fig. 2.8)**
Published records: Jendouba, Tozeur (Dollfuss 2006), Nabeul (Leclercq 1975).
New records: Kebili: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 male.
General distribution: North Africa , Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Turkey, Syria, Jordan, Israel, Iran, Afghanistan, Central Asia, Kazakhstan (Antropov et al., 2017).

***Lindenius pygmaeus algirus* (Kohl, 1892) (Fig. 2.9)**
Published records: Tunis (Graeffe, 1906; Leclercq, 1989).
New records: Beja: Testour, Chambou, N 36°32'47.5", E 09°31'08.9", 81 m, 16.VIII.2018,1 female, Mjez Elbeb, South Mjez ElBeb, N 36°38'14.7", E 09°35'54.3", 53 m, 17.VIII.2018, 3 females; **Kebili**: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 2 females, South Kebili, Errahmat, N 33°39'01.8", E 08°58'27.4", 30 m, 18.V.2018, 1 female; **Mahdia**: Sidi Alouane, Oued Beja, N 35°19'52.2", E 10°53'16.9", 54 m, 12.VI.2017, 1 female; **Sousse**: Bouficha, Salloum, N 36°18'12.3", E 10°28'29.1", 5 m, 14.VII.2017, 1 female.
General distribution: North Africa (Pulawski, 2019).

***Lindenius spilostomus* (Kohl, 1899) (Fig. 2.10)**
Published records: Ariana (Leclercq, 1989), Gafsa, Jendouba, Kairouan, Sousse (Dollfuss, 2006), Tunis (Graeffe, 1906; de Beaumont, 1956).
New records: Le Kef: Le Kef West, Semmena, N 36°06'11.6", E 08°43'21.3", 555 m, 25.IV.2018, 1 female; **Mahdia**: Sidi Alouane, Oued Beja, 35°20'01.3", E 10°53'32.6", 51 m, 30.III.2018, 1 female; **Zaghouan**: Bir Halima, N 36°23'30.9", E 10°02'05.5", 190 m, 20.IV.2018, 1 female.
General distribution: North Africa (Pulawski, 2019).

Genus *Belomicrus* A. Costa, 1871
***Belomicrus odontophorus* (Kohl, 1892) (Fig. 2.11)**
Published records: Jendouba (Guichard, 1991).
New records: Kasserine: Sbeitla, Athar, Route Fej Ettin, N 35°13'20.07", E 09°05'58.7", 545 m, 05.IX.2018, 5 males, 1 female, Oued Nakhil, N 35°14'41.6", E 09°05'40.5", 562 m, 04.IX.2018, 11 males, 5 females; **Kebili**: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 2 females, South Kebili, Errahmat, N 33°39'01.8", E 08°58'27.4", 30 m, 17.V.2018, 1 female; **Tataouine**: Ghomrasen, Ghordhab, N 33°05'06.4", E 10°29'46.2", 159 m, 08.V.2018, 2 males, 1 female.
General distribution: Russia, Eastern Europe, Armenia, Tunisia, Turkey, Turkmenistan, Kazakhstan, Mongolia (Antropov et al., 2017).

Genus *Belomicroides* Kohl, 1899

Belomicroides schmiedeknechti Kohl, 1899 (Fig. 2.12)

Published records: Tunis (Kohl, 1899).

New records: Mahdia: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 1 female.

General distribution: Tunisia (Pulawski, 2019).

Genus *Oxybelus* Latreille, 1797

Oxybelus quatuordecimnotatus Jurine, 1807 (Fig. 2.13)

Published records: Jendouba (Leclercq, 1993), Gafsa, Kasserine, Kebili, Sousse, Tozeur (Dollfuss, 2008).

New records: Beja: Mjez Elbeb, South Mjez Elbeb, N 36°38'14.7", E 09°35'54.3", 53 m, 15.VIII.2018, 1 male, 1 female, 17.VIII.2018, 7 males; **Kairouan**: Sbikha, Aouled Mbarek, N 35°57'21.9", E 10°08'18.1", 52 m, 25.V.2017, 1 male, 1 female, Sisib, N 35°57'20.8", E 10°08'22.0", 51 m, 03.VIII.2017, 2 males, 2 females; **Le Kef**: Le Kef West, Semmena, N 36°06'11.6", E 08°43'21.3", 555 m, 25.IV.2018, 3 males; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 6.IV.2018, 2 males, 30.IV.2018, 2 males, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 2 males, Lemsanaa, N 35°19'44.5", E 10°54'51.3", 41 m, 26.V.2018, 1 male, 1 female, 01.VI.2018, 2 males, 1 female, Oued Beja, N 35°20'01.3", E 10°53'32.6", 51 m, 29.IV.2018, 1 male, N 35°20'07.7", E 10°53'32.6", 55 m, 28.VIII.2017, 1 male; **Nabeul**: Zaouiet Jdidi, N 36°37'44.5", E 10°34'02.0", 45 m, 08.VI.2018, 1 female, Beni Khalled, N 35°22'37.05", E 10°56'17.94", 44 m, 08.VI.2018, 1 male; **Sidi Bouzid**: Sidi Bouzid East, Lasouda, N 35°05'27.8", E 09°33'40.1", 336 m, 26.VII.2018, 1 male, Elhachria, N 34°53'56.2", E 09°26'11.6", 326 m, 24.VII.2018, 2 males, 1 female, Rgueb, Aouled Ayouni, N 34°49'14.5", E 09°51'07.7", 142 m, 18.VIII.2017, 1 male.

Additional records: Jendouba: Tabarka, Melloula, N 36°56'31.4", E 08°42'25.0", 120 m, 16.IV.2018, 1 male; **Kasserine**: Sbeitla, Athar, Oued Nakhil, N 35°14'41.6", E 09°05'40.5", 562 m, 04.IX.2018, 2 males, 1 female; **Kebili**: Douz, Douz center, N 33°27'19.1", E 09°01'27.3", 70 m, 19.V.2018, 1 female, Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 5 males, South Kebili, Errahmat, N 33°39'01.8", E 08°58'27.4", 30 m, 17.V.2018, 1 male, 1 female; **Sousse**: Akouda, Chott Meriem, N 35°55'04.2", E 10°33'57.9", 17 m, 12.VI.2018, 1 male, Bouficha, Bir Elhaj Ammar, N 36°18'34.8", E 10°25'04.4", 17 m, 28.VII.2017, 1 male, Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 22.VII.2017, 6 males, 29.VII.2017, 6 males; **Tozeur**: Dguech, Elmanechi, N 33°58'41.5", E 08°12'33.1", 63 m, 29.VI.2018, 1 male, Temeghza, Cascade 2, N 34°22'34.0", E 07°54'42.7", 247 m, 27.VI.2018, 1 male, 1 female, Tozeur center, Oasis Elberka, N 33°55'01.0", E 08°08'23.3", 45 m, 26.VI.2018, 1 male.

General distribution: North Africa, Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Saudi Arabia, Oman, Yemen, Turkey, Syria, Jordan, Israel, Iran, Afghanistan, Pakistan, Central Asia, Kazakhstan, Mongolia, China (Antropov et al., 2017).

Oxybelus lamellatus andalusiaticus Spinola, 1843 (Fig. 2.14)

Published records: Kebili, Medenine, Sousse, Tozeur (Dollfuss, 2008), Tunis (Graeffe, 1906), Monastir (von Schulthess, 1926).

New records: Beja: Mjez Elbeb, South Mjez Elbeb, N 36°38'14.7", E 09°35'54.3", 53 m,15.VIII.2018, 5 males, 17.VIII.2018, 5 males, Testour, Chambou, N 36°32'47.5", E 09°31'08.9", 81 m, 16.VIII.2018, 3 males, Elghanima, N 36°33'08.8", E 09°23'35.2", 84 m, 16.VIII.2018, 1 male; **Jendouba**: Tabarka, Haouamdia, N 36°54'36.7", E 08°47'03.8", 58 m, 18.IV.2018, 1 male, 2 females, Mejel Roumi, N 36°53'53.4", E 08°46'01.0", 84 m, 13.IV.2018, 2 males, Melloula, N 36°56'31.4", E 08°42'25.0", 120 m, 16.IV.2018, 1 male, Theatre, N 36°57'40.8", E 08°45'31.2", 4 m, 12.IV.2018, 1 male; **Kairouan**: Chbika, Aouled Zair, N 35°36'42.4", E 09°53'29.8", 136 m, 29.VIII.2018, 1 male, South Kairouan, Barouta, N 35°34'28.1", E 10°02'44.3", 95 m, 27.VIII.2018, 3 males, Ragada, N 35°34'46.2", E 10°03'06.1", 92 m, 28.VIII.2018, 2 males, Sbikha, Sisib, N 35°57'20.8", E 10°08'22.0", 51 m, 03.VIII.2017, 3 males; **Le Kef**: Le Kef West, Semmena, N 36°06'11.6", E 08°43'21.3", 555 m, 25.IV.2018, 3 females; **Mahdia**: Ksour Essef, Alya, N 35°19'26.5", E 11°02'32.6", 1 m, 3.VIII.2018, 1 male, Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 1 male, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 1 female, Lemsanaa, N 35°19'44.5", E 10°54'51.3", 41 m, 26.V.2018, 2 males, Oued Beja, Aouled Bouzid, N 35°20'34.0", E 10°53'34.6", 59 m, 06.V.2017, 1 male, Saafat, N 35°20'34.4", E 10°52'54.7", 68 m, 12.VI.2017, 1 male, Zorda, N 35°20'34.0", E 10°53'19.9", 73 m, 06.VIII.2017, 1 male, N 35°19'57.5", E 10°53'39.5"50 m, 26.VIII.2017, 3 males, N 35°20'07.7", E 10°53'32.6", 55 m, 28.VIII.2017, 9 males, N 35°19'57.4", E 10°53'51.4", 49 m, 29.VIII.2017, 5 males, 2 females, Zelba, N 35°13'48.8", E 10°51'30.1", 49 m, 11.VIII.2018, 1 male; **Nabeul**: Haouaria, Gharnem, N 37°02'16.6", E 11°00'19.7", 18 m, 14.IX.2017, 8 males, Korba, N 36°34'01.9", E 10°50'38.7", 12 m, 06.IX.2017, 3 males, Mida, Libna, N 36°42'27.5", E 10°55'34.3", 20 m, 05.IX.2017, 2 males; **Sidi Bouzid**: Rgueb, Aouled Ayouni, N 34°49'45.7", E 09°51'27.4", 141 m, 17.VIII.2017, 1 male, N 34°49'14.5", E 09°51'07.7", 142 m, 18.VIII.2017, 2 males, Sidi Bouzid West, Zaafria, N 35°01'39.8", E 09°17'18.3", 394 m, 25.VII.2018, 1 female; **Tataouine**: Ghomrasen, Ghordhab, N 33°05'06.4", E 10°29'46.2", 159 m, 8.V.2018, 2 males, North Tataouine, Route Tataouine-Medenine km 33, N 33°04'12.2", E 10°29'06.0", 163 m, 10.V.2018, 1 male.

Additional records: Kebili: Douz, Douz center, N 33°27'19.1", E 09°01'27.3", 70 m, 19.V.2018, 6 males, Douz West, N 33°27'04.1", E 09°01'04.5", 63 m, 19.V.2018, 4 males, Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 male, South Kebili, Errahmat, N 33°39'01.8", E 08°58'27.4", 30 m, 17.V.2018, 5??, 18.V.2018, 1 male; **Sousse**: Bouficha, Salloum, N 36°18'12.3", E 10°28'29.1", 5 m, 14.VII.2017, 1 male, Akouda, Chott Meriem, Tantana, N 35°55'17.7", E 10°34'07.8", 12 m, 4.VIII.2017, 1 male, Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 29.VII.2017, 1 male, Sidi Khalifa, Bir Bou Cheikh, N 36°15'49.7", E 10°22'11.9", 94 m, 21.VII.2017, 1 male; **Tozeur**: Dguech, Elmanechi, N 33°58'41.5", E 08°12'33.1", 63 m, 29.VI.2018, 3 males, Nefta, Corbeille, N 33°51'00.0", E 07°51'52.4", 25 m, 28.VI.2018, 1 male, Nefta Oasis, N 33°52'39.1", E 07°52'34.9", 56 m, 28.VI.2018, 1 male, Tozeur center, Oasis Elberka, N 33°55'01.0", E 08°08'23.3", 45 m, 26.VI.2018, 1 male, 1 female.

General distribution: South West Europe, North West Africa , Bahrain (Pulawski, 2019).

Oxybelus haemorrhoidalis Olivier, 1812 (Fig. 2.15)

Published records: Kairouan (von Schulthess, 1926), Gafsa, Jendouba, Kasserine, Kebili, Tataouine, (Dollfuss, 2008).

New records: Mahdia: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 06.IV.2018, 9 males, 3 females, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 5.V.2018, 2 males, 1 female, Oued Beja, N 35°20'01.3", E 10°53'32.6", 51 m, 29.IV.2018, 2 females; **Nabeul**: Zaouiet Jdidi, N 36°37'44.5",

E 10°34'02.0", 45 m, 08.VI.2018, 1 female; **Sousse**: Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 29.VII.2017, 1 female.
Additional records: Kebili: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 female.
General distribution: North Africa, Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Azerbaijan, Turkey, Syria, Israel, Iran, Afghanistan, Turkmenistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Mongolia, China, Korean Peninsula, Japan (Antropov et al., 2017).

Oxybelus mucronatus moricei de Beaumont, 1950 (Fig. 2.16)

Published records: Gafsa, Kebili, Sousse, Tataouine, Tozeur (Dollfuss, 2008).
New records: Jendouba: Tabarka, Melloula, N 36°56'31.4", E 08°42'25.0", 120 m, 16.IV.2018, 1 male; **Kasserine**: Sbeitla, Athar, Oued Nakhil, N 35°14'41.6", E 09°05'40.5", 562 m, 04.IX.2018, 2 males; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 30.IV.2018, 2 males, 06.IV.2018, 2 males, 6 females, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 16 males, 3 females, Lemsanaa, N 35°19'44.5", E 10°54'51.3", 41 m, 01.VI.2018, 5 males, 1 female, Oued Beja, N 35°20'07.7", E 10°53'32.6", 55 m, 28.VIII.2017, 1 female, N 35°19'57.4", E 10°53'51.4", 49 m, 29.VIII.2017, 1 male, N 35°20'01.3", E 10°53'32.6", 51 m, , 30.III.2018, 29.IV.2018, 5 males, South Oued Beja, N 35°18'25.6", E 10°50'09.5", 110 m, 22.III.2018, 1 male, 1 female.
Additional records: Kebili: Douz, Douz center, N 33°27'19.1", E 09°01'27.3", 70 m, 19.V.2018, 1 female, Douz West, N 33°27'04.1", E 09°01'04.5", 63 m, 19.V.2018, 1 female; **Sousse**: Kalaa Kbira, Belaoum, N 35°54'14.0", E 10°23'37.5", 45 m, 22.VII.2017, 1 male; **Tataouine**: Ghomrasen, Ghordhab, N 33°05'06.4", E 10°29'46.2", 159 m, 08.V.2018, 4 males, 1 female.
General distribution: Algeria, Canary Islands, Libya, Morocco, Tunisia (Pulawski, 2019).

Genus *Palarus* Latreille, 1802
Palarus bernardi de Beaumont, 1949 (Fig. 2.17)

Published records: Tozeur (Pulawski & Prentice, 2008).
Additional records: Tozeur: Nefta, Nefta Oasis, N 33°52'39.1", E 07°52'34.9", 56 m, 28.VI.2018, 1 male.
General distribution: North West Africa to Mauritania, Burkina Faso, Sudan (Pulawski & Prentice, 2008).

Palarus confusus R. Turner, 1911 (Fig. 2.18)

Published records: Jendouba, Nabeul (Pulawski & Prentice, 2008), Tunis (de Beaumont, 1949).
New records: Mahdia: Sidi Alouane, Oued Beja, N 35°20'34.0", E 10°53'34.6", 75 m, 21.V.2017, 1 male.
General distribution: Libya to Morocco, Mauritania (Pulawski & Prentice, 2008).

Palarus rufipes Latreille, 1812 (Fig. 2.19)

Published records: Gafsa, Kairouan, Medenine, Tozeur (de Beaumont, 1949); Gafsa, Tozeur (von Schulthess, 1926); Nabeul, Gabes (Pulawski & Prentice, 2008).
New records: Kebili: Douz, Douz West, N 33°27'04.1", E 09°01'04.5", 63 m, 19.V.2018, 3 females, Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 female, South Kebili, Errahmat, N 33°39'01.8", E 08°58'27.4", 30 m,

18.V.2018, 1 female; **Mahdia**: Sidi Alouane, N 35°22'37.05", E 10°56'17.94", 60 m, 17.VII.2018, 1 female.
Additional records: Nabeul: Beni Khalled, N 36°36'07.0", E 10°30'17.8", 44 m, 08.VI.2018, 1 female; **Tozeur**: Nefta, Nefta Oasis, N 33°52'39.1", E 07°52'34.9", 56 m, 28.VI.2018, 1 male.
General distribution: Morocco to Tunisia (Pulawski & Prentice, 2008).

Subfamily Pemphredoninae Dahlbom, 1835
Genus *Diodontus* Curtis, 1834
***Diodontus hyalipennis* Kohl, 1892 (Fig. 2.20)**
Published records: Kairouan (von Schulthess, 1926), Tunis (Kohl, 1901; Morice, 1911).
New records: Kebili: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 female; **Zaghouan**: Bir Halima, N 36°24'15.2", E 10°01'32.4", 173 m, 17.V.2017, 1 female.
General distribution: North Africa, Russia, Southern Europe, Eastern Europe, Azerbaijan, Iran, Kazakhstan, Mongolia (Antropov et al., 2017).

***Diodontus oraniensis* (Lepeletier de Saint Fargeau, 1845) (Fig. 2.21)**
Published records: Tunis (Gribodo, 1894, Morice, 1911, de Beaumont, 1950).
New records: Kebili: Janouara, Rass Elain, N 33°42'02.3", E 08°59'26.4", 56 m, 16.V.2018, 1 female; **Mahdia**: Sidi Alouane, Aouled Kloula, N 35°22'09.4", E 10°51'22.6", 64 m, 06.IV.2018, 1 male, Chammar, N 35°18'34.3", E 10°53'31.6", 65 m, 05.V.2018, 1 female, Oued Beja, N 35°20'34.0", E 10°53'19.9", 73 m, 29.IV.2017, 2 males, N 35°20'01.3", E 10°53'32.6", 51 m, 30.III.2018, 9 males; **Nabeul**: Korba, N 36°34'01.9", E 10°50'38.7", 12 m, 06.IX.2017, 1 female.
General distribution: North Africa, Israel, Kuwait, Palestine, Canary Islands (Pulawski, 2019).

Genus *Pemphredon* (Latreille, 1796)
***Pemphredon lethifer* (Shuckard, 1837) (Fig. 2.22)**
Published records: Sousse (Dollfuss, 2001).
New records: Monastir: Bakalta, Echraf, N 35°36'50.6", E 11°00'43.1", 3 m, 27.VII.2017, 1 male; **Nabeul**: Korba, N 36°34'01.9", E 10°50'38.7", 12 m, 06.IX.2017, 1 male.
General distribution: North Africa, Russia, Western Europe, Northern Europe, Southern Europe, Eastern Europe, Abkhasia, Azerbaidjan, Turkey, Israel, Iraq, Iran, Tajikistan, Uzbekistan, Kyrgyzstan, Afghanistan, Kazakhstan, Mongolia, China, Korean Peninsula, Japan, North America (Antropov et al., 2017).

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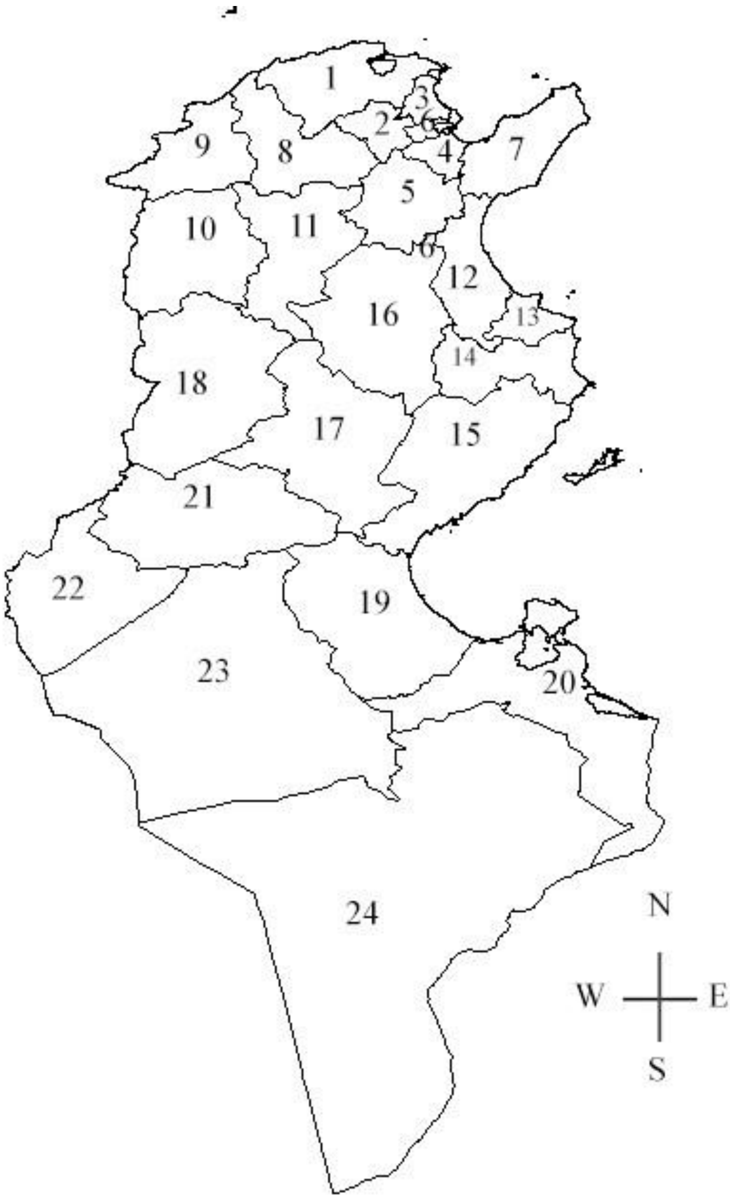

Figure 1. Provinces of Tunisia: 1. Bizerte; 2. Mannouba; 3. Ariana 4. Ben Arous; 5. Zaghouan; 6. Tunis; 7. Nabeul; 8. Beja; 9. Jendouba; 10. Le Kef; 11. Siliana; 12. Sousse; 13. Monastir; 14. Mahdia; 15. Sfax; 16. Kairouan; 17. Sidi Bouzid; 18. Kasserine; 19. Gabes; 20. Medenine; 21. Gafsa; 22. Tozeur; 23. Kebili; 24. Tataouine.

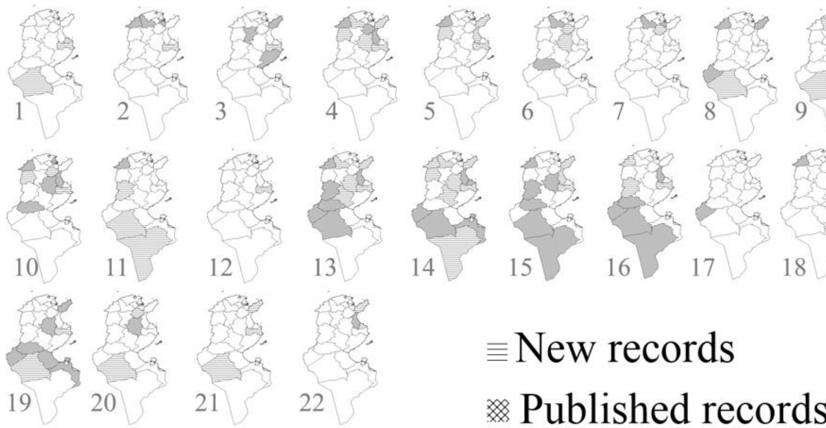

Figure 2. Distributional maps of identified species: (1) *Astata costae* A. Costa, 1867, (2) *Entomognathus euryops* (Kohl, 1899), (3) *Crossocerus elongatulus* (Vander Linden, 1829), (4) *Ectemnius hypsae* (De Stefani Perez, 1884), (5) *Lestica clypeata* (Schreber, 1759), (6) *Lindenius hannibal* (Kohl, 1898), (7) *Lindenius hasdrubal* de Beaumont, 1956, (8) *Lindenius pygmaeus pygmaeus* (Rossi, 1794), (9) *Lindenius pygmaeus algirus* (Kohl, 1892), (10) *Lindenius spilostomus* (Kohl, 1899), (11) *Belomicrus odontophorus* (Kohl, 1892), (12) *Belomicroides schmiedeknechti* Kohl, 1899, (13) *Oxybelus quatuordecimnotatus* Jurine, 1807, (14) *Oxybelus lamellatus andalusiaticus* Spinola, 1843, (15) *Oxybelus haemorrhoidalis* Olivier, 1812, (16) *Oxybelus mucronatus moricei* de Beaumont, 1950, (17) *Palarus bernardi* de Beaumont, 1949, (18) *Palarus confusus* R. Turner, 1911, (19) *Palarus rufipes* Latreille, 1812, (20) *Diodontus hyalipennis* Kohl, 1892, (21) *Diodontus oraniensis* (Lepeletier de Saint Fargeau, 1845), (22) *Pemphredon lethifer* (Shuckard, 1837).

ASPTEGOPTERYX BUMBUSAE (BUCKTON, 1893) (HEMIPTERA: APHIDOIDEA): NEW TO PAKISTAN! WESTERNMOST RANGE IN ASIA REDEFINED

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ABSTRACT: *Astegopteryx bambusae* (Buckton, 1893) was found on *Bambusa* sp. L. from Abbaspur, Kashmir-Pakistan in December 2015-2016. Diagnostic features, morphometric data, micro-ecology and supportive images of the encountered species are presented. The study also attempts to correct rather anomalous distribution status, in the current aphidological literature, of this species vis-a-vis present day Pakistan in the light of bibliographic, geopolitical and biogeographical perspectives and redefines its westernmost range in South East Asia.

KEY WORDS: *Astegopteryx bambusae*, Abbaspur, Kashmir, Westernmost range, Pakistan

Astegopteryx Karsh, (Aphididae: Hormaphidinae: Cerataphidini) an Oriental genus currently comprises about 24 species, endemic to east and south east Asia, that alternate between primary host *Styrax* species (Ericales: Styracaceae) and secondary host *Bambu* spp. (Poaceae) or Palms (Arecaceae) while inducing gall on the former host (Blackman & Eastop, 2008). Unlike most cerataphidines that invariably are host alternate, *A. bambusae* reproducing anholocyclically, may entirely live on secondary host, *Bambusa* sp. (Stern & Kurosu, 1997; Chakrabarti & Debnath, 2011). Cerataphidines are diagnosed by frontal horns and segmentally arranged wax glands (Chakrabarti & Debnath, 2011). *Astegopteryx bambusae* (Buckton) though documented as endemic species in the sub-continent, east and South East Asia as the pest of *Bambusa* spp. (Fukatsu & Ishikawa, 1996; Edirisinghe & Wijerathna, 2006; Idechiil et al., 2007; TG & Remadevi, 2011) has rather dubious distribution record for Pakistan. None of the main citatationers (Doncaster, 1969; Blackman and Eastop, 1984; Naumann-Etienne & Remaudiere, 1995) referring distribution of *A. bambusae* in Pakistan has mentioned direct encounter with this species in Pakistan. We report direct collection and identification of *A. bambusae* (Buckton) from Abbaspur Azad Jammu and Kashmir-Pakistan. The paper includes morphological and morphometric analysis of the collected species and comparison with Indian specimen along with in situ snapshots of colonies on host plant, micrographs of preserved specimen, ecology and evaluate its ambiguous distribution record related to present Pakistan in the background of bibliographic, geopolitical and biogeographical facts and redefines distribution status of *A. bambusae* vis-a-vis Pakistan and its extreme westward range in Asia.

MATERIAL AND METHODS

Colonies of apterous viviparous females and nymphs along with attendant ants were found on the underside of leaf blades of *Bambusa arundinacea* Willd (Figs. 1a and 1b) in Abbaspur (33°48'52.092" N, 73° 58' 32.3652" E; alt., 1161 m above sea level) a south eastern town in Kashmir-Pakistan, on 12-XII-2015. Several specimens were transferred into screw-lidded plastic vial (10 mm^3) containing 70% ethanol. The collected material was brought to the Entomology Lab., University of Poonch Rawalakot, Kashmir-Pakistan. The diagnostic characters of specimens were examined under Olympus binocular at 40-100X magnification Measurements of diagnostic characters were taken by ocular-micrometer. Specimens were identified following Blackman & Eastop (1994, 2012), Remaudière & Remaudière (1997), Chakrabarti & Debnath (2011) and Favret (2019). Field images (1a and 1b) were shot by Canon 1X US 160 camera. The figures (2a, 2b) were prepared by Nikon Digital Trinocular SMZ 1500. The voucher specimens were deposited in the Department of Entomology University of Poonch, Rawalakot.

RESULTS AND DISCUSSION

1893 *Oregma bambusae* Buckton, G. B. Indian Mus. Notes, 3: 87.
1917 *Oregma lutescens* van der Goot, P., Contr. Faune Indes Need, 13: 197.
1966 *Astegopteryx bambusae*, Doncaster, J.P., Entomologist, 99: 157.

Diagnostic characters

Live adult female aptea (Figs. 2a, 2b) yellowish green or pale green, small sized and broadly pear shaped. Head and pronotum fused forming cephalothorax that has few scantly arranged hairs; Frons medially protruded and bears two forwardly directed horns below antennal tubercles; frontal horns are broad-based, gradually tapering terminally, translucently pale and each having characteristic dark rather rounded apex; about 0.20 × less than the combined length of antennal segment I and II. Antennal tubercles moderately developed, below frontal protuberance; antennae 5 segmented, small about 0.18 × of body length, translucently pale; antennal segments II, III, IV pale; segment III and IV bear 2-4 sparsely distributed, long fine hairs; hairs on antennal segment III approximately equal to the basal width of the segment; Terminal process (PT) shorter than base of segment V, about 0.37 × the base of segment V. Eyes small, black, having 3 facets, without triommatidea, broadly spaced and rather backwardly placed. Rostrum reaching mid coxae with ultimate rostral segment (RIV+V) approximately 0.45 × the segment II of hind tarsi, and bears 4-6 secondary hairs. Legs pale, femora slightly brownish, tibia pale, tarsi slightly brownish distally, pretarsi dark. Marginal wax gland pores plates larger and longitudinally arranged on segments, rounded touching each other over much less than their basal diameter. Siphunculi very small, pale placed on dark sclerotic cones surrounded by 8-10 long hairs. Dorsal transverse diffused streaks of green color present between abdominal tergum I and the siphuncular cones. Dorsum with rows of transversely arranged small hairs. Cauda dark, broad, knob-shaped and bears 6-10 long hairs.

Taxonomic remarks

Diagnostic features of our specimen comply with the diagnostic characters given by Blackman & Eastop (1984) and Ghosh (1988) for *A. bambusae*

(Buckton). Comparison of our specimen with published description of the species by Ghosh (1988) was also found compatible except following minor variations that may be attributed to the differences in geographical conditions of the two localities.

1. Our live specimens had light green color (Figs. 1a and 1b) which turned yellowish brown in the preserved specimens (Figs. 2a and 2b) while Ghosh (1988) described it as light brown.

2. Minor morphometric differences were also observed in our specimen and that of Ghosh (1988).

Ecological remarks

Colonies (Figs. 1a and 1b) of light green to yellowish green and broadly pear shaped aphids were observed on the underside of leaf blades of *Bambusa sp*. plansts in Abbaspur, Kashmir-Pakistan. Upper side of infested leaves were covered with oily exude. The infested leaf blades bore pale look and had dry streaks inside and on margins with dry lumpy patches that extended from center to the leaf margins or vice versa. The leaf blades had turned texturally brittle. Ant attendance was observed (Fig. 1b). Aphids, adult and nymphs fed gregariously and actively ran up and down the leaf-blades.

Status of *A. bambusae* in Pakistani aphid-fauna and its westernmost range in Asia

A. bambusae (Buckton), although reported from Uttar Pradesh India as early as 1893 by Buckton as *Oregma bambusae* on *Bambusa arundinacea* L., however, has ambiguous occurrence record pertaining to present day Pakistan. Doncaster (1966) is the main source of reference about the presence of *A. bambusae* in the latter country. Blackman & Eastop (1984) cite Donscaster (1966) for this aphid in Pakistan. Even Naumann-Etienne & Remaudiere (1995) who reported some 300 species including 180 new records for Pakistan, did not mention direct encounter with this species during their countrywide survey and relied on citing Blackman & Eastop (1984) for this species in Pakistan. Incidentally, the original source, Doncaster (1966) too relies, as suggested by the title of his paper, on the work of Buckton (1893). The locally conducted faunal works on Aphididae (Das, 1918; Hill Ris Lambers, 1966; Shah, 1988; Nasir and yousaf, 1992; Irshad, 2001; Hassan et al, 2010; Bodlah et al., 2011) preceding and following Naumann-Etienne & Remaudiere (1995) also have not mentioned direct collection/encounter of this species in Pakistan. In 1966, present Pakistan used to be the West Pakistan while today's Bangladesh at that point of time was East Pakistan. Based on this geopolitical perspective, it could be concluded that, three main references viz., Doncaster (1966), Blackman & Eastop (1984) and Naumann-Etienne & Remaudiere (1995), represent record of this species for Bangladesh. *Astegopteryx bambusae* is distributed in north east and North West India (Ghosh, 1988; Chakrabarti, 2011) (Fig. 3). Northwardly, Bangladesh is in the vicinity of Meghalaya (North East India) where this species has been reported (Ghosh, 1978; Chakrabarti & Debnath, 2011). Abbaspur Azad Jammu and Kashmir-Pakistan, is geographically oriented further westward to North West India, Himachal Pradesh and Uttar Pradesh, Buckton's original collection was from latter. On this account, three main references, Doncaster (1966), Blackman & Eastop (1984) and Naumann-Etienne & Remaudiere (1995) regarding occurrence of *A. bambusae* in present Pakistan could be regarded as incorrect and the species could be considered as a new record to Pakistani aphid-fauna with Abbaspur Azad Jammu and Kashmir-Pakistan being the westernmost range for this oriental species in Asia.

CONCLUSION

This paper presents first record, along with morphological and morphometric data, of *A. bambusae* (Buckton) from Abbaspur, Azad Jammu and Kashmir-Pakistan. The study has highlighted rather dubious bibliographic record, as found in the related literature, of *A. bambusae* (Buckton) vis-a-vis present day Pakistan and has redefined status of this species, for Pakistan and its western most range in South East Asia, on the basis of bibliographic, biogeographic and geopolitical record.

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Table 1. Measurements (in mm) of adult viviparous female aptera, n=4.

Body size		FH	Antennal segments			SIPH	Cauda	
L	W	L	III	IV	V (B+PT)	L	L	W
1.57±0.46[MS]	0.8±0.04	0.09±0.01	0.2±0.2	0.23±0.29	0.02±0.25	0.04±0.01	0.05±0.001	0.10±0.02
1.31	0.71	0.07	0.67	0.67	0.59+0.02	0.04	0.04	0.08
1.35	0.75	0.08	0.07	0.07	0.06+0.02	0.04	0.04	0.08
1.37	0.78	0.09	0.09	0.08	0.07+0.026	0.04	0.05	0.10
2.27	0.81	0.10	0.10	0.10	0.07+0.026	0.05	0.06	0.13

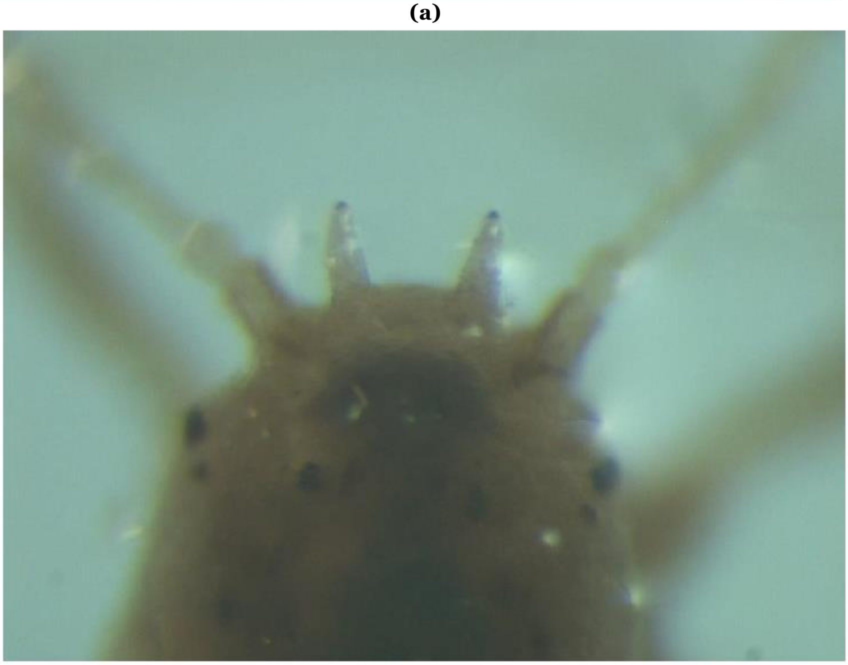
Abbreviations: B base; FH frontal horns; L length; MS Mean ± Standard Deviation; PT processes terminalis; SIPH siphunculi; w width; III-V antennal segments 3-5.

(a)

(b)

Figure 1. (a). *Astegopteryx bambusae* (Buckton) colony on ventral side of leaf-blade *Bambus arundinacea* Willed, (b). Formicid associated with *A. bambusae* on *B. arundinacea*.

(a)



(b)

Figure 2. (a). Apterous vivipara (dorsal view). Siphuncular cones visible at posterior broader margins, (b). Frontal horns with rounded apices.

Figure 3. Distribution of *A. bambusae* in the North-East to North-West of Subcontinent.

CONTRIBUTIONS TO THE DISTRIBUTION OF *RHYNCHOPHORUS FERRUGINEUS* (OLIVIER, 1790) (COLEOPTERA: DRYOPHTHORIDAE) IN TURKEY

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[Tezcan, S. 2020. Contributions to the distribution of *Rhynchophorus ferrugineus* (Olivier, 1790) (Coleoptera: Dryophthoridae) in Turkey. Munis Entomology & Zoology, 15 (1): 118-120**]**

ABSTRACT: In this paper, information on distribution of the red palm weevil, *Rhynchophorus ferrugineus* (Olivier, 1790) (Coleoptera: Dryophthoridae) in Turkey is given.

KEY WORDS: Dryophthoridae, *Rhynchophorus ferrugineus*, The red palm weevil, Turkey

The red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790) (Coleoptera: Dryophthoridae) is a devastating pests of palm species belonging to 18 different genera and three families. The weevil affects approximately 29 palm species and the spread of this species to all continents (Africa, Americas, Asia, Australia together with Oceania, and Europe) except Antarctica (Hussain et al., 2013).

This species reported from Mersin, in 2005 (Karut & Kazak, 2005; Atakan & Yüksel, 2008; Atakan et al., 2012), from Izmir in 2006 (Anonymous, 2013) and later from southern and western provinces of Turkey. Recently, Çıtırıkkaya et al. (2014) reported a note on non-target fauna collected by pheromone traps hanged for this species in Izmir province of Turkey.

Material reported in this paper collected from different provinces by author between the years of 2008-2019. Material given as a gift to the Lodos Entomological Museum, Turkey (LEMT) by researchers, students, gardeners etc. were also included in this paper. Information on locality and date of collection, place / plant from which the specimens were collected, number of specimens were given for presented material.

The aim of this paper is to present the new locality records of *R. ferrugineus* to researchers and relevant persons.

RESULTS

At the end of this study, a total of 195 specimens from 12 provinces were recorded.

Adana: Central province, 29.IV.2010, 3 exs., 12.V.2015, 3 exs.

Antalya: Central province, 20.V.2009, *Washingtonia robusta*, 2 exs., 28.VII.2009, pheromon trap, 4 exs., 03.V.2010, *W. robusta*, 1 ex., 05.V.2010, *W. robusta*, 8 exs., 06.V.2010, pheromon trap, 5 exs., 07.VII.2012, *W. robusta*, 6 exs.; Aksu, 26.V.2016, 4 exs.; Alanya, 03.V.2010, *W. robusta*, 3 exs., 05.V.2010, *W. robusta*, 10 exs., 06.V.2010, *W. robusta*, 10 exs.; Kaş, 21.V.2017, 4 exs.; Kemer, 17.V.2014, 3 exs.; Manavgat, 6.VI.2011, 5 exs.; Muratpaşa, 25.IX.2012, *W. robusta*, 7 exs., Muratpaşa, Çallı, 12.VII.2012, *W. robusta*, 4 exs.; Serik, 18.V.2013, 4 exs.

Aydın: Didim, 11.VII.2016, 3 exs.; Kuşadası, 10.VII.2008, 1 ex., 07.VI.2011, 1 ex., Kuşadası, Davutlar, 26.VII.2010, 4 exs., Kuşadası, Güzelçamlı, 18.VI.2016, 1 ex.; Söke, 08.VI.2017, 3 exs.

Bursa: Gemlik, 24.VI.2018, 3 exs.

Hatay: İskenderun, 18.V.2013, 4 exs.

İstanbul: Central province, 26.VI.2017, 3 exs.; Kartal, 13.VI.2016, 1 ex.

İzmir: Central province, 24.VII.2008, *W. robusta*, 1 ex., 03.IV.2010, 1 ex., 17.IV.2010, 1 ex., 04.VII.2018, *W. robusta*, 1 ex.; Balçova, 26.V.2017, *Phoenix* sp., 1 ex.; Bayraklı, 8.VI.2016, *Phoenix* sp., 1 ex.; Bergama, 3.VI.2017, *Phoenix* sp., 1 ex., Bergama, Karahıdırlı, 08.2012, pheromon trap, 6 exs.; Bornova, 03.V.2017, *W. robusta*, 3 exs., 22.XI.2017, *Chamaerops* sp., 3 exs., 03.V.2018, *Washingtonia filifera*, 1 ex., 18.V.2018, *W. robusta*, 2 exs.; Çeşme, 06.VI.2011, *W. robusta*, 1 ex.; Çiğli, 19.V.2017, *Phoenix* sp., 2 exs.; Güzelbahçe, 26.V.2017, *Phoenix* sp., 3 exs.; Karabağlar, 13.X.2016, *Phoenix* sp., 1 ex.; Karaburun, 18.V.2017, *Phoenix* sp., 2 exs.; Karşıyaka, 8.VI.2016, *Phoenix* sp., 4 exs.; Konak, 9.XI.2017, *Phoenix* sp., 1 ex.; Menderes, 6.VI.2016, *Phoenix* sp., 1 ex., Menderes, Gümüldür, 9.VIII.2013, *Phoenix* sp., 1 ex., Menderes, Gümüldür, Özdere, 19.VIII.2014, *Phoenix* sp., 1 ex.; Menemen, 07.V.2009, 1 ex., 14.VII.2012, *W. robusta*, 3 exs., 24.V.2016, *Phoenix* sp., 1 ex.; Narlıdere, 26.V.2017, *Phoenix* sp., 2 exs.; Ödemiş, 25.VII.2008, *W. robusta*, 2 exs.; Seferihisar, 7.VIII.2018, *Phoenix* sp., 2 exs.; Torbalı, 5.VI.2015, *Phoenix* sp., 1 ex.; Urla, 28.V.2018, *Phoenix* sp., 2 exs.

Kocaeli: İzmit, 19.VI.2018, 2 exs.

Manisa: Salihli, 27.IX.2012, 1 ex.; Sarıgöl, 18.VII.2012, 4 exs.; Şehzadeler, 8.XI.2018, 4 exs.; Yunusemre, 8.XI.2018, 3 exs.

Mersin: Central province, 26.V.2013, 1 ex.; Tarsus, 26.VIII.2018, 1 ex.; Taşucu, 4.VI.2015, 1 ex.

Muğla: Bodrum, 26.V.2009, 3 exs.; Datça, 7.VI.2018, 1 ex.; Fethiye, 13.VI.2011, 3 exs.; Köyceğiz, 27.V.2017, 2 exs.; Marmaris, 3.VI.2017, 4 exs.

Yalova: Çınarcık, 25.VI.2018, 2 exs.

Totally 195 specimens. Distribution of this species in Turkey were given in Figure 1.

Precautions to prevent the spread of this invasive species in Turkey should be taken as soon as possible.

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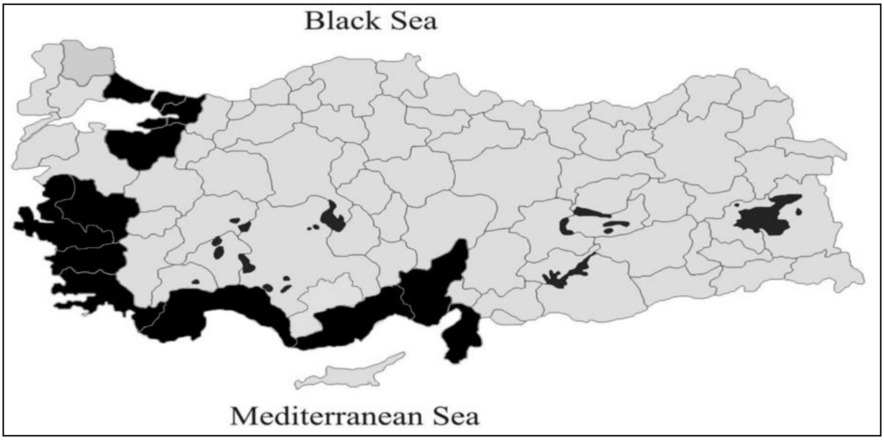

Figure 1. Distribution of *Rhynchophorus ferrugineus* (Olivier, 1790) in Turkey.

SOUTHEASTERN ANATOLIA REGION INSECT FAUNA II (ORDER HEMIPTERA I: SUBORDER HETEROPTERA II: TINGOIDEA, REDUVIOIDEA, ARADOIDEA, COREOIDEA, LYGAEOIDEA) OF TURKEY

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[Bolu, H. 2020. Southeastern Anatolia region insect fauna II (Order Hemiptera I: Suborder Heteroptera II: Tingoidea, Reduvioidea, Aradoidea, Coreoidea, Lygaeoidea) of Turkey. Munis Entomology & Zoology, 15 (1): 121-139**]**

ABSTRACT: Evaluated on insect species in various ecologies have been conducted in the provinces (Adıyaman, Batman, Gaziantep, Diyarbakır, Mardin, Siirt, Şanlıurfa, Şırnak) of Southeastern Anatolia region between the years 1948-2019. During this study totally 208 species were found in 10 families and in 5 superfamilies of Heteroptera. Those superfamilies are Reduvioidea, Tingoidea, Aradoidea, Coreoidea and Lygaeoidea. The distribution of determined insect types according to the provinces, plant hosting and feeding type is also done. Information about their host plants, and distribution in Southeastern Anatolia Region was presented as detailed.

KEY WORDS: Insect fauna, Heteroptera, Southeastern Anatolia region, Turkey

Insects (Insecta) are the most numerous group of animals in the world, with over one million species that have been described (Price, 1997). Insects are difficult to study because they represent the most species-rich, yet one of the least known, of all taxa of living organisms, a problem that is compounded by a dearth of skilled entomologists. Although the number of described insect species is uncertain due to synonyms and the lack of a global list, most authorities recognize 900 000–1 000 000 named morpho-species, representing 56% of all species known on Earth (Groombridge, 1992; Anonymous, 2003). Sensible estimates of the number of insects yet to be discovered range from another 1 million to 30 million species (Erwin 1982, 1991), although most predict around 2–8 million more species (May, 1990; Gaston, 1991; Stork, 1997; Ødegaard, 2000).Conservative estimates suggest that 50–90% of the existing insect species on Earth have still to be discovered, yet the named insects alone comprise more than half of all known species of organism.

Insects constitute the most diverse form of animal life in terrestrial ecosystems. Most species are innocuous and essential components of natural ecosystems. Because they are cold-blooded, the rates of key physiological processes in their life cycles are determined by environmental conditions, especially temperature and precipitation. In general they have short generation times, high fecundity and high mobility (Moore & Allard, 2008).

Turkey in fact seems to be like a small continent in terms of biological diversity. Despite the Anatolia is not a continent alone, it contains all properties of a continent that should have an ecosystem and habitat. Each of seven geographical regions in Turkey has a distinguishable climate, flora and fauna. This study aims to determine insect species found in various ecologies on Southeastern Anatolia.

Heteroptera includes 9365 species belonging to 1632 genera in Palaearctic Region (Aukema et al., 2013).

Heteroptera includes 1526 species and subspecies belonging to 40 families in Turkey (Önder et al., 2006).

This study aims to determine insect species found in various ecologies on Southeastern Anatolia region of Turkey.

MATERIAL AND METHODS

Entomology studies on insect species of Southeastern Anatolia Region (Adıyaman, Batman, Gaziantep, Diyarbakır, Mardin, Siirt, Şanlıurfa, Şırnak) in different ecological provinces were made between the years 1948-2019 (Fig. 1).

In this study, I prepared for the inventory has reached the major advantage of the waterways:

-Currently in Turkey, published or unpublished entomology journals related to scanning,

-Giving more weight to faunistic studies, and in the meantime, the insect fauna of our country foreign scientific journals that publishes articles about scanning,

-Faculty of Agriculture, Faculty of Science and Regional Plant Protection Research Institute in the library of books on insect fauna and the screening of the booklet,

-The doctorate (PhD) and the master's thesis of entomology in the region on the scanning,

-Review of other studies on the insect fauna in the area.

In this study, I evaluated the information as described above were obtained.

RESULTS AND DISCUSSION

Surveys on insect species in various ecologies have been conducted in the provinces (Adıyaman, Batman, Gaziantep, Diyarbakır, Mardin, Siirt, Şanlıurfa, Şırnak) of Southeastern Anatolia region between the years 1948-2019. Almost 2600 species and subspecies almost 180 families belonging to 13 insect orders are defined owing to these studies. The distributions of determined insect species are as follows: suborder Heteroptera included 10 families were recorded (Table 1).

Hemiptera
Heteroptera
Cimicomorpha
Reduvioidea
Reduviidae

***Coranus aegyptius* (Fabricius, 1775)**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Wetland (Hoberlandt, 1955; Önder et al., 2006).

***Coranus contrarius* Reuter, 1881**
Distribution of the studies area: Gaziantep; Host plant: Wetland (Önder et al., 2006).

***Holotrichius apterus* Jakovlev, 1879**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Hoberlandt, 1955; Önder et al., 2006).

***Holotrichius putoni* Reuter, 1909**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).

Holotrichius rotundatus **Stål, 1874**
Distribution of the studies area: Adıyaman; Host plant: Meadow pasture (Önder et al., 2006).
Nagusta goedeli **Kolenati, 1857**
Distribution of the studies area: Mardin, Southeastern Anatolia Region; Host plant: Meadow pasture, Olive, Pistachio, Pomegranate (Mart & Altın, 1992; Önder et al., 2006; Kaplan et al., 2011; Şimşek & Bolu, 2016).
Oncocephalus acutangulus **Reuter, 1882**
Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: Meadow pasture, Pomegranate (Mart & Altın, 1992; Önder et al., 2006).
Onocephalus fasciatus **(De Geer, 1773)**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Pomegranate (Mart & Altın, 1992).
Oncocephalus notatus **(Klug, 1830)**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Önder et al., 2006).
Oncocephalus pugnax **Horvath, 1898**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Önder et al., 2006).
Oncocephalus squalidus **(Rossi, 1790)**
Distribution of the studies area: Gaziantep, Şanlıurfa, Southeastern Anatolia Region; Host plant: Meadow pasture, Pomegranate (Mart & Altın, 1992; Önder et al., 2006).
Oncocephalus thoracicus **Fieber, 1861**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).
Pasira basiptera **Stål, 1859**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
Peirates hybridus **(Scopoli, 1763)**
Distribution of the studies area: Diyarbakır, Gaziantep, Siirt; Host plant: Light trap, Meadow pasture, Pistachio (Önder & Adıgüzel 1979; Önder et al., 2006; Matocq & Özgen, 2010).
Reduvius ciliatus **Jakovlev, 1879**
Distribution of the studies area: Gaziantep, Mardin; Host plant: Meadow pasture, Cherry (Önder et al., 2006; Matocq & Özgen, 2010).
Reduvius festai **G.-T., 1894**
Distribution of the studies area: Adıyaman; Host plant: Meadow pasture (Önder et al., 2006).
Reduvius pallipes **Klug, 1830**
Distribution of the studies area: Diyarbakır, Siirt, Southeastern Anatolia Region; Host plant: Light trap, Pistachio, Pomegranate (Önder & Adıgüzel 1979; Mart & Altın, 1992; Önder et al., 2006; Matocq & Özgen, 2010).
Rhynocoris christophi **(Jakovlev, 1877)**
Distribution of the studies area: Gaziantep; Host plant: Wetland (Önder et al., 2006).
Rhynocoris erythropus **(Linnaeus, 1767)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Meadow pasture (Önder et al., 2006).
Rhynocoris flavolimbatus **(Jakovlev, 1889)**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).

***Rhynocoris niger* (Herrich-Schäffer, 1842)**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Önder et al., 2006).
***Rhynocoris iracundus* (Poda, 1761)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Rhynocoris kolenatii* Reuter, 1881**
Distribution of the studies area: Diyarbakır; Host plant: Cereal (Karaca et al., 2012).
***Rhynocoris persicus* (Jakovlev, 1877)**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Önder et al., 2006).
***Rhynocoris punctiventris* (Herrich-Schäffer, 1846)**
Distribution of the studies area: Diyarbakır; Host plant: Cereal (Karaca et al., 2012).
***Stenolomus bogdanovi* Oshanin, 1870**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Vachiria natolica* Stål, 1859**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Meadow pasture (Önder et al., 2006).

Tingoidea
Tingidae

***Agramma atricapillum* (Spinola, 1837)**
Distribution of the studies area: Diyarbakır, Mardin, Şanlıurfa; Host plant: Agricultural area, Meadow pasture, Wetland (Önder et al., 2006).
***Campylosteira bosnica* Horvath, 1892**
Distribution of the studies area: Diyarbakır; Host plant: Light trap, Meadow pasture (Önder & Adıgüzel, 1979; Önder et al., 2006).
***Cantacader quadricornis* (Lepeletier & Serville, 1828)**
Distribution of the studies area: Siirt; Host plant: Pistachio (Özgen et al., 2018).
***Catoplatus anticus* (Reuter, 1880)**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Catoplatus crassipes* (Fieber, 1861)**
Distribution of the studies area: Diyarbakır; Host plant: Angustifolia, Overwintering areas, Plum (Lodos et al., 1984; Maral, 2012; Maral et al., 2012).
***Catoplatus distinctus* Montandon, 1895**
Distribution of the studies area: Siirt; Host plant: The culture plant (Önder et al., 2006).
***Catoplatus hilaris* Horvath, 1906**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Meadow pasture, *Prunus amygdalus* (Önder et al., 2006; Maral, 2012; Maral et al., 2012).
***Catoplatus nigriceps* Horvath, 1905**
Distribution of the studies area: Diyarbakır; Host plant: Meadow pasture (Önder et al., 2006).
***Copium adumbratum* (Horvath, 1891)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Almond, Overwintering areas (Lodos et al., 1984; Maral, 2012; Maral et al., 2012).

***Copium clavicorne* (Linnaeus, 1758)**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Meadow pasture (Önder et al., 2006).
***Copium teucrii* (Host, 1788)**
Distribution of the studies area: Diyarbakır; Host plant: Hawthorn (Maral, 2012; Maral et al., 2012; Matocq et al., 2014).
***Dictyla echii* (Schrank, 1782)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Dictyla nassata* (Puton, 1874)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Dictyla triconula* (Seidenstucker, 1954)**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Elasmotropis testacea* (Herrich-Schäffer, 1830)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: *Cirsium* sp., Oak, Pistachio, *Populus* sp., *Pyrus malus*, *Quercus* sp. (Maral, 2012; Maral et al., 2012; Şimşek & Bolu, 2017).
***Galeatus helianthi* Önder & Lodos, 1977**
Distribution of the studies area: Diyarbakır, Batman, Mardin, Siirt, Şanlıurfa; Host plant: Sunflower (Kıran, 1978).
***Galeatus scrophicus* Saunders, 1876**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Meadow pasture, The culture plant (Önder et al., 2006).
***Hyalochiton multiseriatus* (Reuter, 1888)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Unknown (Péricart, 1983; Matocq et al., 2014).
***Kalama tricornis* (Schrank, 1801)**
Distribution of the studies area: Diyarbakır; Host plant: *Elaeagnus* sp., Oak (Maral, 2012; Maral et al., 2012).
***Lasiacantha hedenborgii* (Stål, 1873)**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: *Crataegus* sp., Pistachio (Bolu, 2002; Maral, 2012; Maral et al., 2012).
***Monosteira lobulifera* Reuter, 1888**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Pistachio, Almond, Peach, Poplar, The culture plant, Willow (Bolu, 2002; Bolu et al., 2005; Önder et al., 2006; Bolu, 2007; Bolu et al., 2011; Maral, 2012; Maral et al., 2012; Şimşek & Bolu, 2017).
***Monosteira unicostata* (Mulsant & Rey, 1852)**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Pistachio, Almond, Peach, Poplar, The culture plant, Willow (Önder & Adıgüzel 1979; Bolu, 2002; Bolu et al., 2005; Önder et al., 2006; Bolu, 2007; Bolu et al., 2011; Maral, 2012; Maral et al., 2012; Şimşek & Bolu, 2017).
***Physatocheila confinis* Horváth, 1905**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: *Prunus amygdalus*, *Prunus mahlep* (Maral, 2012; Maral et al., 2012).
***Stephanitis oschanini* Vasiliev, 1935**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).

***Stephanitis pyri* (Fabricius, 1775)**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Pistachio, Almond, Peach, Poplar, The culture plant, Willow (Önder & Adıgüzel 1979; Bolu, 2002; Bolu et al., 2005; Önder et al., 2006; Bolu, 2007; Bolu et al., 2011; Maral, 2012; Maral et al., 2012; Maral et al., 2012; Şimşek & Bolu, 2017).
***Tingis auriculata* (Costa, 1847)**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Tingis elongata* (Fieber, 1861)**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Tingis grisea* Germar, 1835**
Distribution of the studies area: Diyarbakır; Host plant: Agricultural area, Scrub and Grassland Overwintering areas (Lodos et al., 1984; Önder et al., 2006).
***Tingis hellenica* (Puton, 1877)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: *Crataegus* sp., *Quercus* sp. (Maral, 2012; Maral et al., 2012).
***Tingis reuteri* Horvath, 1906**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Urentius chobauti* Horvath, 1907**
Distribution of the studies area: Gaziantep; Host plant: Meadow pasture (Önder et al., 2006).
***Urentius euonymus* Distant, 1909**
Distribution of the studies area: Diyarbakır; Host plant: *Althea* spp. (Malvaceae) (Bolu et al., 2019).

Pentatomomorpha
Aradoidea
Aradidae

***Aradus betulae* (Linnaeus, 1758)**
Distribution of the studies area: Gaziantep; Host plant: Agricultural and forest areas (Önder et al., 2006).
***Aradus brenskei* Reuter, 1884**
Distribution of the studies area: Gaziantep; Host plant: Agricultural area (Önder et al., 2006).
***Aradus cilicum* Heiss, 1990**
Distribution of the studies area: Gaziantep; Host plant: Forest area (Önder et al., 2006).
***Aradus flavicornis* Dalman, 1823**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).
***Aradus krueperi* Reuter, 1884**
Distribution of the studies area: Gaziantep; Host plant: Agricultural area (Önder et al., 2006).
***Aradus versicolor* Herrich-Schäffer, 1839**
Distribution of the studies area: Gaziantep; Host plant: Forest area (Önder et al., 2006).

Coreoidea

Alydidae

***Alydus annulatus* Brullé, 1832**

Distribution of the studies area: Diyarbakır, Mardin; Host plant: Almond (Bolu et al., 2005).

***Camptopus lateralis* (Germar, 1817)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).

Coreidae

***Arenocoris waltlii* (Herrich-Schäffer, 1834)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984; Matocq et al., 2014).

***Centrocoris spiniger* (Fabricius, 1781)**

Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).

***Centrocoris variegatus* Kolenati, 1845**

Distribution of the studies area: Mardin; Host plant: Vineyard (Özgen, 2012).

***Ceraleptus obtusus* (Brulle, 1839)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Gözüaçık, 2012).

***Coreus marginatus* (Linnaeus, 1758)**

Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).

***Coriomeris affinis* (Herrich-Schäffer, 1839)**

Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).

***Coriomeris denticulatus* (Scopoli, 1763)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Gözüaçık, 2012).

***Coriomeris hirticornis* (Fabricius, 1794)**

Distribution of the studies area: Diyarbakır; Host plant: Light trap, Overwintering areas (Önder & Adıgüzel 1979; Lodos et al., 1984; Matocq et al., 2014).

***Coriomeris spinolai* (Costa, 1847)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos, et al., 1984).

***Coriomeris vitticolis* Reuter, 1900**

Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).

***Enoplops disciger* (Kolenati, 1845)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Gözüaçık, 2012).

Rhopalidae

***Agraphopus lethierryi* Stål, 1872**

Distribution of the studies area: Mardin; Host plant: Scrub and Meadows areas (Önder et al., 2006).

***Agraphopus pallens* Schmidt, 1939**

Distribution of the studies area: Mardin; Host plant: Scrub and Meadows areas (Önder et al., 2006).

***Brachycarenus tigrinus* (Schilling, 1829)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979; Matocq et al., 2014).
***Chorosoma schillingi* (Schilling, 1829)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979; Matocq et al., 2014).
***Corizus brevicornis* Horváth, 1917**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Corizus hyoscyami* (Linnaeus, 1758)**
Distribution of the studies area: Diyarbakır; Host plant: Legume forage crops, Overwintering areas (Lodos et al., 1984; Akkaya, 1995).
***Corizus fenestella* Horvath, 1917**
Distribution of the studies area: Diyarbakır; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Corizomorpha janowskyi* Jakovlev, 1882**
Distribution of the studies area: Diyarbakır; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Liorhyssus hyalinus* (Fabricius, 1794)**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Cherry, Legume forage crops, Light trap, Tobacco (Önder & Adıgüzel 1979; Karaat, 1986; Akkaya, 1995; Matocq & Özgen, 2010; Matocq et al., 2014).
***Maccevethus errans caucasicus* (Kolenati, 1845)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Maccevethus caucasicus* (Kolenati, 1845)**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Cherry, Legume forage crops, Overwintering areas, Tobacco (Lodos et al., 1984; Karaat, 1986; Akkaya, 1995; Matocq & Özgen, 2010).
***Rhopalus lepidus* Fieber, 1861**
Distribution of the studies area: Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Rhopalus maculatus* (Fieber, 1836)**
Distribution of the studies area: Adıyaman, Diayarbakır, Gaziantep, Siirt; Host plant: Scrub and Meadows areas (Önder et al., 2006; Matocq et al., 2014).
***Rhopalus parumpunctatus* Schilling, 1829**
Distribution of the studies area: Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlıurfa; Host plant: Overwintering areas, Pistachio (Lodos et al., 1984; Bolu, 2002; Matocq et al., 2014).
***Rhopalus subrufus* (Gmelin, 1788)**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Agricultural area, Forest area, Meadow pasture (Önder et al., 2006; Matocq et al., 2014).
***Stictopleurus abutilon* (Rossi, 1790)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Stictopleurus crassicornis* (Linnaeus, 1758)**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).

***Stictopleurus riveti* Royer, 1923**
Distribution of the studies area: Diyarbakır, Siirt, Şanlıurfa; Host plant: Light trap, Scrub and Meadows areas (Önder & Adıgüzel 1979; Önder et al., 2006).

Stenocephalidae

***Dicranocephalus marginatus* (Ferrari, 1874)**
Distribution of the studies area: Diyarbakır; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Dicranocephalus putoni* (Horvath, 1897)**
Distribution of the studies area: Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Dicronacephalus setulosus* (Ferrari, 1874)**
Distribution of the studies area: Diyarbakır; Host plant: Scrub and Meadows areas (Önder et al., 2006).

Lygaeoidea
Berytidae

***Berytinus clavipes* Fabricius, 1775**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Berytinus (Berytinus) hirticornis nigrolineatus* (Jakovlev, 1903)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Berytinus montivagus* Meyer-Dür, 1841**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Berytinus striola* Ferrari, 1874**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Pistachio (Bolu, 2002).
***Campsocoris* sp. nr. *punctipes* Germ.**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Gampsocoris punctipes pallidus* Hoberlandt, 1951**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Metacanthus (Metacanthus) meridionalis* (A. Costa, 1843)**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Neides brevipennis* Puton, 1895**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).

Lygaeidae

***Aellopus atratus* (Goeze, 1778)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Aphanus rolandri* (Linné, 1758)**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Apterola rubicunda* (Stål, 1872)**
Distribution of the studies area: Gaziantep; Host plant: Forest, Scrub and Meadows areas (Önder et al., 2006).

***Artheneis alutacea* Fieber, 1861**
Distribution of the studies area: Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Artheneis balcanica* (Kormilev, 1938)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006; Matocq et al., 2014).
***Auchenodes capito* Horvath, 1891**
Distribution of the studies area: Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Beosus maritimus* (Scopoli, 1763)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Scrub and Meadows areas (Önder & Adıgüzel 1979; Önder et al., 2006).
***Beosus quadripunctatus* (Müller, 1766)**
Distribution of the studies area: Diyarbakır, Gaziantep, Mardin, Siirt; Host plant: Pistachio, Scrub and Meadows areas (Önder et al., 2006; Matocq & Özgen, 2010; Matocq et al., 2014).
***Brachyplax palliata* (Costa, 1852)**
Distribution of the studies area: Gaziantep; Host plant: Scrub and Meadows areas (Önder et al., 2006).
***Camptocera glaberrima* (Walker, 1872)**
Distribution of the studies area: Diyarbakır, Gaziantep, Siirt; Host plant: Light trap, Pistachio, Scrub and Meadows areas (Önder & Adıgüzel 1979; Önder et al., 2006; Matocq & Özgen, 2010).
***Corizus hyoscyami* (Linnaeus, 1758)**
Distribution of the studies area: Diyarbakır; Host plant: Pistachio (Şimşek & Bolu, 2017).
***Cymophyes ochrolenca* Fieber, 1870**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Agricultural area and Wetland (Önder et al., 2006; Matocq et al., 2014).
***Cymus claviculus* (Fallen, 1807)**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Cymus melanocephalus* Fieber, 1861**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: *Cistus* sp., *Cupressus* sp., *Gossypium* sp., *Inula* sp., *Juncus* sp., *Medicago sativa, Phragmites* sp., *Quercus* sp., *Rubus* sp., *Tamarix* sp., *Trifolium* sp., *Triticum* sp., *Verbascum* sp., Leguminous plants, Weeds (Lodos et al., 1999; Matocq et al., 2014).
***Drymus (Drymus) pilipes* Fieber, 1861**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Drymus (Sylvadrymus) brunneus confinis* Reuter, 1893**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Emblethis angustus* Montandon, 1890**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).
***Emblethis denticollis* Horvath, 1878**
Distribution of the studies area: Gaziantep, Siirt; Host plant: Pistachio, Scrub and Meadows areas (Önder et al., 2006; Matocq & Özgen, 2010).

