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DITROPINOTUS CRAWFORD, 1907 (HYMENOPTERA: TORYMYDAE: MICRODONTOMERINI) SPECIES FROM TURKEY, WITH DESCRIPTIONS OF NEW SPECIES

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[**Doğanlar, M.** 2016. *Ditropinotus* Crawford, 1907 (Hymenoptera: Torymydae: Microdontomerini) species from Turkey, with descriptions of new species. Munis Entomology & Zoology, 11 (2): 269-277]

ABSTRACT: In Turkey 2 species of *Ditropinotus* Crawford, 1907 (Hymenoptera: Torymidae), were found in the Southeastern and Central Anatolia of Turkey. The species, *D. golbasinensis* n.sp. from Adıyaman, Gölbaşı and *D. karatayensis* sp. nov. from Sakyatan, Karatay, Konya were described, diagnostic characters were illustrated, and compared with the Holarctic D. *aureoviridis* Crawford, 1907, and an identification key was provided.

KEY WORDS: *Ditropinotus* spp., Torymidae, Turkey.

The genus *Ditropinotus* was described by Crawford (1907) having type species *Ditropinotus aureoviridis* Crawford, 1907 by monotypy. Grissell (1995) recorded *Ditropinotus* as valid genus in the tribe Microdontomerini (Torymidae), and recorded two species, D. *aureoviridis as* holoarctic one and *Ditropinotus obscurus* Nikol'skaya 1952 as Palearctic species, from Rusia. Gahan (1912) described *Ditropinotus flocoxus* from USA and later Gahan (1921) synonymized *D. flocoxus* with *D. aureoviridis* and gave a discussion. Only host record has been given for *D. aureoviridis* as parasitoid of *Tetramesa* sp. (Eurytomidae) and *Mayetiola destructor* (Cecidomyiidae) (Grissell, 1995, and Noyes, 2015). Nikol'skaya (1952) gave an identification key for 3 species of *Ditropinotus* and named two new species, *D. obscurus* and *D. flavus*, by given their key characters in the key. Boucek (1965) combined *D. flavus* Nikol'skaya as species of *Pseuderimerus* Gahan, 1919.

In this work morphological characters of the *Ditropinotus* species from Turkey were studied and the species were described and compared with the holoarctic D. *aureoviridis* Crawford, 1907, and an identification key was provided for the world species.

MATERIAL AND METHOD

This study is based upon examination and identification of the specimens collected from Adıyaman and Konya of Turkey. The examined specimens and types were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC).

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 for further morphological studies. Wings and antennae of the holotypes were slide-mounted in Canada balsam.

The species were identified by following the keys of Nikol'skaya (1952) and Grissell (1995). 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.

The figures of *D. aureoviridis* were taken from the figures given by Grissell (1995), and the characters were taken from Crawford (1907) and from the figures 115, 125,126, 403, 412, 428, 429 of Grissell (1995), and the characters of *D. obscurus* were taken from the key characters and from the figure 176 given by Nikol'skaya (1952) by re-drown as figs.1j-l.

Terminology and abbreviations

Morphological terminology follows Gibson (1997). Abbreviations used in the key and descriptions are: OOL= shorter distance between ocello-ocular line, POL= distance between posterior ocelli, F1-6 = funicular segments.

RESULTS AND DISCUSSION

Ditropinotus Crawford, 1907

Ditropinotus Crawford, 1907: 178-179. Type species *Ditropinotus aureoviridis* Crawford (orig. desg. and monotipic USNM. The synonym list, distribution and host records were given by Grissell (1995), the characters summarized by Nikol'skaya (1952).

Diagnostic characters: Propodeum with 2 complete submedian carinae. Hind femur ventrally minutely serrate or scalloped, the teeth sometimes produced as slender, sharp barbs that difficult to see except at 50-100x; Hind tibia with 2 apical spur, outer spur small. Antennae with 1 anellus,7 funicular and 3 club segments; apical funicular segments slightly larger than 2nd funicular segment, funicular segments often somewhat separated; male with club and funicular segments lacking micropilosity, in dorsal view, apical half of flagellum cylindrical (Holarctic) (Grissell, 1995).

Key to the species of *Ditropinotus*

1- Ovipositor (Fig. 1a) less than 1/3 of metasoma, about 0.25x as long as metasoma, ovipositor index 0.66. Body dark bronze, with coppery luster, metasoma black, sometimes brownish at base. Base of scape, apex of femora, sometimes entire femora and tibiae rusty-yellow, tarsi yellow, funicle dark brown below, light distally. Antenna (Fig. 1b) with flagellum filiform; first 3 funicular segments longer than wide, last 3-4 funicular segments wider than long; F1- F31.55x as long as width, F4-F7 1.6x as wide as long, club twice as long as width. Fore wings (Fig. 1c) slightly darkened, with marginal vein 2.5x stigmal vein and 1.66x postmarginal vein...*D. obscurus* Nikol'skaya
-Ovipositor (Fig. 1d) at least 0.38x metasoma, and ovipositor index about 0.94, metasoma yellow; other characters variable...2

2-Mesosoma (Fig. 1d) black. Ovipositor (Fig. 1d) 0.41x metasoma, and ovipositor index 0.94 Head 1.1x as wide as height; antenna (Fig. 1e) with flagellum filiform, pedicel plus flagellum 2.3x as long as scape; 4.14x as long as pedicel, 1.45x as long as club; first 3 funicular segments transverse, others almost quadrate; F1- F2 twice, F3 1.88x, F4 1.23x, F5-F6 1.4x, F7 1.6x as wide as long, club twice as long as width. Fore wing (Fig. 1f) with marginal vein 3.48x stigmal vein and 1.6x postmarginal vein; hind femora (Fig. 1g) large, 2.72x as long as wide, ventrally broadly c-shaped, in apical half having one big, triangular and some smaller teeth apically, hind tibia almost as long as hind femora; propodeum (Fig. 1h) with the area between spiracles 5.18x as long as propodeum medially.....................................
....*D. karatayensis* Doğanlar sp. nov.
-Body (Fig. 2a) bicolored, head, mesonotum and scutellum dorsally green with metallic reflexion, and ventrally yellow, propodeum mostly brown, apically yellow; length of ovipositor variable...3

3-Ovipositor (Fig. 2a) 0.38x metasoma, and ovipositor index 0.94.Head 1.25x as wide as height; antenna (Fig. 2b) with flagellum clavate, pedicel plus flagellum 3.15x as long as scape; 2.65x as long as pedicel, 1.28x as long as club; anellus transverse, funicular segments mostly slightly transverse, F1 1.22x as wide as long, F2-F3 quadrate, F4-F5 1.4x, F6 1.67x, F7 1.6x as wide as long, club 1.67x as long as width. Fore wing (Fig. 2c) with distinct maculae, marginal vein 1.76x stigmal vein and 1.26x postmarginal vein; propodeum (Fig.2d) with the area between spiracles 3.66x as long as propodeum medially; hind femora (Fig. 2e) large, 2.34x as long as wide, having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically, hind tibia 1.26x as long as hind femora..*D. golbasinensis* Doğanlar sp. nov.
- Fore wing hyaline. Ovipositor about half of metasoma. Head 1.32x as wide as height; antenna (Fig. 3a) with flagellum clavate, pedicel plus flagellum 2.64x as long as scape; the latter 3.13x as long as pedicel, 1.2x as long as club; funicular segments distinctly transverse, F1 1.7x, F2 1.62x, F3 1.4x, F4 1.44x, F5 1.27x, F6 1.36x, F7 1.42x as wide as long, club twice as long as width. Fore wing (Fig. 3b) with marginal vein 2.5x stigmal vein and 1.5x postmarginal vein; propodeum (Fig. 3c) with the area between spiracles 4.86x as long as propodeum medially; hind femora(Fig. 3d) large, 2.73x as long as wide, ventral margin of hind femora with two asymmetrically enlarged lobes, basal one small, apical one bigger, apical lobe with some smaller teeth, but apical ones bigger than others..*D. aureoviridis* Crawford

***Ditropinotus obscurus* Nikol'skaya**

(Figs. 1 a-c)

Ditropinotus obscurus Nikol'skaya, 1952: 140-141. No type, Central Asia.

Diagnostic characters: Ovipositor less than 1/3 of metasoma, about 0.25x as long as metasoma, ovipositor index 0.66. Body dark bronze, with coppery luster, metasoma black, sometimes brownish at base. Base of scape, apex of femora, sometimes entire femora and tibiae rusty-yellow, tarsi yellow, funicle dark brown below, light distally. Fore wings slightly darkened. Antenna with flagellum filiform; anellus transverse, first 3 funicular segments longer than wide, last 3-4 funicular segments wider than long; F1- F31.55x as long as width, F4-F7 1.6x as wide as long, club twice as long as width. Fore wing with marginal vein 2.5x stigmal vein and 1.66x postmarginal vein.

Description:

Female: Length 2.0-2.7 mm. Body dark bronze, with coppery luster, metasoma black, sometimes brownish at base. Base of scape, apex of femora, sometimes entire femora and tibiae rusty-yellow, tarsi yellow, funicle dark brown below, light distally. Fore wings slightly darkened.

Head:(Fig. 1a,b) 1.5x as wide as length, 1.56x as wide as mesosoma; P0L 2.33x OOL; OOL equal diameter of lateral ocellus. Antenna (Fig. 1b) with flagellum filiform; anellus transverse, first 3 funicular segments longer than wide, last 3-4 funicular segments wider than long; F1- F3 1.55x as long as width, F4-F7 1.6x as wide as long, club twice as long as width.

Mesosoma:(Fig. 1a) 1.9x as long as width. Fore wing (Fig. 1c) with marginal vein 2.5x stigmal vein and 1.66x postmarginal vein. Hind femora large,1.3x as long as hind tibia; propodeum with the area between spiracles 4.66x as long as propodeum medially.

Metasoma:(Fig. 1a) almost as long as mesosoma. Ovipositor (Fig. 1a) less than 1/3 of metasoma, about 0.25x as long as metasoma, ovipositor index 0.66.

Materials: No types designated.

Distribution: Central Asia (Nikol'skaya, 1952; Noyes, 2015).

Host: unknown.

Remarks: Female of *Ditropinotus obscurus* Nikol'skaya differs from *Ditropinotus* spp. in having ovipositor 0.25x as long as metasoma and ovipositor index about 0.66 (in *Ditropinotus golbasinensis* sp. nov., *D. karatayensis* sp. nov. ovipositor about 0.4x as long as metasoma and ovipositor index about 0.94 and in *Ditropinotus aureoviridis* Crawford ovipositor about half of metasoma), propodeum with the area between spiracles 4.66x as long as propodeum medially (in *D. golbasinensis* sp. nov. propodeum with the area between spiracles 3.66x as long as propodeum medially, in *D. karatayensis* sp. nov. 5.18x as long as propodeum medially, and in *D. aureoviridis* 4.86x as long as propodeum medially).

Ditropinotus karatayensis Doğanlar sp. nov.

(Figs. 1 d-h)

Etymology: The name is derived from the name of Karatay, Konya, from where the Holotype was collected.

Diagnostic characters: Fore wing hyaline; body bicolored, head and mesosoma black, metasoma yellow, legs yellow, coxae concolorous with mesosoma, except fore coxae yellow; antenna yellow; ovipositor 0.41x metasoma; ovipositor index 0.94. Antenna with flagellum filiform, pedicel plus flagellum 2.3x as long as scape; the latter reaching slightly below lower edge of median ocellus, 4.14x as long as pedicel, 4.46x as long as broad, 1.45x as long as club; anellus transverse, first 3 funicular segments transverse, others almost quadrate; F1- F2 twice, F3 1.88x, F4 1.23x, F5-F6 1.4x, F7 1.6x as wide as long, club twice as long as width. Fore wing with marginal vein 3.48x stigmal vein and 1.6x postmarginal vein; hind femora large, 2.72x as long as wide, ventrally broadly c-shaped, in apical half having one big, triangular and some smaller teeth apically, hind tibia almost as long as hind femora.

Description:

Female. Length 2.74 mm+ovipositor 0.64 mm. Body (Fig. 1c) bicolored, head and mesosoma black, metasoma yellow, legs yellow, coxae concolorous with mesosoma, except fore coxae yellow; antenna yellow Fore wing hyaline; veins yellow.

Head: in dorsal view as wide as mesoscutum, width to length 38:20; POL 2.14x OOL; OOL 1.4x diameter of lateral ocellus. Head in frontal view as wide as high in ratio 38:35; dorsal margin of torulus distinctly above level of lower edge of eyes; malar space consists 0.47x hight of eye; external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 1d) with flagellum filiform, pedicel plus flagellum 2.3x as long as scape; the latter reaching slightly below lower edge of median ocellus, 4.14x as long as pedicel, 4.46x as long as broad, 1.45x as long as club; anellus transverse, first 3 funicular segments transverse, others almost quadrate; F1- F2 twice, F3 1.88x, F4 1.23x, F5-F6 1.4x, F7 1.6x as wide as long, club twice as long as width.

Mesosoma: (Fig. 1c) moderately bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum 0.34x as long as mesoscutum; propodeum with fine reticulation. All coxae with fine reticulation. Forewing (Fig. 1h with basal cell closed, bare; speculum closed, narrow, below marginal vein with sparse setae; marginal vein 3.48x stigmal vein and 1.6x postmarginal vein;hind femora (Fig. 2b) large, 2.72x as long as wide, slightly swollen and finely toothed type, in apical half having one big, triangular and some smaller teeth apically, hind tibia almost as long as hind femora. Propodeum (Fig. 2e) with the area between spiracles 5.18x as long as propodeum medially.

Metasoma: (Fig. 1c) excluding ovipositor slightly longer than rest of body; tip of hypopygium about 3/4 length metasoma; ovipositor (Fig. 1c) 0.41x metasoma; ovipositor index 0.94.
Material examined: Holotype, female, Turkey: Konya, Karatay, Sakyatan, 26 km from Konya to Karatay, 23.vi.2011, M. Doğanlar, swept from pasture, on card, forewing slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.
Male: unknown
Distribution: Turkey: Konya, Karatay.
Host: unknown.
Remarks: Female of *Ditropinotus karatayensis* sp. nov. differs from *Ditropinotus golbasinensis* sp. nov. and *Ditropinotus aureoviridis* Crawford in having mesosoma black, (in *D. golbasinensis* sp. nov. and *D. aureoviridis* mesosoma dorsally green with metallic reflexion, and ventrally yellow), and shape of hind femora slightly swollen and finely toothed type (in *D. golbasinensis* sp. nov. having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically, and (in *D. aureoviridis* fore wing hyaline; hind femora having ventrally two wavy enlargements, basal one small, apical one bigger, having some smaller teeth, but apical ones bigger than others).

Ditropinotus golbasinensis Doğanlar sp. nov.

(Figs. 2 a-e)

Etymology: The name is derived from the name of Gölbaşı, Adıyaman, from where the Holotype was collected.
Diagnostic characters: Fore wing with distinct maculae; body bicolored, head mesonotum and scutellum dorsally green with metallic reflexion, and ventrally yellow, propodeum mostly brown, apically yellow, metasoma yellow, ovipositor black, legs yellow, except coxae basally green with metallic reflexion; antenna with scape and club yellow, pedicel and funicular segments brown, except F6, F7 testaceous; ovipositor 0.38x metasoma; ovipositor index 0.94. Antenna with flagellum clavate, pedicel plus flagellum 3.15x as long as scape; scape; the latter reaching slightly below lower edge of median ocellus, 2.65x as long as pedicel, 4.5x as long as broad, 1.28x as long as club; anellus transverse, F1 1.22x as wide as long, F2-F3 quadrate, F4-F5 1.4x, F6 1.67x, F7 1.6x as wide as long, club 1.67x as long as width. Fore wing with marginal vein 1.76x stigmal vein and 1.26x postmarginal vein; hind femora large, 2.34x as long as wide, having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically, hind tibia 1.26x as long as hind femora.
Description:
Female. Length 3.6 mm+ovipositor 0.76 mm. Body (Fig. 1a) bicolored, head mesonotum and scutellum dorsally green with metallic reflexion, and ventrally yellow, propodeum mostly brown, apically yellow, metasoma yellow, ovipositor black, legs yellow, except coxae basally green with metallic reflexion; antenna with scape and club yellow, pedicel and funicular segments brown, except F6, F7 testaceous; Fore wing with distinct maculae below marginal vein; veins dark brown.
Head: (Fig. 1a) 0.6x as long as height in lateral view, 0.66x as wide as mesoscutum, width to length 40:20; POL 2.66x OOL; OOL 2.25x diameter of lateral ocellus. Head in frontal view 1.25x as wide as high in ratio 40:32; dorsal margin of torulus distinctly above level of lower edge of eyes; malar space consists 0.4x hight of eye; external margin of clypeus straight; face with fine sculpture.

Antenna (Fig. 1b) with flagellum clubbed, funicular segments almost filiform, pedicel plus flagellum 3.15x as long as scape; the latter reaching slightly below lower edge of median ocellus, 2.65x as long as pedicel, 4.5x as long as broad, 1.28x as long as club; anellus transverse, funicular segments mostly slightly transverse, F1 1.22x as wide as long, F2-F3 quadrate, F4-F5 1.4x, F6 1.67x, F7 1.6x as wide as long, club 1.67x as long as width; linear sensilla in a single row on each funicle segment.

Mesosoma: (Fig. 1a) slightly bulged in profile, mesoscutum and scutellum almost flat, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum 0.44x as long as mesoscutum; propodeum with fine reticulation. All coxae with fine reticulation. Forewing (Fig. 1c) with basal cell closed, bare; speculum closed, narrow, below marginal vein with sparse setae; marginal vein 1.76x stigmal vein and 1.26x postmarginal vein. Propodeum (Fig. 1d) with the area between spiracles 3.66x as long as propodeum medially;hind femora (Fig. 1e) large, 2.34x as long as wide, having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically, hind tibia 1.26x as long as hind femora.

Metasoma (Fig. 1a) excluding ovipositor slightly longer than rest of body; tip of hypopygium about 3/4 length metasoma; ovipositor (Fig. 1a) 0.38x metasoma; ovipositor index 0.94.

Male: unknown

Material examined: Holotype, female, Turkey: Adıyaman, Gölbaşı, 13.vii.2006, M. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.

Male: unknown.

Distribution: Turkey: Adıyaman, Gölbaşı,

Host: unknown.

Remarks: Female of *Ditropinotus golbasinensis* sp. nov. is similar to *Ditropinotus aureoviridis* Crawford in having body coloration. But it differs from *D. aureoviridis* in having fore wing with pale brown maculae below marginal vein; hind femora having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically (in *D. aureoviridis* fore wing hyaline; hind femora having ventrally two wavy enlargements, basal one small, apical one bigger, having some smaller teeth, but apical ones bigger than others).

***Ditropinotus aureoviridis* Crawford**

(Figs. 3 a-e)

Ditropinotus aureoviridis Crawford, 1907: 178-179. Lectotype female, Hudson, Michigan, USA; 7 females. 6 males paralectotypes, same as lectotype (USNM) (Grissell 1995).

Synonym: *Ditropinotus flavicoxus* Gahan, 1912: 5-6. Lectotype Female, Prince Georges County, Maryland, USA, (USNM); 5 females, 2 males paralectotypes, same as lectotype (Grissell, 1995). Synonymized by Gahan, 1921: 236.

Taxonomic and biologic notes: The taxonomy, host and biology records were given by Grissell (1995).

Diagnostic characters: Fore wing hyaline; body bicolored,head and mesosoma golden green, pleurae more or less, under sides and abdomen dark honey color; antennae dark, scape more or less and club almost orange color; legs testaceous, hind femora, except tips, and hind tibiae, except apices, almost the color of abdomen; front coxae testaceous; middle coxae slightly and hind almost entirely, greenish; Head 1.32x as wide as height; antenna with flagellum clavate, pedicel plus flagellum 2.64x as long as scape; the latter 3.13x as long as pedicel, 5.55x as long as width, 1.2x as long as club; anellus transverse, funicular segments distinctly transverse, F1 1.7x, F2 1.62x, F3 1.4x, F4 1.44x, F5 1.27x, F6 1.36x, F7 1.42x as wide as long, club twice as long as width. Fore wing with marginal vein 2.5x stigmal vein and 1.5x postmarginal vein; hind femora large, 2.73x as long as wide, ventral margin of hind femora with two asymmetrically enlarged lobes, basal one small, apical one bigger, apical lobe with some smaller teeth, but apical ones bigger than others; propodeum with the area between spiracles 4.86x as long as propodeum medially;ovipositor about half of metasoma.

Description:

Female. Length 3.0-3.5 mm. Body bicolored,head and mesosoma golden green, pleurae more or less, under sides and abdomen dark honey color; antennae dark, scape more or less and club almost orange color; fore wing hyaline; legs testaceous, hind femora, except tips, and hind tibiae, except apices, almost the color of abdomen; front coxae testaceous; middle coxae slightly and hind almost entirely, greenish.

Head: 1.32x as wide as height; antenna (Fig. 3 a) with flagellum clavate, pedicel plus flagellum 2.64x as long as scape; the latter 3.13x as long as pedicel, 5.55x as long as width, 1.2x as long as club; anellus transverse, funicular segments distinctly transverse, F1 1.7x, F2 1.62x, F3 1.4x, F4 1.44x, F5 1.27x, F6 1.36x, F7 1.42x as wide as long, club twice as long as width.

Mesosoma: Fore wing (Fig. 3b) with marginal vein 2.5x stigmal vein and 1.5x postmarginal vein. Propodeum (Fig. 3c) with the area between spiracles 4.86x as long as propodeum medially. Hind femora (Fig. 3d) large, 2.73x as long as wide, ventral margin of hind femora with two asymmetrically enlarged lobes, basal one small, apical one bigger, apical lobe with some smaller teeth, but apical ones bigger than others;

Metasoma: ovipositor about half of metasoma.

Male: Entirely green. not so yellowish in color as the female, antennae as seen Fig. 3e; all segments dark, legs testaceous, coxae and femora except pices green; sculpture of abdomen coarser than female. Length about 2 mm.

Materials: Lectotype female, Hudson, Mishigan, USA; 7 females. 6 males paralectotypes, same as lectotype (Grissell, 1995). As *Ditropinotus flavicoxus* Gahan, 1912:5-6. Lectotype Female, Prince Georges County, Maryland, USA, 5 females, 2 males paralectotypes, same as lectotype (Grissell, 1995).

Distribution: USA, Chile, Russia (Noyes, 2015).

Host: *Tetramesa* sp. (Eurytomidae), *M. destructor* (Cecidomyiidae) (Grissell, 1995, and Noyes, 2015)

Remarks: Female of *Ditropinotus aureoviridis* Crawford differs from *Ditropinotus golbasinensis* sp. nov. and *Ditropinotus karatayensis* sp. nov. in having hind femora 2.73x as long as wide, ventral margin of hind femora with two asymmetrically enlarged lobes, basal one small, apical one bigger, apical lobe with some smaller teeth, but apical ones bigger than others; propodeum with the area between spiracles 4.86x as long as propodeum medially (in *D. golbasinensis* sp. nov. hind femora large, 2.34x as long as wide, having ventrally triangular enlargement with in apical 1/3 having one big, triangular, 3 sharper and longer, 3 smaller teeth apically, hind tibia 1.26x as long as hind femora; propodeum with the area between spiracles 3.66x as long as propodeum medially), and (in *D. karatayensis* sp. nov. hind femora large, 2.72x as long as wide, ventrally broadly c-shaped, in apical half having one big, triangular and some smaller teeth apically, hind tibia almost as long as hind femora; propodeum with the area between spiracles 5.18x as long as propodeum medially).

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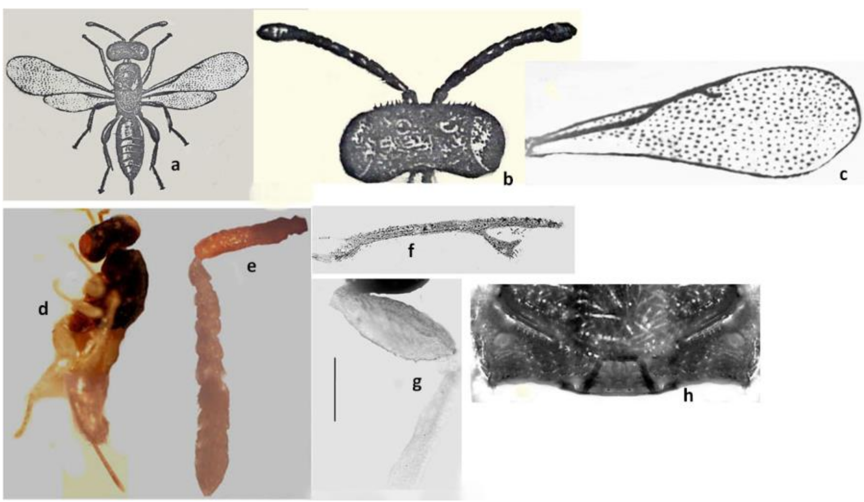

Figure 1. *Ditropinotus* spp., a. b. c. *Ditropinotus obscurus* Nikol'skayaa. body, in dorsal view; b. head with antenna; c. fore wing; d-h. *Ditropinotus karatayensis* Doğanlar sp.nov. d. body in lateral view; e. antennae; f. fore wing veins; g. hind leg; h. propodeum. (scale bar for a= 1 mm, for b= 0.26 mm, for c= 0.36, for d= 0.74 mm; for e, f= 0.3 mm; for g=0.74 mm; for h= 0.5 mm).

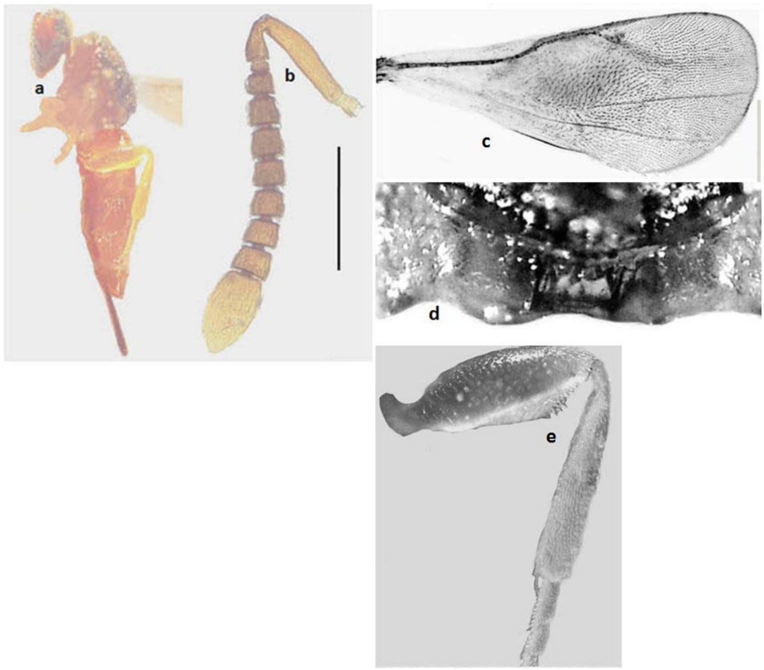

Figure 2. *Ditropinotus golbasinensis*, Doğanlar sp.nov. a. body, in lateral view; b. antenna; c. fore wing; d. propodeum; e. hind leg. (scale bar for a= 0.7 mm, for b= 0.25 mm, for c,e = 0.3 mm, for d= 0.65 mm).

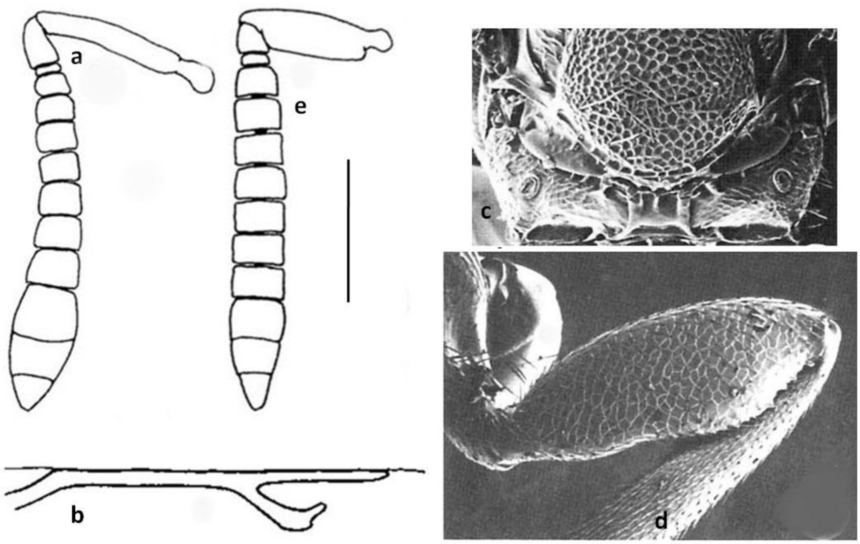

Figure 3. *Ditropinotus aureoviridis* Crawford a. female antenna; b. fore wing veins; c. propodeum; d. hind leg; e. male antenna. (Scale bar for a,e= 0.42 mm; for b= 0.3 mm, for c,d= 0.25 mm).

A NEW ARRANGEMENT OF *PLAGIONOTUS* (*NEOPLAGIONOTUS*) *SPECIOSUS* (ADAMS) (COLEOPTERA: CERAMBYCIDAE: CERAMBYCINAE)

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ABSTRACT: The valid specific name of *Plagionotus* (*Neoplagionotus*) *bobelayei* (Brullé, 1832) is necessarily changed as *Plagionotus* (*Neoplagionotus*) *speciosus* (Adams, 1817) stat. nov. In connection with this, *Clytus bobelayei* Brullé, 1832 syn. nov. is proposed as a new synonym of *Plagionotus* (*Neoplagionotus*) *speciosus* (Adams, 1817). Furthermore, the following taxa are proposed as new subspecies to *Plagionotus* (*Neoplagionotus*) *speciosus* (Adams, 1817) stat. nov.: *Plagionotus* (*Neoplagionotus*) *speciosus mouzafferi* Pic, 1905 ssp. nov. sic stat. nov. from Iran and Iraq, *Plagionotus* (*Neoplagionotus*) *speciosus speciosus* (Adams, 1817) ssp. nov. sic stat. nov. from Caucasus (Georgia and Armenia), and *Plagionotus speciosus bobelayei* (Brullé, 1832) ssp. nov. sic stat. nov. from South-Eastern Europe (including European Turkey), Caucasus (Azerbaijan), Middle East (Israel, Jordan and Syria) and Asian Turkey. Accordingly, the known synonyms of *Plagionotus* (*Neoplagionotus*) *speciosus* (Adams, 1817) as *Plagionotus bobelayei* var. *luristanicus* Pic, 1911 syn. nov. and *Plagionotus persicus* Pic, 1951 syn. nov. are transferred to *Plagionotus* (*Neoplagionotus*) *speciosus mouzafferi* Pic, 1905 as new synonyms.

KEY WORDS: Cerambycidae, Cerambycinae, Clytini, new subspecies, new status, new synonyms

The genus *Plagionotus* Mulsant, 1842 was divided by Kasatkin (2005) into three genera as *Plagionotus* Mulsant, 1842 (type species: *Leptura detrita* Linnaeus, 1758), *Neoplagionotus* Kasatkin, 2005 (type species: *Clytus bobelayei* Brullé, 1832) and *Paraplagionotus* Kasatkin, 2005 (type species: *Cerambyx floralis* Pallas, 1773) on the base of endofallic characters.

Sama (2008) stated that "*A very careful comparative study of the morphology of P. detritus (type of the genus), P. bobelayei (type species of Neoplagionotus), P. scalaris Brullé, 1842 and P. floralis (type species of Paraplagionotus) did not show any significant difference, except the shape of the pronotum, which is more or less transverse in P. detritus, P. arcuatus and in the P. scalaris species group, and about as wide as long in P. floralis*". Thus *Echinocerus* Mulsant, 1863, *Neoplagionotus* Kasatkin, 2005 and *Paraplagionotus* Kasatkin, 2005 were given by Sama (2008) as synonyms of the genus *Plagionotus* Mulsant, 1842. This approach was repeated by Sama in Löbl & Smetana (2010).

However, Özdikmen & Turgut (2009) stated that "*Kasatkin's work on the base of endofallic characters is important and valuable for us in terms of to showing diversities in this group. Furthermore, also diversities of known larval host plants of the species are supported the approach of Kasatkin (2005)*". In connection with this, the genus *Plagionotus* Mulsant, 1842 was divided by Özdikmen & Turgut (2009) into three subgenera as *Echinocerus* Mulsant, 1863 (type species: *Cerambyx floralis* Pallas, 1773), *Neoplagionotus* Kasatkin, 2005 (type species: *Clytus bobelayei* Brullé, 1832) and *Plagionotus* Mulsant, 1842 (type species: *Leptura detrita* Linnaeus, 1758).

According to Danilevsky (2015), *Echinocerus* Mulsant, *Neoplagionotus* Kasatkin and *Plagionotus* Mulsant are separate genera.

In the present work, the approach of Özdikmen & Turgut (2009) is accepted.

MATERIAL AND METHOD

Information in the present text is given in following order: The subfamily and the tribe names are given simply. For the genus group names, the type species and synonyms are provided under the taxa names. Within a genus group name, each species group taxon is given alphabetically with the type information and distibutional data. The type information for each species group taxa are arranged under Tavakilian (2015). The data of distribution are given on basis of Löbl & Smetana (2010, 2011), Danilevsky (2010, 2012a,b, 2013, 2015), Özdikmen (2011) and Miroshnikov (2011). Distributional abbreviations for the present work are available to Löbl & Smetana (2010).

RESULTS

Family Cerambycidae Latreille, 1802
Subfamily Cerambycinae Latreille, 1802
Tribe Clytini Mulsant, 1839

Genus *Plagionotus* Mulsant, 1842: 1
[Type species *Leptura detrita* Linnaeus, 1758]
Platynotus Mulsant, 1839: 71 [HN] [Type species *Leptura detrita* Linnaeus, 1758]
Plagyonotus Thomson, 1861: 220 [unjustified emendation]

Subgenus *Neoplagionotus* Kasatkin, 2005: 51
[Type species *Clytus bobelayei* Brullé, 1832 (= *Callidium speciosum* Adams, 1817)]

Plagionotus speciosus (Adams, 1817) stat. nov.

Callidium speciosum Adams, 1817: 309
Clytus bobelayei Brullé, 1832: 253 **syn. nov.**
Plagionotus bobelayei var. *mouzafferi* Pic, 1905a: 114
Plagionotus bobelayei var. *luristanicus* Pic, 1911: 6
Plagionotus persicus Pic, 1951: 1

The species name was accepted as *Plagionotus* (*Neoplagionotus*) *bobelayei* (Brullé, 1832). Since the senior name *Callidium speciosum* Adams, 1817 was regarded as a junior homonym of *Callidium speciosum* D. H. Schneider, 1787.

Callidium speciosum was described by Adams (1817) from Georgia (Tbilissi). It was a preoccupied with *Callidium speciosum* D. H. Schneider, 1787 that is a valid name as *Isotomus speciosus* (D. H. Schneider, 1787). Thus *Callidium speciosum* Adams, 1817 is not a homonym name anymore and *Plagionotus speciosus* (Adams, 1817) should be accepted as a valid specific name.