***Emblethis kareli* Hoberlandt, 1955**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Emblethis setifer* Seidenstücker, 1966**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Emblethis verbasci* (Fabricius, 1803)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Light trap (Önder & Adıgüzel 1979; Matocq et al., 2014).
***Eremocoris fenestratus* (Herrich-Schaeffer, 1839)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Geocoris arenarius* (Jakovlev, 1867)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Melon, Watermelon, Rocky and sand dune field (Çakır & Önder, 1990; Önder et al., 2006; Büyük & Özpınar, 1999).
***Geocoris ater* (Fabricius, 1787)**
Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: Cotton, *Arbutus* sp., *Berberis* sp., *Cedrus* sp., *Convolvulus* sp., *Juncus* sp., *Medicago maritimus*, *M. minima*, *Onopordum* sp., *Salix* sp., *Verbascum* sp., Weeds, on the ground and under stone; Host insect: *Psallus ancorifer* (Çakır & Önder, 1990; Göven, 1995; Lodos et al., 1999).
***Geocoris grylloides* (Linnaeus, 1791)**
Distribution of the studies area: Mardin; Host plant: Rocky and sand dune field (Çakır & Önder, 1990; Önder et al., 2006).
***Geocoris megacephalus* (Rossi, 1790)**
Distribution of the studies area: Adıyaman, Diyarbakır, Mardin, Siirt, Şanlıurfa; Host plant: Cotton, Light trap, Rocky and sand dune field (Önder & Adıgüzel 1979; Çakır & Önder, 1990; Göven & Efil, 1994; Matocq et al., 2014).
***Geocoris pallidipennis* (Costa, 1843)**
Distribution of the studies area: Adıyaman, Diyarbakır, Mardin, Şanlıurfa; Host plant: Cotton, Light trap, Melon, Watermelon, Rocky and sand dune field (Önder & Adıgüzel 1979; Çakır & Önder, 1990; Göven & Efil, 1994; Büyük & Özpınar, 1999).
***Geocoris (Geocoris) phaeopterus* (Germar, 1838)**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Geocoris (Piocoris) erythrocephalus* (Lepeletier & Serville, 1825)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Geocoris (Piocoris) luridus* (Fieber, 1844)**
Distribution of the studies area: Diyarbakır; Host plant: Pistachio (Şimşek & Bolu, 2016).
***Geocoris (Piocoris) putonianus* Bergroth, 1892**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Heterogaster artemisiae* Schilling, 1829**
Distribution of the studies area: Southeastern Anatolia Region; Host plant: Pomegranate (Mart & Altın, 1992).

***Heterogaster urticae* (Fabricius, 1775)**
Distribution of the studies area: Gaziantep; Host plant: *Armeniaca vulgaris*, *Laurus* sp., Pistachio, *Triticum* sp., *Urtica* sp., *Verbascum* sp., Weeds (Lodos et al., 1999; Bolu, 2002).
***Ischnodemus genei* (Spinola, 1837)**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Ischnodemus suturalis* Horvath, 1883**
Distribution of the studies area: Gaziantep; Host plant: *Centaurea* sp., *Pinus* sp., Weeds, Scrub and grasslands (Lodos et al., 1999; Önder et al., 2006).
***Ischnopeza pallipes* Puton, 1892**
Distribution of the studies area: Mardin; Host plant: Unknown (Matocq et al., 2014).
***Lamprodema maurum* (Fabricius, 1803)**
Distribution of the studies area: Diyarbakır, Gaziantep, Siirt; Host plant: Light trap, Pistachio, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006; Matocq & Özgen, 2010).
***Lasiocoris anomalus* (Kolenati, 1845)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Leptodemus minutus* Jakovlev, 1874**
Distribution of the studies area: Gaziantep, Siirt; Host plant: Pistachio, *Salix* sp. (Lodos et al., 1999; Matocq & Özgen, 2010).
***Lethaeus cribratissimus* (Stål, 1859)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Scrub and grasslands (Önder et al., 2006; Matocq et al., 2014).
***Lethaeus lethierryi* (Puton, 1869)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006).
***Lethaeus picipes* (Herrich-Schäffer, 1853)**
Distribution of the studies area: Diyarbakır, Mardin, Siirt; Host plant: Light trap, Pistachio, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006; Matocq & Özgen, 2010).
***Lygaeosoma reticulata* Herrich-Schaeffer, 1838**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Lygaeosoma reticulatum* (Herrich-Schäffer, 1839)**
Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: Pistachio, Scrub and grasslands, *Acer* sp., *Astragalus* sp., *Centaurea* sp., *Juniperus* sp., *Onopordum* sp., *Quercus* sp., *Verbascum* sp., Weeds (Lodos et al., 1999; Bolu, 2002; Önder et al., 2006).
***Lygaeus creticus* (Lucas, 1854)**
Distribution of the studies area: Gaziantep, Mardin; Host plant: Scrub and grasslands, *Elaeagnus argentea*, *Nerium oleander, Prunus amygdalis, P. persica*, *Rhus* sp., borraginaceaeous plants (Lodos et al., 1999; Önder et al., 2006; Matocq et al., 2014).
***Lygaeus equestris* (Linné, 1758)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Lygaeus pandurus* (Scopoli, 1763)**
Distribution of the studies area: Gaziantep; Host plant: *Abies* sp., *Althaea rosae, Asphodaline* sp., *Asphodelus* sp., *Astragalus* sp., *Centaurea* sp., *Cirsium* sp.,

Cistus sp., *Cupressus* sp., *Eleagnus orientalis, Escholtzia* sp., *Genista* sp., *Hedera* sp., *Hordeum vulgare*, *Juniperus* sp., *Onobrychis* sp., *Laurus nobilis*, *Morus* sp., *Nerium oleander*, *Onopordum* sp., *Pinus* sp., *Quercus ilex*, *Rosa* sp., *Rhus* sp., *Styrax* sp., *Triticum vulgare*, *Verbascum* sp., *Vitis vinifera*, Poaceous plants, Weeds (Lodos et al., 1999; Önder et al., 2006).

***Lygaeus saxatilis* (Scopoli, 1763)**

Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: *Alhagi* sp., *Astragalus* sp., *Beta vulgaris*, *Cannabis sativa*, *Centaurea* sp., *Chenopodium* sp., *Cirsium* sp., *Convolvulus* sp., *Cupressus* sp., *Genista* sp., *Hordeum* sp., *Hypericum* sp., *Juncus* sp., *Juniperus* sp., *Medicago sativa*, *Onopordum* sp., *Pinus* sp., *Pyrus malus*, *Prunus armeniaca*, *Quercus* sp., *Ulmus* sp., *Verbascum* sp., *Viscum album*, Cruciferaous plants, Poaceous plants, Weeds (Lodos et al., 1999; Önder et al., 2006).

***Lygaeus equestris* (Linnaeus, 1758)**

Distribution of the studies area: Diyarbakır, Southeastern Anatolia Region; Host plant: Pistachio, Pomegranate (Mart & Altın, 1992; Şimşek & Bolu, 2017).

***Macroplax fasciata* (Herrich-Schäffer, 1835)**

Distribution of the studies area: Gaziantep; Host plant: *Astragalus* sp., *Citrus* sp., *Onopordum* sp., *Pyrus communis, Quercus* sp., *Rubus* sp., *Styrax* sp., *Tamarix* sp., *Triticum* sp., *Veronica* sp., different species of weeds (Lodos et al., 1999).

***Megalonotus colon* Puton, 1874**

Distribution of the studies area: Diyarbakır, Gaziantep, Siirt; Host plant: Light trap, Overwintering areas, Pistachio, Scrub and grasslands (Lodos et al., 1984; Lodos et al., 1999; Önder et al., 2006; Matocq & Özgen, 2010; Matocq et al., 2014).

***Megalonotus longipilis* (Puton, 1884)**

Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).

***Megalonotus maximus* (Puton, 1895)**

Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).

***Megalonotus praetextatus* (Herrich-Schäffer, 1835)**

Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands (Önder et al., 2006).

***Megalonotus setosus* Puton, 1874**

Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).

***Megalonotus sabulicola* (Thomson, 1870)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).

***Melanocoryphus sefrensis* (Reuter, 1900)**

Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands, Wooded area (Önder et al., 2006).

***Melanocoryphus tristrami* (Douglas & Scott, 1868)**

Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).

***Melanocoryphus superbus* (Pollach, 1779)**

Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Scrub and grasslands, (Önder & Adıgüzel 1979; Önder et al., 2006).

***Metopoplax fuscinervis* Stål, 1872**

Distribution of the studies area: Gaziantep; Host plant: *Artemisia* sp., *Astragalus* sp., *Citrus* sp., *Malus communis, Matricaria chamomilla, Pinus* sp., *Sinapis* sp., *Triticum* sp., *Urtica* sp., *Verbascum* sp., different species of weeds Scrub and grasslands (Lodos et al., 1999; Önder et al., 2006).

Metopoplax origani **(Kolenati, 1845)**

Distribution of the studies area: Diyarbakır, Gaziantep, Mardin, Southeastern Anatolia Region; Host plant: Light trap, Pistachio (Önder & Adıgüzel 1979; Bolu, 2002; Matocq et al., 2014).

Microplax albofasciata **(Costa, 1847)**

Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands (Önder et al., 2006).

Microplax interrupta **(Fieber, 1836)**

Distribution of the studies area: Diyarbakır, Gaziantep, Mardin; Host plant: Scrub and grasslands, Overwintering areas, *Juncus* sp., *Juniperus* sp., *Mentha* sp., *Quercus* sp., *Salvia* sp., *Verbascum* sp., on weeds (Lodos et al., 1984; Lodos et al., 1999; Önder et al., 2006; Matocq et al., 2014).

Microplax limbata **Fieber, 1864**

Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: Pistachio, *Cedrus* sp., *Olea europea*, *Pistacia terebinthus*, *Quercus* sp., *Salix* sp., poaceous plants and different species of weeds, Scrub and grasslands (Lodos et al., 1999; Bolu, 2002; Önder et al., 2006; Matocq et al., 2014).

Neurocladus brachiidens **(Dufour, 1851)**

Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).

Nysius carinata **Lindberg, 1932**

Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).

Nysius cymoides **(Spinola, 1837)**

Distribution of the studies area: Diyarbakır, Gaziantep, Mardin, Southeastern Anatolia Region; Host plant: Light trap, Overwintering areas, Pistachio, Scrub and grasslands, *Acacia* sp., *Agropyron* sp., *Beta vulgaris* var. *altissima, Centaurea* sp., *Chenopodium* sp., *Cirsium* sp., *Matricaria* sp., *Mentha* sp., *Medicago sativa, Pyrus communis, Quercus* sp., *Salvia* sp., *Juncus* sp., *Rhus* sp., *Vicia* sp. (Önder & Adıgüzel 1979; Lodos et al., 1984; Lodos et al., 1999; Bolu, 2002; Matocq & Özgen, 2010; Özgen, 2012).

Nysius ericae **(Schilling, 1829)**

Distribution of the studies area: Gaziantep; Host plant: *Anthemis* sp., *Antirrhinum majus, Astragalus* sp., *Centaurea* sp., *Chenopodium* sp., *Cirsium* sp., *Juncus* sp., *Matricaria* sp., *Medicago sativa*, *Mentha* sp., *Phloemis* sp., *Quercus ilex, Q. macrolepis, Salvia* sp., *Sambucus* sp., *Tamarix sp., Triticum* sp., *Verbascum* sp., *Vicia* sp., Scrub and grasslands (Lodos et al., 1999; Önder et al., 2006).

Nysius graminocola **(Kolenati, 1846)**

Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Pistachio, Scrub and grasslands, *Allium cepa*, *Ammi* sp., *Beta vulgaris* var. *altissima*, *Chenopodium* sp., *Cicer arietinum*, *Cirsium* sp., *Crataegus* sp., *Echium* sp., *Gossypium* sp., *Grammea* sp., *Inula* sp., *Juncus* sp., *Lens culinaris*, *Matricaria chamomilla*, *Medicago sativa, Mentha* sp., *Onopordum* sp., *Pinus* sp., *Rhus* sp., *Salvia* sp., *Scrophularia* sp., *Sinapis* sp., *Tamarix* sp., *Triticum* sp., *Verbascum* sp., poaceous plants, weeds (Önder & Adıgüzel 1979; Lodos et al., 1999; Önder et al., 2006; Özgen, 2012).

Nysius punctipennis **(Herrich-Schäffer, 1838)**

Distribution of the studies area: Diyarbakır; Host plant: Light trap, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006).

***Nysius senecionis* (Schilling, 1829)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).
***Nysius stalianus* Horvath, 1890**
Distribution of the studies area: Diyarbakır; Host plant: Light trap, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006).
***Nysius thymi* (Wolff, 1804)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Scrub and grasslands, *Centaurea* sp., *Cicer arietinum*, *Glycyrrhiza glabra*, *Gossypium* sp., *Juniperus* sp., *Mentha* sp., *Phloemis* sp., *Salvia* sp., *Sinapis* sp., *Tamarix sp.*, *Thymus vulgaris*, *Triticum* sp., *Verbascum* sp., poaceous plants, Weeds (Önder & Adıgüzel 1979; Lodos et al., 1999; Önder et al., 2006).
***Orsillus reyi* Puton, 1871**
Distribution of the studies area: Gaziantep; Host plant: Forest area, *Cupressus* sp., *Juniperus* sp., *Pinus* sp., weeds (Lodos et al., 1999; Önder et al., 2006).
***Ortholomus carinatus* (Lindberg, 1932)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Unknown (Matocq et al., 2014).
***Ortholomus jordani* Hoberlandt, 1953**
Distribution of the studies area: Gaziantep; Host plant: *Poterium* sp., Scrub and grasslands (Lodos et al., 1999; Önder et al., 2006).
***Oxycarenus hyalinipennis* (Costa, 1838)**
Distribution of the studies area: GAP area; Host plant: Cotton (Özpınar & Yücel, 2002).
***Oxycarenus pallens* (Herrich-Schäffer, 1853)**
Distribution of the studies area: Diyarbakır, Gaziantep, Siirt, Southeastern Anatolia Region; Host plant: Light trap, Overwintering areas, Pistachio, Scrub and grasslands, *Althaea rosae*, *Amygdalus* sp., *Astragalus* sp., *Beta vulgaris, Capparis* sp., *Centaurea solstitialis, Cirsium* sp., *Daucus* sp., *Fagus* sp., *Hordeum* sp., *Inula* sp., *Juncus* sp., *Juniperus* sp., *Matricaria chamomilla*, *Medicago sativa*, *Olea europea*, *Onopordum* sp., *Phloemis* sp., *Pyrus malus*, *Quercus* sp., *Rhus* sp., *Rubus* sp., *Salix* sp., *Sinapis* sp., *Sonchus* sp., *Tamarix* sp., *Triticum* sp., *Verbascum* sp., poaceous plants, leguminosaeous plants, weeds (Önder & Adıgüzel 1979; Lodos et al., 1984; Lodos et al., 1999; Bolu, 2002; Önder et al., 2006; Matocq & Özgen, 2010).
***Paranysius fraterculus* Horvath, 1895**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Scrub and grasslands (Önder & Adıgüzel 1979; Lodos et al., 1999; Önder et al., 2006).
***Pachybrachius fracticollis* (Schilling, 1829)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap, Scrub and grasslands (Önder & Adıgüzel 1979; Önder et al., 2006).
***Peritrechus flavicornis* Jakovlev, 1877**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).
***Peritrechus gracilicornis* Puton, 1877**
Distribution of the studies area: Diyarbakır; Host plant: Light trap, Overwintering areas (Önder & Adıgüzel 1979; Lodos et al., 1984).
***Peritrechus rhomboidalis* Puton, 1877**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).

***Plinthisus marginatus* Fabricius, 1874**
Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands, Weeds (Lodos et al., 1999; Önder et al., 2006).
***Piocoris arenarius* (Jakovlev, 1867)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).
***Piocoris erythrocephalus* (Poisson & Serville, 1825)**
Distribution of the studies area: Gaziantep, Southeastern Anatolia Region; Host plant: Cotton *Althaea* sp., *Anchusa* sp., *Astragalus* sp., *Ballota* sp., *Cannabis* sp., *Centaurea* sp., *Cirsium* sp., *Cistus* sp., *Crateagus* sp., *Daucus* sp., *Fagus* sp., *Glychirrizza glabra*, *Inula* sp., *Juglans regia*, *Juniperus* sp., *Lathyrus* sp., *Medicago sativa*, *Mentha* sp., *Olea europea*, *Onopordum* sp., *Pinus* sp., *Phaseolus vulgaris*, *Pistacia vera*, *Pyrus angustifolia, P. malus*, *Populus* sp., *Prunus armeniaca*, *Punica granatum*, *Quercus* sp., *Rhus* sp., *Rosa* sp., *Rubus* sp., *Salix* sp., *Salvia* sp., *Sesamum indicum*, *Sinapis* sp., *Spinacia oleracea*, *Tamarix* sp., *Urtica* sp., *Verbascum* sp., *Veronica* sp., *Vitex agnus-castus*, Poaceous and Umbelliferaeous plants, Weeds (Karaat et al., 1986; Göven & Efil, 1994; Göven, 1995; Lodos et al., 1999).
***Piocoris luridus* Fieber, 1844**
Distribution of the studies area: Diyarbakır, Gaziantep, Siirt, Southeastern Anatolia Region; Host plant: Light trap, Overwintering areas, Pistachio, Scrub and grasslands, *Amygdalus communis, Armeniaca vulgaris*, *Cedrus* sp.,*Centaurea* sp., *Ligustrum* sp., *Matricaria* sp., *Pistacia vera*, *Platanus orientalis, Prunus domestica*, *Punica granatum*, *Quercus* sp., *Rubus* sp., *Salix* sp., *Sinapis* sp., *Spinacia oleracea*, *Tamarix* sp., *Ulmus* sp., *Urtica* sp., *Verbascum* sp., *Viburnum* sp., Umbelliferous plants, Weeds (Karat et al., 1986; Lodos et al., 1999; Bolu, 2002; Bolu et al., 2005; Önder et al., 2006).
***Plinthisus marginatus* Fabricius, 1874**
Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands (Önder et al., 2006).
***Rhyparochromus phoeniceus* (Rossi, 1794)**
Distribution of the studies area: Diyarbakır; Host plant: Overwintering areas (Lodos et al., 1984).
***Rhyparochromus reuteri* (Horvath, 1885)**
Distribution of the studies area: Diyarbakır, Gaziantep; Host plant: Light trap, Overwintering areas, Scrub and grasslands (Önder & Adıgüzel 1979; Lodos et al., 1984; Önder et al., 2006).
***Rhyparochromus saturnius* (Rossi, 1790)**
Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands (Lodos et al., 1999; Önder et al., 2006).
***Scolopostethus cognatus* Fieber, 1861**
Distribution of the studies area: Gaziantep; Host plant: Scrub and grasslands, *Urtica* sp., *Verbascum* sp., Weeds (Lodos et al., 1999; Önder et al., 2006).
***Spilosthetus pandurus* (Scopoli, 1763)**
Distribution of the studies area: Diyarbakır, Mardin; Host plant: Almond (Bolu et al., 2005; Matocq et al., 2014).
***Spilostethus saxatilis* (Scopoli, 1763)**
Distribution of the studies area: Diyarbakır; Host plant: Unknown (Matocq et al., 2014).
***Tropistethus holosericeus* (Scholtz, 1847)**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).

***Tropistethus lanternae* Linnavuori, 1960**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).
***Tropistethus majusculus* Horvath, 1881**
Distribution of the studies area: Diyarbakır; Host plant: Light trap (Önder & Adıgüzel 1979).
***Xantochilus minusculus* (Reuter, 1885)**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).
***Xanthochilus saturnius* (Rossi, 1790)**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq & Özgen, 2010).

Pyrrhocoridae

***Pyrrhocoris apterus* (Linnaeus, 1758)**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq et al., 2014).
***Scantius aegyptius aegyptius* (Linnaeus, 1758)**
Distribution of the studies area: Siirt; Host plant: Pistachio (Matocq et al., 2014).

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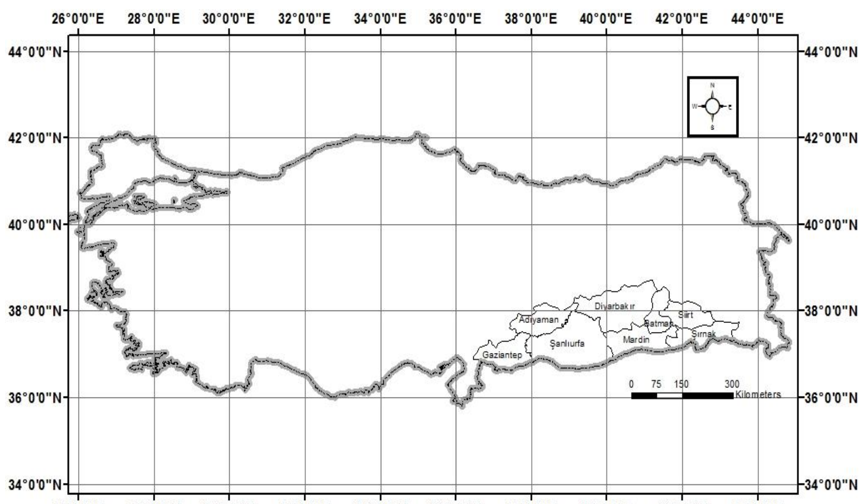

Figure 1. Sampling localities in Southeastern Anatolia Region of Turkey

Table 1. Number of species of Suborder Heteroptera on Southeastern Anatolia Region.

	Superfamily	Family	Number Species	%
Cimicomorpha	Reduvioidea	Reduviidae	27	13.11
	Tingoidea	Tingidae	32	15.05
Pentatomomorpha	Aradoidea	Aradidae	6	2.91
	Coreoidea	Alydidae	2	0.97
		Coreidae	11	5.34
		Rhopalidae	18	8.74
		Stenocephalidae	3	1.46
	Lygaeoidea	Berytidae	8	3.88
		Lygaeidae	99	47.57
		Pyrrhocoridae	2	0.97
Total	5	10	208	100.00

A NEW RECORD FROM THE GENUS *CALLICERA* PANZER, 1809 (INSECTA: DIPTERA: SYRPHIDAE) FROM INDIA

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[Sengupta, J., Naskar, A., Parui, P., Homechaudhuri, S. & Banerjee, D. 2020. A new record from the genus *Callicera* Panzer, 1809 (Insecta: Diptera: Syrphidae) from India. Munis Entomology & Zoology, 15 (1): 140-144**]**

ABSTRACT: One species of genus *Callicera* namely *Callicera nitens* Coe, 1964 is recorded for the first time from India. A brief diagnosis, images and comparison with allied species are provided to validate this species scientifically as a new faunal record from India. The genera as well as the species shows rare distribution pattern along India as well as Oriental region range. There are various environmental and anthropogenic factors that contribute as a threat to the survival strategy of this pollinating hoverfly. Therefore documentation of this species hold high significance in conservation decision making and in ensuring future food security.

KEY WORDS: Taxonomy, New Record, Hoverfly, Syrphidae, *Callicera*, India

The distribution of *Callicera* Panzer, 1809 genus in India is limited with the availability of only 2 species out of total available 355 species from India (Sengupta-Naskar et al., 2016). Genus *Callicera* Panzer, 1809 is characterized by the presence of comparatively longer antennae with long terminal arista. Apart from the 2 available species, 1 species *Callicera nitens* Coe, 1964 is recorded for the first time from India. The species has been collected from Tukpa Valley, Kinnaur district during Survey in the state of Himachal Pradesh in the year 2018.*Callicera nitens* Coe, 1964 have been reportedly associated with pine vegetation (*Pinus* sp.). Thus distribution of this species is evidently in close concordance with that of the pine forests. The aphidophagous larval stages lived in water filled root holes of pine trees (Dixon, 1960) while the pollinating adults are available in upper elevational region where pine dominant vegetation is available. Therefore both the larvae as well as adults are economically important from agricultural view. Thus the present work is relevant in updating the list of current availability of pollinating hoverfly species in India.

MATERIALS AND METHODS

Study area: Kinnaur district of Himachal Pradesh is also known as the "The Land of Gods". Kinnaur surrounded by the Tibet to the east, in the northeast corner of Himachal Pradesh, about 235 kms from Shimla having the three high mountains ranges i.e. Zanskar, Greater Himalayas and Dhauladhar, enclosing valleys of Sutlej, Spiti, Baspa and their tributaries. It is located in the geographical range of 31°05' to 32°05'north to 77°45' to 79°00' East. Survey was conducted in the month of April, 2018 along the district of Kinnaur, Himachal Pradesh.

Collection method: Syrphid flies were collected from the field during day time by using insect sweep nets, traps like malaise trap, pan traps were also used for collection of hoverflies. The collected samples are narcotized by using ethyl acetate and stored for further study in insect envelopes in the field. The specimens were later carried back to the laboratory, mounted on insect pins and stored in insect cabinets.

***Identification of specimens*:** Identification of the fly has been done by following the keys of Miranda & Young et al. (2013), Vockeroth (1992) and Petersen & Shewell et al. (1981) keeping in mind the recent nomenclatural changes After identification, the specimen was deposited in the designated repository of National Zoological Collection, Diptera section, Zoological Survey of India, Kolkata.

Technical details: The 3D map of species distribution has been generated by using ARC GIS software Version 10.1. The photograph of habitus and insect body and parts were taken by using Leica Microscope M205A, where 0.32x Acro lense was used for for habitus photography and PLANAPO 1.0X lense was used for for the photography of body parts.

RESULT

Systematic Account

Subfamily Eristalinae
Tribe Callicerini
Genus *Callicera* Panzer, 1809

Type species: *Bibio aenea* Fabricius

Diagnosis: Body metallic shiny black in colour. Eyes completely covered with hairs, Antennae normally longer in size than normal shape. Long terminal arista present. Scutellum bears hair fringe on ventral side.

Key to species of Genus *Callicera* Panzer, 1809
1. Legs entirely clear orange reddish in colour except for coxa and trochanter.........
....***robusta***, Coe, 1964
- Tarsi area of legs are blackish, legs never orange red in colour............................2
2. Hairs on mesonotum portion of thorax blackish at posterior end........................
....***nitens*** Coe, 1964
- Hairs on mesonotum portion of thorax wholly yellowish whitish colour................
....***christiani*** Ghorpade, 1994

Callicera nitens Coe, 1964 (Figs. 1A-1F)
1964. *Callicera nitens* Coe. Bull. Brit. Mus. Nat. Hist., 15: 287.

Type location: Nepal.

Material examined: 3 ♂♂, Tukpa Valley, Kinnaur district, 2530 mt, 31°25'59"N, 78°14 '36"E, 15.iv.18, coll: J.Sengupta.

Diagnosis: Head: Shining black in colour, covered sparsely with golden orange hairs. Antennae comparatively long with basoflagellomere having excessively long terminal arista. Arista terminal in appearance. Frons less densely haired than face. **Thorax**: Entirely shining black in colour and covered with dense hairs. Hairs predominantly black on notopleuron, posterior anepisternum and on scutellum rim. **Abdomen**: Shining black in colour and highly covered with pubescences. 1st and 2nd abdominal segments covered with dense white pubescences. Whereas hairs covering rest of the segments are brown yellow to black in colour. **Legs**: Dark brown to yellow brown in colour. Tibia covered with white coloured pubescences. Trochanters entirely brownish orange, claws usually bicolored. **Wing**: Clear in appearance, brown suffusion across the middle of wing. Wing venation normal. Microtrichia present in very few abundance. All veins yellow orange in appearance.

Distribution: India: Himachal Pradesh: Kinnaur: Tukpa Valley.

Distribution: Elsewhere: Oriental Region (Nepal).

ACKNOWLEDGEMENTS

Financial assistance from the Ministry of Environment, Forest & Climate Changes (Grant no.F.NO. 270-9/2012-2013/EntDipt), infrastructure support from Director, ZSI and permission to carry out survey in the State of Himachal Pradesh from the Himachal Pradesh Forest Dept. are acknowledged. Thanks is due to Dr. C. Raghunathan, Div. In Charge, Ent. Div. B, for his continuous encouragement. Further, we acknowledge and convey our sincere thanks to our fellow team members for their constant encouragement. Last but not the least a big thank you to Partha for helping during survey time.

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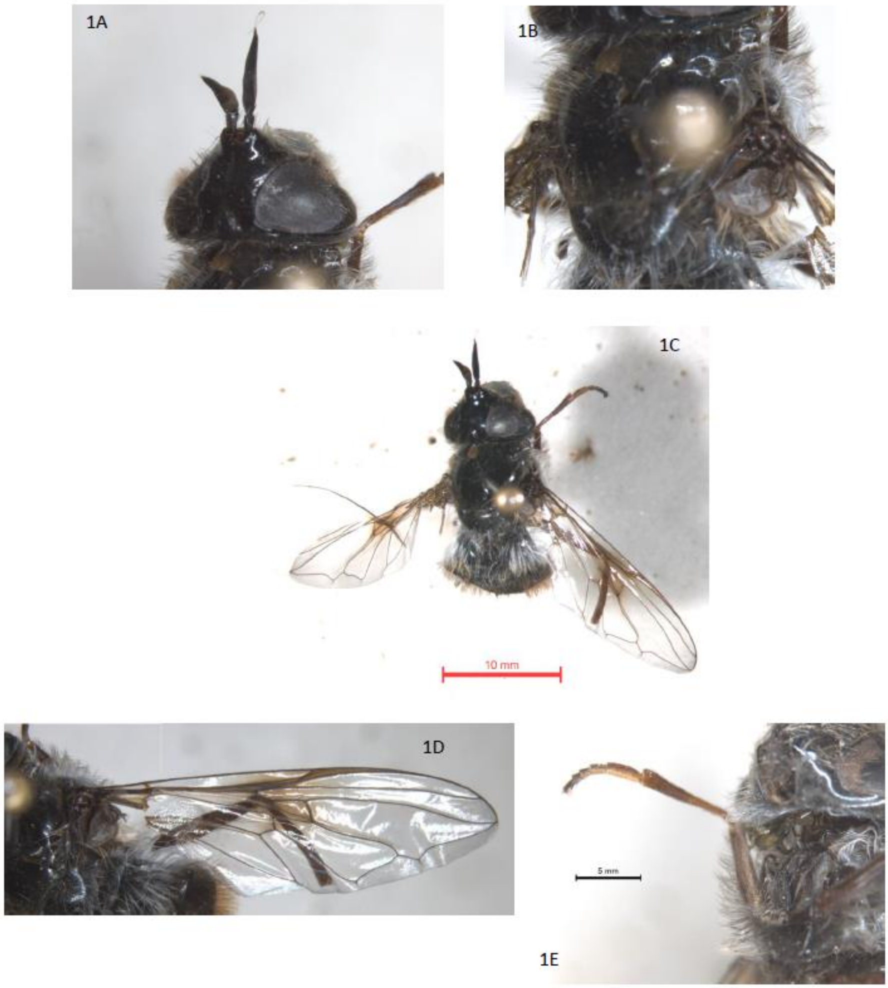

Figures 1A-1E. Dorsal view of head, Dorsal view of thorax, habitus, lateral view of wing and lateral view of leg of *Callicera nitens,* Coe, 1964.

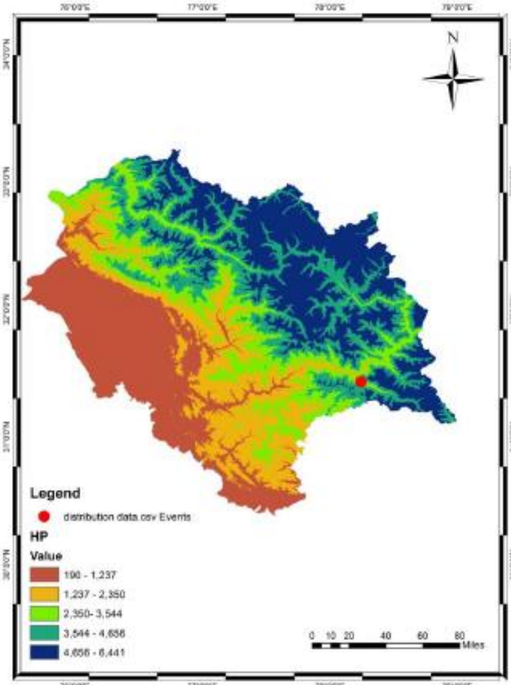

Figure 2. DEM Map of Himachal Pradesh and Shimla district showing the collection site of *Callicera nitens,* Coe, 1964.

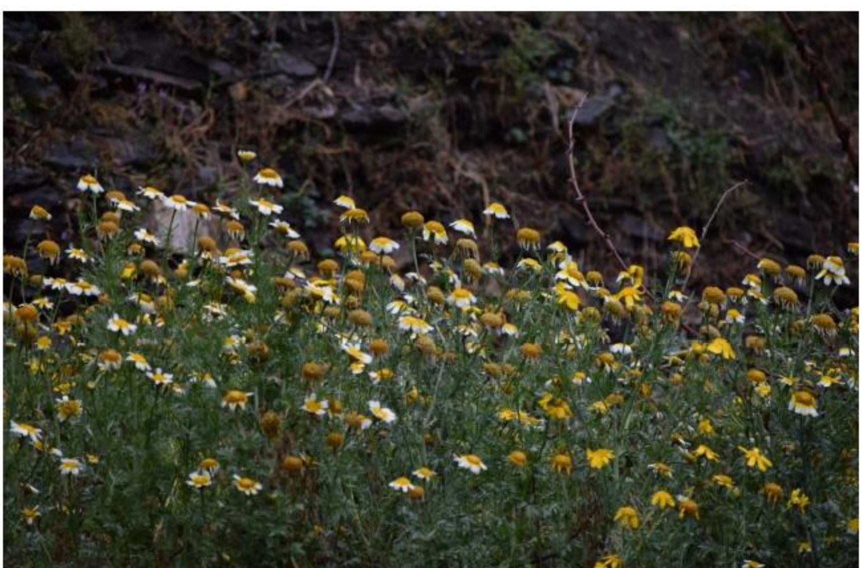

Figure 3. Habitat of collection site of *Callicera nitens,* Coe, 1964 from Kinnaur district, HP.

CATALOGUE OF LONGHORNED BEETLES OF LEMT (LODOS ENTOMOLOGICAL MUSEUM, TURKEY) (COLEOPTERA: CERAMBYCIDAE) PART II: LAMIINAE AND DORCADIONINAE

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[**Tezcan, S., Karsavuran, Y., Pehlivan, E. & Özdikmen, H.** 2020. Catalogue of Longhorned Beetles of LEMT (Lodos Entomological Museum, Turkey) (Coleoptera: Cerambycidae) Part II: Lamiinae and Dorcadioninae. Munis Entomology & Zoology, 15 (1): 145-170]

ABSTRACT: In this second part of study, material belonging to two subfamilies of Cerambycidae housed in the collection of Lodos Entomological Museum, Turkey (LEMT) have been evaluated. A total of 56 species and 44 subspecies belonging to 26 genera have been presented. Among those *Pygoptosia eugeniae* (Ganglbauer, 1884) is a new record for Turkey. Additional new provincial and regional records for many species have been given.

KEY WORDS: Fauna, Cerambycidae, the longhorned beetles, Turkey, biodiversity

The Cerambycidae fauna of Turkey has been studied by many foreign and native scientists. Recent studies of Özdikmen (2007, 2008a, 2008b, 2010, 2011, 2013, 2016, 2017), Özdikmen & Turgut (2007, 2008, 2010), Löbl & Smetana (2010), Sama et al. (2010), Özdikmen & Koçak (2016), Özdikmen & Özdikmen (2016), Lazarev (2019) and Danilevsky (2019) have great importance for Cerambycidae fauna of Turkey. In the previous part of this study (Tezcan et al., 2020) a total of 46 species and 42 subspecies belonging to 50 genera of seven subfamilies have been presented.

The aim of the present paper is to present new locality records of preserved material belonging to Lamiinae and Dorcadioninae subfamilies housed in the Lodos Entomological Museum, Turkey (LEMT) to researchers and relevant persons.

MATERIAL AND METHOD

Most of the material have been collected within the research projects by the researchers of Department of Plant Protection, Faculty of Agriculture, University of Ege (Lodos et al., 1978, 1983, 1989 and others) between the years of 1952-1996. Rest of the material collected and given as a gift to the LEMT, Ege University, İzmir, Turkey, by researchers, students and amateurs. Material have been determined by N. Lodos, C. V. Demelt, W. Braun, C. Holzschuh and C. Pesarini. Material housed in LEMT and evaluated in the publications of Tezcan & Rejzek (2002), Karaca et al. (2006) and Tezcan & Can (2009) have not been included in this catalogue.

RESULTS AND DISCUSSION

In this study 56 species and 44 subspecies of 26 genera belong to two subfamilies of Cerambyidae were given.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

SUBFAMILY LAMIINAE Latreille, 1825: 401

TRIBE PARMENINI Mulsant, 1839: 118
GENUS *PARMENA* Dejean, 1821: 108
SPECIES *P. mutilloides* Sabbadini & Pesarini, 1992: 27
Material examined: İzmir: Çeşme, 13.V.1987, weeds, det. Pesarini, as *Parmena pubescens pilosa* (Brullé, 1833), 2 exs.. This Turkish endemic species is the first record to İzmir province and hereby for Aegean region of Turkey.
SPECIES *P. striatopunctata* Sama, 1994: 553
Material examined: Artvin: Murgul, 22.VIII.1973, *Malus domestica*, det. Holzschuh, as *Parmena unifasciata* (Dalman, 1817), 1 ex.. This Turkish endemic species was recorded from Artvin province.

TRIBE BATOCERINI Thomson, 1864: 71
TRIBE BATOCERINI Thomson, 1864: 71
GENUS *BATOCERA* Dejean, 1835: 341
SPECIES *B. rufomaculata* (DeGeer, 1775: 107)
SUBSPECIES *B. rufomaculata rufomaculata* (DeGeer, 1775: 107)
Material examined: Osmaniye: 13.VIII.1991, *Citrus sinensis*, det. Lodos, 2 exs.. This subcosmopolitan subspecies was recorded from Osmaniye province.

TRIBE MONOCHAMINI Gistel, 1848: [9]
GENUS *MONOCHAMUS* Dejean, 1821: 106
SUBGENUS *MONOCHAMUS* Dejean, 1821: 106
SPECIES *M. galloprovincialis* (Olivier, 1795: No. 67: 125)
SUBSPECIES *M. galloprovincialis tauricola* Pic, 1912: 18
Material examined: İzmir: Bornova, 24.VI.1971, det. Holzschuh, as *Monochamus galloprovincialis pistor,* 2 exs.. This E-Mediterranean (Palaestino-Taurian + Aegean) subspecies is the first record to İzmir province.

TRIBE LAMIINI Latreille, 1825: 401
GENUS *MORIMUS* Brullé, 1832: 258
SPECIES *M. orientalis* Reitter, 1894: 43
Material examined: Bilecik: Bozüyük, 13.VII.1973, *Populus* sp., 2 exs.; İzmir: Bornova, 07.IV.1985, on the ground, 1 ex.; İzmir: Ödemiş, 19.VI.1962, 1 ex.; Sakarya: Adapazarı, 16.V.1973, *Populus* sp., 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species is the first record to İzmir province and hereby for Aegean region of Turkey.
SPECIES *M. verecundus* (Faldermann, 1836: 396)
Material examined: Artvin: Murgul, Başköy, 12.IX.1971, *Alnus glutinosa*, det. Holzschuh, 1 ex.; Kastamonu: İnebolu, 19.VII.1979, weeds, 1 ex.. This Turano-Mediterranean (Turano-Anatolian) species is the first record to Kastamonu province.

GENUS *LAMIA* Fabricius, 1775: 170
SPECIES *L. textor* (Linnaeus, 1758: 239)
Material examined: Sakarya: Adapazarı, 16.VI.1973, det. Braun, 1 ex.. This Asiatic-European species is the first record to Sakarya province.

TRIBE APODASYINI Lacordaire, 1872: 623
GENUS *ANAESTHETIS* Dejean, 1835: 348
SPECIES *A. testacea* (Fabricius, 1781: 235)
SUBSPECIES *A. testacea testacea* (Fabricius, 1781: 235)
Material examined: Amasya: Merzifon, 06.VI.1973, *Crataegus* sp., 1 ex.; Bursa: Mudanya, 29.V.1971, *Centaurea* sp., det. Holzschuh, 1 ex.. This European subspecies is the first record to Bursa province.

TRIBE PTEROPLIINI Thomson, 1860: 73
GENUS *NIPHONA* Mulsant, 1839: 169
SUBGENUS *NIPHONA* Mulsant, 1839: 169
SPECIES *N. picticornis* Mulsant, 1839: 169
Material examined: Adana: Karaisalı, 02.VI.1984, *Ulmus* sp., 2 exs.; Antalya: 28.V.1986, *Pyrus communis*, det. Pesarini, 1 ex.; Antalya: Gazipaşa, 23.V.1984, *Ficus carica*, 1 ex.; Antalya: Kaş, 03.V.1972, *Quercus* sp., 1 ex.; Antalya: Kaş, 01.VIII.1985, *Prunus dulcis*, 1 ex.; Balıkesir: Burhaniye, Çamtepe, 05.VI.1972, weeds, 1 ex.; Bilecik: Vezirhan, 06.V.1973, *Juglans regia*, 1 ex.; Bursa, 18.V.1973, *Quercus* sp., 1 ex.; Çanakkale: Biga 21.V.1973, *Platanus* sp., 1 ex.; Çanakkale: Gökçeada, 26-29.V.1975, weeds, det. Holzschuh, 2 exs.; Hatay, 11.VII.1983, house, 1 ex.; İzmir: Bornova, 18.V.1961, det. Braun, 1 ex.; İzmir: Kemalpaşa, 18.V.1992, *Prunus avium*, 1 ex.; İzmir: Kınık, Kocaömerli, 14.V.1971, weeds, 2 exs.; Mersin: Mezitli, Fındıkpınarı, 30.V.1984, *Hedera helix*, 1 ex.; Mersin: Mezitli, Fındıkpınarı, 07.VII.1986, *Paliurus spina-christi*., 1 ex.; Muğla: Bodrum, 04.VI.1973, *Euphorbia* sp., 1 ex.; Muğla: Dalaman, 22.V.1962, on the ground, 1 ex.; Muğla: Dalaman, 23.V.1962, *Quercus* sp., 1 ex.; Osmaniye: Hasanbeyli, Almanpınarı, 08.VI.1972, *Celtis australis*, 2 exs.. This Mediterranean species is the first record to Balıkesir, Bilecik, Bursa, Çanakkale and İzmir provinces and hereby for Marmara region of Turkey.

TRIBE POGONOCHERINI Mulsant, 1839: 151
GENUS *PARMENOPSIS* Ganglbauer, 1882: 693
SPECIES *P. caucasica* (Leder, 1880: 484)
Material examined: Artvin: Murgul, Başköy, 11.IX.1971, *Corylus avellana*, det. Holzschuh, 1 ex.; Artvin: Murgul, Başköy, 11.IX.1971, *Rhodendron flavini*, 1 ex.. This SW-Asiatic species was recorded from Artvin province.

GENUS *POGONOCHERUS* Dejean, 1821: 107
SUBGENUS *POGONOCHERUS* Dejean, 1821: 107
SPECIES *P. perroudi* Mulsant, 1839: 158
SUBSPECIES *P. perroudi perroudi* Mulsant, 1839: 158
Material examined: İzmir: Bornova, 01.III.1954, weeds, det. Pesarini, 1 ex.; İzmir: Bornova, 27.VII.1962, det. Holzschuh, 1 ex.; İzmir: Bornova, 20.VI.1983, weeds, 1 ex.. This Mediterranean subspecies was recorded from İzmir province.

SUBGENUS *PITYPHILUS* Mulsant, 1862: 302
SPECIES *P. fasciculatus* (DeGeer, 1775: 71)

SUBSPECIES *P. fasciculatus fasciculatus* (DeGeer, 1775: 71)
Material examined: Kütahya: Altıntaş, 02.V.1973, *Pinus* sp., det. Holzschuh, 1 ex.. This Asiatic-European subspecies is the first record to Kütahya province and hereby for Aegean region of Turkey.

TRIBE ACANTHOCININI Blanchard, 1845: 154
GENUS *ACANTHOCINUS* Dejean, 1821: 106
SUBGENUS *ACANTHOCINUS* Dejean, 1821: 106
SPECIES *A. aedilis* (Linnaeus, 1758: 392)
Acanthocinus aedilis (Linnaeus, 1758) C125 1 örnek Lamiinae
Material examined: Denizli: Tavas, Kızılcabölük, 28.VIII.1976, 1 ex.. This Asiatic-European species was recorded from Denizli province.
SPECIES *A. griseus* (Fabricius, 1792: 261)
Material examined: Denizli: Tavas, Kızılcabölük, 18.VIII.1976, 1 ex.; İzmir: Bornova, 10.VIII.1962, det. Holzschuh, 1 ex.; İzmir: Bornova, 10.IX.1972, house, det. Holzschuh, 1 ex.; İzmir: Bornova, 07.VI.1981, weeds, det. Pesarini, 1 ex.; İzmir: Karşıyaka, Yamanlar, 18.VIII.1981, 1 ex.. This Asiatic-European species was recorded from Denizli and İzmir provinces.

GENUS *LEIOPUS* Audinet-Serville, 1835: 86
SUBGENUS *LEIOPUS* Audinet-Serville, 1835: 86
SPECIES *L. femoratus* Fairmaire, 1859: 62
Material examined: Kocaeli: İzmit, 03.VI.1971, *Juglans regia*, det. Holzschuh, 1 ex.; Konya: Ereğli, 25.V.1980, *Juglans regia*, det. Pesarini, 1 ex.; Sakarya: Karasu, 16.V.1973, det. Holzschuh, 1 ex.; Yalova: Çınarcık, 04.VI.1971, *Olea europaea*, det. Holzschuh, 1 ex.. This Turano-European species is the first record to Kocaeli, Konya, Sakarya and Yalova provinces.
SPECIES *L. syriacus* (Ganglbauer, 1884: 532)
SUBSPECIES *L. syriacus tauricus* Sama & Rapuzzi, 2010: 184
Material examined: Adana: Pozantı, 01.V.1984, *Malus domestica*, det. C. Pesarini, 1 ex.; Mersin: Gözne 31.V.1984, *Malus domestica*, 1 ex.; Mersin: Gözne 31.V.1984, weeds, 1 ex.. This taxon was labelled as *Leiopus syriacus*. It should be attributed to *L. syriacus tauricus* Sama & Rapuzzi, 2010. So, this Turkish endemic subspecies is the first record to Adana province.

TRIBE EXOCENTRINI Pascoe, 1864: 7
GENUS *EXOCENTRUS* Dejean, 1835: 339
SUBGENUS *EXOCENTRUS* Dejean, 1835: 339
SPECIES *E. punctipennis* Mulsant & Guillebeau, 1856: 103
SUBSPECIES *E. punctipennis punctipennis* Mulsant & Guillebeau, 1856: 103
Material examined: Muğla: Ula, Gökova, 07.VI.1973, weeds, det. Holzschuh, 2 exs.. This European subspecies is the first record to Muğla province and hereby for Aegean region of Turkey.

TRIBE TETROPINI Portevin, 1927: 39
GENUS *TETROPS* Stephens, 1829: 16
SUBGENUS *TETROPS* Stephens, 1829: 16
SPECIES *T. gilvipes* (Faldermann, 1837: 290)
SUBSPECIES *T. gilvipes gilvipes* (Faldermann, 1837: 290)
Material examined: Artvin: Şavşat, 3.VI.1972, det. Holzschuh, 1 ex.. This SW-Asiatic subspecies was recorded from Artvin province.

SPECIES *T. praeustus* (Linnaeus, 1758: 399)
SUBSPECIES *T. praeustus praeustus* (Linnaeus, 1758: 399)
Material examined: Afyonkarahisar: Sultandağı, 01.V.1973, *Malus domestica*, 1 ex.; Bursa: Mudanya, 19.V.1973, *Quercus* sp., 1 ex.; İzmir: Bozdağ, 20.V.1970, *Cornus mas*, 1 ex.; İzmir: Bozdağ, 20.V.1970, *Corylus avellana*, 1 ex.; İzmir: Bozdağ, 20.V.1970, *Malus domestica*, 1 ex.; Kocaeli: Kandıra, 17.V.1973, weeds, det. Holzschuh, 1 ex.; Kocaeli: Kandıra, 19.V.1973, weeds, 1 ex.; Kütahya: 25.V.1971, *Pyrus communis*, 1 ex.; Manisa: Demirci, 13.IV.1973, *Prunus avium*, 1 ex.; Sakarya: Adapazarı, 26.IV.1975, *Crataegus* sp., 1 ex.. This Sibero-European subspecies is the first record to Afyonkarahisar, Bursa, İzmir, Kocaeli, Kütahya, and Manisa provinces and hereby for Aegean region of Turkey.

TRIBE SAPERDINI Mulsant, 1839: 181
GENUS *SAPERDA* Fabricius, 1775: 184
SUBGENUS *SAPERDA* Fabricius, 1775: 184
SPECIES *S. carcharias* (Linnaeus, 1758: 394)
Material examined: Bilecik: Bozüyük, 13.VII.1973, *Populus* sp., 2 exs.. This Asiatic-European species is the first record to Bilecik province.

SUBGENUS *LOPEZCOLONIA* Alonso-Zarazaga, 1998: 131 [RN]
SPECIES *S. punctata* (Linnaeus, 1767: 1067)
Material examined: Kırklareli: Demirköy, İğneada, 01.VII.1972, weeds, det. Holzschuh, 1 ex.. This Europeo-Mediterranean species is the first record to Kırklareli province.

SUBGENUS *COMPSIDIA* Mulsant, 1839: 182
SPECIES *S. populnea* (Linnaeus, 1758: 394)
Material examined: Bursa: Uludağ, 18.VII.1972, *Populus* sp., 1 ex.; Bursa: Uludağ, 18.VII.1972, *Verbascum* sp,, det. Holzschuh, 1 ex.; Çanakkale: Eceabat, 31.V.1975, *Populus* sp., det. Holzschuh, 2 exs.; İzmir: Bornova, Doğanlar, 29.IV.1971, *Populus* sp., 1 ex.. This Asiatic-European species was recorded from all mentioned provinces.

TRIBE PHYTOECIINI Mulsant, 1839: 191
GENUS *OBEREA* Dejean, 1835: 351
SUBGENUS *OBEREA* Dejean, 1835: 351
SPECIES *O. oculata* (Linnaeus, 1758: 394)
Material examined: Aydın: 6.IX.1983, *Ficus carica*, 1 ex.; Denizli: 13.VII.1962, *Salix* sp., 8 exs.; İzmir: 28.VIII.1983, 1 ex.; İzmir: Bornova, 16.V.1964, *Salix* sp., 19 exs.; İzmir: Torbalı, 15.VIII.1983, weeds, 5 exs.; Kırklareli: Lüleburgaz, Türkgeldi, 22.VII.1972, weeds, 1 ex.. This Palaearctic species is the first record to Aydın and Kırklareli provinces.

SUBGENUS *AMAUROSTOMA* Müller, 1906: 223
SPECIES *O. erythrocephala* (Schrank, 1776: 67)
SUBSPECIES *O. erythrocephala erythrocephala* (Schrank, 1776: 67)
Material examined: Antalya: 21.V.1961, 1 ex.; Hakkari: 10.VIII.1972, 1 ex.; Şırnak: Beytüşşebap, 15.VI.1976, *Fraxinus* sp., det. Holzschuh, 1 ex.. This Sibero-European subspecies is the first record to Hakkari and Şırnak provinces.
SPECIES *O. ressli* Demelt, 1963: 150
Material examined: Ankara: Kızılcahamam, 30.VI.1972, det. Holzschuh, 1 ex. This Turkish endemic species was recorded from Ankara province.

GENUS *OXYLIA* Mulsant, 1862: 398
SPECIES *O. argentata* (Ménétriés, 1832: 227)
SUBSPECIES *O. argentata languida* (Ménétriés, 1839: 42)
Material examined: Diyarbakır: Çüngüş, 14.VI.1972, weeds, as *Oxylia argentata,* 1 ex.; Hakkari: 13.VI.1976, weeds, det. Holzschuh, as *Oxylia argentata,* 1 ex.; Isparta: Eğirdir, 27.V.1961, as *Oxylia argentata,* 3 exs.; Mardin: Ömerli, 03.VI.1976, *Prunus avium*, as *Oxylia argentata,* 1 ex.; Osmaniye: Bahçe, 07.VI.1984, det. Pesarini, as *Oxylia argentata,* 1 ex.; Isparta: Eğirdir, 08.VII.1963, weeds, det. Holzschuh, as *Oxylia languida,* 4 exs.. This taxon was labelled as as *Oxylia argentata*. It should be attributed to *O. argentata languida* (Ménétriés, 1839). So, this E-Mediterranean (Palaestino-Cyprioto-Taurian) subspecies is the first record to Hakkari, Mardin and Osmaniye provinces.

GENUS *MALLOSIA* Mulsant, 1862: 399
SUBGENUS *SEMNOSIA* Daniel, 1904: 304
SPECIES *M. scovitzii* (Faldermann, 1837: 284)
Material examined: Van: Gevaş, 14.VII.1972, det. Holzschuh, 1 ex.. This SW-Asiatic species was recorded from Van province.

SUBGENUS *EUMALLOSIA* Danilevsky, 1990: 364
SPECIES *M. imperatrix* Abeille de Perrin, 1885: CXL
SUBSPECIES *M. imperatrix imperatrix* Abeille de Perrin, 1885: CXL
Material examined: Muş: Buğlan Pass, 23.VI.1972, 1600 m., det. Holzschuh, 1 ex.. This SW-Asiatic subspecies is the first record to Muş province.

GENUS *PYGOPTOSIA* Reitter, 1895: 86
SPECIES *P. eugeniae* (Ganglbauer, 1884: 568)
Material examined: Siirt: 11.V.1972, det. Holzschuh, as *Phytoecia eugeniae*, 1 ex.; Şırnak: Beytüşşebap, 15.VI.1976, *Fraxinus* sp., det. Holzschuh, as *Phytoecia eugeniae*, 1 ex.. This SW-Asiatic (Irano-Anatolian) species is the first record to Siirt and Şırnak provinces and hereby for Turkey.

GENUS *PILEMIA* Fairmaire, 1864: 175
SUBGENUS *PILEMIA* Fairmaire, 1864: 175
SPECIES *P. griseomaculata* (Pic, 1891: 102)
Material examined: Sivas: Central province, Mermer, 15.IV.1972, det. Holzschuh, 1 ex.. This SW-Asiatic species is the first record to Sivas province and hereby Central Anatolian region of Turkey.
SPECIES *P. tigrina* Mulsant, 1851: 134
Material examined: Çanakkale: Çan, 22.IV.1975, weeds, det. Holzschuh, 1 ex.. This E-European species is the first record to Çanakkale province.

SUBGENUS *PSEUDOPILEMIA* Kasatkin, 2018: 157
SPECIES *P. hirsutula* (Frölich, 1793: 141)
SUBSPECIES *P. hirsutula hirsutula* (Frölich, 1793: 141)
Material examined: İzmir: Ödemiş, 25.IV.1973, 1 ex.; Kars: 13.VI.1973, weeds, det. Holzschuh as *Phytoecia hirsutula,* 1 ex.; Samsun: Bafra, 04.VI.1973, weeds, 1 ex.; Uşak: 17.VI.1995, weeds, 1 ex.; Uşak: Eşme, 16.VI.1978, weeds, det. Holzschuh, 1 ex.. This Sibero-European subspecies is the first record to Samsun and Uşak provinces.

GENUS *PHYTOECIA* Dejean, 1835: 351
SUBGENUS *PARACOPTOSIA* Danilevsky, 2017: 1137
SPECIES *P. bithynensis* (Ganglbauer, 1884: 573)
Material examined: Ankara: Kızılcahamam, 24-26.V.1969, det. Holzschuh, as *Coptosia bithynensis,* 1 ex.; Sivas: Gürün, Suçatı, 09.VI.1976, weeds, det. Holzschuh, as *Coptosia bithynensis,* 1 ex.. This Turkish endemic species is the first record to Ankara province.
SPECIES *P. compacta* (Ménétriés, 1832: 228)
Material examined: Mardin: Ömerli, 12.VI.1972, , det. Braun, as *Coptosia compacta,* 1 ex.. This SW-Asiatic species is the first record to Mardin province.

SUBGENUS *HELLADIA* Fairmaire, 1864: 176
SPECIES *P. armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]
Material examined: Ağrı: 26.V.1974, weeds, det. Holzschuh, 1 ex.; Denizli: 15.V.1984, *Lens culinaris*, det. Pesarini, 1 ex.. This SW-Asiatic species is the first record to Ağrı and Denizli provinces and hereby for Aegean region of Turkey.
SPECIES *P. humeralis* (Waltl, 1838: 471)
SUBSPECIES *P. humeralis humeralis* (Waltl, 1838: 471)
Material examined: Bursa: Yenişehir, 20.IV.1975, grazing crop, 1 ex.; Isparta: Eğirdir, 28.V.1961, 3 exs.; İzmir: Balçova, 21.V.1978, weeds, 1 ex.; İzmir: Bornova, 29.III.1972, *Cirsium* sp., 1 ex.; İzmir: Bornova, 30.III.1972, weeds, 2 exs.; İzmir: Bornova, 25.III.1974, weeds, 1 ex.; İzmir: Bornova, 19.III.1975, weeds, det. Holzschuh, 2 exs.; İzmir: Bornova, 14.IV.1975, weeds, 2 exs.; İzmir: Bornova, 23.III.1976, weeds, 2 exs.; İzmir: Bornova, 02.IV.1976, poaceous plants, 1 ex.; İzmir: Bornova, 04.IV.1976, 1 ex.; İzmir: Bornova, 05.IV.1976, 1 ex.; İzmir: Bornova, 12.III.1977, weeds, 1 ex.; İzmir: Bornova, 23.III.1977, weeds, 2 exs.; İzmir: Bornova, 06.IV.1977, weeds, 1 ex.; İzmir: Bornova, 13.IV.1977, weeds, 1 ex.; İzmir: Bornova, 28.IV.1977, weeds, 1 ex.; İzmir: Bornova, 03.V.1977, weeds, 1 ex.; İzmir: Bornova, 13.V.1977, weeds, 1 ex.; İzmir: Bornova, 20.V.1977, 1 ex.; İzmir: Bornova, 17.V.1978, weeds, det. Pesarini, 1 ex.; İzmir: Kemalpaşa, 22.V.1991, weeds, 1 ex.; İzmir: Konak, Gültepe, 16.V.1977, weeds, 1 ex.; İzmir: Menderes, Gümüldür, 28.III.1972, *Cirsium* sp., 2 exs.; İzmir: Menderes, Gümüldür, 09.IV.1973, weeds, 4 ex.; İzmir: Ödemiş, 24.IV.1973, weeds, 1 ex.; İzmir: Tire, 14.IV.1967, weeds, 6 exs.; Kırklareli: Lüleburgaz, 18.V.1968, det. Holzschuh, 1 ex.; Muğla: Dalaman, 23.V.1962, Asteraceae plant, 15 exs.; Van: Gürpınar, 03.VI.1976, weeds, 1 ex.. This SW-Asiatic subspecies is the first record to Bursa, Kırklareli, Muğla and Van provinces.
SPECIES *P. millefolii* (Adams, 1817: 311)
Material examined: Bitlis: Hizan road, 09.VI.1975, weeds, 2 exs.; Bursa: İznik: 01.VI.1971, weeds, det. Holzschuh, 1 ex.; Konya: Yunak, Altınöz, 27.IV.1986, det. Pesarini, 1 ex.. This Turano-European species is the first record to Bitlis and Bursa provinces.
SPECIES *P. praetextata* (Steven, 1817: 184)
SUBSPECIES *P. praetextata praetextata* (Steven, 1817: 184)
Material examined: Erzincan: Refahiye, Yurtbaşı, 30.VI.1976, *Medicago sativa*, det. Holzschuh, 1 ex.. This Turano-European species was recorded from Erzincan province.

SUBGENUS *MUSARIA* Thomson, 1864: 121
SPECIES *P. kurdistana* Ganglbauer, 1884: 572
Material examined: Hakkari: Şemdinli Road, 17.VI.1975, *Astragalus* sp., det. Holzschuh, 1 ex.. This SW-Asiatic species was recorded from Hakkari province.

SUBGENUS *NEOMUSARIA* Plavilstshikov, 1928: 123
SPECIES *P. balcanica* (Frivaldszky, 1835: 268)
Material examined: Şırnak: Uludere, 15.VI.1976, weeds, det. Holzschuh, 1 ex.. This Turano-European species is the first record to Şırnak province.
SPECIES *P. waltli* Sama, 1991: 127 [RN]
Material examined: Kütahya: Gediz, 11.VI.1972, *Triticum aestivum*, det. Holzschuh as *Phytoecia modesta*, 1 ex.. This E-Mediterranean (Palaestino-Taurian) species is the first record to Kütahya province and hereby for Aegean region of Turkey.

SUBGENUS *PHYTOECIA* Dejean, 1835: 351
SPECIES *P. annulipes* Mulsant & Rey, 1863: 165
Material examined: Muş: Korkut, 14.VI.1975, *Smyrnium olusatrum*, det. Holzschuh, 2 exs.. This Turkish endemic species was recorded from Muş province.
SPECIES *P. baccueti* (Brullé, 1832: 262)
Material examined: Balıkesir: Balya, 22.IV.1975, weeds, det. Holzschuh, as *Phytoecia caerulea baccueti,* 1 ex.; İzmir: Bornova, 30.III.1972, weeds, det. Pesarini, as *Phytoecia caerulea baccueti,* 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species was recorded from all mentioned provinces.
SPECIES *P. caerulea* (Scopoli, 1772: 102)
SUBSPECIES *P. caerulea caerulea* (Scopoli, 1772: 102)
Material examined: Sinop: Boyabat, 03.VI.1973, weeds, det. Holzschuh, 1 ex.. This Centralasiatic-European subspecies is the first record to Sinop province.
SUBSPECIES *P. caerulea bethseba* Reiche & Saulcy, 1858: 17
Material examined: Mersin: Erdemli, Güzeloluk, 30.V.1984, 1400 m., det. Pesarini, 1 ex.. This E-Mediterranean subspecies is the first record to Mersin province.
SPECIES *P. croceipes* Reiche & Saulcy, 1858: 17 [RN]
Material examined: İzmir: Balçova, İnciraltı, 08.IV.1975, weeds, 1 ex.; İzmir: Bayındır, 14.IV.1967, weeds, 10 exs.; İzmir: Bornova, 30.III.1962, weeds, det. Demelt, 2 exs.; İzmir: Bornova, 20.III.1975, *Hordeum vulgare*, 1 ex.; İzmir: Ödemiş, 24.IV.1973, *Ulmus* sp., 1 ex.. This SW-Asiatic species was recorded from İzmir province.
SPECIES *P. geniculata* Mulsant, 1862: 420
SUBSPECIES *P. geniculata geniculata* Mulsant, 1862: 420
Material examined: Bursa: Karacabey, 26.IV.1988, weeds, 1 ex.; İzmir: Bayındır, 12.IV.1967, weeds, 1 ex.; İzmir: Bornova, 24.IV.1962, poaceous plants, 2 exs.; İzmir: Bornova, 19.III.1975, weeds, 1 ex.; İzmir: Bornova, 20.III.1975, *Hordeum vulgare*, 1 ex.; İzmir: Bornova, 23.III.1976, weeds, 2 exs.; İzmir: Bornova, 04.V.1977, weeds, 1 ex.; İzmir: Konak, Gültepe, 16.V.1977, weeds, 1 ex.; İzmir: Menderes, Gümüldür, 28.III.1972, *Ulmus* sp., 1 ex.; İzmir: Narlıdere, 11.IV.1973, poaceous plants, det. Holzschuh, 1 ex.; İzmir: Ödemiş, 24.IV.1973, weeds, 1 ex.; Manisa: Turgutlu, 12.IV.1988, weeds, N. Lodos, 1 ex.; Sivas: Gürün, Suçatı, 09.VI.1976, weeds, 1 ex.. This SW-Asiatic subspecies is the first record to Sivas province.
SPECIES *P. manicata* Reiche & Saulcy, 1858: 17
Material examined: Bursa: Orhangazi, 02.VI.1971, weeds, 1 ex.; Çanakkale: Gökçeada, 26-29.V.1975, weeds, det. Holzschuh, 2 exs.; İstanbul: Arnavutköy, Terkos, 02.VII.1972, weeds, 1 ex.; Mardin: Mazıdağı, 05.VI.1996. weeds, 1 ex.. This E-Mediterranean (Palaestino-Taurian) species is the first record to Bursa, Çanakkale, İstanbul and Mardin provinces.

SPECIES *P. pustulata* (Schrank, 1776: 66)
SUBSPECIES *P. pustulata pustulata* (Schrank, 1776: 66)
Material examined: Sakarya: Sapanca, 17.V.1973, meadow, det. Holzschuh, 1 ex.. This Centralasiatic-European subspecies is the first record to Sakarya province.
SPECIES *P. virgula* (Charpentier, 1825: 225)
SUBSPECIES *P. virgula virgula* (Charpentier, 1825: 225)
Material examined: Hakkari: Çukurca, 11.VI.1975, *Populus* sp., 1 ex.; Isparta: Eğirdir, 27.V.1961, 3 exs.; İzmir: Bornova, 14.IV.1970, weeds, 1 ex.; İzmir: Bornova, 08.V.1974, *Mentha* sp., 2 exs.; İzmir: Bornova, 29.V.1974, *Mentha piperita,* 2exs.; İzmir: Bornova, 16.V.1975, weeds, 1 ex.; İzmir: Bornova, 26.V.1975, poaceous plants, 1 ex.; İzmir: Bornova, 15.V.1976, weeds, 1 ex.; İzmir: Bornova, 04.V.1977, weeds, 1 ex.; Muğla: Dalaman, 23.V.1962, Asteraceae plant, 1 ex.; Muğla: Dalaman, 04.V.1972, weeds, det. Holzschuh, 2 exs.; Tekirdağ: Saray, 03.VI.1975, 1 ex.. This Centralasiatic-European subspecies is the first record to Hakkari, Muğla and Tekirdağ provinces.

SUBGENUS *OPSILIA* Mulsant, 1862: 387
SPECIES *P. coerulescens* (Scopoli, 1763: 49)
SUBSPECIES *P. coerulescens coerulescens* (Scopoli, 1763: 49)
Material examined: Adana: 02.VI.1984, weeds, det. Pesarini, 1 ex.; Aydın: Karacasu, 25.IV.1969, *Sinapis arvensis*, 1 ex.; Balıkesir: Manyas, 27.IV.1988, weeds, N. Lodos, 1 ex.; Burdur: 13-14.VII.1963, det. Holzschuh, 2 exs.; Burdur: 10.VI.1973, *Sinapis* sp., 2 exs.; Çanakkale: Lapseki, 02.V.1973, weeds, 1 ex.; Diyarbakır: Silvan, 16.VI.1972, 1 ex.; Elazığ: Maden, 28.VI.1976, *Vicia sativa*, 1 ex.; Isparta: Eğirdir, 25.V.1961, 9 exs.; Isparta: Eğirdir, 8-10.VII.1963, 1 ex.; Isparta: Keçiborlu, 10.VII.1963, 1 ex.; Isparta: Keçiborlu, 10.VII.1974, 4 exs.; İzmir: Bayındır, 12.IV.1962, 1 ex.; İzmir: Bornova, 30.III.1962, weeds, 1 ex.; İzmir: Bornova, 01.V.1962, 1 ex.; İzmir: Bornova, 21.IV.1976, weeds, 1 ex.; İzmir: Karaburun, Mordoğan, 16.V.1969, weeds, 3 exs.; İzmir: Kemalpaşa, 03.V.1962, 3 ex.; İzmir: Tire, 14.IV.1967, weeds, 1 ex.; İzmir: Urla, Zeytinalanı, 17.V.1974, weeds, 5 exs.; Kayseri: 01.VI.1973, *Prunus armeniaca*, 1 ex.; Kırklareli : Lüleburgaz, Türkgeldi, 03.VI.1975, on the ground, 2 exs.; Malatya: 09.VI.1976, weeds, 1 ex.; Manisa: Turgutlu, 08.V.1988, weeds, 1 ex.; Mardin: Mazıdağı, 03.VI.1976, weeds, 1 ex.; Muğla: 25.V.1962, 1 ex.; Muğla: Fethiye, 24.V.1962, 1 ex.; Osmaniye: 02.VI.1972, *Sinapis* sp., 1 ex.; Samsun: Kavak, 06.VI.1973, weeds, 1 ex.; Sinop, 04.VI.1973, weeds, 1 ex.; Tekirdağ: Saray, 03.VI.1975, weeds, 1 ex.. This Palaearctic subspecies is the first record to Balıkesir, Çanakkale, Elazığ, Mardin and Tekirdağ provinces.

SUBGENUS *PAROBEREINA* Danilevsky, 2018: 131
SPECIES *P. vittipennis* Reiche, 1877: CXLI
SUBSPECIES *P. vittipennis leuthneri* Ganglbauer, 1886: 523
Material examined: Adana: Nurdağı Pass, 13-27.V.1970, 1800 m, det. Holzschuh, as *Phytoecia vittipennis inhumeralis* (Pic, 1900), 1 ex.. This E-Mediterranean (Palaestino-Taurian) subspecies was recorded from Adana province.

TRIBE AGAPANTHIINI Mulsant, 1839: 172
GENUS *CALAMOBIUS* Guérin-Méneville, 1847: XVIII
SPECIES *C. filum* (Rossi, 1790: 152)
Material examined: Adana: Seyhan Dam, 22.IV.1969, weeds, 5 exs.; Çanakkale: Gökçeada, 24-26.V.1975, 4 exs.; Çanakkale: Gökçeada, 26.V1975, weeds, det. Holzschuh, 1 ex.; İzmir: Bornova, 04.VI.1961, det. N. Lodos, as *Calomobius*

marginellus, 1 ex.; Muğla: Fethiye, 24.V.1962, det. Demelt, 2 exs.; Van: 12.VII.1970, det. Holzschuh, 1 ex.. This Mediterranean species is the first record to Van province.

GENUS *AGAPANTHIA* Audinet-Serville, 1835: 35
SUBGENUS *SYNTHAPSIA* Pesarini & Sabbadini, 2004: 121
SPECIES *A. kirbyi* (Gyllenhal, 1817: 186)
SPECIES *A. kirbyi kirbyi* (Gyllenhal, 1817: 186)
Material examined: Ankara: Gölbaşı, Örencik, 20.V.1971, *Verbascum* sp., det. Holzschuh, 1 ex.; Bursa: Uludağ, 18.VII.1972, *Verbascum* sp., 4 exs.; Erzurum: Aşkale: Kop Dağı, 09.VII.1978, weeds, 1 ex.; Isparta: Eğirdir, 10.VI:1973, *Paliurus spina-christi*, 1 ex.; İzmir: Bornova, Pınarbaşı, 04.VI.1961, *Olea europaea*, 3 exs.; İzmir: Konak, Kocatepe, 18.VI.1971, *Centaurea* sp., 1 ex.; Manisa: 01.VI.1972, *Verbascum* sp., 1 ex.; Manisa: Kula, 15.IV.1975, weeds, 4 exs.; Mardin: Ömerli, 12.VI.1972, *Platanus orientalis*, 2 exs.; Muğla: Fethiye, 08.VI.1973, *Verbascum* sp., 1 ex.. This Turano-European subspecies is the first record to Mardin and Muğla provinces.

SUBGENUS *EPOPTES* Gistel, 1857: 93
SPECIES *A. dahli* (Richter, 1820: 12)
SPECIES *A. dahli dahli* (Richter, 1820: 12)
Material examined: Osmaniye: Hasanbeyli, Almanpınarı, 08.VI.1972, *Quercus* sp., det. Holzschuh, 1 ex.. This Sibero-European subspecies was recorded from Osmaniye province.
SPECIES *A. lateralis* Ganglbauer, 1884: 541
Material examined: Antalya: 20.V.1961, *Euphorbia* sp., 18 exs.; Burdur: Gölhisar, 10.VI.1973, *Centaurea* sp., 2 exs.; Burdur: Tefenni, 10.VI.1973, *Centaurea* sp., 2 exs.; Isparta: Eğirdir, 8-10.VII.1963, det. Holzschuh, 1 ex.; İzmir: Karşıyaka, Yamanlar, 24.V.1973, weeds, 1 ex.; İzmir: Narlıdere, Çatalkaya, 19.V.1971, *Silybum marianum*, 1 ex.; İzmir: Urla, 17.V.1974, weeds, 1 ex.; Manisa: Kula, 16.VI.1975, weeds, 1 ex.. This Turkish endemic species is the first record to Burdur province.

SUBGENUS *AGAPANTHOPLIA* Pesarini & Sabbadini, 2004: 122
SPECIES *A. coeruleipennis* Frivaldszky, 1878: 9
Material examined: Adana: Tufanbeyli, 04.V.1986, *Centaurea* sp., 1 ex.; Diyarbakır: Karacadağ, 20.V.1952, det. Pesarini, 1 ex.; Kahramanmaraş: Ahır Mountain, 01.V.1986, *Cirsium* sp., 1 ex.; Kahramanmaraş: Nurhak Mountain, 03.V.1988, weeds, 1 ex.. This SW-Asiatic species is the first record to Adana and Diyarbakır provinces.

SUBGENUS *AGAPANTHIA* Audinet-Serville, 1835: 35
SPECIES *A. suturalis* (Fabricius, 1787: 149)
Material examined: Adana: Karaisalı, 02.VI.1984, *Sinapis* sp., 1 ex.; Antalya: 18.V.1986, weeds, 1 ex.; Artvin: 12.VI.1973, weeds, 1 ex.; Aydın: Didim, 09.VI.1973, 1 ex.; Aydın: Köşk, 24.IV.1972, *Lupinus* sp., 1 ex.; Aydın: Söke, 15.V.1972, weeds, 1 ex.; Balıkesir: Bigadiç, 08.VI,1970, *Sinapis* sp., 1 ex.; Bursa, 20.V.1973, *Vicia sativa*, 1 ex.; Çanakkale: Gökçeada, 26-29.V.1975, weeds, det. Holzschuh, 3 exs.; Edirne: Lalapaşa, 02.VI.1975, weeds, 2 exs.; Hatay: Altınözü, 27.IV.1986, weeds, 1 ex.; Hatay: Samandağ, 27.IV.1988, *Laurus nobilis*, 1 ex.; İzmir: Balçova, 11.V.1971, *Nerium oleander*, 1 ex.; İzmir: Bayındır, 12.IV.1967, weeds, 2 exs.; İzmir: Bornova, 18.V.1961, 3 exs.; İzmir: Bornova, 06.V.1962, 1 ex.;

İzmir: Bornova, 03.III.1972, *Silybum marianum*, 3 exs.; İzmir: Bornova, 09.V.1975, *Triticum aestivum*, 2 exs.; İzmir: Bornova, 17.V.1976, weeds, 2 exs.; İzmir: Bornova, 23.V.1976, weeds, 1 ex.; İzmir: Bornova, 20.III.1977, weeds, 2 exs.; İzmir: Bornova, 13.IV.1977, weeds, 2 exs.; İzmir: Bornova, 04.V.1977, weeds, 1 ex.; İzmir: Bornova, 11.V:1977, weeds, 2 exs.; İzmir: Bornova, 15.V.1978, weeds, 1 ex.; İzmir: Bornova, 27.V.1978, weeds, 3 exs.; İzmir: Bornova, 19.IV.1992, Asteraceae plant, 1 ex.; İzmir: Kemalpaşa, 22.V.1991, weeds, 1 ex.; İzmir: Menemen, 28.V.1974, *Raphanus raphanistrum*, 2 exs.; İzmir: Ödemiş, 24.IV.1973, weeds, 2 exs.; İzmir: Ödemiş, 14.V.1973, *Triticum aestivum*, 2 exs.; İzmir: Torbalı, Kuşçuburun, 15.VI:1975, *Elaeagnus angustifolia*, 1 ex.; İzmir: Urla, 05.V.1984, weeds, 1 ex.; İzmir: Urla, 17.V.1988, *Triticum aestivum*, 1 ex.; Kırklareli: Lüleburgaz, 03.VI.1975, weeds, 1 ex.; Kırklareli: Pınarhisar, 03.VI.1975, weeds, 1 ex.; Manisa: 12.V.1984, weeds, 1 ex.; Muğla: Bodrum, 22.IV.1980, *Celtis australis*, 1 ex.; Muğla: Dalaman, 04.V.1972, weeds, 4 exs.; Muğla: Datça, 07.V.1972, *Matricaria chamomilla*, 1 ex.; Muğla: Fethiye, 24.V.1962, det. Demelt, 4 exs.; Osmaniye: Zorkun plateau, 08.VI.1984, weeds, 1 ex.; Şanlıurfa: Siverek, 07.VI.1976, weeds, 1 ex.; Yalova: 02.VI.1971, weeds, 1 ex.. This taxon was labelled from all localities as *Agapanthia cardui* (Linnaeus, 1767). It should be attributed to *A. suturalis* (Fabricius, 1787: 149). So, this Mediterranean species is the first record to Balıkesir, Şanlıurfa and Yalova provinces.

SUBGENUS *HOMOBLEPHARA* Pesarini & Sabbadini, 2004: 128
SPECIES *A. fallax* Holzschuh, 1974: 95
Material examined: Muş: Buğlan Pass, 11-17.VI.1973, 1600 m, det. Holzschuh, 1 ex.. This Turkish endemic species was recorded from Muş province.

SUBGENUS *SMARAGDUL*A Pesarini & Sabbadini, 2004: 128
SPECIES *A. frivaldszkyi* Ganglbauer, 1884: 546
Material examined: Bilecik: Gölpazarı, 28.V.1971, *Triticum aestivum*, 3 exs.; Isparta: Eğirdir, 27.V.1961, 1 ex.; İzmir: Balçova, 19.V.1977, weeds, 1 ex.; İzmir: Bornova, 26.V.1975, poaceous plants, 1 ex.; Mardin: 03.VI.1976, *Prunus dulcis*, det. Holzschuh, 2 exs.. This Turano-Mediterranean (Balkano-Anatolian) species is the first record to İzmir and Mardin provinces and hereby for Sout-Eastern Anatolian region of Turkey.

GENUS *AGAPANTHIOLA* Ganglbauer, 1900: 139
SPECIES *A. leucaspis* (Steven, 1817: 184)
Material examined: Edirne: İpsala, 27.VI.1972, weeds, det. Holzschuh, 1 ex.. This Sibero-European species was recorded from Edirne province.

SUBFAMILY DORCADIONINAE Swainson, 1840: 290

TRIBE DORCADIONINI Swainson, 1840: 290
GENUS *DORCADION* Dalman, 1817: 397
SUBGENUS *CRIBRIDORCADION* Pic, 1901: 12
SPECIES *D. accola* Heyden, 1894: 87
Material examined: Kahramanmaraş: Elbistan, 28.IV.1973, weeds, det. Braun, 1 ex.. This Turkish endemic species is the first record to Kahramanmaraş province and hereby for Mediterranean region of Turkey.
SPECIES *D. anatolicum* Pic, 1900: 12
Material examined: Konya: Akşehir, Sultan Mountain, IV.1971, 1800-2000 m., 1 ex.. This Turkish endemic species was recorded from Konya province.

SPECIES *D. bithyniense* Chevrolat, 1856: 88
Material examined: İzmir: Bornova, 03.V.1983, weeds, det. Pesarini, 1 ex.. This Turkish endemic species was recorded from İzmir province.
SPECIES *D. boluense* Breuning, 1962: 38
SUBSPECIES *D. boluense boluense* Breuning, 1962: 38
Material examined: Bolu: Gerede, 28.V.1980, under stone, det. Pesarini, 1 ex.. This Turkish endemic subspecies was recorded from Bolu province.
SPECIES *D. cachinno* Thomson, 1867: 120
Material examined: Eskişehir: 29.VIII.1981, weeds, det. Holzschuh, 1 ex.; İzmir: Bornova, 23.VIII.1980, on the ground, det. Pesarini, 1 ex.. This Turkish endemic species is the first record to Eskişehir and İzmir provinces.
SPECIES *D. catenatum* Waltl, 1838: 469
SUBSPECIES *D. catenatum catenatum* Waltl, 1838: 469
Material examined: Denizli: 10.V.1972, on the ground, det. Braun, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 21.V.1959, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 24.VI.1961, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 09.II.1972, *Triticum aestivum*, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 03.III.1972, on the ground, as *Dorcadion divisum*, 5 exs.; İzmir: Bornova, 13.III.1972, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 15.III.1972, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 02.IV.1972, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 05.IV.1972, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 14.IV.1972, on the ground, as *Dorcadion divisum*, 7 exs.; İzmir: Bornova, 15.V.1972, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 15.IV.1973, as *Dorcadion divisum*, 2 exs.; İzmir: Bornova, 01.IV.1974, *Hordeum vulgare*, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 26.V.1975, poaceous plants, as *Dorcadion divisum*, 3 exs.; İzmir: Bornova, 14.V.1976, det. Holzschuh, as *Dorcadion divisum*, 2 exs.; İzmir: Bornova, 07.V.1978, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 16.IV.1981, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 01.VI.1983, weeds, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 11.IV.1987, weeds, det. Pesarini, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, 19.V.1987, weeds, as *Dorcadion divisum*, 1 ex.; İzmir: Bornova, Doğanlar, IV.1975, on the ground, det. Braun, as *Dorcadion divisum*, 2 exs.; İzmir: Buca, 15.V.1984, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Karşıyaka, Yamanlar, 04.V.1961, det. Braun, as *Dorcadion divisum*, 2 exs.; İzmir: Karşıyaka, Yamanlar, 24.V.1973, det. Braun, as *Dorcadion divisum*, 1 ex.; İzmir: Seferihisar, 19.V.1970, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: Seferihisar, 26.IV.1972, on the ground, as *Dorcadion divisum*, 1 ex.; İzmir: 05.IV.1984, weeds, as *Dorcadion smyrnense,* 4 exs.; İzmir: Bornova, 21.V.1959, det. Braun, as *Dorcadion smyrnense,* 2 ex.; İzmir: Bornova, 04.IV.1977, poaceous plants, as *Dorcadion smyrnense,* 1 ex.; İzmir: Bornova, 04.V.1983, weeds, as *Dorcadion smyrnense,* 2 exs.; İzmir: Bornova, 15.V.1984, weeds, as *Dorcadion smyrnense,* 1 ex.; İzmir: Bornova, 16.V.1987, on the ground, as *Dorcadion smyrnense,* 1 ex.; İzmir: Konak, Gültepe, 10.V.1977, on the ground, as *Dorcadion smyrnense,* 1 ex.; İzmir: Konak, Hatay, Susuzdede, 18.IV.1982, on the ground, as *Dorcadion smyrnense,* 1 ex.; İzmir: Torbalı, Kuşçuburun, 01.IV.1983, as *Dorcadion smyrnense,* 4 ex.; Konya: Beyşehir, 23.IV.1979, under stone, det. Pesarini, as *Dorcadion smyrnense,* 1 ex.; Muğla: Dalaman, 04.V.1972, as *Dorcadion divisum*, 1 ex.; Uşak: 29.IV.1973, *Quercus* sp., as *Dorcadion divisum*, 1 ex.. This taxon was labelled as *Dorcadion divisum* and *Dorcadion smyrnense*. It should be attributed to *D. catenatum catenatum* Waltl, 1838. So, this E-Mediterranean (Aegean) subspecies is the first record to Denizli, Muğla and Uşak provinces.

SUBSPECIES *D. catenatum intercisum* Kraatz, 1873: 66
Material examined: Erzurum: Aşkale, 16.VI.1973, weeds, as *Dorcadion divisum*, 1 ex.; Kahramanmaraş: Ahır Dağı, 01.V.1986, 1550 m, on the ground, as *Dorcadion divisum*, 1 ex.. This taxon was labelled as *Dorcadion divisum* Germar, 1839. It should be attributed to *D. catenatum intercisum* Kraatz, 1873. So, this Turkish endemic subspecies is the first record to Erzurum and Kahramanmaraş provinces and hereby for Eastern Anatolian region of Turkey.
SUBSPECIES *D. catenatum dissimile* Ganglbauer, 1884: 458
Material examined: Tekirdağ: 28.VI.1972, as *Dorcadion divisum*, 1 ex.. This taxon was labelled as *Dorcadion divisum* Germar, 1839. It should be attributed to *D. catenatum dissimile* Ganglbauer, 1884. So, this Turkish endemic subspecies is the first record to Tekirdağ province.
SPECIES *D. cinctellum* Fairmaire, 1866: 272
Material examined: İzmir: Bozdağ, 13.IV.1978, on the ground, det. Pesarini, 5 exs.. This Turkish endemic species was recorded from İzmir province.
SPECIES *D. delagrangei* Pic, 1894: 110
Material examined: Adana: Nurdağı Pass, 13-27.V.1970, 800-1300 m., det. Holzschuh, 1 ex.. This Turkish endemic species is the first record to Adana province.
SPECIES *D. deyrollei* Ganglbauer, 1884: 482
SUBSPECIES *D. deyrollei deyrollei* Ganglbauer, 1884: 482
Material examined: Elazığ: 24.IV.1982, det. Pesarini, 1 ex.. This Turkish endemic subspecies is the first record to Elazığ province.
SPECIES *D. dimidiatum* Motschulsky, 1838: 186
SUBSPECIES *D. dimidiatum dimidiatum* Motschulsky, 1838: 186
Material examined: Ağrı: Central province, Cumaçay, 12.V.1974, under stone, det. Braun, 2 exs.. This SW-Asiatic (Anatolo-Caucasian) subspecies was recorded from Ağrı province.
SPECIES *D. ferruginipes* Ménetries, 1836: 151
Material examined: Kocaeli: 3-4.V.1969, det. Holzschuh, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species was recorded from Kocaeli province.
SPECIES *D. gallipolitanum* Thomson, 1867: 59
SUBSPECIES *D. gallipolitanum gallipolitanum* Thomson, 1867: 59
Material examined: Edirne: Keşan, 08.VI.1975, *Helianthus annuus*, det. Braun, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) subspecies was recorded from Edirne province.
SPECIES *D. halepense* Kraatz, 1873: 72
SUBSPECIES *D. halepense sehitkamilense* Özdikmen at al., 2012: 595
Material examined: Kahramanmaraş: Elbistan, 28.IV.1973, weeds, det. Braun, 3 exs.; Kahramanmaraş: Göksun, 08.V.1989, on the ground, det. Pesarini, 1 ex.. This taxon was labelled as *Dorcadion halepense* Kraatz, 1873. It should be attributed to *D. halepense sehitkamilense* Özdikmen at al., 2012. So, this Turkish endemic subspecies is the first record to Kahramanmaraş province.
SPECIES *D. hellmanni* Ganglbauer, 1884: 486
Material examined: Ağrı: Taşlıçay, 30.IV.1975, 1250 m., det. Holzschuh, 1 ex.. This SW-Asiatic species is the first record to Ağrı province.
SPECIES *D. iconiense* Daniel, 1900: 140
Material examined: Aksaray: 10.IV.1974, 1250 m., det. Braun, 1 ex.. This Turkish endemic species was recorded from Aksaray province.

SPECIES *D. infernale* Mulsant & Rey, 1863: 158
SUBSPECIES *D. infernale infernale* Mulsant & Rey, 1863: 158
Material examined: Niğde: Ulakışla, 28.IV.1979, under stone, 1 ex.; Yozgat: Akdağmadeni, IV.1974, det. Holzschuh, 1 ex.. This Turkish endemic subspecies is the first record to Yozgat province.
SUBSPECIES *D. infernale luteosutura* Özdikmen & Koçak, 2016: 478
Material examined: Karaman: 25.IV.1979, under stone, det. Pesarini, as *Dorcadion infernale revestitum,* 1 ex.. This taxon was labelled as *Dorcadion infernale revestitum* Daniel, 1900. It should be attributed to *D. infernale luteosutura* Özdikmen & Koçak, 2016. So, this Turkish endemic subspecies was recorded from Karaman province.
SPECIES *D. kindermanni* Waltl, 1838: 470
Material examined: İzmir: Bornova, weeds, det. Braun, 1 ex.; İzmir: Bornova, 23.IX.1980, on the ground, 1 ex.. This Turkish endemic species was recorded from İzmir province.
SPECIES *D. micans* Thomson, 1867: 61
SUBSPECIES *D. micans micans* Thomson, 1867: 61
Material examined: Ankara: IV.1952, , det. Braun, as *Dorcadion micans,* 1 ex.; Konya: Seydişehir, 24.IV.1979, under stone, det. Pesarini, as *Dorcadion cinerarium,* 1 ex.; Yozgat: 16.IV.1974, 1400 m., leg Heinz, as *Dorcadion cinerarium amasinum,* 1 ex.. This Turkish endemic subspecies is the first record to Konya province.
SPECIES *D. nitidum* Motschulsky, 1838: 185
Material examined: Artvin: Bülbülen Plateau, 12.VI.1973, 2400 m, det. Braun, 2 exs.. This SW-Asiatic (Anatolo-Caucasian) species was recorded from Artvin province.
SPECIES *D. nobile* Hampe, 1852: 313
SUBSPECIES *D. nobile nobile* Hampe, 1852: 313
Material examined: Ankara: 24.VI.1975, on the ground, det. Braun, 1 ex.. This Turkish endemic subspecies is the first record to Ankara province.
SPECIES *D. obsoletum* Kraatz, 1873: 78
Material examined: Kırklareli: Lüleburgaz, 02.V.1969, det. Holzschuh, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species was recorded from Kırklareli province.
SPECIES *D. olympicum* Kraatz, 1873: 78
SUBSPECIES *D. olympicum olympicum* Kraatz, 1873: 78
Material examined: Çanakkale: 28.V.1979, on the ground, det. Pesarini, 1 ex.. This Turkish endemic subspecies is the first record to Çanakkale province.
SPECIES *D. petrovitzi* Heyrovsky, 1964: 97
Material examined: Mersin: Namrun, 18-22.V.1969, 1200 m., det. Holzschuh, 2 exs.. This Turkish endemic species was recorded from Mersin province.
SPECIES *D. preissi* Heyden, 1894: 86
Material examined: Karabük: Safranbolu, 29.V.1980, under stone, det. Pesarini, 1 ex.. This Turkish endemic species is the first record to Karabük province.
SPECIES *D. punctipenne* Küster, 1852: 94
Material examined: Antalya: Kurşunlu, 24.V.1973, on the ground, det. Braun, 1 ex.; Çanakkale: Ayvacık, 11.VI.1969, 1 ex.; İzmir: Konak, Göztepe, 02.V.1965, 1 ex.; Manisa: VII.1962, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species is the first record to Antalya, Çanakkale, İzmir and Manisa provinces and hereby for Aegean and Mediterranean regions of Turkey.

SPECIES *D. saulcyi* Thomson, 1865: 549
Material examined: Kahramanmaraş: Andırın, 20.VII.1984, on the ground, det. Pesarini, 1 ex.. This SW-Asiatic (Syro-Anatolian) species is the first record to Kahramanmaraş province.
SPECIES *D. scabricolle* (Dalman, 1817: 174)
SUBSPECIES *D. scabricolle scabricolle* (Dalman, 1817: 174)
Material examined: Konya: Akşehir, det Petrovitz, as *Dorcadion scabricolle,* 1 ex.. This SW-Asiatic (Anatolo-Caucasian) subspecies was recorded from Konya province.
SPECIES *D. septemlineatum* Waltl, 1838: 469
SUBSPECIES *D. septemlineatum novemlineatum* Kraatz, 1873: 61
Material examined: Eskişehir: Sivrihisar, 05.V.1979, meadow, det. Pesarini, as *Dorcadion septemlineatum,* 3 exs.; Kütahya: 02.V.1973, det. Braun, as *Dorcadion septemlineatum,* 1 ex.. This taxon was labelled as *Dorcadion septemlineatum* Waltl, 1838. It should be attributed to *D. septemlineatum novemlineatum* Kraatz, 1873. So, this Turkish endemic subspecies was recorded from Eskişehir and Kütahya provinces.
SUBSPECIES *D. septemlineatum octolineatum* Kraatz, 1873: 61
Material examined: Balıkesir: Bigadiç, 21.V.1968, det. Holzschuh, as *Dorcadion septemlineatum,* 1 ex.; Bursa: Karacabey, 19.IV.1972, as *Dorcadion glicyrrhizae* Pallas, 1774, exs.; Çanakkale: 30.V.1976, on the ground, det. Braun, as *Dorcadion septemlineatum,* 2 exs.. This taxon was labelled as *Dorcadion septemlineatum* Waltl, 1838. It should be attributed to *D. septemlineatum octolineatum* Kraatz, 1873. So, this Turkish endemic subspecies was recorded from Balıkesir and Çanakkale provinces.
SPECIES *D. subsericatum* Pic, 1901: 12
SUBSPECIES *D. subsericatum subsericatum* Pic, 1901: 12
Material examined: Kastamonu: Kuzyaka, leg. Muche, det. L. Heyrovsky, as *Dorcadion subsericatum,* 1 ex.; Kastamonu: Küre, 04.VI.1980, under stone, det. Pesarini, as *Dorcadion subsericatum,* 1 ex.. This Turkish endemic subspecies was recorded from Kastamonu province.
SUBSPECIES *D. subsericatum rufipenne* Breuning, 1946: 118
Material examined: Karabük: Safranbolu, 29.V.1980, under stone, det. Pesarini, as *Dorcadion rufipenne,* 1 ex.. This Turkish endemic subspecies is the first record to Karabük province.
SPECIES *D. tauricum* Waltl, 1838: 468
SUBSPECIES *D. tauricum tauricum* Waltl, 1838: 468
Material examined: İstanbul: Silivri, 02.V.1969, det. Holzschuh, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) subspecies was recorded from İstanbul province.
SPECIES *D. wagneri* Küster, 1846: 87
SUBSPECIES *D. wagneri wagneri* Küster, 1846: 87
Material examined: Ağrı: Taşlıçay, 30.IV.1975, 1850 m, det. Holzschuh, 1 ex.. This SW-Asiatic (Anatolo-Caucasian) subspecies was recorded from Ağrı province.

SUBGENUS *MACULATODORCADION* Breuning, 1943: 525
SPECIES *D. triste* Frivaldszky, 1845: 184
Material examined: Balıkesir: Manyas, 27.IV.1985, on the ground, N. Lodos, 1 ex.; Bursa: Karacabey, 10.IV.1972, 3 exs.; Bursa: Karacabey, Stud farm, 19.IV.1972, on the ground, det. Braun, 1 ex.; İzmir: Bornova, 10.V.1964, det. Braun, 1 ex.; İzmir: Ödemiş, 24.IV.1973, *Vicia ervilia*, 1 ex.. This Turkish endemic species was recorded from all mentioned provinces.

GENUS *MEGALODORCADION* Pesarini & Sabbadini, 1999: 58
SUBGENUS *ANATOLODORCADION* Özdikmen and Kaya, 2015: 3
SPECIES *M. glabrofasciatum* (K. Daniel, 1900: 140)
Material examined: Çanakkale: IV.1962, det. Braun, as *Dorcadion glabrofasciatum,* 1 ex.. This Turkish endemic species is the first record to Çanakkale province.

GENUS *NEODORCADION* Ganglbauer, 1884: 437
SUBGENUS *NEODORCADION* Ganglbauer, 1884: 437
SPECIES *N. exornatum* (Frivaldszky, 1835: 268)
Material examined: Bursa: Karacabey, 25.IV.1989, weeds, det. Pesarini, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species is the first record to Bursa province.
SPECIES *N. laqueatum* (Waltl, 1838: 469)
Material examined: Çanakkale: IV.1962, det. Braun, 1 ex.; Edirne: 25.IV.1973, 1 ex.. This Turano-Mediterranean (Balkano-Anatolian) species is the first record to Çanakkale and Edirne provinces.

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List 1. Provincial and regional new records of Cerambycidae material, housed in LEMT according to family level.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

PROVINCIAL NEW RECORDS

Adana province
SUBSPECIES *Leiopus syriacus tauricus* Sama & Rapuzzi, 2010: 184
SPECIES *Agapanthia coeruleipennis* Frivaldszky, 1878: 9
SPECIES *Dorcadion delagrangei* Pic, 1894: 110

Afyonkarahisar province
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)

Ağrı province
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]
SPECIES *Dorcadion hellmanni* Ganglbauer, 1884: 486

Ankara province
SPECIES *Phytoecia bithynensis* (Ganglbauer, 1884: 573)
SUBSPECIES *Dorcadion nobile nobile* Hampe, 1852: 313

Antalya province
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

Aydın province
SPECIES *Oberea oculata* (Linnaeus, 1758: 394)

Balıkesir province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

Bilecik province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SPECIES *Saperda carcharias* (Linnaeus, 1758: 394)

Bitlis province
SPECIES *Phytoecia millefolii* (Adams, 1817: 311)

Burdur province
SPECIES *Agapanthia lateralis* Ganglbauer, 1884: 541

Bursa province
SPECIES *Anaesthetis testacea* (Fabricius, 1781: 235)
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)
SPECIES *Phytoecia millefolii* (Adams, 1817: 311)
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17
SPECIES *Neodorcadion exornatum* (Frivaldszky, 1835: 268)

Çanakkale province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SPECIES *Pilemia tigrina* Mulsant, 1851: 134
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SUBSPECIES *Dorcadion olympicum olympicum* Kraatz, 1873: 78

SPECIES *Dorcadion punctipenne* Küster, 1852: 94
SPECIES *Megalodorcadion glabrofasciatum* (K. Daniel, 1900: 140)
SPECIES *Neodorcadion laqueatum* (Waltl, 1838: 469)

Denizli province
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

Diyarbakır province
SPECIES *Agapanthia coeruleipennis* Frivaldszky, 1878: 9

Edirne province
SPECIES *Neodorcadion laqueatum* (Waltl, 1838: 469)

Elazığ province
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SUBSPECIES *Dorcadion deyrollei deyrollei* Ganglbauer, 1884: 482

Erzurum province
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66

Eskişehir province
SPECIES *Dorcadion cachinno* Thomson, 1867: 120

Hakkari province
SUBSPECIES *Oberea erythrocephala erythrocephala* (Schrank, 1776: 67)
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)
SUBSPECIES *Phytoecia virgula virgula* (Charpentier, 1825: 225)

İstanbul province
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17

İzmir province
SPECIES *Parmena mutilloides* Sabbadini & Pesarini, 1992: 27
SUBSPECIES *Monochamus galloprovincialis tauricola* Pic, 1912: 18
SPECIES *Morimus orientalis* Reitter, 1894: 43
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Agapanthia frivaldszkyi* Ganglbauer, 1884: 546
SPECIES *Dorcadion cachinno* Thomson, 1867: 120
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

Kahramanmaraş province
SPECIES *Dorcadion accola* Heyden, 1894: 87
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66
SUBSPECIES *Dorcadion halepense sehitkamilense* Özdikmen at al., 2012: 595
SPECIES *Dorcadion saulcyi* Thomson, 1865: 549

Karabük province
SPECIES *Dorcadion preissi* Heyden, 1894: 86
SUBSPECIES *Dorcadion subsericatum rufipenne* Breuning, 1946: 118

Kastamonu province
SPECIES *Morimus verecundus* (Faldermann, 1836: 396)

Kırklareli province
SPECIES *Saperda punctata* (Linnaeus, 1767: 1067)
SPECIES *Oberea oculata* (Linnaeus, 1758: 394)
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)

Kocaeli province
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)

Konya province
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SUBSPECIES *Dorcadion micans micans* Thomson, 1867: 61

Kütahya province
SUBSPECIES *Pogonocherus fasciculatus fasciculatus* (DeGeer, 1775: 71)
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Phytoecia waltli* Sama, 1991: 127 [RN]

Manisa province
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

Mardin province
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)
SPECIES *Phytoecia compacta* (Ménétriés, 1832: 228)
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SPECIES *Agapanthia kirbyi kirbyi* (Gyllenhal, 1817: 186)
SPECIES *Agapanthia frivaldszkyi* Ganglbauer, 1884: 546

Mersin province
SUBSPECIES *Phytoecia caerulea bethseba* Reiche & Saulcy, 1858: 17

Muğla province
SUBSPECIES *Exocentrus punctipennis punctipennis* Mulsant & Guillebeau, 1856: 103
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)
SUBSPECIES *Phytoecia virgula virgula* (Charpentier, 1825: 225)
SPECIES *Agapanthia kirbyi kirbyi* (Gyllenhal, 1817: 186)
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

Muş province
SUBSPECIES *Mallosia imperatrix imperatrix* Abeille de Perrin, 1885: CXL
Osmaniye province
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)

Sakarya province
SPECIES *Lamia textor* (Linnaeus, 1758: 239)
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SUBSPECIES *Phytoecia pustulata pustulata* (Schrank, 1776: 66)

Samsun province
SUBSPECIES *Pilemia hirsutula hirsutula* (Frölich, 1793: 141)

Siirt province
SPECIES *Pygoptosia eugeniae* (Ganglbauer, 1884: 568)

Sinop province
SUBSPECIES *Phytoecia caerulea caerulea* (Scopoli, 1772: 102)

Sivas province
SPECIES *Pilemia griseomaculata* (Pic, 1891: 102)
SUBSPECIES *Phytoecia geniculata geniculata* Mulsant, 1862: 420

<u>Şanlıurfa province</u>
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

<u>Şırnak province</u>
SUBSPECIES *Oberea erythrocephala erythrocephala* (Schrank, 1776: 67)
SPECIES *Pygoptosia eugeniae* (Ganglbauer, 1884: 568)
SPECIES *Phytoecia balcanica* (Frivaldszky, 1835: 268)

<u>Tekirdağ province</u>
SUBSPECIES *Phytoecia virgula virgula* (Charpentier, 1825: 225)
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SUBSPECIES *Dorcadion catenatum dissimile* Ganglbauer, 1884: 458

<u>Uşak province</u>
SUBSPECIES *Pilemia hirsutula hirsutula* (Frölich, 1793: 141)
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

<u>Van province</u>
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)
SPECIES *Calamobius filum* (Rossi, 1790: 152)

<u>Yalova province</u>
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

<u>Yozgat province</u>
SUBSPECIES *Dorcadion infernale infernale* Mulsant & Rey, 1863: 158

<u>REGIONAL NEW RECORDS</u>

<u>Aegean region of Turkey</u>
SPECIES *Parmena mutilloides* Sabbadini & Pesarini, 1992: 27
SPECIES *Morimus orientalis* Reitter, 1894: 43
SUBSPECIES *Pogonocherus fasciculatus fasciculatus* (DeGeer, 1775: 71)
SUBSPECIES *Exocentrus punctipennis punctipennis* Mulsant & Guillebeau, 1856: 103
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]
SPECIES *Phytoecia waltli* Sama, 1991: 127 [RN]
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

<u>Central Anatolian region of Turkey</u>
SPECIES *Pilemia griseomaculata* (Pic, 1891: 102)

<u>Eastern Anatolian region of Turkey</u>
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66

<u>Marmara region of Turkey</u>
SPECIES *Niphona picticornis* Mulsant, 1839: 169

<u>Mediterranean region of Turkey</u>
SPECIES *Dorcadion accola* Heyden, 1894: 87
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

<u>South-Eastern Anatolian region of Turkey</u>
SPECIES *Agapanthia frivaldszkyi* Ganglbauer, 1884: 546

<u>TURKISH NEW RECORDS</u>

<u>New record for Turkey</u>
SPECIES *Pygoptosia eugeniae* (Ganglbauer, 1884: 568)

List 2. Provincial and regional new records of Cerambycidae material, housed in LEMT according to subfamilies.

SUPERFAMILY CERAMBYCOIDEA Latreille, 1802
FAMILY CERAMBYCIDAE Latreille, 1802: 211

SUBFAMILY LAMIINAE Latreille, 1825: 401

PROVINCIAL NEW RECORDS

Adana province
SUBSPECIES *Leiopus syriacus tauricus* Sama & Rapuzzi, 2010: 184
SPECIES *Agapanthia coeruleipennis* Frivaldszky, 1878: 9

Afyonkarahisar province
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)

Ağrı province
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]

Ankara province
SPECIES *Phytoecia bithynensis* (Ganglbauer, 1884: 573)

Aydın province
SPECIES *Oberea oculata* (Linnaeus, 1758: 394)

Balıkesir province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

Bilecik province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SPECIES *Saperda carcharias* (Linnaeus, 1758: 394)

Bitlis province
SPECIES *Phytoecia millefolii* (Adams, 1817: 311)

Burdur province
SPECIES *Agapanthia lateralis* Ganglbauer, 1884: 541

Bursa province
SPECIES *Anaesthetis testacea* (Fabricius, 1781: 235)
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
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SPECIES *Phytoecia millefolii* (Adams, 1817: 311)
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17

Çanakkale province
SPECIES *Niphona picticornis* Mulsant, 1839: 169
SPECIES *Pilemia tigrina* Mulsant, 1851: 134
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)

Denizli province
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]

Diyarbakır province
SPECIES *Agapanthia coeruleipennis* Frivaldszky, 1878: 9

Elazığ province
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)

Hakkari province
SUBSPECIES *Oberea erythrocephala erythrocephala* (Schrank, 1776: 67)
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)
SUBSPECIES *Phytoecia virgula virgula* (Charpentier, 1825: 225)

İstanbul province
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17

İzmir province
SPECIES *Parmena mutilloides* Sabbadini & Pesarini, 1992: 27
SUBSPECIES *Monochamus galloprovincialis tauricola* Pic, 1912: 18
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Kastamonu province
SPECIES *Morimus verecundus* (Faldermann, 1836: 396)

Kırklareli province
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Kocaeli province
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)

Konya province
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62

Kütahya province
SUBSPECIES *Pogonocherus fasciculatus fasciculatus* (DeGeer, 1775: 71)
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Phytoecia waltli* Sama, 1991: 127 [RN]

Manisa province
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)

Mardin province
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)
SPECIES *Phytoecia compacta* (Ménétriés, 1832: 228)
SPECIES *Phytoecia manicata* Reiche & Saulcy, 1858: 17
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)
SPECIES *Agapanthia kirbyi kirbyi* (Gyllenhal, 1817: 186)
SPECIES *Agapanthia frivaldszkyi* Ganglbauer, 1884: 546

Mersin province
SUBSPECIES *Phytoecia caerulea bethseba* Reiche & Saulcy, 1858: 17

Muğla province
SUBSPECIES *Exocentrus punctipennis punctipennis* Mulsant & Guillebeau, 1856: 103
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)
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SPECIES *Agapanthia kirbyi kirbyi* (Gyllenhal, 1817: 186)

Muş province
SUBSPECIES *Mallosia imperatrix imperatrix* Abeille de Perrin, 1885: CXL

Osmaniye province
SUBSPECIES *Oxylia argentata languida* (Ménétriés, 1839: 42)

Sakarya province
SPECIES *Lamia textor* (Linnaeus, 1758: 239)
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SUBSPECIES *Phytoecia pustulata pustulata* (Schrank, 1776: 66)

Samsun province
SUBSPECIES *Pilemia hirsutula hirsutula* (Frölich, 1793: 141)

Siirt province
SPECIES *Pygoptosia eugeniae* (Ganglbauer, 1884: 568)

Sinop province
SUBSPECIES *Phytoecia caerulea caerulea* (Scopoli, 1772: 102)

Sivas province
SPECIES *Pilemia griseomaculata* (Pic, 1891: 102)
SUBSPECIES *Phytoecia geniculata geniculata* Mulsant, 1862: 420

Şanlıurfa province
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

Şırnak province
SUBSPECIES *Oberea erythrocephala erythrocephala* (Schrank, 1776: 67)
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Tekirdağ province
SUBSPECIES *Phytoecia virgula virgula* (Charpentier, 1825: 225)
SUBSPECIES *Phytoecia coerulescens coerulescens* (Scopoli, 1763: 49)

Uşak province
SUBSPECIES *Pilemia hirsutula hirsutula* (Frölich, 1793: 141)

Van province
SUBSPECIES *Phytoecia humeralis humeralis* (Waltl, 1838: 471)
SPECIES *Calamobius filum* (Rossi, 1790: 152)

Yalova province
SPECIES *Leiopus femoratus* Fairmaire, 1859: 62
SPECIES *Agapanthia suturalis* (Fabricius, 1787: 149)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Parmena mutilloides* Sabbadini & Pesarini, 1992: 27
SPECIES *Morimus orientalis* Reitter, 1894: 43
SUBSPECIES *Pogonocherus fasciculatus fasciculatus* (DeGeer, 1775: 71)
SUBSPECIES *Exocentrus punctipennis punctipennis* Mulsant & Guillebeau, 1856: 103
SUBSPECIES *Tetrops praeustus praeustus* (Linnaeus, 1758: 399)
SPECIES *Phytoecia armeniaca* Frivaldszky, 1878: 10 [= 1878: 318]
SPECIES *Phytoecia waltli* Sama, 1991: 127 [RN]

Central Anatolian region of Turkey
SPECIES *Pilemia griseomaculata* (Pic, 1891: 102)

<u>Marmara region of Turkey</u>
SPECIES *Niphona picticornis* Mulsant, 1839: 169

<u>South-Eastern Anatolian region of Turkey</u>
SPECIES *Agapanthia frivaldszkyi* Ganglbauer, 1884: 546

<u>TURKISH NEW RECORDS</u>

<u>New record for Turkey</u>
SPECIES *Pygoptosia eugeniae* (Ganglbauer, 1884: 568)

SUBFAMILY DORCADIONINAE Swainson, 1840: 290

<u>PROVINCIAL NEW RECORDS</u>

<u>Adana province</u>
SPECIES *Dorcadion delagrangei* Pic, 1894: 110

<u>Ağrı province</u>
SPECIES *Dorcadion hellmanni* Ganglbauer, 1884: 486

<u>Ankara province</u>
SUBSPECIES *Dorcadion nobile nobile* Hampe, 1852: 313

<u>Antalya province</u>
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

<u>Bursa province</u>
SPECIES *Neodorcadion exornatum* (Frivaldszky, 1835: 268)

<u>Çanakkale province</u>
SUBSPECIES *Dorcadion olympicum olympicum* Kraatz, 1873: 78
SPECIES *Dorcadion punctipenne* Küster, 1852: 94
SPECIES *Megalodorcadion glabrofasciatum* (K. Daniel, 1900: 140)
SPECIES *Neodorcadion laqueatum* (Waltl, 1838: 469)

<u>Denizli province</u>
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

<u>Edirne province</u>
SPECIES *Neodorcadion laqueatum* (Waltl, 1838: 469)

<u>Elazığ province</u>
SUBSPECIES *Dorcadion deyrollei deyrollei* Ganglbauer, 1884: 482

<u>Erzurum province</u>
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66

<u>Eskişehir province</u>
SPECIES *Dorcadion cachinno* Thomson, 1867: 120

<u>İzmir province</u>
SPECIES *Dorcadion cachinno* Thomson, 1867: 120
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

<u>Kahramanmaraş province</u>
SPECIES *Dorcadion accola* Heyden, 1894: 87
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66
SUBSPECIES *Dorcadion halepense sehitkamilense* Özdikmen at al., 2012: 595
SPECIES *Dorcadion saulcyi* Thomson, 1865: 549

Karabük province
SPECIES *Dorcadion preissi* Heyden, 1894: 86
SUBSPECIES *Dorcadion subsericatum rufipenne* Breuning, 1946: 118

Konya province
SUBSPECIES *Dorcadion micans micans* Thomson, 1867: 61

Manisa province
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

Muğla province
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

Tekirdağ province
SUBSPECIES *Dorcadion catenatum dissimile* Ganglbauer, 1884: 458

Uşak province
SUBSPECIES *Dorcadion catenatum catenatum* Waltl, 1838: 469

Yozgat province
SUBSPECIES *Dorcadion infernale infernale* Mulsant & Rey, 1863: 158

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

Eastern Anatolian region of Turkey
SUBSPECIES *Dorcadion catenatum intercisum* Kraatz, 1873: 66

Mediterranean region of Turkey
SPECIES *Dorcadion accola* Heyden, 1894: 87
SPECIES *Dorcadion punctipenne* Küster, 1852: 94

THE IMPACT OF DIET PROTEIN AND CARBOHYDRATE ON SELECT LIFE-HISTORY TRAITS OF THE HOUSEFLY *MUSCA DOMESTICA* LINNAEUS, 1758 (DIPTERA: MUSCIDAE)

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ABSTRACT: This study examined the impact of ten diet with different protein and carbohydrate percentages on the immature development, survivorship, pupal and adult weight of the house fly, *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae). Different ratio of protein and carbonhydrate diet impacted development and corresponding life-history traits. Survival from the pupal to adult stages was also found to produce *significantly different* between different diet ($F_{9,30}$=768.251, p=0.01). High pupal mortality were seen in blood meal diet (92%) and chicken meal diet (96 %). Percent pupation was significantly higher on the wheat bran diet (P:C= 1:3.4). Larvae reared on the wheat bran diet developed the slowly but had the greatest survivorship to the pupal and adult stage. It is important to know the effect resource has on development *M. domestica* Linnaeus, 1758 helps to understant population dynamics.

KEY WORDS: Artificial diet, development, nutrition ecology

Nutrition is the process in which an organism obtains from its diet are essential for growth and development. Availability of key nutrients, such as sugars, amino acids, lipid during the developmental stages affects life history traits of insect (Nash & Chapman, 2014; Runagall-McNaull, Bonduriansky, & Crean, 2015; Florez-Cuadros, 2017) such as animal survival, longevity (Lee et al., 2008; Nash & Chapman, 2014; Krams et al., 2015; Florez-Cuadros, 2017), size (Diamond & Kingsolver, 2010; Florez-Cuadros, 2017) growth and reproduction (Simpson & Raubenheimer, 2012). Insects undergo remerkable morphological and physiological changes during development stages. Nutritional *requirements* can vary within a group of insects depending on what the insects have fed on many resources (Hochuli, 2001). The major component of most nutrients are protein and carbohydrates. The best sources of essential amino acids are proteins and crucial for life (Nash & Chapman, 2014). Protein and carbohydrate are species-specific that leads to in optimal performance (Raubenheimer & Simpson, 2003; Lee, Behmer, & Simpson, 2006; Behmer & Joern, 2008; Behmer, 2009; Simpson & Raubenheimer, 2012). Carbohydrates are a source of energy and the main fuel used for development. Organisms use the stored energy in all living processes (Nash & Chapman, 2014). The balance of diet consisting of both carbohydrates and protein is very important to growth (Nguyen, Tomberlin, & Vanlaerhoven, 2013) and successfully mature reproductive system of insect and produce eggs (Pastor et al., 2011; Nguyen et al., 2013). Larvae reared on poor protein diet, can cause larval mortality (Green, Simmonds, & Blaney, 2003) delay larval development, reduce body size (Gebhardt & Stearns, 1988; Tu & Tatar, 2003; Bonduriansky, 2006; Parker & Johnston, 2006; Colasurdo, Gélinas, & Despland, 2009; Chown & Gaston, 2010; Sentinella, Crean, & Bonduriansky, 2013; Nash & Chapman, 2014). Small body size is associated with reduced male mating success (Nash & Chapman, 2014).

The species *Musca domestica* Linnaeus, 1758 which belongs to the family Muscidae, popularly known as house fly, (Srinivasan, Jambulingam, Gunasekaran, & Boopathidoss, 2008). The house fly, *Musca domestica* Linnaeus, 1758, is a well-known cosmopolitan pest of livestock and poultry and play an important role as vector of some diseases (Al-Shami et al., 2016; Firoozfar, Moosa-Kazemi, Bahrami & Ahmed Yusuf, 2017). It is known for the medical and economic veterinary importance (Al-Shami et al., 2016). *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae) has also been used in maggot therapy (Al-Ghamdi et al., 2014). *M. domestica* Linnaeus, 1758 (Diptera: Muscidae) can be used as a suitable species in a different ecological, biological, agricultural and medical investigation because of a short life cycle and high growth rate (Black & Krafsur, 1985; Axtell & Arends, 1990; Asiri, 2017).

Nutrition is important factor affecting population dynamics (Han & Dingemanse, 2015). It is important to know how nutritional resources impact longevity, development, reproductive potentials of insect. An understanding of different diet affect on insect development would allow us to increase the effectiveness of the rearing process under laboratory conditions. Previous experiments in the different insects showed that diet affect a range of different life-history (Sutherland, 1978; Kaneshrajah & Turner, 2004; Clark, Evans, & Wall, 2006; Day & Wallman, 2006; Ireland & Turner, 2006). An important deficiency from existing studies of diet is the effect of nutrient quality and quantity on different developmental stages.

Less is known about the effects of carbohydrate (C) and protein (P) content in the larval diet on life history of *M. domestica* Linnaeus, 1758. We addressed this deficincy by testing the effect of novel protein and carbohydrate components on the developmental life history of *M. domestica* Linnaeus, 1758. We altered diet components to provide variation on survival, development, size and life-history traits of of the *M. domestica* Linnaeus, 1758. Information from this study is important for improving rearing methods necessary for future investigation.

MATERIALS AND METHODS

Breeding of *M. domestica* Linnaeus, 1758

The house fly colony used in these experiments was established in January 2017 from larvae received from Ankara municipality investigation laboratories, Ankara, TURKEY, which was initiated from a laboratory colony at the University of Ondokuz Mayıs, also located in Samsun, TURKEY. This colony has been maintained for 2 years and supplemented periodically with wild-caught material.

Adult house flies were kept in 50× 50× 50 cm screen cages at 61.2 ± 1.5% relative humidity (RH), 25.2 ± 0.5° C and a photoperiod of 12:12 (L:D) h and were provided with water, sugar cubes *ad libitum* in open containers as food for the flies (Hogsette, Farkas, & Coler, 2002). Males and females were held together in the same cages. The eggs collected were used to sustain the colony.

From approximately 6 days after emergence, flies were provided with oviposition substrate in the form of 25 g of larval diet (a mixture of the 20 g wheat bran and 50 ml milk) in a 100 mm petri dish. Flies were allowed to oviposit for a 24-hour period every 72 hours over 3 weeks. Newly hatched (every 8 h) larvae were used for the experiment. All the replicates were used from same generation of colony to reduce the genetic variability among the sample. Eggs were transferred aseptically to a sterile petri dish and maintained in a SANYO MIR 252 growth chamber set at 25°C, 70% RH, and a photoperiod of 12:12 (L:D) h. Eggs were monitored hourly for hatch. Resulting larvae were used in the subsequent experiments. After egg hatch, the groups of first-instar larvae were randomized by mixing with a fine paintbrush (Faber-Castell Soft Touch size 4, Faber-Castell Manufacturing, Stein, Germany). With the brush, 20 first-instar larvae were collected and placed onto 20 g of different a feeding substrate composed of 66% moisture inside a 200 ml polypropylene containers (Hobby Life Products, Demirel Plastic,TR). Each plastic cup had a tight-fitting cheesecloth covered to allow for air circulation (Fig. 1C).

Life cycle of *M. domestica* Linnaeus, 1758

Larvae that hatched from the eggs and passed from one instar to another were counted and maintained under the same environmental conditions as the adult organisms. The following aspects were taken into account when analysing each diet's efficacy: developmental stage duration (in days; the I, II and III larval instars, puparia and adult), sex ratio, adult and pupal weight. The size of immature and adult stages was also determined using a stereomicroscope (Leica MZ 12.5, LAS Version 3.8.0, Leica Microsystems, Switzerland) linked to a high-resolution digital camera (DC 100).

Experimental design

Each diet mixture, 20 g, was combined with 47 mL of water, but 20 g wheat bran was combined with 47 ml milk and placed in a 200 ml polypropylene clear plastic cups. Protein and carbohydrate components in the diets were varied (Table 1).

Each cup was seeded. The experiment was replicated five times wheat bran diet mixed with milk had initial moisture levels of 66%, whereas the chicken meal and fish wheat meal diet moisture was slightly lower at 60%. For each diet during an experiment, 20 first instar larvae were placed in each 200 ml polypropylene clear plastic cups.

Clutches of eggs laid by a single female were divided amongst several replicate containers, randomly alternating among treatments to control for genetic variation, parental age, and environment. The replicate containers were maintained at 25°C, 70% RH in an incubator. Cups were each covered with a paper towel and held in the incubator. When needed for feeding to the larvae, batches of diet were mixed with water (except of wheat bran diet) and distributed among each container receiving that diet-moisture treatment to ensure each replicate container received the same diet. Feeding was terminated in a treatment when a cumulative 40% of the larvae in the five cups reached the prepupal stage. However, daily observations continued until all larvae had entered the prepupal stage or died. Prepupae were identifed by a change in integument color from larval white to black. Prepupae were removed daily from each container and weighed, then placed in appropriately-labeled 500-mL rearing containers, containing approximately 15 g of vermiculite, which provided a 3 cm-deep pupation substrate. Prepupae/pupae were held in the same incubator in which the larvae were reared and were monitored daily for adult emergence.

Larval and pupal development time

The number of pupae emerging each day was recorded allowed for pupation, allowing calculation of mean larval development time. The daily cohort of emerging pupae was sieved from the sand and transferred to a petri dish. These petri dishes were then checked daily for adult emergence. Adults were counted and their sex recorded, allowing mean pupal development time to be calculated for each replicate. Individuals that only partially emerged were discarded from the experiment. Overall, development time was calculated by summing the mean larval and pupal development time of each replicate.

Larval and pupal survival

The total number of pupae present allowed for pupation was recorded as a measure of larval survival. The total number of fully emerging adults was used as the measure of pupal survival.

Pupal weight

Each treatment of pupae were weighed pupal weight was used as a proxy for adult size.

Statistical analysis

The average size of the immature and adult stages was calculated, as well as *M. domestica* Linnaeus, 1758 life cycle duration regarding each of the ten diets during five replications. Analysis of variance (ANOVA) was used for evaluating comparisons; such results were analyzed using a 95% confidence interval life-cycle data were analysed according to descriptive statistical parameters; the data derived from some biological phases and life-table variables were also recorded. An analysis of variance (ANOVA) for multiple factors was used to assess differences in time, size and survival amongst several treatment groups. Amount of diet provided, time (days) required for 40% prepupation, prepupal size, adult longevity, and egg production were compared across all diet-moisture treatments using analysis of variance followed by the Tukey–Kramer HSD test, and trial differences (significance set at $p < 0.05$) were tested using the paired t-test. Interactions between diet protein:carbohydrate, and trial on each life-history parameter were also examined. Kruskal–Wallis tests were performed when assumptions of normality and/or homoscedasticity were not met. IBM SPSS Statistics v.21.0 was used for all analyses (IBM, Armonk,NY, USA). Two-way ANOVA was conducted, including the interaction between sex and weight.

RESULTS

Development time

There was a significant difference in development time for larvae to reach pupal, and adult stages of development because of the different diet (Table 2). Diet had a significant effect on larval development (i.e. duration of development from egg to pupa; $F_{9,40}$ =2.177, P=0.045). The development time of larvae reared on mix of poultry feed and wheat bran meal was significantly shorter than other diet. Larvae reared on chicken meal, meat bone meal, mix of wheat bran and milk had the longest time to reach the pupal stage. The duration of the pupal period (time from pupa to adult eclosion) was affected by either diet ($F_{9,40}$ =5.580, P = 0.000). When measuring time to adult emergence, larvae reared on soybean meal, mix of wheat bran and blood meal and blood meal once again had the shortest time needed to reach adult emergence. The longest maximum time to adult emergence was for those reared on fish meal, followed by meat bone meal. When measuring total time from egg hatching to adult emergence, larvae reared on soybean meal (P:C= 1:0.15), mix of wheat bran and blood meal (P:C= 1:0.16), blood meal (P:C= 1:0.012), mix of poultry feed and wheat bran meal (P:C= 1:2.7) again had the shortest time needed to reach adult emergence (Table 2).

Survavial

Diet had a significant effect on larval survival ($F_{9,40}$=1804.469, p=0.000). Larvae feeding on rich carbonhydrate diet (wheat bran diet) showed lowest mortality compared to the other diet treatment. Other the lowest larval mortality occurred on the soybean meal diet. High larval mortality were seen in blood meal

(92%) and chicken meal diet (96%) (Table 3). The third highest rates of mortality occurred on diet meat bone meal. Survival from the pupal to adult stages differed significantly between different diet ($F_{9,30}$=768.251, p=0.01). Percent pupation was significantly higher on the (P:C= 1:3.4) wheat bran diet. The highest emergence rate was observed in wheat bran diet and soybean meal. The lowest emergence rate was observed in blood meal, (50%) mix of poultry feed and wheat bran diet (53%) (Table 3).

Pupal and adult weight

The nutrient content of diets affected the pupal weights. Pupal weight was significantly different between the rearing diets $F_{9,591}$ = 8.679, P,0.001). The highest mean pupal weight was recorded at mix of blood meal and wheat bran (0.202 g) and blood meal diet (0.200 g) while the lowest weight was recorded at chicken meal diet (0.59 g) and mix of poultry feed and wheat bran diet (0.96 g) (Table 4).

The weight of adult body related to the content of diet. This effect is significant between the ten dietary groups. The smallest mean weight of adult were found in mix of chicken meal and the highest mean adult weight was found at blood meal, mix of blood meal and wheat bran diet (0.305) and soybean diet (0.262 g) (Table 4). There was significant difference in adult weight between diets ($F_{59,600}$ = 12.874, P = 0.000). There was significant differences observed in the weight of adult sex reared on different diets (F=35.226, p=0.000).

DISCUSSION

The ecology, physiology, behaviour, performance and the life-history traits of insect are influenced by nutrition or more specifically by the quantity and quality of food (Barragan & Fonseca, Dicke & van Loon, 2018). Diet is crucial determinant of key life-history traits (Barragan & Fonseca et al., 2018; Lee et al., 2008). Our study results provide extremely important highlights into the lifestyle of the *M. domestica* Linnaeus, 1758 and its ability to utilize a variety of resources for larval development. This is the first study to investigate how varying the composition of protein and carbohydrate in an artificial diet effects the life-history of the *M. domestica* Linnaeus, 1758.

Development rate and time

There was a signifcant difference in development time for larvae to reach pupal and adult stages of development because of the different diet (Table 2). The results confirm that the house fly can develop successfully on a wide range of different protein and carbohydrate sources. Protein:carbohydrate content *had no effect* on development duration in our study. Cammack & Tomberlin (2017) found that larval development rate was faster on the protein:carbohydrate balanced diet. Hogsette & Washington (1995) observed that the development and survival of the *O. aenescens* larvae were higher in more protein diets. Nash & Chapman (2014) showed that the larvae developed significantly slower when reared on a low-protein diet.

Survavial

Larval nutrition influences pupal mortality in our studies. In this study, percent emergence for adults and larval survavial produced from the wheat bran diet was higher than other diet but the development time of larvae reared on wheat bran diet was longer than other diet. Larval survival was greatest on the high carbohydrate diet. Our result show that carbohydrate is important component housefly larval and pupal survavial. Wheat bran diet is most effective nutritients for *M. domestica* Linnaeus, 1758 development. Larval and pupal survavial are high with wheat bran diet. Other effective nutritients for *M. domestica* Linnaeus, 1758 are soybean meal, blood meal with wheat bran diet and poultry feed with wheat bran diet. In this study, percent emergence for adults 88% produced from the wheat bran diet was higher than other diet. Hogsette & Washington, 1995; Simon, Krüger, & Ribeiro, 2011; Van Broekhoven, Oonincx, Van Huis, & Van Loon, 2015 showed that the survival of the larvae was higher in diets with more protein.

We record fastest development and second greatest survival rate when larvae of *M. domestica* Linnaeus, 1758 were reared on a soybean diet.

Weight

The results from the present study also demonstrate that impact of diet affects the pupal and adult weight. Pupae reared on high protein diet (blood meal and mix of blood meal and wheat bran) had significantly higher mean weights than all other treatments. Both diets had a significant effect upon mean adult weight. Adult weight from larvae reared at fish meal diet (other high protein diet) and soybean (high carbonhydrate diet) were high (Table 4). Chicken meal diet were negatively effect on pupal weight. Hogsette, 1992 showed that pupal weight from larvae reared at high protein diet heavier than from larvae reared at low protein diet. Nash and Chapman (2014) showed that carbohydrate also had a significant effect on pupal weight. Green et al., (2003) show that high protein contect affect pupal weight. Other high pupal and adult weight are recorded at larva reared on wheat bran diet. The adult body size is positively correlated with adult fecundity. larger bodies of females had the largest ovaries (Gobbi, Martinez-Sanchez, & Rojo, 2013).

CONCLUSION

Results for larvae reared on the ten different diet revealed that additional information on the life history of this species. This study might not be representative of the response of wild house fly colonies or colonies established from different populations around the world. Variety diet significantly affected *M. domestica* Linnaeus, 1758 ability to develop with respect to developmental rate, size of larvae, and mortality. In conclusion Wheat bran diet is most efficient for mass rearing of *M. domestica* Linnaeus, 1758 and reduce the cost.

Soybean meal, Mix of poultry feed and wheat bran and blood meal and wheat bran diet are other affective diet. Further research is necessary to understand the nutritients contributions of adult lifespan and fitness and optimizes black soldier fly production.

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Table 1. Nutrient content of ten different diet.

Quantity/100 g	Protein (g)	Carbohydrate (g)	Protein:carbohydrate
Wheat bran and milk	21.8	75	1:3.4
Fish meal	65	1	1:0.015
Poultry feed and wheat bran	10.71	29.31	1:2.7
Fish meal and wheat bran	57.4	11	1;0.19
Fermented	18.4	60.5	1:3.2
Blood meal and wheat bran	67.8	11	1:0.16
Soybean meal	44	24.4	1:1.8
Blood meal	80	1	1:0.012
Meat bone meal	45	2	1:0.044
Chicken meal	58	2.5	1:0.043

Table 2. Larval and pupal development.

Diet	Larval Development (Mean ± Std. Error)	Pupal Development (Mean ± Std. Error)
Wheat bran and milk	6.0 ± 0.44	5.0 ± 0.15
Fish meal	5.5 ± 0.44	6.5 ± 0.44
Poultry feed and wheat bran	4.0 ± 0.22	5.0 ± 0.35
Fish meal and wheat bran	5.0 ± 0.44	5.0± 0.31
Fermented feed	5.0 ± 0.44	5.0 ± 0.31
Blood meal and wheat bran	5.0 ± 0.44	4.0 ± 0.31
Soybean meal	5.0 ± 0.44	4.2 ± 0.25
Blood meal	5.0 ± 0.44	4.0± 0.15
Meat bone meal	6.0 ± 0.44	5.0 ± 0.31
Chicken meal	6.0 ± 0.44	5.0 ± 0.31

Table 3. Pupal and larval survavial.

Diet	Larval Survavial		Pupal Survavial	
	n	%	n	%
Wheat bran and milk	118	94	110	93
Fish meal	70	56	57	81
Poultry feed and wheat bran	84	67	45	53
Fish meal and wheat bran	50	40	40	80
Fermented feed	71	57	63	88
Blood meal and wheat bran	85	68	77	90
Soybean meal	91	73	78	85
Blood meal	10	8	5	50
Meat bone meal	21	17	19	90
Chicken meal	5	4	4	80

Table 4. Pupal and adult weight.

Diet	Pupal Weight (Mean ± Std. Error)	Adult Weight (Mean ± Std. Dev.)	
		Male	Female
Wheat bran and milk	177.00 ± 15.6622	24.1667 ± 11.25022	25.0645 ± 8.89072
Fish meal	174.51 ± 9.4070	32.1304 ± 7.70067	28.2059 ± 12.30861
Poultry feed and wheat bran	96.714 ± 5.05147	23.1071 ± 8.76161	21.5294 ± 9.44138
Fish meal and wheat bran	129.47 ± 8.38310	20.2083 ± 7.18077	25.9375 ± 3.21390
Fermented feed	145.436 ± 6.10369	21.8750 ± 9.53586	19.6522 ± 8.66869
Blood meal and wheat bran	202.816 ± 7.69256	32.7576 ± 8.09718	35.7500 ± 12.06595
Soybean meal	169.61 ± 7.54490	29.4474 ± 8.18931	32.6250 ± 7.66506
Blood meal	200.500 ± 6.18466	35.3333 ± 3.05505	38.0000 ± 1.41421
Meat bone meal	129.28 ± 8.98097	20.4545 ± 10.38618	20.3750 ± 9.08590
Chicken meal	59.000 ± 14.97665	9.3333 ± 7.37111	14.0000 ± -

SPATIAL AND TEMPORAL DYNAMICS OF PREDATION OF ROBBER FLIES (INSECTA: DIPTERA: ASILIDAE) ON INSECT FAUNA ACROSS THE DRY DECIDUOUS FOREST LANDSCAPE

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[**Naskar, A., Maity, A., Homechaudhuri, S. & Banerjee, D.** 2020. Spatial and temporal dynamics of predation of robber flies (Insecta: Diptera: Asilidae) on insect fauna across the dry deciduous forest landscape. Munis Entomology & Zoology, 15 (1): 180-188]

ABSTRACT: The stability of the landscape depends on the prey predator's relationship on that ecosystem. So, our present model of two most abundant asilid predator and their predation dynamics in response to varied diversity of different prey groups is the main aim of the present study. *P. femoralis* and *M. aurata* found to predate upon nine insect orders and Arenae (spiders). It revealed that slightly better prey capturing frequency of *P. femoralis* (0.68, $p<0.05$) in comparison to *M. aurata* (0.67, $p<0.05$). Sperman's rank correlation study further confirmed maximum prey capturing efficacy of *P. femoralis* in comparison to *M. aurata* as evident from maximum positive values of correlation (41) and positive slopes (6) at $p<0.05$. Present study also established pre-monsoon as most preferred season to influence maximum predation dynamics of these asilid predators in comparison to other season as their feeding activities increased by 2.3-4 folds in case of *P. femoralis* and 1.5-1.9 folds in case of *M. aurata* respectively. It may also seem to be due to most of the insect orders (Diptera-21; Hymenoptera-11; Hemiptera- 10; Coleoptera-9) available in greater abundance during pre-monsoon, thus affecting predatory activities of asilid fauna ultimately. Different vegetation pattern in two different forest patch (dense vegetation patch with large forest undergrowth vs. thin vegetation without forest undergrowth) influenced predatory dynamics of two asilid species from 25 to 44 in case of *P. femoralis* and from 18 to 31 in case of *M. aurata*. Present study also indicated that differences in diet among the habitats can be attributed to differences in the abundance of the dipterans, and other abundant prey groups rather than to the co-existence of two distinct robber fly populations in prey preference. From the best of the knowledge, it will probably require long term and more detailed field studies under conditions of spatially and temporally variable prey community composition and relative abundance at much broader range to better understand trophic interactions and predatory dynamics of theses model asilid fauna at finer level.