The species was recently recorded only by Özdikmen et al. (2014) from Iraq. It has not been included any subspecies until now. However, the present specimens belong to a new subspecies of *P. speciosus*. So, the species includes 3 subspecies with 2 new subspecies in the present work as *P. speciosus bobelayei* (Brullé, 1832) is distributed in E Europe, Ciscaucasus, European and Asian Turkey, Syria, Israel and Jordan, *P. speciosus mouzafferi* Pic, 1905 ssp. nov. sic stat. nov. is distributed in Iraq and Iran, ?NE Syria, ?SE Turkey and ?Turkmenistan, and *P. speciosus speciosus* (Adams, 1817) ssp. nov. sic stat. nov. is distributed in Georgia, Armenia, ?Azerbaijan, ?NETurkey and ?NW Iran now.

Plagionotus speciosus mouzafferi Pic, 1905 ssp. nov. sic stat. nov.

(Figs. 1 and 2)

Plagionotus bobelayei var. *mouzafferi* Pic, 1905a: 114 [Iran: Susa to Isfahan]
Plagionotus bobelayei var. *luristanicus* Pic, 1911: 6 [Iran: Luristan] **syn. nov.**
Plagionotus persicus Pic, 1951: 1 [Iran] **syn. nov.**

Plagionotus bobelayei var. *mouzafferi* was described by Pic (1905a) from Iran (Susa to Isfahan). According to original description of Pic (1905a), prothorax covered with yellow pubescence in its basal third [*prothorax ayant son tiers basal revêtu de pubescence jaune*]. Pic (1905b) stated that "*Plagionotus bobelayei* var. *mouzafferi* distinguishes by the uninterrupted yellow pubescence, and not disposed in the form of distinct bands, on all base of the prothorax, and by the large yellow bands of elytra, especially median" [*"Plagionotus bobelayei var. mouzafferi se distingue par la pubescence jaune continue, et non disposée en forme de bandes distinctes, sur toute la base du prothorax, et par les bandes jaunes des élytres, la médiane surtout, larges."*]. Pic (1911) also stated that "v. *mouzafferi* Pic, with an anteapical macula, and not a fascia, on elytra and, besides, the prothorax is provided with a broad yellow basale band" [*"La v. mouzafferi Pic, offre une macule, et non une fascie, anteapicale sur les élytres et, en outre, le prothorax est muni d'une large bande jaune basale"*].

We found from Iraq such a type of specimens of *Plagionotus speciosus*. And we decided the present specimens that are adequately different from the typical form and *P. speciosus bobelayei* must be a new subspecies of *P. speciosus*. So, we propose *Plagionotus bobelayei* var. *mouzafferi* Pic, 1905 should accept as a new subspecies of *P. speciosus*.

The new subspecies is easily distinguished from the subspecies *P. speciosus bobelayei* by relatively larger size (relatively smaller size in *P. speciosus bobelayei*), relatively much widened yellow bands of elytra (yellow bands of elytra relatively much narrowed in *P. speciosus bobelayei*), relatively large apical spot of elytra, so anteapical and apical spots relatively close to each other (apical spot of elytra relatively small, so anteapical and apical spots relatively far from each other in nominal subspecies), a much narrowed blackened transversal band in posterior half of pronotum or absence of blackened transversal band in posterior half of pronotum, so completely covered with yellow pubescence (blackened transversal band in posterior half of pronotum much widened in *P. speciosus bobelayei*) and much thicker antennae (antennae much thinner in *P. speciosus bobelayei*) chiefly.

Also the new subspecies differs from the nominal subspecies *P. speciosus speciosus* by relatively larger size (relatively smaller size in *P. speciosus speciosus*), relatively much widened yellow bands of elytra (yellow bands of elytra relatively much narrowed in *P. speciosus speciosus*) and relatively thicker antennae (antennae relatively thinner in *P. speciosus speciosus*) chiefly.

Besides, some of the current synonyms of *P. speciosus* as *Plagionotus bobelayei* var. *luristanicus* Pic, 1911 and *Plagionotus persicus* Pic, 1951 from Iran have also relatively much widened yellow bands of elytra and relatively large apical spot of elytra, so anteapical and apical spots relatively close to each other. Therefore, the described taxa should accept as new synonyms of the new subspecies *Plagionotus speciosus mouzafferi* Pic, 1905 stat. nov..

Variability. Body relatively more narrowed and smaller size, subparallel in form in *Plagionotus persicus*, while relatively more widened and larger size, not subparallel in form in the others. Even if narrowed, a blackened transversal band in posterior half of pronotum is present in the specimens from Iraq and *Plagionotus bobelayei* var. *luristanicus* Pic, 1911, while such a band is absent, so completely covered with yellow pubescence in the typical form and *Plagionotus persicus* Pic, 1951. Ground pubescence of elytra, while brown to blackish brown in the specimens from Iraq, is black in the specimens from Iran. Anteapical spot of elytra is maculiform, not a fascia, in the typical form and in the specimens from Iraq while as a fascia, not maculiform in *Plagionotus bobelayei* var. *luristanicus* Pic, 1911 and *Plagionotus persicus* Pic, 1951. And median band of elytra is especially widened in the typical form, while not especially widened in the others.

Material. Iraq: Mosul, Hamam Al-Alil, IV.2012, 1 ♂ that is deposited at Gazi University, Ankara (Turkey); Iraq: Erbil, Topzawa, 08.VI.2002, 1 ♂ that is deposited in Entomology Museum of Erbil (Iraq). The new subspecies *P. speciosus mouzafferi* was also given by Ismail (1983) as *P. speciosus* on the base of a specimen from Mosul (Zaho). The specimen is deposited in the Entomology Museum of Abu Garip (Baghdad).

Distribution. The new subspecies is known from Iran and Iraq now. Probably it can occur also in NE Syria, SE Asian Turkey and even Turkmenistan.

Plagionotus speciosus speciosus (Adams, 1817) ssp. nov. sic stat. nov.

(Fig. 1)

Callidium speciosum was described by Adams (1817) from Georgia (Tbilissi). It was accepted as a synonym of *Plagionotus bobelayei* (Brullé, 1832) from Greece (Peloponnese). It should be accepted as a nominal subspecies of *P. speciosus*.

In the new subspecies, yellow bands relatively widened and apical spot of elytra relatively large, so anteapical and apical spots relatively close to each other.

Moreover, according to original description of the new subspecies, blackened transversal band in posterior half of pronotum is much narrower than that of the nominotypical subspecies, and anteapical band of elytra in the shape of semilunar macula.

"……ceterum laevis tomento compacto decumbente breviore viridi-flavo vestitus, fascia transversali lata utrinque attenuata in medio lineaque tenuiore postice atris……"

"………..4. macula semilunari aut rotundata paulo infra et tandem………"

The new subspecies is easily distinguished from the subspecies *P. speciosus bobelayei* by relatively large apical spot of elytra, so anteapical and apical spots relatively close to each other (apical spot of elytra relatively small, so anteapical and apical spots relatively far from each other in *P. speciosus bobelayei*), relatively widened yellow bands of pronotum and elytra (yellow bands of pronotum and elytra relatively narrowed in *P. speciosus bobelayei*), a much narrowed blackened transversal band in posterior half of pronotum (blackened transversal band in posterior half of pronotum much widened in *P. speciosus bobelayei*) and relatively thicker antennae (antennae relatively thinner in *P. speciosus bobelayei*) chiefly.

Also the new subspecies differs from the subspecies *P. bobelayei mouzafferi* by relatively smaller size (relatively larger size in *P. bobelayei mouzafferi*), relatively much narrowed yellow bands of elytra (yellow bands of elytra relatively much widened in *P. bobelayei mouzafferi*) and relatively thinner antennae (antennae relatively thicker in *P. bobelayei mouzafferi*) chiefly.

Distribution. The new species is known from Georgia and Armenia now. Probably it can occur also in Azerbaijan, NE Asian Turkey and NW Iran.

Plagionotus speciosus bobelayei **(Brullé, 1832) ssp. nov. sic stat. nov.**
(Fig. 1)

Clytus bobelayei was described by Brullé (1832) from Greece (Peloponnese). It was accepted as a valid specific name of *Plagionotus speciosus* (Adams, 1817) that was regarded as a homonym name with *Callidium speciosum* D. H. Schneider, 1787. It should be accepted as a subspecies of *Plagionotus speciosus* (Adams, 1817).

The new subspecies is easily distinguished from the other subspecies by above mentioned characters in the parts of *Plagionotus speciosus mouzafferi* Pic, 1905 and *Plagionotus speciosus speciosus* (Adams, 1817).

Distribution. The new species is known from South-Eastern Europe (including European Turkey), Caucasus (Azerbaijan), Middle East (Israel, Jordan and Syria) and Asian Turkey.

Consequently, a necessarily new arrangement for the species *Plagionotus speciosus* is presented as follows:

Genus *Plagionotus* Mulsant, 1842: 1
[Type species *Leptura detrita* Linnaeus, 1758]
Platynotus Mulsant, 1839: 71 [HN] [Type species *Leptura detrita* Linnaeus, 1758]
Plagyonotus Thomson, 1861: 220 [unjustified emendation]

Subgenus *Neoplagionotus* Kasatkin, 2005: 51
[Type species *Clytus bobelayei* Brullé, 1832 (= *Callidium speciosum* Adams, 1817)]

Species *Plagionotus speciosus* Adams, 1817: 309 (*Callidium*) **stat. n.**

Subspecies *P. s. bobelayei* Brullé, 1832: 253 (*Clytus*) **ssp. n. sic stat. n.**
Type information. Syntypes ♂♂ & ♀♀, Muséum National d'Histoire Naturelle, Paris [type locality "Morea" (Creece)]
Range. E: AL BU GR MC RO ST TR UK **A**: AB IS JO SY TR

Subspecies *P. s. mouzafferi* Pic, 1905a: 114 ssp. n. sic stat. n.
Plagionotus bobelayei var. *luristanicus* Pic, 1911: 6 [Iran: Luristan] **syn. nov.**
Plagionotus persicus Pic, 1951: 1 [Iran] **syn. nov.**
Type information. Syntypes, ex collection M. Pic, Muséum National d'Histoire Naturelle, Paris [Type locality "from Susa to Isfahan" (Iran)]
Range. A: IN IQ ?SY ?TM ?TR

Subspecies *P. s. speciosus* Adams, 1817: 309 (*Callidium*) **ssp. n. sic stat. n.**
Type information. Holotype, ex collection M. Adams, Zoological Museum of Moscow University, Moscow [Type locality "Tbilissi" (Georgia)]

Range. A: ?AB AR GG ?IN ?TR

A key to the described taxa of *Plagionotus speciosus* (Adams, 1817)

1. Apical spot of elytra relatively small, anteapical and apical spots relatively far from each other; antennae relatively thinner............................***Clytus bobelayei***
-. Apical spot of elytra relatively large, anteapical and apical spots relatively close to each other; antennae relatively thicker..**2**

2. Yellow bands of elytra relatively much widened; antennae relatively thicker....**3**
-. Yellow bands of elytra relatively much narrowed; antennae relatively thinner...***Callidium speciosus***

3. Posterior half of pronotum covered with uninterrupted yellow pubescence, and so not arranged in form of distinct bands..**4**
-. Posterior half of pronotum covered with interrupted yellow pubescence, and so arranged in form of distinct bands....................***P. bobelayei* var. *luristanicus***

4. Yellow drawings partly less developed, median band of elytra not especially large; pronotum less large; body relatively more narrowed and smaller size, subparallel in form...***P. persicus***
-. Yellow drawings well developed, median band of elytra especially large; pronotum larger; body relatively more widened and larger size, not subparallel in form...***P. bobelayei* var. *mouzafferi***

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Figure 1. *Plagionotus speciosus mouzafferi* Pic, 1905 ssp. nov. sic stat. nov. from N Iraq: Mosul (left), *Plagionotus speciosus speciosus* (Adams, 1817) ssp. nov. sic stat. nov. (from D. Kasatkin in http://cerambycidae.org/taxa/bobelayei-(Brull%C3%A9-1832)) (center), *P. speciosus bobelayei* (Brullé, 1832) from S Turkey: Antalya (right).

Figure 2. *Plagionotus speciosus mouzafferi* Pic, 1905 ssp. nov. sic stat. nov. from N Iraq (in Entomology Museum of Erbil).

MISHINAELLA, NEW NAME FOR THE GENUS *MARGINELLA* MISHINA, 1972 (OSTRACODA), JUNIOR HOMONYM OF *MARGINELLA* LAMARCK, 1799 (GASTROPODA)

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[Kempf, E. K. 2016. *Mishinaella*, new name for the genus *Marginella* Mishina, 1972 (Ostracoda), junior homonym of *Marginella* Lamarck, 1799 (Gastropoda). Munis Entomology & Zoology, 11 (2): 285-286**]**

ABSTRACT: The genus name *Marginella* Mishina, 1972 (Ostracoda) represents a primary junior homonym of the well-known genus *Marginella* Lamarck, 1799 (Gastropoda). *Mishinaella* is proposed as a new substitutional name for *Marginella* Mishina, 1972.

KEY WORDS: *Marginella*, *Mishinaella*, Ostracoda, nomenclatural changes, junior homonym, replacement name, new combinations.

Class Ostracoda Latreille, 1802
Subclass Podocopa Sars, 1866
Order Podocopida Sars, 1866
Suborder Cypridocopina Jones, 1901
Superfamily Cypridoidea Baird, 1845
Family (?) Cyprididae Baird, 1845

Genus *Mishinaella* nom. nov.

Marginella Mishina, 1972. Novye vidy drevnikh rasteniy i bespozvonochnykh SSSR, 3: 276 (Arthropoda: Crustacea: Ostracoda). Preoccupied by *Marginella* Lamarck, 1799. Mémoires de la Société d'Histoire Naturelle de Paris, 1: 70 (Mollusca: Gastropoda).

Remarks on nomenclatural change: The generic term *Marginella* was established by Lamarck (1799). It is still widely used as an available valid genus name in Gastropoda, comprising dozens of species. Subsequently, a genus name *Marginella* was also proposed as new by Mishina (1972) for fossil ostracods from non-marine Lower Triassic deposits of Russia.

Thus, the genus name *Marginella* Mishina, 1972 is a primary junior homonym of the valid genus name *Marginella* Lamarck, 1799. In accordance with article 60.3 of the International Code of Zoological Nomenclature (1999), herewith is proposed to replace *Marginella* Mishina, 1972 with the new substitutional name *Mishinaella*.

Overview of the species (according to Kempf, 1997a,b):
Type species: *Mishinaella necessaria* (Mishina, 1972) **comb. nov.**
Original binomen: *Marginella necessaria* Mishina, 1972
Other species:
Mishinaella triassiensis (Mishina, 1972) **comb. nov.**
Original binomen: *Marginella triassiensis* Mishina, 1972
Mishinaella granumiformis (Mishina, 1986) **comb. nov.**
Original binomen: *Marginella granumiformis* Mishina, 1986
Mishinaella integra (Mishina, 1986) **comb. nov.**
Original binomen: *Marginella integra* Mishina, 1986

Remarks: In all her publications, E. M. Mishina used the author name Mischina as transliteration of the Cyrillic writing of her family name. In more recent publications her family name is transliterated as Mishina, for example Sennikov & Golubev (2006).

Etymology: The new name is honoring Evgeniya Mikhailovna Mishina in recognition of her valuable contributions to ostracodology and biostratigraphy.

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EFFICACY OF *NIGELLA SATIVA* (RANUNCULACEAE) EXTRACTS ON ADULT PERFORMANCE AND PHASE TRANSITION OF THE DESERT LOCUST *SCHISTOCERCA GREGARIA* (ORTHOPTERA: ACRIDIDAE).

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[Ghoneim, K., Hamadah, K., El-Hela, A., Mohammad, A.-H. & Amer, M. 2016. Efficacy of *Nigella sativa* (Ranunculaceae) extracts on adult performance and phase transition of the desert locust *Schistocerca gregaria* (Orthoptera: Acrididae). Munis Entomology & Zoology, 11 (2): 287-302**]**

ABSTRACT: The current work was carried out to investigate the effects of methanolic, petroleum ether and n-butanol extracts (30.0, 15.0, 7.5, 3.7 and 1.8%) of *Nigella sativa* seeds on several parameters of the adult performance and phase transition of *Schistocerca gregaria*. The n-butanol extract exhibited the most potent adulticidal activity followed with petroleum ether and methanolic extract, respectively, after treatment of penultimate (4th) instar nymphs. After treatment of last (5th) instar nymphs, methanolic extract exhibited the least adulticidal activity. Also, treatment of penultimate instar nymphs with *N. sativa* extracts resulted in blocked adult emergence in a dose-dependent course. Whereas no effect was exhibited by n-butanol extract on adult emergence after treatment of last instar nymphs, various degrees of restrained process was determined at some concentrations of other extracts. All *N. sativa* extracts (only at the higher two concentrations) caused adult deformities after treatment of the penultimate instar nymphs. After treatment of the last instar nymphs, n-butanol extract halted the adult morphogenesis only at the higher two concentrations but other extracts impaired it at all concentrations. In connection with the phase transition, treatment of penultimate instar nymphs with n-butanol extract (at 15.0 %) resulted in a solitarious tendency of *S. gregaria* adults as appeared with deeply green colour. The ovarian maturation in adult females was pronouncedly or slightly prohibited by *N. sativa* extracts during prolonged duration, depending on the concentration. Also, the reproductive life-time (oviposition period) was affected. Total adult longevity was shortened or prolonged, i.e. adult aging was accelerated or delayed, depending on extracts, concentration level and time of treatment.

KEY WORDS: emergence, longevity, methanol, morphogenesis, mortality, n-butanol, petroleum ether, solitarization

The desert locust *Schistocerca gregaria* (Forskal) (Orthoptera: Acrididae) ranks together with other migratory locusts-amongst the most important crop pests in Africa. Damage caused by the desert locust is a consequence of its polyphagous behaviour, high density of the population, and the nature to aggregate and swarm. Each individual gregarious locust is able to consume roughly its own weight (about 2 grams) in foliage daily (Youdeowei, 1988; Lindsey, 2002; Lecoq, 2005). In the last century alone, there were seven periods of numerous plagues, the longest of which lasted intermittently for 13 years (Lindsey, 2002). Current locust control operations are mainly based on organophosphorus pesticides as a result of the banning of organochlorines (Lecoq, 2001). The widespread use of such synthetic pesticides has considerable drawbacks, such as the development of insect resistance to insecticides, increased costs, handling hazards, concerns about insecticide residues, and great threats to both human and environmental health (Garriga & Caballero, 2011). Therefore, many institutions have intensified their efforts in the search for integrated locust control measures. Much attention has been devoted to use plant extracts or plant constituents that have insecticidal effects (Schmutterer, 1990a,b; Krall & Wilps, 1994) because they are generally pest-specific, relatively harmless to non-target organisms and they are biodegradable and consequently harmless to the environment (Rembold, 1984; Isman, 2008).

Nigella plants are widely distributed in countries which border the Mediterranean Sea, central Europe and western Asia (Hedrick, 1972). There are many species classified in the genus *Nigella* (Ranunculaceae) (Bailey, 1978; Atta, 2003). Among the most important medicinal crops in Egypt is *Nigella sativa* which is commonly called as known as black seed or black cumin (Rayan et al., 2011) and "Habbat al-barakah" (the seed of blessing) in Arabic. Seeds of *N. sativa* and their oil have a long history of folklore usage in various systems of medicines. Sharma et al. (2009) reviewed the medicinal, pharmacological, traditional value and folk remedies of this herb. In pest control, Deshpande et al. (1974) reported that oleic and linoleic acid as insecticidal components from *N. sativa* which were found to be toxic to *Callosobruchus chinensis*. Similar results were obtained (Adebowale & Adeire, 2006; Adabie-Gomez et al., 2006). The *N. sativa* extracts exhibited toxic effects on *Spodoptera littoralis* (Abd ELatif et al., 2009) and *S. gregaria* (Hamadah et al., 2013) in addition to disrupted growth, development (Hamadah et al., 2013) and larval haemogram (Ghoneim et al., 2015) of the latter insect. Also, Ahmad et al. (2013) studied the insecticidal activity of *N. sativa* extracts against the larvae of *Trogoderma granarium* under laboratory conditions. Recently, Khan et al. (2014) reported disturbing effects of the acetone seed extract on biology and invasion of the stored product pest *Tribolium castaneum*. The present work was carried out to investigate the effects of different extracts of *N. sativa* on the adult performance of *S. gregaria* including emergence, survival, morphogenesis and longevity. In addition, possible effect of the present plant extracts on phase transition of *S. gregaria* was studied.

MATERIALS AND METHODS

Experimental insect

The desert locust *S. gregaria* was used as an experimental insect in the present study. The insects were reared and handled under the crowded conditions of Hunter-Jones (1961). Depending on the improvements of Ghoneim et al. (2009) Insects were reared in wooden formed cages provided with electric bulbs (150 watt) adjusted to a photoperiod of 12L:12D and to maintain an ambient temperature of 32±2°C. Fresh clean leaves of *Trifolium alexandrinum* (Egyptian clover), in winter, and the leaves of leguminous plant *Sesbania aegyptiaca,* in summer, were used for feeding insects in the stock culture. On the other hand, *T. alexandrinum* leaves only were offered as food for insects of the experimental work.

Plant extracts

Samples of *N. sativa* seeds were purchased from an Egyptian market. The samples were air-dried, powdered and kept in tightly closed amber coloured glass containers for protecting from light, at low temperature. Dried and pulverized powder of *N. sativa* (2 kg) was exhaustively separately extracted with methanol (1.7 Lx3). The combined alcohol extracts were concentrated to 400 ml, diluted with 400 ml of water and the next successively extracted with petroleum ether (5x400 ml) was concentrated to dryness under reduced pressure giving (11 and 90 g), and n-butanol (5x400 ml) extracts were concentrated to dryness under reduced pressure giving (75 and 55 g).

Nymphal treatments

The newly moulted 4th (penultimate), or 5th (last) instar nymphs of *S. gregaria* were fed on fresh leaves of *Trifolium alexandrinum* after dipping in the different concentration levels of each *N. sativa* seed extract. After dipping for three minutes, the treated leaves were allowed to dry before offering to nymphs. A day after treatment, all nymphs (treated and control) were provided with untreated fresh food plant. Ten replicates (one nymph/replicate) were used for each concentration. Each individual nymph was isolated in a glass vial provided with a thin layer of sterilized sand as a floor. All vials were located in a large cage having a suitable electric bulb. The nymphs were carefully handled until the adult emergence just after which all parameters of adult performance and solitarization tendency were recorded.

Adult performance parameters

Adult emergence was recorded in percentage. For investigation the adulticidal activity of *N. sativa* extracts on *S. gregaria*, the adult mortality was observed throughout the adult longevity and calculated in percentage. For investigating the morphogenic efficiency, the adult deformities were observed and calculated in percentage according to Vargas & Sehnal (1973) as follows:

[No. of deformed adults / No. of larvae] × 100

The ovarian maturation period, reproductive life-time, post-oviposition period and total adult longevity was measured in days±SD (Norris, 1954).

The solitarization tendency of the adults appeared with green colour and other solitary features. The phase transition was estimated in percentage.

Statistical analysis of Data

Data obtained were analyzed by the Student's *t*-distribution, and refined by Bessel correction (Moroney, 1956) for the test significance of difference between means.

RESULTS

Effect of *N. sativa* extracts on adult survival

Depending on data assorted in Table 1, the survival potential of adult *S. gregaria* was affected by a latent adulticidal activity of *N. sativa* seed extracts. Treatment of penultimate (4th) instar nymphs with the highest concentration of methanolic extract resulted in 20% mortality. The same extract, at other concentrations, failed to cause adult mortality. Both petroleum ether and n-butanol extracts exhibited various adulticidal activities since different mortality percentages were recorded, regardless the concentration. Moreover, n-butanol extract was the most effective on the adult survival followed with petroleum ether and methanolic extracts, respectively. As clearly seen in the same table, a similar adulticidal activity of *N. sativa* extracts could be exhibited after treatment of last instar nymphs. Furthermore, mortality was dose-dependent by both petroleum ether and n-butanol extracts. Methanolic extract was the least toxic one (10.0% mortality at the highest concentration vs. 0.0% mortality of control adults).

Effect of *N. sativa* extracts on adult emergence

Data of Table 2 clearly reveal some effects of *N. sativa* extracts on the nymphal metamorphosis into adults after treatment of penultimate instar nymphs because the adult emergence decreased as the concentration was increased. As for example, the adult emergence was determined as 62.5 and 20.0 (compared to 88.9% of control congeners) at the highest concentration of methanolic and petroleum ether extracts, respectively. No adults emerged after treatment with the highest concentration of n-butanol extract but the sublethal concentration led to only 50.0% of adult emergence (compared to 90.0% of control congeners). Whereas no effect was displayed by n-butanol extract on the adult emergence after treatment of last instar nymphs, restrained emergence was observed after treatment with the higher two concentrations of petroleum ether extract (60 and 40%, respectively, vs. 90% emergence of control adults). Also, treatment with methanolic extract, at 30.0 and 3.7%, resulted in 90.0% adult emergence (compared to 100% emergence of adult controls, Table 2).

Effect of *N. sativa* extracts on adult morphogenesis

In connection with the impaired adult morphogenesis program of *S. gregaria* by *N. sativa* seed extracts, data distributed in the previously cited table obviously show various percentages of deformed adults. After treatment of the penultimate instar nymphs, only 20% adult deformities were recorded at the highest concentration of methanolic extract but it failed to affect the morphogenesis at other lower concentrations. Petroleum ether and n-butanol extracts were more potent because different percentages of adult malformations were observed almost proportionally to the concentration (50.0, 14.2,14.2 and 12.5 at 30.0, 15.0, 7.5 and 3.7 % of petroleum ether extract as well as 40.0, 33.3, 33.3 and 25.0 at 15.0, 7.5, 3.7 and 1.8 of n-butanol extract). The adult deformities could be, generally, assorted in the following features: Adults with curled legs and coiled incompletely developed short antennae. Adults with crumpled wings and transparent posterior area and coiled antennae (Fig.1). Adult failure to completely get rid the last nymphal exuvia, where the nymphal exuvia remained as attached parts to the adult body (Fig. 2). After treatment of the last instar nymphs with methanolic extract, no deranging action could be exerted on the adult morphogenesis (Table 2). In contrast, treatment with petroleum ether or n-butanol extracts resulted in serious adult deformities. At the highest concentration of each, the strongest action was exerted on morphogenesis (33.3 % adult deformities at 30 % of petroleum ether extract and 22.2 % adult deformities at 30 % of n-butanol extract (compared to no adult deformities of control adults). Referring to Figs 1 and 2, features of adult impaired morphogenesis program can be observed and described as previously mentioned.

Effects of *N. sativa* extracts on phase transition

After treatment of penultimate instar nymphs with only n-butanol extract of *N. sativa*, an important solitarization affect was exhibited because 50 % of the deformed adults appeared with some characteristics of the solitary phase (such as deeply green colour of the body) at 15 % of n-butanol extract (Table 2 and Fig. 3). No solitarization effect was recorded after treatment of last instar nymphs, regardless the extract or concentration.

Effects of *N. sativa* extracts on adult longevity

It may be conceivable to mention that the maturation period (preoviposition period) is an important indicator for the ovarian maturation rate, i.e, longer period usually indicate a slower rate and *vice versa*. After treatment of penultimate instar nymphs with *N. sativa* seed extracts, data arranged in Table 3 exiguously show that methanolic extract pronouncedly prohibited the ovarian maturation of *S. gregaria* during remarkably lengthened duration, especially at the higher three concentrations (31.3±1.5, 28.7±1.5 and 28.7±0.6 days at 30.0, 15.0 and 7.5 % vs. 22.0±1.7 days of controls). On the other hand, both petroleum ether and n-butanol extracts slightly prohibited it, during insignificantly prolonged duration, regardless the concentration.

After treatment of last instar nymphs, data of the same table clearly indicate a major prolonging effect of *N. sativa* seed extracts on the ovarian maturation period which may be informative to delayed sexual maturity owing to regressed ovarian maturation rate, especially at the higher concentrations. However, methanolic extract pronouncedly prohibited such vital process at the higher three concentrations (25.7±1.1, 26.0±1.3 and 26.0±1.0 days, at 30.0, 15.0 and 7.5%, vs. 22.0±1.7 days of control congeners). Only at the higher two concentrations of petroleum ether extract and the highest concentration of n-butanol extract, the ovarian maturation period was significantly prolonged indicating remarkably delayed sexual maturity (Table 3).

Considering the reproductive life-time (oviposition period), data assorted in Table 4 show general enforcing action of N. sativa extracts on the adult females to quickly lay eggs during shortened period, after treatment of penultimate instar nymphs. Such action was exerted during significantly or insignificantly shortened period, depending on the concentration of methanolic extract and petroleum ether extract. Moreover, n-butanol extract exerted stronger enforcing action on this process at the majority of concentrations (at least $P<0.05$: 7.7±1.5, 8.7±0.6, 9.7±1.5 and 11.7±1.2 days at 15.0, 7.5, 3.7 and 1.8 %, compared to 13.7±2.1 days of controls). After treatment of last instar nymphs, a prohibiting effect was appreciated for adult females by methanolic extract because they lasted insignificantly prolonged reproductive life time. A reverse result was recorded for both petroleum ether and n-butanol extracts because adult females had been enhanced to lay eggs during shortened time intervals (11.7±1.6 and 11.3±1.5, $p<0.01$, at 30.0 and 15.0 % of petroleum ether extract, vs. 23.7±1.2 days of controls, as well as 9.3±1.0 and 11.3±1.5, $p<0.05$ at least, at 30.0 and 15.0 % of n-butanol extract, vs. 15.7±1.5 days of controls, Table 4).

The total adult longevity can be used as an informative indicator of the adult aging, i.e. the prolonged longevity denotes the delaying of adult aging and *vice versa*. Data of total adult longevity, as affected by the *N. sativa* extracts, were listed in Table 5. After treatment of penultimate instar nymphs, both methanolic and petroleum ether extracts caused a slight prolongation in the total longevity, irrespective of concentration. In contrast, n-butanol extract exhibited a pronounced shortening effect on longevity because all treated adult females reached the death point after remarkably shorter duration than that of control adult females, at all concentrations (39.7±3.5, 43.0±3.6, 43.0±3.5 and 48.7±2.5 days at concentrations 15.0, 7.5, 3.7 and 1.8 %, vs. 58.8±4.6 days of controls).

After treatment of the last instar nymphs, data of aforementioned table obviously revealed a shortening effect of both petroleum ether and n-butanol extracts on the total longevity which was obviously observed at the higher two concentrations (30.0 and 15.0 %, respectively). In other words, petroleum ether and n-butanol extracts led to an accelerated aging of the adults ending in death (45.0±1.0 and 45.7±3.1 days, compared to 53.0±2.6 days of controls, for petroleum ether extract and 38.7±2.3 and 48.0±2.6 days, compared to 53.0±1.0 days of controls, for n-butanol extract). On the contrary, methanolic extract did not exert a similar action but reversely delayed the adult aging during slightly prolonged longevity.

DISCUSSION

Blocked adult emergence of *S. gregaria*

Complete or partial blockage of adult emergence was reported for different insects by various botanicals such as the blocked emergence of *Musca domestica*

(Naqvi et al., 2007) and *Rhynchophorus ferrugineus* by azadirachtin (Abdel-Ghaffar et al., 2008), *Tribolium castaneum* by the methanolic extracts of *Centaurium erythreae* and *Pteridium aquilinum* (Jbilou et al., 2008), *S. gregaria* by extracts of *Fagonia bruguieri* (Aly et al., 2010) and *Ammi visnaga* (Ghoneim et al., 2014a) as well as *Earias vittella* by Neemazal T/S and Nimbecidine (Bhardwaj & Ansari, 2015).

In the present study, treatment of penultimate (4th) instar nymphs of *S. gregaria* with *N. sativa* seed extracts resulted in blocked adult emergence in a dose-dependent course. Whereas no effect was exhibited by n-butanol extract on adult emergence after treatment of last (5th) instar nymphs, various degrees of restrained emergence was determined at the higher two concentrations of petroleum ether extract (30.0, 15.0%) and at 30.0 and 3.7% of methanolic extract. Since the eclosion hormone, a blood-born factor arising from the central nervous system (Truman & Riddiford, 1970) triggers eclosion in a wide range of insect orders including Orthoptera (Truman, 1981), the *N. sativa* extracts probably prevented this hormone from being released at the appropriate time. Hence, the eclosion hormone appears to be affected by a certain active ingredient(s) contained in the *N. sativa* extracts. However, the exact mode of action needs further investigation.

Affected adult survival of *S. gregaria*

The available literature contains many reported toxicities of extracts from various plant species on the immature stages of several insect pests (Nicol and Schmutterer, 1991; Osman, 1993; Ghoneim et al., 2000, 2009; 2014a; von Elling et al., 2002; Athanassiour et al., 2005; Senthil Nathan et al., 2006, 2007; Siriwattanarungsee et al., 2008; Tripathy et al., 2011; Janakan & Ramakrishnan, 2014a,b) while the lethal effects of botanicals on adults are relatively scarce. In the present study, n-butanol extract of *N. sativa* seeds exhibited the most potent adulticidal activity followed with petroleum ether and methanolic extract, respectively, after treatment of penultimate instar nymphs of *S. gregaria*. The methanolic extract exhibited the least mortal effect after treatment of last instar nymphs. These results agree, to some extent, with those reported adulticidal activities of different plant species on some pests, such as *T. castaneum* (Naqvi & Perveen, 1991), *Muscina stabulans* (Ghoneim & Al-Dali, 2002) and *M. domestica* (Amer et al., 2004). Also, the current results are in consistent with the adulticidal activities of extracts derived from *Rhizophora mucronata* (Kabaru & Gichia, 2001), *Fagonia bruguieri* (Aly et al., 2010) and *Punica granatum* (Ghoneim et al., 2014b) on the same locust.

The adult mortality, i.e., reduced survival potential, of *S. gregaria* by *N. sativa* extracts, in the present study, may be explicated by a latent prohibitory effect on feeding leading to continuous starvation and subsequently death (Ghoneim et al., 2000). It may be, also, attributed to the action of certain active ingredients in the *N. sativa* seed extracts on the homeostasis leading to increasing loss of body water and subsequently death (Amer et al., 2004), since *N. sativa* contains conjugated linoleic acid, thymoquinone, nigellone (dithymoquinone), melanthin, nigilline, damascenine, tannins, flavonoids, saponins, alkaloids, proteins, lipids, dithymoquinone carvacol and anethole 4-terpinole (Bruits & Bucar, 2000; Al-Ghamdi, 2001; Ali & Blunden, 2003; Sharma et al., 2009; Ali et al., 2012).