KEY WORDS: Prey preference, predation, capture efficiency, robber flies, dry deciduous forest

The study of trophic relationships is fundamental to understand the structure and function of floral and faunal communities in a particular landscape (Juen & Traugott, 2005). The stability of that landscape depends on the prey predator's relationship on that ecosystem.

Some generalized predators are able to exploit a wide variety of prey, they can respond to fluctuations in the relative abundances of alternative prey and occupy habitats with different prey communities. Populations of such predators may appear to be specialists if they switch to near exclusive use of the most abundant prey type (Hansson, 1989). Therefore to determine the overall impact on prey communities of predators in heterogeneous environments, it is essential to understand the integrate prey use over an entire landscape, where resource availability changing over time (O' Neill, 1992).

The robber flies (Diptera: Asilidae) is a large and diverse family of formidable aerial predatory dipterans. They are mostly generalist predators, although some species show more specialized feeding habits. Robber flies (Insecta: Diptera: Asilidae) are also opportunistic predators that also can be found in many similar habitats. Some robber flies can successfully capture dangerous prey such as stinging bees and wasps (Londt, 1993; Dennis & Lavigne, 2007).

Most of the work done by the eminent scientist is recording the prey utilized by the asilids (Oldroyd, 1980; Lehr et al., 2007 and Hayat et al., 2008). More than 2000 prey species of the asilids are also recorded from the Afro-tropical region (Londt, 2006). But there is a scatter representation of the interaction of asilids with their prey and how they change the trophic level by interacting. Moreover all the studies done in a particular prey group, but there is no overall studies done on the prey insect communities. Therefore the present study thus help to understand the impact of predation done by the asilids in the arid region.

To understand this relationship over time within a limited anthropogenic factor, we chose two species of asilids namely *Michotamia aurata* (Fabricius, 1794) and *Philodicus femoralis* (Ricardo, 1921) as they are the most abundant species in this dry deciduous landscape. Moreover they are generalized as well as specialized predators. Thus our study aimed to understand the overall trophic relationship, over short time intervals and small distances in a dry deciduous landscape with limited anthropogenic factor.

MATERIALS AND METHODS

(i) Study area

Study area in and around Sonamukhi protected forest area has been designed in such a way to divide it into 24 stations for present study on predation dynamics of Asilidae.

(ii) Collection & preservation techniques

The collection of asilids from several study sites is mainly done by insect sweep net after close observation and video recording their predatory activities. In several instances 6 modified large malaise traps were used to capture large amount of asilid fauna in short time. After capturing the fauna, they were sacrificed in killing jar filled with cotton sopping benzene. Then most abundant asilid fauna were sorted separately and transferred in dry envelope with locality label. After they were brought to the laboratory, temporary locality label were replaced followed by their proper identification using Leica EZ4 stereo microscope and Leica stereoiso microscope M205A fitted with Leica software 3.0 were used for their photographic documentation.

(iii) Statistical analysis

Several graphs, Speramnn's rank correlation were performed using multiple softwares like Past 3.0, Microsoft excel 2013 and Xlstat 2014. Maps were generated in Google earth Pro version 7.3.0.3830.

RESULTS

(i) Species abundance

Population size of two highly abundant species i.e. *Michotamia aurata* (Fabricius, 1794) and *Philodicus femoralis* (Ricardo, 1921) are 117 and 76 respectively as revealed from the present study in dry deciduous landscape of Sonamukhi forest. List of two asilid species is given below.

Family ASILIDAE
Subfamily ASILINAE
Tribe Ommatini

1. *Michotamia aurata* (Fabricius, 1794)
   1794, *Michotamia aurata* Fabricius, *Ent. Syst.* 4: 387 (sex-? *Asilus*)
   Type-locality: East India
   Distribution: India [W. Bengal, Uttar Pradesh]
   Elsewhere: Burma, Celebes, Formosa, W. Pakistan
2. *Philodicus femoralis* (Ricardo, 1921)
   1921, *Philodicus femoralis* Ricardo, *Ann. Mag. nat. Hist.*, (9)8: 190 (♂; ♀).
   Type-locality: Okkyl, Schwegu, Burma
   Distribution: India
   Elsewhere: Burma

(ii) List of prey species recorded from present study

Prey Records from present results exhibited that two species of Asilidae was recorded as most abundant and frequently predate upon preys (Table 1). Nine insect orders and Arenae also recorded as prey of the Asilidae. The order Diptera however are mostly targeted pray for Robber flies. Hymenoptera, Coleoptera and Hemiptera are the next targeted group of Insect Order (Fig. 1). More abundant species was *Philodicus femoralis* (Ricardo, 1921) followed by *Michotamia aurata* (Fabricius, 1794) under subfamily Asilinae (Fig. 2).

(iii) Prey capture efficiency

Prey capturing frequency of asilid predators were mainly measured from auto-correlation analyses of the collected data from field. It revealed that at lag 2, *P. femoralis* (0.29, $p<0.05$) clearly won the competition as far as the prey capture efficiency is concerned in comparison to *M. aurata* (0.22, $p<0.05$). Similarly at final lag (lag 4), *P. femoralis* established itself as more efficient predator (0.68, <0.05), in comparison to *M. aurata* (0.67, $p<0.05$) (Fig. 3).

(iv) Prey capturing efficacy

Prey capturing efficacy is another term to talk about the capturing accuracy of predators. Here prey capturing efficacy was measured in terms of Sperman's rank correlation between number of respective asilid species and number of prey individuals captured of different insect orders and araneae as the case may be. It revealed clearly that maximum positive values of correlation (41) and positive slopes (6) were formed in case of *P. femoralis*, in comparison to *M. aurata* (Fig. 4).

(v) Seasonal influence on prey capture efficiency

Seasonal effect on prey capture: is quite common and evident. Asilid fauna also followed a definite trend as far as interplay among different seasonal parameters like temperature, relative humidity, rainfall etc. and predation dynamics are concerned. Present study revealed that their prey capturing efficiency increased by 2.3 folds and 4 folds during pre-monsoon in comparison to monsoon and post monsoon respectively in case of *P. femoralis*. While in case of *M. aurata* the prey capturing efficiency during pre-monsoon increased by 1.5 folds and 1.9 folds in comparison to monsoon and post monsoon respectively (Fig. 5).

(vi) Seasonal variation in prey size

Seasonal variation in available prey size: is pretty known and well documented and evident from the previous literatures (Dennis et al., 2012). Present study also produced similar results and it depicted that number of individuals of most of the insect orders varied seasonally and thereby affect predatory activities frequency of their encounter seasonally. However most of the insect orders available in greater abundance during pre-monsoon, thus affecting predatory activities of asilid fauna eventually (Fig. 6).

(vii) Spatial variation in prey capture efficiency

Relative study sites and prey capture are always inter-related as evident from few old literatures (Hansson, 1989, O'Neill, 1992). Our present study also supported by the previous findings as the present study also revealed that vegetation pattern wise there was a certain variation in prey population affecting their ability to escape the predatory activity as evident from the figures given below (Fig. 7). It also therefore resulted that in less dense vegetation area around dense forest without and / or with low forest understory might cause difficulties of prey populations of different insect orders and preyed upon more frequently by the predatory asilids.

DISCUSSION

Two most abundant asilid can prey on arthropods from widely different taxa and size classes they can (i) respond rapidly to diet fluctuations in the abundance of specific prey within a patch and (ii) forage in different patches that vary in relative abundance of specific prey groups, similar with the findings of Oneill, 1992. Short-term temporal variation in diet was observed when surges in the abundance of dipterans, hymenopterans and coleopterans resulted in a rapid increase in the number of robber flies feeding and a decrease in the proportion of non-dipteran / non-hymenopteran / non-coleopteran prey in their diets. This change occurred on the same time scale as the changes in these prey activity. During non-swarm periods and non-swarm days (specially late monsoon and post monsoon), both the asilid used alternative prey taxa (Orthopterans and lepidopterans) and a wider range of prey sizes. A less pronounced increase in predation upon dipterans was observed on the day that swarms of dipterans of the family Stratiomyidae appeared at the site. Because the flies exploited both large (Tabanidae) and small (Sepsidae) dipterans, it is quite obvious that prey abundance, not only prey size, determined asilid predator's diet composition as already evident from similar results (Oneill, 1992).

In the second part of the study, differences in the abundance of dipterans, hymenopterans, coleopterans and other prey insect orders between native (core dense vegetation zone of forest with high amount of forest understory) and reseeded habitats (less dense planted habitat at the periphery of dense forest zone) were correlated with differences in the proportion of these insect orders in the diet of two asilid predators. On native rangeland, the more varied diet of the these two asilid fauna reflected their ability to exploit a wide range of prey when no single group was extremely abundant. Because of the relatively large home ranges of *P. femoralis* in comparison to shorter home range of *M. aurata* (Londt, 2006) and the small spatial scale over which the study was conducted, it seems likely that differences in diet among the habitats can be attributed to differences in the abundance of the dipterans, and other abundant prey groups rather than to the co-existence of two distinct robber fly populations in prey preference.

Rees & Onsager (1985) estimated the impact of a robber fly with a varied diet on a local community by experimentally controlling *E. bicaudata* densities in the field and in cages and found that heavy predation by the robber flies on the parasitoid flies (Sarcophagidae) reduced the impact of the latter upon grasshoppers. However, it would be grim to extrapolate these results to other times and sites in case of *P. femoralis* and *M. aurata*. Thus, without comprehensive knowledge of the response of the robber flies to spatial and temporal variation in the relative abundance of dipterans and other prey groups, the role of either of the asilid predator in different prey community dynamics cannot be predicted. Such knowledge will only come from more detailed field studies under conditions of spatially and temporally variable prey community composition and relative abundance at much broader range and needed perhaps long term monitoring too.

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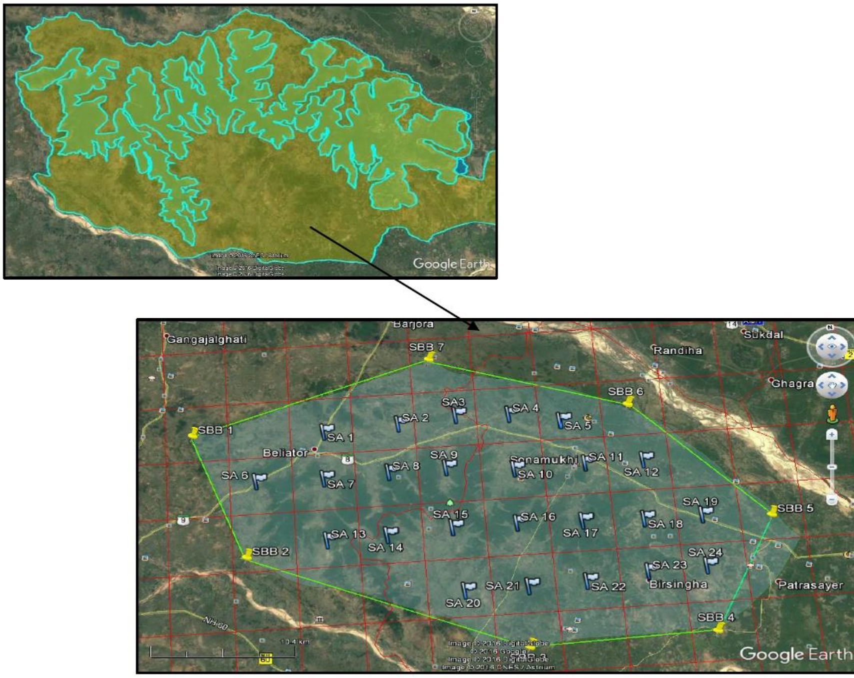

Map 1. Showing 5 Km X 5 Km grid satellite map of study area in and around Sonamukhi protected forest, pop out from satellite map showing actual core forest area of Sonamukhi.

Table 1. Showing combined predatory activities of two most abundant asilid species on 10 different insect orders.

Prey Order	Total No.	*Philodicus femoralis* (Ricardo, 1921)	*Michotamia aurata* (Fabricius, 1794)
Araneae	6	11	0
Coleoptera	15	19	10
Diptera	35	31	40
Hemiptera	14	2	10
Hymenoptera	16	12	4
Isoptera	4	6	0
Lepidoptera	11	18	8
Odonata	3	0	0
Orthoptera	12	18	4
Thysanoptera	2	0	0
Total	118	117	76

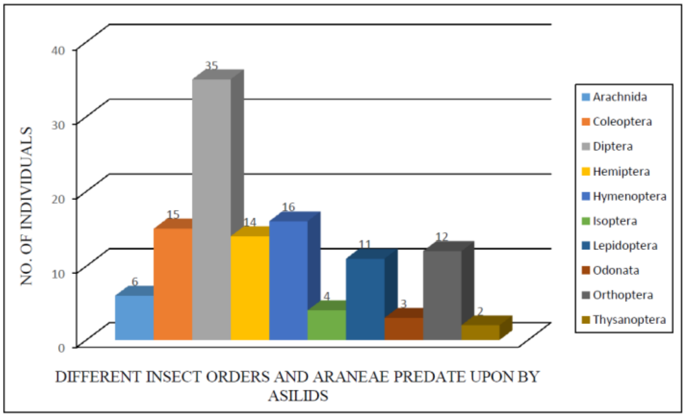

Figure 1. Showing range of predatory activities of two asilid species predated on different insect orders and order Araneae.

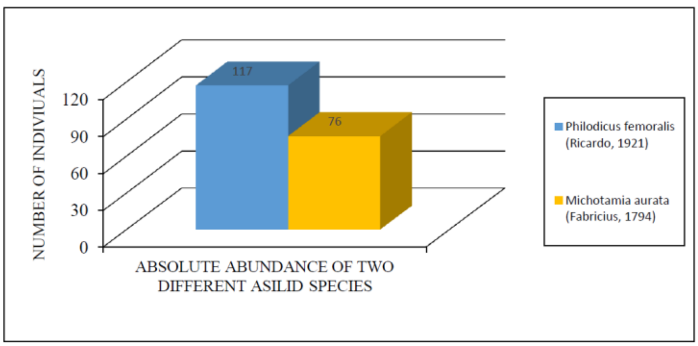

Figure 2. Showing absolute abundance of two asilid species predated on different insect orders.

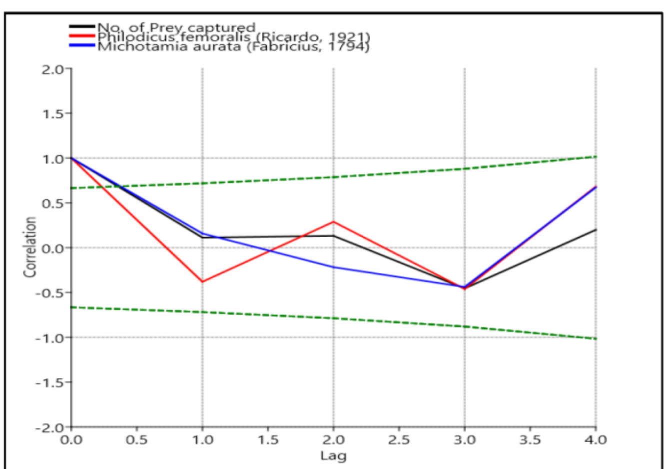

Figure 3. Auto correlation study exhibited graph showing predation dynamics of two asilid species in terms of prey capture efficiency.

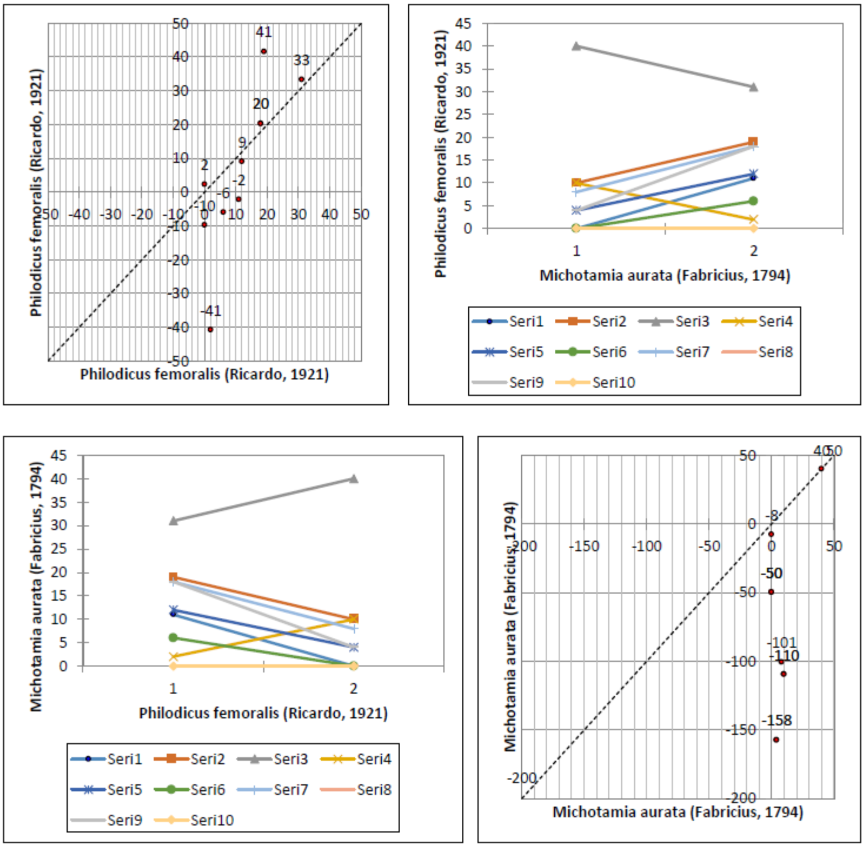

Figure 4. Line diagram and Q-Q plot showing the results of Sperman's rank correlation between *P. femoralis* and the prey captured and *M. aurata* and the prey captured respectively.

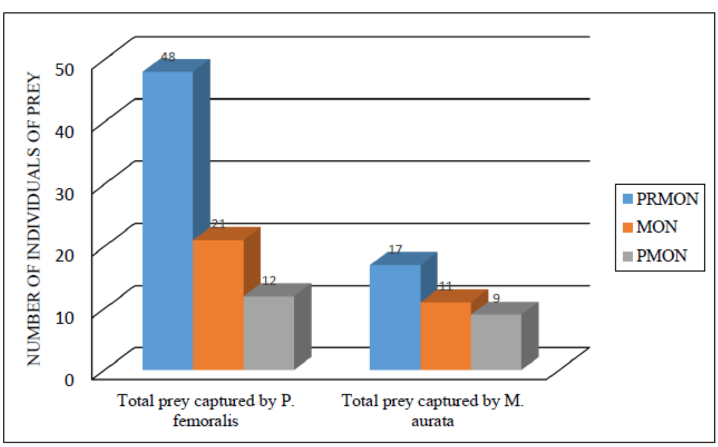

Figure 5. Clustered column showing the effect of season on prey capturing ability of two asilid predators.

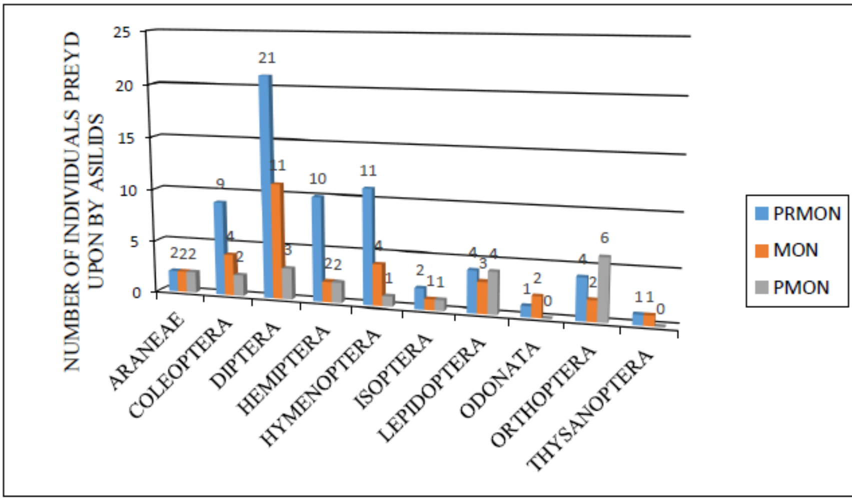

Figure 6. Clustered column diagram showing individual insect order wise seasonal variation in their availability and predated upon by asilid flies.

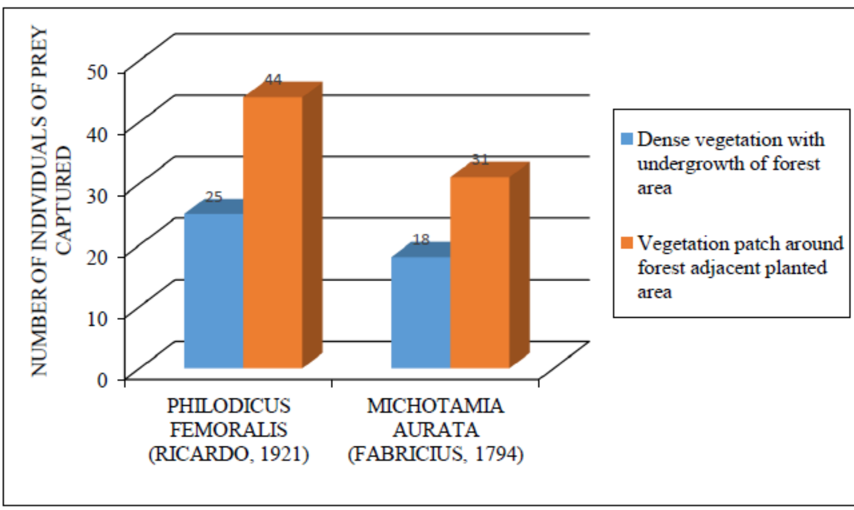

Figure 7. Clustered column showing comparative predatory activities of two asilid flies in varied vegetation patch in and around the Sonamukhi protected forest area.

PLANT RESISTANCE TO THE SAFFLOWER APHID, *UROLEUCON CARTHAMI* (THEOBALD) (HOMOPTERA: APHIDIDAE) IN SAFFLOWER GENOTYPES

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[Saeidi, K. 2020. Plant resistance to the safflower aphid, *Uroleucon carthami* (Theobald) (Homoptera: Aphididae) in safflower genotypes. Munis Entomology & Zoology, 15 (1): 189-196**]**

ABSTRACT: The safflower aphid, *Uroleucon carthami* (Theobald) (Homoptera: Aphididae), is an important pest afflicting safflower in most safflower growing countries in the world. Plant infestation with aphids can reduce plant growth and thus reduce fecundity and crop production. Deliniating the categories of resistance in safflower genotypes under field conditions could be helpful in management of this pest. Antixenosis is defined as a resistance mechanism affecting pest establishment on their host plants. In this research, antixenosis mechanism was evaluated in eight safflower genotypes namely, Padideh, Sina, Zarghan, Sofeh, Goldasht, Golmehr, Esfahan and Varamin at College of Agriculture, Urmia University, during 2016-2017, to identify antixenotic resistance against safflower aphid, *U. carthami*. Choice tests were conducted at 25 ± 1 ºC, 60 ± 5% RH and a photoperiod of 16:8 (L: D) h. After introduction of apterous adult aphids to test arena, the number of aphids on each entry was counted at 2, 4, 6 and 24 hours of release. Significant differences were found between genotypes for Total phenolic content, NPK essential elements, leaf thickness and leaf trichome density. It was found that the most antixenosis effect was observed on 'Sina'. Increase in antixenosis correlated with increase in leaf trichomes. Antixenosis can be important mode of resistance by reducing host selection and delaying aphid colonization. The identification of antixenotic resistance in several genotypes provides additional options for management of this pest. Moreover, the factors associated with this mode of resistance can be effectively used in an integrated pest management of the safflower aphid.

KEY WORDS: *Carthamus tinctorius*, Safflower aphid, Plant resistance, Morphological characteristics, Pest management

Safflower (*Carthamus tinctorius* L.) is an ancient crop of the family Compositae or Asteraceae, originated in the near east and has been grown for centuries in China, India and North Africa (Vargas et al., 2008). It is a multi-purpose species with many traditional uses (Hallman, 2008). In Iran, safflower cultivations is being done for centuries for its orange red and yellow dye (Carthamine) extracted from the florets were once used to color food and clothing and for its oil, rich in poly unsaturated fatty acids which are considered to reduce blood cholesterol and good for heart patients (Sabzalian et al., 2008). There are several causes for low productivity in Gachsaran, among them biotic factors play key role (Akashe et al., 2012; Saeidi et al., 2016).

Among the insect pests that attack safflower the aphid, *Uroleucon carthami* (Theobald) is considered as a major pest causing severe losses to the crop throughout the world. Safflower aphid, *U. carthami* is one of the most destructive pests (Akashe et al., 1999; Jadhav et al., 2012; Akashe & Sawant, 2012), which alone causes 35-72 percent yield loss, during heavy infestation period (Anon, 2007; Bade & Kadam, 2001). Saeidi et al. (2012) recorded 46.2 percent yield loss of safflower in Gachsaran. Seed and oil content losses due to this pest to the extent of 20 to 80 percent have been reported from different parts of country (Bhumaneshvar & Thondarya, 1979; Shetgar & Tahir, 1992; Vijay, 2002; Saeidi et al., 2015). The aphids not only reduce yields of seed and oil content but also attack petals lowering the quality of the value added product of this part of the plant (Saeidi et al., 2015).

The widespread use of insecticides to control this pest and selection pressure has resulted in developing resistance to the insecticides (Sykes, 1977). The development of insecticide resistant biotypes and other harmful effects of chemical control methods to the environment require alternative control strategies (Margaritopoulos et al., 2007). Using resistant genotypes is one of the alternative control methods for this aphid. Several factors in safflower plants may contribute to its resistance to aphids, such as the existence of resistance factors on the plant surface (Gibson, 1971; Alvarez et al., 2006) or at the mesophyll/phloem tissues. In addition, the age and different parts of the plant and can influence the aphid population on plant (Eigenbrode et al., 2002; Alvarez et al., 2006, 2007).

Plant resistance also varies with nutritional quality of phloem sap (primary plant metabolites) or on the amount and nature of secondary metabolites (Gibson & Pickett 1983, Ave & Tingey 1986, Karley et al., 2002). So far, resistances of several wild safflowers and their related accessions and also some commercial genotypes have been assessed to *U. carthami* and some of them have shown various degree of resistance to the aphid, (Alvarez et al., 2006; Leroux et al., 2007, 2008).

The use of resistant genotypes in safflower fields will help to reduce aphid damage and enhance production yield, what is valuable to develop a successful integrated pest management (IPM) programme for the safflower aphid. The objective of this study was to determine the resistance mechanism of eight commercial safflower genotypes in Iran and to measure the biological parameters of the safflower aphid on these genotypes to select the most resistant genotype.

MATERIALS AND METHODS

Plant Materials

In this experiment eight safflower genotypes including Padideh, Sina, Zarghan, Sofeh, Goldasht, Golmehr, Esfehan and Varamin were tested for antixenosis. Seeds of native genotypes were obtained from Seed and Plant Improvement Institute, Karaj, Iran. The seeds of genotypes were sown in polyvinyl chloride pots (27 × 27cm) filled with fertilized field soil. The potted plants were then transferred to a screen-house condition at 25 ± 1 °C, 60 ± 10% RH and a photoperiod of 16:8 h (L: D).

Aphid colony

The rearing of *U. carthami* was started from virginoparous apterous females collected in summer 2016 from a safflower field in Gachsaran, Iran. Aphid colonies were maintained on *C. tinctorius* var. Sina (Compositae) in a climatic room at 20 ± 2°C and a photoperiod of 16:8h (L: D). To maintain the colony, every 15 days some aphids from the infested plants were transferred to a new young safflower plant of Sina genotype.

Antixenosis experiment

The eight safflower genotypes were planted in the perimeter of plastic basins (50 cm diameter × 15 cm height), which were filled with suitable field soil and maintained in the growth chamber at 20 ± 2°C, 65 ± 5% RH and a photoperiod of 16:8h (L:D). These plants were used in the experiment at the 3-4 leaf stage of development. The plastic basins were surrounded by clear cylindrical plastics covered with muslin (50 meshes) for ventilation. This experiment was conducted in five replicates in a randomized design. For each replicate 120 viviparous apterous adults were randomly selected from the colony and released in the centre of each plastic basin on the soil surface to choose the plants. After 2h, 4h, 6h and 24h, the number of aphids on each plant was counted and recorded (Laamari et al., 2008).

Choice tests

One detached leaf from fifth or sixth leaf of each genotype was used for this test. The leaves were arranged in a circular arena in a completely randomized design with 10 replicates for each accession of each test. Eighty apterous adult of aphids released on a filter paper (8cm diameter) were placed at the center of the circle. Dishes were closed using a net to prevent aphids from escaping and placed in a climate room. The number of aphids on each leaf discs was counted after 2, 4, 6 and 24 hours.

Trichome density measurement

To estimate leaf trichome density, in the laboratory we counted the numbers of trichomes density/cm^2 of leaf was carried out by using one cm^2 stopper cutter/borer to punch in a fixed area at one side of the midrib and the stopper was used for tracing on the leaf then within the one cm^2 the number of trichomes were counted. The process of counting trichomes was done under the microscope with the aid of 10x lens and objective on microscope 10/0.25-160/0.17 Kyowa optical Co. Ltd. Japan. Ten trichomes were selected for size measurement from the midrib of the central portion of the leaf blade. Size of trichomes was measured on Microscope (Nikon Alphaphot, Ys, Japan) by ocular micrometer in micron on 5x eyepiece and objective then converted in (mm) millimeter.

Leaf thickness

A digital micrometer was used to measure thickness of the leaves, took care to ensure a constant pressure by using the instrument's ratchet clutch and the leaflet mid and lateral ribs were avoided in measurements (White & Montes, 2005).

Essential elements (NPK)

The amount of nitrogen (N), potassium (K) and phosphorus (P) were measured according to methods of Kjeldahl (1883), Olsen (1954) and Jackson (2005), respectively. These tests were done in faculty of Agriculture, Shiraz University, Iran.

Determination of total phenolic content

Plant samples were washed with distilled water and air dried and then cut into small bits. Small plant bits were refluxed for 30 minutes in 25 ml of 80 percent alcohol on hot water bath. Supernatant extract was decanted into another flask and the residue was again re-extracted with small quantity of hot ethanol. Both the extracts were pooled and filtered through What man number 1 filter paper (Mahadevan, 1965; Jayapal & Mahadevan, 1968). The final volume was maintained at 25 ml. This extract was directly used to estimate total phenol. The alcohol part of the extract was evaporated and the aqueous fraction was analyzed. Total phenols were estimated from the various extracts using Folin-ciocalteau reagent.

Data analysis

Antixenosis data were square root transformed to standardize the variance before analysis. Data of antixenosis, Total phenolic content, NPK essential elements, leaf thickness and leaf trichome density of the safflower aphid were evaluated using the analysis of variance (ANOVA) using the MINITAB-13.1 statistical software (Minitab lnc. 1994 Philadelphia, PA) and comparisons among means were carried out by using the LSD test at $\alpha = 0.05$.

RESULTS

According to the choice test two hours after releasing aphids, the number of aphids on Padideh, Sina, Zarghan and Sofeh was lower than on the other genotypes ($F_{7, 72} = 12.436$, $P < 0.05$). The most antixenosis effect after 4 hours was recorded for Sina and Zarghan ($F_{7, 72} = 35.764$, $P < 0.05$). The number of aphids at third time evaluation ranged from 8.80 aphids on Sina to 12.40 aphids on Varamin ($F7, 72 = 12.04$, $P < 0.05$). After 24 hours, the least number of aphids settled on Sina ($F_{7, 72} = 14.245$, $P < 0.05$) (Table 1). The greatest differences were detected at 6 h after safflower aphid introduction. According to the results of repeated measures design, there was significant difference in number of aphids on the genotypes (Table 2). And the most overall antixenotic effect to safflower aphid was observed in 'Sina', whereas Varamin and Golmehr exhibited little or no antixenosis (Table 1).

The amount of measured plant factors are summarized and illustrated in Table 3. There was no significant different among the genotypes with respect to leaf thickness ($F_{7, 16} = 1.620$, $P = 0.314$) and NPK contents ($F_{7, 16} = 2.468$, $P = 0.265$ for N; $F_{7, 16} = 1.620$, $P = 0.452$ for P and $F_{7, 16} = 1.332$, $P = 0.520$ for K) but significant differences in the leaf trichome density and phenolic content were observed. The highest trichome density and total phenolic content were recorded for Sofeh. On the basis of Pearson correlation coefficient, there was a negative correlation between leaf trichome density and number of aphids. But there was no relationship between the number of aphids and leaf thickness, total phenolic content, and NPK (Table 4).

DISCUSSION

Plant species are different with respect to their suitability as hosts for different insects when their performance and preference are measured on these plants (Storer & van Emden, 1995; Frei et al., 2003). Meanwhile, different genotypes of a plant species differ in chemical and morphological characteristics which influence their suitability as hosts (Ave & Tingey, 1986). Therefore, assessing the resistance of different genotypes to the pests with respect to the plants differences can provide valuable information on their suitability or unsuitability to the insects.

The current study revealed that there were significant differences in the safflower aphid performance among the eight safflower genotypes tested. We tested safflower genotypes for antixenosis to *U. carthami* by assessing feeding deterrence and aphid settling in choice test. The genotypes with lowest number of aphids on them have the highest antixenosis resistance. Therefore, in our study the most antixenotic effect belonged to Sina.

Several mechanisms such as morphological characteristics and quality of the host plant could be responsible for the variation in aphid's performance on different genotyps. Host plant quality is an important factor that is responsible for the antibiotic resistance of plants, as host plant suitability is affected by the level of amino acids or nitrogen in the phloem sap and the secondary metabolites that influence aphids' performance (Gibson & Pickett, 1983; Ave & Tingey, 1986; Dixon, 1998; Cisneros & Godfrey, 2001; Karley et al., 2002). In this study, antixenosis in the safflower genotypes was positively correlated with morphological features. At different test times there were aphid density fluctuations on some genotypes. One reason for such fluctuations may be diurnal changes in the phloem sap composition (van Emden & Harrington, 2007; Winter et al., 1992); changes in concentration of some amino acids and sugars may cause aphids to stop feeding and to pull out their stylets as shown in *Nasonovia ribisnigri* (Mosley) on lettuce (*Lactuca sativa*) and *Aphis fabae* Scopoli on beans (Van Helden et al., 1993). Another reason may be an increase in mobility of individuals in dense colony by tactile disturbance from other members as in colonies of *Drepanosiphum platanoidis* (Schrank) (Dixon, 2012) or attributed to volatile semiochemicals as in colonies of *Rhopalosiphum padi* (L.), (Quiroz et al., 1997). The allelochemicals can be as stimulant or deterrent for the aphids (Smith, 2005).

The antixenosis was positively correlated with leaf trichome density. The role of leaf trichomes is generally water control and resistance against herbivory in some plants (Gonzales et al., 2008). The simple trichomes of these genotypes probably act as mechanical barriers that hinder insect movement and/or feeding (Le Roux et al., 2008; Levin, 1973; Smith, 2005).

Plant acceptance is a critical phase for aphid colonization and population establishment (Le Rouxet et al., 2008). Antixenosis can deter aphids, reduce colonization and keep the size of population under economically injurious levels (Hesler & Tharp, 2005; Hesler & Dashiell, 2011). Deterrence form settling on host plants may cause aphid to continue searching. Aphids maybe exhausted after long time searching or be preyed before finding a suitable host plant for feeding and reproduction (Hesler & Dashiell, 2011). Aphids initially invade crops in low numbers, and then populations increase gradually to reach damaging levels. For these pests, low-to-moderate levels of antixenosis and antibiosis can be effective (Hesler & Tharp, 2005). So, we have focused on evaluation of antixenosis in safflower against *U. carthami*. Such findings in combination with information on other resistance mechanisms (Saeidi et al., 2015) can be helpful in IPM programs of safflower.

CONCLUSION

As a result, the characterization and use of resistant genotypes can be an effective strategy to aid in the control of the population level of insect pests and in reducing the use of chemical treatments in the crop. Besides, it can be integrated with biological control and any other control strategy devoted to IPM programs. Therefore, with respect to our findings, antixenotic effect was observed in the Sina genotype and this genotype can be used as a moderately resistant genotype in IPM of the safflower aphid.

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Table 1. Mean (± SE) number of safflower aphids on eight safflower genotypes in several sampling times.

Genotypes	Number of aphids per leaf disc (± S.E)				
	2h	4h	6h	24h	Mean
Padideh	9.65 ± 0.522abc	10.36 ± 0.763abc	10.30 ± 0.667bc	9.50 ± 0.453cd	9.952 ±0.283cd
Sina	9.25 ± 0.564c	8.12 ± 0.482c	8.80 ± 0.533b	8.40 ± 0.582d	8.642 ± 0.281d
Zarghan	9.55 ± 0.376bc	8.66 ± 0.423bc	10.80 ± 0.573ab	10.50 ± 0.687abcd	9.877 ±0.282cd
Sofeh	10.15 ± 0.668abc	10.85 ± 0.567ab	11.20 ± 0.814b	10.10 ± 0.605bcd	10.575 ± 0.284bc
Goldasht	11.15 ± 0.668abc	12.84 ± 0.706a	10.10 ± 0.482ab	12.30 ± 0.423ab	11.597 ± 0.283ab
Golmehr	12.55 ± 0.838a	12.25 ± 0.616a	10.20 ± 0.712ab	13.20 ± 0.712a	12.05 ± 0.284a
Esfehan	10.65 ± 0.928abc	11.00 ± 0.471ab	10.30 ± 0.633ab	10.10 ± 0.900bcd	10.512 ± 0.283bc
Varamin	12.45 ± 0.432ab	11.76 ± 0.490a	12.40 ± 0.236a	11.30 ± 0.473abc	11.977 ± 0.284a

* Means in a column followed by the same letters are not significantly different (LSD test at 5% significance level).

Table 2. Repeated measures variance analysis of genotype effects on aphids density in choice test.

Source of Variations	SS	df	Mean of Square	F	*P*
Genotypes	465.318	7	63.654	18.002	0.01
Error	278.416	72	5.670		

Table 3. Means (± SE) of some measured features of safflower genotypes.

Genotypes	N%	P%	K%	TPC (ppm)	Thickness(mm)	Trichome density(mm)
Padideh	3.240 ± 0.122	0.470 ±.012	3.825 ± .190	779.795±63.275a	0.468±.045	40.123±2.511abc
Sina	4.065 ± 0.123	0.460 ± .043	3.225 ± .432	679.125±11.241ab	0.473±.040	45.765±2.123ab
Zarghan	3.223 ± 0.410	0.520 ± .022	4.590 ± .300	519.684±31.655bc	0.484±.062	38.187±3.044bcd
Sofeh	3.250 ± 0.456	0.485 ± .164	5.125 ± .377	880.898±39.23a	0.555±.041	47.244±4.222a
Goldasht	3.468 ± 0.311	0.455 ±.017	3.315 ± .180	311.396±55.186d	0.532±.019	30.411±3.066d
Golmehr	3.789 ± 0.225	0.340 ± .067	3.175 ± .400	258.451±32.540d	0.485±.055	30.333±1.542d
Esfahan	3.856 ± 0.076	0.295 ± .077	4.675 ± .500	398.543±61.321bc	0.451±.067	31.255±1.235d
Varamin	3.765 ± 0.345	0.370 ± .062	4.075 ± 1.70	333.528±42.486bc	0.476±.024	32.561±1.127cd
F(df =7,16)	2.468	1.620	1.332	39.551	1.620	14.677
	0.265	0.452	0.520	< 0.05	0.314	< 0.05

Abbreviations: N: nitrogen; P: Phosphor; K: potassium and TPC: total phenol content
1 Means in a column followed by the same letters are not significantly different (LSD test at 5% significance level).

Table 4. Pearson correlation coefficient (r) between number of aphids *Uroleucon carthami* and some plant factors which may have role in antixenosis of safflower genotypes to safflower aphid.

	n	p	k	TPC	Thickness	Trichome density
Number of Aphids	-0.410	-0.525	-0.211	-0.780	0.075	-0.864*

Abbreviations: N: nitrogen; P: Phosphor; K: potassium and TPC: total phenol content.
*: Significant $p < 0.05$.

A NEW SPECIES OF THE GENUS *PARMENA* DEJEAN, 1821 (COLEOPTERA: CERAMBYCIDAE) FROM TURKEY

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ABSTRACT: *Parmena lodosi* sp. nov. is described from Turkey (İzmir environs). The new species is close to *P. unifasciata* (Rossi, 1790); the distinguishing characters are discussed.

KEY WORDS: *Parmena*, Cerambycidae, Lamiinae, new species, Turkey

Parmena Dejean, 1821 includes twenty species in Palaearctic region. The genus is represented by seven species in Turkey. Five of seven species are endemic to Turkey as *P. bialookii* Danilevsky, 2017 (from central part of S Turkey), *P. istanbulensis* Danilevsky & Hizal, 2017 (from European Turkey), *P. lukati* Sama, 1994 (from western parts of S Turkey), *P. mutilloides* Sabbadini & Pesarini, 1992 (from western parts of S Turkey), *P. striatopunctata* Sama, 1994 (from eastern parts of N Turkey). One of the remaining two species, *P. pontocircassica* Danilevsky & Miroshnikov, 1985 (from eastern parts of N Turkey) has SW-Asiatic (Anatolo-Caucasian) chorotype, and the other one *P. slamai* Sama, 1986 (from European Turkey) has E-Mediterranean (NE-Mediterranean) chorotype (Danilevsky & Smetana, 2010; Danilevsky, 2019).

As seen above, the species *Parmena unifasciata* (Rossi, 1790) is not known from Turkey.

We found a single female specimen that was identified as *Parmena balteus* (Linnaeus, 1767) of *Parmena* Dejean, 1821 during examination of an interesting material from Turkey in Lodos Entomological Museum (LEMT) (İzmir, Turkey). So that it has revealed a new species of *Parmena* Dejean, 1821.

Parmena unifasciata (Rossi, 1790)

The species was originally described by Rossi (1790) as *Lamia unifasciata*. The original description of Rossi (1790) is as follows.

"*L. unifasciata*

Thorace inermi, ovato, sordide nigro, elytris fuscis nigro punctatis, fascia media atra flexuosa flavo-marginata.

Corpus ovatum. Antennae longitudine corporis articulis subferrugineis, apice pallidis, tertio, & quarto praelongis, arcuatis. Caput, & thorax fusco-nigra. Elytra obtusa punctis nigris raris excavata, fascia lata nigra margine utrinque flexuoso angulato flavor, quae magnam partem abdominis tegunt. Femora fusca tibiis apice albido.

Habitat sub arborum cortice in silvis. Lecta m. Dec. & Feb."

According to Danilevsky (2019), this species is distributed only in Albania, Bosnia Herzegovina, Croatia, France, Greece, Italy, Macedonia, Slovenia, Switzerland and Yugoslavia.

Parmena lodosi sp. nov.

(Figs. 1A,B,C)

Material. Holotype, female, Turkey, İzmir prov.: Tire, 07.VI.1974, – preserved in Lodos Entomological Museum (LEMT) (İzmir, Turkey).

A single female available; rather large pale specimen close to *Parmena unifasciata* (Rossi, 1790); frons, genae and eye lobes are about same; 1st antennal joint swollen; 3rd antennal joint is 1.5 times 1st antennal joint; 4th antennal joint is almost the same as 1st antennal joint; prothorax is 1.2 times longer than basal width with similar lateral tubercles; pronotum is about same; elytra with relatively denser punctation less pronounced than the nominotypical subspecies; oblique short setae rather long, pale; pale setae spots near scutellum well developed; brown transverse elytral band narrower, bordered by lines of light hairs with contrast pale anterior and posterior borders; longitudinal elytral striae indistinct; body length: 8.75 mm, body width: 3.25 mm.

Differencial diagnoses. The new species is close to *Parmena unifasciata* (Rossi, 1790) in general. It clearly differs from *P. unifasciata* by less ovate (relatively more slender) body; transverse elytral band narrower and brown never black; paler and almost uniform body color (reddish-brown or brownish) including uniformly colored antennae.

Distribution. Asian Turkey (Anatolia); the species is known from the nearest environs of İzmir province.

Etymology. The name of new species is dedicated to the Late Prof. Dr. Niyazi Lodos.

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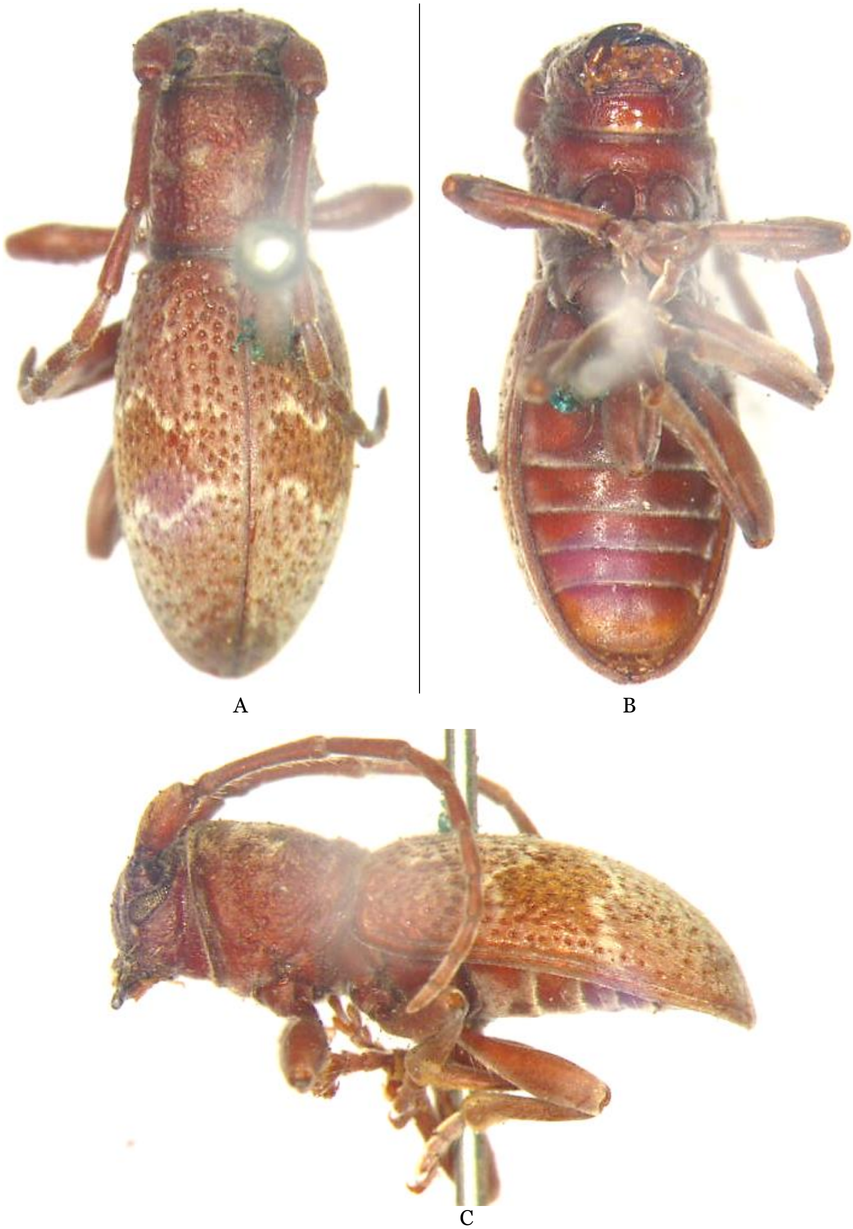

Figure 1. Habitus of *Parmena lodosi* sp. nov., holotype, A. Dorsal view, B. Ventral view, C. Lateral view.

TAXONOMIC ACCOUNTS WITH NOTES ON SPATIAL DIVERSITY AND RELATIVE ABUNDANCE PATTERN OF HORSEFLIES (DIPTERA: TABANIDAE) FROM SONAMUKHI PROTECTED FOREST AREA OF WEST BENGAL, INDIA

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ABSTRACT: Haematophagy is perhaps one of the common and of advantageous mode of feeding as far as horse fly fauna are concerned. Taxonomic studies of this haematophagous and veterinary important fly revealed a total of nine tabanid species namely *Chrysops dispar* (Fabricius, 1798); *Atylotus virgo* (Wiedemann, 1824); *Tabanus dorsiger* Wiedemann, 1821; *Tabanus (Tabanus) rubidus* Wiedemann, 1821; *Tabanus (Tabanus) striatus* Fabricius, 1787; *Tabanus (Tabanus) tenens* Walker, 1850; *Haematopota javana* Wiedemann, 1821; *Haematopota marginata* Ricardo, 1911; *Hippocentrodes desmotes* Philip, 1961 under four genera viz. *Atylotus* Osten Sacken, 1876; *Tabanus* Linnaeus, 1758; *Haematopota* Meigen, 1803; *Hippocentrodes* Philip, 1961 and two subfamilies i.e. Chrysopsinae and Tabaninae from study sites of Sonamukhi dry deciduous protected forest habitat across arid zone of West Bengal. Among these nine tabanid species, one species namely *Tabanus dorsiger* Wiedemann, 1821 are recorded for the first time from this zone of the state. Diversity analyses of tabanid species comparatively throughout the three season revealed that most of the diversity and evenness indices of tabanid species yielded maximum value during post monsoon, whereas dominance indices recorded maximum value during pre-monsoon and post monsoon respectively. Margalef's species richness index and Chao-1 index of tabanid species yielded maximum value during monsoon. Rank abundance model of tabanid species revealed best suited with log series model (bootstrap value: 9999; $p<0.05$). Mau-Tau's sample rarefaction analyses revealed that present sampling of tabanids almost approached towards the asymptote and sampling of tabanid species throughout the three season is well within the acceptable range significantly (95% confidence level; $p<0.05$). Moreover abundance based indices yielded maximum value during monsoon, and diversity based indices yielded maximum value during post monsoon. This results might indicate a clear correlationship of abundance with relative humidity and and diversity with temperature parameters. This will need to be confirmed through more rigorous and long term monitoring of environmental parameters in future.

KEY WORDS: Taxonomy, spatial diversity, relative abundance, Tabanidae, Sonamukhi protected forest

Blood-sucking insects are the vectors of many of the most debilitating parasites of humans and their domesticated animals. In addition they are of considerable direct cost to the agricultural industry through losses in milk and meat yields, and through damage to hides, wool and other products (Lehane, 2005). It is believed that haematophagy arose independently at least six times among the arthropods of the Jurassic and Cretaceous periods (145–65 million years ago) (Balashov, 1984; Ribeiro, 1995). Once blood was regularly encountered by insects, it is likely that its high nutritional value favoured the development of a group of insects that regularly exploited blood as a resource. This would have developed progressively, through physiological, behavioural and morphological adaptations, first to facultative haematophagy and eventually, in some insects, to obligate haematophagy. Overall prolonged close association with vertebrates along with morphological pre-adaptation for piercing habit in tabanids might favour their adaptive fitness in course of evolution. Tabanids are one of those well-known dipteran fauna with reputation of fierce biting and sucking blood meal from different domesticated, wild animals and even human.

The family Tabanidae (Insecta: Diptera), also known as daans-makkhi elsewhere in the India and dansmachi in Bengal, are widely known for their disease causing capabilities in different wild animals, like horses, deer, cattle and livestock. They are a widespread dipteran family with considerable vector potentiality and ability to transmit around 100 different types of bacterial, protozoan and viral diseases. They are ordinarily known as deerfly, horsefly and clegs. They are large bodied, sturdy fliers ranging from 7-33 mm, known for their furious bite to vertebrate animals including humans. The flies are easily identified by their sickle shaped antennae (3rd segment annulated), pulvilliform empodium, and 4th & 5th radial veins which always terminate on either side of the wing (Thomas, 2011). They are generally with broad bodies and bulging eyes. Sexes are easily distinguishable on the basis of eyes, i.e. they are contiguous in males and widely separated by fore head in females (Mitra & Sharma, 2009). Males and females of this family are mainly differentiated in terms of eyes that are separated in females and are contiguous in males. The adults of both sexes feed on nectar and pollen of flowers. Females of most species have piercing mandibles and also known to sustain on blood meals from vertebrate animals during their reproductive period (Chainey, 2014).

"Surra disease" or trypanosomiasis, caused by *Trypanosoma evansi* (Steel) is one of the most important diseases of animals affecting health and survival of a number of domestic and wild animals (Veer et al., 2002) in India and abroad . The disease has been reported from a wide variety of domestic and wild animals in Asia, Africa, South America, and Europe (Desquesnes et al., 2013; Truc et al., 2013), and is categorized under list B diseases by the Office International Epi-zooties (OIE, 2014). Surra disease can seriously impact the health of infected wild animals leading to mass mortality. Thirteen tigers (*Panthera tigris* Linn.) died at Nandankanan Biological Park in Orissa state of India (Veer et al., 2002) in an epidemic. Human cases of trypanosomiasis are not unusual, and a few cases have been reported from India and other parts of the world in the last decade, sometimes leading to death of the patient (Truc et al., 2013). Surra is mechanically transmitted by haematophagous Diptera of the families Tabanidae and Muscidae mainly (Veer et al., 2002), and several tabanid species have been indicted as major vectors (Veer and Parashar, 2008). The tabanid flies are also deadly vectors of several other diseases of livestock with over 35 pathogenic agents. They are the main causative vectors of equine infectious anaemia virus, *Anaplasma marginale,* and *T. vivax,* as well as the agents of cutaneous anthrax, tularaemia, bovine viral leucosis, vesicular stomatitis and hog cholera including *Trypanosoma evansi* (responsible for causing Trypanosomiasis), that affect cattle, horses and wild animals and also spill over to adjoining humans (Veer, 1999).

Although Diptera specially vector groups have several economic implications in our society, is less studied and much attention is needed to work on medico-veterinary important groups of flies. Tabanidae is one of such important dipteran family considering their vector potentiality and abilities of transmitting around 100 different types of bacterial, protozoan and viral diseases. Blood-sucking females of tabanid flies not only cause serious discomfort for humans and animals

(Wilson 1968; Foil et al., 1983; Baldacchino et al. 2014) but also transmit the pathogens of numerous diseases (Foil 1989; Hall and Wall 2004; Lehane 2005). Tabanids disturb the grazing of large herbivores, like cattle, resulting in reduced meat and milk production in cattle farms (Hunter and Moorhouse 1976; Harris et al. 1987). An intense tabanid annoyance makes horse riding impossible outside or even may cause traumatic injuries by running the horses riot (Lin et al. 2011).

For the control of tabanids, the knowledge about their seasonal activities is of great importance. The diversity and distribution of insect population is directly affected by the available food resource and the climatic condition. The influence of the climate, vegetation and their interaction plays a crucial role in diversity, abundance and richness of insect species can be influenced by the climate, vegetation and their interactions (Wolda 1978; Marinoni & Ganho 2003; Kittelson 2004; Torres & Madi-Ravazzi 2006). Food resources and climatic conditions vary in space and time, directly affecting the diversity and distribution of insect populations (Morais et al. 1999; Kittelson 2004; Bispo et al. 2006; Bispo & Oliveira 2007; Goldsmith 2007). Climate is one of the determining factors in insect population fluctuations throughout the year (Wolda 1978; Torres & Madi-Ravazzi 2006).

Kozlov et al. studied diversity and abundance of human bitting flies and found Simuliidae and Tabanidae as most abundant flies specially in pre-monsoon and recorded their highest activities in pre-monsoon and also reported that their abundance pattern remained unchanged irrespective of pollution and other anthropogenic disturbances (Kozlov *et al.*, 2005). But there is no such data available on their distribution in India. Few scattered works reported that abundance of tabanid fauna increased by many folds during monsoon (Datta et al., 1998; Veer et al., 2002). So, there is a constant dilemma present over the diversity and seasonal abundance of tabanid flies. Besides this the study also emphasises on change in land use pattern as one of the non-climatic influential factor affecting assemblage of tabanid fauna specially in connection with their disease transmitting capabilities (Baldacchino et al., 2017).

Moreover worldwide information about Tabanidae is biased towards taxonomical research, which has been the main source of diversity data for this group of flies (Cardenas et al., 2009). Main focus is levied on the taxonomic studies of tabanids specially in India. Though few diversity studies were conducted but that were mainly on the basis of availability of species from different study sites and their faunal composition from different distribution sites (Datta, 1997; Veer et al., 2002; Vasudeva et al., 2007).

The Indian Tabanidae was studied which included a species and described from India herself earlier in 1798 by Fabricius (1798), who has later added three more species (Fabricius, 1805). Subsequently, in the nineteenth century, Wiedemann (1821; 1824), Macquart (1838; 1846; 1850; 1855), Saunders (1841), Walker (1848; 1850; 1854), Schiner (1868) and Bigot (1891; 1892) have described several species from different parts of India. With the beginning of the twentieth century, Ricardo (1902; 1906; 1909; 1911a; 1911b; 1913; 1914; 1917) has contributed much to the Indian fauna and her outstanding contribution of 1911 is the most important source of reference till today. Besides, Brunetti (1912), Surcouf (1921), Austen (1922), Senior-White (1922a; 1922b; 1924; 1927), Enderlein (1922), Szilady (1926), Schuurmans Stekhoven (1926; 1928; 1932), Krober (1930), Basu & Menon (1952), Philip (1959; 1960a; 1960b; 1962; 1970; 1972), Philip &. Mackerras (1960), Mackerras (1962), Sen & Fletcher (1962), Chvala (1969), Stone &. Philip (1974), Stone (1975), Datta & Biswas (1977), Datta & Das (1978), Datta (1980; 1981) and Veer (1999) have also made commendable works by describing and recording species occurring in India. A check-list of Tabanidae hitherto known, is provided synoptically in order to have a general idea of the faunal composition in India after Datta (1985); Vasudeva *et al.* (2007); Mitra & Sharma (2009). But the overall taxonomic analysis of different tabanid fauna in arid zone with special reference to Sonamukhi dry deciduous protected forest habitat of the state of West Bengal is largely coveted. The comprehensive ecological studies also largely wanted from this important dry deciduous protected forest landscape. By studying abundance pattern, one can infer about their frequency of occurrence in different season in their availability.

MATERIALS AND METHODS

(i) *Collection and preservation techniques*

Tabanid flies specially females can be more convenient to be collected from cattle animals as they usually exhibit the characteristic haematophagy and males can be collected from tree trunks or on vegetation by sweeping with insect net in warm sunny weather or from lights at night. Traps specially malaise trap, canopy trap etc. can also be known as most effective method to catch large amount of Tabanids in a short time with minimum effort. For night collection light trap is an essential method. After collecting samples are usually killed by exposing them to the killing jar filled with benzene or high dose chloroform, this procedure takes just fraction of time, immediately after that the entomo-fauna has been transferred to the special drying envelope for the dehydration purpose, this specimens had been kept there until they would be bring back to the lab (ZSI, HQ) for further identification purpose. After catching, adults are killed in killing jars as it contains benzene and it should be pinned as early as possible for studying most of the characters that might be present at live condition. Then specimens are kept in special envelopes composed of blotting papers.

(ii) *Identification and taxonomic studies*

Diptera structurally comprises the most highly specialised members of the class Insecta. All the subfamilies, tribe, genera and species of family Tabanidae are presented following the classification scheme of Burger and Thompson, 1981 for convenience. Proper identification was performed using Leica EZ4 stereo microscope and Leica stereo-iso microscope M205A fitted with Leica software 3.0 were used for taking their snapshot. All the terminologies used in the present study are from McAlpine (1989).

(iii) *Diversity indices and relative abundance*

α-diversity analysis:

Structural associations i.e. percentage abundance were also calculated and analysed from the pooled data and finally enumerating Tabanidae diversity with the help of several biodiversity indices. These include Shannon-weaver index, Species richness index, Evenness index and dominance diversity index.

Shannon-weaver index (Shannon & Weaver, 1948):

$$\text{Shannon-weaver index } (H') = -\Sigma\,(ni/N)\ln(ni/N)$$

Where (ni/N) is proportion of individuals found in calculated sample and ln (ni/N) is natural logarithm of proportion of individuals of each species.

Simpson's Index of Diversity 1 – D (Simpson, 1949):

Simpson's Index (D) measures the probability that two individuals randomly selected from a sample will belong to the same species (or some category other than species). There are two versions of the formula for calculating D. Either is acceptable, but be consistent. n = Total number of organisms of a particular species, N = The total number of organisms of all species.

$$D = \Sigma (n/N)^2 \qquad D = \Sigma \frac{n(n-1)}{N(N-1)}$$

The value of this index also ranges between 0 and 1, but now, the greater the value, the greater the sample diversity. This makes more sense. In this case, the index represents the probability that two individuals randomly selected from a sample will belong to different species.

Evenness index (Pielou, 1969):

It is the mean distribution of individuals among the species. Evenness is expressed by considering how close a set of observed species abundances are to those from aggregation of species having maximum possible diversity for a given N and S.

$$\text{Evenness index (e)} = H' / \ln S$$

Where H′ is Shannon-weaver index and ln S is natural logarithm value of no. of species present.

Brillouin index (Brillouin, 1956):

When the randomness of a sample cannot be guaranteed, for example during trapping where different species of flies are differentially attracted to the stimulus, or if the community is completely censused and every individual accounted for, the Brillouin index (HB) is the appropriate form of the information index (Pielou 1969, 1975). It is calculated as follows:

$$HB = 1nN! - Y \ln ni! \;\; N$$

Evenness (E) for the Brillouin diversity index is obtained from:

$$E = HB/Hbmax$$

Menhinick's index (Menhinick, 1964):

Menhinick's index, D_{mn} (Whittaker, 1977), is calculated using:

$$D_{mn} = S / \sqrt{N}$$

Where N is the total number of individuals in the sample and S the species number.

Species richness index (Margalef, 1958):

This index can simply be presented as no. of species present in a community.

$$\text{Richness} = (S-1) / \ln N$$

Where S= total no. of species found and ln N is sum of all individuals of all the species present there.

Equitability index (Lloyd & Ghelardi, 1964):

Lloyd & Ghelardi defined their index as follows:

$$\varepsilon = S' / S$$

Where S is the observed number of species and S′ is the theoretical number of species which would yield the observed diversity H, if their relative abundances followed the broken stick model of McAurther (1957).

Fisher's alpha index (Fisher et al., 1943):

This is a parametric index of diversity that assumes that the abundance of species follows the log series distribution:

$$\alpha x, \alpha x^2 / 2, \alpha x^3 / 3, \ldots \alpha x^n / n$$

Where each term gives the number of species predicted to have 1,2,3,....n individuals in the sample. The index is the alpha parameter.

This is a useful index, which has been widely used. To test if a log series distribution is appropriate. It is estimated by an iterative procedure that may take an appreciable amount of time with large data sets.

Where αx is the number of species predicted to have one individual, αx^2 to have two individuals etc.

Estimate x from the iterative solution of:

$S/N = (1-x)/x\ (-\ln (1-x))$ where S=number of spp., N = total individuals

Once you know x, calculate α, the diversity index

$\alpha = N\ (1-x)/x$

Chao-1 species richness index (Chao, 1984):

The Chao1 estimator uses only the numbers of singletons and doubletons (and the observed richness) to obtain the following lower bound for the expected asymptotic species richness (Chao, 1984):

$\hat{S}_{Chao1} = \{S_{obs} + f_1^2/2f_2\}$ if, $f_2>0$

$\hat{S}_{Chao1} = \{S_{obs} + f_1 (f_1-1) / 2\}$ if, $f_2=0$

ln SHE index:

It is a combined index of log transformed value of species richness(S), species evenness (E) and original value of Shannon Weaver's index (H).

Dominance-diversity index (Berger and Parker, 1970):

Dominance indices are weighted toward abundance of commonest species. It is result of division of total no. of individuals of most common species (N_{max}) and sum of all the individuals of all the species present in that site.

$$\text{Dominance index (D)} = N_{max}/N$$

And finally dominance was determined by dividing the obtained value by 1.

$$DBP = 1/D$$

Relative abundance & sample rarefaction:

Relative abundance is a component of biodiversity and refers to how frequent or rare a species is in relation to other species in a defined location. Relative species abundance describes key factor of biodiversity. During the present study, the relative abundance of different species of tabanid fauna across the Sonamukhi protected forest area of West Bengal were analysed. Besides that graphs of log series model of rank abundance for tabanid species and species accumulation curves (Sanders, 1968) for tabanid sample rarefaction were generated on 5 times replication of the collected field data after method (Simberloff, 1972) using Past 3.0.

(iv) *Preparation of GIS based maps and graphs*

Maps were produced using software DIVA GIS version 7.5.0.0. Photographs in the field were captured using Nikon D7000 camera and Nikkor lens. Graphs were produced using MS Excel 2013, Past 3.0.

(v) *Study areas*

Sonamukhi Protected Forest area, located in the Sonamukhi block of Bankura district, West Bengal is our proposed study area, which was surveyed extensively in the period of three years (2013-16). Sonamukhi protected forest, Bankura holds one of the best quality Sal forests in West Bengal. A typical red-lateritic soil covered with medium density Sal forests is the typical feature of that area. Sonamukhi protected forest area was surveyed because it's floral bio diversity and unique soil quality. The qualitative change in the species mix really made facelift in the Sonamukhi forest. There is no consolidated report on the Dipteran fauna and this is the first time attempt to inventories the Dipteran fauna of Sonamukhi Protected Forest. 61 specimens of Tabanidae were collected and these are pinned, labelled and sorted according to their family and made ready for identification. Survey was done thoroughly in Sonamukhi protected forest and its adjacent villages to get a complete scenario of horsefly diversity in this protected forest area. The places that have been surveyed mostly are namely: Sonamukhi forest area, Churamanipur, Muslo, Patharmura, Kalyanpur, Lokesol, Palsora, Hamirhati, Kasdihi beat area. The landscape and vegetation pattern of this area where collection has been done extensively has been discussed. It includes 3 study sites from each of these stations mentioned above.

RESULTS

Present study is part of the study of Tabanid fauna of arid region of West Bengal enumerated a total of nine tabanid species under five genera and two subfamilies namely Chrysopsinae and Tabaninae. Among them single species i.e. *Tabanus dorsiger* Wiedemann, 1821 reported for the first time from the state (Maity et al., 2017). Systematic account with key is given wherever deemed necessary along with first reference, current reference, type locality, material examined, and distribution are given for each tabanid species. Wherever diagnosis of only single species which is reported for the first time from the state, is provided.

(i) Systematic list (newly recorded species is indicated with double asterisks sign)

Family TABANIDAE (Latreille, 1802)
Subfamily CHRYSOPSINAE (Lutz, 1905)
Tribe Chrysopsini (Lutz, 1905)
I. Genus ***Chrysops*** Meigen, 1803
1. ***Chrysops dispar*** (Fabricius, 1798)

Subfamily TABANINAE (Latreille, 1802)
Tribe Tabanini (Chainey & Oldroyd, 1980)
II. Genus ***Atylotus*** Osten Sacken, 1876
2. ***Atylotus virgo*** (Wiedemann, 1824)

III. Genus ***Tabanus*** Linnaeus, 1758
3. ***Tabanus dorsiger*** Wiedemann, 1821**
Subgenus ***Tabanus*** Linnaeus, 1758
4. ***Tabanus (Tabanus) rubidus*** Wiedemann, 1821
5. ***Tabanus (Tabanus) striatus*** Fabricius, 1787
6. ***Tabanus (Tabanus) tenens*** Walker, 1850

Tribe Haematopotini (Chainey & Oldroyd, 1980)
IV. Genus ***Haematopota*** Meigen, 1803
7. ***Haematopota javana*** Wiedemann, 1821
8. ***Haematopota marginata*** Ricardo, 1911

V. Genus ***Hippocentrodes*** Philip, 1961
9. ***Hippocentrodes desmotes*** Philip, 1961

(ii) Detailed systematic accounts
Family TABANIDAE
Subfamily CHRYSOPSINAE
Tribe Chrysopsini
I. Genus ***Chrysops*** Meigen, 1803

1. ***Chrysops dispar*** (Fabricius, 1798)
   1798, *Chrysops dispar* Fabricius, Ent. Syst. Suppl., 567 (♂, ♀; *Tabanus*).
   Type-locality: India
   Distribution: India,
   Elsewhere: Borneo, Burma, Ceylon, China, Formosa, Hainan, Laos, Malaya, Nepal, Philippines, [Luzon] Sumatra, Thailand, Viet Nam.

Subfamily TABANINAE

Tribe Tabanini

II. Genus ***Atylotus*** Osten Sacken, 1876

2. ***Atylotus virgo*** (Wiedemann, 1824)
   1824, *Atylotus virgo* Wiedemann, Analecta Ent., 22 (♂, ♀; *Tabanus*)
   Type-locality: "Ind. Orient"
   albulus Walker, 1850 Insecta Saundersiana, 1:46 (♂, ♀; *Tabanus*), Type-locality: East India
   puella Walker, 1850, Insecta Saundersiana, 1: 53 (♂; *Tabanus*), Type-locality: East India
   Distribution: India "Orient"
   Elsewhere: Nil

III. Genus ***Tabanus*** Linnaeus, 1758

3. ***Tabanus dorsiger*** Wiedemann, 1821**
   1821. *Tabanus dorsiger* Wiedemann*,* Diptera Exotica, Kiliae, pp. 43-50, 101.
   Type locality: Brazil
   Distribution: India (Orissa, West Bengal)
   Elsewhere: Mexico to Argentina; Trinidad

   Subgenus ***Tabanus*** Linnaeus, 1758

4. ***Tabanus (Tabanus) rubidus*** Wiedemann, 1821
   1821, *Tabanus (Pseudobolbodimyia) rubidus* Wiedemann, Dipt. exot., 1: 69 (♀).
   Type-locality: "Bengalia"
   Distribution: India,
   Elsewhere: Burma, Ceylon, China [Kwangtung] Java, Malaya, Nepal, Nias Island, Sumatra, Thailand , Viet Nam

5. ***Tabanus (Tabanus) striatus*** Fabricius, 1787
   1787, *Tabanus (Pseudobolbodimyia) striatus* Fabricius, Mantissa Insect, 2: 356 (sex-?).
   Type-locality: China
   Distribution: India, [Bengal, Bihar, Punjab]
   Elsewhere: Ceylon, China, [Kwangtung], N.Thailand, N. Viet Nam W. Pakistan, Africa.
   ? dorsilinea Wiedemann, 1824, Analecta Ent.: 22 (♂) Type-locality , Ind. Orient
   ? chinensis Thunberg 1827, Nova. Acta, Soc. Sci. upsal., 9: 61 (? sex) Type-loc. China, Cape of God Hope.
   hilaris Walker, 1850, Insecta Saundersiana, 1: 49 (♂).Type-locality: East India

6. ***Tabanus (Tabanus) tenens*** Walker, 1850
   1850, *Tabanus (Pseudobolbodimyia) tenens* Walker, Insecta Saundeersiana, 1: 49 (♀).
   Type-locality: East India

Distribution: India. [Chenai, Maharashtra, Punjab]
Elsewhere: Bali, Burma, Ceylon, Java, Madura Islands, Malaya, Philippines, [Luzon, Mindoro, Sumar, Leyte, Negros, Mindanao] Soembawa, Sumatra, Thailand, Timor, Guam

Tribe Haematopotini

IV. Genus ***Haematopota*** Meigen, 1803

7. ***Haematopota javana*** Wiedemann, 1821

1821, *Haematopota javana* Wiedemann, Dipt. exot., 1: 100 (♀).
Type-locality: Java
Distribution: India
Elsewhere: Burma, Java, Laos, Malaya, Sumatra, Thailand, Viet Nam.
Pasiatica Rondani (Wiedemann MS), 1875, Annali, Mus. civ. Stor. nat. Giacomo Doria 7: 461 (♀), Type-locality: unknown

8. ***Haematopota marginata*** Ricardo, 1911

1911, *Haematopota marginata* Ricardo, Rec. Indian Mus., 4: 347 (♂ ♀)
Type-locality: Pusa and Goalbathan Bengal, Tezpore, Assam, India
Distribution: India, W. Bengal, Bihar [Pusa and Goalbathan] Assam, [Tezpore]
Elsewhere: Nil

V. Genus ***Hippocentrodes*** Philip, 1961

9. ***Hippocentrodes desmotes*** Philip, 1961

1961. *Hippocentro desdesmotes* Philip, Indian J. Entomol., 21 (2): 83.
Type location: Kanchrapara, West Bengal
Distribution: India [Rajasthan, West Bengal; Nepal]
Elsewhere: Nil

(iii) Identification keys of family Tabanidae up to species level (representative family of haematophagous vector flies)

Family TABANIDAE

Key to the subfamilies

1. Hind tibiae with paired apical spurs mostly, vertex with well-developed functional ocelli; caudal ends of spermathecal ducts of female without cup-like expansion..CHRYSOPSINAE (one genus, one species)

- Caudal ends of spermathecal ducts of female with cup-like expansion; vertex with rudimentary or no ocelli, hind tibiae without apical spurs................................ ....TABANINAE (four genera, eight species)

Subfamily TABANINAE

Key to tribes

1. Frons in females much longer than wide, frontal callus usually longitudinal when present, flagellum with large basal plate and 4 annuli; wing hyaline or dusty; basicosta in wing with strong setae.......................................Tabanini (two genera)

-. Frons in females wider than long, frontal callus transverse, antennae long and slender, flagellum with narrow base and 3 annuli; pictured wing pattern with pale markings, basicosta with thin setae.............................Haematopotini (two genera)

Tribe Tabanini

Key to genera

1. Antennal style with 4 annulations, frons with prominent callus...***Tabanus*** Linnaeus (four species)

-. Frons with reduced or spotted calli...........***Atylotus*** Osten-Sacken (one species)

Genus ***Tabanus*** Linnaeus

Key to species

1. Frontal callus with a spindle shaped linear extension...2

– Frontal callus with the linear extension not spindle shaped..***rubidus*** Wiedemann, 1821

2. Abdomen with median stripe continuous up to 6th segment, except on 2nd tergite absent; costal cell clear..***striatus*** Fabricius, 1787

– Abdomen with median stripe complete, present on 2nd tergite; costal cell not clear..3

3. Abdomen with median stripe light and complete, present on 2nd tergite, lateral stripes much straight, costal cell tinge yellowish....................***tenens*** Walker, 1850

– Abdomen with median stripe complete, broad on 2nd tergite, lateral stripes in form of irregular spots appearing as steps, costal cell light yellowish..***dorsiger*** Wiedemann, 1821

Tribe Haematopotini

Key to genera

1. Wings with pale spots, wavy lines or punctulate forming circles and/or rosettes...***Haematopota*** Meigen (two species)

– Wings infuscated with 6 or more pale transverse bands, no rosettes..***Hippocentrodes*** Philip (one species)

Genus ***Haematopota*** Meigen, 1803

Key to species

1. Wings dark brown with fairly distinct rosettes; 3rd rosette very irregular, no such transverse bars on posterior border, anal cell has curved white streak..***javana*** Wiedemann, 1821

-. Wings brown, numerous light markings, three rosettes distinct, small transverse bars on posterior border zigzag, anal cell has no such streak..***marginata*** Ricardo, 1911

(iv) Diagnostic accounts

Subfamily CHRYSOPSINAE (Lutz, 1905)

Diagnosis: Abdominal tergite IX divided. Style of male gonocoxite bluntly ended. Antennae with 3–4 flagellomeres. Caudal ends of spermathecal ducts with simple tubes. Hind tibiae mostly with pair of apical spurs.

Tribe Chrysopsini (Lutz, 1905)

Diagnosis: Scape much elongated than broad, flagellomere narrow without dorsal angle. Eyes bare with spots or variegated dark markings, rarely with bands. Posterior margin of cells open.

I. Genus ***Chrysops*** Meigen, 1803

1803. *Chrysops* Meigen, Mag. Insekten Kude, 2: 267.

Type species: Tabanus caecutiens Linnaeus, 1761

Diagnosis: Varies from small to moderately long in size (5.5-12.5 mm in length), usually bright yellow to black coloured species. Callus usually transverse with three functional ocelli. Scape and pedicel much longer and scape in most often swollen. Proboscis long. Wings infuscated in irregular fashion or with dark cross band, Sc vein bare, r5 and m2 cells open widely. Abdomen with specific yellow and black patterns or yellowish or dark stripes, spots or triangles.

1. ***Chrysops dispar*** (Fabricius, 1798)

1798. *Tabanus dispar* Fabricius, Ent. Syst. Suppl., 1: 567.

Type locality: India orientalis

Material examined: 2♀♀, collected from cow, 23°17′25.29″ N, 87°15′2.58″ E, 92.9 m, Station 1, Bankura, 23.ix.2013, Coll. A. Naskar; 1♀, collected from cow, 23°19'15.15"N, 87°12'28.52"E, 96.8 m, Station 2, Bankura, 23.ix.2014, Coll. A. Naskar.

Distribution: India (West Bengal: Nadia; S 24 Paraganas; Andaman island, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tripura).

Elsewhere: Bangladesh, China, Java, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sumatra, Sri Lanka, Taiwan, Thailand and Vietnam.

Remarks: They become active in low light or towards evening. Their abundance is notably high in rainy season.

Subfamily TABANINAE (Latreille, 1802)

Diagnosis: Hind tibia without apical spurs. Style of gonocoxite truncate by a shallow incision. Caudal ends of spermathecal ducts of female with cup like expansion. Antennae with 3-4 flagellomeres. Cell r5 mostly closed, m3 always open.

Tribe Tabanini (Chainey & Oldroyd, 1980)

Diagnosis: Basicosta densely setulose except in some palearctic species. Antennae usually short and stout. Basal flagellomere with well-developed dorsal angle. Flagellum with 4 flagellomeres.

II. Genus ***Atylotus*** Osten-Sacken, 1876

1876. *Atylotus* Osten-Sacken, Mem. Boston Soc. Nat. Hist., 2: 425-426.

Type species: Tabanus bicolour Wiedemann, 1821.

Diagnosis: Usually small sized fly, frons with spotted calli or without calli. Colour of eyes in living specimen green or yellow. Basal plate of flagellum broad and obtuse dorsal angle. Basicosta pale to brown setulose.

2. ***Atylotus virgo*** (Wiedemann, 1824)

1824. *Tabanus virgo* Wiedemann, Analecta. Entomol., p. 22.

1973. *Atylotus virgo* Philip, Entomol. Scand. Suppl., 4: 57.

Type locality: "Indies orientalis"

Material examined: 1♀, collected from cow, 23°17′25.29″ N, 87°15′2.58″ E, 92.9 m, Station 1, Bankura, 23.ix.2013, Coll. A. Naskar; 1♀, collected from cow, 23°16'13.29"N, 87°11'51.51"E, 108.7 m, Station 3, Bankura, 12.iii.2015, Coll. A. Maity.

Distribution: India (West Bengal: Bankura, Puruliya, S 24 Paraganas; Andaman Island, Himachal Pradesh, Madhya Pradesh, Punjab, Uttarakhand).

Elsewhere: Sri Lanka, Pakistan.

Remarks: Burger (1981) put forwarded the conflict regarding placement of this species under genus *Atylotus* as it differs in many features from it. It can transmit Surra disease pathogens.

III. Genus ***Tabanus*** Linnaeus, 1758

1758. *Tabanus* Linnaeus, Syst. Nat. Ed., 10: 601.

Type species: *Tabanus bovinus* Linnaeus, 1758

Diagnosis: Robust flies with colourful eyes in live condition; vertex without prominent ocellar tubercle; in males entirely pollinose when present; eyes bare.

3. ***Tabanus dorsiger*** Wiedemann, 1821

1821. *Tabanus dorsiger*. Wiedemann, Diptera Exotica, Kiliae, pp. 43-50, 101.

Type locality: Indian subcontinent.

Material examined: 2♀♀, collected from cow, 23°13'25.65"N, 87°13'46.55"E, 93.7 m, Station 4, Bankura, 27.ix.2013, Coll. A. Maity; 1♀, collected from cow, 23°18'31.42"N, 87°18'14.02"E, 85.9 m, Station 5, Bankura, 17.ix.2014, Coll. A. Maity; 1♀, collected from cow, 23°14'33.50"N, 87°21'20.85"E, 91 m, Station 6, Bankura, 21.iii.2015, Coll. A. Maity.

Diagnosis: Adult fly is usually larger (14–16 mm in length) than the other two trivittate flies, *T. striatus* and *T. tenens*. Fore head slightly divergent above, frontal callus narrowly separated from eye margins and median callus spindle shaped and narrowly joined to dorsal extension of frontal callus. Abdomen trivittate, mid dorsal stripe complete and broad on tergum II, sub lateral pale stripes noticeably step-like; venter uniform with grey tomentum and light pilose. Fore femur and fore tibia are uniformly orange to orangy brown in colour but are darkened apically. Thoracic stripes are distinct. The male has a yellow tinted costal cell on the wing.

Distribution: India (West Bengal: Bankura, East Midnapre, Hooghly, S 24 Paragana; Orissa).

Elsewhere: Mexico to Argentina, Trinidad.

Remarks: This species is previously known to us as *Tabanus triceps* Thunberg, 1827, later the species was synonymised under *Tabanus dorsiger* Wiedemann, 1821 due to basically same character of callus in fore head and abdominal pattern with sub lateral stripes step like in both species. This species is recorded for the first time from the state of West Bengal.

Subgenus ***Tabanus*** Linnaeus, 1758

4. ***Tabanus (Tabanus) rubidus*** Wiedemann, 1821

1821. *Tabanus rubidus* Wiedemann, Dipt. Exot., 1: 69.

Type locality: Bengalia.

Material examined: 2♀♀, collected from cow, 23°17'24.55"N, 87°24'52.28"E, 76.4 m, Station 8, Bankura, 20.iv.2014, Coll. A. Maity; 5♀♀, collected from cow, 23°16'23.26"N, 87°22'32.06"E, 83.2 m, Station 7, Bankura, 27.ix.2013, Coll. A. Naskar.

Distribution: India (West Bengal: Bankura, Birbhum, Hooghly, Maldah; Arunachal Pradesh, Meghalaya, Orissa, Sikkim).

Elsewhere: Pakistan, Philippines, China, Indonesia.

Remarks: This species is very common across different study area of West Bengal. This species shows wide distribution pattern across different districts of the state.

5. ***Tabanus (Tabanus) striatus*** Fabricius, 1787

1787. *Tabanus striatus*. Fabricius, Mantissa insect, 2: 356.

Type locality: China.

Material examined: 7♀♀, collected from cow, 23°16'23.26"N, 87°22'32.06"E, 83.2 m, Station 7, Bankura, 27.ix.2013, Coll. R.S. Mridha; 1♀, collected from cow, 6♀♀, collected from buffalo, 23°17'24.55"N, 87°24'52.28"E, 76.4 m, Station 8, Bankura, 29.ix.2013, Coll. R.S. Mridha; 2♀♀, collected from cow, 23°17'24.55"N, 87°24'52.28"E, 76.4 m, Station 8, Bankura, 29.ix.2013, Coll. S.K. Sinha; 10♀♀, collected from cow, 23°16'23.26"N, 87°22'32.06"E, 83.2 m, Station 7, Bankura, 27.vii.2014, Coll. A. Maity; 7♀♀, collected from buffalo, 23°16'23.26"N, 87°22'32.06"E, 83.2 m, Station 7, Bankura, 26.vii.2014, Coll. A. Maity; 1♀, collected from cow, 23°13'31.79"N, 87°23'50.42"E, 84.9 m, Station 9, Bankura, 20.iv.2014, Coll. A. Maity; 1♀, collected from cow, 23°15'18.73"N, 87°25'49.44"E, 83.5 m, Station 10, Bankura, 20.iv.2014, Coll. A. Maity.

Distribution: India (West Bengal: Alipurduar, Bankura, Birbhum, Bardhaman, Darjeeling, East Midnapore, Hooghly, Howrah, Jalpaiguri, Kolkata, Maldah, Murshidabad, N 24 Paragana, Nadiya, Puruliya, S 24 Paragana, S Dinazpur, West Midnapore; Arunachal Pradesh, Assam, Bihar, Delhi, Gujrat, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharastra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh).

Elsewhere: Bangladesh, Bhutan, Combodia, China, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Remarks: There was taxonomic misinterpretation through ages and hence the distributional records associated with the species were in a mess everywhere before Burton (1978) who took pains to sort out the perplexed identity of the species from its allies. Later, Burger and Thompson (1981) aptly illustrated, keyed and discussed these species with a view to making away with the recurrent confusion. This is a very common and widespread species in India, and is often found to enter the house, being attracted by light in hot summer night.

6. ***Tabanus (Tabanus) tenens*** Walker, 1850

1850. *Tabanus tenens* Walker, Insecta Saunders., Dipt., 1: 49.

Type locality: East India.

Material examined: 1♀, collected from cow, 23°17'24.55"N, 87°24'52.28"E, 76.4 m, Station 8, Bankura, 29.ix.2013, Coll. S.K. Sinha; 2♀♀, collected from cow, 23°18'31.42"N, 87°18'14.02"E, 85.9 m, Station 5, Bankura, 20.iv.2014, Coll. A. Maity.

Distribution: India (West Bengal: E Midnapore, Bankura, Maldah, Birbhum, Hooghly, S 24 Paragana; Assam, Orissa, Sikkim); SE Asia.

Remarks: The adult fly is an important mechanical vector of Surra disease and is also implicated in the transmission of anthrax.

Tribe Haematopotini (Chainey & Oldroyd, 1980)

Diagnosis: Fore head broad usually with paired dark velvety spots above the wide and glossy callus. Antennae usually long and narrow. Scape cylindrical, longer than wide. Basal flagellomere cylindrical with under developed or rounded dorsal angle and with 3 flagellomeres. Characteristic dappled wing. Vein R4 usually with strong appendix.

IV. Genus ***Haematopota*** Meigen, 1803

1803. *Haematopota* Meigen, Magazin Insekt Kude, 2: 67.

Type species: Tabanus pluvialis Linnaeus, 1758.

Diagnosis: Generally small and slender flies of brownish to blackish grey in colour; eyes with several wavy bands in live condition; frons with velvety black spot on each side above the frontal callus and often a mid-frontal spot above these; picture wing pattern i.e. dark wing with pattern of pale spots; mid tibiae and hind tibiae often with pale rings.

7. ***Haematopota javana*** Wiedemann, 1821

1821. *Haematopota javana* Wiedemann, Dipt. Exot., 1: 100.

Type locality: Java.

Material examined: 2♀♀, collected from cow, 23°18'31.42"N, 87°18'14.02"E, 85.9 m, Station 5, Bankura, 20.ii.2014, Coll. A. Maity; 2♀♀, collected from cow, 23°16'23.26"N, 87°22'32.06"E, 83.2 m, Station 7, Bankura, 20.ii.2014, Coll. A. Maity.

Distribution: India (West Bengal: Birbhum, Nadia; Bihar, Himachal Pradesh, Kerala, Meghalaya, Mizoram, Tamil Nadu).

Elsewhere: Andalas, Bangladesh, China, Java, Laos, Malaya, Myanmar, Thailand and Vietnam.

Remarks: This is a common and widespread species, and hence it shows certain amount of variable characters (vide Stone & Philip, 1974).

8. ***Haematopota marginata*** Ricardo, 1911

1911. *Haematopota marginata* Ricardo, Rec. Indian Mus., 4: 347.

Type locality: Pusa, Bihar.

Material examined: 1♀, collected from cow, 23°17′25.29″ N, 87°15′2.58″ E, 92.9 m, Station 1, Bankura, 20.ii.2014, Coll. A. Maity; 1♀, collected from cow, 23°15'18.73"N, 87°25'49.44"E, 83.5 m, Station 10, Bankura, 20.ii.2014, Coll. A. Maity.

Distribution: India (West Bengal: Birbhum; Assam, Bihar, Meghalaya).

Elsewhere: Bangladesh.

Remarks: This species is commonly found in hilly region of North Bengal.

V. Genus ***Hippocentrodes*** Philip, 1961

1961. *Hippocentrodes* Philip, Magazin Insekt Kude, p. 82.

Type species: Hippocntrodes desmotes Philip, 1961 by monotypy.

Diagnosis: Transversely banded wings; straight bands of eyes; short appendix in relation to base of vein R_4; mostly yellowish mid tibia, hind tibia and tarsi.

9. ***Hippocentrodes desmotes*** Philip, 1961

1961. *Hippocentrodes desmotes* Philip, Indian J. Entomol., 21 (2): 83.

Type locality: Kanchrapara, West Bengal.

Material examined: 1♀, collected from cow, 23°17'24.55"N, 87°24'52.28"E, 76.4 m, Station 8, Bankura, 27.ix.2013, Coll. R.S. Mridha.

Distribution: India (West Bengal: Bankura, N 24 Paraganas; Rajasthan).

Elsewhere: Nepal.

Remarks: This species is rare in occurrence across study area of West Bengal.

(v) Detailed diversity accounts

A. Comparative analyses of several diversity indices in three different season:

Figure 1A depicted that maximum diversity (Shannon) of tabanid species recorded during post monsoon (1.673), in comparison to pre-monsoon (0.976) and monsoon (1.097). Figure 1B depicted that maximum dominance of tabanid species recorded during pre-monsoon (0.528), in comparison to monsoon (0.361) and post monsoon (0.207). Figure 1C depicted that maximum Simpson's dominance of tabanid species recorded during post monsoon (0.793), in comparison to pre-monsoon (0.472) and monsoon (0.639). Figure 1D depicted that maximum evenness of tabanid species recorded during post monsoon (0.888), in comparison to pre-monsoon (0.531) and monsoon (0.506). Figure 1E depicted that maximum Brillouin's index of tabanid species recorded during post monsoon (1.202), in comparison to pre-monsoon (0.783) and monsoon (1.188). Figure 1F depicted that maximum Menhinick's index of tabanid species recorded during post monsoon (1.809), in comparison to pre-monsoon (1.021) and monsoon (1.765). Figure 1G depicted Margalef's species richness index of tabanid species recorded maximum during monsoon (2.455), in comparison to pre-monsoon (1.259) and post monsoon (2.085). Figure 1H depicted maximum equitability index of tabanid species recorded during post monsoon (0.934), in comparison to pre-monsoon (0.607) and monsoon (0.690). Figure 1I depicted that maximum Fisher's alpha index of tabanid species recorded during post monsoon (5.403), in comparison to pre-monsoon (1.922) and monsoon (4.877). Figure 1J depicted that maximum Berger-Parker's dominance index of tabanid species recorded during pre-monsoon (0.708), in comparison to monsoon (0.577) and post monsoon (0.273). Figure 1K depicted that maximum Chao-1 index of tabanid species recorded during monsoon (16.5), in comparison to pre-monsoon (5.5) and post monsoon (7.5). Figure 1L (log of SHE index) depicted that maximum ln S of tabanid species recorded during monsoon and post monsoon (2.197), in comparison to pre-monsoon (1.609); maximum H of tabanid species recorded during post monsoon (1.512), in comparison to pre-monsoon (0.976) and monsoon (1.346); maximum ln E of tabanid species recorded during pre-monsoon (-0.633), in comparison to monsoon (-0.852) and post monsoon (-0.685).

B. Log series model of rank abundance of Tabanidae throughout three seasons:

Figures 2.A-C. showing present samples of tabanid species best suited in log series model of rank abundance, depicting maximum abundance during pre-monsoon and monsoon of species *T. straitus* (17, 12.545; 15, 8.298) and of species *T. striatus* (3, 3.857) and *H. javana* (3, 2.429) respectively during post monsoon, as evident and significantly supported by bootstrap value of *9999 ($p<0.05$).

C. Mau-Tau's sample rarefaction analyses of tabanid species collected throughout the three seasons:

Mau-Tau's sample rarefaction analyses of tabanid species sampled throughout the three seasons revealed that present sampling of tabanids almost approached towards the asymptote and though more sampling needed to reduce the sampling error, but overall sampling of tabanids species throughout the three season is well within the acceptable range significantly, as evident from the species accumulation curves (95% confidence level; $p<0.05$).

DISCUSSION

A total of nine tabanid species namely *Chrysops dispar* (Fabricius, 1798); *Atylotus virgo* (Wiedemann, 1824); *Tabanus dorsiger* Wiedemann, 1821; *Tabanus (Tabanus) rubidus* Wiedemann, 1821; *Tabanus (Tabanus) striatus* Fabricius, 1787; *Tabanus (Tabanus) tenens* Walker, 1850; *Haematopota javana* Wiedemann, 1821; *Haematopota marginata* Ricardo, 1911; *Hippocentrodes desmotes* Philip, 1961 under four genera viz. *Atylotus* Osten Sacken, 1876; *Tabanus* Linnaeus, 1758; *Haematopota* Meigen, 1803; *Hippocentrodes* Philip, 1961 and single subfamily i.e. Tabaninae are recorded during study period in study sites of Sonamukhi dry deciduous protected forest habitat across arid zone of West Bengal. Among these nine tabanid species, one species namely *Tabanus dorsiger* Wiedemann, 1821 are recorded for the first time from this zone of the state. Notably the species *Hippocentrodes desmotes* Philip, 1961 of genus *Hippocentrodes* Philip, 1961 are recorded only for the second time from the state.

Diversity analyses of tabanid species comparatively throughout the three season revealed that most of the diversity and evenness indices of tabanid species yielded maximum value during post monsoon (Shannon index- 1.673; Pielou's evenness- 0.888; Brillouin's index- 1.202; Menhinick's index- 1.809; Equitability index- 0.934; Fisher's alpha index- 5.403), whereas dominance indices recorded maximum value during pre-monsoon (dominance index- 0.528; Berger-Parker's dominance- 0.708) and post monsoon (Simpson's dominance index- 0.793) respectively. Margalef's species richness index and Chao-1 index of tabanid species yielded maximum value during monsoon (Margalef's richness- 2.455; Chao-1: 16.5).

Rank abundance model of tabanid species revealed best suited with log series model, as evident from maximum abundance during pre-monsoon and monsoon of species *T. straitus* (17, 12.545; 15, 8.298) and of species *T. striatus* (3, 3.857) and *H. javana* (3, 2.429) respectively during post monsoon, significantly supported by bootstrap value of *9999 ($p<0.05$).

Mau-Tau's sample rarefaction analyses revealed that present sampling of tabanids almost approached towards the asymptote and sampling of tabanid species throughout the three season is well within the acceptable range significantly (95% confidence level; $p<0.05$).

Among all these tabanid fauna recorded from Sonamukhi protected forest and adjacent area representing arid zone of the state, only one species i.e. *Haematopota marginata* Ricardo, 1911 exhibit endemism to this zone within the state. Other 8 tabanids are more or less distributed widely with one species namely *Tabanus (Tabanus) striatus* Fabricius, 1787 is most widespread and almost found to be cosmopolitan in distribution. Distribution map of Tabanidae in arid region of West Bengal (Map 1) exhibited their collection sites and species richness of the family on the basis of number of species collected from study sites. It revealed that station 8 in Sonamukhi protected forest area under Chotanagpur dry deciduous eco region is most species rich as far as tabanid fauna are concerned. Besides, it can be said that certain tabanid species occurring in Sonamukhi protected forest and adjacent area under eco-region of Chotanagpur dry deciduous forest and associated arid region of West Bengal may immigrate at least to the neighbouring states i.e. Bihar, Jharkhand, Chhattisgarh and countries, such as Bangladesh, Myanmar, Thailand, etc. or emigrate from those states and countries. Though family Tabanidae are presumed to exhibit discontinuous distribution in arid region of the state and this appears to be due to the need of thorough exploration of several area, unfavourable natural conditions in the area for survival and colonization, inaccessible area specially large part of Jungle mahal. But in far future, the distribution is expected to be continuous due to influence of similar topographic conditions prevailing in surrounding states encompassing same eco-region of Chotanagpur dry deciduous forest of arid zone.

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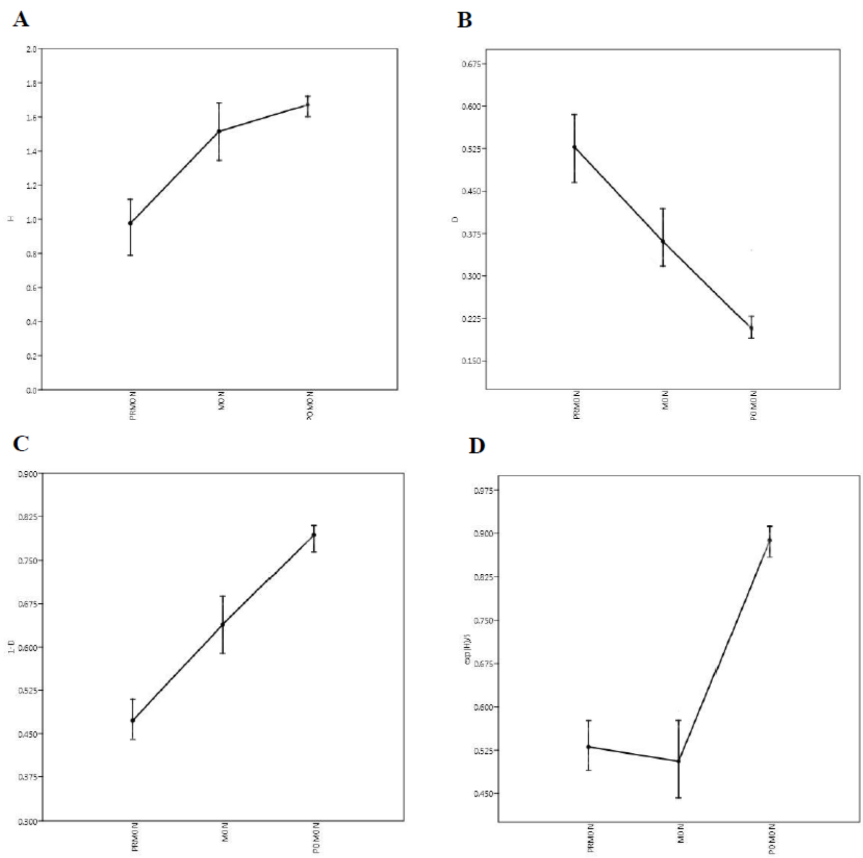

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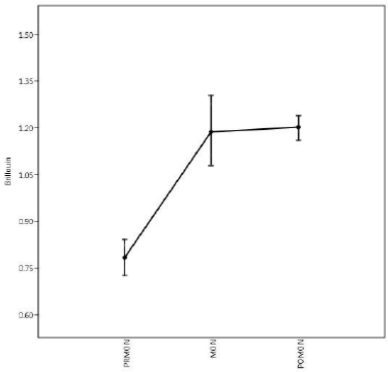
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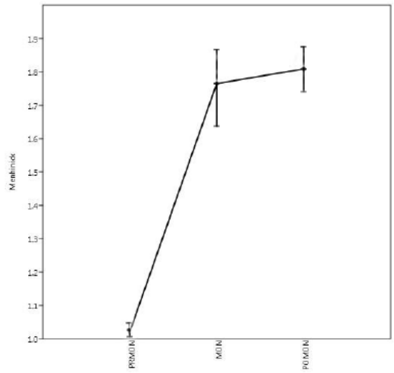
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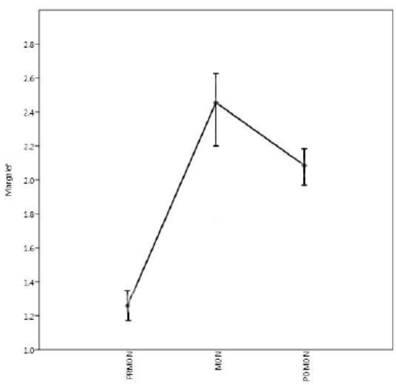
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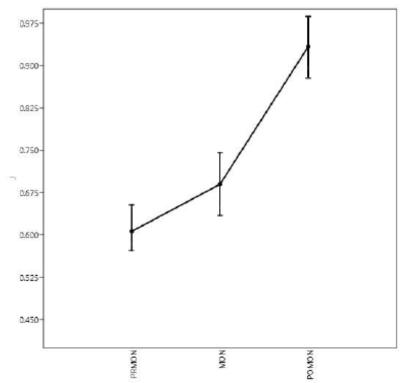
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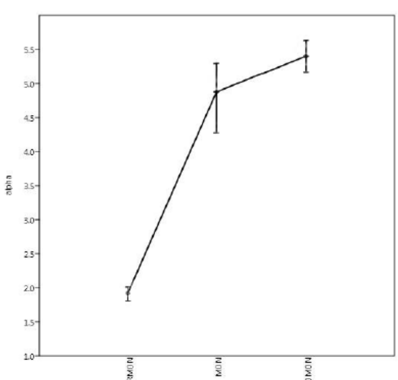
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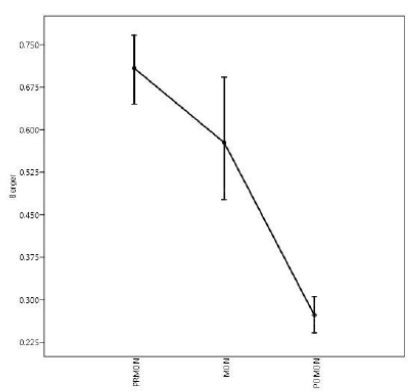
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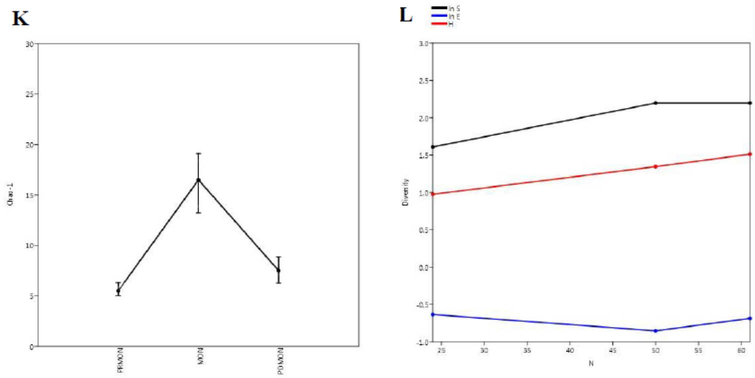


Figure 1. A-L. Comparative analyses of different alpha diversity indices of tabanids seasonally through pre-monsoon, monsoon and post monsoon i.e. A: Shanon diversity index; B: Dominance index; C: Simpson's dominance index; D: Evenness index; E: Brillouin's index; F: Menhinick index; G: Margalef's index; H: Equitability index; I: Fisher's alpha index; J: Berger-Parker index; K: Chao-1 index; L: ln SHE index.

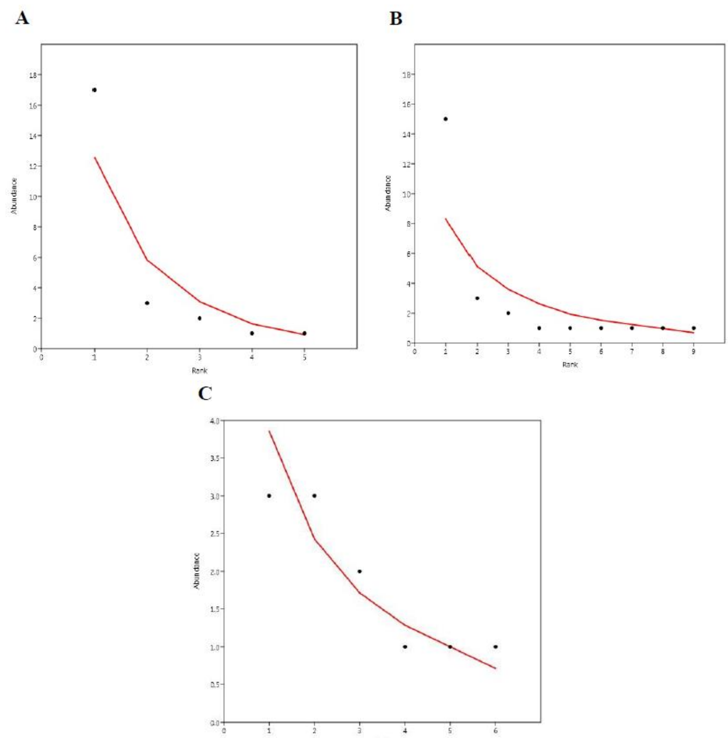


Figure 2. A-C. Graphs showing log series model of rank abundance of tabanids depicting maximum abundance during pre-monsoon and monsoon of species *T. straitus* (17, 15) and of species *T. striatus* (3) and *H. javana* (3) respectively during post monsoon.

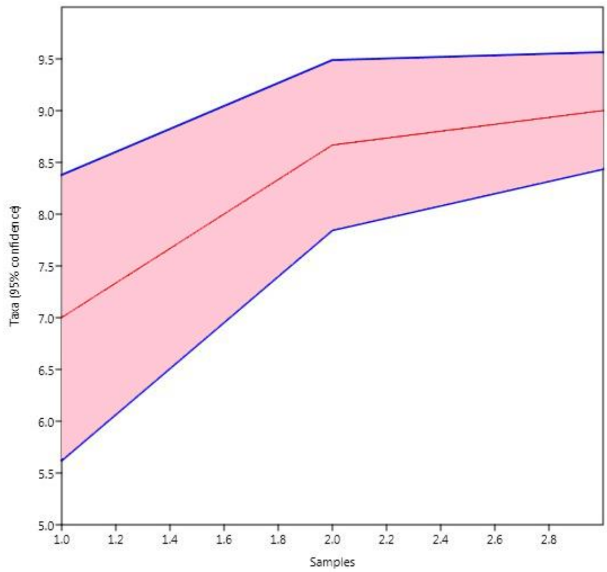


Figure 3. Species accumulation curves showing sample rarefaction (Mau Tau's) of the tabanids sampled throughout the season.

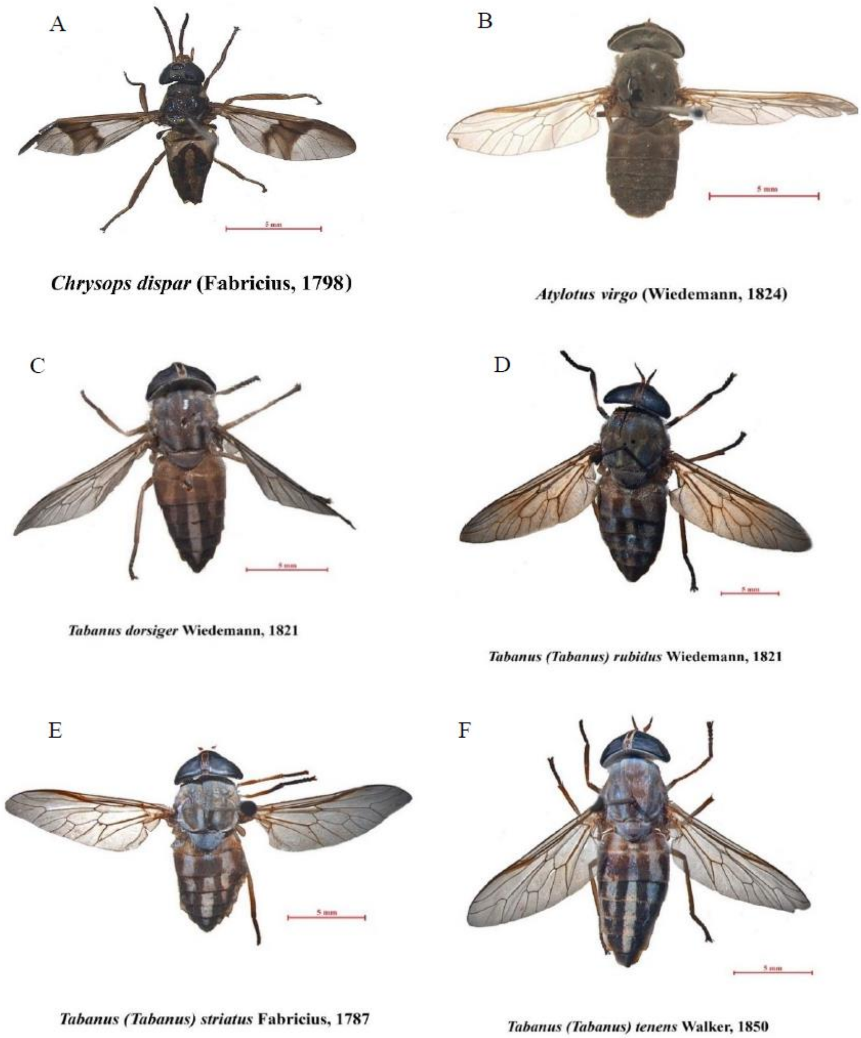


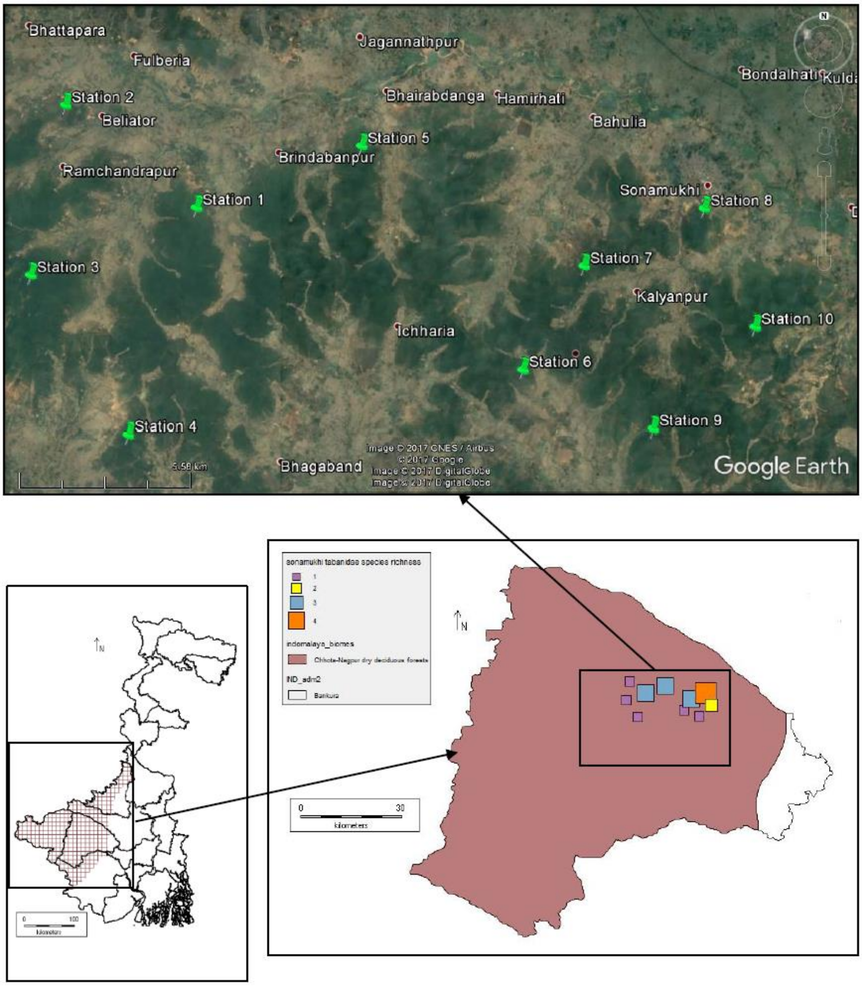
Plate 1. Habitus of six species of Tabanidae, i.e. A: *Chrysops dispar* (Fabricius, 1798); B: *Atylotus virgo* (Wiedemann, 1824); C: *Tabanus dorsiger* Wiedemann, 1821 (new record from Sonamukhi protected forest area under arid zone of West Bengal); D: *Tabanus (Tabanus) rubidus* Wiedemann, 1821; E: *Tabanus (Tabanus) striatus* Fabricius, 1787 and F: *Tabanus (Tabanus) tenens* Walker, 1850.

***Haematopota javana* Wiedemann, 1821**

***Haematopota marginata* Ricardo, 1911**

***Hippocentrodes desmotes* Philip, 1961**

Plate 2. Habitus of three species of Tabanidae, i.e. A: *Haematopota javana* Wiedemann, 1821; B: *Haematopota marginata* Ricardo, 1911 and C: *Hippocentrodes desmotes* Philip, 1961.



Map 1. GIS map showing distribution and richness of family Tabanidae in Sonamukhi protected forest, on the basis of eco-regions in Indo-malayan biome of arid region of west Bengal below and satellite map of all the stations showing study sites of Tabanidae above.

A CONFIRMATION ON THE PRESENCE OF FOUR LITTLE KNOWN LEAF-BEETLE SPECIES-GROUP TAXA IN TURKEY WITH EXACT LOCALITY DATA (COLEOPTERA: CHRYSOMELIDAE)

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[Özdikmen, H., Coral Şahin, D. & Bal, N. 2020. A confirmation on the presence of four little known leaf-beetle species-group taxa in Turkey with exact locality data (Coleoptera: Chrysomelidae). Munis Entomology & Zoology, 15 (1): 226-228**]**

ABSTRACT: The paper presents confirmations with exact locality data of the presence in Turkey of four little known species-group taxa in the leaf-beetle genera *Chrysolina* Motschulsky, 1860 and *Clytra* Laicharting, 1781. The presence in Turkey of all of the aforementioned species-group taxa has been reported mostly as there are in Anatolia without exact locality data up to now. So that the presence in Turkey of these species-group taxa is confirmed again with exact locality data for the first time. *Chrysolina* (*Sulcicollis*) *impavida* Bechyné, 1949 and *Clytra* (*Ovoclytra*) *ovata borealis* Medvedev & Kantner, 2002 are confirmed with exact locality data after 70 years and 17 years since their original description respectively. Also, *Clytra* (*Ovoclytra*) *weisei* Monros, 1953 is confirmed with exact locality data after 16 years since Warchalowski (2003). In addition, *Clytra* (*Clytraria*) *valeriana taurica* Medvedev, 1961 is confirmed with exact locality data after 9 years since Palaearctic catalogue of Regalin & Medvedev (2010).

KEY WORDS: *Clytra, Chrysolina,* new data, Chrysomelidae, Turkey

Examination of an interesting material from Turkey in Nazife Tuatay Plant Protection Museum (NTM) has revealed some new important locality data of four little known leaf-beetle species-group taxa. So that the presence in Turkey of these species-group taxa is confirmed with exact locality data for the first time.

All specimens of four leaf-beetle species-group taxa are deposited at Nazife Tutay Plant Protection Museum (NTM) (Ankara, Turkey).

Chrysolina (*Sulcicollis*) *impavida* Bechyné, 1949

Material examined: Turkey, Adana prov.: Balcalı, 15.V.2000, T. Arslan, 1 specimen; Balcalı, 08.VI.2000, leg. A. Alacuklu, 1 specimen.

Remarks: This species was described by Bechyné (1949) from Turkey (as "Asia Minor: Taurus") as a subspecies of *Chrysolina peregrina* (Herrich-Schaeffer, 1839). Thus it was firstly recorded by Bechyné (1949) from Turkey (Anatolia) with original description. Then, it was reported by Bienkowski (2001) from Anatolia, Israel, Rhodes; by Aslan et al. (2003) from Anatolia, Israel, Jordan; by Warchalowski (2010) from Anatolia, Israel, Lebanon, Rhodes as a subspecies of *Chrysolina peregrina* (Herrich-Schaeffer, 1839). This subpecies was given by Palaearctic catalogue of Kippenberg (2010) as a separate species from Greece, Cyprus, Israel, Syria and Anatolia. Recently, the species was reported by Ekiz et al. (2013) and Özdikmen (2014) from Anatolia.

As seen above, the Anatolian records of this species in all previous works were based on the work of Bechyné (1949) without exact locality data. So that the presence in Turkey of this species is confirmed with exact locality data for the first time after 70 years since its original description.

According to data mentioned above, this species is distributed at least in Adana province and therefore central part of S Turkey (S Anatolia) in Mediterranean region that is one of the 7 regions of Turkey.

Clytra (*Clytraria*) *valeriana taurica* Medvedev, 1961

Material examined: Turkey, İzmir prov.: Bornova, 18.V.1938, 1 specimen; **Konya prov.:** Akşehir, 05.V.1962, leg. N. Karabıyık, 1 specimen.

Remarks: This subspecies was described by Medvedev (1961) from Crimea. It was also reported by Warchalowski (2010) from Crimea. The subspecies was firstly recorded by Palaearctic catalogue of Regalin & Medvedev (2010) from Turkey (Anatolia) without exact locality data and the record of Crimea (Ukraine) repeated in their work. Regalin & Medvedev (2010) stated also presence of the nominotypical subspecies in Turkey (both European Turkey and Anatolia). Accordingly, Ekiz et al. (2013) and Özdikmen (2014) mentioned both subspecies for Turkey. In both studies, the authors stated that "It is not possible to give the distributions of subspecies separately, because infraspecific data are not included in cited references".

As seen above, the Anatolian records of this subspecies in all previous works were based on the work of Regalin & Medvedev (2010) without exact locality data. So that the presence in Turkey of this subspecies is confirmed with exact locality data for the first time after 9 years since Palaearctic catalogue of Regalin & Medvedev (2010).

According to data mentioned above, this subspecies is distributed at least in İzmir, Konya provinces and therefore Aegean and Central Anatolian regions that are 2 of the 7 regions of Turkey respectively.

Clytra (*Ovoclytra*) *ovata borealis* Medvedev & Kantner, 2002

Materyal examined: Turkey, Adana prov.: 02.VI.1963, leg. S. Taşçıoğlu, 1 specimen; **Ankara prov.:** Hacıkadın, 21.VI.1940, 1 specimen.

Remarks: This subspecies was described by Medvedev & Kantner (2002) for northern populations of *Clytra ovata* Lacordaire, 1848 in N Syria and S Turkey. It was also reported by Warchalowski (2010) from N Syria and S Turkey. Thus it was firstly recorded by Medvedev & Kantner (2002) from Turkey (Anatolia). The subspecies was recorded by Palaearctic catalogue of Regalin & Medvedev (2010) from Lebanon, Syria and Turkey (Anatolia) without exact locality data. Regalin & Medvedev (2010) stated also presence of the nominotypical subspecies in Turkey (only Anatolia). Accordingly, Ekiz et al. (2013) and Özdikmen (2014) mentioned both subspecies for S Turkey (S Anatolia).

As seen above, the Anatolian records of this subspecies in all previous works were based on the work of Medvedev & Kantner (2002) without exact locality data. So that the presence in Turkey of this subspecies is confirmed with exact locality data for the first time after 17 years.

According to data mentioned above, this subspecies is distributed at least in Adana, Ankara provinces and therefore Mediterranean and Central Anatolian regions that are 2 of the 7 regions of Turkey respectively.

Clytra (*Ovoclytra*) *weisei* Monros, 1953

Materyal examined: Turkey, Ankara prov.: Bağlum, 07.VI.1961, leg. N. Tuatay, 2 specimens; 17.VI.1964, leg. A. Demirtola, 1 specimen; 18.VI.1964, leg. Y. Sürmeli, 3 specimens; **Diyarbakır prov.:** Beşpınar, 03.VI.1969, leg. A. Kalkandelen, 1 specimen; **Elazığ prov.:** 14.V.1966, leg. Y. Sürmeli, 1 specimen; **Gaziantep prov.:** 1 specimen; **Hakkari prov.:** 22.V.1966, leg. Y. Sürmeli, 6 specimens; **Konya prov.:** Akşehir, 05.V.1962, leg. N. Karabıyık, 1 specimen.

Remarks: This species was described by Weise (1898) from Iraq as *Clytra cingulata*, nec Latreille, 1811. The homonym specific name *Clytra cingulata* was changed by Monros (1953) as *Clytra weisei*. The species was firstly recorded by Warchalowski (2003) from Turkey (Anatolia) without exact locality data. Then, Warchalowski (2010) repeated the record of Turkey (Anatolia) without exact locality data as well as the records from Middle East. This species was given by Regalin & Medvedev (2010) from Iraq, Syria and Turkey (Anatolia). Recently, the species was reported by Ekiz et al. (2013) from Anatolia. Later, Özdikmen (2014) stated from Eskişehir province in Turkey for this species without locality data.

As seen above, the Anatolian records of this species in previous works were mostly based on the work of Warchalowski (2003) without exact locality data. So that the presence in Turkey of this species is confirmed with exact locality data for the first time after 16 years.

According to data mentioned above, this subspecies is distributed at least in Ankara and Konya provinces in Central Anatolian region, Diyarbakır and Gaziantep provinces in South-Eastern Anatolian region, Elazığ and Hakkari provinces in Eastern Anatolian region. So that this species is distributed at least in 3 of the 7 regions of Turkey.

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NEW LOCALITY RECORDS OF MELOIDAE (COLEOPTERA) FAUNA OF TURKEY

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ABSTRACT: In this study, Meloidae material housed in the Prof. Dr. Niyazi Lodos Museum (LEMT), İzmir, Turkey have been evaluated. A total of 26 species belonging to eight genera of two subfamilies have been presented. New locality records for some species have been given.

KEY WORDS: Fauna, Meloidae, the blister beetles, Turkey, biodiversity

The Meloidae fauna of Turkey has been studied by foreign and native scientists, such as Bodemeyer (1900), Ganglbauer (1905), Kaszab (1941, 1952a,b, 1959, 1968), Muche (1962), Pardo Alcaida (1977), Bologna (1979), Öncüer (1991), Lodos (1998), Özbek & Szaloki (1998) and Koçak & Kemal (2010). Among those, Özbek & Szaloki (1998) reported 147 species. Bologna (2008) listed 171 species from Turkey in the Palaearctic Catalogue of blister beetles. Recently Koçak & Kemal (2010) listed 178 species known from Turkey with their synonyms and distributions in their checklists.

The aim of the present paper is to present the complete and new locality records of preserved material in the Prof. Dr. Niyazi Lodos Museum (LEMT) to researchers and relevant persons.

MATERIAL AND METHOD

Most of the material belonging to Meloidae family have been collected within the research projects by the researchers of Department of Plant Protection, Faculty of Agriculture, University of Ege (Lodos et al., 1978, 1983, 1989 and others). Rest of the material collected and given as a gift to the Prof. Dr. Niyazi Lodos Museum (LEMT), Ege University, İzmir, Turkey, by researchers, students and amateurs. Material have been determined by M. Bologna and by N. Lodos.

RESULTS AND DISCUSSION

In this study 26 species of eight genera belong to two subfamilies of Meloidae were given.

Meloinae: Cerocomini

***Cerocoma* (*Metacerocoma*) *schreberi* Fabricius, 1781**

Material examined: Adapazarı: 18.VII.1972, *Matricaria chamomilla*, det. Bologna, 1 ex. Totally 1 ex.

Meloinae: Lyttini

***Alosimus chalybaeus* (Tauscher, 1812)**

Material examined: Afyonkarahisar: 12.VI.1972, *Triticum aestivum*, det. Bologna, 2 exs. İzmir: Bornova, 16.IV.1961, poaceous plants, det. Bologna, 1 ex.; 13.VI.1961, det. Bologna, 1 ex.; 27.IV.1962, det. Bologna, 1 ex.; 29.IV.1962, weed, det. Bologna, 1 ex.; 14.V.1962, det. Bologna, 1 ex.; 30.IV.1974, det. Bologna, 1 ex.; 23.III.1976, weeds, det. Bologna, 2 exs.; 28.V.1976, weed, det. Bologna, 1 ex.; 15.IV.1977, weed, det. Bologna, 1 ex.; 19.V.1977, weed, det. Bologna, 1 ex.; 14.V.1981, *Elymus elymoides*, 5 exs; Çeşme, 1963, det. Bologna, 1 ex. Manisa: 01.VI.1972, weed, 1 ex. Mersin: Mut, 20.IV.1985, *T.aestivum*, 11 exs.; 21.IV.1985, *T.aestivum*, 1 ex.; 22.IV.1985, weeds, 3 exs. Uşak: Sivaslı, 24.VI.1981, *Papaver somniferum*, 3 exs. Totally 38 exs. Recorded from Mersin province for the first time.

Alosimus decolor (Abeille de Perrin, 1880)

Material examined: İzmir: Bornova, 18.V.1975, weed, det. Bologna, 1 ex.; 27.V.1975, weed, det. Bologna, 1 ex.; 04.V.1977, weed, det. Bologna, 1 ex. Totally 3 exs.

Alosimus luteus (Waltl, 1838)

Material examined: Diyarbakır: Ergani, 07.V.1970, cruciferous plants, det. Bologna, 1 ex. Totally 1 ex.

Alosimus pallidicollis (Gyllenhal, 1806)

Material examined: Elazığ: Kovancılar, 13.VI.1972, weed, det. Bologna, 1 ex. Totally 1 ex.

Alosimus smyrnensis (Maran, 1942)

Material examined: Denizli: Pamukkale, 15.IV.1973, weed, det. Bologna, 1 ex. İzmir: 30.IV.1975, weed, det. Bologna, 1 ex.; 25.IV.1980, *Sinapis* sp., 3 exs.; Balçova, İnciraltı, 16.IV.1964, weed, det. Bologna, 1 ex.; 16.IV.1964, weed, 1 ex.; Bayındır, 24.IV.1973, *T.aestivum*, det. Bologna, 1 ex.; 24.IV.1973, weed, det. Bologna, 1 ex.; 27.VI.1976, weed, det. Bologna, 1 ex.; Bornova, 18.V.1975, weed, det. Bologna, 1 ex.; 19.V.1975, weed, det. Bologna, 1 ex.; 13.V.1976, weed, 1 ex.; 30.V.1977, weed, 1 ex.; 10.VI.1977, weed, 1 ex.; 14.V.1978, weed, 1 ex.; 12.IV.1981, poaceous plants, 1 ex.; 03.V.1981, weed, 1 ex.; 23.V.1981, poaceous plants, 1 ex.; 26.VI.1981, weed, 1 ex.; Gaziemir, 06.V.1977, weed, 1 ex.; 15.VI.1978, weeds, 2 exs.; 26.IV.1981, weeds, 3 exs.; Güzelbahçe, Kilizman, 15.V.1975, weed, det. Bologna, 1 ex.; Menderes, Ahmetbeyli, 17.VI.1980, weed, 1 ex.; Bulgurca, 10.V.1981, weeds, 3 exs.; Cumaovası, 09.IV.1973, grasses, det. Bologna, 1 ex.; Gümüldür, 09.IV.1973, weed, det. Bologna, 1 ex.; Ödemiş, 24.IV.1973, *Urtica dioica*, det. Bologna, 2 exs.; 24.IV.1973, weed, det. Bologna, 1 ex.; 25.IV.1973, *Matricaria chamomilla*, det. Bologna, 1 ex.; Torbalı, 25.IV.1962, poaceous plants, det. Bologna, 2 exs.; Urla, 19.V.1981, weed, 1 ex. Totally 40 exs.

Lydus pilicollis Fairmaire, 1892

Material examined: Osmaniye: Hasanbeyli, Almanpınarı, 08.VI.1972, *T.aestivum*, det. Bologna, 1 ex. Totally 1 ex. Reported from Osmaniye province for the first time.

Lydus trimaculatus (Fabricius, 1775)

Material examined: Bursa: İznik, 20.VII.1972, weeds, det. Bologna, 4 exs. İzmir: Gaziemir, 20.IV.1981, weeds, 2 exs. Totally 6 exs. Reported from İzmir province for the first time.

Lydus turcicus Kaszab, 1952

Material examined: Isparta: 12.VI.1973, weed, det. Bologna, 1 ex. Totally 1 ex.

Muzimes collaris (Fabricius, 1787)

Material examined: Aydın: Söke, 16.V.1987, weed, det. as *Micromerus collaris*, 1 ex. Burdur: 12.VI.1973, weed, det. Bologna as *Micromerus collaris*, 1 ex. Isparta: 12.VI.1973, weeds, det. as *Micromerus collaris*, 3 exs.; 12.VI.1973, weeds, det. Bologna as *Micromerus collaris*, 6 exs.; Keçiborlu, 10.VII.1963, compositaeous plants, det. Bologna as *Micromerus collaris*, 1 ex. İzmir: Menderes, Ahmetbeyli, 17.VI.1980, weed, det. as *Micromerus collaris*, 1 ex.; Ödemiş, Bozdağ, 08.VII.1974, *T.aestivum*, det. as *Micromerus collaris*, 2 exs. Konya: Ereğli, 01.VII.1980, weeds, det. as *Micromerus collaris*, 6 exs. Manisa: 01.VI.1972, weed, det. as *Micromerus collaris*, 1 ex. Mersin: Çamlıyayla, Namrun, 01.VI.1984, *Sinapis* sp., det. as *Micromerus collaris*, 1 ex.; Gözne, 31.V.1984, weeds, det. as *Micromerus collaris*, 3 exs. Totally 26 exs. Reported from Aydın, İzmir, Konya and Mersin provinces for the first time.

Muzimes dersimensis (Kaszab, 1968)

Material examined: Diyarbakır: 07.V.1970, cruciferous plants, det. Bologna as *Micromerus dersimensis*, 1 ex. Totally 1 ex. Endemic species in Turkey.

Oenas crassicornis (Illiger, 1800)

Material examined: Bilecik: Gölpazarı, 15.VII.1972, weeds, det. Bologna, 5 exs. Bursa: İznik, 20.VII.1972, weed, det. Bologna, 1 ex. İzmir: Bornova, 1963, det. Bologna, 1 ex.; 18.V.1975, weed, det. Bologna, 1 ex.; 13.V.1976, weed, 1 ex.; 15.VI.1976, weed, det. Bologna, 1 ex.; 19.VI.1981, weeds, 2 exs.; 20.VI.1981, weed, 1 ex. Manisa: Yunusemre, Beydere, 22.VII.1960, weeds, det. Bologna, 2 exs. Totally 15 exs.

Meloinae: Mylabrini

Hycleus fuscus (Olivier, 1811)

Material examined: Antalya: Güllük Mountain, 03.VI.1973, weed, det. Bologna as *Coryna fusca*, 1 ex. Aydın: 11.V.1976, weed, det. Bologna as *C.fusca*, 1 ex. İzmir: Bornova, 04.III.1962, det. Bologna as *C.fusca*, 1 ex. Manisa: 01.VI.1972, *Rosa* sp., det. Bologna as *C.fusca*, 3 exs. Totally 6 exs. Reported from Antalya, Aydın, İzmir and Manisa provinces for the first time.

Hycleus polymorphus (Pallas, 1771)

Material examined: Denizli: Acıpayam, Kızılhisar, 13.VI.1973, *Verbascum* sp., det. Bologna as *Gorrizia polymorpha*, 1 ex. İzmir: Bayındır, 26.VII.1976, meadow plants, det as *G.polymorpha*, 1 ex.; Bornova, 26.V.1975, *Carthamus* sp., det. Bologna as *G.polymorpha*, 1 ex.; Güzelbahçe, Kilizman,16.V.1974, weed, det. Bologna as *G.polymorpha*, 1 ex. Totally 4 exs. Reported from Denizli and İzmir provinces for the first time.

Hycleus scabiosae (Olivier, 1811)

Material examined: Mardin: 12.VI.1975, det. Bologna as *Coryna scabiosae*, 1 ex.; Midyat, 12.VI.1973, det. Bologna as *C.scabiosae*, 1 ex. Uşak: 10.VI.1972, weed, det. Bologna as *C.scabiosae*, 1 ex. Totally 3 exs. Reported from Uşak province for the first time.

Hycleus zebraeus (Marseul, 1870)

Material examined: Afyonkarahisar: Şuhut, 15.VI.1972, weed, det. Bologna as *Coryna zebraeus*, 1 ex. Denizli: 17.VI.1970, weed, det. Bologna as *C.zebraeus*, 1 ex. Gaziantep: 08.VI.1973, weed, det. Bologna as *C.zebraeus*, 1 ex. İzmir: Bornova, 26.V.1975, *Carthamus* sp., det. Bologna as *C.zebraeus*, 2 exs.; Menderes, Gümüşsu, 21.VI.1974, det. Bologna as *C.zebraeus*, 1 ex. Mardin: Midyat, 12.VI.1973, det. Bologna as *C.zebraeus*, 3 exs. Muğla: Fethiye, Seki, 09.VI.1973, weed, det. Bologna as *C.zebraeus*, 1 ex. Uşak: 10.VI.1972, weed, det. Bologna as *C.zebraeus*, 1 ex. Totally 11 exs. Reported from Uşak province for the first time.

Mylabris (_Eumylabris_) _calida_ (Pallas, 1782)

Material examined: Ankara: Çubuk, 28.VIII.1975, weeds, 3 exs. Edirne: İpsala, 27.VI.1972, weed, det. Bologna, 1 ex. İzmir: Balçova, Çatalkaya, 22.VII.1969, *Centaurea solstitialis*, 4 exs.; 11.VIII.1971, *Vigna unguiculata*, 3 exs.; Bornova, 09.IV.1962, 1 ex.; 25.IV.1962, 1 ex.; 10.IV.1975, weed, det. Bologna, 1 ex.; 19.V.1981, weeds, 2 exs.; Karşıyaka, Yamanlar, VIII.1973, weeds, det. Bologna, 5 exs.; Narlıdere, 25.VI.1961, 1 ex.; Ödemiş, Bozdağ, 08.VII.1974, *T.aestivum*, 2 exs.; Gölcük, 07.VII.1970, *Ononis spinosa*, 3 exs.; 30.VII.1975, *Onopordum* sp., det. Bologna, 5 exs. Manisa: 01.VI.1972, weeds, det. Bologna, 3 exs.; Central province, Osmancalı, 01.VI.1972, *Pistacia terebinthus*, det. Bologna, 3 exs.; Gördes, 26.VII.1977, weed, 1 ex. Şanlıurfa: Suruç, 26.VII.1976, *Gossypium hirsutum*, 1 ex. Uşak: Yeniköy, 21.VI.1976, *Silybum marianum*, 16 exs. Totally 56 exs. Recorded for the first time from Ankara, Şanlıurfa and Uşak provinces.