Deranged adult morphogenesis of *S. gregaria*

In the present work, all *N. sativa* extracts (only at the higher two concentrations) caused adult deformities after treatment of the penultimate instar nymphs. After treatment of the last instar nymphs, n-butanol extract halted the adult morphogenesis only at the higher two concentrations but other extracts impaired it at all concentrations. These results are in agreement with those reported results for extracts from various plants against the same locust. As for examples, adult morphogenic defects were observed after treatment of last instar nymphs with a neem oil (Schmutterer et al., 1993), after treatment of penultimate instar nymphs with ethanol extract of *Cyprus rotendus* (El-Sokkary, 2003), Neemazal (a neem preparation) (Hamadah et al., 2013), some extracts of *F. bruguieri* (Aly et al., 2010) as well as some extracts of *P. granatum* peel (Ghoneim et al., 2014b). Moreover, various malformed moths of *Spodoptera littoralis* were caused by Neemazal (Ghoneim et al., 2000), acetone and ethanol extracts of *Aristolochia pubescens* impaired the adult morphogenesis of *Aticarsia gemmatalis* (Nascimento et al., 2004), as well as many adult deformities in both *Spodoptera frugiperda* and *Tenebrio molitor* were observed after treatment with methanol extract of *Myrtillocactus geometrizans* (Cespedes et al., 2005).

Imperfectly emerged adults, in the present study may be due to the disturbance of normal ecdysteroid titer which is usually needed for the achievement of perfect metamorphosis program or even the inhibition of neurosecretion (prothoracicotropic hormone) causing inhibition of a number of physiological processes, such as metamorphosis and morphogenesis (Josephrajkumar et al., 1999).

Induced solitarization tendency of *S. gregaria*

The desert locust, *S. gregaria*, usually display a dramatic polyphenism, being able to transform reversibly between two forms or phases that differ considerably in many aspects including behaviour, physiology and morphology (Uvarov, 1977; Roessingh et al., 1993; Tawfik et al., 1999; Rogers et al., 2004; Pener & Simpson, 2009; Gordon et al., 2012; Harano et al., 2012; Rogers et al., 2014). Many studies have been performed searching for the exogenous and endogenous causes of phase changes in *S. gregaria*. They has focused on the changes from gregarious to solitary, since only gregarious locusts form large migratory swarms capable of invading and inflicting serious damage to crops. No striking interpretation was introduced more than the suggestion about the role of ecdysteroids, juvenoids, and possibly also pheromones in initiating and regulating this process (Pener, 1983).

As reported in the available literature, phase shift from gregaria to solitaria in *S. gregaria* was caused by some extracts of *Melia volkensii* (Rembold & Mwangi, 1989; Nasseh et al., 1993). A clear tendency to solitarization was elicited after treatment of *S. gregaria* gregarious phase with neem oil (Nicol and Schmutterer, 1991; Schmutterer et al., 1993; Langewald et al., 1995). Also, treatment of earlier instar nymphs of *Locusta migratoria migratorioides* resulted in behavior toward the solitary phase (Schmutterer & Freres, 1990). Treatment of gregarious penultimate or last instar nymphs of *S. gregaria* with the ethanol extract of *C. rotendus* resulted in a solitary tendency in adult females (Bakr et al., 2008). The n-butanol extract of *F. bruguieri* enhanced the solitarious tendency in adult females of gregarious *S. gregaria*, regardless the time of nymphal treatment (Aly et al., 2010). In connection with the phase transition, in the present study, treatment of penultimate instar nymphs of *S. gregaria* with n-butanol extract of *N. sativa* seeds (at 15.0 %) induced the solitarious tendency of *S. gregaria* because 50 % of the deformed adults appeared with deeply green colour (characteristic of solitary phase).

The phase transition can be explained on the hormone basis. Allatectomy (surgical removal of corpora allata, CA, responsible for the production of juvenile hormone, JH) resulted in no gregarious behavior in locusts (Richard et al., 2001). Such observation rationally explains the higher activity of CA in solitary *S.*

gregaria causing higher titers of JH in haemolymph and a green colouration of the cuticle (Uvarov, 1966). On the pheromone basis, the existence of 'gregarization pheromone' was postulated (Nolte, 1963; Gillett & Phillips, 1977). The solitarization effect of *N. sativa* n-butanol extract, in the present study, may be due to their influence on this pheromone or to its influence on the hormonal system of the insect (Langewald et al., 1995). For some detail, JH influences the response of olfactory interneurons in the antennal lobe to aggregation pheromone, whereas the responsiveness of antennal receptors neurons is not changed (Richard et al., 2001). In conclusion, it is reasonable to suggest the existence of a juvenilizing, and subsequently antigregarizing, substance in *N. sativa* extracts but more deep investigation is needed to disclose some aspects of our suggestion since juvenilizing effects of some other plant species, such as *Ajuga chamaepitys*, were determined (Jacobson, 1989).

Disturbed adult longevity of *S. gregaria*

In Orthoptera, the sexual maturity usually needs a time interval elapsed between adult emergence until the day of laying the first egg. During such period, the ovaries (or testes) developed and the adult will be sexually mature. Generally, the pre-oviposition period may be informative for the sexual maturity rate, i.e. the shorter period indicates the faster rate and *vice versa*. Thus, it may acceptable to use the pre-oviposition period in adult females of *S. gregaria* as a good indicator to the ovarian maturation rate. In this regard, several contradictory results had been reported in the literature, since some plant extracts promoted the ovarian maturation, and hastened the sexual maturity, while others prohibited the ovarian maturation, and delayed the sexual maturity. An enhancing effect on the ovarian maturation of *S. gregaria* was exhibited by certain concentrations of Neemazal (a neem preparation)(Hamadah et al., 2013) as well as by methanolic and petroleum ether extracts of *F. bruguieri* (Aly et al., 2010). In contrast, some extracts of *C. rotendus* completely retarded the ovarian maturation of the same locust (El-Sokkary, 2003), n-butanol extract of *F. bruguieri* exhibited a delaying effect on the same process (Aly et al., 2010) and some extracts of *P. granatum* peel slightly or remarkably retarded this vital process (Ghoneim et al., 2014b). On the other hand, no effect was exhibited on it in *M. domestica* by Margosan-O (a neem preparation) or Jojoba oil (Hamadah, 2003).

In the present investigation, treatment of penultimate instar nymphs of *S. gregaria* with methanolic extract of *N. sativa* seeds resulted in pronouncedly prohibited ovarian maturation but petroleum ether extract or n-butanol extract exhibited a slight inhibitory effect. Moreover, predominantly retarding effect on this vital process during prolonged duration was recorded after treatment of last instar nymphs, especially at the higher concentrations. An appreciable interpretation of the prolonged pre-oviposition period, indicating delayed sexual maturity and regressed ovarian maturation rate, in *S. gregaria* after treatment with *N. sativa* extracts, in the present study, is still obscure but some active compounds in these extracts may interfere with the hormonal regulation of this physiological event.

As reported in the literature, treatments of some insects with extracts of various plants resulted in shortened reproductive life-time (oviposition period) of the adult females. With regard to *S. gregaria*, treatment of 2^{nd}-4^{th} instar nymphs with ethanol extract of *M. volkensii* shortened the reproductive life-time (Nasseh et al., 1993). A similar result was reported after nymphal treatments with *F. bruguieri* (Basiouny, 2008) or *P. granatum* peel extracts (Ghoneim et al., 2014b). In addition, shortened reproductive life-time of some other insects was caused by several botanicals, such as *M. domestica* by an aqueous extract of *Hyoscyamus* *muticus* (Abou El-Ela et al., 1995) and Margosan-O or Jojoba oil (Hamadah, 2003) and *Chrysomya chloropyga* by some extracts of certain Nigerian plants (Muse et al., 2003). In agreement with these reported results, the current study revealed an enforcing action of all *N. sativa* seed extracts on the reproducing adult females of *S. gregaria* to quickly lay eggs during significantly or insignificantly shortened period. An exceptional case of prolonged time was recorded after treatment of last instar nymphs only with methanolic extract. Unfortunately, no acceptable interpretation of the general shortening effect of *N. sativa* extracts on the reproductive life-time, or enforcing the adult females of *S. gregaria* to quickly lay eggs, is available right now!! Therefore, further investigation should be carried out to explore the mode of action of certain chemical constituents of these extracts on this crucial physiological criterion.

After the attainment of sexual maturity, insects often show degenerative changes in some tissues and organs which can be called 'senility' or 'aging'. In insects, the affected adult longevity can be considered an informative indicator of the adult aging, i.e. prolongation of longevity may denote a delay of aging and *vice versa*. As reported in the available literature, several neem products pronouncedly affected the total adult longevity of some insect pests, such as *Spodoptera litura* (Steffens & Schmutterer, 1982; Gujar & Mehrotra, 1983a, b; Mehrotra & Gujar, 1984; Di Ilio et al., 1999), *M. stabulans* (Ghoneim & Al-Dali, 2002), *M. domestica* (Amer et al., 2004), *Chrysomya megacephala* (Siriwattanarungsee et al., 2008). Also, the adult longevity of *S. littoralis* was shortened by larval treatments with extracts from *Melia azedarach* (Schmidt et al., 1997; Hassan, 2002). Considering the present experimental locust, *S. gregaria*, Neemazal treatments of penultimate instar nymphs resulted in remarkably shortened adult longevity but a reversal effect was recorded after treatment of last instar nymphs (Hamadah, 2009). Similar results had been reported for the same locust by extracts of *F. bruguieri* (Aly et al., 2010). Also, accelerating or delaying action of *P. granatum* peel extracts was exhibited on the adult females of the same locust, depending on the extract and time of nymphal treatment (Ghoneim et al., 2014b).

In the present study, treatment of penultimate instar nymphs of *S. gregaria* with methanolic extract or petroleum ether extract of *N. sativa* seeds resulted in a slight prolongation of total adult longevity (delayed aging), irrespective of the concentration. On the contrary, n-butanol extract exhibited a significant shortening effect on the longevity (accelerated aging). After treatment of the last instar nymphs, a shortening effect of both petroleum ether and n-butanol extracts was remarkably exhibited on the longevity, at the higher two concentrations. In contrast, methanolic extract affected the adult life in an insignificantly prolonged longevity or delayed aging. The probable cause of shortened and prolonged adult longevity, as described by Gujar & Mehrotra (1983a, b) and Mehrotra & Gujar (1984), is due to azadirachtin's interference with the neuro-endocrine system of the insects. Delaying of adult aging (or prolonged longevity) in *S. gregaria*, in the current study, may be attributed to the antioxidant properties of some constituents of *N. sativa* seeds as extracted by certain solvents. On the other hand, accelerating of adult aging (or shortened longevity) may be explicated by the action of some chemicals extracted from the tested plant by certain solvents on a hormonal activity because there is a close relation between certain hormones and adult longevity (Clancy et al., 2001; Simon et al., 2003; Broughton et al., 2005; Yamamoto et al., 2013).

CONCLUSION

As clearly shown in the present study, *N. sativa* seed extracts exhibited slight or remarkable effects on various parameters of adult performance of *S. gregaria*. In addition, n-butanol extract induced the phase transition from gregaria to solitaria. It prohibited the gregarization tendency of *S. gregaria* and hence the swarm formation necessary for invasion can be avoided. Therefore, *N. sativa* seed extracts can be used as a complementary agent in the integrated control of this destructive locust. However, further investigation should be carried out to ascertain the active ingredient (s) contained in these extracts responsible for these effects.

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A B C

Figure 1. Different adult malformations of *S. gregaria* were produced as a result of the nymphal treatments with *N. sativa* extracts. A) Normal adult. B) Treated adult with curled legs, incompletely developed short antennae and crumbled wings with transparent posterior area. C) Treated adult with crumbled wings of transparent posterior area and coiled antenna.

A B C

Figure 2. Different degrees of adult failure to completely get rid the last nymphal exuvia as a result of the nymphal treatments with *N. sativa* extracts. A) Nymphal exuvium attached to abdomen, wings and legs. B) Nymphal exuvium attached to wings, legs and mouth parts. C) Nymphal exuvium attached to wings.

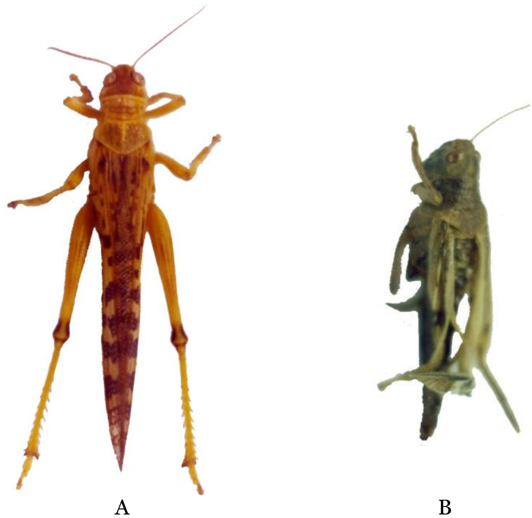

Figure .3 Phase shift of *S. gregaria* from gregaria to solitaria as a result of the nymphal treatments with some concentrations of *N. sativa* extracts. A) Normal gregarious adult. B) Solitarized adult.

Table 1. Adulticidal activity (%) of *N. sativa* extracts on *S. gregaria*.

Solvent	**Conc. (%)**	**After treatment of 4th instar nymphs**	**After treatment of 5th instar nymphs**
Methanol	30.0	20.0	10.0
	15.0	00.0	00.0
	07.5	00.0	00.0
	03.7	00.0	10.0
	01.8	00.0	00.0
	Controls	00.0	00.0
Petroleum ether	30.0	50.0	50.0
	15.0	12.5	50.0
	07.5	14.2	22.2
	03.7	14.2	22.2
	01.8	00.0	11.1
	Controls	00.0	00.0
n-butanol	30.0	---	22.2
	15.0	50.0	22.2
	07.5	50.0	42.9
	03.7	40.0	22.2
	01.8	33.3	11.1
	Controls	00.0	00.0

Conc.: Concentration level. ---: No adult could metamorphose from the treated nymphs.

Table 2. Affected adult emergence and morphogenesis of *S. gregaria* by nymphal treatments with *N. sativa* extracts.

Solvent	Conc. (%)	After treatment of 4th instar nymphs			After treatment of 5th instar nymphs		
		Emergence (%)	Deformed %	Solitarian %	Emergence (%)	Deformed %	Solitarian %
Methanol	30.0	62.5	20.0	0.0	090.0	0.0	0.0
	15.0	85.7	0.0	0.0	100.0	0.0	0.0
	07.5	88.9	0.0	0.0	100.0	0.0	0.0
	03.7	87.5	0.0	0.0	090.0	0.0	0.0
	01.8	88.9	0.0	0.0	100.0	0.0	0.0
	Controls	88.9	0.0	0.0	100.0	0.0	0.0
Petroleum ether	30.0	20.0	50.0	0.0	60.0	33.3	0.0
	15.0	85.7	12.5	0.0	40.0	25.0	0.0
	07.5	85.7	14.2	0.0	90.0	11.1	0.0
	03.7	85.7	14.2	0.0	90.0	22.2	0.0
	01.8	88.9	0.0	0.0	90.0	11.1	0.0
	Controls	88.9	0.0	0.0	90.0	0.0	0.0
n-butanol	30.0	---	---	0.0	90.0	22.2	0.0
	15.0	50.0	40.0	**50.0**	90.0	11.1	0.0
	07.5	40.0	33.3	0.0	90.0	0.0	0.0
	03.7	60.0	33.3	0.0	90.0	11.1	0.0
	01.8	60.0	25.0	0.0	90.0	11.1	0.0
	Controls	90.0	0.0	0.0	90.0	0.0	0.0

Conc., ---: see footnote of Table (1). Mean ± SD followed by letter (a): not significantly different (P>0.05), (b): Significantly different (P<0.05), (c): Highly significantly different (P<0.01), (d): Very highly significantly different (P<0.001).

Table 3. Influenced ovarian maturation period (Mean days±SD) of *S. gregaria* by nymphal treatments with *N. sativa* extracts.

Solvent	Conc. (%)	After treatment of 4th instar nymphs	After treatment of 5th instar nymphs
Methanol	30.0	31.3 ± 1.5 c	25.7 ± 1.1 b
	15.0	28.7 ± 1.5 c	26.0 ± 1.3 b
	07.5	28.7 ± 0.6 c	26.0 ± 1.0 b
	03.7	24.0 ± 1.7 a	24.3 ± 1.2 a
	01.8	23.7 ± 1.5 a	24.0 ± 1.0 a
	Controls	22.0 ± 1.7	22.0 ± 1.7
Petroleum ether	30.0	---	28.3 ± 1.2 c
	15.0	25.0 ± 1.0 a	26.7 ± 1.3 b
	07.5	23.0 ± 1.7 a	24.7 ± 1.5 a
	03.7	23.0 ± 1.0 a	24.3 ± 0.6 a
	01.8	22.7 ± 1.2 a	24.7 ± 1.2 a
	Controls	22.0 ± 1.7	23.7 ± 1.2
n-butanol	30.0	---	24.0 ± 1.0 c
	15.0	27.7 ± 3.1 a	28.3 ± 1.2 a
	07.5	28.7 ± 4.2 a	27.7 ± 1.2 a
	03.7	28.0 ± 3.6 a	27.7 ± 0.6 a
	01.8	30.7 ± 1.5 a	28.3 ± 0.6 a
	Controls	32.0 ± 3.7	28.0 ± 1.0

Conc., ---: see footnote of Table (1). a, b, c, d: see footnote of Table (2).

Table 4. Disturbed reproductive life-time (Mean days±SD) of *S. gregaria* by nymphal treatments with *N. sativa* extracts.

Solvent	Conc. (%)	After treatment of 4th instar nymphs	After treatment of 5th instar nymphs
Methanol	30.0	10.7 ± 1.2 c	17.3 ± 1.2 a
	15.0	14.0 ± 1.7 a	17.0 ± 1.0 a
	07.5	14.0 ± 1.0 a	16.7 ± 1.2 a
	03.7	16.7 ± 1.2 a	17.3 ± 2.1 a
	01.8	16.3 ± 1.5 a	17.3 ± 1.5 a
	Controls	16.7 ± 1.5	16.7 ± 1.5
Petroleum ether	30.0	---	11.7 ± 1.6 c
	15.0	08.7 ± 1.2 c	11.3 ± 1.5 c
	07.5	09.7 ± 1.5 c	17.0 ± 1.0 a
	03.7	15.3 ± 1.5 a	17.7 ± 1.2 a
	01.8	16.3 ± 1.5 a	17.0 ± 2.0 a
	Controls	16.7 ± 1.5	19.0 ± 1.0
n-butanol	30.0	---	09.3 ± 1.2 c
	15.0	07.7 ± 1.5 c	11.3 ± 1.5 b
	07.5	08.7 ± 0.6 c	13.3 ± 1.5 a
	03.7	09.7 ± 1.5 b	14.7 ± 1.2 a
	01.8	11.7 ± 1.2 a	15.3 ± 0.6 a
	Controls	13.7 ± 2.1	15.7 ± 1.5

Conc., ---: see footnote of Table (1). a, b, c, d: see footnote of Table (2).

Table 5. Disturbed total adult longevity (Mean days±SD) of *S. gregaria* by nymphal treatments with *N. sativa* extracts.

Solvent	Conc. (%)	After treatment of 4th instar nymphs	After treatment of 5th instar nymphs
Methanol	30.0	46.3 ± 2.5 a	45.7 ± 2.1 a
	15.0	46.3 ± 1.5 a	45.7 ± 2.9 a
	07.5	46.7 ± 1.2 a	45.3 ± 1.5 a
	03.7	44.7 ± 3.5 a	45.0 ± 2.0 a
	01.8	44.3 ± 1.5 a	45.0 ± 1.0 a
	Controls	43.3 ± 2.1	43.3 ± 2.1
Petroleum ether	30.0	---	45.0 ± 1.0 c
	15.0	42.3 ± 2.1 a	45.7 ± 3.1 b
	07.5	41.3 ± 3.5 a	48.3 ± 1.5 a
	03.7	43.3 ± 3.2 a	49.3 ± 1.5 a
	01.8	44.0 ± 1.0 a	49.0 ± 3.5 a
	Controls	43.3 ± 2.1	53.0 ± 2.6
n-butanol	30.0	---	38.7 ± 2.3 d
	15.0	39.7 ± 3.5 c	48.0 ± 2.6 b
	07.5	43.0 ± 3.6 c	49.0 ± 2.6 a
	03.7	43.0 ± 3.5 c	50.7 ± 1.5 a
	01.8	48.7 ± 2.5 b	52.3 ± 1.2 a
	Controls	58.8 ± 4.6	53.0 ± 1.0

Conc., ---: see footnote of Table (1). a, b, c, d: see footnote of Table (2).

A NEW SPECIES OF *CHEILOTOMA* CHEVROLAT FROM TURKEY WITH AN UPDATED LIST (COLEOPTERA: CHRYSOMELIDAE: CLYTRINAE)

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[Özdikmen, H. & Bal, N. 2016. A new species of *Cheilotoma* Chevrolat from Turkey with an updated list (Coleoptera: Chrysomelidae: Clytrinae). Munis Entomology & Zoology, 11 (2): 303-311**]**

ABSTRACT: All members of Turkish *Cheilotoma* Chevrolat is introduced on the base of 95 specimens of 4 species from 7 different provinces in Turkey. Correspondingly *Cheilotoma* (s. str.) *cankiriensis* sp. nov. from Çankırı province in North part of Central Anatolian Region of Turkey is described. Holotype (female) and its spermatheca are photographed. The newly described species is distinct with spermathecal structures (especially thickening of ductus spermatheca) whereby are easily distinguished from other known species of the genus. *Cheilotoma* (s. str.) *beldei* Kasap, 1984 is recorded for the first time from Çankırı province of Turkey. Accordingly an updated list of *Cheilotoma* species with their provincial distributions of all existing taxa in Turkey is given. A key to species in Palaearctic region of the genus is also provided.

KEY WORDS: Chrysomelidae, Clytrinae, *Cheilotoma, Cheilotoma cankiriensis,* new species, taxonomy, Turkey

The palearctic genus *Cheilotoma* Chevrolat, 1836 was intensively studied in the last time (Kasap, 1984, 1987; Vela & Bastazo, 1994; Medvedev & Kantner, 2003; Medvedev, 2004; Özdikmen et al., 2007). According to Regalin & Medvedev in Löbl & Smetana (2010), the genus includes eleven taxa (seven species and four subspecies) of two subgenera as the nominate subgenus and *Exaesiognatha* Jakobson, 1923. They are distributed only in Palaearctic region (mostly Mediterranean area, and also Central Asia and Siberia). In Europe, the genus is represented by four subspecies of two species of the subgenus *Cheilotoma* (s. str.) (Regalin & Medvedev in Löbl & Smetana, 2010; Audisio & Regalin, 2016).

Özdikmen et al. (2007) stated that Turkish fauna of *Cheilotoma* Chevrolat consist of four species. The same species for Turkish fauna were given by Ekiz et al. (2013) and Özdikmen & Mercan (2014) repeatedly. They are *Ch.* (s. str.) *beldei* Kasap [types from Ankara, Eskişehir, Nevşehir and Sivas provinces], *Ch.* (s. str.) *erythrostoma* Faldermann [recorded to Turkey by Regalin (2002), Medvedev (2004), Özdikmen et al. (2007) and Özdikmen (2011) from Ankara, Bolu, Erzurum, Kastamonu, Konya and Samsun provinces], *Ch.* (s. str.) *musciformis* (Goeze) [recorded to Turkey by Gruev & Tomov (1979, 1984), Aslan & Özbek (2000) and Özdikmen (2011) from Ankara, Erzurum, Isparta and Konya provinces], and *Ch.* (s. str.) *voriseki* Medvedev & Kantner, 2003 [type from Adıyaman province].

We had the opportunity to study material of the genus *Cheilotoma* Chevrolat collected during the expedition of Çankırı province in 2015 and a new species of the genus *Cheilotoma* was detected. In addition many deposited specimens at Gazi University and Nazife Tuatay Plant Protection Museum (Turkey, Ankara) collected from Ankara, Bolu, Eskişehir, Kastamonu, Konya and Samsun provinces in previous years were also evaluated. The description of the new species is presented below.

MATERIALS AND METHODS

The available specimens for the present study are into two categories. a) New material: 22 specimens were collected by the present authors from Çankırı province in Northern part of Central Anatolia of Turkey in 2015. b) Old material: 73 specimens were collected mostly by the first author from Ankara, Bolu, Eskişehir, Kastamonu, Konya and Samsun provinces in Northern part of Central Anatolia, and North-Western and Central parts of Northern Anatolia of Turkey in 1973, 1994, 1997, 2003, 2004, 2007. As a result of identification, known species and a new species of *Cheilotoma* were determined. The holotype of *Cheilotoma cankiriensis* sp. nov. is described, discussed and illustrated in the present text. The available specimens for the present study are deposited at Gazi University and Nazife Tuatay Plant Protection Museum (Turkey: Ankara).

Information in the present text is given in following order:

For the generic names, the type species and synonyms are provided under the taxon name. For each species group taxa, reported from Turkey, are given alphabetically. The Turkish distribution patterns for each species group taxon are given only concerning provinces. A distribution map for each species group taxon in Turkey is also provided. Turkish endemic taxa are marked with the sign (*).

For distribution data of the taxa, Özdikmen (2011), Ekiz et al. (2013), Özdikmen & Mercan (2014) for Turkey and Regalin & Medvedev in Löbl & Smetana (2010) for World are used in the text chiefly. The data is given in addition to the distribution data in Turkey, marked underlined. Key to species of genus is proposed on the base of the keys of Medvedev (2004) and Warchalowski (2010).

RESULTS AND DISCUSSIONS

The genus *Cheilotoma* includes 5 species in Turkey with a newly described species. Turkish *Cheilotoma* is reviewed on the base of 95 specimens of 5 species from 7 different provinces in Turkey with the present work. All members of Turkish *Cheilotoma* are presented as follows:

Genus *Cheilotoma* Chevrolat, 1836

Cheilotoma Chevrolat in Dejean, 1836: 420 (type species *Chrysomela bucephala* Schaller, 1783 = *Chrysomela musciformis* Goeze, 1777)
Chilotoma Agassiz, 1846: 78 (unjustified emendation)

The genus includes two subgenera as the nominate subgenus and *Exaesiognatha* Jakobson, 1923. It is represented only by the nominate subgenus in Turkey.

Subgenus *Cheilotoma* Chevrolat, 1836

Cheilotoma Chevrolat in Dejean, 1836: 420 (type species *Chrysomela bucephala* Schaller, 1783 = *Chrysomela musciformis* Goeze, 1777)
Chilotoma Agassiz, 1846: 78 (unjustified emendation)

Cheilotoma beldei Kasap, 1984

Cheilotoma beldei Kasap, 1984: Col. Bull., 38: 216
Cheilotoma ammanica Lopatin, 1995: Ent. Obozr., 74: 100

This species is known from Ankara, Bolu, Çankırı, Eskişehir, Isparta, Nevşehir, Samsun and Sivas provinces in Turkey (Fig. 4a). It is recorded for the first time from Çankırı province. It is distributed only in Asia (Israel, Jordan and Turkey). Thus it has an E-Mediterranean (Palaestino-Taurian) chorotype.

New material: **Çankırı prov.:** Yapraklı, entry of Topuzsaray, 40°38'28" N, 33°53'11" E, 1169 m, 26.V.2015, 1 specimen; Ilgaz, Yaylaören, 40°53'7" N, 33°30'28" E, 999 m, 29.V.2015, 1 specimen; Çerkeş, İnceğiz village, 40°55'00" N, 32°58'54" E, 1133 m, 20.VI.2015, 1 specimen; Bayramören, Koçlu-Feriz return, 41°1'9" N, 33°17'58" E, 758 m, 21.VI.2015, 2 specimens; Bayramören, between Feriz-Dereköy, 41°2'5" N, 33°14'32" E, 954 m, 21.VI.2015, 6 specimens.

Old material: **Ankara prov.:** Kızılcahamam, Güvem, 1100 m, 28.V.1997 and 14.VI.1997, 3 specimens; Kızılcahamam, Aköz village, 1150 m, 28.V.1997, 5 specimens; Kızılcahamam, Soğuksu National Park, 1350 m, 07.VI.1997, 18 specimens; Kızılcahamam, Yukarı Çanlı, 1540 m, 14.VI.1997, 3 specimens; Kızılcahamam, Yenimahalle, 1100 m, 05.VII.1997, 1 specimen; Kızılcahamam, Karagöl, 1650 m, 11.VII.1997, 2 specimens; **Bolu prov.:** Gerede, 14.VI.1994, 1 specimen; between Gerede–Kızılcahamam, 1200 m, 17.V.2003, 1 specimen; **Eskişehir prov.:** Seyitgazi, 14.VI.1973, 1 specimen; **Samsun prov.:** Alaçam, Kapaklı village, 620 m, 16.VI.2004, 5 specimens.

****Cheilotoma cankiriensis*** **spec. nov.**

(Figs. 1, 2, 4b)

Type material. Holotype ♀: Turkey: Çankırı prov.: Ilgaz, Yaylaören, 40°53'7" N, 33°30'28" E, 999 m, 29.V.2015, Paratypes: 7 ♀♀: Same locality and data with holotype; 1 ♀: Turkey: Çankırı prov.: Orta, entry of Kısaç village, 40°37'57" N, 33°3'11" E, 1283 m, 10.V.2015; 1 ♀: Turkey: Çankırı prov.: Ilgaz, Kuyupınar village, 40°51'24" N, 33°36'8" E, 1411 m, 18.VI.2015; 1 ♀: Turkey: Çankırı prov.: Çerkeş, between Gelikova-Çorapoğlu return, 40°51'47" N, 32°56'47" E, 1361 m, 20.VI.2015. The specimens are deposited at Gazi University (Turkey: Ankara).

Etymology. The name is dedicated to the type locality Çankırı province (Turkey).

Description of holotype.

Body length 5.9 mm. Body width 3.25 mm.

Black with metallic reflection.

Head dorsoventrally flattened, black with metallic green reflection. Labrum entirely fulvous. Mandibles fulvous at most part, darkened only in apical part. Palpi of mouth parts darkened. Clypeus entirely black with metallic green reflection, distinctly punctate with gently arcuate apical margin. Frons entirely black with metallic green reflection, indistinctly grooved, indistinctly punctate and pubescent near eyes. Vertex glossy, sparsely punctate. Antennae distinctly serrate from 5th antennomere, antennomeres 1 and 2 thick and robust, 3 small and thin, 4 distinctly longer than 3 and widened to apex, 5-10 triangular, as wide as long, 11 feebly elongate. First four antennomeres entirely fulvous, the remaining parts of antennae black.

Pronotum bicolorous, fulvous with a large black spot with metallic green reflection on disc, with moderately strong, rather dense punctures, but interspaces between punctures distinctly more than diameter of punctures. Pronotum 2 times as wide as long, broadest beyond centre, with rear angles broadly rounded.

Scutellum black, trapeziform with broadly truncate apex, distinctly elevated above level of elytra, surface glossy, finely and sparsely punctate, mostly on sides.

Elytra approximately 1.3 times as long as wide, entirely metallic green, densely punctate, interspaces mainly as large as the punctures themselves, with dense microsculpture.

Pygidium black, covered with rather long, semierect or erect light pubescence.

Underside black with metallic reflection excluding fulvous prothorax, covered with rather long, semierect or erect light pubescence. Last abdominal sternite with a distinct hollow in the middle.

Legs covered with densely light pubescent, all coxae, trochanters and tarsi black, all tibiae fulvous, all femora bicolorous (anterior femora black in basal 1/3 and fulvous in apical 2/3, mid femora black in basal 2/3 and fulvous in apical 1/3, hind femora black in basal 3/4 and fulvous in apical 1/4).

Spermatheca in figure 2.

Male. Unknown.

Variability. Body length changes 4.75-6.25 mm. The size of central dark spot on pronotal disc is more or less same in all paratypes, but its shape displays three different forms as the same of holotype (5 paratypes), diamond shaped (5 paratypes) and entirely rounded (1 paratype).

Distribution. Known only from the type locality situated in Çankırı province in Northern part of Central Anatolian region of Turkey.

Diagnosis. The genus *Cheilotoma* is represented by 4 species in Turkey until now as *Cheilotoma beldei* Kasap, *Cheilotoma erythrostoma* Faldermann, *Cheilotoma musciformis* (Goeze) and *Cheilotoma voriseki* L. N. Medvedev & Kantner. Spermathecal structures of 3 species were given by Medvedev (2004) and Warchalowski (2010) with figures. Since female of *Cheilotoma voriseki* L. N. Medvedev & Kantner from Southern Anatolia is unknown. Thus the new species is unique due to spermathecal structures in known species from Turkey. It is easily distinguished from the other Turkish species by thickening of ductus spermatheca chiefly. Similar thickening is known only in *C. fulvicollis* from Syria. Anyway the spermathecal structures of new species also much differs from that of *C. fulvicollis*.

A comparison with spermathecal structures of the new species and known species can present as follows:

In the new species, vasculum C shaped. Apex of vasculum pointed. Bulbus more or less like a small wineglass. Ductus relatively thickened, its proximal part smooth, the remaining part spirally coiled (Fig. 2).

In *C. fulvicollis*, vasculum like a somewhat narrowed question mark. Apex of vasculum relatively thickened, extreme apex of vasculum somewhat curved inwards. Bulbus swollen. Ductus relatively thickened, all parts not spirally coiled (Fig. 3a).

In *C. erythrostoma*, vasculum like a somewhat widened question mark. Apex of vasculum pointed, extreme apex of vasculum slightly directed upward. Bulbus like a cushion. Ductus relatively thinned, its proximal part smooth, the remaining part spirally coiled (Fig. 3b).

In *C. musciformis*, vasculum a somewhat widened question mark. Apex of vasculum pointed. Bulbus elongated. Ductus relatively thinned, almost all parts spirally coiled (Fig. 3c).

In *C. beldei*, vasculum a somewhat widened question mark. Apex of vasculum pointed, extreme apex curved inward clearly. Bulbus elongated. Ductus relatively thinned, almost all parts spirally coiled (Fig. 3d).

Cheilotoma erythrostoma Faldermann, 1837

Cheilotoma erythrostoma Faldermann, 1837: Faun. Ent. Transc., 376
Cheilotoma erythostoma Faldermann, 1837: Faun. Ent. Transc., 376 (unused original spelling)

This species has two subspecies as the nominate subspecies and *Cheilotoma erythrostoma italica* Leoni, 1906 that is known only from Italy and Spain. Thus it is represented only by the nominate subspecies *Cheilotoma erythrostoma erythrostoma* Faldermann, 1837 in Turkey.

It is known from Ankara, Bolu, Erzurum, Kastamonu, Konya and Samsun provinces in Turkey (Fig. 4c). It is distributed in Europe (Bulgaria, Czech Republic, Slovakia, South part of European Russia and Ukraine) and Asia (Armenia, Azerbaijan, Georgia, Iran, Kazakhstan and Turkey). Thus it has a Turano-European chorotype.

Old material: **Ankara prov.:** Kızılcahamam, Yukarı Çanlı, 1250 m, 28.V.1997, 2 specimens; Kızılcahamam, Salin village, 1300 m, 14.VI.1997, 2 specimens; **Bolu prov.:** Bolu–Gerede road, Susuz Kınık village, 720 m, 1 specimen; between Gerede–Kızılcahamam, 1200 m, 17.V.2003, 2 specimens; Yeniçağa-Mengen, Çamlık village, 20.V.2004, 4 specimens; Yeniçağa-Mengen, 20.V.2004, 2 specimens; **Kastamonu prov.:** Kastamonu-İnebolu, 17.V.2004, 2 specimens; **Konya prov.:** Beyşehir, 1137 m, 16.V.2007, 16 specimens; **Samsun prov.:** Alaçam, Kapaklı village, 620 m, 16.VI.2004, 1 specimen.