Mylabris (_Eumylabris_) _cincta_ Olivier, 1795

Material examined: Adana: Saimbeyli, 11.VII.1986, weeds, 2 exs. Antalya: 29.VI.1980, weeds, 2 exs.; Finike, 30.VII.1985, weed, 1 ex.; Korkuteli, 15.VII.1976, weeds, det. Bologna, 2 exs. Artvin: 1971, *Camellia sinensis*, det. Bologna, 1 ex.; 1971, *Citrus* sp., det. Bologna, 1 ex. İzmir: Bornova, 04.VI.1962, 1 ex.; Menderes, Gümüşsu, 21.VI.1974, det. Bologna, 1 ex. Kahramanmaraş: 21.VII.1984, weed, 1 ex.; 08.VI.1985, weed, 1 ex. Manisa: 01.VI.1972, weed, 1 ex.; 01.VI.1972, weeds, det. Bologna, 4 exs.; Central province, Osmancalı, 01.VI.1972, *Avena sativa*, det. Bologna, 2 exs.; 01.VI.1972, *P.terebinthus*, det. Bologna, 7 exs. Mardin: Artuklu, Sultanköy, 17.VI.1975, asteraceous plants, det. Bologna, 4 exs. Muğla: Fethiye, Seki Plateau, 09.VI,1973, *Avena sativa*, det. Bologna, 1 ex. Niğde: Ulukışla, Çiftehan, 01.VII.1980, weed, 1 ex. Totally 33 exs. Recorded for the first time from Kahramanmaraş and Niğde provinces.

Mylabris (_Eumylabris_) _crocata_ (Pallas, 1781)

Material examined: Afyonkarahisar: Emirdağ, 14.VI.1972, *T.aestivum*, det. Bologna, 1 ex. İzmir: Dikili, 24.V.1973, weed, det. Bologna, 1 ex. Manisa: Central province, Osmancalı, 01.VI.1972, *P.terebinthus*, det. Bologna, 1 ex. Totally 3 exs.

Mylabris (_Eumylabris_) _fabricii_ Sumakov, 1924

Material examined: Ankara: 29.VI.1978, weeds, 4 exs. İzmir: Bozdağ, 08.VII.1974, *T.aestivum*, det. Bologna, 1 ex. Mardin: Mazıdağı, 05.VI.1976, weed, det. Bologna, 1 ex. Totally 6 exs.

Mylabris (s.str.) _ciliciensis_ (Escherich, 1899)

Material examined: Diyarbakır: 19.VI.1972, weed, det. Bologna, 1 ex. Totally 1 ex. Endemic in Turkey.

Mylabris (s.str.) _olivieri_ Billberg, 1813

Material examined: Bilecik: Pazaryeri, 16.VII.1972, weed, det. Bologna, 1 ex. Totally 1 ex.

Mylabris (s.str.) _quadripunctata_ (Linnaeus, 1767)

Material examined: Bilecik: Pazaryeri, 16.VII.1972, weed, det. Bologna, 1 ex. Diyarbakır: 19.VI.1972, weed, det. Bologna, 1 ex. Edirne: İpsala, 27.VI.1972, weed, det. Bologna, 1 ex. Erzurum: 04.VIII.1977, weed, det. Bologna, 1 ex. Isparta: Eğirdir, 10.VII.1963, weed, det. Bologna, 1 ex. İzmir:17.VII.1976, weed, det. Bologna, 1 ex.; Bornova,18.VI.1961, weed, det. Bologna, 1 ex.; 19.VI.1961, det. Bologna, 1 ex.; 20.VI.1961, det. Bologna, 1 ex.; 25.V.1972, weed,, 1 ex.; 19.VI.1974, *T.aestivum*, det. Bologna, 1 ex.; 07.V.1975, weed, det. Bologna, 1 exs.; 26.V.1975, *Carthamus* sp., det. Bologna, 16 exs.; 08.VI.1975, weeds, det. Bologna, 3 exs.; 17.V.1976, weeds, det. Bologna, 2 exs.; 01.VI.1976, weeds, det. Bologna, 2 exs.; 04.VI.1976, weeds, det. Bologna, 2 exs.; 12.VI.1976, weeds, det. Bologna, 2 exs.; 18.VI.1976, weeds, det. Bologna, 3 exs.; 20.VI.1976, weeds, det. Bologna, 4 exs.; 21.VI.1976, weeds, det. Bologna, 5 exs.; 26.III.1977, weed, 1 ex.; 09.V.1977, weed, det. Bologna, 1 ex.; 18.V.1977, weed, det. Bologna, 1 ex.; 20.V.1977, weed, det. Bologna, 1 ex.; Doğanlar, 07.VI.1976, weeds, det. Bologna, 2 exs.; Kemalpaşa, 29.V.1976, weed, det. Bologna, 1 ex.; Menderes, Gümüşsu, 23.VI.1974, det. Bologna, 1 ex.; Narlıdere, 25.V.1961, det. Bologna, 1 ex.; Narlıdere, 25.VI.1961, det. Bologna, 1 ex.; Selçuk, Meryemana, 06.VI.1972, *Arbutus unedo*, det. Bologna, 1 ex. Kütahya: 19.VI.1972, *Verbascum* sp., det. Bologna, 1 ex. Manisa: 22.VII.1960, weed, det. Bologna, 1 ex.; 01.VI.1972, weeds, det. Bologna, 11 exs.; 02.VI.1972, weed, det. Bologna, 1 ex.; Central province, Osmancalı, 01.VI.1972, *Avena sativa*, det. Bologna, 3 exs.; 01.VI.1972, *P.terebinthus*, det. Bologna, 4 exs. Mardin: Midyat, 12.VI.1973, det. Bologna, 1 ex. Muğla: Fethiye, 21.V.1974, weeds, det. Bologna, 2 exs.; Köyceğiz, 22.V.1974, weed, det. Bologna, 1 ex.; Marmaris, 07.VI.1973, weed,, 1 ex.; 07.VI.1973, weeds, det. Bologna, 2 exs.; 23.IV.1979, , 1 ex. Sakarya: Sapanca, 15.VII.1972, weed, det. Bologna, 1 ex. Şanlıurfa: Ceylanpınar, 05.VI.1976, det. Bologna, 6 exs. Tekirdağ: Saray, 02.VII.1972, weed, det. Bologna, 1 ex. Tunceli: Pülümür, 13.VII.1977, det. Bologna, 2 ex. Totally 101 exs. Recorded for the first time from Diyarbakır province.

***Mylabris* (s.str.) *variabilis* (Pallas, 1781)**

Material examined: Antalya: Central province, 24.VI.1987, pupae of this species were found with eggs of *Calliptamus italicus* by N. Lodos, 1 ex. Bursa: Uludağ, 18.VII.1972, det. Bologna, 1 ex. Çankırı: Korgun, Dikenli, 08.VII.1976,, 1 ex. Eskişehir: Mihalgazi, Sarıcaköy, 29.VI.1976, det. Bologna, 1 ex. Totally 4 exs. Recorded for the first time from Eskişehir province.

***Mylabris* (*Zitunabris*) *syriaca* Klug, 1845**

Material examined: Antalya: Akseki, 22.VI.1981, weeds, 3 exs. Mersin: Anamur, 03.VII.1986, *Heliotropium* sp., 5 exs.; Çamlıyayla, 10.VII.1986, *Paliurus* sp., 1 ex. Muğla: Marmaris, 07.VI.1973, weed, det. Bologna, 1 ex. Totally 10 exs.

Nemognathinae: Stenoderini

***Stenodera* (s.str.) *caucasica* (Pallas, 1781)**

Material examined: Kütahya: Simav, 07.V.1973, *Rubus* sp., det. Bologna, 1 ex. Totally 1 ex.

In consequence of this study, a total of 374 specimens of 26 species belonging to two subfamilies of Meloidae have been preserved in the collection of Prof. Dr. Niyazi Lodos Museum (LEMT). Among those *M.quadripunctata* (101 exs), *M.calida* (56 exs.) and *A.smyrnensis* (40 exs.) are richer species than others in collection.

New locality records for 12 species namely, *A.chalybaeus*, *L.pilicollis*, *L.trimaculatus*, *M.collaris*, *H.fuscus*, *H.polymorphus*, *H.scabiosae*, *H.zebraeus*, *M.calida*, *M.cincta*, *M.quadripunctata* and *M.variabilis* were given for the first time from Turkey.

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REVIEW OF THE SPECIES OF *CONOMORIUM* MASI (HYMENOPTERA: PTEROMALIDAE), WITH DESCRIPTIONS OF NEW SPECIES FROM TURKEY

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ABSTRACT: World species of *Conomorium* Masi, 1924 were studied. By this work 13 species of *Conomorium*, 7 of them as new species from Turkey, were found from several regions of the world. They are *Conomorium amplum* (Walker, 1835), *Conomorium patulum* (Walker, 1835), *Conomorium pityocampae* Graham, 1992, *Conomorium pelor* Boucek, 1993, *Conomorium equilaterale* Xiao & Huang, 2000, *Conomorium cuneae* Yang & Baur, 2004, and the new ones: *C. turhalensis* n. sp., *C. goelbasinensis* n. sp., *C. guenemekensis* n. sp., *C. taslıcayensis* n. sp., *C. helvaciogluae* n. sp., *C. kayserinensis* n. sp., *C. hacipasanensis* n. sp. The new species are described and the species recorded from Turkey are given. An identification key was provided for the species of the world.

KEY WORDS: *Conomorium*, Hymenoptera, Pteromalidae, new species, World

Conomorium Masi, 1924 (Chalcidoidea: Pteromalidae) is a small genus with only six Holarctic species. Up to now two species of *Conomorium, C. patulum* (Walker) (Doğanlar, 1985) and *C. pityocampae* Graham (Graham, 1992) and their hosts were recorded from Turkey. Graham (1992) recognized three European species and gave an identification key for the species, but subsequently Boucek (1993) described C. *pelor* from North America, Xiao & Huang (2000) C. *equilaterale* and Yang & Baur (2004) C. *cuneae* from China. The genus is easily recognized by having the characters given by (Graham 1969, 1992) as follows: in female "head protuberant at level of antennal toruli, with vertex curving over into the occiput and at most forming a vague ridge where the two surfaces join, genae moderately to strongly compressed, usually sharp near the bases of the mandibles. Antennae with first funicular segment subconical, constricted in its proximal half, about as long as the second and third segments together; anelli short and strongly transverse. Fore wing with a broad bare strip below the marginal vein, extending to the stigmal vein and broken by at most a few scattered hairs on the lower surface of the wing; marginal vein of fore wing only 1,2 to 1,4 times as long as the stigmal vein. Gaster subcircular, obtuse apically, the ovipositor sheaths, sometimes project very slightly and in male mesosternum posteriorly, just in front of the trochantinal lobes, clothed with long whitish hairs which stand out almost vertically. Antennae with first funicular segment about 1,5 times as long as the second segment, and at least 1,5 times as long as broad. Propodeal nucha represented only by a ridge; usually defined anteriorly by a sharp edge.

The available evidence suggests that the species of *Conomorium* are parasitoids of Lepidoptera pupae (Noyes 2019).

By this work, 7 new species of *Conomorium* were found, which are described, illustrated and two known species were given. An identification key is provided for the world species.

MATERIAL AND METHODS

This study is based upon examination and identification of the specimens collected from several parts of Turkey. The examined specimens and types of the new species were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). Some of the specimens were collected by sweeping net and putting the whole contents of the swept materials directly in 96 % ethanol. After sorting the material, individuals were mounted on cards and one species were reared from the host larvae. The specimens were card mounted and, antenna and/or forewings of some species were slide mounted in Canada balsam for further morphological studies.

The species were identified by following the key of Graham (1969, 1992). Some of the characters were taken from their original description taken from the figures and descriptions given by Boucek & Rasplus (1991), Graham (1992), Boucek (1993), Xiao & Huang (2000) and Yang & Baur (2004).

Photographs of diagnostic characters of the species were taken by using of Leica DM 500 Microscopes with a digital Leica ICC 50 camera attached to it.

Terminology and abbreviations:

Morphological terminology follows that of Gibson et al. (1997) and Graham (1969, 1992).

Abbreviations used in the key and descriptions are:

POL: distance between posterior ocelli

OOL: distance between hind ocellus and eye

Ohm: shortest distance between hind ocellus and occiput

F1-7 : funicular segments

C1-C3 : Club segments

(A): ratio the distance between tip of temple and the distance between levels of hind tip of temple and midpoint of occiput.

RESULTS AND DISCUSSION

Key to species of C*onomorium*

FEMALES

1- Metasoma acuminate, 1.76x as long as breadth; pronotal collar rounded, without carina; propodeum with spiracle almost touching to posterior edge of metanotum; plicae distinct in posterior half, postspiracular sulci deep and with transverse costulae……………………………………………………………………………………………*C. pelor* Boucek, 1993

- Metasoma subcircular or at most oblong; pronotal collar with carina, at least medially……2

2- Mesosoma in lateral view moderately strongly bent, dorsellum and propodeum sloping at an angle of about 40-50° with respect to dorsal plane of mesoscutum and scutellum. Lower face receding at an angle of about 50-65° with respect to the upper face. Forewing with area between post marginal vein and stigmal vein bare without setae………………….10

-Mesosoma dorsally depressed, so that mesoscutum, scutellum and propodeum slightly bent, dorsellum and propodeum sloping at an angle of at most 30°. Lower face receding at an angle of about 75-90° with respect to the upper face; Forewing with area between post marginal vein and stigmal vein with or without setae on upper side……………………3

3- Forewing with area between post marginal vein and stigmal vein with 4-5 setae on upper side; angle between stigmal vein and postmarginal vein 53°; marginal vein 1.23 times as long as postmarginal vein and 1.1x as long as stigmal vein, the latter 1.1x as long as post marginal vein; Head in dorsal view with temple forming a slightly obtuse angle (90°) with occiput and 1.73x as broad as long; POL 1.23x OOL; and 1.42x Ohm; eyes separated by 1.26 times their height; (A) = 4.83; temple 0.6x eye length; malar space 0.23 times eye height; latter 1.75x eye width; antenna with scape 7.86x as long as width, pedicellus plus flagellum 0.88x head width and 1.44x as long as scape; first funicular segment 1.57x as long as apical wide, 3.66x as long as basal wide; 1.22x as long as pedicellus; 6th 1.5x as broad as long; clava 1.74x as long as width; propodeum with spiracle separated from posterior edge of metanotum by its diameter......................................*C. turhalensis* n. sp.

-Forewing with area between post marginal vein and stigmal vein bare without setae on upper side; other characters variable..4

4-Metasoma wholly yellow or with a yellow spot at base; malar space 0.22-0.25 times eye height; antenna with scape about as long as an eye; pedicellus 2.0x as long as broad in lateral view...5

- Metasoma dark; other characters variable..7

5-Metasoma yellow; fore wing with angle between stigmal vein and postmarginal vein 55°; marginal vein 2.22 times as long as postmarginal vein; 1.2 times as long as stigmal vein, the latter 1.35x as long as postmarginal vein; Head in dorsal view with temple forming a slightly obtuse angle (90°) with occiput and 2.1x as broad as long; 1.25x as width as height; temple 0.33x eye length; POL 1.1x OOL and 1.44x Ohm; mouth 2.6x malar space; eyes separated by 1.36 times their length; (A) = 4.8; temple as long as eye length; malar space 0.22x eye height, the latter 1.83x eye width; antenna with scape 7.7x as long as broad; pedicellus plus flagellum 0.8x head width; 1.72x as long as scape; first funicular segment 1.42 times as long as apical wide, 2.8x as long as basal wide, as long as pedicellus, 0.8x as long as clava; following segments slightly transverse, 6th 1.6x as broad as long; clava 1.75x as long as broad; spiracle separated from posterior edge of metanotum by half of its shortest diameter...................................*C. goelbasinensis* n. sp.

- Metasoma with a yellow spot at base; fore wing with marginal vein 1.42-1.45x as long as stigmal vein; spiracle separated from posterior edge of metanotum by its longest diameter,..6

6-Fore wing with angle between stigmal vein and postmarginal vein 48°; marginal vein 1.86 times as long as postmarginal vein; stigmal vein 1.3x as long as postmarginal vein; Head in dorsal view with temple forming a slightly obtuse angle (90 °) with occiput and 2.0x as broad as long; 1.1x as width as height; temple 0.52x eye length; POL 1.5x OOL and 1.9x Ohm; mouth 2.0x malar space; eyes separated by 1.32 times their length; (A) = 4.8; temple 0.52x as long as eye length; malar space 0.27x eye height, the latter 1.44x eye width; antenna with scape 7.5x as long as broad; pedicellus plus flagellum 1.1x head width; twice as long as scape; first funicular segment 1.6 times as long as apical wide, 3.5x as long as basal wide, 1.3x as long as pedicellus, 1.1x as long as clava; following segments slightly transverse, 6th 1.3x as broad as long; clava twice as long as broad.. *C. guenemekensis* n. sp.

-Fore wing with angle between stigmal vein and postmarginal vein 45°; marginal vein 1.6 times as long as postmarginal vein; stigmal vein 1.12x as long as postmarginal vein; Head in dorsal view with temple forming a slightly obtuse angle (105 °) with occiput and 1.93x as broad as long; 1.3x as width as height; temple 0.43x eye length; POL 1.2x OOL and 1.45x Ohm; mouth 3.14x malar space; eyes separated by 1.4 times their length; eye 1.62x width, (A) = 3.57; malar space 0.25x eye height, the latter 1.9x eye width; antenna with scape 8.6x as long as broad; pedicellus plus flagellum 0.83x head width; 1.72x as long as scape; first funicular segment 1.8 times as long as apical wide, 3.6x as long as basal wide, 1.4x as long as pedicellus, as long as clava; following segments slightly transverse, 6th 1.5x as broad as long; clava 2.35x as long as broad...................................... ....*C. taslıcayensis* n. sp.

7-Fore wing with marginal vein at least 1.6x as long as postmarginal vein.............................8

- Fore wing with marginal vein at most 1.27 times as long as postmarginal vein.....................9

8- Fore wing with angle between stigmal vein and postmarginal vein 40°; marginal vein 1.6 times as long as postmarginal vein; 1.35x stigmal vein the latter 1.2x as long as postmarginal vein; Head in dorsal view with temple forming a slightly obtuse angle (110 °) with occiput and 2.12x as broad as long; 1.3x as width as height; temple 0.33x eye length; POL 1.24x OOL and 1.3x Ohm; mouth 3.33x malar space; eyes separated by 1.26 times their length; eye 1.5x width, (A) = 6.43; malar space 0.23x eye height, the latter 1.46x eye width; antenna with scape 7.16x as long as broad; pedicellus plus flagellum 0.94x head width; 1.86x as long as scape; first funicular segment 1.6 times as long as apical wide, 2.66x as long as basal wide, as long as pedicellus, 0.8x as long as clava; following segments slightly transverse, 6th 1.25x as broad as long; clava 1.9x as long as broad; spiracle separated from posterior edge of metanotum by its longest diameter...... ....*C. helvaciogluae* n. sp.

- Fore wing with angle between stigmal vein and postmarginal vein 40°; marginal vein 1.72 times as long as postmarginal vein; 1.1x stigmal vein the latter 1.55x as long as postmarginal vein; Head in dorsal view with temple forming a slightly obtuse angle (95°) with occiput and 1.9x as broad as long; 1.23x as width as height; temple 0.57x eye length; POL 1.1-1.17x OOL and 1.0x Ohm; mouth 2.0-2.3x malar space; eyes separated by 1.44-1.52 times their length; eye height 1.8x width; (A) = 5.5; malar space 0.27-031 eye height; antenna with scape 8.4x as long as broad; pedicellus plus flagellum 0.75-0.8x head width; 1.62x as long as scape; first funicular segment 1.54 times as long as apical wide, 2.86x as long as basal wide, a little shorter than or as long as clava; 6^{th} 1.5x as broad as long; clava 1.33x as long as broad; spiracle separated from posterior edge of metanotum by its shortest diameter...................................*C. pityocampae* Graham, 1992

9- Fore wing with angle between stigmal vein and postmarginal vein 35°; with marginal vein stigmal vein and post marginal vein equal in length; Head in dorsal view with temple forming a slightly obtuse angle (115°) with occiput and twice as broad as long; 1.3x as width as height; temple 0.54x eye length; POL 1.17x OOL and 1.67x Ohm; mouth 3.45x malar space; eyes separated by 1.43 times their length; eye height 1.6x width; (A) = 4.33; malar space 0.26 eye height; antenna with scape 9.4x as long as broad; pedicellus plus flagellum equal to head width; 2.02 as long as scape; first funicular segment 1.87 times as long as apical wide, 3.75x as long as basal wide, 1.5x as long as pedicellus; as long as clava; 6^{th} 1.75x as broad as long; clava 2.14x as long as broad; spiracle big, placed midpoint of posterior and anterior edges of metanotum................*C. kayserinensis* n. sp.

- Fore wing with angle between stigmal vein and postmarginal vein 40-50°; with marginal vein 1.1-1.27 times as long as postmarginal vein; 0.92-1.27x as long as stigmal vein; the latter 0.84x as long as postmarginal vein; Head in dorsal view with temple forming an obtuse angle (93°) with occiput and 1.7-2.0 as broad as long; 1.25-1.3x as width as height; temple 0.6-07x eye length; POL 1.1-1.4x OOL and 1.4-1.5x Ohm; mouth 2.35-3.07x malar space; eyes separated by 1.28-1.58 their length; eye height 1.62-1.66x width; (A) = 4.8-5.0; malar space 0.26-0.28x eye height; antenna with scape 6,7-7.1x as long as broad; 0.96-1.05x eye length; pedicellus plus flagellum 0.7-0.8x head width; 1.83-2.02 as long as scape; first funicular segment 1.1-1.33x as long as apical wide, 2.6-2.75x as long as basal wide; 1.0-1.2x as long as pedicellus; 0.75-0.9x as long as clava; 6^{th} 1.8-2x as broad as long; clava 1.9x as long as broad; spiracle separated from posterior edge of metanotum by its longest diameter...*C. hacipasanensis* n. sp.

10- Metasoma with a yellow spot at base; head in dorsal view with temple forming a slightly acute angle (80°) with occiput; eyes small, 1.47-1.55 times as high as wide, separated by 1.35-1.45 times their height; fore wing with angle between stigmal vein and post marginal vein 47°; anterior margin of clypeus narrowly and rather deeply emarginate, more or less angulate medially, with a depression touching the emarginated edge. Female: pedicel in lateral view 2.07-2.15 times as long as wide; POL 1.14x OOL and 1.64x Ohm; pedicellus plus flagellum 0.8-0.9x head breadth; spiracle separated from posterior edge of metanotum by its shortest diameter..C. *cuneae* Zhong-Qi & Baur, 2004

-Metasoma dark; head in dorsal view with temple forming a right or slightly obtuse angle (110°) with occiput; eyes large, 1.66-1.83 times as high as wide; POL at least 1.4x OOL and at most 1.45x Ohm; other characters variable; head 1.3x as width as height.............11

11- Fore wing with marginal vein 1.8x as long as postmarginal vein and stigmal vein 1.4x as long as post marginal vein; angle between stigmal vein and postmarginal vein 30°; Head in dorsal view with temple forming a slightly obtuse angle (110°) with occiput; head 2.12x as broad as long; Anterior margin of clypeus broadly and shallowly emarginate, median depression indistinct; temple 0.36x eye length; POL 1.42x OOL and 1.33x Ohm; eyes separated by 1.36 times their length; eye height 1.66x width; malar space 0.25 times eye height; antenna with scape 6.5-7.5x as long as broad; pedicel in lateral view 2.4 times as long as wide; pedicellus plus flagellum 0.85-095x head width; 2.2x as long as scape; first funicular segment 1.33 times as long as apical wide, 2.66x as long as basal wide, 1.3x length of pedicellus, 0.84x as long as clava; 6^{th} 2.0x as broad as long; clava 1.9x as long as broad; spiracle separated from posterior edge of metanotum by more than its longest diameter..C. *amplum* (Walker, 1835)

- Fore wing with marginal vein at most 1.4x as long as postmarginal vein and 1.24x as long as stigmal vein; anterior margin of clypeus broadly and deeply emarginate, median depression distinct; head in dorsal view with temple forming right angle (90°) with occiput; temple 0.6x eye length; malar space 0.23 times eye height; pedicellus plus flagellum 1.7x as long as scape; first funicular segment 1.36x length of pedicellus..........12

12-Fore wing with marginal vein 1.4x as long as postmarginal vein and 1.24x as long as stigmal vein, the latter 1.14x as long as post marginal vein; angle between stigmal vein and postmarginal vein 42°; head 1.66x as broad as long; POL 1.55x OOL, and 1.45x Ohm; eyes separated by 1.3 times their length; eye height1.7x own width; antenna with scape 7.2x as long as broad; pedicel in lateral view 1.7 times as long as wide; pedicellus plus flagellum 0.91x head width; First funicular segment 1.4 times as long as apical wide, 2.25x as long as basal wide, 0.81x as long as clava; 6th 2.0x as broad as long; clava 1.72x as long as broad; spiracle separated from posterior edge of metanotum by its shortest diameter...C. *patulum* (Walker, 1835)

-Fore wing with marginal vein 1.33x as long as postmarginal vein and as long as stigmal vein, the latter 1.33x as long as post marginal vein; angle between stigmal vein and postmarginal vein 35°; head 2.06x as broad as long; POL1.23x OOL; Eyes separated by 1.84 times their length; eye height1.4x own width; antenna with scape 8.33x as long as broad; pedicel in lateral view 2.17 times as long as wide; first funicular segment 1.8 times as long as apical wide, 3.6x as long as basal wide, as long as clava; 6th 1.66x as broad as long; clava 1.8x as long as broad; spiracle separated from posterior edge of metanotum by its longest diameter...........................*C. equilaterale* Xiao & Huang, 2000

MALES

1-Head with temples forming a slightly acute angle with edge of occiput. Antenna: scape about 0.9-0.95 times as long as eye height; scape slightly shorter than an eye, reaching to about level of middle of median ocellus, its ventral shiny plaque extending over upper 0.45 to 0.6; funicular segments decreasing gradually in length, sixth hardly longer than broad. Eye 1.7-1.75x as long as broad; malar space 0.33-0.38x eye height. Fore wing with marginal vein 1.05-1.20 times as long as stigmal vein.............*C. patulum* (Walker, 1835)

-Head with temples forming a right angle or slightly obtuse angle with edge of occiput. Antenna: scape slightly longer than an eye, virtually reaching level of vertex or even a little above it, with ventral shiny plaque extending over upper 0.7-0.75; funicular segments sometimes otherwise. Eye 1.4-1.55x as long as broad.......................................2

2- Head with temples forming an right angle with edge of occiput; Antenna with scape as long as eye height; pedicel 1.7-1.85 times as long as wide; metatibiae slightly infuscate medially; first gastral tergite mostly without a pale mark. pedicellus plus flagellum somewhat greater than breadth of head; funicular segments distinctly longer than broad, except occasionally the sixth which may be quadrate; F1 1.2-1.3x as long as pedicellus and 1.6-2.35x as long as broad; clava nearly or about 3x as long as broad; scape 6-7x as long as broad...*C. amplum* (Walker, 1835)

- Head with temples forming a slightly obtuse angle with edge of occiput..............................3

3- Antenna with pedicellus plus flagellum at most 0.92x breadth of head..............................4

- Antenna with pedicellus plus flagellum at least 1.1 x breadth of head.................................5

4-Antenna with pedicellus plus flagellum 0.75-0.80x breadth of head; funicular segments relatively shorter sixth quadrate; F2-F5 at most slightly longer than broad; F1 1.0-1.15x as long as pedicellus and 1.5-1.7x as long as broad; clava 2.2-2.5x as long as broad; scape 5.0-5.5x as long as broad, with a shiny area ventrally extending over its upper 0.7-0.75; metasoma oblong to oval, about as long as mesosoma; having basal tergit with a narrow yellowish transverse band along hind margin....................*C. pityocampae* Graham, 1992

--Antenna with pedicellus plus flagellum 0.92x as long as breadth of head; scape 1.11x eye height; pedicel 1.66x as long as wide; first funicular segment 1.73 times as long as wide, 1.73 times as long as second segment and 1.37 times as long as pedicel; second funicular segment about 1.14 times as long as wide; F2-F6 equal in length and width; clava acuminate, 2.23 times as long as wide, 1.15x as long as two preceding funicular segments combined; body bluish-black, legs pale yellow, except coxae concolorous with body; first gastral tergite with a transverse broad, pale band along its hind margin; metasoma oblong, about 1.44 times as long as wide, as long as mesosoma; hind margin of first tergite straight...*C. taslicayensis* n. sp.

5- Antenna with pedicellus plus flagellum 1.3x as long as breadth of head; scape distinctly longer than eye height; 1.11-1.20x eye height; pedicel 1.5-1.55x as long as wide; first funicular segment 2.2-2.4 times as long as wide, 1.3-1.4 times as long as second segment and 1.5-1.6 times as long as pedicel; second funicular segment about 1.8 times as long as wide and up to 1.15 times as long as sixth segment; sixth funicular segment 1.7-1.8 times as long as wide; clava acuminate, 3.5-3.75 times as long as wide, about as long as two preceding funicular segments combined; metatibiae bright testaceous; first gastral tergite with a transverse pale band along its hind margin; forewing with marginal vein 1.27-1.45 times as long as stigmal vein which is about 1.1 times as long as postmarginal vein; stigma slightly capitate, separated by about twice or slightly more its height from posterior edge of postmarginal vein; metasoma oblong, about 2.1 times as long as wide, 1.1-1.2 times as long as mesosoma, lateral margins parallel; hind margin of first tergite straight..*C. cuneae* Zhong-Qi & Baur, 2004

- Antenna with pedicellus plus flagellum .1.1x as long as breadth of head...............................6

6- Antenna with scape 1.20 times eye height; pedicel 2x as long as wide; first funicular segment 2.0 times as long as wide, 2x as long as second segment and 1.3 times as long as pedicel; second funicular segment about 1.1 times as long as wide; sixth funicular segment as long as wide; clava acuminate, 1.8 times as long as wide, about1.14x as long as two preceding funicular segments combined; body bluish-black, legs pale yellow, except coxae concolorous with body; first gastral tergite with a transverse pale band along its hind margin; metasoma oblong, about 1.55 times as long as wide, 0.93 times as long as mesosoma, lateral margins parallel; hind margin of first tergite straight. metatibiae slightly infuscate medially; first gastral tergite with a transverse pale band along its hind margin..*C. helvciogluae* n. sp.

-Antenna with scape as long as eye height; pedicel 1.7x as long as wide; first funicular segment 1.75 times as long as wide, 1.4 times as long as second segment and 1.16 times as long as pedicel; second funicular segment about 1.25 times as long as wide and 1.33 times as long as sixth segment; sixth funicular segment 1.14 times as long as wide; clava acuminate, 2.33 times as long as wide, 1.3x as long as two preceding funicular segments combined; body bluish-black, legs pale yellow, except coxae concolorous with body; first gastral tergite pale yellow; metasoma oblong, about 1.38 times as long as wide, 0.93 times as long as mesosoma, lateral margins narrowing to tip; hind margin of first tergite straight..*C. turhalensis* n. sp.

Conomorium turhalensis **n. sp.**

(Figs. 1a, 2a1, a2, 3a, 4a1, a2)

Etymology. The name is derived from the name of Turhal, Tokat from which the types were collected.

Type material. Holotype ♀, Tokat, Turhal, Şenköy, 13.iv.1987, swept from leaves *Prunus avium* (H. Çam); Paratype, ♂, Tokat, 28.ix.1984, swept from pasture in cherry orchard, (M. Doğanlar). The types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.1 mm. Head and mesosoma dark blue-black with metallic lustre. Antenna with scape pale yellow, pedicel and anelli testaceous, flagellum fuscous. Setae on mesosoma dark. Coxae concolorous with body, rest of legs testaceous, wings hyaline, venation brownish testaceous; petiole and first tergit of metasoma pale testaceous, other part metallic dark brown to black.

Head (Fig. 1a) about 1.2 times as wide as mesoscutum, in dorsal view about 1.73 times as broad as long; vertex moderately convex; POL 1.23 OOL; A) = 4.8;.temple 0.6 times as long as eye length, forming a right angle with occiput. Eyes 1.42 times as high as wide, separated by 1.26 times their height, inner orbits very slightly divergent ventrally; malar sulcus superficial but traceable, malar space 0.23 times eye height. Head in frontal view about 1.35 times as wide as high; lower margin of toruli at or slightly below level of lower ocular line; Head in lateral view with lower face receding at an angle of about 90 with respect to upper face. Head reticulate, meshes largest on gena and temple; clypeus finely striate, its anterior margin narrowly and rather deeply emarginate. Antenna (Fig. 2a1) with scape extending to slightly above level of middle of anterior ocellus; scape about 7.86 times as long as wide; pedicel in lateral view 2.12 times as long as wide; combined length of pedicel plus flagellum 0.88 times head width; both anelli strongly transverse and subequal in length; first funicular segment1.57x as long as apical wide, 3.66x as long as basal wide; 1.22x as long as pedicellus, distal third with a row of longitudinal sensillae; the subsequent funicular segments transverse, the sixth about 1.5 times as wide as long, each segment with one row of longitudinal sensilla and densely covered with short setae; clava 1.72 times as long as wide and about as long as first funicular segment.

Mesosoma about 1.4 times as long as wide, in lateral view moderately strongly bent dorsellum and propodeum sloping at an angle of about 28° with respect to dorsal plane of mesoscutum and scutellum. Pronotum short, distinctly narrower than mesoscutum; pronotal collar about 0.2x as long as mesoscutum, broadly reticulate, its anterior edge distinctly carinate in whole front margin; hind margin of pronotum with a smooth and shiny strip and a row of moderately long setae. Mesoscuturn about 2.1 times as wide as long; notauli superficial and extending about two thirds length of mesoscutum; mesoscutum finely reticulate, meshes rather high, areoles small and only slightly enlarged in median part of sclerite. Scutellum 1.13x as long as wide, almost flat in lateral view; reticulation on scutellum about as strong and coarse as on posterior part of mesoscutum, areoles more or less isodiametric; sculpture on frenum the same as on rest of scutellum, frenal line indicated by one or two rows of smaller and more superficial areoles; scutellum on each side with 5 setae anterior to frenal line; sculpture on inner half of axilla as strong as on scutellum, reticulation on outer half distinctly weaker but still slightly raised. Dorsellum with anterior margin slightly raised its surface with short longitudinal carinulae. Reticulation on meso- and metapleuron about as strong as on mesoscutum, except on upper mesepimeron, which is smooth or only very superficially reticulate. Fore wing (Fig. 3a), 2.2 times as long as wide; basal cell bare; costal cell bare on upper surface, lower surface with about 8-11 hairs in distal half, hair line widely spaced medially; wing disc on upper surface with sparse and minute hairs beyond speculum; area between post marginal vein and stigmal vein with 4-5 setae; angle between stigmal vein and postmarginal vein 53°; with marginal vein 1.23 times as long as postmarginal vein and 1.1x as long as stigmal vein, the latter 1.1x as long as post marginal vein; stigma small, space between post marginal vein and stigma about twice of length of stigma. Propodeum 0.56 times as long as scutellum; median area twice as wide as long; median carina strong and straight; plica bent inwards in anterior two fifths and strong, but absent posteriorly; inner comer of plica anteriorly with a depression; median area evenly reticulate, its sculpture as strong as on mesoscutum; spiracle separated from posterior edge of metanotum by its diameter, the area between spiracle and plica convex; postspiracular sulcus extremely superficial, almost missing; callus covered with numerous long setae; nucha without setae, forming a lunate, transversely aciculate strip, whose length occupies about one third median length of propodeum.

Petiole as long as wide. Metasoma (Fig. 4a1) subcircular, 1.1 times as long as wide, about 1.13 times as wide as mesoscutum and about 1.1x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.28x length of gaster, its hind margin slightly curved backwards medially; tergites 1-4 smooth and shining, tergites 4-6 alutaceous laterally, the syntergite entirely so. Ovipositor sheaths slightly projecting.

Description male. Body length 2.1 mm. Similar to female, except as follows: Head and mesosoma black with metallic blue tints; antenna pale yellow. Legs pale yellow, except coxae concolorous with mesosoma. Petiole and metasoma in basal 1/3 part pale testaceous, other part metallic dark brown to black.

Head having antenna (Fig. 2a2) with scape as long as eye height and about 4.5 times as long as wide, extending above vertex; ventral shiny. plaque extending over upper three fourths of the length of scape; combined length of pedicel plus flagellum 1.1 times as long as head width; pedicel in lateral view 1.7 times as long as wide; flagellum filiform, first funicular segment slightly constricted basally and about 1.13 times as wide as subsequent segments; 1.4 times as long as second segment and 1.16 times as long as pedicel; second funicular segment about 1.25 times as long as wide and 1.33 times as long as sixth segment; sixth funicular segment 1.14 times as long as wide; clava acuminate, 2.33 times as long as wide, 1.3x as long as two preceding funicular segments combined.

Petiole about 0.7 times as wide as long, moderately widening posteriorly. Metasoma (Fig. 4a2) oblong, about 1.38 times as long as wide, 0.93 times as long as mesosoma, lateral margins narrowing to tip; hind margin of first tergite straight.

Biology. Unknown.

***Conomorium goelbasinensis* n. sp.**

(Figs. 1b, 2b, 3b, 4b)

Etymology. The name is derived from the name of Gölbaşı, Adıyaman from which the types were collected.

Type material. Holotype ♀, Adıyaman, from Gölbaşı to Malatya 25 km, 19.V.2010, swept from pasture, (M. Doğanlar), deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.1 mm. Head and mesosoma dark blue-black with metallic lustre. Antenna with scape, pedicel and anelli pale yellow, flagellum testaceous, club dirty yellow. Setae on mesosoma dark. Coxae concolorous with body, rest of legs testaceous, wings hyaline, venation brownish testaceous; petiole and metasoma pale testaceous.

Head (Fig. 1b) about 1.16 times as wide as mesoscutum, in dorsal view about 2.1 times as broad as long; vertex moderately convex; POL 1.1 OOL; (A) = 4.8; temple 0.33 times as long as eye length, forming a right angle with occiput. Eyes 1.83 times as high as wide, separated by 1.36 times their height, inner orbits very slightly divergent ventrally; malar sulcus superficial but traceable, malar space 0.22 times eye height. head in dorsal view 2.1x as broad as long; in frontal view 1.25x as width as height; lower margin of toruli slightly below level of lower ocular line; Head in lateral view with lower face receding at an angle of about 73° with respect to upper face. Head reticulate meshes largest on gena and temple; clypeus finely striate, its anterior margin narrowly and rather deeply emarginate. Antenna (Fig. 2b) with scape extending to slightly below level of middle of anterior ocellus;

scape about 7.7 times as long as wide; pedicel in lateral view 1.9 times as long as wide; combined length of pedicel plus flagellum 0.8 times head width; both anelli strongly transverse and subequal in length; First funicular segment 1.42 times as long as apical wide, 2.8x as long as basal wide, as long as pedicellus, 0.8x as long as clava; following segments slightly transverse, 6^{th} 1.6x as broad as long; clava 1.75x as long as broad.

Mesosoma about 1.32 times as long as wide, in lateral view moderately strongly bent, dorsellum and propodeum sloping at an angle of about 25° with respect to dorsal plane of mesoscutum and scutellum. Pronotum short, distinctly narrower than mesoscutum; pronotal collar about 0.2x as long as mesoscutum, broadly reticulate, its anterior edge distinctly carinate in whole front margin; hind margin of pronotum with a smooth and shiny strip and a row of moderately long setae. Mesoscuturn about 1.8 times as wide as long; Scutellum 1.12x as long as wide, moderately convex in lateral view; reticulation on scutellum about as strong and coarse as on posterior part of mesoscutum, areoles more or less isodiametric; sculpture on frenum the same as on rest of scutellum, frenal line indicated by one or two rows of smaller and more superficial areoles; scutellum on each side with 4 setae anterior to frenal line; sculpture on inner half of axilla as strong as on scutellum, reticulation on outer half distinctly weaker but still slightly raised. Forewing (Fig. 3b) 2.5 times as long as wide; area between postmarginal vein and stigmal vein without setae; angle between stigmal vein and postmarginal vein 55°; marginal vein 2.22 times as long as postmarginal vein; 1.2 times as long as stigmal vein, the latter 1.35x as long as postmarginal vein; stigma small, space between post marginal vein and stigma about twice of length of stigma. Propodeum 0.52 times as long as scutellum; median area 1.67x as wide as long; median carina strong and straight; spiracle separated from posterior edge of metanotum by half of its shortest diameter; nucha without setae, forming a lunate, transversely aciculate strip, whose length occupies about one third median length of propodeum.

Petiole as long as wide. Metasoma (Figs. 4b) subcircular, 1.18 times as long as wide, about 1.13 times as wide as mesoscutum and about 1.1x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.26x length of gaster, its hind margin straight; tergites 1-4 smooth and shining, tergites 4-6 alutaceous laterally, the syntergite entirely so. Ovipositor sheaths slightly projecting.

Conomorium guenemekensis n. sp.

(Figs. 1c, 2c, 3c, 4c)

Etymology. The name is derived from the name of Gümenek, Tokat from which the types were collected.

Type material. Holotype ♀, Tokat, Gümenek, 27.ix.86, swept from pasture, (M. Doğanlar) deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.3 mm. Head and mesosoma black with greenish reflection. Antenna with scape and anelli pale yellow, pedicel slightly testaceous, flagellum testaceous, club slightly paler. Setae on mesosoma pale. Coxae concolorous with body, rest of legs testaceous, wings hyaline, venation brownish testaceous; petiole yellow, metasoma with first tergit having a yellow circular spot at base, other sides of the tergit and gaster medially brown, with apical tree segments testaceous.

Similar to *C. goelbasinensis* n. sp. excepts as follows:

Head (Fig. 1c) about 1.19 times as wide as mesoscutum, in dorsal view about 1.9 times as broad as long; vertex moderately convex; POL 1.5 OOL; (A) = 4.8; temple 0.52 times as long as eye length, forming 95° angle with occiput. Eyes 1.44 times as high as wide, separated by 1.32 times their height, malar space 0.27 times eye height. head in dorsal view 2.0x as broad as long; in frontal view 1.1x as width as height; Head in lateral view with lower face receding at an angle of about 93° with respect to upper face. Antenna (Fig. 2c) scape about 7.5 times as long as wide; pedicel in lateral view twice as long as wide; combined length of pedicel plus flagellum 1.1 times head width, twice as long as scape; first funicular segment constricted in its proximal half, 1.6 times as long as apical wide, 3.5x as long as basal wide, 1.3x length of pedicellus, 1.1x as long as clava; following segments slightly transverse, 6th 1.3x as broad as long; clava 2x as long as broad.

Mesosoma about 1.36 times as long as wide, in lateral view moderately strongly bent, dorsellum and propodeum sloping at an angle of about 33° with respect to dorsal plane of mesoscutum and scutellum. Pronotum with pronotal collar about 0.17x as long as mesoscutum, Mesoscuturn about 1.93 times as wide as long; Scutellum 1.11x as long as wide, Fore wing (Fig. 3c) 2.23 times as long as wide; angle between stigmal vein and postmarginal vein 48°; marginal vein 1.86 times as long as postmarginal vein; 1.42 times as long as stigmal vein, the latter 1.3x as long as postmarginal vein; stigma big, space between post marginal vein and stigma about 1.43x length of stigma. Propodeum 0.7 times as long as scutellum; median area 2.25x as wide as long; spiracle separated from posterior edge of metanotum by its longest diameter.

Petiole distinctly wider than long. Metasoma (Fig. 4c) subcircular, 1.1 times as long as wide, about 1.22 times as wide as mesoscutum and about 1.1x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.37x length of gaster.

***Conomorium taslıcayensis* n. sp.**

(Figs. 1d, 2d1, d2; 3d, 4d1, ad2)

Etymology. The name is derived from the name of Taşlıçay, Ağrı from which the types were collected.

Type material. Holotype ♀, TR. Ağrı, Taşlıçay, 14.vii.2010, swept from pasture, (M. Doğanlar). Paratype ♂, same locality as the holotype, 18.vii.2012. swept from pasture, (M. Doğanlar). The types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 3.32 mm. Head and mesosoma -black with bluish reflection. Antenna with scape, pedicel and anelli yellow, flagellum testaceous, club slightly paler. Setae on mesosoma pale. Coxae concolorous with body, rest of legs testaceous, wings hyaline, venation brownish testaceous; petiole black, metasoma brown.

Similar to *C. guenemekensis* n. sp. excepts as follows:

Head (Fig. 1d) about 1.18 times as wide as mesoscutum, in dorsal view about 2.0 times as broad as long; POL 1.2 OOL; (A) = 3.57; temple 0.43 times as long as eye length, forming 100° angle with occiput. Eyes 1.62 times as high as wide, separated by 1.38 times their length, malar space 0.25 times eye height. head in dorsal view 1.93x as broad as long; in frontal view 1.3x as width as height; Head in lateral view with lower face receding at an angle of about 65° with respect to upper face. Antenna (Fig. 2d1) scape about 8.6 times as long as wide; pedicel in lateral view 2.1 as long as wide; combined length of pedicel plus flagellum 0.83 times head width, 1.72x as long as scape; first funicular segment slightly constricted in its proximal half, 1.8x as long as apical wide, 3.6x as long as basal wide; 1.4x as long as pedicellus; following segments distinctly transverse, 6th 1.5x as broad as long; clava 2.35x as long as broad.

Mesosoma about 1.5 times as long as wide, in lateral view moderately bent, dorsellum and propodeum sloping at an angle of about 34° with respect to dorsal plane of mesoscutum and scutellum. Pronotum with pronotal collar about 0.22x as long as mesoscutum, Mesoscuturn about 1.96 times as wide as long; Scutellum as long as wide, Forewing (Fig. 3d) 2.15 times as long as wide, with marginal vein 1.6 times as long as postmarginal vein, 1.45x as long as stigmal vein; the latter 1.12x as long as post marginal vein; angle between stigmal vein and postmarginal vein 45°; stigma big, space between post marginal vein and stigma about2.5x length of stigma. Propodeum 0.5 times as long as scutellum; median area 2.6x as wide as long; spiracle separated from posterior edge of metanotum by its longest diameter.

Petiole distinctly wider than long. Metasoma (Fig. 4d1) ellipsoidal, 1.4 times as long as wide, about 1.1 times as wide as mesoscutum and about 1.1x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.43x length of gaster.

Description male. Body length 2.5 mm. Similar to female, except as follows: Head and mesosoma bluish-black, legs pale yellow, except coxae concolorous with body; first gastral tergite with a transverse broad, pale band along its hind margin; other part metallic dark brown to black.

Head with antenna (Fig. 2d2) with scape 1.11x as long as eye height and about 4.4 times as long as wide, extending above vertex; ventral shiny. plaque extending whole length of scape; combined length of pedicel plus flagellum 0.92 times as long as head width; pedicel in lateral view 1.6 times as long as wide; flagellum filiform, first funicular segment 1.73 times as long as wide, 1.73 times as long as second segment and 1.37 times as long as pedicel; second funicular segment about 1.14 times as long as wide; F2-F6 equal in length and width; clava acuminate, 2.23 times as long as wide, 1.15x as long as two preceding funicular segments combined.

Petiole about 0.5 times as long as wide. Metasoma (Fig. 4d2) oblong, about 1.44 times as long as wide, as long as mesosoma; hind margin of first tergite straight.

Conomorium helvaciogluae **n. sp.**

(Figs. 1e, 2e1, e2; 3e, 4e1, e2)

Etymology. The name is derived from the name of Dr. Özge Helvacıoğlu who reared the types of the new species.

Type material. Holotype ♀, TR. Sakarya, 04.viii.2019, reared from pupae of *Sesamia nonagrioides* Lef. (Lepidoptera: Noctuidae) (Ö. Helvacıoğlu). Paratypes 15♀♀, 7♂♂, same locality as the holotype, reared from pupae of *S. nonagrioides* and of *Ostrinia nubilalis* Hbn. (Lepidoptera: Crambidae), 18.vii.- 05.ix.2019. (Ö.

Helvacıoğlu). The types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.3-2.4 mm. Head and mesosoma -black with bluish reflection. Antenna with scape and pedicel yellow, anelli pale testaceous, flagellum black. Setae on mesosoma brown. Coxae concolorous with body, rest of legs dirty yellow, wings hyaline, venation brownish testaceous; petiole black, metasoma brown.

Similar to *C. taslıcayensis* n. sp. excepts as follows:

Head (Fig. 2e) about 1.28 times as wide as mesoscutum, in dorsal view about 2.12 times as broad as long; in frontal view 1.28x as width as height; Head in lateral view with lower face receding at an angle of about 70^o with respect to upper face. POL 1.24 OOL and 1.3x Ohm; (A) = 4.25; temple 0.33 times as long as eye length, Head in dorsal view with temple forming a slightly obtuse angle (110 ^{o}) with occiput; Eyes 1.5 times as high as wide, separated by 1.26 times their length, malar space 0.23 times eye height. antenna (Fig. 2e1) with scape about 7.43x as long as broad; pedicellus plus flagellum 0.94x head width; F1 1.6 times as long as apical wide, 2.66x as long as basal wide, 0.8x as long as clava; following segments slightly transverse, 6th 1.25x as broad as long; clava 1.9x as long as broad.

Mesosoma about 1.5 times as long as wide, in lateral view moderately bent, dorsellum and propodeum sloping at an angle of about 27° with respect to dorsal plane of mesoscutum and scutellum. Pronotum with pronotal collar about 0.25x as long as mesoscutum, Mesoscuturn about 1.6 times as wide as long; Scutellum 0.9x as long as wide, Fore wing 2.18 times as long as wide, with marginal vein 1.6 times as long as post marginal vein, 1.35x as long as stigmal vein; the latter 1.2x as long as post marginal vein; angle between stigmal vein and post marginal vein 42^o; stigma big, space between post marginal vein and stigma about 1.43x length of stigma. Propodeum 0.6 times as long as scutellum; median area 2.2x as wide as long; spiracle separated from posterior edge of metanotum by its longest diameter.

Petiole distinctly wider than long. Metasoma (Fig. 4e1) circular, 1.1 times as long as wide, about 1.16 times as wide as mesoscutum and about 1.15x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.3x length of gaster.

Description male. Body length 2.0-2.2 mm. Similar to female, except as follows: Head and mesosoma bluish-black, legs pale yellow, except coxae concolorous with body; metatibiae slightly infuscate medially; first gastral tergite with a transverse narrow pale band along its hind margin; other part metallic dark brown to black.

Head with antenna (Fig. 2e2) with scape 1.2x as long as eye height and about 5 times as long as width, extending above vertex; ventral shiny. Plaque extending almost whole length of scape; combined length of pedicel plus flagellum 1.1 times as long as head width; pedicel in lateral view twice as long as wide; flagellum filiform, first funicular segment 2 times as long as wide, twice as long as second segment and 1.3 times as long as pedicel; second funicular segment about 1.1 times as long as wide; F6 equal in length and width; clava acuminate, 1.8 times as long as wide, 1.14x as long as two preceding funicular segments combined.

Petiole about 0.5 times as long as wide. Metasoma (Fig. 4e2) oblong, about 1.55 times as long as wide, 0.93x as long as mesosoma; hind margin of first tergite straight.

Conomorium pityocampae Graham, 1992

Conomorium pityocampae Graham, 1992. Holotype ♀, and some paratypes ♀ ♂, Yugoslavia, France, Cyprus, and Turkey: Orhaneli, 25.vii. to viii.1959. Ex cocoon of *Thaumetopoea pitypcampae* Den.& Schiff. (E. Can) (BMNH).

Studied material. TR: Tokat, 1♀, 31.x.1986, (2.8mm), 1♀, 28.xi.1986, (2.7 mm); 1♀, 27.xi.1987 (2.8 mm); Almus, Çevreli, 27.v.1998, (3.0 mm), swept from leaves of *Purunus mahalep* (H.Çam).

Conomorium kayserinensis n. sp.

(Figs. 1f, 2f, 3f, 4f)

Etymology. The name is derived from the name of Kayseri, from which the types were collected.

Type material. Holotype ♀, TR. Kayseri, Sarız, 08.vi.2008, swept from pasture (M. Doğanlar). The types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.3-2.4 mm. Head and mesosoma -black with bluish reflection. Antenna with scape, pedicel and anelli yellow, flagellum fuscous, club dirty yellow. Setae on mesosoma brown. Coxae concolorous with body, rest of legs dirty yellow, wings hyaline, venation brownish testaceous; petiole yellow, metasoma brown.

Similar to *C. helvaciogluae* n. sp. excepts as follows:

Head (Fig. 1f) about 1.28 times as wide as mesoscutum, in dorsal view about 1.95 times as broad as long; in frontal view 1.3x as width as height; Head in lateral view with lower face receding at an angle of about 68° with respect to upper face. POL 1.17x OOL and 1.67x Ohm; (A) = 6.25; temple 0.54 times as long as eye length, head in dorsal view with temple forming a slightly obtuse angle (100 °) with occiput; eyes 1.6 times as high as wide, separated by 1.43 times their length, malar space 0.26 times eye height. antenna (Fig. 2f) with scape about 9.4x as long as broad, and as long as eye length; pedicellus plus flagellum equal head width and twice length of scape; F1 1.43x as long as pedicellus, 1.8 times as long as apical wide, 3.6x as long as basal wide, 1.06x as long as clava; following segments slightly transverse, 6th 1. 43x as broad as long; clava 2.2x as long as broad.

Mesosoma about 1.44 times as long as wide, in lateral view moderately bent, dorsellum and propodeum sloping at an angle of about 33° with respect to dorsal plane of mesoscutum and scutellum; pronotum with pronotal collar about 0.22x as long as mesoscutum, the latter about 2.2 times as wide as long; scutellum 0.9x as long as wide, fore wing 2.1 times as long as wide, with marginal vein stigmal vein and post marginal vein equal in length; angle between stigmal vein and postmarginal vein 35°; stigma big, space between post marginal vein and stigma about 1.57x length of stigma. Propodeum 0.8 times as long as scutellum; median area 2.0x as wide as long; spiracle big, placed midpoint of posterior and anterior edges of metanotum.

Petiole 1.66x as long as broad. Metasoma (Fig. 4f) oblong, 1.1 times as long as wide, about as wide as mesoscutum and about 0.93x as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.28x length of gaster.

Conomorium hacipasanensis n. sp.
(Figs. 1g, 2g, 3g, 4g)

Etymology. The name is derived from the name of Hacıpaşa, Altınözü, Hatay, from which the types were collected.

Type material. Holotype ♀, TR. Hatay, Altınözü, Hacıpaşa, 25.vi.1998, swept from pasture, (M. Doğanlar); Paratypes: 3♀♀, same data as the holotype; 1♀, Altınözü, Center, 14.iv.2008; 1♀, Altınözü, Kozkalesi, 08.v.2007, all of the paratypes were swept from pasture, (M. Doğanlar); The types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

Description female. Body length 2.5-2.7 mm. Head and mesosoma -black with bluish reflection. Antenna with scape, pedicel and anelli yellow, flagellum fuscous, club dirty yellow. Setae on mesosoma white. Coxae concolorous with body, rest of legs dirty yellow, wings hyaline, venation brownish testaceous; petiole and metasoma black and brown.

Similar to *C. helvaciogluae* n. sp. excepts as follows:

Head (Fig. 1g) about 1.1 times as wide as mesoscutum, in dorsal view about twice as broad as long; in frontal view 1.25x as width as height; head in lateral view with lower face receding at an angle of about 60-70^{o} with respect to upper face. POL 1.1-1.4x OOL and 1.4-1.5x Ohm; (A) = 5.0; temple 0.6-07 times as long as eye length; head in dorsal view with temple forming a slightly obtuse angle (100 ^{o}) with occiput; eyes 1.62-1.66 times as high as wide, separated by 1.25-1.32 times their length, malar space 0.24 times eye height. antenna (Fig. 2f) with scape about 6.7-7.1x as long as broad, and 0.87x as long as eye length; pedicellus plus flagellum 0.7-0.8 head width and 1.83-2.02x length of scape; first funicular segment 1.1-1.33x as long as apical wide, 2.6-2.75x as long as basal wide; 1.0-1.2x as long as pedicellus; 0.96x as long as clava; 6th 1. 75x as broad as long; clava 1.57x as long as broad.

Mesosoma about 1.4 times as long as wide, in lateral view moderately bent, dorsellum and propodeum sloping at an angle of about 30-34° with respect to dorsal plane of mesoscutum and scutellum; pronotum with pronotal collar about 0.2x as long as mesoscutum, the latter about 2.0 times as wide as long; scutellum 0.94x as long as wide; forewing (Fig. 3f) with marginal vein 1.1-1.27 times as long as postmarginal vein; 0.92-1.27x as long as stigmal vein; the latter 0.84x as long as postmarginal vein;; angle between stigmal vein and postmarginal vein 40-50^{o}; stigma big, space between post marginal vein and stigma about 1.57-1.8x length of stigma. Propodeum 0.46 times as long as scutellum; median area 2.0x as wide as long; spiracle separated from posterior edge of metanotum by its longest diameter.

Petiole 0.65x as long as broad. Metasoma (Fig. 4f) circular, as long as wide, 1.18 as wide as mesoscutum and about as long as mesosoma; gastral tergites dorsally slightly sunken, first tergite occupying 0.31x length of metasoma.

***Conomorium patulum* (Walker, 1835)**
Pteromalus patulus Walker, 1835: 479.♀.
Conomorium patulum (Walker): Graham, 1969: 821.

Studied materials: 1♀, Erzurum, 12.viii.1982 (Ö. Aloğlu); 13 ♀♀, 27-28.ix.1987, swept from pasture (H. Çam).

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I am very grateful to Dr. J. Noyes for his kind help in providing references. The author also wishes to thank to Prof. Dr. H. Çam, Prof. Dr. Ö. Aloğlu and Dr. Özge Helvacıoğlu for collecting and rearing some of the specimens.

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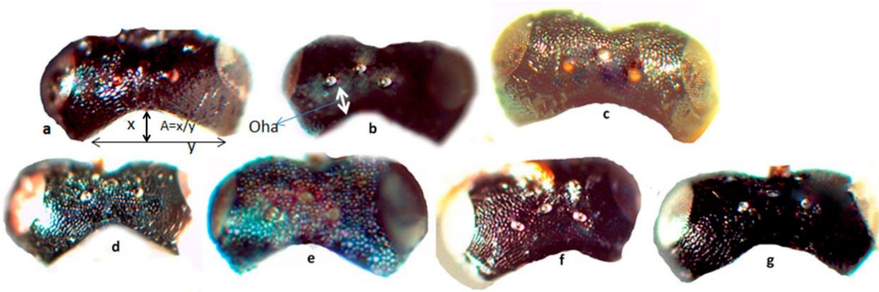
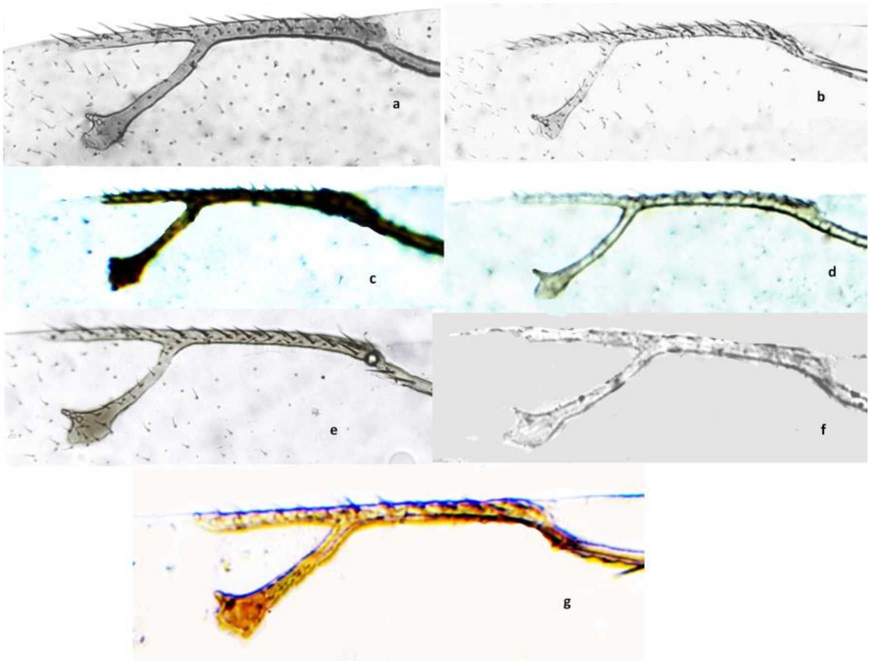
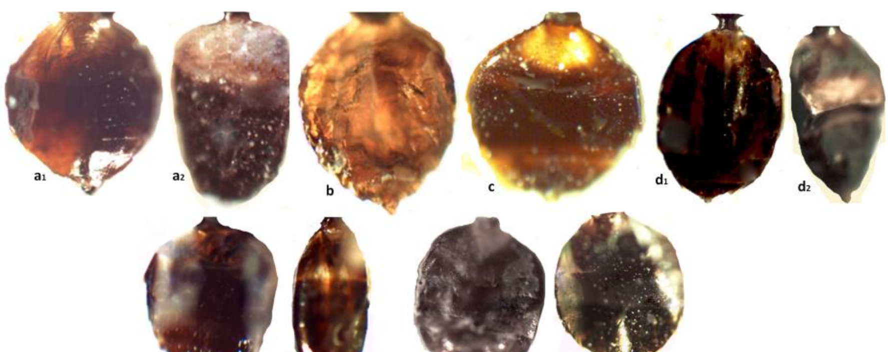


Figures 1. Heads of *Conomorium* Masi, 1924: a. *C. turhalensis* n. sp., b. *C. goelbasinensis* n. sp., c. *C. guenemekensis* n. sp., d. *C. taslıcayensis* n. sp., e. *C. helvaciogluae* n. sp., f. *C. kayserinensis* n. sp., g. *C. hacipasanensis* n. sp.

Figures 2. Antennae of *Conomorium* Masi, 1924: a. *C. turhalensis* n. sp., b. *C. goelbasinensis* n. sp., c. *C. guenemekensis* n. sp., d. *C. taslıcayensis* n. sp., e. *C. helvaciogluae* n. sp., f. *C. kayserinensis* n. sp., g. *C. hacipasanensis* n. sp.



Figures 3. Forewings of *Conomorium* Masi, 1924: a. *C. turhalensis* n. sp., b. *C. goelbasinensis* n. sp., c. *C. guenemekensis* n. sp., d. *C. taslıcayensis* n. sp., e. *C. helvaciogluae* n. sp., f. *C. kayserinensis* n. sp., g. *C. hacipasanensis* n. sp.



Figures 4. Metasoma of *Conomorium* Masi, 1924: a. *C. turhalensis* n. sp., b. *C. goelbasinensis* n. sp., c. *C. guenemekensis* n. sp., d. *C. taslıcayensis* n. sp., e. *C. helvaciogluae* n. sp., f. *C. kayserinensis* n. sp., g. *C. hacipasanensis* n. sp.

A SEM STUDY ON AEDEAGUS AND SPERMATHECA OF *CASSIDA NEBULOSA* LINNAEUS, 1758 (COLEOPTERA: CHRYSOMELIDAE: CASSIDINAE) FROM TURKEY

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[Özdikmen, H., Bal, N., Amutkan Mutlu, D. & Suludere, Z. 2020. A SEM study on aedeagus and spermatheca of *Cassida nebulosa* Linnaeus, 1758 (Coleoptera: Chrysomelidae: Cassidinae) from Turkey. Munis Entomology & Zoology, 15 (1): 252-261**]**

ABSTRACT: It is accepted male genitalia are not diagnostic, spermathecae are partly diagnostic within the genus *Cassida* Linnaeus, 1758 (Coleoptera: Chrysomelidae: Cassidinae). However, studies on genitalia have been based on only stereo microscope up to now. Ultrastructures of genitalia have never been studied except for a few works. The aim of this study is to determine whether the ultrastructural works are efficient. Spermathecae of totally 5 specimens of *Cassida nebulosa* Linnaeus, 1758 for the present work were collected from Konya province in Turkey in 1993 and 2006, which have been examined for the first time. Thus new diagnostic characters were obtained and it revealed that it was diagnostic from species in other subgenus. Photos of aedeagus and spermatheca in SEM as weel as in stereo microscope are also given in the text.

KEY WORDS: *Cassida nebulosa*, SEM, ultrastructure, aedeagus, spermatheca, Turkey

The genus *Cassida* Linnaeus, 1758 includes a large number of species distributed around the world (Palaearctic, Nearctic, Oriental, Afro-tropical, Madagascar and Australian Regions). The genus is divided into 15 subgenera for the species distributed in Palaearctic and Oriental Regions (Borowiec, 2007; Özdikmen and Bal, 2019).

The Cassidinae fauna of Turkey includes 51 species of 6 genera. The genus *Cassida* has 41 species of 11 subgenera (Ekiz et al., 2013; Özdikmen et al., 2014; Özdikmen and Kaya, 2014).

The nominotypical subgenus *Cassida* (*Cassida*) Linnaeus, 1758 includes 46 species distributed around the World (45 Palaearctic species and one native species from North America). The nominotypical subgenus is represented by 21 species in Turkey. *Cassida nebulosa* Linnaeus, 1758 is the type species of the genus *Cassida* Linnaeus, 1758 and so the nominotypical subgenus *Cassida* (*Cassida*) Linnaeus, 1758 (Chrysomelidae: Cassidinae).

According to Bordy & Doguet (1987), Borowiec & Świętojańska (2001) and Borowiec (2007), male genitalia are not diagnostic within the genus *Cassida* Linnaeus, 1758. Spermathecae are partly diagnostic. However, studies on genitalia have been based on only stereo microscope up to now. Ultrastructures of genitalia have never been studied except for a few recent works (Ataş et al., 2019a,b). For this reason, ultrastructural investigations of aedeagi and spermathecae are very important in the genus *Cassida*.

Hitherto, we think that arrangement of the subgeneric classification in the genus *Cassida* on the base of aedeagal and especially spermathecal morphologies was overlooked due to this acceptance and approval. However, we believe that ultrastructural and detailed investigations of aedeagi and spermathecae will be very important in the genus *Cassida* with regard to subgeneric classification especially. With this reason, detailed investigations of spermatheca of *Cassida nebulosa* Linnaeus, 1758 from Turkey were studied with SEM and stereo microscope. Obtaining observations are presented below.

The aim of this work is to reveal, detailed morphologies observed by SEM and stereo microscope of spermatheca of of *Cassida nebulosa* Linnaeus, 1758 (Coleoptera: Chrysomelidae: Cassidinae) from Turkey.

MATERIAL AND METHODS

The available specimens (a total of 5 specimens) for the present work were collected from Konya province in Turkey in 1993 and 2006. The specimens are deposited in Nazife Tuatay Plant Protection Museum (NTM) (Turkey, Ankara).

The spermathecae and aedeagi were dissected from abdomen, remaining tissue were removed with fine tweezers.

For light microscopic examination after cleaning, the samples were placed 70% ethanol and examined with Olympus SZX7 stereomicroscope.

For scanning electron microscopy (SEM), cleaned samples were dehydrated using an ascending series of ethanol (70%, 80%, 90%, and 100%) and then air dried. After that the specimens were mounted onto SEM stubs using a double-sided adhesive tape, coated with gold using a Polaron SC 502 Sputter Coater, and examined with a JEOL JSM 6060 Scanning Electron Microscope (SEM) at 5 kV and 10 kV.

RESULTS

***Cassida nebulosa* Linnaeus, 1758** (Fig. 1)

Cassida nebulosa Linnaeus, 1758 is a Asiatic-European species. It is distributed in most parts of Europe including European Turkey, China, Far East Russia, Kazakhstan, Korea, Mongolia, Siberia, Tadjikistan, Asian Turkey and Uzbekistan (Warchalowski, 2010; Borowiec & Sekerka, 2010; Özdikmen & Kaya, 2014).

The species is rather widely distributed in Turkey. It has been recorded from 14 provinces in 5 of 7 Turkish regions. It is reported from Ankara, Artvin, Balıkesir, Bursa, Çanakkale, Düzce, Giresun, Gümüşhane, İzmir, Kastamonu, Konya, Sakarya, Tokat and Yozgat provinces in Turkey (Ekiz et al., 2013; Özdikmen & Kaya, 2014).

Material examined: Turkey, Konya prov.: Akşehir, Dereçine, 05.VIII.1993, leg. A. Kalkandelen, 2 males and 2 females specimens; Akşehir, Sarayköy, 23.V. 2006, leg. Y. Özdemir, 1 male specimen.

Aedeagus and spermatheca of *Cassida nebulosa* Linnaeus, 1758 were studied with both stereo microscope and SEM for the first time. Obtaining observations on ultrastructures of them are presented as follows:

Aedeagus (Figs. 2-11)**:** In lateral view, median lobe distinctly and regularly curved median foramen to apex in general. Median lobe gradually, but slightly narrowed from the base to the apex. The apex of median lobe almost abruptly sharpened and pointed.

In dorsal view, median lobe barely widened from the median part to the apex, and the apex more or less prolonged and clearly truncated. Upper and lateral margins of orifice more or less rounded. Dorsal plate distinct and almost covered basal half of orifice. Median lobe in lateral parts and fore part of orifice thickened. Thickening in lateral parts smaller than the fore part. Median lobe behind the orifice joined more or less V-shaped.

Median lobe especially in anterior half with scattered, irregular and sparsely ultrastructural pits. The pits on ventral parts of median lobe much more than on dorsal parts. The pits located only in lateral parts of terminal part of median lobe in dorsal view. Dorsal plate and flattened area behind it without ultrastructural pits in dorsal view. Also the terminal area from upper margin of orifice to aedeagal apex without ultrastructural pits in dorsal view. Apex of median lobe folded to dorsal surface and so appears like a truncated-shaped, but not cut. Apex of median lobe gradually narrowed, not additionally prolonged.

Spermatheca (Figs. 12-18)**:** Vasculum in the form of opened hook or bird beak-shaped, distinctly curved. Apical part of cornu clearly sharpened. Apex of cornu pointed. Apical part of cornu with an integument extended to front of its apex. Nodulus distinctly swollen and bulbous. Nodulus with an integument on internal surface basally. Ampulla bulbous but small. Collum invisible, very reduced. Ramus visible. Ampulla joined to nodulus in external surface basally. Spermathecal gland connected to ampulla in its median part. Spermathecal duct joined to ampulla in its top surface medially. Ductus spermatheca very long, rather fine, regularly spiral almost along its lenght.

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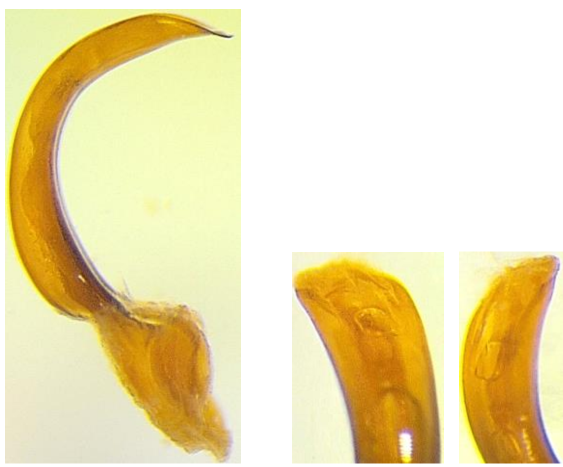
Figure 1. *Cassida nebulosa* Linnaeus, 1758; dorsal view (left), ventral view (right).



A B C

Figure 2. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, A. Lateral view, B, C. Dorsal view.

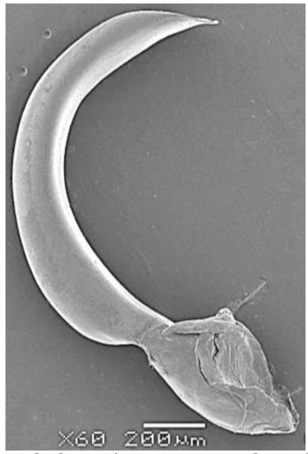


Figure 3. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, lateral view (SEM).

Figure 4. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, dorso-lateral view (SEM).

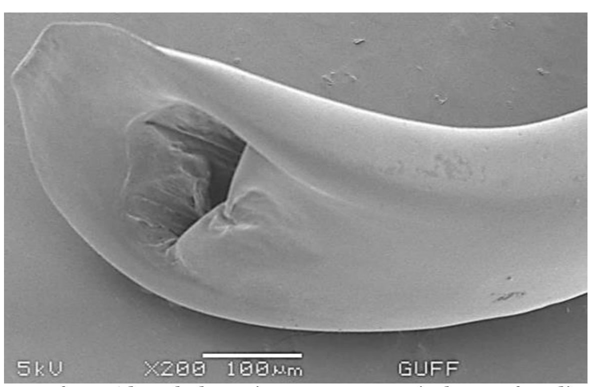


Figure 5. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, apical part of median lobe in dorso-lateral view (SEM).

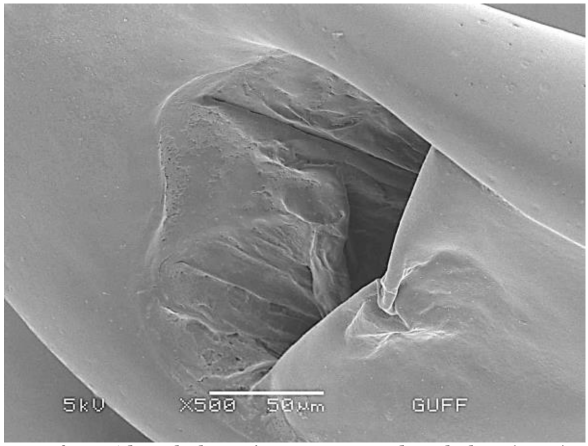


Figure 6. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, dorsal plate (SEM).

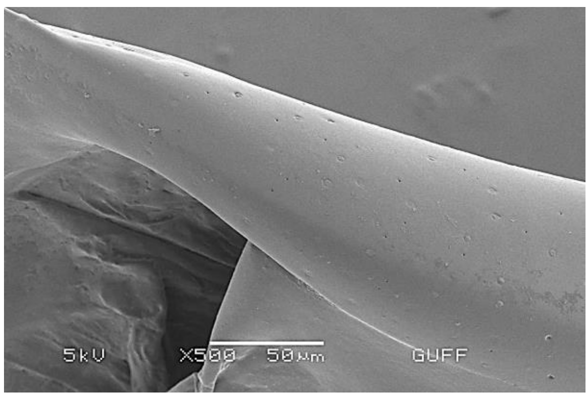


Figure 7. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, ultrastructural pits on lateral part of orifice (SEM).

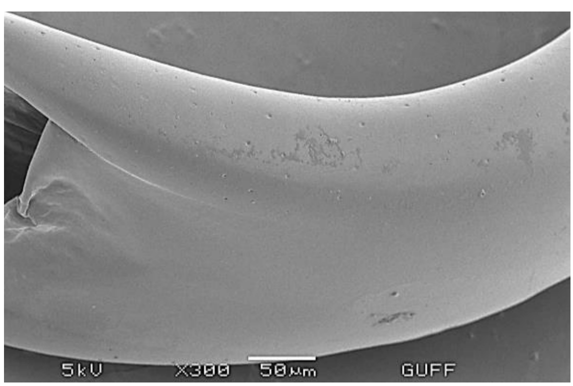


Figure 8. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, ultrastructural pits on lateral part of median lobe (SEM).

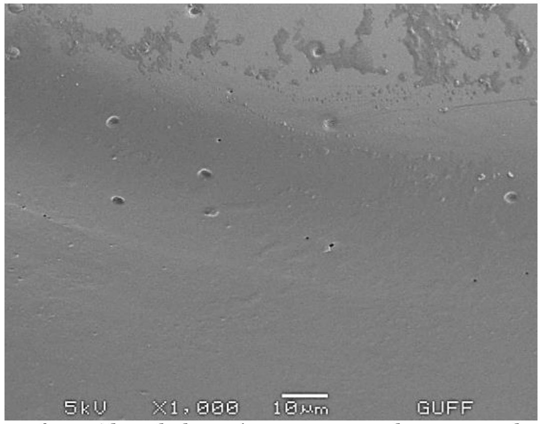


Figure 9. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, ultrastructural pits on lateral part of median lobe (SEM).

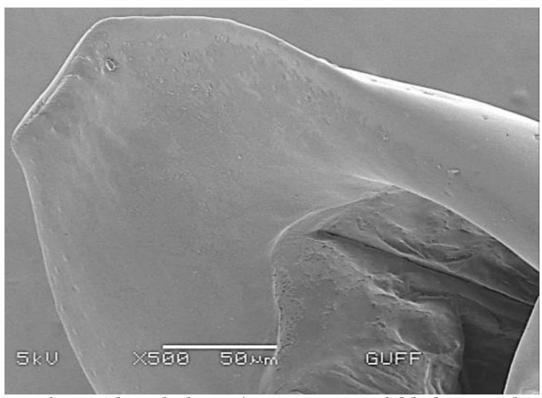


Figure 10. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, folded apex, ultrastructural pits on sides of apical part of median lobe (SEM).

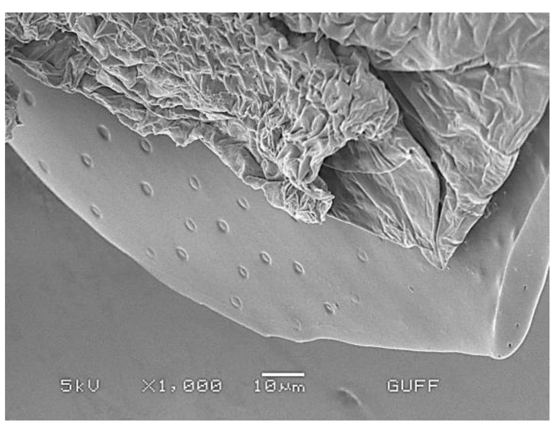


Figure 11. Aedeagus of *Cassida nebulosa* Linnaeus, 1758, folded apex, ultrastructural pits on sides of apical part of median lobe (SEM).

Figure 12. Spermatheca of *Cassida nebulosa* Linnaeus, 1758.

Figure 13. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, lateral view (SEM).

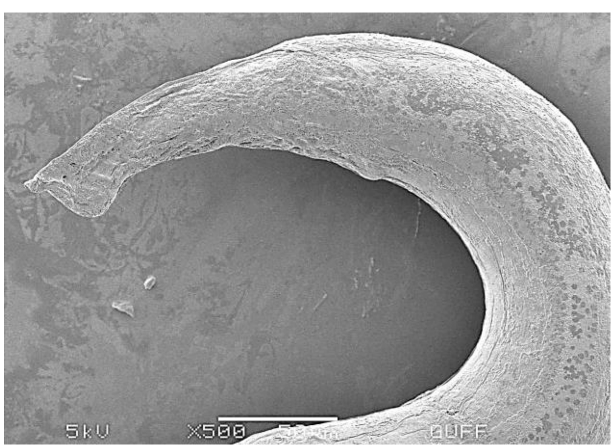


Figure 14. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, apical part of cornu in lateral view (SEM).

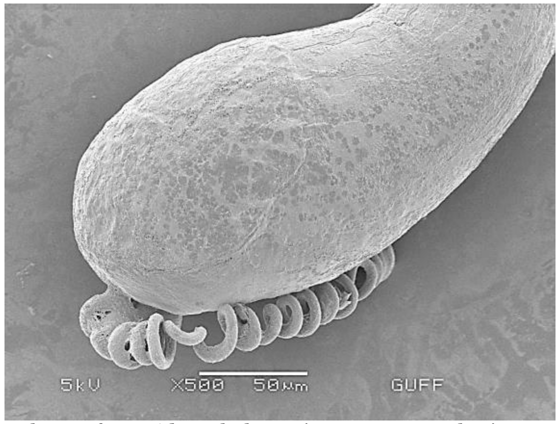


Figure 15. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, the integument on internal surface of nodulus (SEM).

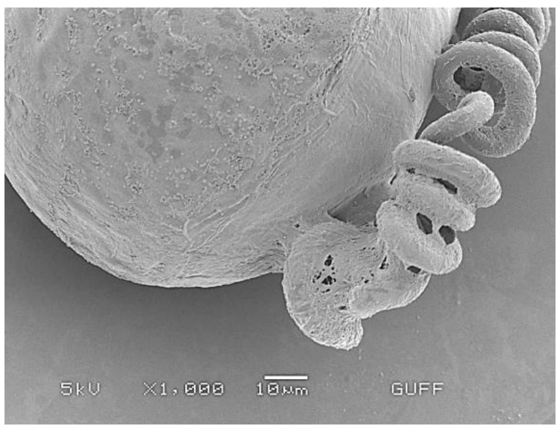


Figure 16. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, basal part of nodulus, ampulla and ductus spermatheca (SEM).

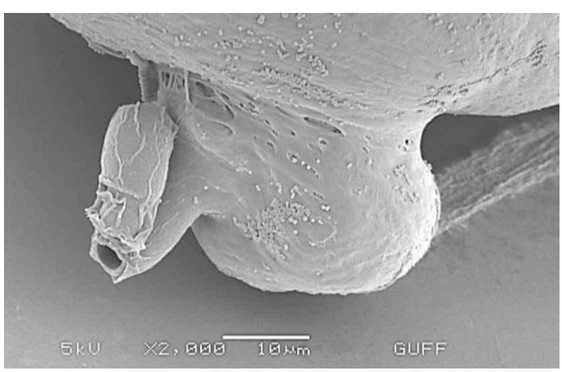


Figure 17. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, ampulla and spermathecal gland (SEM).

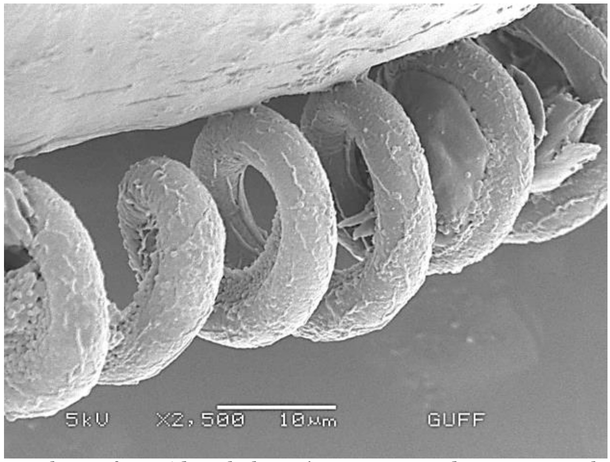


Figure 18. Spermatheca of *Cassida nebulosa* Linnaeus, 1758, ductus spermathecal (SEM).

NEW RECORDS OF ENCYRTIDS (HYMENOPTERA: ENCYRTIDAE) PARASITOIDS OF COCCOMORPHA (HEMIPTERA) FROM PORTUGAL

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[Japoshvili, G., Ramos, A. P. & Silva, E. B. 2020. New records of Encyrtids (Hymenoptera: Encyrtidae) parasitoids of coccomorpha (Hemiptera) from Portugal. Munis Entomology & Zoology, 15 (1): 262-264**]**

ABSTRACT: One new record for Iberian peninsula *Leptomastix algirica* Trjapitzin and three new records: *Metaphycus dispar* (Mercet), *M. maculipennis* (Timberlake) and *Microterys dichrous* (Mercet) for Portugal are given.

KEY WORDS: Coccidae, Kermes, Mealybug, Natural enemies

Prior to our study 54 species of encyrtids have been recorded from Portugal (Noyes, 2018). The latest studies on the fauna of Encyrtidae from Portugal were conducted by the first author in 2004-2005. During these surveys 14 species of Encyrtidae have been recorded from Portugal for the first time. Four species were recorded as a new for Iberian Peninsula, and additionally two species were described as a new for science (Japoshvili & Abrantes, 2006).

Present results are based on the material collected by second and third authors during 2012 and 2017-2018 seasons. Samples from several hosts infested with scale insects were collected randomly, material was placed in the laboratory for parasitoids emergence.

The specimens are deposited in the insect collection of the Laboratory of Entomology of the Instituto Superior de Agronomia, Universidade de Lisboa (Lisbon, Portugal).

New records for Portugal are indicated with one asterisk and new record for Iberian Peninsula with two asterisks.

List of new records:

Genus *Leptomastix* Förster

Leptomastix algirica Trjapitzin**

Species Examined: Portugal, Cascais gardens: 2 females, 1 male, 6.VI.2018, ex *Phenacoccus peruvianus* on *Bougainvillea** sp. (card mounted), Leg. AP Ramos/EB Silva.

Genus *Metaphycus* Mercet

Metaphycus dispar (Mercet)*

Species Examined: Portugal, Cadaval: 6 females, 3 males, 22.VI.2012, ex *Parthenolecanium corni* on *Vitis vinifera* (card mounted), Leg. AP Ramos/EB

Silva; Lisbon gardens : 2 females, 2.III.2017, ex *Parthenolecanium persicae* on *Ginkgo biloba* (card mounted), Leg. AP Ramos/EB Silva.

Metaphycus maculipennis (Timberlake)*
Species Examined: Portugal, Lisbon gardens: 6 females, 8 males, 2.III.2017, ex *Parthenolecanium persicae* on *Ginkgo biloba* (card mounted), Leg. AP Ramos/EB Silva.

Genus *Microterys* Thomsoni
Microterys dichrous (Mercet)*
Species Examined: Portugal, Lisbon gardens: 1 female, 8.III.2012, ex *Nidularia pulvinata* on *Quercus ilex* (slide), Leg. AP Ramos/EB Silva.; Lisbon gardens: 5 males, 2.III.2017, ex *Nidularia pulvinata* on *Quercus ilex* (card mounted), Leg. AP Ramos/EB Silva.
Comments: The species was recorded previously by Zahradnik (1972) according to Viggiani (1997), however this record was an erroneous and we were not able to confirm this.

As there are no detailed photos, we provide here photos of some morphological parts for *M. dichrous* (Fig. 1).

In the key to the genus *Microterys* of Iberian Peninsula, Japoshvili (2011) made an error, couplete 11 must be formulated as: Thesis - Mesoscutum and scutellum at most dirty yellow (**12)**; Antithesis - Mesoscutum and scutellum dark, almost black with metallic reflection (**16).**

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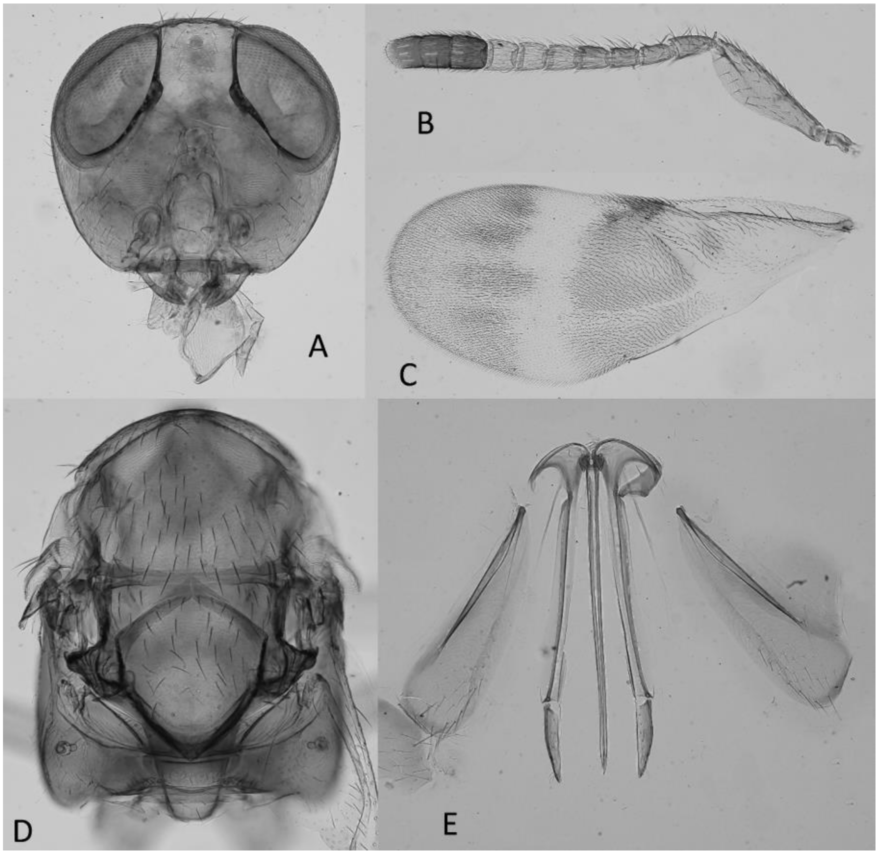

Figure 1. Female of *Micoretys dichrous*: A – Head; B – Antenna; C – Fore Wing; D – Mesosoma; E – Ovipositor.

A NEW POTENTIAL PEST OF EAST AND SOUTH-EASTERN ANATOLIA IN TURKEY: *NYSIUS CYMOIDES* (SPINOLA, 1837) (HETEROPTERA, LYGAEIDAE)

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[Özgen, İ., Kaymak Kara, B., Miroğlu, S., Koç, İ. & Dioli, P. 2020. A New Potential Pest of East and Southeastern Anatolia in Turkey: *Nysius cymoides* (Spinola, 1837) (Heteroptera, Lygaeidae). Munis Entomology & Zoology, 15 (1): 265-268**]**

ABSTRACT: This study was conducted in 2018-2019. This work was implemented surveys and field observations in Adıyaman, Batman, Diyarbakır, Elazığ, Mardin, Siirt and Muş. In this study, the distribution of the species in Southeast and Eastern Anatolia provinces and their damage status were determined. It has been observed that this species causes damage to Antep pistachios, corn, tomatoes, peppers and soybeans, further it has been observed that the population has reached significant levels. Further studies on the species are required in the following years.

KEY WORDS: *Nysius cymoides,* spread, harmfull

Nysius cymoides (Spinola, 1837) (Heteroptera: Lygaeidae: Orsillinae) has spread in a wide and diverse habitat ranging from the Holomediterranean area to the deserts of Arabia, Europe, Africa, and Asia (Pericart, 1998) (Fig. 1). Recently its distribution has enlarged to all Europe: Andorra, Austria, Belgium, Bulgaria, Crete, Croatia, Czech Republic, European Turkey, France, Great Britain (Jersey), Germany, Greece, Hungary, Italy, Liechtenstein, Luxembourg, Malta, Macedonia, Moldavia, Montenegro, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Switzerland, Ukraine. North Africa: Algeria, Canary Islands, Egypt, Libya, Morocco, Madeira, Tunisia. Asia: Azerbaijan, Arab Emirates, Kazakhstan, Armenia, Turkey, China (not confirmed), Cyprus, Georgia, Iran, Iraq, Israel, Jordan, Kirgizia, Saudi Arabia, Sinai, Tadzhikistan, Turkmenistan, Uzbekistan and Yemen. Equatorial Africa: Cabo Verde Is., Mauritania, Sierra Leone, Sudan (Aukema & Rieger, 2001; Protić Lj., 2001; Aukema et al., 2013).

Especially in Italy, it has caused significant losses in recent years on quinoa (*Chenopodium quinoa*) (Bocchi et al., 2016; Dioli et al., 2016; Reguzzi et al., 2019) and soybean (*Glycine max*) due to significant population growth (Scaccini & Furlan, 2019). This species also causes necrosis and weight loss and damage in seeds from yellow to brown where they are fed in plant species (Chapelin-Viscardi et al., 2017). It has been reported that especially in Iran, it causes significant damages in canola plant, making intense damages of adults and nymphs and causing 3 offsets per year. Also, the same researchers determined that the species causes intense damage on sunny days (Badam et al., 2006). Additionally, it was reported that this species is harmful in the cabbage and vineyard areas in Israel (Gilat et al., 1974). This widely observed pest (Yazıcı et al., 2015) were it was detected on pistachio (Bolu, 2002), canola (Demirel, 2009), vineyard (Özgen, 2012) fields in Turkey. In this study; the population increases of pests in different culture plants and spread of pests in the Eastern and Southeastern Anatolia region of Turkey in recent years will be brief discussed.

MATERIALS AND METHODS

This study was conduct in 2018-2019. Samples were collected from pistachio, vineyard, tomato, cucumber, watermelon, eggplant, pepper, corn, purslane, alfalfa, capers, canary and *Solanum nigrum* in Adıyaman, Batman, Diyarbakır, Elazığ, Muş, Siirt and Mardin provinces. The samples were collected using sweep net and brought to the laboratory to examine and make ready for diagnosis. The samples were diagnosed by the fifth author.

RESULTS AND DISCUSSION

MATERIAL: Adıyaman, 22.06.2018, eggplant, pepper, 11 exc., Batman, 12.08.2019, 13 exc., Diyarbakır, Hevsel gardens, 27.07.2019, 168 exc., tomato, cucumber, watermelon, capers, purslane, Bismil, 12.08.2019, 145 exc., tomato, eggplant, Çınar, Selman village, 21.07.2018, tomato, pepper, watermelon, eggplant, 18 exc., Ergani, 22.07.2018, tomato, pepper, eggplant, 12 exc., Elazığ, Baskil, 22.07.2018, tomatoes, 18 exc., Yazıkonak, vineyard, alfalfa, 28.08.2019, 34 exc., Mardin, Kızıltepe, 22.07.2019, 89 exc., pistachios, canopy, Midyat, 23.7.2019, 14 exc., *Solanum nigrum*, Muş, Berce, 22.07.2019, maize, 8 exc. **Total:** 530 exc.

DAMAGE: Discoloration was observed in species feed areas and then browning and dryness were observed while they were in a collective and serial manner. Pests were found in areas contaminated with weeds. In parallel with the increase in temperature, the population has also increased. It is thought that the fight against these weeds, especially in the fields where there are plenty of canals, will reduce the population of the pests. It was determined that there was an increase in the temperature and population in the areas where the Dicle River increased the humidity rate at the edge of Hevsel gardens. In the vineyard areas of Elazığ province, it was observed that the nymphs stopped on the grape leaves without feeding. It has also been observed that the pests were fed on freshly planted two-year pistachio seedlings in Mardin and cause drying problem on seedlings (Fig. 2). It was also observed that the species absorbed the leaves of products such as tomatoes, eggplants and watermelons, and they were observed to be fed in groups (Fig. 3). This species might increase the damage in the rainy years with the increase of temperature in the following years. The species was spreaded at different altitudes. In this study, the species was collected at altitudes of 587 m and 1255 m. It is thought that leaving the weeds, that can cause harm to the species, will reduce the damage in the culture plants. More detailed studies on the species may be more helpful and, study of chemical control alternatives that will not cause damage to of organic agriculture and agroecosystem are important to prevent the damage of the species.

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Figure 1. *Nysius cymoides* (photo P. Dioli).

Figure 1. Collection of *Nysius cymoides* (Spinola, 1837) and its position on weeds (A: Collective presence, B, D: Damage conditions in young pistachio nuts, C. Adult wandering in pistachio exile, E. Its presence on weeds).

Figure 2. Damage of *Nysius cymoides* (Spinola, 1837) on tomato and watermelon.

A CONTRIBUTION TO THE KNOWLEDGE OF LEAF-BEETLES (COLEOPTERA: CHRYSOMELIDAE) IN TURKEY USING DATA OF SPECIMENS IN NAZİFE TUATAY PLANT PROTECTION MUSEUM (TURKEY, ANKARA)

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[Özdikmen, H., Bal, N. & Coral Şahin, D. 2020. A contribution to the knowledge of leaf-beetles (Coleoptera: Chrysomelidae) in Turkey using data of specimens in Nazife Tuatay Plant Protection Museum (Turkey, Ankara). Munis Entomology & Zoology, 15 (1): 269-297**]**

ABSTRACT: In this study, material belonging to nine subfamilies of Chrysomelidae housed in the collection of Nazife Tuatay Plant Protection Museum (NTM) (Turkey, Ankara) have been evaluated. A total of 121 species of 41 genera have been presented. Among those *Smaragdina concolor concolor* (Fabricius, 1792) and *Podagrica malvae semirufa* (Küster, 1847) are the first record for Turkey. Also, *Labidostomis metallica metallica* Lefèvre, 1872, *Chrysolina anceyi anceyi* (Marseul, 1868), *Aphthona pallida* (Bach, 1859) and *Longitarsus callidus* Warchałowski, 1967 are the second reports for Turkey. Additional new provincial and regional records for many species have been given.

KEY WORDS: Fauna, Chrysomelidae, the leaf beetles, Turkey, biodiversity

The Chrysomelidae fauna of Turkey has been studied by many foreign and native scientists. Recent studies of Löbl & Smetana (2010), Warchalowski (2010), Ekiz et al. (2013), Özdikmen (2014a,b), Özdikmen & Cihan (2014), Özdikmen & Kavak (2014), Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Özbek (2014) and Özdikmen & Topcu (2014) have great importance for Chrysomelidae fauna of Turkey. The aim of the present paper is to present new locality records of preserved material in Nazife Tuatay Plant Protection Museum (NTM) to researchers and relevant persons.

MATERIAL AND METHOD

Most of the material have been collected by the various researchers from Turkey between the years of 1917-2015. Rest of the material collected and given as a gift to the NTM, Ankara, Turkey, by researchers, students and amateurs. Material have been determined by H. Özdikmen, N. Bal and D. Coral Şahin.

RESULTS AND DISCUSSION

In this study 121 species of 41 genera belong to 9 subfamilies of Chrysomelidae were given (2 species of 2 genera in the subfamily Criocerinae; 25 species of 6 genera in the subfamily Clytrinae; 17 species of 2 genera in the subfamily Cryptocephalinae; 18 species of 7 genera in the subfamily Chrysomelinae; 2 species of 2 genera in the subfamily Eumolpinae; 15 species of 9 genera in the subfamily Galerucinae; 30 species of 10 genera in the subfamily Alticinae; 1 species of 1 genus in the subfamily Hispinae; 11 species of 2 genera in the subfamily Cassidinae).

SUPERFAMILY CHRYSOMELOIDEA
FAMILY CHRYSOMELIDAE

SUBFAMILY CRIOCERINAE

GENUS *LILIOCERIS* Reitter, 1913
SPECIES *Lilioceris faldermanni* (Guérin-Méneville, 1844)
Materyal examined: Ankara prov.: 29.V.1964, Y. Sürmeli, 1 specimen; Hacıkadın, 25.VI.1953, 1 specimen; Çubuk, Karagöl, 03.VIII.1983, leg. A. Kalkandelen, 1 specimen. This Turano-Mediterranean (Turano-Balkan) species was recorded from Ankara province.

GENUS *OULEMA* Gozis, 1886
SPECIES *Oulema melanopus* (Linnaeus, 1758)
Materyal examined: Afyonkarahisar prov.: 04.VIII.1993, leg. A. Kalkandelen, 1 specimen; **Ankara prov.:** Bala, Çavuşlu, 26.V.1992, leg. Y. Özdemir, 1 specimens; Beypazarı, İnözü, 11.V.1999, leg. Y. Özdemir, 1 specimen; **Çankırı prov.:** 20.V.1974, 1 specimen: **Eskişehir prov.:** Sivrihisar, Kaymaz, 23.VI.1997, Y. Özdemir, 1 specimen; Mahmudiye, Kaymazyayla, 26.VI.1991, Y. Özdemir, 1 specimen; **Konya prov.:** Çumra, 22.VI.1962, leg. N. Karabıyık, 2 specimens; **Tokat prov.:** Niksar, 08. VI.1995, leg. A. Kalkandelen, 1 specimen. This Holarctic species was recorded from Afyonkarahisar, Ankara, Eskişehir and Konya provinces. It is the first record to Çankırı and Tokat provinces.

SUBFAMILY CLYTRINAE

GENUS *CLYTRA* Laicharting, 1781
SUBGENUS *CLYTRA* Laicharting, 1781
SPECIES *Clytra laeviuscula* Ratzeburg, 1837
Materyal examined: Adana prov.: 1939, 2 specimens; **İzmir prov.:** Ağamemnun, 21.VII.1967, leg. N. Çağatay, 2 specimens; **Sakarya prov.:** Adapazarı, Poyrazlar village, 22.VII.1993, leg. A. Kalkandelen, 1 specimen. This Centralasiatic-European species was recorded from İzmir and Sakarya provinces. It is the first record to Adana province.

SUBGENUS *CLYTRARIA* Semenov, 1903
SPECIES *Clytra atraphaxidis* (Pallas, 1773)
SUBSPECIES *Clytra atraphaxidis atraphaxidis* (Pallas, 1773)
Materyal examined: Isparta prov.: Eğirdir, 28.VI.1995, leg. Y. Özdemir, 1 specimen; 29.VI.1995, leg. Y. Özdemir, 1 specimen; **İzmir prov.:** Bornova, 08.VII. 1771, 2 specimens; **Manisa prov.:** Beydere, 22.VII.1960, leg. H. Giray, 1 specimen. This Centralasiatic-European subspecies was recorded from all mentioned provinces.
SPECIES *Clytra novempunctata* Olivier, 1808
Materyal examined: Ankara prov.: Şereflikoçhisar, 6.VII.1939, 1 specimen; 8.VII.1939, 1 specimen; Gölbaşı, 10.VII.1947, 1 specimen; 15.VIII.1965, leg. N. Tuatay, 1 specimen; Beypazarı, İnözü Plateu, 29.V.1996, leg. A. Kalkandelen, 1 specimen; **Afyonkarahisar prov.:** İhsaniye, Gazlıgöl, 08.VI.2006, 1056 m., leg. M. Karataş, 1 specimen; Bayat, İmrallı village, 19.VI. 2006, 1355m., leg. Y. Güler, 2 specimens; **Kahramanmaraş prov.:** Elbistan, Osman göl 04.VIII.1939, 1 specimen; **Sakarya prov.:** Adapazarı, Poyrazlar village, 22.VII.1993, leg. A. Kalkandelen, 1 specimen; **Tokat prov.:**, Turhal, 03.VI.1984, 1 specimen; **Turkey:** Without locality data, 1 specimen. This Turano-Mediterranean species was recorded from Ankara, Kahramanmaraş and Tokat provinces. It is the first record to Afyonkarahisar and Sakarya provinces.
SPECIES *Clytra valeriana* (Ménétriés, 1832)
SUBSPECIES *Clytra valeriana valeriana* (Ménétriés, 1832)
Materyal examined: Ankara prov.: Ayrancı, 14.VI.1939, 5 specimens; Etimesgut, 30.VII. 1939, 2 specimens; Akyurt, 04.VII.1979, 2 specimens; **Konya prov.:** 19. VIII. 1939, 1 specimen; Karaağaç village, 19.VI. 1979, 1 specimen; **İzmir prov.:** Bornova, 24.V.1938, 1 specimen; Cuma ovası, 20.V. 1939, 1 specimen; Kemalpaşa, 21.V.1969, 1 specimen. This Turano-Mediterranean (Turano-Balkan) subspecies was recorded from all mentioned provinces.

SUBSPECIES *Clytra valeriana taurica* Medvedev, 1961
Materyal examined: İzmir prov.: Bornova, 18.V.1938, 1 specimen; **Konya prov.:** Akşehir, 05.V.1962, leg. N. Karabıyık, 1 specimen. These records were given by Özdikmen et al. (2020a). Therefore, this E-Mediterranean (NE-Mediterranean) subspecies was recorded from all mentioned provinces.

SUBGENUS *OVOCLYTRA* Medvedev, 1961
SPECIES *Clytra ovata* (Lacordaire, 1848)
SUBSPECIES *Clytra ovata borealis* Medvedev & Kantner, 2002
Materyal examined: Adana prov.: 02.VI.1963, leg. S. Taşçıoğlu, 1 specimen; **Ankara prov.:** Hacıkadın, 21.VI.1940, 1 specimen. These records were given by Özdikmen et al. (2020a). Therefore, this E-Mediterranean (Palaestino-Taurian) subspecies was recorded from all mentioned provinces.
SPECIES *Clytra weisei* Monros, 1953
Materyal examined: Ankara prov.: Bağlum, 07.VI.1961, leg. N. Tuatay, 2 specimens; 17.VI.1964, leg. A. Demirtola, 1 specimens; 18.VI.1964, leg. Y. Sürmeli, 3 specimens; **Akşehir prov.:** 05.V.1962, leg. N. Karabıyık, 1 specimen; **Diyarbakır prov.:** Beşpınar, 03.VI.1969, leg. A. Kalkandelen, 1 specimen; **Elazığ prov.:** 14.V.1966, leg. Y. Sürmeli, 1 specimen. **Gaziantep prov.:** 1 specimen; **Hakkari prov.:** 22.V.1966, leg. Y. Sürmeli, 6 specimens. These records were given by Özdikmen et al. (2020a). Therefore, this SW-Asiatic species was recorded from all mentioned provinces.

GENUS *COPTOCEPHALA* Chevrolat, 1836
SPECIES *Coptocephala destinoi* Fairmaire, 1884
Materyal examined: Ankara prov.: Kazan,, Kurtboğazı, 9.VIII.1983, leg. A. Kalkandelen, *Quercus* sp. and *Thuja* sp., 1 specimen; Kazan, Kurtboğazı, 16.VIII.1983, leg. A. Kalkandelen, *Quercus* sp. and *Thuja* sp., 2 specimen; **Şanlıurfa prov.:** Ceylanpınar, Gümüşsuyu, 04.VI.1969, leg. A. Kalkandelen, 3 specimens. This SW-Asiatic species was recorded fron Ankara province. It is the first record to Şanlıurfa province and hereby for South-Eastern Anatolian region of Turkey.
SPECIES *Coptocephala gebleri* (Gebler, 1841)
Materyal examined: Afyonkarahisar prov.: 4 km to Çay, 15.VIII.2006, leg. M. Karataş, 1 specimen; **Ankara prov.:** Esenboğa airport, 09.IX.1961, leg. Müfit Dankel, 1 specimen; **Aydın prov.:** 10.VI.1963, leg. N. Çağatay, 1 specimen; **Bursa prov.:** İnebolu 22.VII.1964, leg. A. Kalkandelen, 1 specimen; **Diyarbakır prov.:** Müderris village, 20.IX.1977, leg. A. Kalkandelen, 1 species; **Eskişehir prov.:** Kartal airport, 31.VII.1961, leg. Orhan Telekoğlu, 1 specimen; **İstanbul prov.:** 23.VII.1975, leg. N. Aysev, 3 specimen; **Kastamonu prov.:** 22.VII.1964, leg. Y. Sürmeli, 2 specimens; **Kocaeli prov.:** İzmit, 13.VIII.1964, leg. Y. Sürmeli, 1 specimen; **Şanlıurfa prov.:**, Gümüşsuyu, Ceylanpınar, 04.VI.1969, leg. A. Kalkandelen, 4 specimens. This Turano-Mediterranean (Turano-Balkan) species was recorded from Ankara province. It is the first record to Afyonkarahisar, Aydın, Bursa, Diyarbakır, Eskişehir, İstanbul, Kastamonu, Kocaeli and Şanlıurfa provinces and hereby for Aegean and South-Eastern Anatolian regions of Turkey.

GENUS *LABIDOSTOMIS* Germar, 1822
SUBGENUS *Labidostomis* Germar, 1822
SPECIES *Labidostomis basanica* Sahlberg, 1913
Materyal examined: Gaziantep prov.: İslahiye, 13.IV.1962, leg. Y. Sürmeli, 3 specimens; 29.IV.1966, leg. A. Demirtola, 1 specimen. These records were given by Özdikmen et al. (2016). Therefore, this E-Mediterranean (Palaestino-Taurian) species was recorded from Gaziantep province.
SPECIES *Labidostomis brevipennis* Faldermann, 1837
Materyal examined: Hakkari prov.: 25. V.1966, leg. Y. Sürmeli, 6 specimens; **Konya prov.:** Central, Sarıcalar, 13.VI.1991, leg. M. Aydemir, 1 specimen. These records were given by Özdikmen et al. (2016). Therefore, this SW-Asiatic species was recorded from all mentioned province.
SPECIES *Labidostomis decipiens* Faldermann, 1837
Materyal examined: Ankara prov.: Kalecik, Hacıoğlu, 30.V.1985, leg. H. Zeki, 1 specimen; **Şanlıurfa prov.:** Ceylanpınar, 04.VI.1969, leg. A. Kalkandelen, 1 specimen. This

record was given by Özdikmen et al. (2016). This SW-Asiatic species was recorded from all mentioned provinces.

SPECIES *Labidostomis kaszabi* (Medvedev, 1962)

Materyal examined: Afyonkarahisar prov.: Sinanpaşa, Tazlar, 05.VI.2006, 1365 m, leg. Y. Güler, 1 specimen; **Isparta prov.:** Isparta, 19.VII.1966, leg. N. Çağatay, 1 specimen. This record was given by Özdikmen et al. (2016). Therefore, this Anatolian endemic species was recorded from Isparta province. This endemic species is the first record to Afyonkarahisar province and hereby for Aegean region of Turkey.

SPECIES *Labidostomis maculipennis* Lefèvre, 1870

Materyal examined: Çankırı prov.: Çerkeş, 03.VII.1964, leg. Y. Sürmeli, 1 specimen; **İzmir prov.:** 06.V.1961, leg. O. Değirmenci, 2 specimens. These records were given by Özdikmen et al. (2016). Therefore, this SW-Asiatic (Irano-Palaestinian) species was recorded from all mentioned provinces.

SPECIES *Labidostomis mesopotamica* Heyden, 1886

Materyal examined: Ankara prov.: Polatlı-Düç, 08.V.1990, leg. M. Aydemir, 1 specimen. **Şanlıurfa Prov.:** Ceylanpınar, 18. V. 1961, leg. N. Tuatay, 2 specimens. These records were given by Özdikmen et al. (2016). Therefore, this SW-Asiatic (Syro-Anatolian) species was recorded from all mentioned provinces.

SPECIES *Labidostomis metallica* Lefèvre, 1872

SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872

Materyal examined: Çankırı prov.: Eldivan, 17.V.2000, leg. A. Özdem Darbe, 1 specimen. This Turanian (Ponto-Caspian) subspecies is the first record to Çankırı province and hereby for Central Anatolian region of Turkey. Also, it is the second record for Turkey.

SPECIES *Labidostomis rufa* (Waltl, 1838)

Materyal examined: Ankara prov.: Kazan, 17.VI.1981, leg. R. Kedici, 1 specimen. This Turano-Mediterranean (Balkano-Anatolian) species was recorded from Ankara province.

GENUS *LACHNAIA* Chevrolat, 1836

SUBGENUS *LACHNAIA* Chevrolat, 1836

SPECIES *Lachnaia sexpunctata* (Scopoli, 1763)

Materyal examined: Adana prov.: 2.VI.1963, leg. Ş. Taşçıoğlu, 1 specimen; Balcalı, 07.V. 2000, leg. F. Yoksuloğlu 1 specimen; Balcalı, 20. V. 2000, leg. Hasret Ündağ, 2 specimens; **Ankara prov.:** Ankara, Işık dağı, 28. V. 1982 leg. Y. Sürmeli, 1 specimen; **İzmir prov.:** 20.V.1961, leg. O. Değirmenci, 3 specimens. This C and E-European species was recorded from Adana and Ankara provinces. It is the first record to İzmir province.

GENUS *SMARAGDINA* Chevrolat, 1836

SPECIES *Smaragdina biornata* (Lefèvre, 1872)

SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)

Materyal examined: Ankara prov.: Kızılcahamam, 30.V.1962, Y. Sürmeli, 1 specimen, Polatlı, 10.V.1963, leg. T. Erol, 9 specimens; Polatlı, 04.VI.1981, leg. H. Karakaya, 1 specimen; **Çankırı prov.:** Ilgaz, Eskikıymık village env., 26.VII.2013, 1230 m, leg. N. Bal, 1 specimen; **Konya prov.:** Gözlü, 11.V.1963, leg. N. Tuatay, 57 specimens; Gözlü, 11.V.1965, 1 specimen; **Niğde prov.:** Ortaköy, Yukarı Kabakulak, 10.VI.1987, leg. H. Zeki, *Helianthus annuus*, 1 specimen. This Anatolian endemic subspecies was recorded from Ankara province. It is the first record to Çankırı, Konya and Niğde provinces. Also, these are the second provincial records for Turkey after Ankara province.

SPECIES *Smaragdina concolor* (Fabricius, 1792)

SUBSPECIES *Smaragdina concolor concolor* (Fabricius, 1792)

Materyal examined: Osmaniye prov.: 22.IV.1966, leg. A. Demirtola, 1 specimen. This S-European subspecies is the first record to Osmaniye province and hereby for Turkey.

SPECIES *Smaragdina flavicollis* (Charpentier, 1825)

Materyal examined: Ankara prov.: Ayaş, 22-23.V.1991, *Pyrus* sp., 7 specimens. This C and E-European species is the first record to Ankara province.

SPECIES *Smaragdina hypocrita* (Lacordaire, 1848)

Materyal examined: Afyonkarahisar prov.: Yazıçayır, 23.V.2006, 988 m, leg. Y. Özdemir, 1 specimen; **Kastamonu prov.,** İnebolu, 22.VII, 1964, leg. A. Kalkandelen, 1 specimen; **Tokat prov.:** Turhal, 03.VI.1934, 1 specimen. This Turano-Mediterranean

(Turano-Balkan) species was recorded from Kastamonu and Tokat provinces. It is the first record to Afyonkarahisar province.

SPECIES *Smaragdina vaulogeri* (Pic, 1895)

Materyal examined: Düzce prov.: Yeşilköy, 11.V.1988, leg. Ö. Ataç, *Corylus* sp., 1 specimen; Cumayeri, 10.V.1988, leg. Ö. Ataç, *Corylus* sp., 1 specimen; Cumayeri, 19.IV.1988, leg. Ö. Ataç, *Corylus* sp., 1 specimen. This SW-Asiatic (Syro-Anatolian) species is the first record to Düzce province and hereby for Black Sea region of Turkey in Northern Anatolia.

SPECIES *Smaragdina viridana* (Lacordaire, 1848)

SUBSPECIES *Smaragdina viridana viridana* (Lacordaire, 1848)

Materyal examined: Bolu prov.: Yedigöller, 02.VII.2003, 1670 m, leg. I. Özdemir, 3 specimens; **Gaziantep prov.:** İslahiye, 08.IV.1957, 14 specimens; 08.IV.1962, leg. Y. Sürmeli, 5 specimens; İslahiye, 11.IV.1962, leg. Y. Sürmeli, 1 specimen; **Hatay prov.:** 05.V.1954, 1 specimen; Antakya, 16.IV.1962, leg. Y. Sürmeli, 1 specimen. This E-Mediterranean (Palaestino-Taurian) subspecies was recorded from all mentioned provinces.

SPECIES *Smaragdina xanthaspis* (Germar, 1824)

Materyal examined: Ankara prov.: Kızılcahamam, Güvem, 03.VII.1964, leg. A. Kalkandelen, 1 specimen; Beynam Ormanları, 19.IX.1980, leg. A. Kalkandelen, 1 specimen; **Bolu prov.:** Abant, 23.VI.1981, leg. R. Kedici, 2 specimens; Abant, Yedigöller, 02.VII.2003, 1057 m, leg. Y. Özdemir, 6 specimen; 30.VI.2003, 1486 m, leg. I. Özdemir, 5 specimens; **Zonguldak prov.:** Çaycuma, 10.VI.1994, leg. A. Kalkandelen, 1 specimen. This Turano-European species was recorded from all mentioned provinces.

GENUS *TITUBOEA* Lacordaire, 1848

SPECIES *Tituboea macropus* (Illiger, 1800)

Materyal examined: Adana prov.: Balcalı, 19.V.2000, leg. Ayça Erdoğan, 2 specimens; Balcalı, 17. V.2000, leg. Feray Erdal, 3 specimens; Balcalı, 17.V.2000, leg. S. Oldac, 1 specimen; Balcalı, 20.V.2000, leg. Osman Kozan, 1 specimen; Balcalı, 20.V.2000, leg. Hasret Ündağ, 2 specimens; Balcalı, 21.V.2000, 1 specimen; Balcalı, 29.V.2000, leg. M. Ateş, 1 specimen; Balcalı, 30.V.2000, leg. i. M. Şentürk, 1 specimen; **Diyarbakır prov.:** 31.V.1969, leg. A.Kalkandelen, 1 specimen; Turkey: Without locality data, 6 specimens. This Turano-Mediterranean (Turano-Apenninian) species was recorded from Adana province. It is the first record to Diyarbakır province and hereby for South-Eastern Anatolian region of Turkey.

SUBFAMILY CRYPTOCEPHALINAE

GENUS *CRYPTOCEPHALUS* Geoffroy, 1762

SUBGENUS *BURLINIUS* Lopatin, 1965

SPECIES *Cryptocephalus fulvus* Goeze, 1777

SUBSPECIES *Cryptocephalus fulvus fulvus* Goeze, 1777

Materyal examined: Van prov.: Van-Muş çıkışı, 27. VII. 1977, leg. N. Uygun, 1 specimen; **Turkey:** 1 specimen. This Sibero-European subspecies is the first record to Van province.

SUBSPECIES *Cryptocephalus fulvus schatzmayri* Burlini, 1969

Materyal examined: Turkey: 1 specimen. This is an E-Mediterranean (Palaestino-Taurian) + Arabian subspecies.

SPECIES *Cryptocephalus ocellatus* Drapiez, 1819

SUBSPECIES *Cryptocephalus ocellatus ocellatus* Drapiez, 1819

Materyal examined: Ankara prov.: Çubuk, Karagöl, 03.VIII.1983, leg. T. Davarcı, weed, 1 specimen; **Mersin prov.:** Erdemli-Limonlu, 10.IV.1963, leg. Y. Sürmeli, 1 specimen. This Sibero-European subspecies was recorded from Ankara and Mersin provinces.

SPECIES *Cryptocephalus pygmaeus* Fabricius, 1792

SUBSPECIES *Cryptocephalus pygmaeus vittula* Suffrian, 1848

Materyal examined: Ankara prov.: Eymir, 31.VII.1968, leg. A. Kalkandelen, 2 specimens. This C and E-European subspecies is the first record to Ankara province.

SUBGENUS *CRYPTOCEPHALUS* Geoffroy, 1762
SPECIES *Cryptocephalus anticus* Suffrian, 1848
Material examined: Ankara prov.: Akyurt, Büğdüz, 02.VIII.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen. This Sibero-European species was recorded from Ankara province.
SPECIES *Cryptocephalus bipunctatus* (Linnaeus, 1758)
SUBSPECIES *Cryptocephalus bipunctatus bipunctatus* (L., 1758)
Materyal examined: Giresun prov.: Taşhan, 28. VI. 1971, leg. S. Kornoşon, 2 specimens. This European subspecies is the first record to Giresun province.
SPECIES *Cryptocephalus cribratus* Suffrian, 1847
Materyal examined: Ankara prov.: 29.V.1964, leg. Y. Sürmeli, 1 specimen. This Turano-Mediterranean (Turano-Anatolian) species was recorded from Ankara province.
SPECIES *Cryptocephalus duplicatus* Suffrian, 1847
Material examined: Ankara prov.: Çubuk, Sarıkoz, 14.VI.1990, leg. M. Aydemir, 1 specimen; **Bartın prov.:** Kozpınarı, 31.V.1988, leg. Ö. Ataç, *Corylus* sp., 1 specimen; **Çankırı prov.:** Eldivan, 04.VI.1997, leg. Y. Özdemir, 1 specimen; **Eskişehir prov.:** Alpu road, 23.VI.1997, weed, leg. Y. Ö., 1 specimen; **Erzurum prov.:** Uzundere, 09.VII.1970, leg. A. Kalkandelen, *Phaseolus vulgaris,* 1 specimen. This Turano-Mediterranean (Turano-Balkan) species was recorded from all mentioned provinces except for Bartın. It is the first record to Bartın province.
SPECIES *Cryptocephalus flavipes* Fabricius, 1781
Material examined: Ankara prov.: Beypazarı, İnözü valley, 29.V.1996, leg. A. Kalkandelen, 1 specimen; **Bolu prov.:** Mengen, Kökem village, 14.VI.1994, leg. A. K., 1 specimen; **Düzce prov.:** Yeşilköy, 28.VI.1988, *Corylus* sp., Ö. Ataç, 1 specimen; **Zonguldak prov.:** 23.VII.1964, leg. Y. Sürmeli, 2 specimens. This Sibero-European species was recorded from Ankara, Bolu and Düzce provinces. It is the first record to Zonguldak province.
SPECIES *Cryptocephalus moraei* (Linnaeus, 1758)
Material examined: Sakarya prov.: Poyrazlar village forest, Ada, 22.VII.1993, leg. A. Kalkandelen, *Quercus* sp., 3 specimens. This Sibero-European species was recorded from Sakarya province.
SPECIES *Cryptocephalus rugicollis* Olivier, 1791
Materyal examined: İzmir prov.: İzmir, Selçuk, Meryemana, 10.V.1964, Y. Sürmeli, 4 specimens. This Mediterranean species was recorded from İzmir province.
SPECIES *Cryptocephalus sericeus* (Linnaeus, 1758)
Material examined: Isparta prov.: 29.VI.1995, leg. Y. Özdemir, 1 specimen. This Sibero-European species was recorded from Isparta province.

SUBGENUS *HETERICHNUS* Warchałowski, 1991
SPECIES *Cryptocephalus prusias* Suffrian, 1853
Materyal examined: Ankara prov.: Bağlum, 7. VI. 1961, leg. N. Tuatay, 1 specimen; Kızılcahamam, 31.V.1962, leg. Y. Sürmeli, 1 specimen; Bağlum, 15.V.1984, leg. A. Kalkandelen, 2 specimens. This Turano-Mediterranean (Turano-Balkan) species was recorded from Ankara province.

SUBGENUS *PROTOPHYSUS* Chevrolat, 1836
SPECIES *Cryptocephalus schaefferi* Schrank, 1789
SUBSPECIES *Cryptocephalus schaefferi moehringi* Weise, 1884
Material examined: Ankara prov.: Lalahan, 24.V.1967, leg A. Kalkandelen, 1 specimen. This E-Mediterranean (Palaestino-Cyprioto-Taurian) subspecies was recorded from Ankara province.

GENUS *PACHYBRACHIS* Chevrolat, 1836
SUBGENUS *PACHYBRACHIS* Chevrolat, 1836
SPECIES *Pachybrachis fimbriolatus* (Suffrian, 1848)
Materyal examined: Ankara prov.: Eymir gölü, 27.VI.1966, leg. A. Kalkandelen, 1 specimen; Çubuk, Güldarbı, 04.VI.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen; Ayaş, Uğurçayırı, 05.VI.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen; Polatlı, Kocahacılı, 12.VI.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen; **Bolu prov.:**

Güneyce, 05.VI.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen; **Konya prov.:** Kaşınhan, 06.VI.1991, leg. M. Aydemir, *Medicago sativa,* 1 specimen; Beyşehir, Gökçimen, 14.V.1991, leg. M. Aydemir, *Medicago sativa,* 1 specimen; Hotamış, 15.V.1991, leg. M. Aydemir, *Medicago sativa,* 1 specimen; **Nevşehir prov.:** Avanos, 26.V.1998, leg. Y. Özdemir, 1 specimen; **Sakarya prov.:** Adapazarı, Poyrazlar, 22.VII.1993, leg. A. Kalkandelen, 2 specimens. This Sibero-European species was recorded from all mentioned provinces except for Sakarya. It is the first record to Sakarya province.

SPECIES *Pachybrachis glycyrrhizae* (Olivier, 1808)

Materyal examined: Şanlıurfa prov.: Ceylanpınar, 07.VI.1969, leg. A. Kalkandelen, 6 specimens; Harran, 07.VI.1969, leg. A. Kalkandelen, 3 specimens. This SW-Asiatic + Centralasiatic species was recorded from Şanlıurfa province.

SPECIES *Pachybrachis limbatus* (Ménétriés, 1836)

Material examined: Erzurum prov.: Hasankale, 11.VII.1976, leg. A. Kalkandelen, *Elaeagnus* sp., 1 specimen. This Turano-Mediterranean (Turano-Apenninian) species was recorded from Erzurum province.

SPECIES *Pachybrachis tesselatus* (Olivier, 1791)

SUBSPECIES *Pachybrachis tesselatus tauricus* Suffrian, 1848

Material examined: Ankara prov.: Keçiören, 05.VI.1961, leg. N. Tuatay, 4 specimens; Kızılcahamam, Güven, 03.VII.1964, leg A. Kalkandelen, 1 specimen; Çubuk, 09.VII.1968, leg. A. Kalkandelen, 1 specimen; Ayaş, Bayram, 05.VI.1990, leg. M. Aydemir, *Medicago sativa,* 1 specimen. This SW-Asiatic subspecies was recorded from Ankara province.

SUBFAMILY CHRYSOMELINAE

GENUS *CHRYSOLINA* Motschulsky, 1860

SUBGENUS *CHALCOIDEA* Motschulsky, 1860

SPECIES *Chrysolina marginata* (Linnaeus, 1758)

SUBSPECIES *Chrysolina marginata marginata* (Linnaeus, 1758)

Materyal examined: Ankara prov.: Polatlı, 10.V.1963, leg. T. Erol, 1 specimen. This C and E-European subspecies is the first record to Ankara province.

SPECIES *Chrysolina sanguineocincta* (Crotch, 1871)

SUBSPECIES *Chrysolina s. pinarbasiense* Özdikmen et al., 2020

Materyal examined: Afyonkarahisar prov.: Emirdağ, 10.VI.1998, leg. M. Özdemir, 1 specimen; **Aksaray prov.:** Kocaş, 11.V.2007, leg. E. Koçak, 1 specimen; **Kayseri prov.:** Pınarbaşı, Kılıçkışla, 38°39'48" N 36°12'37" E, 05.VI.2018, 1433 m, leg. D. Coral Şahin and N. Bal, 2 specimens. These records were given by Özdikmen et al. (2020c). Therefore, this endemic subspecies was recorded from all mentioned provinces.

SUBGENUS *CHRYSOLINOPSIS* Bechyné, 1950

SPECIES *Chrysolina americana* (Linnaeus, 1758)

Materyal examined: Çanakkale prov.: Eceabat, 21.V.1969, leg. O. Özar, 7 specimens; **İzmir prov.:** Foça, 27. X. 1936, 3 specimens; Bornova, 17.IV.1941, 1 specimen; Bornova, 06.IX. 1941, 1 specimen; Bornova, 15.V.1950, 6 specimens. This Mediterranean species was recorded from İzmir province. It is the first record to Çanakkale province and hereby for Marmara region of Turkey.

SUBGENUS *HYPERICIA* Bedel, 1892

SPECIES *Chrysolina didymata* (Scriba, 1791)

SUBSPECIES *Chrysolina didymata didymata* (Scriba, 1791)

Materyal examined: Burdur prov.: İlyas, 24.V.1969, leg. N. Tuatay, 1 specimen. This Turano-Mediterranean (Turano-Balkan) subspecies is the first record to Burdur province.

SUBSPECIES *Chrysolina didymata syriaca* (Weise, 1884)

Materyal examined: Adana prov.: Balcalı, 05.V. 2000, leg. E. Sarı, 1 specimen; Balcalı, 15.V.2000, leg. D. Arısoy, 1 specimen; Balcalı, 30.V.2000, leg. Ş. Özel, 1 specimen; Pozantı, 17.V.2000, leg. A. Selek, 1 specimen. This E-Mediterranean (Palaestino-Taurian) subspecies was recorded from Adana province.

SUBGENUS *OVOSOMA* Motschulsky, 1860

SPECIES *Chrysolina orientalis* (Olivier, 1807)

SUBSPECIES *Chrysolina orientalis sahlbergi* (Ménétriés, 1832)
Materyal examined: Adana prov.: Balcalı, 25.V. 2000, K. Sarpkaya, 1 specimen; Balcalı, 25.V.2000, S. Ünlü, 1 specimen; **Siirt prov.:** 20.V.1966, leg. Y. Sürmeli, 1 specimen. This SW-Asiatic (Irano-Anatolian + Irano-Palaestinian) subspecies was probably recorded from Adana and Siirt provinces.

SUBGENUS *STICHOPTERA* Motschulsky, 1860
SPECIES *Chrysolina gypsophilae* (Küster, 1845)
Materyal examined: Adana prov.: Balcalı, 14.V.2000, leg. N. Yoğurtoğlu, 1 specimen; Balcalı, 16.V.2000, leg. F.Yoksuloğlu, 1 specimen; Balcalı, 23.V. 2000, leg. N. Aykan, 1 specimen; Balcalı, Boş Arazi, 27.V.2000, leg. S.H. Mercan, 3 specimens; Balcalı, Boş Arazi, 28.V.2000, leg. S.H. Mercan, 1 specimen; **Afyonkarahisar prov.:** Emirdağ, Hisarköyü, Davulga yolu, 950 m.,24.V.2006, leg. Y. Özdemir, 1 specimen; Çay, Yazıçayır, 988 m., 23.V.2006, leg. Y. Özdemir, 1 specimen; Bayat, İmranlı village, 1355 m., 19. VI.2006, leg. Y. Güler, 1 specimen. This Centralasiatic-European species was recorded from all mentioned provinces.

SUBGENUS *SULCICOLLIS* Sahlberg, 1913
SPECIES *Chrysolina impavida* Bechyné, 1949
Materyal examined: Adana prov.: Balcalı, 08.VI.2000, leg. A. Alacuklu, 1 specimen; Balcalı, 15.V.2000, leg. T. Arslan, 1 specimen. These records were given by Özdikmen et al. (2020a). Therefore, this E-Mediterranean (Palaestino-Cyprioto-Taurian + Aegean) species was recorded from Adana province.

SUBGENUS *SYNERGA* Weise, 1900
SPECIES *Chrysolina coerulans* (Scriba, 1791)
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)
Materyal examined: Adana prov.: Ceyhan, 07.V.2000, leg. Erdeniz Sezer, 2 specimens; Ceyhan, 24.V.2000, leg. B. Çetinkura, 1 specimen; **Diyarbakır prov.:** Çınar Aşağı Konak, 14.VI.1972, leg. İ. Seral, 1 specimen; **İçel prov.:** 1924; 4 specimens; **İzmir prov.:,** Tire, 07. XI.1966, leg. O. Ozar, 1 specimen. This SW-Asiatic (Irano-Anatolian + Irano-Palaestinian) subspecies was probably recorded from İzmir and Mersin provinces. It is the first record to Adana and Diyarbakır provinces and hereby for South-Eastern Anatolian region of Turkey.
SPECIES *Chrysolina herbacea* (Duftschmid, 1825)
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)
Materyal examined: Afyonkarahisar prov.: Şuhut-Arızlı K., 16. VIII.2006, 1110 m., leg. M. Karataş, 1 specimen; **Amasya prov.:** Amasya, Yenice, 09.V.2002, leg. Y. Özdemir, 2 specimens; **Ankara prov.:** Ankara, Kavaklıdere, 24.IV.1941, 1 specimen; Kavaklıdere, 24.III.1941, 1 specimen; Kazan, İçören, 27.VII. 1981, Kavak, leg. R. Kedici, 7 specimens; **Bolu prov.:** Abant, Sinekliyayla, 03. VII.2003, 1100m., leg. Y. Özdemir, 1 specimen; Kıbrıscık, 10.VIII.1983, leg. A. Kalkandelen, 2 specimens; **Erzincan prov.:** Çağlayan, 04.VII.1970, leg. A. Kalkandelen, 1 specimen; Çağlayan, 04.VII.1970, leg. N. Tuatay, 5 specimens; **Gümüşhane prov.:** 13.VII.1971, leg. S. Kornoşor, 2 specimens; **İzmir prov.:** Bornova, 07.V.1938, 1 specimen; Ödemiş, 02.11.1966, leg. O. Ozar, 1 specimen; Tire, 07.11.1966, leg. O. Ozar, 1 specimen; Kemalpaşa, 01.IV.1970, 1 specimen; Beydağı, 28.VII.1981, 1 specimen; **Karabük prov.:** Ereğli, Çayköy, 11.V.1988, leg. O. Ataç, 1 specimen; **Turkey:** 28.V.1933, 1 specimen; 13.V.1936, K. Beleu, 1 specimen; 23.V.1936, leg. K. Beleu, 1 specimen; 05. III.1937, 1 specimen; 01.VIII. 1937, leg. Z. Orkun, 2 specimens; 23.V.1937, leg. K. Beleu, 1 specimen. This Sibero-European subspecies was recorded from Ankara, Bolu, Erzincan, İzmir and Karabük provinces. It is the first record to Afyonkarahisar, Amasya and Gümüşhane provinces.

SUBGENUS *THRENOSOMA* Motschulsky, 1860
SPECIES *Chrysolina anceyi* (Marseul, 1868)
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)
Materyal examined: Şanlıurfa prov.: 01.V.1966, leg. A. Demirtola, 1 specimen. This E-Mediterranean (Palaestino-Taurian) subspecies is the first record to Şanlıurfa province and

hereby for South-Eastern Anatolian region of Turkey. Also, it is the second record for Turkey.