Cheilotoma musciformis (Goeze, 1777)

Chrysomela musciformis Goeze, 1777: Ent. Beyt., 319
Chrysomela bucephala Schaller, 1783: Abh. Hall. Nat. Ges., 1: 276
Melolontha muscoides Geoffroy, 1785: Ent. Par., 72

This species has three subspecies as the nominate subspecies, *Cheilotoma musciformis apennina* L. N. Medvedev, 2004 that is known only from Italy, Spain and *Cheilotoma musciformis iranica* L. N. Medvedev, 2004 that is known only from Iran. *Cheilotoma musciformis hispanica* L. N. Medvedev, 2004 is a synonym of *Cheilotoma musciformis apennina* L. N. Medvedev, 2004. Thus it is represented only by the nominate subspecies *Cheilotoma musciformis musciformis* (Goeze, 1777) in Turkey.

It is known from Ankara, <u>Erzurum</u>, <u>Isparta</u> and Konya provinces in Turkey (Fig. 4d). It was recorded by Aslan & Özbek (2000) from Erzurum and Isparta provinces. Unfortunately Ekiz et al. (2013) and Özdikmen & Mercan (2014) did not include these records. It is distributed in Europe (Austria, Bosnia & Herzegovina, Bulgaria, Central and South parts of European Russia, Croatia, France, Greece, Hungary, Italy, Moldovia, Montenegro, Romania, Slovenia and Ukraine) and Asia (East Siberia, Kazakhstan, Mongolia and Turkey). Thus it has a Sibero-European chorotype.

Old material: **Konya prov.:** Hadim, Küçüklü village, Şeker Piknik, 1300 m, 18.V.2007, 1 specimen.

**Cheilotoma voriseki* L. N. Medvedev & Kantner, 2003

Cheilotoma voriseki L. N. Medvedev & Kantner, 2003: Ent. Zeit., 113: 268

This endemic species is known only from Adıyaman province in Turkey (Fig. 4e). It is distributed only in Asia (Turkey). Thus it has an Anatolian chorotype.

KEY TO SPECIES

1. Mandibles much shorter than head. Elytra unicolorous. West Palaearctic species..Subgenus *Cheilotoma*.........2
-. Mandibles strongly elongate, almost as long as head. Elytra with fulvous apical spot. Central Asiatic species.....................Subgenus *Exaesiognatha*.........*C. ivanovi*

2. Pronotum entirely fulvous. Ductus of spermatheca not spirally coiled (Fig. 3a)... 3
-. Pronotum bicolorous (fulvous with central metallic spot). Ductus of spermatheca spirally coiled (Figs. 2, 3b,c,d)..4

3. Emargination of clypeus in male strictly quadrangular, its teeth curved outside. Head sparsely pubencent and weakly punctate. Vasculum of spermatheca like a somewhat narrowed question mark. Apex of vasculum relatively thickened, extreme apex of vasculum somewhat curved inwards. Bulbus spermatheca swollen. Ductus spermatheca relatively thickened, all parts not spirally coiled (Fig. 3a). Syrian species..*C. fulvicollis*
-. Emargination of clypeus in male feebly trapeziform, widened to apex, its teeth straight. Head pubencent and strongly punctate. Female unknown. Anatolian species..*C. voriseki*

4. Pronotum with fulvous lateral margins and large spot in the middle. Elytra with fulvous apex. North African species..*C. rotroui*
-. Pronotum fulvous with central metallic dark spot. Elytra without fulvous apex. Species from other parts of West Palaearctic region...5

5. Vasculum of spermatheca like a somewhat widened question mark. Apex of vasculum pointed, extreme apex of vasculum slightly directed upward. Bulbus spermatheca like a cushion. Ductus spermatheca relatively thinned, at least its proximal part smooth, the remaining part spirally coiled (Fig. 3b). Clypeus U-like emarginated in male. Apex of aedeagus widened and transversely truncate............ ....*C. erythrostoma*
-. Vasculum of spermatheca C shaped or like a somewhat widened question mark (Figs. 2, 3c,d). Ductus spermatheca relatively thickened or thinned. If male known, emargination of clypeus quadrangular or deltoidal. Apex of aedeagus more or less pointed..6

6. Vasculum of spermatheca C shaped. Ductus spermatheca relatively thickened as in *C. fulvicollis*, its proximal part smooth, the remaining part spirally coiled (Fig. 2). Male unknown..*C. cankiriensis* sp. nov.
-. Vasculum of spermatheca like a somewhat widened question mark. Ductus spermatheca relatively thinned, almost all parts spirally coiled (Figs. 3c,d). Emargination of clypeus in male quadrangular or deltoidal. Apex of aedeagus more or less pointed..7

7. Clypeus with quadrangular emargination in male. Apex of aedeagus pointed. Spermatheca with extreme apex not curved inward (Fig. 3c)...........*C. musciformis*

-. Clypeus with deltoidal emargination in male. Apex of aedeagus more or less pointed. Spermatheca with extreme apex strongly curved inward (Fig. 3d)............. ....*C. beldei*

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Figure 1. *Cheilotoma cankiriensis* sp. nov. (holotype ♀), dorsal view (left), ventral view (right).

Figure 2. Spermathecal structures of *C. cankiriensis* sp. nov.

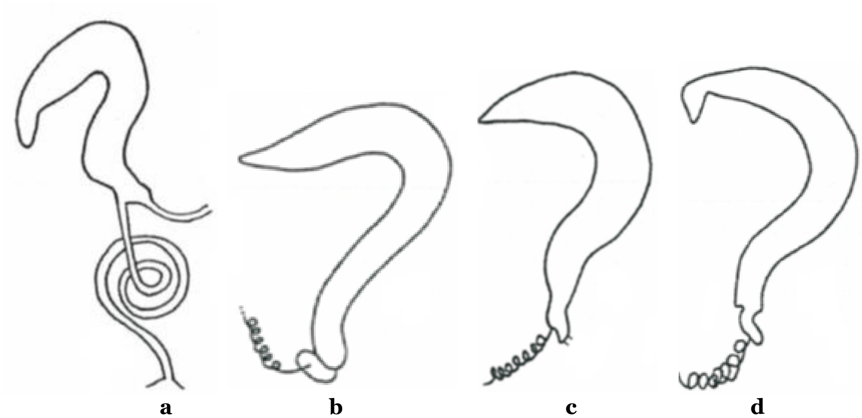

Figure 3. Spermathecal structures of a) *C. fulvicollis*, b) *C. erythrostoma*, c) *C. musciformis*, d) *C. beldei* (after Warchalowski, 2010).

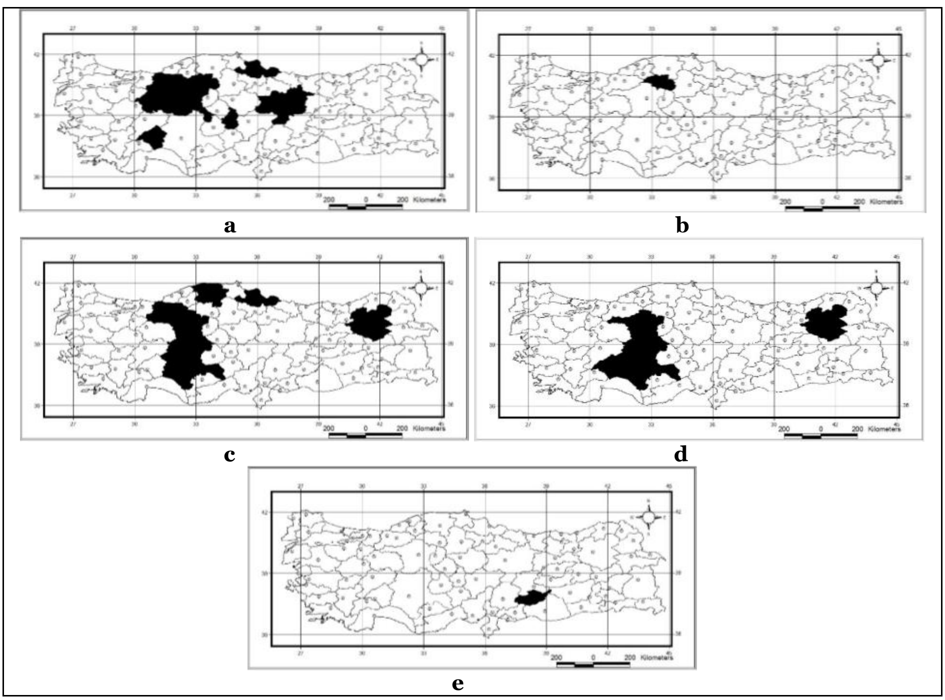

Figure 4. Known provincial distribution patterns in Turkey of a) *C. beldei*, b) *C. cankiriensis* sp. nov., c) *C. erythrostoma*, d) *C. musciformis*, e) *C. voriseki*.

SPECIES OF *IDIOMACROMERUS* CRAWFORD IN TURKEY (HYMENOPTERA: TORYMIDAE: MICRODONTOMERINI)

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[Doğanlar, M. 2016. Species of *Idiomacromerus* Crawford in Turkey (Hymenoptera: Torymidae: Microdontomerini). Munis Entomology & Zoology, 11 (2): 312-354**]**

ABSTRACT: In Turkey 25 species of *Idiomacromerus* Crawford 1914 (Hymenoptera: Torymidae), were found in several parts of Turkey. The species are: *I. curticaudatus* (Szelenyi) (new record); *I. papaveris* (Förster, 1856), *I. akdenizeus* (Doganlar), elevated as distinct species from synonyms list of *I. papaveris* (new status) and, 22 of them as new species: *I. yunusi* sp. nov., *I. sebnemae* sp. nov., *I. gumusensis* sp. nov., *I. selimensis* sp. nov., *I. aladagensis* sp. nov., *I. erzurumensis* sp. nov., *I. golbasinensis* sp. nov., *I. lutfiyeae* sp. nov., *I. aslihanae* sp. nov., *I. zerovaae* sp. nov., *I. nigdenensis* sp. nov., *I. haliti* sp. nov., *I. oguzhani* sp. nov., *I. mbahadiri* sp. nov., *I. uguranlari* sp. nov., *I. neslihanae* sp. nov., *I. zeynepbanuae* sp. nov., *I. gozuaciki* sp. nov., *I. hasandagus* sp. nov., *I. turhalensis* sp. nov., *I. karakurtensis* sp. nov., *I. fursovi* sp. nov.. The following species were transferred to *Pseuderimerus* as new combinations: *P. urospermi* (Askew 2004), *P. semiaeneus* (Szelényi 1957) and *P. bouceki* (Zerova & Seryogina, 1997), and the following ones to *Microdontomerus* as new combinations: *M. mesoplanus* (Askew & Nieves-Aldrey 2007), *M. ephedricola* (Askew 2000) and *M. longicornis* (Askew 1997). *Idiomacromerus pannonicus* (Ruschka, 1923) was moved from the torymid list of Turkey. The new species were described and diagnostic characters were illustrasted, and an identification key for the 48 palearctic species was provided.

KEY WORDS: *Idiomacromerus* spp., Torymidae, key, Turkey

The genus *Idiomacromerus* was described by Crawford (1914) having type species *Idiomacromerus bimaculipennis* Crawford, 1914 by monotypy. Grissell (1995) recorded *Idiomacromerus* as valid genus in the tribe Microdontomerini (Torymidae), and gave its synonyms, such as: *Liodontomerus* Gahan, 1914, *Liotorymus* Steffan, 1962, *Lochimerus* Szelényi, 1957, *Lochites* Förster, 1856, (Junior primary homonym of *Lochites* Gistl, 1844), *Lochitisca* Ghesquière, 1946 (Replacement name for *Lochites* Förster, 1856 nec Gistl, 1848). Up to now forty three species of *Idiomacromerus* are distributed worldwide, fourty of them were present in the Palaearctic (32 spp. from Europe, 11 spp. from the Middle East, 3 spp. from Caucasus), four from several regions (Noyes, 2014). Sixteen species have been recorded from Ukraine and adjacent countries alone (Zerova & Seryogina, 1999) and only two species have been recorded from Turkey, such as: *Liodontomerus pannonicus* Ruschka which was synonimized with *Idiomacromerus pannonicus* Ruschka by Grissell (1995) was recorded by Doğanlar (1984) (Öncüer (1991) and Grissell (1995) followed that record, by this work it was found that it was a misidentifcation of a new species), and *Ameromicrus akdenizeus* was described from Adana, Turkey by Doğanlar (1989), and later it was recorded as synonym of *Idiomacromerus papaveris* (Förster) by Zerova & Seregina (2001). By this work *I. papaveris* was found as a different species from *A. akdenizeus*, and it was recorded again in some parts of Turkey.

Most species are associated with gall wasps, exclusively in the tribe Aylacini (herb gall wasps) (Askew, 1997, 2000; Askew et al., 2004; Zerova & Seryogina, 1997, 1999), and with cynipids inhabiting cryptic stem galls is particularly rich, with several species specifically associated with different aylacine species on Asteraceae (Askew et al., 2004).

In this work morphological characters of the *Idiomacromerus* species from Turkey were studied and the new species were described, the status of some species were changed. By aids of some morphological characters a new identification key was provided for the species of *Idiomacromerus* in the Palearctic Region.

MATERIAL AND METHOD

This study is based upon examination and identification of the specimens collected from several parts of Turkey. The examined specimens and types were deposited in Insect Museum of Biolocical Control Station, Yüreğir, Adana, Turkey (IMBC). 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 for further morphological studies. The species were identified by following the keys of Szelenyi (1957, 1959), Grissell (1995) and Zerova & Seregina (1999). Wings and antennae of some holotypes and paratypes were slide-mounted in Canada balsam. Photographs of diagnostic characters of the genera 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 Gibson (1997). Abbreviations used in the key and descriptions are: OOL= shorter distance between ocello-ocular line, POL= distance between posterior ocelli, F1-6 = funicular segments.

Acronyms of the museum:

IMBC: Insect Museum of Biolocical Control Station, Yüreğir, Adana, Turkey
MNCN: the Museo Nacional de Ciencias Naturales (Madrid)
HNHM: the Hungarian Natural Hstory Museum
ZIKU: Schmalhausen Institute of Zoology(National Academy ofSciences of Ukraine)
BMNH: British Museum Natural History
USNM: United States National Museum

RESULTS AND DISCUSSION

I have not seen the types but by examining the their descriptions the following species of *Idiomacromerus* were transferred to the genus *Pseuderimerus*, which were fits definition given for the characters by Grissell (1995), i.e., hind tibia with 1 apical spur; the structure of antennal clava of female with apical spicula, anellus in both sexes wider than long and funicle with basal 1-5 segments reduced (appear to be, are, anelli, see figs. 3-4 of Askew (2004) based on those assessments, the species would appropriately be placed as species of *Pseuderimerus*, listed below:

urospermi (Askew). PALEARCTIC: Spain **(New combination).**

Idiomacromerus urospermi Askew, 2004: 145-146 (Figs. 3, 4). Holotype Fem, (MNCN)

The new combination is a result of the study on the illustrations of female habitus and forewing and female antenna given by Askew et al. (2004). ex gall of *Timaspis urospermi* in stem of *Urospermum picroides* collected 29-viii-2002, emerged 16.ix-2003 (J. L. Nieves-Aldrey leg). deposited in the Museo Nacional de Ciencias Naturales (Madrid) (MNCN).

semiaeneus (Szelényi). PALEARCTIC: Hungary.

Lochitimorpha semiaenea Szelenyi, 1957: 386-387 (Fig. A). Holotype fem. Somlovasarhely, Hungary (HNHM) (transferred *semiaenea* to *Pseuderimerus* by Grissell and recorded again in Grissell, 1995: 253). However, Zerova & Seregina (1999) and Askew (2004) recorded it in *Idiomacromerus*.

bouceki (Zerova & Seryogina). PALEARCTIC: Ukranie **(New combination).**

Liodontomerus bouceki Zerova & Seryogina, 1997: 970-971. Holotype fem. ZIKU

Zerova & Seregina (1999) (Figs. 26, 6-8) and Zerova et al. (2013) (Figs. 1, 13-15) recorded it in *Idiomacromerus*.

The following species of *Idiomacromerus* were transferred to the genus *Microdontomerus* which were fits definitoin given for the characters by Grissell (1995), i.e., hind tibia with 2 apical spur, and ventrally without serrations, antenna with 1 anellus (Grissell, 1995), based on those assessments the species would appropriately be placed as species of *Microdontomerus*, listed below:

mesoplanus (Askew & Nieves-Aldrey). PALEARCTIC: Spain **(New combination) .**

Idiomacromerus mesoplanus Askew & Nieves-Aldrey, 2007: 386. Holotype fem. Spain, Madrid, Valdemorillo, (Museo Nacional de Ciencias Naturales (Madrid) (MNCN). ex gall of *I. luteipes* in *P. somniferum* stem, collected 6-VI-2004, emerged VI-2004 (J. L. Nieves-Aldrey leg).

ephedricola (Askew). PALEARCTIC: Spain **(New combination) .**

Idiomacromerus ephedricola Askew, 2000: 56. Holotype fem. BMNH

longicornis (Askew). PALEARCTIC: Spain, Zaragosa **(New combination) .**

Idiomacromerus longicornis Askew, 1997: 68-69. Holotype fem. BMNH.

The new combination is a result of the study on the illustrations of female habitus and forewing and female antenna given by Askew (1997). ex galls of *Stefaniola sasolae* (Tavares) (Cecidomyiidae) on *Salsola vermiculata* L. collected 19-i-1992 (J. L. Blasco-zumeta leg), deposited in BMNH.

Idiomacromerus Crawford

Idiomacromerus Crawford, 1914: 124-125. Type species *Idiomacromerus bimaculatipennis* Crawford (orig. desg. and monotipic USNM. The synonym list, distribution and host records were given by Grissell (1995: 85)).

Diagnostic characters: Hind femur simple; the occipital carina absent or weakly expressed; marginal vein 2.0-4.5x as long as stigmal vein; 2 or more anelli, and the unreduced eyes of the male. Additionally, in females, metaterga 2 and 3 are at most somewhat emerginate, in males only metaterga 2 is very slightly emarginate medially (Grissell, 1995).

Key to the palearctic species of *Idiomacromerus* Crawford

1(38) Antennae with 3 or more annelli

2(29) Antennae with 3 annelli (Figs. 2a-j)

3(4) Stigma increased, rounded, brilliant yellow, is considerably brighter than the remaining part of the nervation. Basal segments of funicula yellowish, antannae brown, the body of green. Metatarsi of all tarsi green, coxae, tibiae and pretarsi brownish- yellow. Segments of antennae transverse. Ovipositor index 1.3, ovipositor is equal to approximately 4/5 lengths of the metasoma. 1,5 mm...................................*I. eltonicus* (Zerova et Seryogina)

4(3) Stigma normal, of the same colors as the remaining part of the nervation.

5(8) Lines of cubital and basal veins without hair

6(7) Forewing with marginal ciliae; front femora somewhat expanded. propodeum thrice as long as metascutum, femora metallic green, tibiae brown; ovipositor a little shorter than metasoma. 2,7-3.1 mm; 2,2 mm...*I. budensis* (Erdös)

7(6) Forewing without marginal ciliae (Fig. 3a); front femora not expanded; Ovipositor 0. 84x as long as metasoma (Fig. 1a). Ovipositor index 1.2x; Antenna (Fig. 2a) with F1 as long as F2; pedicel plus flagellum 2.12x as long as scape;.club 2.3x as long as width; Forwing (Fig. 3a) marginal vein 2.77x stigmal vein and 1.8x postmarginal vein; antennae yellow; thorax black with greenish reflection, metasoma bronze; femora testaceaus, except 1/6 apical yellow, tibiae, tarsi yellow, except last segment black; wing hyaline, veins yellow; hind femora, 2.7x as long as wide........................*I. yunusi* sp. nov.

8(5) Lines of cubital and basal veins are designated by numbers of hair; front coxae not expanded.

9(12) Body (Figs. 1b, c) bicolored

10(11) Head, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, except metasoma with brownish tan, pedicel and ovipositor black, fore wing with brownish maculae below stigmal and submarginal veins, except below marginal vein white. marginal vein 2.3x stigmal vein and 1.6x postmarginal vein. Ovipositor (Fig. 1b) 0. 54x as long as metasoma. Ovipositor index 1.0x; fore and hind femora large, expanded 2.7x as long as wide...*I. sebnemae* sp. nov.

11(10) Head, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, except metasoma yellow, antenna brown, except scape yellow, fore wing hyaline (Fig. 3c), marginal vein 1.9x stigmal vein and 1.5x postmarginal vein. Ovipositor (Fig. 3c) 0. 38x as long as metasoma. Ovipositor index 0.66x; fore femora expanded 2.8x as long as wide; hind femora long 4.11x as long as wide......................*I. gumus*ensis sp. nov.

12(9) Body green, blackish with coppery to violet reflection

13(18) Ovipositor at least 0. 8x as long as metasoma.

14(15) Ovipositor 0.8x as long as metasoma; F1 almost as long as F2; flagellum clavate F5 1.7x as wide as long; pedicel plus flagellum 2.5x as long as scape; marginal vein 2.0x stigmal vein and 2.0x postmarginal vein; thorax coppery green, metasoma bronze, with the smoothed strongly bright sculpture; wing slightly infuscate below marginal vein; the metasoma (top view) is not wider than thorax. 1,5 mm....................*I. lysander* (Szelenyi)

15(14) Ovipositor about 0. 9-0.94x as long as metasoma

16(17) Body (Fig. 1d) thorax black with greenish reflection with metasoma bronz; fore wings hyaline; Ovipositor (Fig.1c) 0.9x metasoma. Ovipositor index 1.4x; antenna (Fig. 2d) with pedicel plus flagellum 2.4x as long as scape; anelli strongly transverse, F1- F3 in same length, F4-F5 slightly longer 1.25x longer than F1; funicular segments distinctly transverse,gradually widening F5 twice as wide as long,1.3x as wide as F1; Fore wing (Fig. 3d) marginal vein 2.5x stigmal vein and 1.36x postmarginal vein; hind femora large, 3.12x as long as wide..*I. selimensis* sp. nov.

17(16) Body black with greenish reflection with metasoma bronz; fore wings hyaline; ovipositor 0.94x metasoma. Ovipositor (Fig. 1e) index 1.5x; antenna (Fig. 2e) with pedicel plus flagellum 2.4x as long as scape; anelli strongly transverse, 3rd anellus distinctly shorter than F1, 3x as wide as length; F1-F5 funicular segments strongly transverse, about 1.75x as wide as length; flagellum clubbed; club 1.67x as wide as F1, 1.7x as long as width. Fore wing (Fig. 3e) with marginal vein 2.83x stigmal vein and 1.5x postmarginal vein; hind femora large, 3.5x as long as wide...........*I. aladagensis* sp. nov.

18(13) Ovipositor at most 0. 64x as long as metasoma

19(20) Body black with greenish reflection with metasoma bronz; fore wings hyaline; propodeum placed almost vertical, propodeum almost nill seen above. Ovipositor (Fig.1f) 0.64x metasoma. Ovipositor index 1.28x; antenna (Fig.2f) with pedicel plus flagellum 2.15x as long as scape; anelli transverse, funicular segments distinctly transverse, F1 twice, F5 2.67x as wide as long; funicle slightly widening apically, F5 1.44x as wide as F1. Fore wing (Fig.3f) with marginal vein 2.5x stigmal vein and 1.5x postmarginal vein; hind femora large, 3.6x as long as wide.........*I. erzurumensis* sp. nov.

20(19) Propodeum declined, distinctly visible from above; Ovipositor about as long as 0.5-0.64x metasoma

21(22) Ovipositor about as long as 0.5x metasoma; Ovipositor index 1.0x; pedicel plus flagellum 2.63x as long as scape; marginal vein 2.38x stigmal vein and 1.5x postmarginal vein; thorax very dark coppery, nearly black, metasoma blackish with bronze luster, with the clear cellular sculpture; propodeum declining, distinctly visible from above; hind femora large, 3.1x as long as wide; 3/5 as wide as respective tibiae, the metasoma (top view) somewhat wider than thorax.1,6 mm... ....*I. pannonicus* (Ruschka)

22(21) Ovipositor about as long as 0.6x metasoma

23(24) Antenna with basal 1/3 of scape, apical1/4 pedicel and flagellum yellow; Pedicel plus flagellum 2.28x as long as scape; Ovipositor as long as 0.6x metasoma. Ovipositor index 1.0x; antenna with first anellus quadrate, other anelli transverse, F1-F4 funicular almost quadrate, F5 distincly transverse, 1.86x as wide as long; funicle slightly widening apically, F5 1.62x as wide as F1; marginal vein 1.77x stigmal vein and 1.7x postmarginal vein; wings hyaline; propodeum declining, distinctly visible from above; hind femora large, 3.4x as long as wide; 2/5 as wide as respective tibiae... ....*I. grisseli* Zerova & Seregina

24(23) Antenna brown, at most scape in basal 1/3 yellow; pedicel plus flagellum at least 2.6x as long as scape

25(26) Body (Fig. 1g) coppery greenish, scutellum and propodeum bronz, metasoma brown; antenna brown; fore wings hyaline; Propodeum declined, distinctly visible from above; ovipositor (Fig. 1g) 0.62x metasoma. Ovipositor index 1.16x; Antenna (Fig. 2g) with flagellum clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape reaching slightly below lower edge of median ocellus, 2.75x as long as pedicel; anelli transverse, funicular segments slightly transverse, F1 1.4x, F2-F3 1.3x, F4 1.44x, F5 1.78x as wide as long; scape 4.37x as long as broad, scape 1.23x as long as club; pedicel plus flagellum 2.86x as long as scape. Fore wing (Fig. 3g) Marginal vein 2.72x stigmal vein and 1.5x postmarginal vein; coxae and half of hind femora concolorous with body, fore and mid femora, half of hind femora, tibiae and tarsi yellow; hind femora large, 2.5x as long as wide...*I. golbasinensis* sp. nov.

26(25) Antenna (Figs. 2h,i) with flagellum slightly clavate, funicle slightly widening apically

27(28) Antenna (Fig. 2h) with F5 1.28x as wide as F1, scape 2.8x as long as pedicel; pedicel plus flagellum 2.6x as long as scape; anelli transverse, funicular segments slightly transverse, F1 1.55x, F5 2.25 as wide as long; ovipositor (Fig. 1h) as long as 0.62x metasoma. Ovipositor index 1.16; Fore wing (Fig. 3 h) with marginal vein 2.7x stigmal vein and 1.67x postmarginal vein, below marginal vein with sparse setae. Antenna with scape brown; body very dark greenish, nearly black, coxae and femora concolorous with body except apical 1/4 of femora, and fore tibia, apical and basal 1/4 mid and hind tibiae yellow; tarsi pale yellow, except last segment brown; wings hyaline, veins pale yellow; hind femora large, 3.5x as long as wide...*I. lutfiyeae* sp. nov.

28(27) Body (Fig. 1i) black with greenish reflection; fore wings hyaline; mesosoma slightly bulged in profile, propodeum declined, distinctly visible from above. Ovipositor (Fig. 1i) as long as 0.6x metasoma. Ovipositor index 1.2; antenna (Fig. 2i) with pedicel plus flagellum 3.0x as long as scape; the latter 1.8x as long as pedicel; anelli transverse, funicular segments distinctly transverse, F1 1.3x, F5 twice as wide as long; funicle slightly widening apically, F5 1.33x as wide as F1;. Fore wing (Fig. 3i) with marginal vein 2.5x stigmal vein and 1.6x postmarginal vein, below marginal vein with dense setae; scape in basal 1/3 yellow; coxae and femora concolorous with body, except apical tip of femora and tibiae and tarsi yellow, except hind tibia medially with black maculae; wings hyaline, veins pale yellow. Hind femora moderately large, 3.0x as long as wide................. ....*I. aslihanae* sp. nov.

29(2) Antannae with 4 and more annelli; club without spicula.

30(33) Antennae with at least 5 anelli like flagellomere.

31(32)Antennae with 6 anelli like flagellomere; toruli placed below lower ocular line; ovipositor 1.34x as long as metasoma; antenna having funicular segments without sensillae. 1,4 mm...*I. balasi* (Szelenyi)

32(31)Antennae with 5 anelli like flagellomere; Toruli placed at same level of lower ocular line; ovipositor (Fig. 1j) 5.0x metasoma; Ovipositor index 8.0; antenna (Fig. 2j) having last 3 funicular segments with one row of linear sensillae, pedicel plus flagellum 2.5x as long as scape; fore wing (Fig. 3j) with marginal vein 2.7x longer than radial vein and 1.6x postmarginal vein; Body head and mesosoma green with metallic reflexion, metasoma yellow, with some brown lines laterally; antenna testaceous, scape yellow, in apical half dorsally brown, with metallic green reflexion, legs yellow, 3rd coxa dorsally green, hind femora medially testaceous. Hind femora 4.2x as long as wide........................ ....*I. zerovaae* sp. nov.

33(30)Antennae with 4 annelli; clup without spicula; other characters variable

34(35) Ovipositor as long as metasoma; ovipositor index 2.2x; pedicel plus flagellum 2.0x as long as scape; marginal vein 2.86x stigmal vein and 2.5x postmarginal vein; body green with metallic reflection, coxae and femora concolorous with body; scape and pedicel dark brown, flagellum pale brown, tibiae brown, tarsi dirty yellow; wings hyaline, vein white; hind femora 3.67x as long as wide.......................*I. mirabilis* Zerova

35(34) Ovipositor at most 0.76x as long as metasoma

36(37)) Ovipositor 0. 6x as long as metasoma; ovipositor index 1.38x; pedicel plus flagellum 2.72x as long as scape;. marginal vein 2.1x stigmal vein and 1.8x postmarginal vein......... ....*I. persimilis* Zerova

37(36) Ovipositor 0.76x as long as metasoma; ovipositor index 1.43x; pedicel plus flagellum 2.5x as long as scape; marginal vein 3.3x stigmal vein and 2.2x postmarginal vein........... ....*I. artusis* Zerova

38(1) Antennae (Figs. 4b, e; Figs. 6a-l) with 2 annelli.

39(48) Female with mesosoma green, metasoma wholly or in the substantial part yellow, at most brown

40(43) Forewings hyaline

41(42) Female metasoma with basal tergites dorsally yellowish; mesosoma in dorsal view 1.55x as long as wide; Ovipositor 0.75x lengths of the metasoma; Ovipositor index 1.4; Hind femora 2.8x as long as wide..*I. silybi* Askew

42(41) Female metasoma entirely yellow; ovipositor at most 0.4x lengths of the metasoma; Antenna with pedicel dark brown, clava yellow; F1 1.2x as broad as pedicel, 2.0x as broad as long; F2 slightly broader and longer than F1, F3-F5 subequal in length but progressively broadening and F6 2.3x as broad as long; linear sensilla in a single, irregular, transverse row on each funicle segment; clava 1.6x as long (excluding apical process) as broad, with a digitiform apical process or terminal spine, surrounded by long erect setae and a patch of short setae basal to the apical spine............................... ....*I. luteus* Nieves-Aldrey & Askew

43(40) Forewing with darkened sections in the form of spot or wide arc; female metasoma brown

44(45) Ovipositor 0.78x lengths of the metasoma; Antenna brown; anelli transverse, funicular segments slightly transverse, funicle slightly widening apically, F6 1.33x as wide as F1. Fore wings with the darkening around the radial vein; submarginal and radial (especially stigma) veins are dark brown, marginal and postmarginal veins yellow. ovipositor 0.78x as long as metasoma. 2-2,2 mm; 1,5 - 1,7 mm.............................. ....*I. phlomidis* (Zerova et Seryogina)

45(44) Ovipositor at most 0.5x lengths of the metasoma

46(47) Ovipositor 0.5x lengths of the metasoma; front wings with the darkening partly of wide arc or the horseshoe, by the inverted convex part downward of the marginal vein.......... ....*I. arcus* (Boucek)

47(46) Ovipositor about 0.25x lengths of the metasoma. forewing with base and below submarginal vein having brown band; marginal vein 4.75x stigmal vein, 3.6x postmarginal vein; Thorax .2.2x as long as wide; ovipositor index 0.5x; wings hyaline; sculpture of head and thorax (especially!) greased, almost smooth, strongly shining, body bright green, tibia yellow, 1.8-2.3 mm (Ovipositor 0.27-0.30 mm)........................... ....*I. conicollis* Askew

48(39) Female with mesosoma and metasoma green, the latter blackish with coppery to violet reflection,

49(58) Fore wings (Figs. 4c,f) darkening under marginal vein

50(51) Ovipositor (Fig. 4a) longer than metasoma, almost as long as thorax plus metasoma, 1.3-1.64x as long as metasoma; thorax wholly green with metasoma bronz; fore wings with maculae below marginal vein; vipositor index 2.7-3.1; antenna (Fig. 4b) with pedicel plus flagellum 2.1- 3.5x as long as scape; pedicel 1.3- 1.44x as long as anelli plus F1 combined; anelli transverse, F1 slightly transverse,F2-F6 almost quadrate; club 2.44-2.66x as long as width; scape 1.12-1.25x as long as club. Fore wing (Fig. 4c) with marginal vein almost 1.7-2.92x longer than radial vein, 1.22-1.5x postmarginal vein. Hind femora 3.5-4.2x as long as wide..................................*I. nigdenensis* sp. nov.

51(50) Ovipositor (Fig. 4d) distinctly shorter than metasoma

52(55) Ovipositor at most 0.58x metasoma, Body wholly green with metasoma bronz; fore wings with pale maculae below marginal vein;

53(54) Ovipositor (Fig. 4d) 0.58x as long as metasoma; ovipositor index 1.17. Antenna (Fig. 4e) with pedicel plus flagellum 3.0x as long as scape; pedicel 1.2x as long as anelli plus F1 combined; anelli transverse, F1 distictly transverse,F2-F6 slightly transverse; club 1.75x as long as width; scape 1.14x as long as club; forewing (Fig. 4f) with marginal vein almost 2.67x longer than radial vein, 1.6x postmarginal vein; having area between postmarginal vein and stigmal vein narrow and with hair lines. hind femora 3.8x as long as wide..*I. haliti* sp. nov.

54(53) Ovipositor of approximately 0.5x metasoma; ovipositor index 1.1x. Antenna with pedicel plus flagellum 2.62x as long as scape; pedicel 1.67x as long as anelli plus F1 combined; anelli transverse, F1- F6 distictly transverse, club 2.4x as long as width; scape as long as club; marginal vein almost 2.7x longer than radial vein, 1.8x postmarginal vein; Wings darkening under the marginal vein, having area between postmarginal vein and stigmal vein, broad and bare. 1,3 - 3 mm; 1,2 - 2 mm.................. ....*I. perplexus* (Gahan)

55(52) Ovipositor at least 0.75x metasoma

56(57) Ovipositor of approximately 0.75x metasoma; ovipositor index 1.26; marginal vein almost 1.76x longer than radial vein; antenna with pedicel plus flagellum 2.7x as long as scape; anelli strongly transverse, funicular segments transverse, flagellum clavate; body purplish black, not very shining, forewing with kidney shaped macula below marginal vein; coxae metallic, remainder of legs dark brown, only femora weakly metallic, with apices of femora and tibiae, and some of the more proximal tarsal segments lighter in color; front femur 2.9x and Hind femora 3.0x as long as wide. without ovipositor 2.4 mm, ovipositor sheaths 0.8 mm..............*I. pallistigmus* Askew

57(56) Ovipositor of approximately 0.88x metasoma; mesosoma in dorsal view 1.2-1.3x as long as broad. antennal funicle segments only slightly transverse. Thorax very dark coppery, nearly black, metasoma blackish with bronze luster; wings under the marginal vein more or less darkened, marginal vein 2.7x longer than the radial vein; antannae with 1 anellus and reduced secong flagellomer; scape basal half and tibia dark yellow; 1,7-3 mm...*I. mayri* (Wachtl)

58(49) Wings (Figs. a-l) hyaline

59(91) ovipositor at most slightly longer than metasoma (1.1x)

60(61) Ovipositor about 0.25x metasoma. Ovipositor index 0.5x; marginal vein 3.6x stigmal vein, 4.5x postmarginal vein; wings hyaline; Sculpture of head and thorax (especially!) greased, almost smooth, strongly shining, body bright green, tibia yellow, 2,1 mm.......... ....*I. splendidus* (Szelenyi)

61(60) Ovipositor (Fig. 5a) at least 0.36x metasoma

62(67)Ovipositor at most 0.45x metasoma

63(66) Metasoma (Fig. 5a) almost as long as mesosoma; Antenna black, except 2/5 base of scape yellow; Head from the front as long as width.

64(65) Fore wing (Fig. 7a) with marginal vein 4.0x as long as stigmal vein and 2.6x postmarginal vein; basal cell and speculum closed by sparse setae, area below marginal vein with dense setae on both side. Antenna (Fig. 6a) with flagellum slightly clavate, anelli strongly transverse, funicular segments transverse; pedicel plus flagellum 3.05x as long as scape; scape 4.4x as long as width, 1.09x as long as club; pedicel 1.5x as long as width, and as long as anelli plus F1; anelli strongly transverse, funicular segments transverse, flagellum slightly clavate, F1 1.6x as wide as long; F6 1.36x as wide as F1, and 1.9x as wide as long; club 1.7x as long as width. Ovipositor (Fig. 5a) 0.36-0.44x metasoma; ovipositor index 0.66. Body green with bronze tint, metasoma dark bronze, basal segments of tarsus and tibia dark yellow, Hind femura 3.2x as long as wide...*I. oguzhani* sp. nov.

65(64) Fore wing (Fig. 7b) with marginal vein almost 5x longer than radial vein, 2.5x postmarginal vein; basal cell and speculum closed by dense setae, area below marginal vein with sparse. Antenna (Fig. 6b) with pedicel plus flagellum 2.67x as long as scape; scape 4x as long as width, 1.11x as long as club; pedicel 1.67x as long as width, and

1.22x anelli plus F1; anelli strongly transverse, funicular segments transverse, flagellum moderately clavate, F1 1.75x as wide as long; F6 1.6x as wide as F1, and 2.2x as wide as long; club 1.9x as long as width; ovipositor (Fig. 5b) 0.45x metasoma; ovipositor index 0.74; setae body black with greenish reflection, scape in basal half, apical half of front and mid femora, 1/4 apical of hind femora, tibiae, tarsi yellow, except 2 segments of tarsi black, forewing veins yellow. Hind femura 3.0x as long as wide...*I. mbahadiri* sp. nov.

66(63) Metasoma (Fig. 5 c) distinctly longer than mesosoma; antenna (Fig. 6c) with scape yellow, Head from front distinctly wider than length (70:63); flagellum distinctly clavate, testaceous dorsally with metallic green reflextion, F6 1.75x wider than F1; anelli strongly transverse, F1-F4 distinctly transverse 2.86x,, F5-F6 transverse, F5 3.0x, F6 2.53x as wide as long; pedicel plus flagellum 2.37x as long as scape. Fore wing (Fig. 7c) with marginal vein 4.3x as long as stigmal vein and 2.0x postmarginal vein. Ovipositor (Fig. 5c) 0.43x metasoma; Ovipositor index 0.68; Body with head green, meso and metasoma black with coppery reflection, legs testaceous with metallic green reflection, last segment of tarsi brown. Hind femura 2.86x as long as wide...................
....*I. uguranlari* sp. nov.

67(62) Ovipositor at least 0.5x metasoma

68(71) Ovipositor aproximately 0.5x metasoma

69(70) Fore wing with marginal vein 2.2x as long as stigmal vein and 1.7x postmarginal vein. Antenna with base and apical of scape and ring segment yellow; having very small first and almost twice size of 2nd ring segments and flagellum slightly clavate, F6 1.2x as wide as F1; funicular segments distnctly transverse; pedicel plus flagellum 3.27x as long as scape. Head from the front 1.23x as wide as height; from side view 1.7x as heigh as length. Ovipositor index 1.1. Hind femora 3.07x as long as wide. 2 mm..*I. curticaudatus* (Szelenyi)

70(69) Marginal vein 3x stigmal vein; Sculpture of head and thorax clear, fine-mesh, surface weakly shining; Thorax with prescutum yellowish red, remaining part of thorax green, with the coppery reflection, the metasoma brown without the metallic tint; the 1st segment of metasoma noticeably longer than following. 1,6 mm...................................
....*I. variegatus* (Szelenyi)

71(68) Ovipositor at least 0.54x metasoma

72(77) Ovipositor (Figs. 5d-e) at most 0.64x metasoma

73(74) Ovipositor (Fig. 5d) approximately 0.64x metasoma; ovipositor index 1.16x. Antenna (Fig. 5d) with scape black,with metallic green reflextion, pedicel and flagellum blrown; Pedicel 1.1x as long as anelli plus F1 combined; both anelli distictly transverse, flagellum almost filiform, F6 1.25x as wide as F1; funicular segments almost quadrate, to slightly transverse; pedicel plus flagellum 2.83x as long as scape;. club 2.15x as long as width; scape 1.07x as long as club; Head from the front 1.12x as wide as height. Fore wing (Fig. 7d) with marginal vein 2.7x as long as stigmal vein and 1.9x postmarginal vein. Body black with metallic green reflextion, coxae and femora concolorous with body, except apical tips femora, tibiae, tarsi yellow, forewing veins pale yellow; Hind femura 3.0x as long as wide..............................*I. neslihanae* sp. nov.

74(73) Ovipositor (Fig. 5e) at most 0.56x metasoma

75(76) Ovipositor (Fig. 5e) 0.54x metasoma; Ovipositor index 1.11x; Antenna (Fig. 6e) with scape yellow, in apical half dorsally testaceous, pedicel and flagellum black; pedicel 1.33x as long as anelli plus F1 combined; both anelli distictly transverse flagellum distinctly clavate, F6 1.5x as wide as F1; funicular segments distnctly transverse; pedicel plus flagellum 2.67x as long as scape; club 2.27x as long as width; scape 1.2x as long as club; Head from the front 1.23x as wide as height, from side view 1.8x as heigh as length. Fore wing (Fig. 7e) with marginal vein 2.64x as long as stigmal vein and 1.48x postmarginal vein. Body black with coupery reflextion, coxae and femora concolorous with body, except apical tips femora, tibiae, tarsi yellow, except last segment of tarsi black, forewing veins yellow; Hind femura 2.8x as long as wide..*I. zeynepbanuae* sp. nov.

76(75) Ovipositor 0.56x metasoma; ovipositor index 0.96; antennae black; segments of funicle transverse; pedicel plus flagellum 2.7x as long as scape; head from the front as long as height, marginal vein 3.8x as long as stigmal vein and 2.7x postmarginal vein. 2.0-3.8 (holotype 2.1) mm...*I. nitens* (Boucek)

77(72) Ovipositor at least 0.7x metasoma.

78(79) Ovipositor 0.7x metasoma; F6 about twice as wide as F1. Ovipositor index 1.5-1.7. F6 about twice as wide as F1; pedicel 1.77x annelli plus F1 (Fig. 5 of Askew & Nieves 1988); marginal vein almost 2.15x longer than radial vein; antenna with pedicel plus flagellum 3.0x as long as scape; anelli strongly transverse, funicular segments transverse,; pedicel 1.77x annelli plus F1; club 1.5x as long as width; body green with coppery on propodeum, metasoma black with coppery to violet reflection, basal segments of tarsus and tibia testaceous; Hind femora 3.4x as long as wide. 2.8-3.0 mm (+ ovi)..*I. centaureae* (Askew and Nives)

79(84) Ovipositor at most 0.75x metasoma

80(83) Ovipositor (Fig. 5j) 0.73x metasoma

81(82) Ovipositor index 1.35; flagellum moderately clavate, F6 1.4x as wide as F1. Fore wing (Fig. 7k) with marginal vein almost 2.7x longer than radial vein, 2.0x postmarginal vein; antenna (Fig. 6k) with pedicel plus flagellum 2.96x as long as scape; scape 5.5x as long as width, 1.32x as long as club; anelli strongly transverse, F1 distinctly transverse, twice as wide as long; other funicular segments slightly transverse, F2-F4 1.5x; F5-F6 1.7x as wide as long; club 2.1x as long as width. Body green with bronze tint, metasoma dark bronze, scape yellow,(in dark form scape black, except radicle and base of scape yellow), coxae, 1/2 of femora black, 1/2 of femora, tibiae yellow, tarsi yellow except claws black, and veins yellow; hind femora long, 4x as long as wide; hypopygium as fig. 8a. 1,6- 3,2 mm...*I. papaveris* (Förster)

82(81) Ovipositor index 1.75; flagellum distinctly clavate F6 1.8x as wide as F1. Fore wing with marginal vein almost 2.6x longer than radial vein, 1.63x postmarginal vein; antenna with pedicel plus flagellum 2.86x as long as scape; the latter 4.6x as long as width, 1.16x as long as club; first anellus quadrate, 2nd anellus strongly transverse, funicular segments slightly transverse, distinctly widening towards tip; F1 1.5x, F2 1.37x, F3 1.2x, F4 1.5x, F5 1.67x, F6 1.8x as wide as long; club 1.73x as long as width. Body black with greenish reflection, scape yellow, flagellum testaceous; pedicel black, legs yellow, except coxae concolorous with thorax, and claws black; veins yellow. Hind femora 3.0x as long as wide..*I. pulcher* (Zerova et Seryogina)

83(80) Ovipositor (Fig. 5f) 0.75x metasoma. F6 1.25x as wide as F1. Ovipositor index 1.04. Fore wing (Fig. 7f) with marginal vein almost 2.36x longer than radial vein, 1.5x postmarginal vein; antenna (Fig. 6f) with pedicel plus flagellum 2.5x as long as scape; the latter about 4x as long as width, and 1.5x as long as club; flagellum slightly clavate, anelli strongly transverse, funicular segments slightly transverse, F1-F2 about 1.33x as wide as long; F3-F5 almost quadrate, F6 1.25x as wide as long; club 1.76x as long as width. Body black with greenish reflection, scape, tibiae fuscous, tarsi yellow except claws black, forewing hyaline, veins yellow. Hind femura 3.1x as long as wide............... ....*I. gozuaciki* sp. nov.

84(79) Ovipositor at least 0.80x length of metasoma

85(88) Ovipositor at most 0.86x length of metasoma

86(87) Ovipositor (Fig. 5g) 0.80x length of metasoma; flagellum slightly clavate; ovipositor index 1.4. Antenna (Fig. 6g) with scape 4.6x as long as width, 1.1x as long as club; pedicel plus flagellum 2.5x as long as scape; flagellum slightly clavate, F6 1.5x as wide as F1; pedicel 1.4x as long as width, 0.73x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 twice, F6 1.7x as wide as long; club 2.5x as long as width. Fore wing (Fig. 7g) with marginal vein 2.0x longer than radial vein, 1.2x postmarginal vein. Body black with violet reflextion, antenna with scape yellow, pedicel and flagellum black, coxae and femora concolorous with body, except apical 1/5 of fore and mid femora, 1/4 of hind femora, tibiae and tarsi yellow. Hind femora 3.75x as long as width....................... ....*I. hasandagus* sp. nov.

87(86) Ovipositor (Fig. 5h) 0.86x length of metasoma; ovipositor index 1.32. Antenna (Fig. 6h) with flagellum clubed, funicular segments almost filiform, club wider; scape 5.0x as long as width, 1.25x as long as club; pedicel plus flagellum 3.1x as long as scape; flagellum clubed, funicular segments almost filiform, F6 1.2x as wide as F1; pedicel 1.67x as long as width, 0.84x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 1.45x, F6 2.5x as wide as long and 1.25x as wide as F1; club 1.6x as long as width. Fore wing (Fig. 7h) with marginal vein 5.0x longer than radial vein, 2.5x postmarginal vein; Body black with metallic green reflextion, antenna brown with greenish reflextion,legs concolorous with body, except apical 1/5 of femora, both ends of tibiae and tarsi yellow, except last two segment brown. Hind femora 5.0x as long as width.................... ....*I. turhalensis* sp. nov.

88(85) Ovipositor about as long as metasoma.

89(90) Ovipositor Fig. 5i) almost equal to the length of metasoma; ovipositor index 1.87. Antenna (Fig. 6i) with scape 4.5x as long as width, almost as long as club; pedicel plus flagellum 3.1x as long as scape; flagellum moderately clavate, F6 1.33x as wide as F1; pedicel 1.43x as long as width, as long as anelli plus F1; anelli transverse, funicular segments distinctly transverse,almost same length, distinctly widening towards tip, F1 1.5x, F6 twice as wide as long and 1.33x as wide as F1; club 2.25x as long as width. Fore wing (Fig. 7i) with marginal vein 4.75x longer than radial vein, 2.9x postmarginal vein. Body black with metallic green reflextion, antenna brown with greenish reflextion, legs concolorous with body, except fore tibiae testaceous, apical 1/5 of femora, both ends of mid and hind tibiae and tarsi yellow, except last two segment brown. Hind femora 5.0x as long as width...............................*I. karakurtensis* sp. nov.

90(89) Ovipositor (Fig. 5k) 0.91-1.10x metasoma; ovipositor index 1.5-1.66. Fore wing (Fig. 7j) with marginal vein 2.70- 3.0x longer than radial vein and 1.37-1.57x postmarginal vein. Antenna (Fig. 6j) with scape 3.66x as long as width, 1.4x as long as club; pedicel plus flagellum 2.4x as long as scape; pedicel 1.9x as long as width, 1.15x as long as anelli plus F1 combined; flagellum moderately clavate, F6 1.3x as wide as F1; F1 2.33x F2-F3 1.6x, F4-F6 1.3x as wide as long; club 2.35x as long as width; malar space 0.37x length of eye. Body violet, with copery reflextion; scape, tibiae, tarsi, yellow excepts claws black, apical half of fore femora, apical1/6 and tip of other femora yellow and veins pale yellow;(in pale form 1/6 of femora, fore tibia, both ends of mid and hind tibiae and tarsi yellow except claws black). Hind femora 3.07x as long as wide. Hypopygium as fig. 8b)..*I. akdenizeus* (Doğanlar)

91(59) Ovipositor distinctly longer than metasoma

92(95) Ovipositor at most shorter than length of body

93(94) Ovipositor about length of the metasoma plus 1/3 of mesosoma. Ovipositor index 2.5. Antenna with anelli wider than its length, sometimes square in front view, funicular segments quadrate, to longer than wide; club 2.44x as long as width; scape 1.23x as long as club; tibiae reddish, middle and hind ones infuscate in middle, tarsi yellow. Female 1,5- 2 mm; male 2 mm (Figs. 23, 16).......................*I. terebrator* (Masi)

94(93) Ovipositor (Fig. 5l) about length of the metasoma plus 1/2 of mesosoma, 1.5x metasoma; ovipositor index 2.8. Antenna (Fig. 6l) with scape 6.62x as long as width, 1.5x as long as club; pedicel plus flagellum 2.4x as long as scape; pedicel twice as long as width, 1.54x as long as anelli plus F1 combined; flagellum almöst filiform, slightly widenning apically, F6 1.3x as wide as F1; F1-F2 1.6x F3-F4 1.5x, F5-F6 1.55x as wide as long; club 2.5x as long as width. Fore wing (Fig. 7l) with marginal vein 1.7x longer than radial vein and 1.35x postmarginal vein. Body violet, with copery reflextion; scape, except apicaly brown, both ends of tibiae, tarsi, yellow excepts claws black. Hind femora 4.4x as long as wide..*I. fursovi* sp. nov.

95(92) Ovipositor at least equal to length of body

96(97) Ovipositor equal to length of body; annelli in same length, 2nd anellus twice wider than the first anellus; pedicel 1.3x as long as anelli plus F1 combined, F1 quadrate, F2-F6 at least slightly longer than wide; head in frontal view almost as long as wide; marginal vein twice as long as stigmal vein and 1.3x as long as postmarginal vein. Body (without ovipositor) 2.4-2.8 mm, ovipositor 2.3--2.8 mm; male with antennal formula: 11353...*I. carayoni* (Steffan)

97(96) Ovipositor slightly longer than body; 1st annelus 1/2 width of 2nd anellus, Pedicel as long as almost anelli plus F1 combined, F1 and F2 quadrate, F3-F6 transverse.......... ....*I. korneyevi* Zerova & Seryogina

Idiomacromerus yunusi sp. nov.

(Figs. 1a, 2a, 3a, 9a)

Etymology. The name is derived from the name of my grandson, Mehmet Yunus Anlar.

Diagnosis. Antennae with 3 annelli. Forewing without marginal ciliae; front femora not expanded; Ovipositor 0. 84x as long as metasoma. Ovipositor index 1.2x; F1 as long as F2; pedicel plus flagellum 2.12x as long as scape; club 2.3x as long as width; marginal vein 2.77x stigmal vein and 1.8x postmarginal vein; antennae yellow; thorax black with greenish reflection, metasoma bronze; femora testaceaus, except 1/6 apical yellow, tibiae, tarsi yellow, except last segment black; wing hyaline, veins yellow; hind femora, 2.7x as long as wide

Description:

Female. Body (Fig. 1a) black with greenish reflection, antennae yellow; femora testaceaus, except 1/6 apical yellow, tibiae, tarsi yellow, except last segment black; wing hyaline, veins yellow metasoma bronze. Length 1.75 mm + ovipositor 1.0 mm.

Head in dorsal view 0.88x as wide as mesoscutum, width to length 35:18; POL twice OOL; OOL twice diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 37:35; dorsal margin of torulus distinctly below level of lower orbit; malar space consists 1/4 hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2a) with flagellum strongly clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; anelli transverse, without longitudinal sensilla; scape nearly reaching only mid level of eye, 3.5x as long as broad; length of pedicel plus flagellum 2.12x as long as scape; pedicel 2.5 as long as broad, about 1.5x as long as anelli plus first funicle segment (F1); F1 as long as F2; F1 1.16x as broad as pedicel, 2.0x as broad as long; F3-F5 slightly broader and longer than F2, F1-F5 subequal in length and in width and F5 1.8 as broad as long; linear sensilla in a single row on each funicle segment; clava (Fig. 3a) 2.4 as long as broad, surrounded by long erect setae.

Mesosoma (Fig. 1a) bulged in profile, propodeum slightly visible dorsally; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum very short; propodeum and mesosternnum almost smooth. All coxae reticulated. Forewing (Fig. 3a) with basal part bare, marginal ciliae absent; apical part with very short and light pubescence. marginal vein 2.77x stigmal vein and 1.8x postmarginal vein.

Metasoma (Fig. 1a) excluding ovipositor slightly shorter than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium at two-thirds metasoma length; Ovipositor 0. 84x as long as metasoma. Ovipositor index 1.2. Hind femora large 2.7x as long as wide.

Male. Similar to female except as folows: Length 1.66 mm. Antenna (9 a) with club brown; 5 funicular segment strongly transverse, the last 3 segments transverse, about 2.3x as broad ad long, club broad about 1.55x as broad as F5, 1.7x as lng as width.

Material examined: Holotype, female, Turkey: Hatay, Antakya, Campus of MKU, 5-9.vii.2004, reared from flower head of *Echinops* sp., M. Doğanlar. Paratypes: 1 male, same data as the holotype; 1 female, Kahramanmaraş, Pazarcık, 27.vi. 2007, swept from pasture, M. Doğanlar. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey:Antakya, Hatay; Kahramanmaraş.

Host: reared from flower head of *Echinops* sp.

Comments: Female: *Idiomacromerus yunusi* sp. nov. is similar to *I. budensis* (Erdös) in having fore wing without hair on lines of cubital and basal veins. But the new species differs from all known species of the genus by having fore wing without marginal ciliae, and from *I. budensis* in having femora testaceaus, except 1/6 apical yellow, tibiae, tarsi yellow, except last segment black (in *I. budensis* femora metallic green, tibiae brown).

Idiomacromerus sebnemae sp. nov.

(Figs. 1b, 2b, 3b)

Etymology. The name is derived from the name of my grand daughter, Şebnem Tuğba Kazan.

Diagnosis. Antennae with 3 annelli; forewing having lines of cubital and basal veins with hair; marginal ciliae present; front femora not expanded; Body bicolored, head, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, except metasoma with brownish tan, pedicel and ovipositor black, fore wing brownish maculae below stigmal and submarginal veins, except below marginal vein white. pedicel plus flagellum 2.6x as long as scape; marginal vein 2.3x stigmal vein and 1.6x postmarginal vein. Ovipositor 0. 54x as long as metasoma. Ovipositor index 1.0x; hind femora large 2.7x as long as wide.

Description:

Female. Body (Fig. 1b) bicolored, head,except face below toruli yellow, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, except metasoma with brownish tan, pedicel and ovipositor black, fore wing brownish maculae below stigmal and submarginal veins, except below marginal vein white. Length 1.5 mm + ovipositor 0.38 mm.

Head in dorsal view 1.2 broader than mesoscutum, width to length 34: 28; POL 2.5 OOL; OOL twice diameter lateral ocellus. Head in frontal view distincly wider than high, in ratio 34:24; dorsal margin of torulus slightly below level of lower edge of eye; malar space consists 0.62 hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2b) with flagellum strongly clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; anelli transverse, without longitudinal sensilla; scape nearly reaching only mid level of eye, 4.6x as long as broad; length of pedicel plus flagellum 2.6x as long as scape; pedicel 2.1 as long as broad, about 1.3x as long as anelli plus first funicle segment (F1); F1 slightly longer than F2; F1 1.2x as broad as pedicel, 1.8x as wide as long; F2 2.4x as wide as long; F3-F5 slightly broader and longer than F2, F5 1.6 as broad as long, and 1.5x as wide as F1; linear sensilla in a single row on each funicle segment; clava 2.2 as long as broad.

Mesosoma (Fig. 1b) slightly bulged in profile; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, almost as long as mesoscutum; propodeum almost smooth, mesosternnum finely reticulated. All coxae almost smooth with fine reticulated. Forewing (Fig. 3b) with basal part with basal cell and speculum closed, basal cell hairy apically, with two maculae, one below submarginal, other below postmarginal and stigmal veins; two maculae connected with a semisircular pale brownish band; below marginal with a circular area with white hairs, on maculae with stronger and black hairs, and apical part with very short and light pubescence. marginal vein 2.3x stigmal vein and 1.6x postmarginal vein.

Metasoma (Fig. 1b) excluding ovipositor slightly shorter than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about half length metasoma; Ovipositor 0. 54x as long as metasoma. Ovipositor index 1.0x; hind femora 2.7x as long as wide.

Male. unknown.

Material examined: Holotype, female, Turkey: Niğde, 11.vı.2003, O. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Niğde

Host: unknown.

Comments: Female: *Idiomacromerus sebnemae* sp. nov. is unique species in *Idiomacromerus* species having 3 anelli in having bicolored body and fore wing with two maculae. The new species seems to be similar to *Idiomacromerus arcus* (Boucek) in having fore wing maculate. But *I. sebnemae* n.sp having antenna with 3 anelli (in *I. arcus* having antenna with 2 anelli).

Idiomacromerus gumusensis sp. nov.

(Figs. 1c, 2c, 3c)

Etymology. The name is derived from the name of Gümüş, Ulukışla, Niğde, from where the Holotype was collected.

Diagnosis. Antennae with 3 annelli; forewing having lines of cubital and basal veins with hair; marginal ciliae present; front femora expanded; body bicolored, head, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, except metasoma yellow, antenna brown, except scape yellow, fore wing hyaline, pedicel plus flagellum 2.35x as long as scape; marginal vein 1.9x stigmal vein and 1.5x postmarginal vein. Ovipositor (Fig. 1c) 0. 38x as long as metasoma. Ovipositor index 0.66x; fore femora expanded 2.8x as long as wide; hind femora long 4.11x as long as wide

Description:

Female. Body (Fig. 1c) bicolored, head, dorsum of thorax and venter of mesothorax metallic green, remained of body yellow, antenna brown, except scape yellow, fore wing hyaline. Length 1.5 mm + ovipositor 0.25 mm.

Head in dorsal view as wide as mesoscutum, width to length 35: 20; POL 1.8 OOL; OOL 1.43 diameter lateral ocellus. Head in frontal view distincly wider than high, in ratio 35:20; dorsal margin of torulus distinctly below level of lower edge of eye; malar space consists 0.3 hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2c) with flagellum filiform, comprising 3 anelli, 5 funicle segments and a three-segmented clava; anelli transverse, without longitudinal sensilla; scape nearly reaching only mid level of eye, 3.7x as long as broad; length of pedicel plus flagellum 2.35x as long as scape; pedicel 2.3x as long as broad, about 1.8x as long as anelli; first annellus twice, second 2.5x, 3rd 2.4x as wide as long; F1, F2 equal in size, twice as wide as long; 1.25x as wide as pedicel; F3 1.67x; F4-F5 slightly longer and wider than F1, F5 1.22 as broad as long, and 1.1x as wide as F1; linear sensilla in a single row on each funicle segment; clava 2.25 as long as broad.

Mesosoma (Fig. 1c) slightly bulged in profile; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, slightly shorter than mesoscutum (15:27); propodeum smooth, mesosternnum finely reticulated. All coxae finely reticulated, fore femora expanded 2.8x as long as wide; hind femora long 4.11x as long as wide. Forewing (Fig. 3c) with basal part with basal cell closed, hairy apically, speculum open, broad, reaching almost stigmal vein, marginal vein 1.9x stigmal vein and 1.5x postmarginal vein.

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Metasoma (Fig. 1c) excluding ovipositor slightly shorter than rest of body (65:72); basal tergite with posterior margin weakly incised medially; tip of hypopygium about 0.77 length metasoma; Ovipositor (Fig. 1c) 0. 38x as long as metasoma. Ovipositor index 0.66x; hind femora long 4.11x as long as wide.
Male. unknown.
Material examined: Holotype, female, Turkey: Gümüş, Ulukışla, Niğde, 11.vi.2003, O. Doğanlar, swept from pasture, on card, deposited in the Insect collection of Research Station of Biological Control, Adana.
Distribution: Turkey: Niğde
Host: unknown.
Comments: Female: *Idiomacromerus gumusensis* sp. nov. is similar to *Idiomacromerus sebnemae* sp. nov. in having bicolored body. But *I. gumusensis* sp. nov. differs from *I. sebnemae* sp. nov. in having fore wing hyaline; marginal vein 1.9x stigmal vein and 1.5x postmarginal vein; Ovipositor 0. 38x as long as metasoma. Ovipositor index 0.66x; hind femora long 4.11x as long as wide. (in *I. sebnemae* sp. nov. having fore wing with two maculae; marginal vein 2.3x stigmal vein and 1.6x postmarginal vein; ovipositor 0. 54x as long as metasoma. Ovipositor index 1.0x; hind femora large, expanded 2.7x as long as wide).

Idiomacromerus selimensis sp. nov.

(Figs. 1d, 2d, 3d)

Etymology. The name is derived from the name of Selim, Kars, from where the Holotype was collected.
Diagnosis. Antennae with 3 annelli; thorax black with greenish reflection with metasoma bronz; fore wings hyaline; ovipositor 0.9x metasoma. Ovipositor index 1.4. Antenna with pedicel plus flagellum 2.4x as long as scape; anelli strongly transverse, F1- F3 in same length, F4-F5 slightly longer 1.25x longer than F1; funicular segments distinctly transverse, gradually widening F5 twice as wide as long,1.3x as wide as F1; Fore wing with marginal vein 2.5x stigmal vein and 1.36x postmarginal vein; hind femora large, 3.12x as long as wide.
Description:
Female. Body (Fig. 1d) black with greenish reflection, metasoma bronze, femora concolorus with body, except 1/6 apical yellow, tibiae yellow except medially black, tarsi yellow, except last segment black; wing hyaline, veins yellow. Length 1.5 mm + ovipositor 0.5 mm.
Head in dorsal view 1.4 broader than mesoscutum, width to length 38:15; POL 2.8x OOL; OOL 1.4x diameter of lateral ocellus. Head in frontal view slightly wider than high in ratio 38:30; dorsal margin of torulus slightly above level of lower edge of eyes; malar space consists 0.33x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2d) with flagellum distincly clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, 5x as long as broad; scape 1.2x as long as club; antenna with pedicel plus flagellum 2.4x as long as scape; anelli strongly transverse, F1- F3 in same length, F4-F5 slightly longer, F5 1.25x longer than F1; funicular segments distinctly transverse, gradually widening F5 twice as wide as long,1.3x as wide as F1; linear sensilla in a single row on each funicle segment.
Mesosoma (Fig. 1d) distinctly bulged in profile; propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, 0.6x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3d) with basal cell and speculum closed, basal cell a few setae

apically, speculum broad, below marginal vein with sparse setae, apical part with very short and light pubescence; marginal vein 2.5x stigmal vein and 1.36x postmarginal vein.

Metasoma (Fig. 1d) excluding ovipositor slightly shorter than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; ovipositor 0.9x as long as metasoma; ovipositor index 1.4; hind femora 3.12x as long as wide.

Male. Unknown.

Material examined: Holotype, female, Turkey: Kars, Selim 12.vii.2012, M. Doğanlar, swept from Onobrycis sativa field, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Kars, Selim

Host: unknown.

Comments: Female: *Idiomacromerus selimensis* sp. nov. is similar to *I. aladagensis* sp. nov. in having metasoma slightly shorter than metasoma, and antenna with pedicel plus flagellum 2.4x as long as scape. But *I. selimensis* differs from *I. aladagensis* in having anelli strongly transverse, funicular segments distinctly transverse, gradually widening F5 twice as wide as long,1.3x as wide as F1; scape 5x as long as broad; scape 1.2x as long as club; fore wing with speculum closed, moderately broad (in *I. aladagensis* the first two anelli strongly tranverse, 3rd anellus distinctly longer and wider than them; funicular segments slightly transverse, almost same length and width; scape 4.2x as long as broad; fore wing with speculum open, very broad).

Idiomacromerus aladagensis sp. nov.

(Figs. 1e, 2e, 3e)

Etymology. The name is derived from the name of Adana, Aladağ, from where the Holotype was collected.

Diagnosis. Antennae with 3 annelli; body black with greenish reflection with metasoma bronz; fore wings hyaline; ovipositor 0.94x metasoma. Ovipositor index 1.5. Antenna with pedicel plus flagellum 2.4x as long as scape; anelli strongly transverse, 3rd anellus distinctly shorter than F1, 3x as wide as length; F1-F5 funicular segments strongly transverse, about 1.75x as wide as length; flagellum clubbed; club 1.67x as wide as F1, 1.7x as long as width. Marginal vein 2.83x stigmal vein and 1.5x postmarginal vein; hind femora large, 3.5x as long as wide.

Description:

Female. Body (Fig. 1e) black with greenish reflection, metasoma bronze, scape black, apical 1/6 of femora,and tibiae yellow, except mid and hind tibiae with 1/4 medialy black; tarsi, yellow, except claws black; wings hyaline, veins pale yellow. Length 1.63 mm+ovipositor 0.65 mm.

Head in dorsal view as wide as mesoscutum, width to length 23:8; POL 3x OOL; OOL 1.4x diameter of lateral ocellus. Head in frontal view as wide as high in ratio 23:23; dorsal margin of torulus slightly below level of lower edge of eyes; malar space consists 0.36x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2e) with flagellum clubbed, funicular segments filiform,, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, the first two anelli strongly tranverse, 3rd anellus distinctly longer and wider than both of them; funicular segments slightly transverse, almost same length and width; scape 4.2x as long as broad, scape 1.29x as long as club; antenna with pedicel plus flagellum 2.4x as long as scape; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 1e) slightly bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, 0.54x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3e) with Basal part of basal cell closed, speculum open, basal cell a few setae apically, speculum very broad, below marginal vein with sparse setae, apical part with very short and light pubescence; marginal vein 2.83x stigmal vein and 1.5x postmarginal vein.

Metasoma (Fig. 1e) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/4 length metasoma; ovipositor 0.94x metasoma; ovipositor index 1.5x; hind femora 2.5x as long as wide.

Male: Unknown.

Material examined: Holotype, female, Turkey: Adana, Aladağ, 16.vii.2001, O. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, same data as holotype.

Distribution: Turkey: Adana, Aladağ,

Host: unknown.

Comments: Female: *Idiomacromerus aladagensis* sp. nov. is similar to *I. selimensis* sp. nov.. The discusion was given before.

Idiomacromerus erzurumensis sp. nov.

(Figs. 1f, 2f, 3f, 9b)

Idiomacromerus pannonicus (Ruschka, 1923): misidentifiation by Doğanlar (1984).

Etymology. The name is derived from the name of Erzurum, from where the Holotype was collected.

Diagnosis. Antennae with 3 annelli; body black with greenish reflection with metasoma bronz; fore wings hyaline; propodeum placed almost vertical, propodeum almost nill seen above. Ovipositor 0.64x metasoma. Ovipositor index 1.28. Antenna with pedicel plus flagellum 2.15x as long as scape; anelli transverse, funicular segments distinctly transverse, F1 twice, F5 2.67x as wide as long; funicle slightly widening apically, F5 1.44x as wide as F1. Marginal vein 2.5x stigmal vein and 1.5x postmarginal vein; hind femora large, 3.6x as long as wide.

Description:

Female. Body (Fig. 1f) black with greenish reflection, scape yellow,pedicel and flagellum brown, coxae and femora concolorous with body except apical 1/5 of femora, and tibiae yellow,; tarsi pale yellow, except claws brown; wings hyaline, veins pale yellow. Length 1.7 mm+ovipositor 0.5 mm.

Head in dorsal view slightly narrower than mesoscutum, width to length 30:15; POL 1.75x OOL; OOL 1.33 diameter of lateral ocellus. Head in frontal view as wideas high, in ratio 30:30; dorsal margin of torulus same level of lower orbit; malar space consists 0.25x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2f) with flagellum clubbed, funicular segments filiform,, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, anelli transverse, funicular segments distinctly transverse, F1 twice, F5 2.67x as wide as long; funicle slightly widening apically, F5 1.44x as wide as F1. scape 5x as long as broad, scape 1.25x as long as club; antenna with pedicel plus flagellum 2.15x as long as scape; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 1f) dorsally almost flat in profile, propodeum placed almost vertical, propodeum almost nill seen above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, almost as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3f) with basal cell and speculum closed, basal cell almost bare, speculum very broad, below marginal vein with sparse setae, apical part with very short and light pubescence; Marginal vein twice stigmal vein and 1.4x postmarginal vein;

Metasoma (Fig. 1f) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/4 length metasoma; ovipositor 0.64x metasoma. Ovipositor index 1.285x; hind femora 3.6x as long as wide.