GENUS *CHRYSOMELA* Linnaeus, 1758
SPECIES *Chrysomela populi* Linnaeus, 1758
Materyal examined: Ankara prov.: Çubuk, 03.VIII.1983, leg. T. Davarcı, 5 specimen; Pursaklar, Aşağı Peçenek, 06.IX.1996, leg. Y. Özdemir, *Populus* sp. 1 specimen; **Isparta prov.:** Gölcük, 28.VI.1995, leg. Y. Özdemir, 1 specimen; **Konya prov.:** Beyşehir, Emen, 04.VI.1991, leg. M. Aydemir, *Medicago sativa*, 1 specimen; **Mersin prov.:** Aslanköy, 23.VII.1976, leg. Nedim Uygun, 2 specimens; Aslanköy 23.VII.1978, leg. Nedim Uygun, 1 specimen. This Asiatic-European species was recorded from Ankara, Isparta and Konya provinces. It is the first record to Mersin province.
SPECIES *Chrysomela saliceti* (Weise, 1884)
SUBSPECIES *Chrysomela saliceti saliceti* (Weise, 1884)
Materyal examined: Ankara prov.: Çubuk, 03.VIII.1983, leg. T. Davarcı, 1 specimen; Bala, Çavuşlu, 26.V.1992, leg. Y. Özdemir, 2 specimen; Akyurt, fruit garden, 06.IX.1996, leg. Y. Özdemir, 1 specimen; **Bitlis prov.:** Central, 12.VI.1976, leg. N. Uygun, 1 specimen; **Burdur prov.:** Hacılar, 22.VI.1983, 1 specimen; **Isparta prov.:** Senirkent, 19.Vı.1967, leg. E. Güllü and A. Eriş, 1 specimen. This Sibero-European subspecies was recorded from Ankara and Isparta provinces. It is the first record to Bitlis and Burdur provinces.

GENUS *ENTOMOSCELIS* Chevrolat, 1837
SPECIES *Entomoscelis adonidis* (Pallas, 1771)
Materyal examined: Afyonkarahisar prov.: Şuhut, karadillli, 23.V.2006, 1098m., leg. A. Özdem, 7 specimens; Çay, Yazıçayır, 23.V.2006, 988m., leg. Y. Özdemir, 11 specimens; Emirdağ, Davulga, 24.V.2006, 1037m., leg. Y. Özdemir, 3 specimens; Bolvadin, Emirdağ road, 24.V.2006, leg. Y. Özdemir, 2 specimens; Bolvadin, Emirdağ road, Güney village, 24.V.2006, 1238 m., leg. Y. Güler, 8 specimens. **Aksaray prov.:** Koçaş, 11.V.2007, leg. E. Koçak, 1 specimen; **Burdur prov.:** Gölhisar, 21.V.1969, leg. N. Tuatay, 21 specimens; **Karaman prov.:** 17.V.2001, leg. M. Özdemir, 1 specimen. This Sibero-European + Nearctic species was recorded from Afyonkarahisar and Aksaray provinces. It is the first record to Burdur and Karaman provinces.
SPECIES *Entomoscelis suturalis* Weise, 1882
Materyal examined: Ankara prov.: Çamlıdere, 11.VI.1998, leg. S. Halıcı, 1 specimen. This Turano-Mediterranean (Turano-Balkan) species was recorded from Ankara province.

GENUS *GASTROPHYSA* Chevrolat, 1836
SUBGENUS *GASTROPHYSA* Chevrolat, 1836
SPECIES *Gastrophysa polygoni* (Linnaeus, 1758)
SUBSPECIES *Gastrophysa polygoni polygoni* (Linnaeus, 1758)
Materyal examined: Ankara prov.: Ayaş, Yeni kayık, 18.VI.1976, leg. A. Alkandelen, 3 specimens; Çubuk, 09. VII.1976, leg. N. Aysev, 1 specimen; **Eskişehir prov.:** Hamidiye, 24.VI.1997, leg. Y.Ö., 1 specimen. This Sibero-European + Nearctic subspecies was recorded from Ankara and Eskişehir provinces.

GENUS *GONIOCTENA* Chevrolat, 1836
SUBGENUS *SPARTOMENA* Reitter, 1913
SPECIES *Gonioctena fornicata* (Brüggemann, 1873)
Materyal examined: Adana prov.: 07.V.1939, 1 specimen; 08.V.1940, 1 specimen; Balcalı, 19.V.2000, leg. H. Özcan, 1 specimen; Balcalı, 20.V. 2000, 3 specimens; Balcalı, 23.V.2000, leg. M. Güngör, 4 specimens; Balcalı, 23.V.2000, leg. M. E. Aktay, 6 specimens; Balcalı, 23.V.2000, leg. Z. Saray, 1 specimen; Balcalı, 29.04.2000, leg. M. Özmen, 1 specimen; **Afyonkarahisar prov.:** Başmakçı, Ovacık K., 07.VI.2006, 1250 m., leg. Y. Güler, 1 specimen; **Ankara prov.:** 16.VI.1939, 1 specimen; Çubuk, 26.VI.1986, leg. Y. Özdemir, 1 specimen; Polatlı, Sazılar, 07.V.1990, 4 specimens; Ayaş, Bayram, 09. V.1990, leg. M. Aydemir, 1 specimen; Ayaş, Güneyce, 09.V.1990, leg. M. Aydemir, 1 specimen; Çubuk, Sünlü, 16.V.1990, leg. M. Aydemir, 1 specimen; Ayaş, fruit garden, 11.V. 1999, leg. Y. Özdemir, 5 specimens; **Çankırı prov.:** Central, Hasakça village 28.VII.1993, leg. A. Kalkandelen, 2 specimens; **Eskişehir prov.:** 01.VII.1963, leg. S. Bayraktaroğlu, 26

specimens; Sivrihisar, Kaymaz, 23.VI. 1997, leg. Y. Özdemir, 2 specimens; **Konya prov.:** 22.VI.1962, leg. M. Karabıyık, 3 specimens; İçeriçumra, 30. V.1984, leg. A. Kalkendelen, 1 specimen; **Zonguldak prov.:** Zonguldak, Devrek, 15.V.2004, 11 specimens. This Mediterranean species was recorded from all mentioned provinces.

GENUS *LEPTINOTARSA* Chevrolat, 1836
SPECIES *Leptinotarsa decemlineata* (Say, 1824)
Materyal examined: Afyonkarahisar prov.: Bahçecik, 28.VII.1983, leg. A. Kalkandelen, 6 specimens; Bahçecik, 28.VII.1983, leg. T. Davarcı, 3 specimens; Gebeciler, 27.VII.1983, leg. T. Davarcı, 3 specimens; **Ankara prov.:** Ayaş, Akkaya, 23.VII.2015, 545m., leg. G. Yazıcı, 14 specimens; Mogan Lake, 27.VI.1980, leg. A. Kalkandelen, 1 specimen; Çubuk, Ahi, 30.VI.1980, leg. Y. Özdemir, 4 specimens; Ayaş, Peroz village, 16.VI.1979, 2 specimens; Kızılcahamam, Bağlıca village, 06.VI.1979, 1 specimen; Çubuk, Yakup Hasan, 30.VI.1980, leg. H. Ural, 2 specimens; **Kırıkkale prov.:** Balışeyh, 11.VIII.1983, leg. Y. Özdemir, 3 specimens; **Turkey:** 14 specimens. This C and E-European + Nearctic species was recorded from Afyonkarahisar and Ankara provinces. It is the first record to Kırıkkale province.

GENUS *PLAGIODERA* Chevrolat, 1836
SPECIES *Plagiodera versicolora* (Laicharting, 1781)
Materyal examined: Ankara prov.: Ayaş Resmi Fidanlık, 24.V.1991, 2 specimens; **Balıkesir prov.:** Kuşcenneti, 15.VI.1981, leg. T. Akyol, 6 specimens. This Palearctic + Oriental species was recorded from Ankara province. It is the first record to Balıkesir province.

SUBFAMILY EUMOLPINAE

GENUS *MACROCOMA* Chapuis, 1874
SPECIES *Macrocoma rubripes* (Schaufuss, 1862)
SUBSPECIES *Macrocoma rubripes rubripes* (Schaufuss, 1862)
Materyal examined: Isparta prov.: Eğirdir, 28.VI.1995, leg. Y. Özdemir, 1 specimen. This Turano-Mediterranean (Turano-Balkan) subspecies was recorded from Isparta province.

GENUS *PACHNEPHORUS* Chevrolat, 1836
SUBGENUS *PACHNEPHORUS* Chevrolat, 1836
SPECIES *Pachnephorus villosus* (Duftschmid, 1825)
Materyal examined: Ankara prov.: Kurtboğazı, 16. VIII. 1983, leg. A. Kalkandelen, 1 specimen. This C and E-European species was recorded from Ankara province.

SUBFAMILY GALERUCINAE

GENUS *AGELASTICA* Chevrolat, 1836
SPECIES *Agelastica alni* (Linnaeus, 1758)
SUBSPECIES *Agelastica alni alni* (Linnaeus, 1758)
Material examined: Rize prov.: Pazar, 05.VI.1971, leg. S. Kornoşor, 4 specimens. This European species was recorded from Rize province.

GENUS *AULACOPHORA* Chevrolat, 1836
SPECIES *Aulacophora foveicollis* (Lucas, 1849)
Materyal examined: Adana prov.: 25.IV.1939, 3 specimens; 04.VI.1963, N. Çağatay, 1 specimen; **Ankara prov.:** Çubuk, 17.V.1963, A. Kalkandelen, 3 specimens; **Antalya prov.:** Alanya, 06.VI.1963, leg. S. Yılmazkurt, 2 specimens; **İzmir prov.:** 06.V.1966, N. Çağatay, 1 specimen; **Muğla prov.:** Marmaris, 12.VI.1963, leg. N. Çağatay, 7 specimens. This Afrotropico-Indo-Mediterranean + Oriental species was recorded from Adana, İzmir and Muğla provinces. It is the first record to Ankara and Antalya provinces.

GENUS *DIORHABDA* Weise, 1983
SPECIES *Diorhabda carinata* Faldermann, 1837
Materyal examined: Kayseri prov.: Süleymanlı, 15.IX.1993, leg. A. K., 1 specimen. This Centralasiatic + SW-Asiatic + Nearctic species is the first record to Kayseri province and hereby for Central Anatolian region of Turkey.
SPECIES *Diorhabda elongata* (Brullé, 1832)
Material examined: Elazığ prov.: Sivrice, 23.VII.1961, 1 specimen; **Kayseri prov.:** Süleymanlı, 15.IX.1993, leg. A.K., 1 specimen. This Mediterranean + Nearctic species was recorded from Kayseri province. It is the first record to Elazığ province.

GENUS *EXOSOMA* Jacoby, 1903
SPECIES *Exosoma flavipes* (Heyden, 1878)
Material examined: Van prov.: Başkale, Güzelsu, 21.VII.1970, leg. A. Kalkandelen, *Stipa* sp. and Graminae, 1 specimen. This SW-Asiatic (Anatolo-Caucasian) species is the first record to Van province and hereby for Eastern Anatolian region of Turkey.
SPECIES *Exosoma neglectum* Mohr, 1968
Materyal examined: Ankara prov.: Kazan, 23.VI.1962, leg. Y. Sürmeli, 1 specimen. This SW-Asiatic (Syro-Anatolian) species was recorded from Ankara province.
SPECIES *Exosoma thoracicum* (Redtenbacher, 1843)
Materyal examined: Burdur prov.: Bucak, Ürkütlü village, 08.VI.1972, 3 specimens; **Turkey:** 1 specimen. This E-Mediterranean (NE-Mediterranean) species is the first record to Burdur province.

GENUS *GALERUCA* Geoffroy, 1762
SUBGENUS *GALERUCA* Geoffroy, 1762
SPECIES *Galeruca interrupta* (Illiger, 1802)
Materyal examined: Afyonkarahisar prov.: Bolvadin, Emirdağ road, 24.V.2006, leg. Y. Özdemir, 1 specimen; **Ankara prov.:** Bağlum, 07. VI.1961, N. Tuatay, 2 specimens; 25.V.1962, leg. Y. Sürmeli, 1 specimen; 06.VIII.1962, leg. A. Kalkandelen, 1 specimen; **Burdur prov.:** Gölhisar, 21.V.1969, leg. N. Tuatay, 1 specimen**; Kırşehir prov.:** 27.V.1962, leg. N. Karabıyık, 1 specimen; **Nevşehir prov.:** Avanos, 28.V.1992, leg. Y. Özdemir, 7 specimens. Avanos, 26.V.1998, leg. Y. Özdemir, 1 specimen. This Mediterranean species was recorded from Ankara province. It is the first record to Afyonkarahisar, Burdur, Kırşehir and Nevşehir provinces and hereby for Aegean region of Turkey.
SPECIES *Galeruca pomonae* (Scopoli, 1763)
SUBSPECIES *Galeruca pomonae pomonae* (Scopoli, 1763)
Materyal examined: Ankara prov.: 16.VI.1964, leg. A. Demirtola, 1 specimen; Çubuk, Karagöl, 03.VIII.1983, leg. A. Kalkandelen, 1 specimen; Diyarbakır, Beşpınar, 03.VI.1969, leg. A. Kalkandelen, 1 specimen. This Sibero-European subspecies was recorded from Ankara province.
SPECIES *Galeruca spectabilis* (Faldermann, 1837)
SUBSPECIES *Galeruca spectabilis orientalis* (Osculati, 1844)
Materyal examined: Ankara prov.: Elmadağ, 30.V.1961, N. leg. Tuatay, 4 specimens; Esenboğa, 20.VI.1961, leg. M. Denkel, 1 specimen; **Artvin prov.:** Murgul, 05.IX.1962, leg. Y. Sürmeli, 1 specimen; **Bolu prov.:** Abant, Yedigöller, 02.VII.2003, leg. Y. Özdemir, 1 specimen; **Niğde prov.:** Gümüşler, 13.VI.1961, leg. N. Tuatay, 3 specimens. This SW-Asiatic (Irano-Anatolian + Syro-Anatolian) subspecies was recorded from Ankara, Artvin and Niğde provinces. It is the first record to Bolu province.

GENUS *LUPERUS* Geoffroy, 1762
SPECIES *Luperus flavipes* (Linnaeus, 1767)
SUBSPECIES *Luperus flavipes flavipes* (Linnaeus, 1767)
Material examined: Ankara prov.: Kızılcahamam, Akdoğan village, 30.VI.1983, leg. A. Kalkandelen, 1 specimen; **Çankırı prov.:** Şabanözü, Gümerdin, 10.VII.1974, leg. G. Altınayar, *Triticum* sp., 6 specimens. This Centralasiatic-European subspecies was recorded from Ankara and Çankırı provinces.
SPECIES *Luperus xanthopoda* (Schrank, 1781)
Materyal examined: Ankara prov.: Işık Mountain, 28.V.1962, leg. Y. Sürmeli, 5 specimens; Kızılcahamam, 30.V.1962, leg. Y. Sürmeli, 1 specimen; 29.V.1964, leg. Y. Sürmeli

and S. Taşçıoğlu, 21 specimens; Etimesgut, Karaağaç, V.1978, 1 specimen; Çubuk, 03.VIII.1983, leg. Y. Özdemir, 1 specimen; **Çankırı prov.:** 17.V.2000, leg. A. Özdem, *Prunus avium,* 2 specimens; **Gaziantep prov.:** 08.IV.1962, leg. Y. Sürmeli, 1 specimen; **Nevşehir prov.:** Hacıbektaş, Kurugöl, 26.VI.1998, leg. Y. Özdemir, 1 specimen; **Turkey:** 2 specimens. This Centralasiatic-European species was recorded from Ankara, Çankırı and Nevşehir provinces. It is the first record to Gaziantep province and hereby for South-Eastern Anatolian region of Turkey.

GENUS *NYMPHIUS* Weise, 1900
SPECIES *Nymphius lydius* (Weise, 1886)
Material examined: Tokat prov.: Turhal, 04.VI.1934, leg. N. Shevket, 8 specimens. This Turano-Mediterranean (Turano-Balkan) species is the first record to Tokat province.

GENUS *RADYMNA* Reitter, 1913
SPECIES *Radymna persica* (Faldermann, 1837)
Materyal examined: Isparta prov.: Gölcük, Yakaören, 28.VI.1995, leg. Y. Özdemir, 1 specimen. This Centralasiatic-Mediterranean species is the first record to Isparta province and hereby for Mediterranean region of Turkey.

GENUS *XANTHOGALERUCA* Laboissiere, 1934
SPECIES *Xanthogaleruca luteola* (Müller, 1766)
Materyal examined: Aydın prov.: Aydın, Çine, 27.VII, 1967, leg. N. Çağatay, 1 specimen; **Edirne prov.:** Karaağaç, 10.VII.1935, 8 specimens; **Hatay prov.:** 07.VIII.1984, leg. İ. Karaca, 2 specimens; **Kars prov.:** Kağızman, 12.VII.1970, leg. A. Kalkandelen, 2 specimens; **Konya prov.:** Akşehir, 04. VI. 1962, leg. Y. Sürmeli, 1 specimen. This Centralasiatic-Europeo-Mediterranean species was recorded from Aydın province. It is the first record to Edirne, Hatay, Kars and Konya provinces.

SUBFAMILY ALTICINAE

GENUS *ALTICA* Müller, 1764
SPECIES *Altica oleracea* (Linnaeus, 1758)
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
Materyal examined: Afyonkarahisar prov.: Afyonkarahisar, Gebeciler, 27.VII.1983, leg. A. Kalkandelen, 1 Specimen; **Ankara prov.:** Kızılcahamam, Çamlıdere, 16.VIII.1983, leg. A. Kalkandelen, 1 specimen; Keskin, Alçıyeniyapan, 23.IX.1980, 6 specimens; Çubuk, 03.VIII.1983, leg. Y. Özdemir, 2 specimens; Karagöl, 03.VIII.1983, leg. Y. Özdemir, 1 specimen; Beynam, 18.VIII.1983, leg. Y. Özdemir, 11 specimens; Ayaş, Resmi fidanlık, 24.V.1991, 1 specimen; Sincan, Yenikent, 23.VII.2015, 814 m, leg. G. Yazıcı, 1 specimen; **Bolu prov.:** Kartalkaya, 01.VII.2003, 1800 m, leg I. Özdemir, 1 specimen; **Düzce prov.:** Yenitaşköprü, 23.V.1991, leg. C. Zeki, *Pyrus communis,* 1 specimen; **Erzincan prov.:** Çağlayan, 04.VII.1970, leg. A. Kalkandelen, 1 specimen; **Eskişehir prov.:** 21.VIII.1963, leg. S. Ortay, 107 specimens; Şeyitgazi, 26.VI.1983, Y. Özdemir, 12 specimens; Alpu way, 23.VI.1997, leg. Y. Özdemir, Weed, 1 specimen; **Konya prov.:** Ereğli, Yıldızlı, 01.X.1992, *Prius malus,* 1 specimen; **Samsun prov.:**, Gelemen, 05.VII.1981, leg. S. Kurçman, 9 specimens; Hasan akın, 24.V.1991, 1 specimen. This Asiatic-European + Australian + Nearctic subspecies was recorded from Ankara, Eskişehir, Konya and Samsun provinces. It is the first record to Afyonkarahisar, Bolu, Düzce and Erzincan provinces and hereby for Aegean region of Turkey.

GENUS *APHTHONA* Chevrolat, 1836
SPECIES *Aphthona atrocaerulea* (Stephens, 1831)
Material examined: Çankırı prov.: Eldivan, 19.VII.2000, leg. A. Özdem Darbe, 1 specimen. This Europeo-Mediterranean species was recorded from Çankırı province.
SPECIES *Aphthona kuntzei* Roubal, 1931
Material examined: Çankırı prov.: Eldivan, 27.VII.2000, leg. A. Özdem Darbe, 1 specimen. This E-Mediterranean species was recorded from Çankırı province.

SPECIES *Aphthona pallida* (Bach, 1859)
Materyal examined: Ankara prov.: Çubuk, Sarıkoz, 16.V.1990, leg. M. Aydemir, 1 specimen; Temelli, 08. V.1990, leg. M. Aydemir, 1 specimen; İlyakut, 08.V.1990, leg. M. Aydemir, 1 specimen; Başbereket, 09.V.1990, leg. M. Aydemir; Mahmutoğlu, 16.V.1990, leg. M. Aydemir, 1 specimen; Polatlı- Düç, 30.VII.1990, leg. M. Aydemir, 1 specimen; Beynam, 16.VIII.1982, leg. Y. Özdemir, 1 specimen; Ballıkuyumcu, 10.IX.1990, leg. M. Aydemir, 2 specimens. This European species was recorded from Ankara province. Also these records are the second report for Turkey.
SPECIES *Aphthona venustula* (Kutschera, 1861)
Material examined: Bolu prov.: Dörtdivan, 05-06.VII.1983, leg. S. Bilgitekin, weed, 1 specimen. This European species is the first record to Bolu province and hereby for Black Sea region of Turkey.

GENUS *CHAETOCNEMA* Stephens, 1831
SUBGENUS *CHAETOCNEMA* Stephens, 1831
SPECIES *Chaetocnema arenacea* (Allard, 1860)
Material examined: Burdur prov.: Karamanlı, 21.VI.1983, *Triticum* sp., leg. A. Kalkandelen, 1 specimen. This Europeo-Mediterranean species is the first record to Burdur province.
SPECIES *Chaetocnema montenegrina* Heikertinger, 1912
Materyal examined: Ankara prov.: Ayaş, Başbereket, 09.V.1990, leg. M. Aydemir, 4 specimens; Sünlü, 02.VIII.1990, leg. M. Aydemir, 2 specimens; Çubuk, Sarıkoz, 02.VIII.1990, M. Aydemir, 1 specimen; **Burdur prov.:** Karamanlı, 21.VI.1983, leg. A. Kalkandelen, 1 specimen; **Turkey:** 2 specimens.
This Centralasiatic-European species was recorded from Ankara province. It is the first record to Burdur province.

SUBGENUS *TLANOMA* Motschulsky, 1845
SPECIES *Chaetocnema chlorophana* (Duftschmid, 1825)
Material examined: Amasya prov.: 24.IV.1974, *Triticum* sp., 2 specimens.
This Europeo-Mediterranean species is the first record to Amasya province and hereby for Black Sea region of Turkey.
SPECIES *Chaetocnema concinna* (Marsham, 1802)
Materyal examined: Balıkesir prov.: Kürsü village, 12.VIII.1982, 1 specimen; **Samsun prov.:** 01.VI. 1934, 4 specimens; 17.IV.1972, leg. R. Çamlıdere, 3 specimens. This Holarctic species was recorded from Samsun province. It is the first record to Balıkesir province.
SPECIES *Chaetocnema conducta* (Motschulsky, 1838)
Materyal examined: Ankara prov.: Beypazarı, Dibecik, 09.V.1990, M. Aydemir, 1 specimen. This Afrotropica-Mediterranean + Centralasiatic-European species was recorded from Ankara province.
SPECIES *Chaetocnema scheffleri* (Kutschera, 1864)
Material examined: Afyonkarahisar prov.: Sandıklı, Başaran village, 1000 m, 11.VI.1998, leg. M. Özdemir, 2 specimens. This Europeo-Mediterranean species is the first record to Afyonkarahisar province.
SPECIES *Chaetocnema tibialis* (Illiger, 1807)
Materyal examined: Ankara prov.: Polatlı, 08.V.1990, leg. M. Aydemir, 3 specimens; Başbereket-Ayaş, 09.V.1990, leg. M. Aydemir, 1 specimen; Çubuk, Sarıkoz, 16.V.1990, leg. M. Aydemir, 1 specimen; Güneyce, 05.VI.1990, leg. M. Aydemir, 1 specimen; Beypazarı, Dibecik, 31.VII.1990, leg. M. Aydemir, 12 specimens; Sünlü, 02.VIII.1990, leg. M. Aydemir, 2 specimens; Temelli, 08.VIII.1990, leg. M. Aydemir, 1 specimen; **Düzce prov.:** Central, near forest, 17.IV.2003, 200 m, leg. M. Özdemir, 1 specimen; **İzmir prov.:** Bornova, 15.VIII.1932, 10 specimens; **Samsun prov.:** Gelemen, 31.II.1978, leg. N. Yılmaz, 1 specimen; Gelemen, 26.IV.1978, leg. N. Yılmaz, 1 specimen; Gelemen, 10.V.1978, leg. N. Yılmaz, 1 specimen; Gelemen, 24.V.1978, leg. N. Yılmaz, 1 specimen; Engiz, 05.VII.1978, leg. N. Yılmaz, 1 specimen. This Sibero-European species was recorded from all mentioned provinces.

GENUS *CREPIDODERA* Chevrolat, 1836
SPECIES *Crepidodera aurata* (Marsham, 1802)
Materyal examined: Ankara prov.: Bala, Beynam, 18.VIII.1983, leg. M. Ural, weed, 1 specimen; **Bartın prov.:** Central, 13.V.1988, leg. Ö. Ataç, *Corylus* sp., 1 specimen; **Burdur prov.:** 29.VI.1995, leg. A. Kalkandelen, 1 specimen; **Nevşehir prov.:** Hacıbektaş, Kurugöl, 26.VI.1998, leg. Y. Özdemir, 1 specimen; **Tokat prov.:** Turhal, 09.VI. 1934, 3 specimens. This Sibero-European species was recorded from Ankara and Nevşehir provinces. It is the first record to Bartın, Burdur and Tokat provinces.

GENUS *EPITRIX* Foudras, 1860
SPECIES *Epitrix pubescens* (Koch, 1803)
Material examined: Samsun prov.: 17.IV.1972, leg. R. Çamlıdere, 2 specimens. This Sibero-European species is the first record to Samsun province.

GENUS *LONGITARSUS* Latreille, 1829
SUBGENUS *LONGITARSUS* Latreille, 1829
SPECIES *Longitarsus callidus* Warchałowski, 1967
Material examined: Samsun prov.: Havza, 15.II.1978, leg. N. Yılmaz, *Onobrychis sativa,* 1 specimens; Havza, 28.II.1978, leg. N. Yılmaz, *Onobrychis sativa,* 1 specimens; Havza, 8.VI.1978, leg. N. Yılmaz, *Onobrychis sativa,2* specimens; Havza, 4.VII.1978, leg. N. Yılmaz, *Onobrychis sativa,* 7 specimens; Havza, 5.VII.1978, leg. N. Yılmaz, *Onobrychis sativa,* 3 specimens; Havza, 6.VII.1978, leg. N. Yılmaz, *Onobrychis sativa, 1* specimens; Havza, 13.VII.1978, leg. N. Yılmaz, *Onobrychis sativa,* 2 specimens. This Europeo-Mediterranean species is the first record to Samsun province and hereby for Black Sea region of Turkey. Also, it is the second record for Turkey.
SPECIES *Longitarsus helvolus* Kutschera, 1863
Materyal examined: Ankara prov.: Beypazarı, Dibecik, 09.V.1990, leg. M. Aydemir, 2 specimens; Ayaş, Uğurçayırı, 05.VI.1990, leg. M. Aydemir, 1 specimen; Polatlı, Düç, 12.VI.1990, leg. M. Aydemir, 1 specimen; Akyurt, 14.VI.1990, leg. M. Aydemir, 1 specimen; Beypazarı, Dibecik, 31.VII.1990, leg. M. Aydemir, 1 specimen; Saray, 19.IX.1990, leg. M. Aydemir, 1 specimen; **Konya prov.:** Selçuklu, Hotamış, 15.V.1991, leg. M. Aydemir, 1 specimen; **Nevşehir prov.:** Bağcılık, 3.X.1969, leg. A. Kalkandelen, 19 specimens; **Şanlıurfa prov.:** Ceylanpınar, 04.VI.1965, Leg. A. Kalkandelen, 1 specimen. This C and E-European species is the first record to Ankara, Konya, Nevşehir and Şanlıurfa provinces and hereby for Central Anatolian and South-Eastern Anatolian regions of Turkey. These records are the third report from Turkey.
SPECIES *Longitarsus hermonensis* Furth, 1979
Material examined: Afyonkarahisar prov.: Gebeciler, 27.VII.1983, leg. A. Kalkandelen, 1 specimen; **Ankara prov.:** Polatlı, 11.V.1998, S.Halıcı, 3 specimens; Ayaş, Akkaya, 11.V.1999, leg. M. Özdemir, 1 specimen; **Antalya prov.:** 1979, leg. A. Yayla, *Olea* sp. 1 specimen; **Çankırı prov.:** Eldivan (Institute.B.), 19.VII.2000, leg. A. Özdem, *Prunus avium,* 3 specimens; Eldivan (Karş.B.), 27.VII.2000, leg. A. Özdem, *Prunus avium,* 5 specimens, 09.VIII.2000, leg. A. Özdem, *Prunus avium,* 4 specimens; **Isparta prov.:** Senirkent, Kovada, 29.VI.1995, leg. A. Kalkandelen, 1 specimen; **Konya prov.:** Ereğli, Yıldızlı, 01.10.1992, leg. C. Zeki, *Malus* sp., 2 specimens. This E-Mediterranean (Palaestino-Taurian) species was recorded from Antalya and Isparta provinces. It is the first record to Afyonkarahisar, Ankara, Çankırı and Konya provinces and hereby for Aegean and Central Anatolian regions of Turkey.

SUBGENUS *TESTERGUS* Weise, 1893
SPECIES *Longitarsus anchusae* (Paykull, 1799)
Material examined: Ankara prov.: Polatlı, Düç, 08.V.1990, *Onobrychis sativa,* 1 specimen, **Burdur prov.:** Bucak, Keçili, 13.IV.1983, leg. A. İlden, *Triticum* sp., 2 specimens; Yeşilova, Bayırbaşı, 14.IV.1983, leg. H. Uysal, *Triticum* sp., 3 specimens; **Çankırı prov.:** Eldivan, 09.VIII.2000, leg. A. Özdem, *Prunus avium,* 1 specimen; **Kocaeli prov.:** Gebze, Keren, 20.XII.1977, 4 specimens. This Sibero-European species is the first record to Ankara, Burdur, Çankırı and Kocaeli provinces and hereby for Central Anatolian region of Turkey.

GENUS *OCHROSIS* Foudras, 1860
SPECIES *Ochrosis ventralis* (Illiger, 1807)
Materyal examined: Ankara prov.: Polatlı, 28.VII.1983, leg. A. Kalkandelen, 1 specimen; Saray, 02.VIII.1990, leg. M. Aydemir, 1 specimen; Saray, 19.IX.1990, leg. M. Aydemir, 1 specimen; **Kahramanmaraş prov.:** Göksun, Saraycık, 14.VIII. 1979, 1 specimen; **Sinop prov.:** Mertoğlu village, 25.VI.1971, 1 specimen; **Şanlıurfa prov.:** Ceylanpınar, 04.VI. 1969, leg. A. Kalkandelen, 1 specimen; Lokalitesiz, 3 specimen. This W-Palearctic + Afrotropical species was recorded from Ankara and Kahramanmaraş provinces. It is the first record to Sinop and Şanlıurfa provinces and hereby for South-Eastern Anatolian region of Turkey.

GENUS *PHYLLOTRETA* Chevrolat, 1836
SPECIES *Phyllotreta atra* (Fabricius, 1775)
Materyal examined: Afyonkarahisar prov.: Central, Gebeciler, 26.VII.1983, leg. A. Kalkandelen, 8 specimens; Central, Gebeciler, 27.VII.1983, leg. A. Kalkandelen, 22 specimens; **Ankara prov.:** Kazan, 07.VII.1982, leg. Y. Özdemir, 4 specimens; **Çankırı prov.:** Eldivan, 27.IV.-19.VII.2000, leg. A. Özdem, *Prunus avium*, 2 specimens; **Isparta prov.:** Gelendost, 11.V.1983, leg. M. Kaya, 1 specimen. This Palearctic species was recorded from all mentioned provinces.
SPECIES *Phyllotreta erysimi* Weise, 1900
SUBSPECIES *Phyllotreta erysimi erysimi* Weise, 1900
Material examined: Bolu prov.: 18.IV.2003, 1200 m, leg. M. Özdemir, 1 specimen. This Centralasiatic-European subspecies is the first record to Bolu province.
SPECIES *Phyllotreta nemorum* (Linnaeus, 1758)
Material examined: Yozgat prov.: Çayıralan, Konuklar, 07.VI.1991, leg. M. Aydemir, *Onobrychis viciifolia,* 2 specimens. This Sibero-European + Australian species is the first record to Yozgat province.
SPECIES *Phyllotreta nigripes* (Fabricius, 1775)
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)
Materyal examined: Afyonkarahisar prov.: 01.IV.1917, 1 specimen; Sandıklı, 14.IV.1983, leg. M. Ali Doğru, 20 specimens; Gebeciler, 26.VII.1983, leg. A. Kalkandelen, *Solanum tuberosum* and Cruciferae, 15 specimens; Central, Gebeciler, 27.VII.1983, leg. T. Davarcı, 52 specimens; Central, Bahçecik, 28.VII.1983, leg. A. Kalkandelen, 16 specimens; Central, Gebeciler, 26.VII.1983, leg. A. Kalkandelen, 12 specimens; Emirdağ, Dereköy, 6.VII.2006, 1058 m, leg. Y. Güler, 1 specimen; **Ankara prov.:** Şereflikoçhisar, 25.VII.1983, leg. A. Kalkandelen, 8 specimens; Bala, Beynam, 16.VIII.1982, leg. Y. Özdemir, 2 specimens, 16-18.VIII.1983, leg. Y. Özdemir, *Pinus* sp. and *Quercus* sp., 2 specimens, 18.VIII.1983, leg. A. Kalkendelen, *Pinus* sp., 34 specimens; **Düzce prov.:** Central, near forest, 17.IV.2003, 200 m, leg. M. Özdemir, 1 specimen; **Isparta prov.:** Gelendost, 11.V.1983, leg.M. Kaya, 1 specimen; Yalvaç, 15.IV.1983, leg. M. Kaya, 2 specimens; **Kilis prov.:** Musabeyli, 19.VI.1990, leg. A. Tamer, *Lens culinaris,* 4 specimens; **Konya prov.:** Çumrainli village, 04.V.1983, leg. Ş. Gür; 2 specimens; Ereğli, Yıldızlı, 01.X.1992, leg. C. Zeki, *Malus* sp., 1 specimen. This Centralasiatic-Europeo-Mediterranean subspecies was recorded from Afyonkarahisar, Ankara, Isparta and Konya provinces. It is the first record to Düzce and Kilis provinces and hereby for South-Eastern Anatolian region of Turkey.
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)
Material examined: Afyonkarahisar prov.: Sandıklı, 14.IV.1983, *Triticum* sp., leg. M. Ali Doğru, 2 specimens; **Yozgat prov.:** Akbenli, 21.VI.1990, leg. A. Tamer, *Lens culinaris,* 3 specimens. This Centralasiatic-Europeo-Mediterranean + Afrotropical species is the first record to Afyonkarahisar and Yozgat provinces and hereby for Aegean region of Turkey.

GENUS *PODAGRICA* Chevrolat, 1836
SPECIES *Podagrica malvae* (Illiger, 1807)
SUBSPECIES *Podagrica malvae malvae* (Illiger, 1807)
Material examined: Adana prov.: 16.V.1957, *Malva* sp., 4 specimens; **Ankara prov.:** Çubuk, 24.VII.1939, 1 specimen; Çubuk, 9.VII.1976, leg. N. Aysev, 2 specimens; Polatlı, 11.VI.1998, leg. S. Halıcı, 1 specimen. This C and E-European subspecies was recorded from Ankara province. It is the first record to Adana province.

SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)
Materyal examined: İzmir prov.: Selçuk, Meryemana, 10.V.1964, leg. Y. Sürmeli, 1 specimen; **Manisa prov.:** Demirci, 29.V.1936, *Alcea rosea*, 11 specimens. This Mediterranean subspecies is the first record to İzmir and Manisa provinces and hereby for Turkey.

GENUS *PSYLLIODES* Latreille, 1825
SUBGENUS *PSYLLIODES* Latreille, 1825
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004
Material examined: Afyonkarahisar prov.: 15.III.1936, 7 specimens**;** 22.III.1937, 1 specimen; 24.III.1937, 3 specimens. This endemic species is the first record to Afyonkarahisar province and hereby for Aegean region of Turkey. Also, it is the third record for Turkey.
SPECIES *Psylliodes chalcomera* (Illiger, 1807)
Material examined: Konya prov.: Akşehir, 05.V.1962, leg. N. Karabıyık, 1 specimen; 22.VI.1962, leg. N Karabıyık, 1 specimen. This Holarctic species was recorded from Konya province.
SPECIES *Psylliodes chrysocephala* (Linnaeus, 1758)
SUBSPECIES *Psylliodes chrysocephala chrysocephala* (L., 1758)
Material examined: Ankara prov.: Beynam, 16.VIII.1982, leg. Y. Özdemir, 1 specimen; **Antalya prov.:** 1979, leg. A. Yayla, 3 specimens; **İzmir prov.:** 27.VIII.1937, 1 specimen; **Trabzon prov.:** Akçaabat, 07.VII.1971, leg. S. Kornoşor, 1 specimens. This Holarctic + Afrotropical subspecies was recorded from Ankara, Antalya and İzmir provinces. It is the first record to Trabzon province.
SPECIES *Psylliodes pallidicolor* Pic, 1903
Material examined: Ankara prov.: Kocahacılı, 12.VI.1990, M. Aydemir, 1 specimen. This Mediterranean species is the first record to Ankara province and hereby for Central Anatolian region of Turkey.
SPECIES *Psylliodes tricolor* Weise, 1888
Material examined: Afyonkarahisar prov.: Dinar, Karabedir, 11.VI.1998, 1100 m, leg. M. Özdemir, 1 specimen; **Çankırı prov.:** 23.VI.1997, leg. Y. Özdemir, *Malus pumila*, 2 specimens; **Kilis prov.:** Musabeyli, 19.VI.1990, leg. A. Tamer, *Lens culinaris,* 1 specimen; **Konya prov.:** 22.VI.1962, leg. N. Karabıyık, 1 specimen; **Nevşehir prov.:** Avanos, 26.V.1998, leg. Y. Özdemir, 1 specimen. This Centralasiatic-Europeo-Mediterranean species was recorded from Konya and Nevşehir provinces. It is the first record to Afyonkarahisar, Çankırı and Kilis provinces and hereby for Aegean and South-Eastern Anatolian regions of Turkey.

SUBFAMILY HISPINAE

GENUS *DICLADISPA* Gestro, 1897
SPECIES *Dicladispa testacea* Linnaeus, 1767
Materyal examined: İzmir prov.: Tire, 20.VI.1931, leg. N. Schewket, 1 specimen; Tire, 22.VI.1931, leg. N. Schewket, 1 specimen. This Mediterranean species was recorded from İzmir province.

SUBFAMILY CASSIDINAE

GENUS *CASSIDA* Linnaeus, 1758
SPECIES *Cassida brevis* Weise, 1884
Material examined: Amasya prov.: Taşova, Durucasu, 09.V.2002, 350 m, leg. Y. Özdemir, 2 specimens. This Turano-European species was recorded from Amasya province.
SPECIES *Cassida fausti* Spaeth & Reitter, 1926
Material examined: Ankara prov.: Yenimahalle, 17.V.1984, leg. A. Kalkandelen, 1 specimen. This E-European species was recorded from Ankara province.
SPECIES *Cassida nebulosa* Linnaeus, 1758
Materyal examined: Konya prov.: Akşehir, Dereçine, 05.VIII.1993, leg. A. Kalkandelen, 4 specimens; Akşehir, Sarayköy, 23.V. 2006, leg. Y. Özdemir, 1 specimen. These records

were given by Özdikmen et al. (2020b). Therefore, this Asiatic-European species was recorded from Konya province.

SPECIES *Cassida nobilis* Linnaeus, 1758

Material examined: Isparta prov.: Yalvaç, 02.V.1972, *Triticum* sp., 1 specimen. This Palearctic species was recorded from Isparta province.

SPECIES *Cassida pannonica* Suffrian, 1844

Materyal examined: Çankırı prov.: Şabanözü, 02.VII.1997, leg. M. Özdemir, 1 specimen. This Sibero-European species was recorded from Çankırı province.

SPECIES *Cassida prasina* Illiger, 1798

Materyal examined: Konya prov.: Karacadağ, 25.IX.1950, 1620 m, 1 specimen. This Sibero-European species was recorded from Konya province.

SPECIES *Cassida rubiginosa* Müller, 1776

SUBSPECIES *Cassida rubiginosa rubiginosa* Müller, 1776

Materyal examined: Adana prov.: Balcalı, 29.IV.2000, leg. M. Özmen, 6 specimens; Balcalı, 08.V.2000, leg. E. Özzengin, 1 specimen; Balcalı, 10.V.2000, leg. H. Emel Aydın, 1 specimen; Balcalı, 13.V.2000, leg. N. Yoğurtoğlu, 7 specimens; Balcalı, 13.V. 2000, leg. Z. Kutulay, 4 specimens; Balcalı, 14.V. 2000, leg. Hasret Dağ, 6 specimens; Balcalı, 15.V.2000, leg. T. Arslan, 4 specimen; Balcalı, 15.V.2000, leg. D. Arısoy, 3 specimens; Balcalı, 15.V.2000, leg. L. Bayındar, 1 specimen; Balcalı, 17.V. 2000, leg. S. Oldac, 5 specimens; Balcalı, 17.V.2000, leg. R. S. Tülüce, 3 specimens; Balcalı, 17.V.2000, leg. Ferav Erdal, 3 specimens; Balcalı, 19.V.2000, leg. Ayça Erdoğan, 5 specimens; Balcalı, 19.V.2000, leg. Ö. Özcan, 4 specimens; Balcalı, 20.V.2000, leg. O. Bozdoğan, 4 specimens; Balcalı, 20.V.2000, leg. O. Demirözer, 1 specimen; Balcalı, 20.V.2000, leg. Gökhan Altay, 7 specimens; Balcalı, 20.V. 2000, leg. Ayça Erdoğan, 2 specimens; Balcalı, 20.V.2000, leg. L. Bayındar, 1 specimen; Balcalı, 28.V.2000, leg. H. Esen, 5 specimens; Balcalı, 30.V.2000, leg.İ. M. Şentürk, 3 specimens; **Mersin prov.:** 21.V.2000, leg. A. Selek, 2 specimens. This Holarctic species was recorded from all mentioned provinces.

SPECIES *Cassida seraphina* Ménétriés, 1836

Materyal examined: İzmir prov.: Bornova, 16. IV. 1932, 3 specimens; **Tokat prov.:** Turhal, Çay ucu, 31. IV.1920, 1 specimen; Turhal, 04. VI. 1934, 2 specimens. This SW-Asiatic species was recorded from all mentioned provinces.

SPECIES *Cassida viridis* Linnaeus, 1758

Materyal examined: Adana prov.: Balcalı, 20.V.2000, leg. Gökhan Altay, 1 specimen; **Isparta prov.:** Gelendost, 02.V.1970, *Triticum* sp., leg. G. Altınayar, 1 specimen. This Palearctic species was recorded from Adana and Isparta provinces.

SPECIES *Cassida vittata* Villers, 1789

Material examined: Konya prov.: Akşehir, Tekke, 29.V.1984, leg. A. Kalkandelen, 1 specimen. This Palearctic species is the first record to Konya province.

GENUS *HYPOCASSIDA* Weise, 1893

SPECIES *Hypocassida subferruginea* (Schrank, 1776)

Materyal examined: Adana prov.: Balcalı, 30.V.2000, leg. İ. M. Şentürk, 1 specimen; **Ankara prov.:** Polatlı, 08.VII.1998, leg. S. Halıcı, 2 specimens; Polatlı, 09.VII.1998, leg. S. Halıcı, 1 specimen; Ayaş, 03.VIII.2015, 1000 m, leg. G. Yazıcı, 1 specimen. This Palearctic species was recorded from all mentioned provinces.

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List 1. New records of Chrysomelidae material, housed in NTM according to family level.

SUPERFAMILY CHRYSOMELOIDEA
FAMILY CHRYSOMELIDAE

PROVINCIAL NEW RECORDS

Adana province
SPECIES *Clytra laeviuscula* Ratzeburg, 1837
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)
SUBSPECIES *Podagrica malvae malvae* (Illiger, 1807)

Afyonkarahisar province
SPECIES *Clytra novempunctata* Olivier, 1808
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Labidostomis kaszabi* (Medvedev, 1962)
SPECIES *Smaragdina hypocrita* (Lacordaire, 1848)
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Chaetocnema scheffleri* (Kutschera, 1864)
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004
SPECIES *Psylliodes tricolor* Weise, 1888

Amasya province
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)
SPECIES *Chaetocnema chlorophana* (Duftschmid, 1825)

Ankara province
SPECIES *Smaragdina flavicollis* (Charpentier, 1825)
SUBSPECIES *Cryptocephalus pygmaeus vittula* Suffrian, 1848
SUBSPECIES *Chrysolina marginata marginata* (Linnaeus, 1758)
SPECIES *Aulacophora foveicollis* (Lucas, 1849)
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes pallidicolor* Pic, 1903

Antalya province
SPECIES *Aulacophora foveicollis* (Lucas, 1849)

Aydın province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Balıkesir province
SPECIES *Plagiodera versicolora* (Laicharting, 1781)
SPECIES *Chaetocnema concinna* (Marsham, 1802)

Bartın province
SPECIES *Cryptocephalus duplicatus* Suffrian, 1847
SPECIES *Crepidodera aurata* (Marsham, 1802)

Bitlis province
SUBSPECIES *Chrysomela saliceti saliceti* (Weise, 1884)

Bolu province
SUBSPECIES *Galeruca spectabilis orientalis* (Osculati, 1844)
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Aphthona venustula* (Kutschera, 1861)
SUBSPECIES *Phyllotreta erysimi erysimi* Weise, 1900

Burdur province
SUBSPECIES *Chrysolina didymata didymata* (Scriba, 1791)
SUBSPECIES *Chrysomela saliceti saliceti* (Weise, 1884)
SPECIES *Entomoscelis adonidis* (Pallas, 1771)
SPECIES *Exosoma thoracicum* (Redtenbacher, 1843)
SPECIES *Galeruca interrupta* (Illiger, 1802)
SPECIES *Chaetocnema arenacea* (Allard, 1860)
SPECIES *Chaetocnema montenegrina* Heikertinger, 1912
SPECIES *Crepidodera aurata* (Marsham, 1802)
SPECIES *Longitarsus anchusae* (Paykull, 1799)

Bursa province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Çanakkale province
SPECIES *Chrysolina americana* (Linnaeus, 1758)

Çankırı province
SPECIES *Oulema melanopus* (Linnaeus, 1758)
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes tricolor* Weise, 1888

Diyarbakır province
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Tituboea macropus* (Illiger, 1800)
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)

Düzce province
SPECIES *Smaragdina vaulogeri* (Pic, 1895)
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)

Edirne province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Elazığ province
SPECIES *Diorhabda elongata* (Brullé, 1832)

Erzincan province
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)

Eskişehir province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Gaziantep province
SPECIES *Luperus xanthopoda* (Schrank, 1781)

Giresun province
SUBSPECIES *Cryptocephalus bipunctatus bipunctatus* (L., 1758)

Gümüşhane province
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)

Hatay province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Isparta province
SPECIES *Radymna persica* (Faldermann, 1837)

İstanbul province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

İzmir province
SPECIES *Lachnaia sexpunctata* (Scopoli, 1763)
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Karaman province
SPECIES *Entomoscelis adonidis* (Pallas, 1771)

Kars province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Kastamonu province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Kayseri province
SPECIES *Diorhabda carinata* Faldermann, 1837

Kırıkkale province
SPECIES *Leptinotarsa decemlineata* (Say, 1824)

Kırşehir province
SPECIES *Galeruca interrupta* (Illiger, 1802)

Kilis province
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)
SPECIES *Psylliodes tricolor* Weise, 1888

Kocaeli province
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Longitarsus anchusae* (Paykull, 1799)

Konya province
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)
SPECIES *Xanthogaleruca luteola* (Müller, 1766)
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Cassida vittata* Villers, 1789

Manisa province
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Mersin province
SPECIES *Chrysomela populi* Linnaeus, 1758

Nevşehir province
SPECIES *Galeruca interrupta* (Illiger, 1802)
SPECIES *Longitarsus helvolus* Kutschera, 1863

Niğde province
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)

Osmaniye province
SUBSPECIES *Smaragdina concolor concolor* (Fabricius, 1792)

Sakarya province
SPECIES *Clytra novempunctata* Olivier, 1808
SPECIES *Pachybrachis fimbriolatus* (Suffrian, 1848)

Samsun province
SPECIES *Epitrix pubescens* (Koch, 1803)
SPECIES *Longitarsus callidus* Warchałowski, 1967

Sinop province
SPECIES *Ochrosis ventralis* (Illiger, 1807)

Şanlıurfa province
SPECIES *Coptocephala destinoi* Fairmaire, 1884
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Ochrosis ventralis* (Illiger, 1807)

Tokat province
SPECIES *Oulema melanopus* (Linnaeus, 1758)
SPECIES *Nymphius lydius* (Weise, 1886)
SPECIES *Crepidodera aurata* (Marsham, 1802)

Trabzon province
SUBSPECIES *Psylliodes chrysocephala chrysocephala* (L., 1758)

Van province
SUBSPECIES *Cryptocephalus fulvus fulvus* Goeze, 1777
SPECIES *Exosoma flavipes* (Heyden, 1878)

Yozgat province
SPECIES *Phyllotreta nemorum* (Linnaeus, 1758)
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)

Zonguldak province
SPECIES *Cryptocephalus flavipes* Fabricius, 1781

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Labidostomis kaszabi* (Medvedev, 1962)
SPECIES *Galeruca interrupta* (Illiger, 1802)
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004
SPECIES *Psylliodes tricolor* Weise, 1888

Black Sea region of Turkey
SPECIES *Smaragdina vaulogeri* (Pic, 1895)
SPECIES *Aphthona venustula* (Kutschera, 1861)
SPECIES *Chaetocnema chlorophana* (Duftschmid, 1825)
SPECIES *Longitarsus callidus* Warchałowski, 1967

Central Anatolian region of Turkey
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872
SPECIES *Diorhabda carinata* Faldermann, 1837
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes pallidicolor* Pic, 1903

Eastern Anatolian region of Turkey
SPECIES *Exosoma flavipes* (Heyden, 1878)

Marmara region of Turkey
SPECIES *Chrysolina americana* (Linnaeus, 1758)

Mediterranean region of Turkey
SPECIES *Radymna persica* (Faldermann, 1837)

South-Eastern Anatolian region of Turkey
SPECIES *Coptocephala destinoi* Fairmaire, 1884
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Tituboea macropus* (Illiger, 1800)
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)
SPECIES *Luperus xanthopoda* (Schrank, 1781)
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Ochrosis ventralis* (Illiger, 1807)
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)
SPECIES *Psylliodes tricolor* Weise, 1888

TURKISH NEW RECORDS

First record for Turkey
SUBSPECIES *Smaragdina concolor concolor* (Fabricius, 1792)
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Second record for Turkey
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)
SPECIES *Longitarsus callidus* Warchałowski, 1967

Second report for Turkey
SPECIES *Aphthona pallida* (Bach, 1859)

Third report for Turkey
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004

List 2. Provincial and regional new records of Chrysomelidae material, housed in NTM according to subfamilies.

SUPERFAMILY CHRYSOMELOIDEA
FAMILY CHRYSOMELIDAE

SUBFAMILY CRIOCERINAE

PROVINCIAL NEW RECORDS

Çankırı province
SPECIES *Oulema melanopus* (Linnaeus, 1758)

Tokat province
SPECIES *Oulema melanopus* (Linnaeus, 1758)

SUBFAMILY CLYTRINAE

PROVINCIAL NEW RECORDS

Adana province
SPECIES *Clytra laeviuscula* Ratzeburg, 1837

Afyonkarahisar province
SPECIES *Clytra novempunctata* Olivier, 1808
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Labidostomis kaszabi* (Medvedev, 1962)
SPECIES *Smaragdina hypocrita* (Lacordaire, 1848)

Ankara province
SPECIES *Smaragdina flavicollis* (Charpentier, 1825)

Aydın province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Bursa province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

Çankırı province
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)

Diyarbakır province
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Tituboea macropus* (Illiger, 1800)

Düzce province
SPECIES *Smaragdina vaulogeri* (Pic, 1895)

Eskişehir province
SPECIES *Coptocephala gebleri* (Gebler, 1841)

<u>İstanbul province</u>
SPECIES *Coptocephala gebleri* (Gebler, 1841)

<u>İzmir province</u>
SPECIES *Lachnaia sexpunctata* (Scopoli, 1763)

<u>Kastamonu province</u>
SPECIES *Coptocephala gebleri* (Gebler, 1841)
<u>Kocaeli province</u>
SPECIES *Coptocephala gebleri* (Gebler, 1841)

<u>Konya province</u>
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)

<u>Niğde province</u>
SUBSPECIES *Smaragdina biornata angorensis* (Lopatin, 2002)

<u>Osmaniye province</u>
SUBSPECIES *Smaragdina concolor concolor* (Fabricius, 1792)

<u>Sakarya province</u>
SPECIES *Clytra novempunctata* Olivier, 1808

<u>Şanlıurfa province</u>
SPECIES *Coptocephala destinoi* Fairmaire, 1884
SPECIES *Coptocephala gebleri* (Gebler, 1841)

<u>REGIONAL NEW RECORDS</u>

<u>Aegean region of Turkey</u>
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Labidostomis kaszabi* (Medvedev, 1962)

<u>Black Sea region of Turkey</u>
SPECIES *Smaragdina vaulogeri* (Pic, 1895)

<u>Central Anatolian region of Turkey</u>
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872

<u>South-Eastern Anatolian region of Turkey</u>
SPECIES *Coptocephala destinoi* Fairmaire, 1884
SPECIES *Coptocephala gebleri* (Gebler, 1841)
SPECIES *Tituboea macropus* (Illiger, 1800)

<u>TURKISH NEW RECORDS</u>

<u>First record for Turkey</u>
SUBSPECIES *Smaragdina concolor concolor* (Fabricius, 1792)

<u>Second record for Turkey</u>
SUBSPECIES *Labidostomis metallica metallica* Lefèvre, 1872

SUBFAMILY CRYPTOCEPHALINAE

<u>PROVINCIAL NEW RECORDS</u>

<u>Ankara province</u>
SUBSPECIES *Cryptocephalus pygmaeus vittula* Suffrian, 1848

Bartın province
SPECIES *Cryptocephalus duplicatus* Suffrian, 1847

Giresun province
SUBSPECIES *Cryptocephalus bipunctatus bipunctatus* (L., 1758)

Sakarya province
SPECIES *Pachybrachis fimbriolatus* (Suffrian, 1848)
Van province
SUBSPECIES *Cryptocephalus fulvus fulvus* Goeze, 1777

Zonguldak province
SPECIES *Cryptocephalus flavipes* Fabricius, 1781

SUBFAMILY CHRYSOMELINAE

PROVINCIAL NEW RECORDS

Adana province
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)

Afyonkarahisar province
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)

Amasya province
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)

Ankara province
SUBSPECIES *Chrysolina marginata marginata* (Linnaeus, 1758)

Balıkesir province
SPECIES *Plagiodera versicolora* (Laicharting, 1781)

Bitlis province
SUBSPECIES *Chrysomela saliceti saliceti* (Weise, 1884)

Burdur province
SUBSPECIES *Chrysolina didymata didymata* (Scriba, 1791)
SUBSPECIES *Chrysomela saliceti saliceti* (Weise, 1884)
SPECIES *Entomoscelis adonidis* (Pallas, 1771)

Çanakkale province
SPECIES *Chrysolina americana* (Linnaeus, 1758)

Diyarbakır province
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)

Gümüşhane province
SUBSPECIES *Chrysolina herbacea herbacea* (Duftschmid, 1825)

Karaman province
SPECIES *Entomoscelis adonidis* (Pallas, 1771)

Kırıkkale province
SPECIES *Leptinotarsa decemlineata* (Say, 1824)

Mersin province
SPECIES *Chrysomela populi* Linnaeus, 1758

Şanlıurfa province
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)

REGIONAL NEW RECORDS

Marmara region of Turkey
SPECIES *Chrysolina americana* (Linnaeus, 1758)

South-Eastern Anatolian region of Turkey
SUBSPECIES *Chrysolina coerulans angelica* (Reiche & Saulcy, 1858)
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)

TURKISH NEW RECORDS

Second record for Turkey
SUBSPECIES *Chrysolina anceyi anceyi* (Marseul, 1868)

SUBFAMILY GALERUCINAE

PROVINCIAL NEW RECORDS

Ankara province
SPECIES *Aulacophora foveicollis* (Lucas, 1849)

Antalya province
SPECIES *Aulacophora foveicollis* (Lucas, 1849)

Bolu province
SUBSPECIES *Galeruca spectabilis orientalis* (Osculati, 1844)

Burdur province
SPECIES *Exosoma thoracicum* (Redtenbacher, 1843)
SPECIES *Galeruca interrupta* (Illiger, 1802)

Edirne province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Elazığ province
SPECIES *Diorhabda elongata* (Brullé, 1832)

Gaziantep province
SPECIES *Luperus xanthopoda* (Schrank, 1781)

Hatay province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Isparta province
SPECIES *Radymna persica* (Faldermann, 1837)

Kars province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Kayseri province
SPECIES *Diorhabda carinata* Faldermann, 1837

Kırşehir province
SPECIES *Galeruca interrupta* (Illiger, 1802)

Konya province
SPECIES *Xanthogaleruca luteola* (Müller, 1766)

Nevşehir province
SPECIES *Galeruca interrupta* (Illiger, 1802)

Tokat province
SPECIES *Nymphius lydius* (Weise, 1886)

Van province
SPECIES *Exosoma flavipes* (Heyden, 1878)

REGIONAL NEW RECORDS

Aegean region of Turkey
SPECIES *Galeruca interrupta* (Illiger, 1802)

Central Anatolian region of Turkey
SPECIES *Diorhabda carinata* Faldermann, 1837

Eastern Anatolian region of Turkey
SPECIES *Exosoma flavipes* (Heyden, 1878)

Mediterranean region of Turkey
SPECIES *Radymna persica* (Faldermann, 1837)

South- Eastern Anatolian region of Turkey
SPECIES *Luperus xanthopoda* (Schrank, 1781)

SUBFAMILY ALTICINAE

PROVINCIAL NEW RECORDS

Adana province
SUBSPECIES *Podagrica malvae malvae* (Illiger, 1807)

Afyonkarahisar province
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Chaetocnema scheffleri* (Kutschera, 1864)
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004
SPECIES *Psylliodes tricolor* Weise, 1888

Amasya province
SPECIES *Chaetocnema chlorophana* (Duftschmid, 1825)

Ankara province
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes pallidicolor* Pic, 1903

Balıkesir province
SPECIES *Chaetocnema concinna* (Marsham, 1802)

Bartın province
SPECIES *Crepidodera aurata* (Marsham, 1802)

Bolu province
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Aphthona venustula* (Kutschera, 1861)
SUBSPECIES *Phyllotreta erysimi erysimi* Weise, 1900

Burdur province
SPECIES *Chaetocnema arenacea* (Allard, 1860)
SPECIES *Chaetocnema montenegrina* Heikertinger, 1912
SPECIES *Crepidodera aurata* (Marsham, 1802)
SPECIES *Longitarsus anchusae* (Paykull, 1799)

Çankırı province
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes tricolor* Weise, 1888

Düzce province
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)

Erzincan province
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)

İzmir province
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Kilis province
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)
SPECIES *Psylliodes tricolor* Weise, 1888

Kocaeli province
SPECIES *Longitarsus anchusae* (Paykull, 1799)

Konya province
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979

Manisa province
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Nevşehir province
SPECIES *Longitarsus helvolus* Kutschera, 1863

Samsun province
SPECIES *Epitrix pubescens* (Koch, 1803)
SPECIES *Longitarsus callidus* Warchałowski, 1967

Sinop province
SPECIES *Ochrosis ventralis* (Illiger, 1807)

Şanlıurfa province
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Ochrosis ventralis* (Illiger, 1807)

Tokat province
SPECIES *Crepidodera aurata* (Marsham, 1802)

Trabzon province
SUBSPECIES *Psylliodes chrysocephala chrysocephala* (L., 1758)

Yozgat province
SPECIES *Phyllotreta nemorum* (Linnaeus, 1758)
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)

REGIONAL NEW RECORDS

Aegean region of Turkey
SUBSPECIES *Altica oleracea oleracea* (Linnaeus, 1758)
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Phyllotreta procera* (Redtenbacher, 1849)
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004
SPECIES *Psylliodes tricolor* Weise, 1888

Black Sea region of Turkey
SPECIES *Aphthona venustula* (Kutschera, 1861)
SPECIES *Chaetocnema chlorophana* (Duftschmid, 1825)
SPECIES *Longitarsus callidus* Warchałowski, 1967

Central Anatolian region of Turkey
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Longitarsus hermonensis* Furth, 1979
SPECIES *Longitarsus anchusae* (Paykull, 1799)
SPECIES *Psylliodes pallidicolor* Pic, 1903

South-Eastern Anatolian region of Turkey
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Ochrosis ventralis* (Illiger, 1807)
SUBSPECIES *Phyllotreta nigripes nigripes* (Fabricius, 1775)
SPECIES *Psylliodes tricolor* Weise, 1888

TURKISH NEW RECORDS

First record for Turkey
SUBSPECIES *Podagrica malvae semirufa* (Küster, 1847)

Second record for Turkey
SPECIES *Longitarsus callidus* Warchałowski, 1967

Second report for Turkey
SPECIES *Aphthona pallida* (Bach, 1859)

Third report for Turkey
SPECIES *Longitarsus helvolus* Kutschera, 1863
SPECIES *Psylliodes anatolica* Gök & Çilbiroğlu, 2004

SUBFAMILY CASSIDINAE

PROVINCIAL NEW RECORDS

Konya province
SPECIES *Cassida vittata* Villers, 1789

SCIENTIFIC NOTES

REPLACEMENT FOR THE GENUS GROUP NAME *ANOPSILUS* JACOBSEN, 1917 (COELEOPTERA: CHRYSOMELIDAE: CRYPTOCEPHALINAE), JUNIOR HOMONYM OF *ANOPSILUS* KIRSCH, 1870 (COLEOPTERA: CURCULIONIDAE)

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[Ponting, J. 2020. Replacement for the genus group name *Anopsilus* Jacobsen, 1917 (Coeleoptera: Chrysomelidae: Cryptocephalinae), junior homonym of *Anopsilus* Kirsch, 1870 (Coleoptera: Curculionidae). Munis Entomology & Zoology, 15 (1): 298-300**]**

In 1870, Kirsch described a genus of American curculionid beetle and gave it the name *Anopsilus* Kirsch, 1870. This genus originally contained just one species, *Anopsilus bonvouloiri* Kirsch, 1870 which is therefore the type species by monotypy. The genera *Balbus* Pascoe 1889, *Balgus* Blackwelder 1947 and *Saranthebaris* Bondar 1945 were subsequently synonymised under it (Alonso-Zarazaga & Lyal, 1999), resulting in a genus which now contains 28 species (Roskov et al 2019).

In 1917 Jacobsen proposed the genus group name *Anopsilus* Jacobsen 1917 for a subgenus of the genus *Thelyterotarsus* Weise 1882, (Coleoptera: Chrysomelidae: Cryptocephalinae). This subgenus originally contained five species: *Thelyterotarsus* (*Anopsilus*) *zarudnyi* Jacobsen, 1917; *Thelyterotarsus* (*Anopsilus*) *hebraeus* (Sahlberg, 1913); *Thelyterotarsus* (*Anopsilus*) *minimus* Jacobsen, 1917; *Thelyterotarsus* (*Anopsilus*) *hauseri* (Weise, 1887); and *Thelyterotarsus* (*Anopsilus*) *theryi* (Chobaut, 1896). *Serrinotus* Tan 1992 was also synonymised under *Thelyterotarsus* by Lopatin 1997. *Thelyterotarsus* was subsequently synonymised under *Acolastus* Gerstäcker, 1855 by Schöller 2000, along with *Falsopachybrachys* Pic 1947. Finally, *Pachylanka* Medvedev 1989 by Schöller & Warchałowski 2009. The subgenus now contains 30 species from Africa and Asia. The gender is masculine and the type species is *Pachybrachis theryi* Chobaut, 1896. (Schöller & Warchałowski, 2009).

The genus group name *Anopsilus* Jacobsen, 1917 is therefore a junior homonym of *Anopsilus* Kirsch, 1870 and the replacement name *Lapsionus* **nomen novum** is proposed for *Anopsilus* Jacobsen, 1917, preoccupied by *Anopsilus* Kirsch, 1870. The gender is masculine and it is an anagram of the name originally given to the subgenus by Jacobsen. The type species in accordance with Article 67.8 of the International Code of Zoological Nomenclature, is *Pachybrachis theryi* Chobaut, 1896.

Lapsionus contains the following species: *Acolastus (Lapsionus) afghanicus* (Medvedev, 1978) **comb. nov**.; *Acolastus (Lapsionus) apicenotatus* (Chobaud, 1899) **comb. nov**.; *Acolastus (Lapsionus) arabicus* (Lopatin, 1982) **comb. nov**.; *Acolastus (Lapsionus) costatus* (Medvedev et Sprecher-Uebersachs, 1999) **comb. nov**.; *Acolastus (Lapsionus) glabratus* (Lopatin, 1985) **comb. nov**.; *Acolastus (Lapsionus) gurjevae* (Lopatin, 1968) **comb. nov**.; *Acolastus (Lapsionus) hebraeus* (Sahlberg, 1913) **comb. nov**.; *Acolastus (Lapsionus) iranicus* (Lopatin, 1980) **comb. nov**.; *Acolastus (Lapsionus) jacobsoni* (Lopatin, 1968) **comb.**

nov.; *Acolastus (Lapsionus) jelineki* (Lopatin, 1985) **comb. nov**.; *Acolastus (Lapsionus) klimenkoi* (Romantsov & Bukejs, 2009) **comb. nov**.; *Acolastus (Lapsionus) korotyaevi* (Lopatin, 1992) **comb. nov**.; *Acolastus (Lapsionus) kryzhanovsdkii* (Lopatin, 1976) **comb. nov**.; *Acolastus (Lapsionus) latifrons* Lopatin, 2007 **comb. nov**.; *Acolastus (Lapsionus) lugubris* (Berti et Rapilly, 1973) **comb. nov**.; *Acolastus (Lapsionus) mandli* (Lopatin, 1967) **comb. nov**.; *Acolastus (Lapsionus) mesopotamicus* (Lopatin, 1996) **comb. nov**.; *Acolastus (Lapsionus) minimus* (Jacobson, 1917) **comb. nov**.; *Acolastus (Lapsionus) ophthalmicus* (Lopatin, 1997) **comb. nov**.; *Acolastus (Lapsionus) pallidus* (Lopatin, 1956) **comb. nov**.; *Acolastus (Lapsionus) pici* (Lopatin, 1985) **comb. nov**.; *Acolastus (Lapsionus) poecilopterus* (Suffrian, 1860) **comb. nov**.; *Acolastus (Lapsionus) postfasciatus* (Lopatin, 1975) **comb. nov**.; *Acolastus (Lapsionus) praevius* (Suffrian, 1857) **comb. nov**.; *Acolastus (Lapsionus) rubiginosus* (Suffrian, 1860) **comb. nov**.; *Acolastus (Lapsionus) similis* (Lopatin, 1976) **comb. nov**.; *Acolastus (Lapsionus) sogdianus* (Lopatin, 1992) **comb. nov**.; *Acolastus (Lapsionus) tadzhibaevi* (Lopatin, 1975) **comb. nov**.; *Acolastus (Lapsionus) theryi* (Chobaut, 1896) **comb. nov**. and *Acolastus (Lapsionus) zarudnyi* (Jacobson, 1917) **comb. nov**.

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