Male. Similar to female except as follows: length 1.9 mm. antenna (Fig. 9 b) with flagellum slightly clavate; club 2.1x as long as wide.

Material examined: Holotype, female, Turkey: Erzurum, 08.ix.1980, M. Doğanlar, swept from *Medicago sativa* field, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: Erzurum, 1 female, 08.ix. 1984; 1 male, 04.vii.1984, M. Doğanlar, swept from *Medicago sativa* field, on card, deposited in the Insect collection of Research Station of Biological Control, Adana. (The specimens were identified as *I. pannonicus* by Doğanlar (1984).

Distribution: Turkey: Erzurum

Host: reared from Tephritidae sp. in the flowerheads of *Carduus* spp.

Comments: Female: *Idiomacromerus erzurumensis* sp. nov. is a unique species in having propodeum placed almost vertical, in other species of *Idiomacromerus* with 3 anelli, and Ovipositor about as long as 0.5-0.64x metasoma. Other diagnostic characters were given in the key.

Idiomacromerus golbasinensis sp. nov.

(Figs. 1g, 2g, 3g, 9c)

Etymology. The name is derived from the name of Gölbaşı, Adıyaman, from where the holotype was collected.

Diagnosis. Body coppery greenish, scutellum and propodeum bronz, metasoma brown; antenna brown; fore wings hyaline; Propodeum declined, distinctly visible from above;. Ovipositor 0.62x metasoma. Ovipositor index 1.16x; flagellum clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape reaching slightly below lower edge of median ocellus. Antenna with scape 2.75x as long as pedicel; anelli transverse, funicular segments slightly transverse, F1 1.4x, F2-F3 1.3x, F4 1.44x, F5 1.78x as wide as long;; scape 4.37x as long as broad, scape 1.23x as long as club; antenna with pedicel plus flagellum 2.86x as long as scape. Marginal vein 2.72x stigmal vein and 1.5x postmarginal vein; coxae and half of hind femora concolorous with body, fore and mid femora, half of hind femora, tibiae and tarsi yellow; hind femora large, 2.5x as long as wide.

Description:

Female. Body (Fig. 1g) coppery greenish, scutellum and propodeum bronz, metasoma brown; antenna brown; fore wings hyaline; ; coxae and half of hind femora concolorous with body, fore and mid femora, half of hind femora, tibiae and tarsi yellow; wings hyaline, veins pale yellow; Length 1.38mm+ ovipositor 0.5 mm.

Head in dorsal view 1.13 broader than mesoscutum, width to length 25:10; POL 2.25x OOL; OOL 0.5x diameter of lateral ocellus. Head in frontal as wide as high in ratio 25:23; dorsal margin of torulus at level of lower edge of eye; malar space consists 0.29x hight of eye. external margin of clypeus straight; face strongly reticulated. Antenna (Fig. 2g) with flagellum clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; (Fig. 1E); scape reaching slightly below lower edge of median ocellus, anelli transverse, funicular segments slightly transverse, F1 1.4x, F2-F3 1.3x, F4 1.44x, F5 1.78x as wide as long;; scape 4.37x as long as broad, scape 1.23x as long as club; antenna with pedicel plus flagellum 2.86x as long as scape. linear sensilla in a single row on each funicle segment.
Mesosoma (Fig. 1g) slightly bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum distinctly reticulated; pronotum about 0.6x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3g) with basal cell closed and speculum open, basal cell almost bare, speculum very broad, below marginal vein with sparse setae, apical part with very short and light pubescence; marginal vein 2.72x stigmal vein and 1.5x postmarginal vein.
Metasoma (Fig. 1g) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma. Ovipositor 0.62x metasoma. Ovipositor index 1.16x; hind femora broad 2.5x as long as wide.
Male. Similar to female, except as follow: length 1.2 mm. Antenna (Fig. 9c) with 3 anelli, F1-F3 distinctly transverse, without sensillae, F4-F5 transverse, with sensillae, club 1.67x as long as wide.
Material examined: Holotype, female, Turkey: Gölbaşı, Adıyaman, 24.v.2007, M. Doğanlar, swept from pasture, on card, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratype: 1 male, same data as the holotype.
Distribution: Turkey: Gölbaşı, Adıyaman
Host: Unknown.
Comments: Female: *Idiomacromerus golbasiensis* sp. nov. is similar to *Idiomacromerus grisselli* Zerova & Seregina and *Idiomacromerus aslihanae* sp. nov. in having ovipositor about as long as 0.6x metasoma, and it is also similar to *I. lutfiyeae* sp. nov. by pedicel plus flagellum at least 2.6x as long as scape. But it differs from *I. grisselli* in having pedicel plus flagellum 2.86x as long as scape; F1 1.4x, F2-F3 1.3x, F4 1.44x, F5 1.78x as wide as long, and F5 2.28x as wide as F1 (in *I. grisselli* pedicel plus flagellum 2.28x as long as scape; F1-F4 funicular almost quadrate, F5 distincly transverse, 1.86x as wide as long; funicle slightly widening apically, F5 1.62x as wide as F1). *I. golbasiensis* sp. nov. differs from *I. lutfiyeae* sp. nov. and *I.aslihanae* sp. nov. in having flagellum clavate, funicle distintly widening apically, F5 2.28x as wide as F1; pedicel plus flagellum 2.86x as long as scape; hind femora large, 2.5x as long as wide (in *I. lutfiyeae* sp. nov. and *I. aslihanae* sp. nov. flagellum slightly clavate, funicle slightly widening apically, F5 1.28x as wide as F1, and F5 1.33x as wide as F1 and pedicel plus flagellum 2.6x, and 3x as long as scape,; hind femora longer, 3.5x and 3.0x as long as wide, respectively).

Idiomacromerus lutfiyeae sp. nov.

(Figs. 1g, 2g, 3g, 9d)

Etymology. The name is derived from the name of Prof. Dr. Lütfiye Gençer, who is the collector of holotype.

Diagnosis. Body black with greenish reflection; antenna with scape brown fore wings hyaline; propodeum declined, distinctly visible from above;. Ovipositor 0.62x metasoma. Ovipositor index 1.16. with flagellum moderately clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, anelli transverse, funicular segments slightly transverse, F1-F3 1.25x, F4-F5 1.56x as wide as long; funicle moderately widening apically, F5 1.25x as wide as F1; scape 3.67x as long as broad, scape as long as club; antenna with pedicel plus flagellum 3.27x as long as scape. Marginal vein 2.7x stigmal vein and 1.67x postmarginal vein; hind femora large, 3.5x as long as wide.

Description:

Female. Body (Fig. 1h) dark greenish almost black, antenna brown, coxae and femora concolorous with body except apical 1/4 of femora, and fore tibia, apical and basal 1/4 mid and hind tibiae yellow; tarsi pale yellow, except last segment brown; wings hyaline, veins pale yellow; Length 1.62 mm+ovipositor 0.45 mm.

Head in dorsal view as wide as mesoscutum, width to length 30:15; POL 2.4x OOL; OOL twice diameter of lateral ocellus. Head in frontal as wide as high in ratio 34:55; dorsal margin of torulus slightly above level of lower orbit; malar space consists 0.34x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2h) with flagellum moderately clavate, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, anelli transverse, funicular segments slightly transverse, F1-F3 1.25x, F4-F5 1.56x as wide as long; funicle moderately widening apically, F5 1.25x as wide as F1; scape 3.67x as long as broad, scape as long as club; antenna with pedicel plus flagellum 3.27x as long as scape; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 1h) slightly bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, 0.8x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3h) with basal cell closed and speculum open, basal cell almost bare, speculum very broad, below marginal vein with sparse setae, apical part with very short and light pubescence; Marginal vein 2.7x stigmal vein and 1.67x postmarginal vein.

Metasoma (Fig. 1h) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/4 length metasoma; ovipositor 0.62x metasoma. Ovipositor index 1.16x; hind femora 3.5x as long as wide.

Male. Similar to female except as follows: Length 1.3-1.5 mm. Antenna (Fig. 9 c) with F1-F2 1.3x, F3-F4 twice, F5 1.83x as wide as long; F5 1.7x as wide as F1; scape 4.0x as long as broad, scape 1.16x as long as club; antenna with pedicel plus flagellum 2.7x as long as scape.

Material examined: Holotype, female, Turkey: Sivas, Paşabahçe, 12.vii.2012, L. Gencer, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes:, Sivas, 1 female, Türk-İş blokları, 05.ix. 1992; Paşabahçe, 1 female,2 male, 04-13.viii.1992; 2 female, 05-06. ix.1992; 1 female, Tuzlugöl, 26.vii.1992;1 female, 04.viii.1992; 3 females, Univ. Campus, 07.viii.1992; 1 male, Univ. Campus, 16.vii.1992, 1 female, 17.viii. 1992. all paratypes collected by L. Gençer. deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Sivas, Paşabahçe

Host: Unknown.

Comments: Female: *Idiomacromerus lutfiyeae* sp. nov. is similar to *Idiomacromerus grisselli* Zerova & Seregina and *Idiomacromerus aslihanae* sp. nov. in having ovipositor about as long as 0.6x metasoma, and ovipositor index about 1.0-1.2. But *I. lutfiyeae* sp. nov. differs from *I. grisselli* by antenna with scape brown; pedicel plus flagellum 2.6x as long as scape; anelli transverse, funicular segments slightly transverse, F1 1.55x, F5 2.25 as wide as long; funicle slightly widening apically, F5 1.28x as wide as F1. (in *I. grisselli* antenna with basal 1/3 of scape, apical 1/4 pedicel and flagellum yellow; pedicel plus flagellum 2.28x as long as scape; first anellus quadrate, other anelli transverse, F1-F4 funicular almost quadrate, F5 distincly transverse, 1.86x as wide as long; funicle slightly widening apically, F5 1.62x as wide as F1). *I. lutfiyeae* sp. nov. differs from *I. aslihanae* sp. nov. in having Antenna with scape brown; pedicel plus flagellum 2.6x as long as scape; the latter 2.8x as long as pedicel; hind femora large, 3.5x as long as wide (in *I. aslihanae* sp. nov. antenna with scape in basal 1/3 yellow; pedicel plus flagellum 3.0 as long as scape; the latter 1.8x as long as pedicel; hind femora 3.0x as long as wide).

***Idiomacromerus aslihanae* sp. nov.**

(Figs. 1h, 2h, 3h, 9e)

Etymology. The name is derived from the name of my daughter, Dr. Aslıhan (Doğanlar) Anlar

Diagnosis. Body black with greenish reflection; fore wings hyaline; mesosoma slightly bulged in profile, propodeum declined, distinctly visible from above. Ovipositor as long as 0.6x metasoma. Ovipositor index 1.2. Antennae with 3 annelli; pedicel plus flagellum 3.0x as long as scape; anelli transverse, funicular segments distinctly transverse, F1 1.3x, F5 twice as wide as long; funicle slightly widening apically, F5 1.33x as wide as F1. Marginal vein 2.5x stigmal vein and 1.6x postmarginal vein; scape in basal 1/3 yellow; coxae and femora concolorous with body, except apical tip of femora and tibiae and tarsi yellow, except hind tibia medially with black maculae; wings hyaline, veins pale yellow; hind femora moderately large, 3.0x as long as wide.

Description:

Female. Body (Fig. 1i) black with greenish reflection, scape in basal 1/3 yellow; coxae and femora concolorous with body, except apical tip of femora and tibiae and tarsi yellow, except hind tibia medially with black maculae; wings hyaline, veins pale yellow. Length 1.65 mm+ ovipositor 0.48 mm.

Head in dorsal view slightly narrower than mesoscutum, width to length 50:20; POL 2.4x OOL; OOL 1.4 diameter of lateral ocellus. Head in frontal view slightly higher than wide in ratio 36:34; dorsal margin of torulus same level of lower edge of eye; malar space consists 0.36x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 2i) with flagellum slightly clavate, funicular segments slightly widening apically, comprising 3 anelli, 5 funicle segments and a three-segmented clava; scape reaching slightly below lower edge of median ocellus, anelli transverse, funicular segments distinctly transverse, F1 1.3x, F5 twice as wide as long; funicle slightly widening apically, F5 1.33x as wide as F1; scape 1.1x as long as club; antenna with pedicel plus flagellum 3x as long as scape; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 1i) slightly bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum 0.75x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation.

Forewing (Fig. 3i) with basal cell and speculum closed, basal cell bare, speculum very broad, below marginal vein with sparse setae, apical part with very short and light pubescence; marginal vein 2.5x stigmal vein and 1.6x postmarginal vein.
Metasoma (Fig. 1i) excluding ovipositor as long as mesosoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/4 length metasoma; ovipositor as long as 0.6x metasoma. Ovipositor index 1.2; hind femora 3.0x as long as wide.
Male. Similar to female except as follows: length 2.2 mm. Antenna (Fig. 9e) with F1-F2 twice, F3-F4 2.5x, F5 1.8x as wide as long; F5 1.25x as wide as F1; scape 4x as long as width, and 1.5x as long as club; antenna with pedicel plus flagellum 2.24x as long as scape
Material examined: Holotype, female, Turkey: Hatay, Hacıpaşa, 12.vii.2012, M. Doğanlar, swept from lent field, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratype: 1 male, 25.vi.1998, Hatay, Hacıpaşa, 25.vi.1998, M. Doğanlar, swept from lent field, on card.
Distribution: Turkey: Hatay, Hacıpaşa
Host: Unknown.
Comments: *Idiomacromerus aslihanae* sp. nov. is similar to *I. golbasinensis* sp. nov., *Idiomacromerus sivasensis* sp. nov. and *Idiomacromerus grisselli* Zerova & Seregina. The discusion was given before.

Idiomacromerus zerovaae sp. nov.

(Figs. 1j, 2j, 3j)

Etymology. The name is derived from the name of Dr. M. D. Zerova, who is a famos Ukranian chalcidologist.
Diagnosis. Ovipositor about 2.5x length of the body, 5.0x metasoma; Ovipositor index 8.0; antenna with scape 4.1x as long as width, 1.04x as long as club; pedicel plus flagellum 2.5x as long as scape; pedicel 2.3x as long as width, 1.6x as long as the first 4 segments of flagellum combined; flagellum clavate, strongly widenning apically, the last funicular segment (F5) 1.4x as wide as, and 2.5x as long as fourth flagellar segment (F1); 1st anellus 0.8 width of 2nd and 3rd anellus; F1-F2 anelli form, almost 2.5x as wide as long; F3 1.2x, F4 1.9x as wide as long; F5 the biggest funicular segment, almost quadrate, 1.07x as wide as long; club 2.11x as long as width; malar space 0.26x length of eye; fore wing with marginal vein 2.7x longer than radial vein and 1.6x postmarginal vein; Body head and mesosoma black with greenish reflexion, metasoma yellow, with some brown lines laterally; antenna testaceous, scape yellow, in apical half dorsally brown, with metallic green reflexion, legs yellow, 3rd coxa dorsally green, hind femora medially testaceous. Hind femora 4.2x as long as wide.
Description:.
Female. Body head and mesosoma black with greenish reflexion, metasoma yellow, with some brown lines laterally; antenna testaceous, scape yellow, in apical half dorsally brown, with metallic green reflexion, legs yellow, 3rd coxa dorsally green, hind femora medially testaceous; forewings hyaline, veins pale yellow. Length 1.3 mm+ovipositor 1.6 mm.
Head in dorsal view 1.1x wider than mesoscutum, width to length 42:26; POL 2.25 OOL; OOL 1.33 diameter far from lateral ocellus. Head in frontal view as wide as high in ratio 42:42; dorsal margin of torulus at level of lower margin of eye; malar space consists 0.26x hight of eye. external margin of clypeus straight; face with fine sculpture. antenna (Fig. 2j) with scape 4.1x as long as width, 1.04x as long as club; pedicel plus flagellum 2.5x as long as scape; pedicel 2.3x as long

as width, 1.6x as long as the first 4 segments of flagellum combined; flagellum clavate, strongly widenning apically, the last funicular segment (F5) 1.4x as wide as, and 2.55x as long as fourth flagellar segment (F1); 1st anellus 0.8 width of 2nd and 3rd anellus; F1-F2 anelli form, almost 2.5x as wide as long; F3 1.22x, F4 1.86x as wide as long; F5 the biggest funicular segment, almost quadrate, 1.07x as wide as long; club 2.11x as long as width; linear sensilla in a row on each funicle segment.

Mesosoma (Fig. 1j) 1.85x as long as height, 0.7x as long as metasoma, with pronotum and mesoscutum almost flat, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long in side view, 0.54x as long as mesoscutum; propodeum almost smooth, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 3j) with basal cell closed by sparse setae, with some on upper side; speculum closed, narrow, reaching begining of marginal vein; with 4-5 rows of long setae below marginal vein; marginal vein 2.7x longer than radial vein and 1.6x postmarginal vein, having area between postmarginal and stigmal vein broad, bare.

Metasoma (Fig. 1j) excluding ovipositor 1.16x as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 4/5 length metasoma; Ovipositor (Fig. 1 j) about 1.25x length of the body, 2.5x metasoma. Ovipositor index 4.0; Hind femora 4.2x as long as wide.

Male. Unknown.

Material examined: Holotype, female, Turkey: Hatay, Antakya, 28.vii.2007. M. Doğanlar, swept from pasture, on card, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 2 females, same data as holotype.

Distribution: Turkey: Hatay, Antakya.

Host: Unknown.

Comments: Female: *Idiomacromerus zerovaae* sp. nov. is similar to *Idiomacromerus balasi* (Szelenyi) and *I. mirabilis* Zerova in having antenna with 4 or more anelli. But *I. zerovaae* sp. nov. differs from both of them in having ovipositor longer than body, and 2.5x as long as metasoma; antenna having 5 anelli like flagellomere. In both species ovipositor shorter, in *I. balasi* ovipositor 1.34x as long as metasoma, in *I. mirabilis* ovipositor as long as metasoma; in antenna with 6 anelli like flagellomere in *I. balasi* and with 4 anelli like flagellomere in *I. mirabilis*.

***Idiomacromerus nigdenensis* sp. nov.**

(Figs. 4 d-f, 9f)

Etymology. The name is derived from the name of Niğde, from where the holotype was collected.

Diagnosis. Antennae with 2 annelli; thorax wholly green with metasoma bronz; fore wings with maculae below marginal vein; ovipositor longer than metasoma, almost as long as thorax plus metasoma, 1.3-1.64x as long as metasoma; Ovipositor index 2.7-3.1; Pedicel plus flagellum 2.1- 3.5x as long as scape; Pedicel 1.3- 1.44x as long as anelli plus F1 combined; anelli transverse, F1 slightly transverse,F2-F6 almost quadrate; club 2.44-2.66x as long as width; scape 1.12-1.25x as long as club; marginal vein almost 1.7-2.92x longer than radial vein, 1.22-1.5x postmarginal vein. hind femora 3.5-4.2x as long as wide.

Description:

Female. Body (Fig. 4d) wholly green with metasoma bronz. color of scape variable from yellow to black, flagellum brown; fore wings with maculae below marginal vein; front tibia yellow sometimes with black maculae; middle and hind ones infuscate, basal and apical ends yellow, tarsi yellow, last 1-2 segments black. Length 1.5-1.65 mm+ovipositor 1.12-1.4 mm.

Head in dorsal view 1.12 broader than mesoscutum, width to length 28:13; POL 2.8 OOL; OOL 1.5 diameter lateral ocellus. Head in frontal view slightly higher than wide in ratio 30:27; dorsal margin of torulus at level of lower orbit; malar space consists 0.28x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 4e) with flagellum almost filiform, comprising 2 anelli, 6 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, 3.67x as long as broad; length of pedicel plus flagellum 2.1-3.5x as long as scape; pedicel 1.8x as long as width, about 1.3-1.44x as long as anelli plus first funicle segment (F1); 1st anellus slightly, 2nd anellus strongly transverse, funicular segments at least slightly transverse, club 2.34-2.66x as long as width; scape 1.27x as long as club; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 4d) distinctly bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long, 0.6x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 4f) with basal cell and speculum closed, basal cell 3-4setae apically, with a maculae below stigmal veins, reaching median part of wing; below marginal with sparse setae, apical part with very short and light pubescence. marginal vein 2.33x stigmal vein and 1.67x postmarginal vein.

Metasoma (Fig. 4d) excluding ovipositor slightly longer than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 4/5 length metasoma; ovipositor longer than metasoma, almost as long as thorax plus metasoma, 1.3-1.64x as long as metasoma. Ovipositor index 2.7-3.1; hind femora 3.5-4.2x as long as wide.

Male. Similar to female except as follows: Length 1.4-1.5 mm. Antenna (Fig. 9f) 3 anelli, 5 funicular segments and a three-segmented clava; pedicel 1.14x as long as width, as long as anelli; the latter strongly transverse, F1 slightly transverse, F2-F5 quadrate to slightly longer than width; club 3.75x as long as width.

Material examined: Holotype, female, Turkey: Niğde, 11.vı.2003, O. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.Paratypes: 3 females, 1 male, same data as the holotype; 1 female, Höyük, Niğde, 11.vı.2003, O. Doğanlar, swept from pasture, on card, 2 females, Ardahan, side of the road from Ardahan to Şavşat, 10 km from Ardahan, 11.vi. 2003, swept from *Onobrychis sativa* L. field, M. Doğanlar.

Distribution: Turkey: Niğde, Höyük; Niğde; Ardahan, side of the road from Ardahan to Şavşat, 10 km from Ardahan.

Host: Unknown.

Comments: Female: *Idiomacromerus nigdenensis* sp. nov. is unique species by long ovipositor, almost as long as thorax plus metasoma, 1.3-1.64x as long as metasoma in the species of *Idiomacromerus* having 2 anelli and fore wing with maculae. The new species seems to be similar to *Idiomacromerus terebrator* (Masi) in having long metasoma, if the maculated forwing ignored. But *I. nigdenensis* sp. nov. having 1st anellus slightly, 2nd anellus strongly transverse, funicular segments at least slightly transverse; front tibia yellow sometimes with black maculae; middle and hind ones infuscate, basal and apical ends yellow, tarsi yellow, last 1-2 segments black. (in *I. terebrator* having anelli wider than its length, sometimes square in front view; funicular segments quadrate, to longer than wide; tibiae reddish, middle and hind ones infuscate in middle, tarsi yellow).

Idiomacromerus haliti **sp. nov.**

(Figs. 4a-c, 9g)

Etymology. The name is derived from the name of Prof.Dr. Halit Çam, who is the collector of holotype.

Diagnosis. Antennae with 2 annelli; Body wholly green with metasoma bronz; fore wings with pale maculae below marginal vein; ovipositor 0.58x as long as metasoma; Ovipositor index 1.17; Pedicel plus flagellum 3.0x as long as scape; Pedicel 1.2x as long as anelli plus F1 combined; anelli transverse, F1 distictly transverse,F2-F6 slightly transverse; club 1.75x as long as width; scape 1.14x as long as club; forewing with marginal vein almost 2.67x longer than radial vein, 1.6x postmarginal vein; having area between postmarginal vein and stigmal vein narrow and with hair lines. hind femora 3.66x as long as wide.

Description:.

Female. Body (Fig. 4a) wholly green with metasoma bronz; fore wings with pale maculae below marginal vein; scape black; fore tibia yellow, mid and hind tibiae yellow, medially fuscous, tarsi pale yellow, last segment brown. Length 2.12 mm+ovipositor 0.65 mm.

Head in dorsal view 1.12 broader than mesoscutum, width to length 36:16; POL 2.3 OOL; OOL 1.67 diameter lateral ocellus. Head in frontal view as wide as high, in ratio 35:35; dorsal margin of torulus slightly above level of lower orbit; malar space consists 0.37x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 4b) with flagellum slightly clavate, F6 1.33x as wide as F1, comprising 2 anelli, 6 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, 5.33x as long as broad, 1.5x as long as club; Pedicel plus flagellum 2.5x as long as scape; pedicel 1.86x as long as width, 1.3x as long as anelli plus F1 combined; anelli transverse, F1 distictly transverse,2.5x as wide as long; F2-F6 slightly transverse, F6 1.7x as wide as long; club 1.5x as long as width; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 4a) almost flat in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum short, 0.66x as long as mesoscutum; propodeum with fine reticulation, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 4c) with basal cell closed, basal cell one row of setae near submarginal vein; speculum narrowly open, moderately broad, below marginal vein with 2-3 rows of setae; below stigmal veins with a maculae, reaching median part of wing; forewing with dense setae below marginal vein. marginal vein almost 2.67x longer than radial vein, 1.6x postmarginal vein; having area between postmarginal vein and stigmal vein narrow and with hair lines.

Metasoma (Fig. 4a) excluding ovipositor slightly shorter than mesosoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 1/2 length metasoma; ovipositor 0.58x as long as metasoma. Ovipositor index 1.17; hind femora 3.8x as long as wide.

Male. Similar to female except as follows: Length 1.8-2.0 mm. Antenna (Fig. 9g) with F5 1.25x as wide as F1, comprising 3 anelli, 5 funicle segments and a three-segmented clava; 5.0x as long as broad, 1.15x as long as club; Pedicel plus flagellum 2.8x as long as scape; pedicel 1.25x as long as width, 1.25x as long as anelli; anelli transverse, F1-F3 distictly transverse, twice as wide as long; F4 1.33x, F5 twice, as wide as long; club 1.9x as long as width.

Material examined: Holotype, female, Turkey: Tokat, Gümenek, 05.viii.1989, H. Çam, swept from pasture, on card, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, forewing and left antenna slide mounted in Canada balsam, same data as holotype; 6 females, 2 males, Tokat, Gümenek, 29.vii.-05.viii.1989, H. Çam, swept from pasture, on card; 1 female, 1 male, Tokat, Taşlıçiftlik, 28.vii. 1989, H. Çam, swept from pasture, on card; 7 females, 1 male, 04.-28.vii.1989, H. Çam, swept from pasture, on card; 1 female, 29.vii. 1986, H. Çam, swept from pasture, on card; 1 female, Paşabahçe, Sivas, 24.vii. 1992, L. Gencer, swept from pasture, on card. The paratypes were deposited in the Insect collection of Research Station of Biological Control, Adana.
Distribution: Turkey: Tokat, Sivas.
Host: Unknown.
Comments: Female: *Idiomacromerus haliti* sp. nov. is similar to *I. perplexus* (Gahan) in having forewing with maculae below marginal vein and ovipositor about as long as half of metasoma. But *I. haliti* sp. nov. differs from *I. perplexus* in having pedicel plus flagellum 3.0x as long as scape; Pedicel 1.2x as long as anelli plus F1 combined; F1 distictly transverse,F2-F6 slightly transverse; club 1.75x as long as width; Forewing having area between postmarginal vein and stigmal vein, narrow and with hair lines (in *I. perplexus* pedicel plus flagellum 2.62x as long as scape; Pedicel 1.67x as long as anelli plus F1 combined; F1- F6 distictly transverse, club 2.4x as long as width; Forewing having area between postmarginal vein and stigmal vein,broad and bare).

***Idiomacromerus oguzhani* sp. nov.**

(Figs. 5a, 6a, 7a, 9h)

Etymology. The name is derived from the name of my son, Associate Prof.Dr. Oğuzhan Doğanlar who collected the holotype.
Diagnosis. Marginal vein 4.0x as long as stigmal vein and 2.6x postmarginal vein; basal cell and speculum closed by sparse setae, area below marginal vein with dense setae on both side Antenna with flagellum slightly clavate, anelli strongly transverse, funicular segments transverse; pedicel plus flagellum 3.05x as long as scape; scape 4.4x as long as width, 1.09x as long as club; pedicel 1.5x as long as width, and as long as anelli plus F1; anelli strongly transverse, funicular segments transverse, flagellum slightly clavate, F1 1.6x as wide as long; F6 1.36x as wide as F1, and 1.9x as wide as long; club 1.7x as long as width. Ovipositor 0.36-0.44x metasoma; ovipositor index 0.6- 0.71. Body green with bronze tint, metasoma dark bronze, basal segments of tarsus and tibia dark yellow. Hind femora 3.2x as long as wide.
Description:.
Female. Body (Fig. 5a) green with bronze tint, metasoma dark bronze; fore wings hyaline; 2/5 base of scape yellow; coxae concolorous with body, femora and tibiae, tarsi, except last segment brown. Length 1.95 mm+ovipositor) 0.3 mm.
Head in dorsal view 1.14 broader than mesoscutum, width to length 28:15; POL 2.0x OOL; OOL 1.83 diameter far from lateral ocellus. Head in frontal view slightly wider than high in ratio 43:40; dorsal margin of torulus at level of lower orbit; malar space consists 0.32x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6a) with flagellum slightly clavate towards club, comprising 2 anelli, 6 funicle segments and a three-segmented clava; scape nearly reaching lower edge of median ocellus, 4.4x as long as broad; Pedicel plus flagellum 3.05x as long as scape; Pedicel 1.5x as long as width, as long as anelli plus F1 combined; anelli transverse, F1 1.6x as wide as long; funicular segments

transverse, gradually widening towards club, F6 1.36x as wide as F1, 1.9x as wide as long; club 1.7x as long as width; scape 1.09x as long as club; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 5a) with pronotum and mesoscutum almost flat in profile, scutellum distinctly bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum short, 0.43x as long as mesoscutum; propodeum almost smooth, mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7a) with basal cell and speculum closed by sparse setae, basal cell bare on uppr side; speculum broad, reaching half of marginal vein; forewing with dense setae below marginal vein. marginal vein almost 4x longer than radial vein, 2.6x postmarginal vein; having area between postmarginal vein and stigmal vein with dense setae on both side.

Metasoma (Fig. 5a) excluding ovipositor as long as mesosoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; ovipositor 0.36- 0.44x as long as metasoma. Ovipositor index 0.66; hind femora 4.0-4.3x as long as wide.

Male. Similar to female except as follows: length 1.4 mm. Antenna (Fig. 9f) with one anellus, 7 funicular segments, 3-segmented club. F1 almost quadrate, smaller than other funicular segments, flagellum slightly clavate, club narrower than F7.

Material examined: Holotype, female, Turkey: Adıyaman, Gölbaşı, 24.v. 2007, O. & M. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 2 females, 23 males, same data as holotype; 4 females, 2 males, Yukarımülk, Pazarcık, Kahramanmaraş, 24.v. 2007, swepı from pasture; 1 F, Kangörmez, Bozova, Şanlıurfa, 07.v.2005, Buğday; 1F, 1M, Keçikuyusu, Oğuzeli, Gaziantep, 13.v. 2011, pasture; 1 F, Keçikuyusu 6km Direkli, Oğuzeli, Gaziantep, 02.v. 2010, pasture; 3F, 4M, from Gölbaşı to Adıyaman Araban road connection, 02.v. 2008, swept from lent field; 1 female, Tokat: Center, 01.vi. 1986; 1 female, Necip, 11.v.1989, H. Çam, 1 female, 2 males, Niğde, Höyük, O. Doğanlar, All of the paratypes were swept from pasture and deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Adıyaman, Tokat, Niğde, Gaziantep, Kahramanmaraş.

Host: Unknown.

Comments: Female: *Idiomacromerus oguzhani* sp. nov. is similar to *Idiomacromerus mbahadiri* sp. nov. and *Idiomacromerus uguranlari* sp. nov. in having ovipositor about 0.44x of metasoma. But *I. oguzhani* sp. nov. differs from *I. mbahadiri* by marginal vein 3.0-4.0x as long as stigmal vein and 1.9-2.14x postmarginal vein; basal cell and speculum closed by sparse setae, area below marginal vein with dense setae on both side; Antenna with pedicel plus flagellum 3.05x as long as scape, and F1 1.6x as wide as long; F6 1.36x as wide as F1 (in *I. mbahadiri* marginal vein almost 5x longer than radial vein, 2.5x postmarginal vein; basal cell and speculum closed by dense setae, area below marginal vein with sparse setae; antenna with pedicel plus flagellum 2.67x as long as scape, and F1 1.75x as wide as long; F6 1.6x as wide as F1). *Idiomacromerus oguzhani* sp. nov. differs from *I. uguranlari* by metasoma almost as long as mesosoma; antenna black, except 2/5 base of scape yellow; head from the front as long as width (in *I. uguranlari* metasoma distinctly longer than mesosoma; antenna with scape yellow, flagellum testaceous dorsally with metallic green reflextion; head from front distinctly wider than length (43:35)).

***Idiomacromerus mbahadiri* sp. nov.**

(Figs. 5b, 6b, 7b)

Etymology. The name is derived from the name of my friend, Mustafa Bahadır, who helped me when I collect the specimens.

Diagnosis. Marginal vein almost 5x longer than radial vein, 2.5x postmarginal vein; basal cell and speculum closed by dense setae, area below marginal vein with sparse setae. Antenna with pedicel plus flagellum 2.67x as long as scape; scape 4x as long as width, 1.11x as long as club; pedicel 1.67x as long as width, and 1.22x anelli plus F1; anelli strongly transverse, funicular segments transverse, flagellum moderately clavate, F1 1.75x as wide as long; F6 1.6x as wide as F1, and 2.2x as wide as long; club 1.9x as long as width; ovipositor 0.45x metasoma; ovipositor index 0.74; body black with greenish reflection, scape in basal half, apical half of front and mid femora, 1/4 apical of hind femora, tibiae, tarsi yellow, except 2 segments of tarsi black, forewing veins yellow; hind femora 3.0x as long as wide

Description:.

Female. Body (Fig. 5b) black with greenish reflection, scape in basal half, apical half of front and mid femora, 1/4 apical of hind femora, tibiae, tarsi yellow, except 2 segments of tarsi black, forewing veins yellow. Length 1.7 mm+ovipositor 0.2 mm.

Head in dorsal view 1.3x as wide as mesoscutum, width to length 30:15; POL 2.5x OOL; OOL 2 diameter far from lateral ocellus. Head in frontal view almost as wide as high in ratio 30:30; dorsal margin of torulus slightly below level of lower margin of eye; malar space consists 0.35x hight of eye; external margin of clypeus straight; face reticulated. Antenna (Fig. 6b) with pedicel plus flagellum 2.67x as long as scape; scape 4x as long as width, 1.11x as long as club; pedicel 1.67x as long as width, and 1.22x anelli plus F1; anelli strongly transverse, funicular segments transverse, flagellum moderately clavate, F1 1.75x as wide as long; F6 1.6x as wide as F1, and 2.2x as wide as long; club 1.9x as long as width; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 5b) with pronotum and mesoscutum slightly bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum short, 0.36x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7b) with basal cell and speculum closed by dense setae, basal cell with some setae on upper side; speculum broad, reaching almost half of marginal vein; forewing with sparce setae below marginal vein; marginal vein almost 5x longer than radial vein, 2.5x postmarginal vein; having area between postmarginal and stigmal vein narrow with 2 setae.

Metasoma (Fig. 5b) excluding ovipositor slightly longer than mesosoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/4.5 length metasoma; ovipositor 0.45x metasoma; ovipositor index 0.74; hind femora 3.0x as long as wide.

Male. Similar to female excepts as folllows: Length 1.4-1.6 mm. Antenna with one anellus, 7 funicular segments, F1 1.5x as wide as long; F6 twice as wide as F1, and 2.5x as wide as long; club 2.2x as long as width.

Material examined: Holotype, female, Turkey: Hatay, Belen, Kömürçukuru, 05.v.2012, M. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes; 3 Females, 2 Males, Kömürçukuru, Belen, Hatay, 05.v. 2012; 2 Females, 1 Male, Sekili 8 km to Oğuzeli, Gaziantep, 02.v.2010, swept from pasture.

Distribution: Turkey: Hatay, Belen, Gaziantep.
Host: Unknown.
Comments: Female: *Idiomacromerus mbahadiri* sp. nov. is similar to *I. oguzhani* sp. nov. and *I. uguranlari* sp. nov.. The status of the species were discused above.

Idiomacromerus uguranlari sp. nov.

(Figs. 5c, 6c, 7c)

Etymology. The name is derived from the name of my son in law, Uğur Anlar.
Diagnosis. Wings hyaline, metasoma distinctly longer than mesosoma; antenna with scape yellow, head from front distinctly wider than length (70:63); flagellum distinctly clavate, testaceous dorsally with metallic green reflextion, F6 1.75x wider than F1; anelli strongly transverse, F1-F4 distinctly transverse 2.86x,, F5-F6 transverse, F5 3.0x, F6 2.53x as wide as long; pedicel plus flagellum 2.37x as long as scape. marginal vein 4.3x as long as stigmal vein and 2.0x postmarginal vein. Ovipositor index 0.68; Ovipositor 0.43x metasoma. Body with head green, meso and metasoma black with coppery reflection, legs testaceous with metallic green reflection, last segment of tarsi brown. Hind femora 2.86x as long as wide.
Description:.
Female. Body (Fig. 5c) with head green, meso and metasoma black with coppery reflection, antenna with scape yellow, flagellum testaceous dorsally with metallic green reflextion; legs testaceous with metallic green reflection, last segment of tarsi brown wings hyaline, veins yellow. Length 1.32 mm+ovipositor 0.45 mm.
Head in dorsal view 1.35 broader than mesoscutum, width to length 28:14; POL 5.33x OOL; OOL a diameter far from lateral ocellus. Head in frontal view wider than high in ratio 70:63; dorsal margin of torulus slightly above level of lower margin of eye; malar space consists 0.26x hight of eye; external margin of clypeus straight; face reticulated. Antenna (Fig. 6c) with flagellum distinctly clavate towards club, comprising 2 anelli, 6 funicle segments and a three-segmented clava; scape distincly below lower edge of median ocellus, 4.2x as long as broad; pedicel plus flagellum 2.37x as long as scape; pedicel 1.9x as long as width, as long as anelli plus F1 combined; anelli strongly transverse, F1-F4 distinctly transverse 2.86x,, F5-F6 transverse, F5 3.0x, F6 2.53x as wide as long and 1.75xas wide as F1; club 1.7x as long as width; scape 1.25x as long as club; linear sensilla very sparce, 1-3 sensillae on each funicle segment.
Mesosoma (Fig. 5c) with pronotum and mesoscutum bulged in profile, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum short, 0.5x as long as mesoscutum; propodeum finely reticulated, mesosternnum finely reticulated. All coxae with distinct reticulation. Forewing (Fig. 7c) with basal cell and speculum closed by sparse setae, basal cell with a few setae on uppr side; speculum broad, reaching half of marginal vein; forewing with sparse setae below marginal vein. marginal vein 4.3x as long as stigmal vein and 2.0x postmarginal vein; having area between postmarginal vein and stigmal vein narrow, with 2 setae.
Metasoma (Fig. 5c) excluding ovipositor as long as mesosoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 2/3 length metasoma; ovipositor index 0.68; ovipositor 0.43x metasoma. Hind femora 2.86x as long as wide.
Male. Unknown.
Material examined: Holotype, female, Turkey: Balıkesir, 25. viii. 2004, (B. Hepdurgun), trapped in orchards of *Olea europea* on card, forewing and left

antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana.
Distribution: Turkey: Balıkesir.
Host: Unknown.
Comments: Female: : *Idiomacromerus uguranlari* sp. nov. is similar to *I. oguzhani* sp. nov. and *I. mbahadiri* sp. nov.. The status of the species were discused above.

Idiomacromerus curticaudatus (Szelenyi, 1981)

Liodontomerus curticaudatus Szelenyi, 1981: 211-212. Holotype female, Hungarian National History Museum, Hungary.
Idiomacromerus curticaudatus (Szelenyi), Grissell, 1995: 196. New combination for *Liodontomerus curticaudatus* Szelenyi.
Material examined: 1 female, Hamamköy, Ankara, 11.ix. 1990, reared from seed of Medicago sativa, M. Aydemir **(New record for Turkey).**

Idiomacromerus neslihanae sp. nov.

(Figs. 5d, 6d, 7d, 9i)
Etymology. The name is derived from the name of my daughter, Neslihan Doğanlar.
Diagnosis. Ovipositor approximately 0.64x metasoma; ovipositor index 1.16x. Antenna with scape black,with metallic green reflextion, pedicel and flagellum blrown; Pedicel 1.1x as long as anelli plus F1 combined; both anelli distictly transverse, flagellum almost filiform, F6 1.25x as wide as F1; funicular segments almost quadrate, to slightly transverse; pedicel plus flagellum 2.83x as long as scape;. club 2.15x as long as width; scape 1.07x as long as club; Head from the front 1.12x as wide as height; marginal vein 2.7x as long as stigmal vein and 1.9x postmarginal vein. Body black with metallic green reflextion, coxae and femora concolorous with body, except apical tips femora, tibiae, tarsi yellow, forewing veins pale yellow. Hind femora 3.0x as long as wide.
Description:.
Female. Body (Fig. 5d) black with metallic green reflextion, antenna with scape black, with metallic green reflextion, pedicel and flagellum brown; coxae and femora concolorous with body, except apical tips femora, tibiae, tarsi yellow, forewing hyaline, veins pale yellow. Length 2.1 mm+ovipositor 0.63 mm.
Head in dorsal view 1.16x as wide as mesoscutum, width to length 35:15; POL 2.5x OOL; OOL 2 diameter far from lateral ocellus. Head in frontal view 1.1x as wide as high in ratio 35:32; dorsal margin of torulus at level of lower margin of eye; malar space consists 0.26x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6d) with scape black,with metallic green reflextion, pedicel and flagellum blrown; Pedicel 1.1x as long as anelli plus F1 combined; both anelli distictly transverse, flagellum almost filiform, F6 1.25x as wide as F1; funicular segments almost quadrate, to slightly transverse; pedicel plus flagellum 2.83x as long as scape;. club 2.15x as long as width; scape 1.07x as long as club; linear sensilla in a single row on each funicle segment.
Mesosoma (Fig. 5d) with pronotum and mesoscutum slightly bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum short, 0.45x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7d) with basal cell closed by sparse setae, with a few setae on upper side, speculum open, broad, reaching almost stigmal vein; forewing with a few setae below marginal vein; marginal vein 2.7x as long as

stigmal vein and 1.9x postmarginal vein; having area between postmarginal and stigmal vein narrow, bare.

Metasoma (Fig. 5d) excluding ovipositor as long as mesosoms; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; ovipositor approximately 0.64x metasoma; ovipositor index 1.16x; hind femora 3.0x as long as wide.

Male. Similar to female, except as follows: length 1.55 mm. Antenna (Fig. 9i) with both anelli very small and distinctly transverse, pedicel plus flagellum 2.8x scape, the latter 4.2x as long as wide; funicular segments distinctly transverse.

Material examined: Holotype, female, Turkey: Kahramanmaraş, Araban, Yukarımülk, 11.v.2008, M. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, Adıyaman, Gölbaşı, 20 km to Malatya, 24.v. 2007; 5 males, Adıyaman, Gölbaşı, 20 km to Malatya, 24.v. 2007, M. Doğanlar, swept from pasture, on card. The paratypes were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Kahramanmaraş, Adıyaman.

Host: Unknown.

Comments: Female: *Idiomacromerus neslihanae* sp. nov. is similar to *Idiomacromerus nitens* (Boucek) in having ovipositor 0.64 metasoma, and Ovipositor index around 1.16 and antennae black. But *I. neslihanae* sp. nov. differs from *I. nitens* in having marginal vein 2.7x as long as stigmal vein and 1.9x postmarginal vein; funicular segments almost quadrate, to slightly transverse; head from the front 1.12x as wide as height; (in *I. nitens*, marginal vein 3.8x as long as stigmal vein and 2.7x postmarginal vein; funicular segments transverse; head from the front as long as height).

Idiomacromerus zeynepbanuae sp. nov.

(Figs. 5e, 6e, 7e, 9j)

Etymology. The name is derived from the name of my daughter in law, Associate Prof. Dr. Zeynep Banu (Porgalı) Doğanlar.

Diagnosis. Ovipositor approximately 0.54x metasoma; ovipositor index 1.11x; antenna with scape yellow, in apical half dorsally testaceous, pedicel and flagellum black; Pedicel 1.33x as long as anelli plus F1 combined; both anelli distictly transverse flagellum distinctly clavate, F6 1.5x as wide as F1; funicular segments distnctly transverse; pedicel plus flagellum 2.67x as long as scape;. club 2.27x as long as width; scape 1.2x as long as club; head from the front 1.23x as wide as height, from side view 1.8x as heigh as length; marginal vein 2.64x as long as stigmal vein and 1.48x postmarginal vein. Body black with coupery reflextion, coxae and femora concolorous with body, except apical tips femora, tibiae, tarsi yellow, except last segment of tarsi black, forewing veins yellow. Hind femora 2.8x as long as wide.

Description:.

Female. Body (Fig. 5e) black with coupery reflextion,antennae black, with metallic reflextion, except scape yellow; coxae and femora concolorous with body, except apical tips femora, tibiae, testaceous, tarsi yellow, except last segment of tarsi black, forewing hyaline, veins yellow. Length 1.9 mm+ovipositor 0.5 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 32:15; POL 1.7x OOL; OOL a diameter far from lateral ocellus. Head in frontal view as wide as high in ratio 43:43; dorsal margin of torulus at level of lower margin of eye; malar space consists 0.31x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6e) with flagellum distinctly clavate; comprising 2 anelli, 6 funicle segments and a three-segmented clava; scape nearly reaching distinctly below edge of median ocellus, 3.33x as long as broad; pedicel plus flagellum 2.67x as long as scape; pedicel 1.33x as long as anelli plus F1 combined; both anelli and funicular segments slightly transverse; F6 1.5x as wide as F1; club 2.27x as long as width; scape 1.2x as long as club; linear sensilla in a single row on each funicle segment.

Mesosoma (Fig. 5e) with pronotum and mesoscutum slightly bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with distinct reticulation; pronotum short, 0.4x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7e) with basal cell and speculum closed by sparse setae, basal cell with some setae on upper side; speculum broad, reaching almost stigmal vein; forewing with a few setae below marginal vein. ; marginal vein 2.64x as long as stigmal vein and 1.48x postmarginal vein, having area between postmarginal and stigmal vein narrow with 4 setae.

Metasoma (Fig. 5e) excluding ovipositor longer than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 5/6.5 length metasoma; ovipositor approximately 0.54x metasoma; ovipositor index 1.11; hind femora 2.8x as long as wide.

Male. Similar to female, except as follows: length 1.7 mm. Antenna (Fig. 9j) with 3 anelli,5 funicular segments,3-segmented club; flagellum distinctly clavate, pedicl plus flagellum 2.78x scape.

Material examined: Holotype, female, Turkey: Tokat, 19.viii.1989, H. Çam, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, Tokat; 2 females, 2 males, Tokat, Taşlıçiftlik, 02.vi.-28.vii.1989; 1 female, Gümenek, 29.vii. 1989, H. Çam, swept from pasture, on card. The paratypes were deposited in same museum as the Holotype.

Distribution: Turkey: Tokat

Host: Unknown.

Comments: Female: *Idiomacromerus zeynepbanuae* sp. nov. is similar to *Idiomacromerus nitens* (Boucek) in having ovipositor about 0.54-0.56x metasoma, and Ovipositor index around 0.96-1.11; pedicel plus flagellum 2.7x as long as scape. But *Idiomacromerus zeynepbanuae* sp. nov. differs from *I. nitens* in having antenna with scape yellow, in apical half dorsally testaceous, pedicel and flagellum black; Head from the front 1.23x as wide as height; marginal vein 2.64x as long as stigmal vein and 1.48x postmarginal vein (in *I. nitens* antennae black; segments of funicle transverse; head from the front as long as height, marginal vein 3.8x as long as stigmal vein and 2.7x postmarginal vein).

Idiomacromerus papaveris (Förster, 1856)

(Figs. 5j,6k, 7k)

Lochites papaveris Förster, 1856: 44, 120. female, male syntypes, Germany, (?NMW), USNM.

Distribution: Germany; Hungary (Szelenyi 1957); Italy (Masi 1916); Spain (Nieves Aldrey & Chicote 1986), France (Askew & Nieves 1988), Ukraine, Crimea (Zerova &Seregina, 1999; 2001).

Turkey **(New record):** Sivas: 4 females, Uni.Campus, 17.-27. viii.-07.ix. 1992; 3 females, Hara, 25.viii.-16.ix. 1992, the specimens were swept from pasture by L. Gencer; 1 female, Gaziantep, Oğuzeli, Keçikuyusu,28.iv. 2012; 5 females, 5 males, Adıyaman, Gölbaşı, 20 km to Malatya, 24. v. 2007, 2 males, Şanlıurfa, Bozova, Kangörmez, 24.iv. 2007, the specimens were swept from pasture by M. Doğanlar. length 2.4 mm+ovipositor 0.67 mm.

Comments: The diagnostic characters of *Idiomacromerus papaveris* were given in the key.

Idiomacromerus gozuaciki sp. nov.

(Figs. 5f, 6f, 7f, 9k))

Etymology. The name is derived from the name of Asisstant Prof. Dr. Celalettin Gözüaçık, who collected the types.

Diagnosis. Ovipositor 0.75x metasoma; ovipositor index 1.04; marginal vein almost 2.36x longer than radial vein, 1.5x postmarginal vein; antenna with pedicel plus flagellum 2.5x as long as scape; the latter about 4x as long as width, and 1.5x as long as club; flagellum slightly clavate, F6 1.25x as wide as F1; anelli strongly transverse, funicular segments slightly transverse, F1-F2 about 1.33x as wide as long; F3-F5 almost quadrate, F6 1.25x as wide as long; club 1.76x as long as width. Body black with greenish reflection, scape, tibiae fuscous, tarsi yellow except claws black, forewing hyaline, veins yellow; hind femora 3.1x as long as wide.

Description:

Female. Body (Fig. 5f) black with metallic green reflextion, antenna with scape fuscous,dorsally greenish reflextion, flagellum brown, coxae and femora concolorous with body, except apical 2/5 of femora, fore tibiae, both ends of mid and hind tibiae and tarsi yellow, forewing hyaline, veins pale yellow. Length 2.9 mm+ovipositor 0.85 mm.

Head in dorsal view 0.9x as wide as mesoscutum, width to length 45:22; POL 3x OOL; OOL a diameter far from lateral ocellus. Head in frontal view 1.15x as wide as high in ratio 46:40; dorsal margin of torulus slightly above lower margin of eye; malar space consists 0.26x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6f) with pedicel plus flagellum 2.5x as long as scape; the latter about 4x as long as width, and 1.5x as long as club; flagellum slightly clavate, F6 1.25x as wide as F1; anelli strongly transverse, funicular segments slightly transverse, F1-F2 about 1.33x as wide as long; F3-F5 almost quadrate, F6 1.25x as wide as long; club 1.76x as long as width; linear sensilla in 1.5 rows on each funicle segment.

Mesosoma (Fig. 5f) with pronotum and mesoscutum bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum short in side view, 0.35x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7f) with basal cell and speculum closed by dense setae, basal cell with 2 rows long setae on upper side; speculum broad, but reaching begining of marginal vein; forewing with 3 rows of long setae below marginal vein; marginal vein 2.36x as long as stigmal vein and 1.5x postmarginal vein, having area between postmarginal and stigmal vein broad with 2 rows of setae.

Metasoma (Fig. 5f) excluding ovipositor slightly than rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; Ovipositor 0.75x metasoma. Ovipositor index 1.04; Hind femora 3.1x as long as wide.

Male. Similar to femal except as follows: length 1.5 mm. Antenna (Fig. 9k) with 3 anelli, 5 funicular segments, 3-segmented club. Pedicel plus flagellum 2.86x scape, the latter wider basally.

Material examined: Holotype, female, Turkey: Ağrı, Taşlıçay, Aşağı Toklu, 18.vii.2012, C. Gözüaçık, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 male, same data as the holotype; 1 Female,1 Male, Nişancı, Erciş, Van, 04.vii.2010, 39 03 N, 43 17 E, O. Doğanlar.

Distribution: Turkey: Ağrı,Van.

Host: Unknown.

Comments: Female: *Idiomacromerus gozuaciki* sp. nov. is similar to *Idiomacromerus papaveris* (Förster) in having ovipositor 0.75 metasoma, and funicular segments slightly transverse. But *I. gozuaciki* sp. nov. differs from *I. papaveris* in having marginal vein 2.82x as long as stigmal vein and 1.43x postmarginal vein; antenna with pedicel plus flagellum 2.5x as long as scape (in *papaveris*, marginal vein 2.7x as long as stigmal vein and 2.0x postmarginal vein; antenna with pedicel plus flagellum 2.96x as long as scape).

***Idiomacromerus hasandagus* sp. nov.**

(Figs. 5g, 6g, 7g, 9l)

Etymology. The name is derived from the name of the highest mountain of Niğde from where the holotype was collected.

Diagnosis. Ovipositor 0.80x length of metasoma; flagellum slightly clavate; ovipositor index 1.4; Antenna with scape 4.6x as long as width, 1.1x as long as club; pedicel plus flagellum 2.5x as long as scape; flagellum slightly clavate, F6 1.5x as wide as F1; pedicel 1.4x as long as width, 0.73x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 twice, F6 1.7x as wide as long; club 2.5x as long as width; marginal vein 2.0x longer than radial vein, 1.2x postmarginal vein. Body black with violet reflextion, antenna with scape yellow, pedicel and flagellum black, coxae and femora concolorous with body, except apical 1/5 of fore and mid femora, 1/4 of hind femora, tibiae and tarsi yellow. Hind femora 3.75x as long as width.

Description:

Female. Body (Fig. 5g) black with violet reflextion, antenna with scape yellow, pedicel and flagellum black, coxae and femora concolorous with body, except apical 1/5 of fore and mid femora, 1/4 of hind femora, tibiae and tarsi yellow. length 2.6 mm+ovipositor 1.12 mm.

Head in dorsal view slightly wider than mesoscutum, width to length 30:17; POL 2.4x OOL; OOL 1.4 diameter far from lateral ocellus. Head in frontal view as wide as high in ratio 30:30; dorsal margin of torulus at lower margin of eye; malar space consists 0.33x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6g) with scape 4.6x as long as width, 1.1x as long as club; pedicel plus flagellum 2.5x as long as scape; flagellum slightly clavate, F6 1.5x as wide as F1; pedicel 1.4x as long as width, 0.73x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 twice, F6 1.7x as wide as long; club 2.5x as long as width; linear sensilla in a row on each funicle segment.

Mesosoma (Fig. 5g) twice as long as width, 0.72x as long as metasoma, with pronotum and mesoscutum bulged, propodeum sharply declined, almost vertical, not visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long in side view, 0.7x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7g) with basal cell and speculum closed by dense setae, basal cell almost bare on upper side; speculum broad, reaching begining of stigmal vein; below marginal vein almost 3 rows of sparse long setae; marginal vein 2.0x longer than radial vein, 1.2x postmarginal vein; having area between postmarginal and stigmal vein narrow, with one row of setae.

Metasoma (Fig. 5g) excluding ovipositor as long as rest of the body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; ovipositor 0.80x length of metasoma; ovipositor index 1.4; hind femora 3.75x as long as wide.

Male. Similar to female except as follows: length 1.62 mm. Antenna (Fig. 9l) both anelli distinctly transverse, flagellar segments widening towards tip, F6 1.57x as wide as F1; club 1.67x as wide as long.

Material examined: Holotype, female, Turkey: Niğde, 11.vi.2008, O. Doğanlar, swept from pasture, on card, deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Niğde

Host: Unknown.

Comments: Female: *Idiomacromerus hasandagus* sp. nov. is similar to *Idiomacromerus turhalensis* sp. nov., in having ovipositor 0.80 metasoma (in *I. turhalensis* sp. nov. 0.86x length of metasoma). But it differs from *I. turhalensis* sp. nov. in having marginal vein 2.0x longer than radial vein, 1.2x postmarginal vein; pedicel plus flagellum 2.5x as long as scape (in *I. turhalensis* marginal vein 5.0x longer than radial vein, 2.5x postmarginal vein; pedicel plus flagellum 3.1x as long as scape).

***Idiomacromerus turhalensis* sp. nov.**

(Figs. 5h, 6h, 7h)

Etymology. The name is derived from the name of Tokat, Turhal, from where the types were collected.

Diagnosis. Ovipositor 0.86x length of metasoma; flagellum clubed, funicular segments almost filiform, club wider; Ovipositor index 1.32; Antenna with scape 5.0x as long as width, 1.25x as long as club; pedicel plus flagellum 3.1x as long as scape; flagellum clubed, funicular segments almost filiform, F6 1.2x as wide as F1; pedicel 1.67x as long as width, 0.84x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 1.45x, F6 2.5x as wide as long and 1.25x as wide as F1; club 1.6x as long as width; marginal vein 5.0x longer than radial vein, 2.5x postmarginal vein. Body black with metallic green reflextion, antenna brown with greenish reflextion,legs concolorous with body, except apical 1/5 of femora, both ends of tibiae and tarsi yellow, except last two segment brown. Hind femora 4.0x as long as width.

Description:

Female. Body (Fig. 5h) black with metallic green reflextion, antenna brown with greenish reflextion,legs concolorous with body, except apical 1/5 of femora, both ends of tibiae and tarsi yellow, except last two segment brown. length 1.63 mm+ovipositor 0.63 mm

Head in dorsal view almost as wide as mesoscutum, width to length 50:22; POL 2.44 OOL; OOL 1.12 diameter far from lateral ocellus. Head in frontal view as wide as high in ratio 30:30; dorsal margin of torulus at level of lower margin of eye; malar space consists 0.38x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6h) with scape 5.0x as long as width, 1.25x as long as club; pedicel plus flagellum 3.1x as long as scape; flagellum clubed, funicular segments almost filiform, F6 1.2x as wide as F1; pedicel 1.67x as long as width, 0.84x as long as anelli plus F1; anelli transverse, funicular segments slightly transverse, almost same length, slightly widening towards tip, F1 1.45x, F6

2.5x as wide as long and 1.25x as wide as F1; club 1.6x as long as width; linear sensilla in a row on each funicle segment.

Mesosoma (Fig. 5h) 1.85x as long as width, 1.2x as long as metasoma, with pronotum and mesoscutum bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum short in side view, 0.4x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7h) with basal cell and speculum closed by sparse setae, basal cell with a few long setae on upper side; speculum broad, reaching begining of marginal vein; below marginal vein almost 6 rows of sparse long setae; marginal vein 5.0x longer than radial vein, 2.5x postmarginal vein; having area between postmarginal and stigmal vein narrow, bare.

Metasoma (Fig. 5h) excluding ovipositor slightly slightly shorter than rest metasoma; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 3/5 length metasoma; ovipositor 0.86x length of metasoma; ovipositor index 1.32; hind femora 4.0x as long as width.

Male. Unknown.

Material examined: Holotype, female, Turkey: Tokat, 11.v.1989, H. Çam, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, same data as the holotype, except date 15. viii. 1989; 1 Female, from Gölbaşı to Adıyaman Araban road connection, 02.v. 2008, swept from lent field.

Distribution: Turkey: Tokat, Adıyaman.

Host: Unknown.

Comments: Female: *Idiomacromerus turhalensis* sp. nov. is similar to *Idiomacromerus gozuaciki* sp. nov., *I. pulcher* (Zerova et Seryogina) and *I. papaveris* (Förster) in some respects. having ovipositor 0.75 metasoma, and funicular segments slightly transverse. But *I. turhalensis* sp. nov. differs from 3 of them in having ovipositor 0.86x length of metasoma (in those species ovipositor at most 0.75x length of metasoma). It also similar to *I. karakurtansis* sp. nov. in having legs concolorous with body, pedicel plus flagellum 3.1x as long as scape. But *I. turhalensis* n.sp. differs from *I. karakurtansis* sp. nov. in having antenna with scape 4.5x as long as width, almost as long as club, and flagellum moderately clavate, F6 1.33x as wide as F1 (in *I. karakurtansis* sp. nov. antenna with scape 5.0x as long as width, 1.25x as long as club, and funicular segments almost filiform, F6 1.2x as wide as F1).

Idiomacromerus karakurtensis sp. nov.

(Figs. 5i, 6i, 7i, 9m)

Etymology. The name is derived from the name of Erzurum, Horasan, Karakurt, from where the holotype was collected.

Diagnosis. Ovipositor almost equal to the length of metasoma; ovipositor index 1.87. Antenna with scape 4.5x as long as width, almost as long as club; pedicel plus flagellum 3.1x as long as scape; flagellum clavate, F6 1.33x as wide as F1; pedicel 1.43x as long as width, as long as anelli plus F1; anelli transverse, funicular segments distinctly transverse,almost same length, distinctly widening towards tip, F1 1.5x, F6 twice as wide as long and 1.33x as wide as F1; club 2.25x as long as width; Marginal vein 4.75x longer than radial vein, 2.9x postmarginal vein; Body black with metallic green reflextion, antenna brown with greenish reflextion, legs concolorous with body, except fore tibiae testaceous, apical 1/5 of femora, both ends of mid and hind tibiae and tarsi yellow, except last two segment brown. Hind femora 5.0x as long as width.

Description:

Female. Body (Fig. 5i) black with metallic green reflextion, antenna brown with greenish reflextion, , legs concolorous with body, except apical 1/6 of femora, fore tibiae, both ends of mid and hind tibiae and tarsi yellow,except last two segment brown, forewing hyaline, veins pale yellow. Length 1.6 mm+ovipositor 0.62 mm.

Head in dorsal view 1.12x wider than mesoscutum, width to length 45:20; POL twice OOL; OOL 1.66 diameter far from lateral ocellus. Head in frontal view as wide as high in ratio 45:45; dorsal margin of torulus slightly above lower margin of eye; malar space consists 0.53x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6i) with scape 4.5x as long as width, almost as long as club; not reaching median ocellus; pedicel plus flagellum 3.1x as long as scape; flagellum clavate, F6 1.33x as wide as F1; pedicel 1.43x as long as width, as long as anelli plus F1; anelli transverse, funicular segments distinctly transverse,almost same length, distinctly widening towards tip, F1 1.5x, F6 twice as wide as long and 1.33x as wide as F1; club 2.25x as long as width; linear sensilla in a row on each funicle segment.

Mesosoma (Fig. 5i) 1.4x as long as heigh, shorter than metasoma, 0.7x as long as metasoma, with pronotum and mesoscutum distinctly bulged, propodeum declined, distinctly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long in side view, 0.8x as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Forewing (Fig. 7i) with basal cell closed by dense sparse setae, with 4 setae on upper side; speculum open, broad, reaching begining of marginal vein; with 3 rows of long setae below marginal vein; marginal vein 4.75x longer than radial vein, 2.9x postmarginal vein; having area between postmarginal and stigmal vein broad, with 2 setae.

Metasoma (Fig. 5i) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 4/5 length metasoma; Ovipositor almost equal to the length of metasoma. Ovipositor index 1.87; Hind femura 5.0x as long as wide.

Male. Similar to femal except as follows: length 1.55 mm. Antenna (Fig. 9m) with one anellus and 7 funicular segments; scape 3.7x as long as width, slightly shorter than club; pedicel plus flagellum 3.7x as long as scape; flagellum slightly clavate, F7 1.2x as wide as F1; pedicel almos quadrate, as long as anellus plus F1; anellus transverse, funicular segments distinctly transverse, almost same length, slightly widening towards tip, F1 and, F7 twice as wide as long; club twice as long as width.

Material examined: Holotype, female, Turkey: Kars, Sarıkamış, Karakurt, 12.vii.2012, M. Doğanlar, swept from pasture, on card, forewing and left antenna slide mounted in Canada balsam, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, 3 males, same data as the holotype.

Distribution: Turkey: Kars, Sarıkamış

Host: Unknown.

Comments: Female: *Idiomacromerus karakurtensis* sp. nov. is similar to *Idiomacromerus papaveris* (Förster) and *I. akdenizeus* in having flagellum moderately clavate. But *I. karakurtensis* sp. nov. differs from *I. papaveris* in having ovipositor almost equal to the length of metasoma and Ovipositor index 1.87; (in *I. papaveris* Ovipositor 0.73x metasoma; Ovipositor index 1.35). It differs from *I. akdenizeus* in having marginal vein 4.75x longer than radial vein, 2.9x postmarginal vein; antenna with pedicel plus flagellum 3.1x as long as scape (in *I. akdenizeus* marginal vein 2.70- 3.0x longer than radial vein and 1.37-1.57x postmarginal vein; antenna with pedicel plus flagellum 2.4x as long as scape).

Idiomacromerus akdenizeus (Doganlar, 1989)

(Figs. 5k, 6j ,7j)

Ameromicrus akdenizeus Doganlar 1984: 144-145. Holotype female, (IMBC). **(New status)**

Idiomacromerus papaveris (Förster), misidentification by Zerova & Seregina (2001).

Distribution: Turkey: Adana: Yumurtalık, 15.viii. 1979, A.Beyarslan, as Holotype of *A. akdenizeus*; 6 females, 4 males, same locality, 20-22.viii.1982, M. Doğanlar, as Paratype of *A. akdenizeus*. Additional materials: Adana, Aladağ, 16. vii. 2001, M. Doğanlar; Gaziantep, Araban, 2 females, 02. v. 2008, M. Doğanlar; 1 female, Niğde, Gümüş, 27. vi. 2006, M. Doğanlar; Niğde- Adana road connection, 19.v. 2005, O. Doğanlar; Sivas: 1 female, Hara, 16.ix. 1992, 1 female, Paşabahçe, 05.ix.1992, 1 female, Türk-İş blok, 13. viii. 1992, 4 females, CÜ Campus, 16. viii.- 07.ix.1992, all of the specimens from Sivas were collected by L. Gencer. All of the specimens were swept from pasture, and deposited in IMBC.

Comments: Length 2.0 mm+ovipositor 0.9 mm. The diagnostic characters of *Idiomacromerus akdenizeus* were given in the key.

Idiomacromerus fursovi sp. nov.

(Figs. 5l, 6l, 7l, 9n)

Etymology. The name is derived from the name of Dr. Victor Fursov, who is a famos Ukranian chalcidologist.

Diagnosis. Ovipositor 1.5x metasoma; ovipositor index 2.8. Fore wing with marginal vein 1.7x longer than radial vein and 1.35x postmarginal vein; antenna with scape 6.62x as long as width, 1.5x as long as club; pedicel plus flagellum 2.4x as long as scape; pedicel twice as long as width, 1.54x as long as anelli plus F1 combined; flagellum almöst filiform, slightly widenning apically, F6 1.3x as wide as F1; F1-F2 1.6x F3-F4 1.5x, F5-F6 1.55x as wide as long; club 2.5x as long as width; malar space 0.18x length of eye; Body violet, with copery reflextion; scape, except apicaly brown, both ends of tibiae, tarsi, yellow excepts claws black, hind femora 4.4x as long as wide.

Description:

Female. Body (Fig. 5l) violet, with copery reflextion; scape, except apicaly brown, both ends of tibiae, tarsi, yellow excepts claws black, forewing hyaline, veins pale yellow. Length 1.6 mm+ovipositor 0.95 mm.

Head in dorsal view 1.15x wider than mesoscutum, width to length 30:15; POL twice OOL; OOL 1.4 diameter far from lateral ocellus. Head in frontal view 1.2x as wide as high in ratio 30:25; dorsal margin of torulus slightly above lower margin of eye; malar space consists 0.18x hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 6l) with scape 6.62x as long as width, 1.5x as long as club, not reachin median ocellus; pedicel plus flagellum 2.4x as long as scape; pedicel twice as long as width, 1.54x as long as anelli plus F1 combined; flagellum almöst filiform, slightly widenning apically, F6 1.3x as wide as F1; F1-F2 1.6x F3-F4 1.5x, F5-F6 1.55x as wide as long; club 2.5x as long as width; linear sensilla in a row on each funicle segment.

Mesosoma (Fig. 5l) 1.42x as long as height, 0.8x as long as metasoma, with pronotum and mesoscutum distinctly bulged, propodeum declined, slightly visible from above; sculpture of pronotum, mesoscutum and scutellum with fine reticulation; pronotum long in side view, 0.66 as long as mesoscutum; propodeum and mesosternnum finely reticulated. All coxae with fine reticulation. Fore wing (Fig. 7l) with with basal cell closed by sparse setae, with 4 setae on upper side; speculum closed, broad, reaching begining of marginal vein; with 3 rows of long setae below marginal vein; marginal vein 1.7x longer than radial vein and 1.35x postmarginal vein; having area between postmarginal and stigmal vein narrow, with 2 setae.

Metasoma (Fig. 5l) excluding ovipositor as long as rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium about 4/5 length metasoma; Ovipositor (Fig. 5l) 1.5x metasoma; Ovipositor index 2.8. Hind femura 4.4x as long as wide.

Male. Similar to femal except as follows: length of body 1.5 mm. antenna (Fig. 9n) with 3 anelli, 5 funicular segments, anelli strongly taransfer, F1 2.6x, F2- F3 about 2.1x, F4 1.53x, F5 1.67x as wide as width; club about twice as long as wide.

Material examined: Holotype, female, Turkey: Hacıpaşa, Reyhanlı, Hatay, 25.vi. 1998, deposited in the Insect collection of Research Station of Biological Control, Adana. Paratypes: 1 female, 1 male, same data as the holotype.

Distribution: Turkey: Hatay, Reyhanlı.

Host: Unknown.

Comments: Female: *Idiomacromerus fursovi* sp. nov. is similar to *Idiomacromerus terebrator* (Masi) in having ovipositor about about length of the metasoma plus 1/2 of mesosoma But *I. fursovi* sp. nov. differs from *I. terebrator* in having ovipositor about 1.5x metasoma ovipositor index 2.8; antenna (Fig. 6j) with scape 1.5x as long as club; funicular segments distinctly transverse, F1-F2 1.6x F3-F4 1.5x, F5-F6 1.55x as wide as long; slightly widenning apically, F6 1.3x as wide as F1 (in *I. terebrator* ovipositor about length of the metasoma plus 1/3 of mesosoma; ovipositor index 2.5; antenna with scape 1.23x as long as club; anelli wider than its length, sometimes square in front view, funicular segments quadrate, to longer than wide; club 2.44x as long as width).

Species unplaced into the identification key:

Idiomacromerus longicorpus (Abdul-Rassoul, 2000)

Liodontomerus longicorpus Abdul-Rassoul, 2000: 1, 3. Holotype, female, Allotype, male (Iraq Natural History Museum).

Diagnosis: Marginal vein about 6x stigmal vein, and about 4x postmarginal vein. Thorax twice as long as wide; fore and hind femora strongly swollen; legs dark violet, tip of tibiae and tarsi yellow, claws black (Abdul-Rassoul, 2000).

Descriptions of female and male were given by Abdul-Rassoul (2000).

Host: Unknown.

Distribution: Iraq: Diyala, Adhaim.

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Figure 1. *Idiomacromerus* spp. Female. Bodies a. *I. yunusi* sp. nov., b. *I. sebnemae* sp. nov., c. *I. gumusensis* sp. nov., d. *I. selimensis* sp. nov., e. *I. aladagensis* sp. nov., f. *I. erzurumensis* sp. nov., g. *I. golbasinensis* sp. nov., h. *I. lutfiyeae* sp. nov., i. *I. aslihanae* sp. nov., j. *I. zerovaae* sp. nov. (Scale bar for (a,c, d, g)= 0.86 mm; for (b) 0.8 mm; for (d)= 1.2 mm; for (e)= 0.76 mm; for (f, h,j)= 0.67 mm).

Figure 2. *Idiomacromerus* spp. Female. Antennae. a. *I. yunusi* sp. nov., b. *I. sebnemae* sp. nov., c. *I. gumusensis* sp. nov., d. *I. selimensis* sp. nov., e. *I. aladagensis* sp. nov., f. *I. erzurumensis* sp. nov., g. *I. golbasinensis* sp. nov., h. *I. lutfiyeae* sp. nov., i. *I. aslihanae* sp. nov., j. *I. zerovaae* sp. nov. (Scale bar = 0.15 mm).

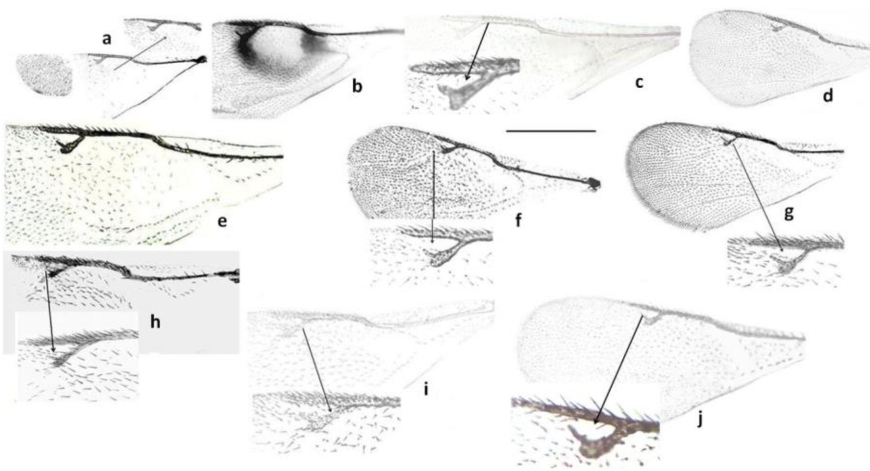

Figure 3. *Idiomacromerus* spp. Female. Fore wings. a. *I. yunusi* sp. nov., b. *I. sebnemae* sp. nov., c. *I. gumusensis* sp. nov., d. *I. selimensis* sp. nov., e. *I. aladagensis* sp. nov., f. *I. erzurumensis* sp. nov., g. *I. golbasinensis* sp. nov., h. *I. lutfiyeae* sp. nov., i. *I. aslihanae* sp. nov., j. *I. zerovaae* sp. nov. (Scale bar for a,b,e,f,g = 0.44 mm; c,d,h,i,j= 0.39 mm).

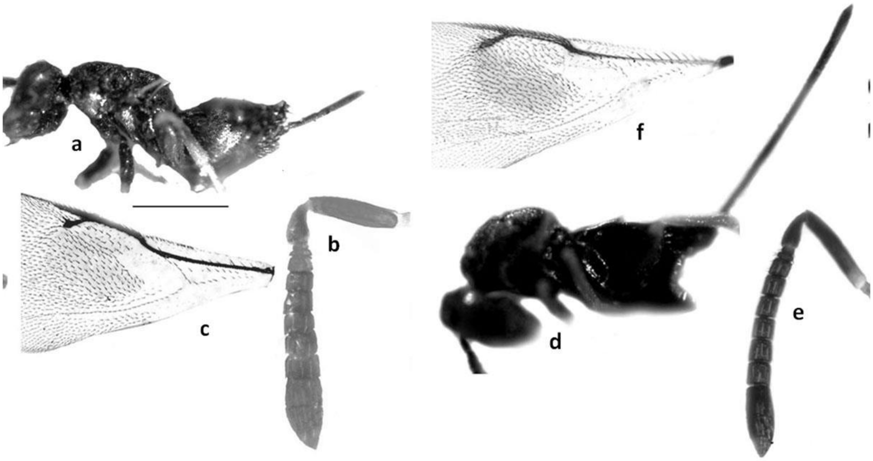

Figure 4. *Idiomacromerus* spp. Female. a,b,c. *I. haliti* sp. nov.; d,e,f. *I. nigdenensis* sp. nov., a, d. body; b,e. antennae; c,f. fore wing part (Scale bar for a= 0.75 mm, for d = 0.5 mm; for b,e= 0.12 mm; for c = 0.38mm; for f= 0.33 mm).

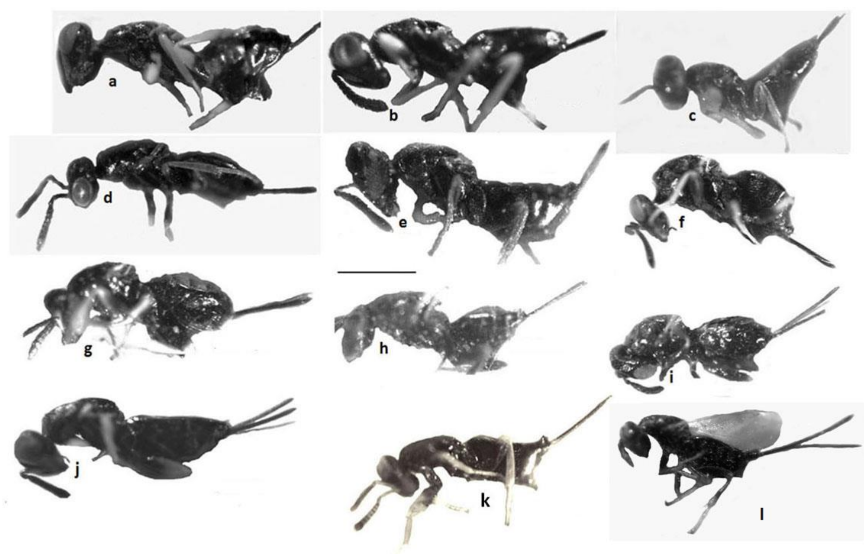

Figure 5. *Idiomacromerus* spp. Female bodies. a. *I. oguzhani* sp. nov., b. *I. mbahadiri* sp. nov., c. *I. uguranlari* sp. nov., d. *I. neslihanae* sp. nov., e. *I. zeynepbanuae* sp. nov., f. *I. gozuaciki* sp. nov., g. *I. hasandagus* sp. nov., h. *I. turhalensis* sp. nov., i. *I. karakurtensis* sp. nov., j. *I. papaveris* (Förster, 1856), k. *I. akdenizeus* (Doganlar, 1989), l. *I. fursovi* sp. nov. (Scale bar for a, e, h = 0.71 mm; for b,c= 0.6 mm; for d, j= 0.9 mm; for f,g=1.12 mm; for i, k= 0.82 mm).

Figure 6. *Idiomacromerus* spp. Female antennae. a. *I. oguzhani* sp. nov., b. *I. mbahadiri* sp. nov., c. *I. uguranlari* sp. nov., d. *I. neslihanae* sp. nov., e. *I. zeynepbanuae* sp. nov., f. *I. gozuaciki* sp. nov., g. *I. hasandagus* sp. nov., h. *I. turhalensis* sp. nov., i. *I. karakurtensis* sp. nov., j. *I. papaveris* (Förster, 1856), k. *I. akdenizeus* (Doganlar, 1989), l. *I. fursovi* sp. nov. (Scale bar = 0.5 mm).

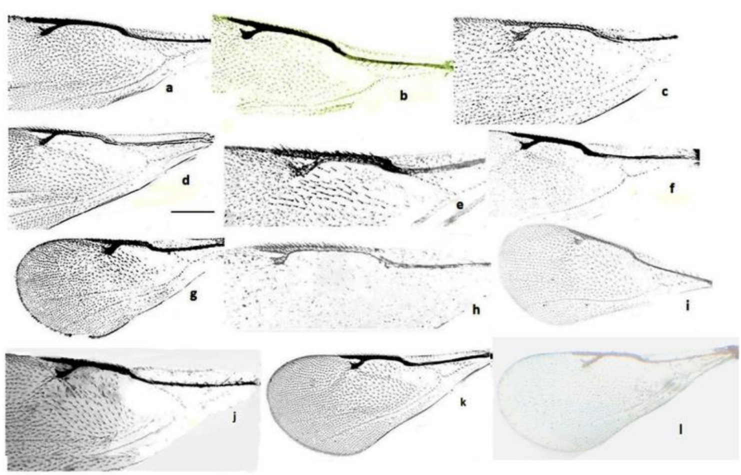

Figure 7. *Idiomacromerus* spp. Female fore wings. a. *I. oguzhani* sp. nov., b. *I. mbahadiri* sp. nov., c. *I. uguranlari* sp. nov., d. *I. neslihanae* sp. nov., e. *I. zeynepbanuae* sp. nov., f. *I. gozuaciki* sp. nov., g. *I. hasandagus* sp. nov., h. *I. turhalensis* sp. nov., i. *I. karakurtensis* sp. nov., j. *I. papaveris* (Förster, 1856), k. *I. akdenizeus* (Doganlar, 1989), l. *I. fursovi* sp. nov. (Scale bar for a, g= 0.23; for b, d= 0.2 mm; for c, e, f, h, j, l= 0.15 mm; for i=0.36 mm; for k= 0.27 mm).

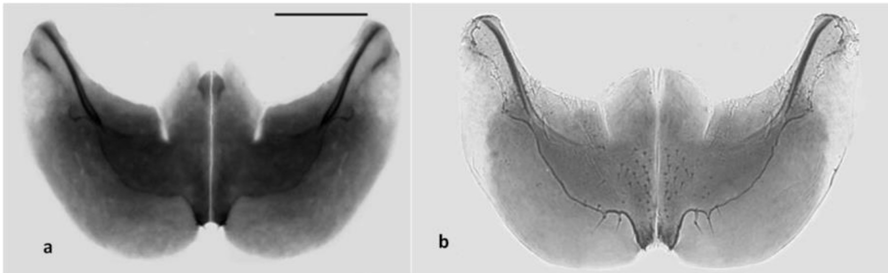

Figure 8. *Idiomacromerus* spp. Hypopygia. a. *I. papaveris* (Förster); b. *I. akdenizeus* (Doganlar) (Scale bar = 0.10 mm).

Figure 9. *Idiomacromerus* spp. Male antenna. a. *I. yunusi* sp. nov., b. *I. erzurumensis* sp. nov., c. *I. golbasinensis* sp. nov., d. *I. lutfiyeae* sp. nov., e. *I. aslihanae* sp. nov., f. *I. nigdenensis* sp. nov., g. *I. haliti* sp. nov., h. *I. oguzhani* sp. nov., i. *I. neslihanae* sp. nov., j. *I. zeynepbanuae* sp. nov., k. *I. gozuaciki* sp. nov., l. *I. hasandagus* sp. nov., m. *I. karakurtensis* sp. nov., n. *I. fursovi* sp. nov. (Scale bar = 0.35 mm).

TWO SUBSPECIES OF *DORCADION* DALMAN, 1817 FROM TURKEY (COLEOPTERA: CERAMBYCIDAE)

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[**Özdikmen, H. & Koçak, Ö.** 2016. Two subspecies of *Dorcadion* Dalman, 1817 from Turkey (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 11 (2): 355-358]

ABSTRACT: The following new subspecies are described: *Dorcadion menradi pilosicollis* ssp. nov. from Karaman province, and *Dorcadion lameerei konyaense* ssp. nov. from Konya province.

KEY WORDS: Cerambycidae, Dorcadionini, *Dorcadion*, new subspecies, Turkey

Tribe DORCADIONINI Swainson, 1840
Genus *DORCADION* Dalman, 1817: 397
[type species *Cerambyx glicyrrhizae* Pallas, 1773]
Subgenus *CRIBRIDORCADION* Pic, 1901: 12
[type species *Dorcadion mniszechi* Kraatz, 1873]

Dorcadion menradi Holzschuh, 1989
Dorcadion menradi Holzschuh, 1989: 172

The species was described by Holzschuh (1989) from Kahramanmaraş province (Afşin) in Central part of South Anatolia of Turkey. It is known only the type locality until now (Holzschuh, 1989; Özdikmen, 2010, 2012; Pesarini & Sabbadini, 2013).

Type information: Holotype ♂, collection Carolus Holzschuh, Villach (Holzschuh, 1989; Tavakilian, 2016).

Dorcadion menradi pilosicollis ssp. nov.
(Figs. 1A,B, 2)

Holotype ♂: Turkey: Karaman province, Central, Yollarbaşı village, 2016, 1200 m, leg. Ö. Koçak; Paratype ♀: Turkey: Karaman province, Central, Yollarbaşı village, 2016, 1200 m, leg. Ö. Koçak. The specimens are deposited in collection of Özgür Koçak (Turkey: Karaman).

Body length: 10 mm in male, 13 mm in female.

The new subspecies from Karaman province is Western population of *Dorcadion menradi* Holzschuh, 1989. It differs from *Dorcadion menradi menradi* Holzschuh, 1989 by the following characters:

<u>*Dorcadion menradi menradi* Holzschuh, 1989</u>
In male and female: Antennae reddish brown, against the top dark colored. Antennal pubescence dark. Antennal segments relatively elongated. Head only

very sparsely hairy - practically bald. Pronotum only very sparsely hairy - practically bald, without median stripe. Apex of elytra narrowly reddish.

Dorcadion menradi pilosicollis ssp. nov.
In male and female: Only first antennal segment reddish brown, the remaining segments black. Antennal pubescence on first two segments and basal part of third segment light, while on the remaining segments dark. Antennal segments relatively shortened and thickened. Head at least on vertex rather densely hary. Pronotum very sparsely hairy, with an interrupted median stripe of white hairs in male. Pronotum very sparsely hairy, with an complete median stripe of white hairs in female. Apex of elytra completely black in male.

Dorcadion lameerei Théry, 1896

Dorcadion lameerei Théry, 1896: 109

The species was described by Théry (1896) from Kastamonu province in North-Western Anatolia of Turkey. It is known only the type locality until now (Théry, 1896; Breuning, 1962; Önalp, 1990; Özdikmen, 2010, 2012).

Type information: Syntypes 2 ♂♂ & 2 ♀♀, ex collection A. Théry in M. Pic, Muséum National d'Histoire Naturelle, Paris (Tavakilian, 2016).

Dorcadion lameerei konyaense ssp. nov.

(Figs. 3A,B)

Holotype ♀: Turkey: Konya province, 2015, 1100 m, leg. Ö. Koçak. The specimen is deposited in collection of Özgür Koçak (Turkey: Karaman).

Body length: 11 mm.

The new subspecies from Konya province is Southern population of *Dorcadion lameerei* Théry, 1896. It differs from *Dorcadion lameerei lameerei* Théry, 1896 by a complete median band of white hairs on pronotum, by dark colored legs with reddish-brown basal parts of tibiae, and by relatively shorthened elytra.

ACKNOWLEDGEMENT

I would like to thank M. Danilevsky (Moscow, Russia).

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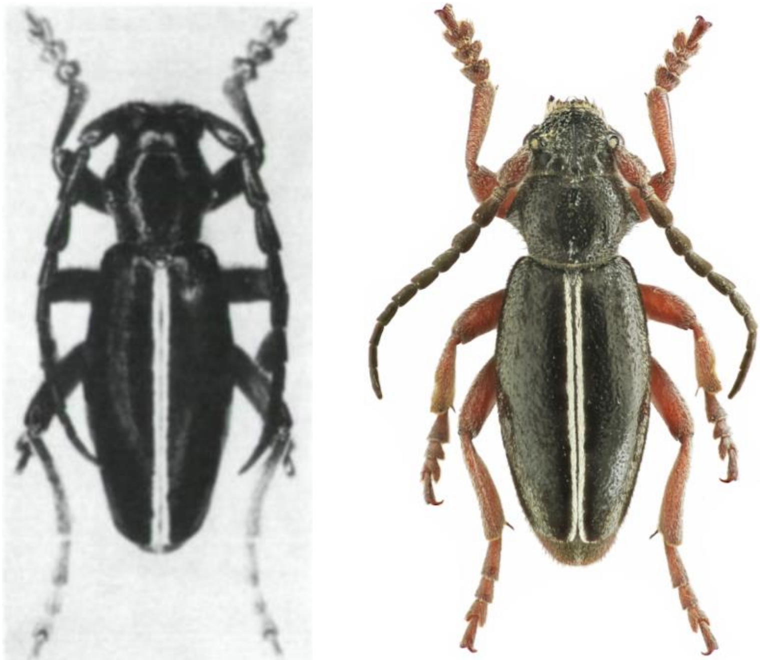
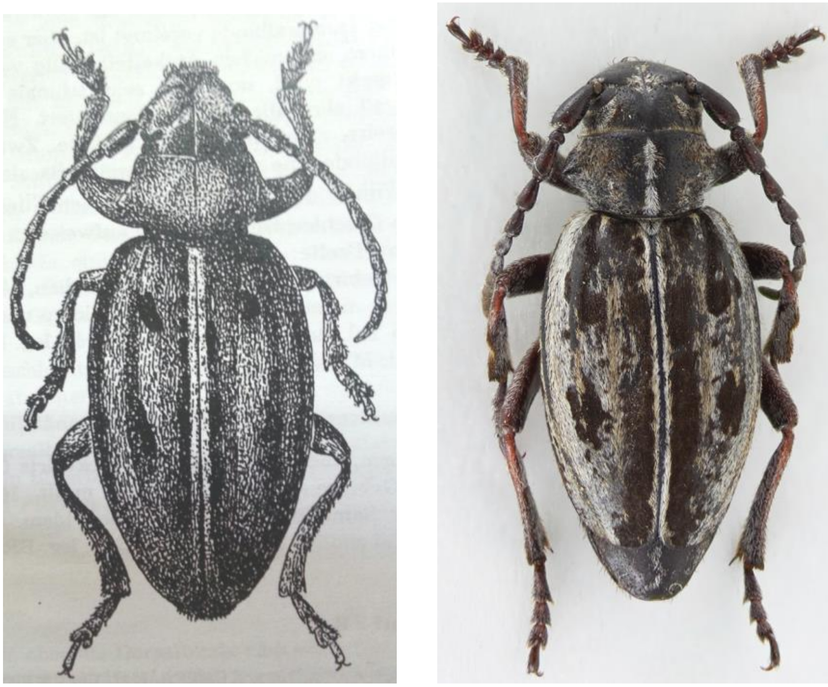


A **B**

Figure 1. **A.** Male of *Dorcadion menradi menradi* Holzschuh, 1989 (ex Holzschuh, 1989), **B.** *Dorcadion menradi pilosicollis* ssp. nov. (holotype ♂).

Figure 2. Female of *Dorcadion menradi pilosicollis* ssp. nov. (paratype ♀)



A B

Figure 3. **A.** Female of *Dorcadion lameerei lameerei* Théry, 1896 (ex Breuning, 1962), **B.** *Dorcadion lameerei konyaense* ssp. nov. (holotype ♀).

A NEW INTRODUCED WAX SCALE TO TURKEY: *CEROPLASTES CERIFERUS* (FABRICIUS) (HEMIPTERA: COCCIDAE)

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[Ülgentürk, S. 2016. A new introduced wax scale to Turkey: *Ceroplastes ceriferus* (Fabricius) (Hemiptera: Coccidae). Munis Entomology & Zoology, 11 (2): 359-362**]**

ABSRACT**:** The Indian wax scale, *Ceroplastes ceriferus* (Fabricius), is highly polyphagous. It occurs in many parts of world. Recently it is introduced to Turkey. A description of the adult female, geographic distribution, host plants and biology are presented with an identification key to the Turkish wax scales.

KEY WORDS: Coccidae, wax scales, invasive insect, *Acer palmatum*

The wax scale genus *Ceroplastes* Gray, 1828 (Hemiptera: Coccidae: Ceroplastinae) has a characteristic thick wax test that covers the adult female body. Species of the genus have been recorded from all zoogeographical regions and the genus contains approximately 145 species worldwide (Garcia et al., 2015). In the Palearctic region, there are 13 *Ceroplastes* species, 7 from southern Mediterranean countries (Feyko et al., 2012). Four species as *C. floridensis* (Comstock)*, C. japonicus* Green, *C. rusci* (Linnaeus) and *C. sinensis* (Del Guercio) have been reported in Turkey (Kaydan et al., 2013). *C. floridensis* and *C. rusci* are considered important pests of fig, citrus, pomegranate, forest and ornamental plants in Turkey (İyriboz, 1940; Bodenheimer, 1953; Anonymous, 2008; Ülgentürk & Çanakçıoğlu, 2004; Ülgentürk et al., 2012; Kaydan et al. 2013). *C. floridensis* and *C. rusci* are part of pest control programs of the Turkish Ministry of Food, Agriculture and Livestock (Anonymous, 2008). Both species have two or three generations in a year and hibernate as second nymph stages in southern Turkey (Soylu, 1976; Uygun et al., 1987). *C. sinensis* was first noticed by Bodenheimer (1953) who recorded on *Citrus* sp. and *Punica granatum* and kiwi in Black Sea Region (Alkan, 1957; Ülgentürk et al., 2009). Recently, Ülgentürk et al. (2013) reported it on *Ilex aquifolium*, *Nerium oleander* and an undetermined Poaceae in Aegean and Marmara Regions. According to Bodenheimer (1953), it has one generation in Black Sea Region. *Ceroplastes japonicus* was first determined on *Hedera helix* and *Laurus nobilis* (Kaydan & Kondo, 2008), after *Acer negundo, A. pseudoplatanus, Aesculus hippocastaneum*, *Fraxinus sp.*, *Laurus nobilis, Malus floribunda, Morus alba, N. oleander*, *Pistaciae terebrentia***,** *Pyracantha coccinea* and *Ulmus campestre* in İstanbul parks (Ülgentürk et al., 2008). This paper reports the detection and information of Indian wax scale insect for the first time in Turkey.

MATERIAL AND METHODS

Specimens were collected from a garden in Yalova, Marmara Region. Specimens were prepared for light microscopy using the slide-mounted method of Kosztarab & Kozár (1988). Gimpel et al. (1974) and Williams & Watson (1990) followed for morphological terminology. Photographs were taken using Canon EOS 550 D camera and Bs200 ProPsoftware and a Nikon E600 phase contrast microscope with Delta pix camera. Slides and dry material are deposited at Ankara University, Faculty of Agriculture, Department of Plant Protection, Turkey.

OBSERVATION AND RESULTS

Ceroplastes Gray, 1828

Type species: *Coccus janeirensis* Gray, 1828

Ceroplastes ceriferus (Fabricius, 1798)

Synonyms: *Coccus* (*Ceroplastes*) *chilensis* Gray, 1828; *Ceroplastes australiae* Walker, 1852; *Lacca alba* Signoret, 1869.

Material examined: *Acer palmatum* cv *atropurpureum* (Magnoliophda: Aceraceae), 28.xi.2015, 4 ♀♀ in Yalova, Marmara Region, Turkey.

Field characters. Body covered with thick, white to pinkish white, wet wax, convex, circular or irregular in outline, with an anteriorly projecting wax horn on old female (post-reproductive) (Figs. 1a,b). Wax plates visible on older females, without nuclei. Wax bands near both anterior and posterior spiracles, anterior bands directed dorsally.

Slide-mounted characters. Adult female broadly oval, caudal process poorly developed in young adult female (Williams & Watson, 1990). In our samples, caudal process fully developed, projects from posterior end as cylindrical process about one third length of body (Fig. 1c). **Dorsum.** Without a mediodorsal clear area and with cephalic and posterolateral clear areas divided. Dorsal setae mostly cylindrical with rounded or truncate apices. Pores predominantly triangular and trilocular (Fig. 1i), with a few numbers of oval trilocular pores, quadrilocular pores and bilocular pores present. With 1 ventral and 4 dorsal setae on each anal plate; with about 52-54 bullet-shaped stigmatic setae along margins in 6 irregular rows (Fig. 1d). No filamentous ducts at our mature females but according to Williams & Watson (1990) filamentous ducts band present on dorsum. **Ventrum.** With many cruciform pores, antennae 6- segmented, legs without tibio-tarsal articulatory scleroses with unequal claw digitules (Figs. 1e,f); multilocular pores present on all abdominal segments (Fig. 1g) and normally present near each coxa. Tubular duct present on head and in vulvar region (Fig. 1h). Quinquelocular pores in stigmatic furrows present in wide bands.

Hosts, distribution, damages and natural enemies

C. ceriferus is a highly polyphagous species that was reported on over a hundred species of different plant families from 40 countries (Garcia et al., 2015). It is most likely native to Asia, but is widely distributed all over the world (Gimpel et al., 1974; Lee et al., 2012). In Europe, it has been intercepted several times on imported ornamental plants (*Ficus, Podocarpus*) from Taiwan and it was added to the EPPO (European Plant Protection Organization) alert List (EPPO, 2002). It has since been reported on *Acer palmatum, Buxus* sp. *Camellia, Cornus, Desmodium penduliflorum, Deutzia, Euonymus, Hedera, Laurus nobilis, Magnolia, Malus, Spirea, Pyracantha,* and many others in North Italy (More et al., 2001). It is less aggressive than the former (Mazzeo et al., 2014). On the other hand, it is a pest of economic importance of ornamentals in the USA (Gimpel et al., 1974) and it has been in invasive and Exotic Insect List of North America (Anonymous, 2014). After this species was removed from the EPPO alert list in 2005 (EPPO, 2016), new records are reported from Europe (Malumphy &

Badmin, 2012; Fetyko & Kozar, 2012; Seljak et al., 2012). *C. ceriferus* occurs only on stems and branches. It sucks plant juice and can cause wilting and dieback of stems. It secretes large honeydew and causes sooty mold (Gimpel et al., 1974; Pellizzari et al., 2004). It has few natural enemies namely, *Pectinodiplosis erratica* (Diptera: Cecidomyiidae), *Anicetus rarisetus* and *A. zhejiangensis* (Hymenoptera: Encyrtidae) (Xu & Li, 1991; Xu & He, 1997; Gagne et al., 2009).

Key to adult female of *Ceroplastes* of Turkey

1. Anal process present, not more than one-third length of body............................ ....*ceriferus* (Fabricius)
- Anal process absent..2
2. Ventral tubular ducts with a short, broad inner filament...................................3
- Ventral tubular ducts, if present, not short, with narrow inner filament.............4
3. The anterior and posterior stigmatic setae rows are separated by 7-12 marginal bristle-shaped setae on body margin.....................................*floridensis* Comstock
- The stigmatic setae of anterior and posterior stigmatic cleft usually an uninterrupted row on body margin...*japonicus* Green
4. Antenna 7-segmented, dorsal pores predominantly trilocular.............................. ....*sinensis* Del Guercio
- Antenna 6- segmented, dorsal pores predominantly bilocular....*rusci* (Linnaeus)

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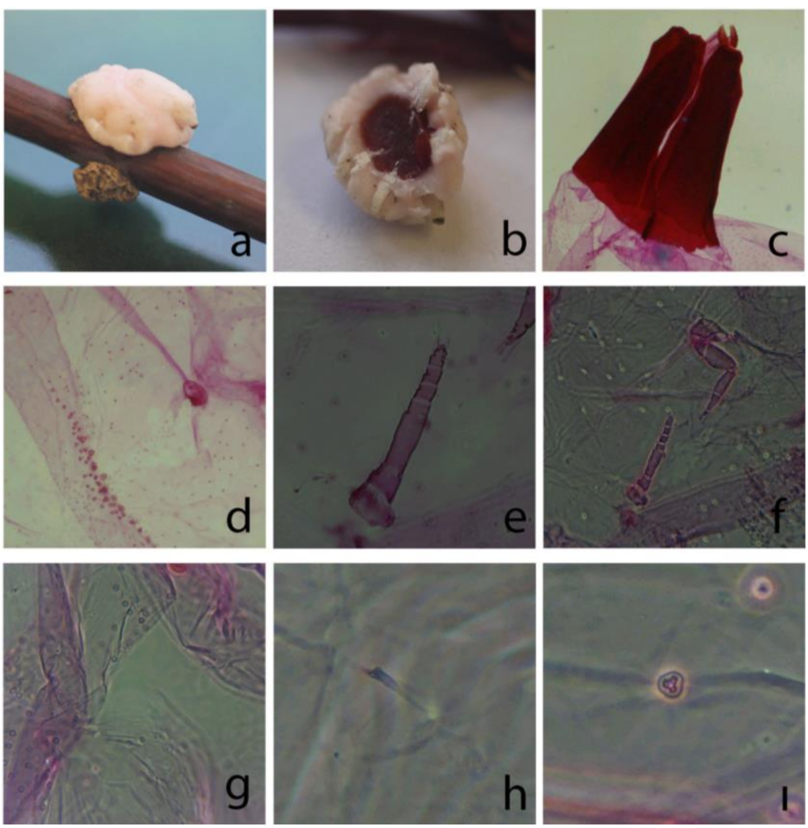

Figure 1. Dorsal (a) and ventral appearances (b), anal process (c), stigmatic areas (d) antenna (e) leg (f) multicocolar disc pores (g) tubular duct (h) and trilocular pore (ı) of *Ceroplastes ceriferus* (Fabricius).

TURKISH SPECIES OF *MICRODONTOMERUS* CRAWFORD, 1907 WITH DESCRIPTIONS OF NEW SPECIES (HYMENOPTERA: TORYIDAE: MICRODONTOMERINI),

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[Doğanlar, M. 2016. Turkish species of *Microdontomerus* Crawford, 1907 with descriptions of new species (Hymenoptera: Toryidae: Microdontomerini). Munis Entomology & Zoology, 11 (2): 363-381**]**

ABSTRACT: Turkish species of *Microdontomerus* Crawford, 1907 (Hymenoptera: Torymidae), collected from several parts, were studied in the last 20 years. In order to find and identify the parasitoid species, an identification key for the 4 known species, *Microdontomerus annulata* Spinola, *M. gurcukoyensis* Doğanlar, *M. direklinensis* Doğanlar, *M. altinekinesis* Doğanlar and for the 8 new species found by this work, *M. maculosacus* sp. nov., *M. kocakeri* sp. nov., *M. balikesirensis* sp. nov., *M. yigiti* sp. nov., *M. sivasensis* sp. nov., *M. ulukislanensis* sp. nov., *M. kayserinensis* sp. nov., and *M. erzurumensis* sp. nov. was provided. The new species were described, their diagnostic characters were illustrated and compared with the similar species of the genus.

KEY WORDS: *Microdontomerus* spp., Hymenoptera, Torymidae, Turkey

The genus *Microdontomerus* was described by Crawford (1907) having type species *Torymus anthonomi* Crawford (orig. desig. and monotypy). Grissell (1995) gave the synonyms of genus, and recorded 8 species all over the world, 4 of them as Nearctic, 2 as Palearctic, and 2 are Afrotropical species. Later, Grissell (2005) revised the Nearctic species, and described 15 new species and Doğanlar (20016) revised the Turkish species, and described 3 new species and the known species, *M. annulata* Spinola. Diagnostic characters, host records and distributions of the known species were given by Grissell (1995, 2005), Noyes (2015) and Doğanlar (2016 a,b).

By this work 8 more new species were found, described and a new identification key for the Turkish species was provided.

MATERIAL AND METHOD

This study is based upon examination and identification of the specimens collected from some parts of Turkey in the last 20 years. The examined specimens and types of the new species were deposited in Insect Museum of Biological Control Station, Yüreğir, Adana, Turkey (IMBC). 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 for further morphological studies. The species were identified by following the keys of Grissell (1995; 2005), Zerova & Seryogina (1991, 1999) and Doğanlar (2016b). Wings and antennae of holotypes of the new species were slide-mounted in Canada balsam. Photographs of diagnostic characters of the genera 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 Gibson (1997), and terminology of hypopygia was taken from Doğanlar (2016). Abbreviations used in the key and descriptions are: OOL= shorter distance between ocello-ocular line, POL= distance between posterior ocelli, F1-6 = funicular segments.

RESULTS AND DISCUSSION

Key to the Turkish species of *Microdontomerus* (female)

1- Ovipositor sheaths (Fig. 1a) 2.62x length of metasoma, and 1.2x as long as body; Antenna (Fig. 1c) with pedicel plus flagellum 2.74x length of scape, the latter equal to pedicel plus anellus and F1+F3; pedicel 1.33x longer than wide; anellus almost 2.5x as wide as long; flagellum filiform, funicular segments in equal size, 1.33x as wide as long, club 1.5x wider than F7, and 1.58x as long as wide. Body (Fig. 1a) blue-violet, with green reflexion; scape and pedicel blue, flagellum brown; coxae and femora concolorous with body, excepts apical tip of hind femora, tibiae, and tarsi yellow, hind tibiae with testaceous flack medially, in 2/5 length of tibiae. Mesonotum (Fig. 1d) finely reticulated, parapsidal groves deep; propodeum (Fig. 1e) with fine carina, finely reticulated; forewing (Fig. 1f) with marginal vein 2.03x as long as post marginal vein, and 4.06x stigmal vein; post marginal vein 2x as long as stigmal vein. Hind femora (Fig. 1b) without tooth at the apex, 3.0x as long as width. Ovipositor index: 3.63..*M. maculosacus* sp. nov.
-- Ovipositor sheaths at most 2x length of metasoma...2

2- Ovipositor sheaths 2x length of metasoma (Figs. 2, 3a)...3
-- Ovipositor sheaths at most 1.7x as long as metasoma (Figs. 4-6a)......................................4

3- Antenna (Fig. 2c) with pedicel plus flagellum 2.8x length of scape; with scape equal to pedicel plus anellus and F1+F2; pedicel 1.5x longer than wide; anellus almost 3x as wide as long; funicular segments F1-F2 distinctly quadrate, F3-F7 almost quadrate, towards apex slightly broader and shorter, F7 1.1x as wide as F1; club 1.7x as long as wide. Body (Fig. 2a) blue-violet; scape and pedicel blue, coxae, femora and fore and mid tibiae dark blue-green, hind tibiae in basal half and tarsi pale yellow; Mesonotum (Fig. 2d) finely reticulated, parapsidal groves shallow; propodeum with fine carina, finely reticulated; forewing (Fig. 2f) with marginal vein 2.33x as long as post marginal vein, and 4.7x stigmal vein; post marginal vein 2x as long as stigmal vein. Hind femora with indistinct tooth at the apex, 3.64-3.75x as long as width. Ovipositor sheaths (Fig. 2a) 2x length of metasoma, and almost equal (0.96x) to the length of the body; Ovipositor index: 3.33-3.43.............................*M. annulata* Spinola
-- Antenna (Fig. 3c) pedicel plus flagellum 2.3x length of scape; with scape equal to pedicel plus first 4 flagellar segments; pedicel slightly longer than wide (7:6); anellus slightly transverse (5:3); funicular segments distinctly transverse, gradually widening apically, F7 1.3x as wide as F1; club 1.4x as long as wide. Body (Fig. 3a) blue-green, scape blue, basally yellow and pedicel blue, coxae and femora dark blue-green, tibiae and tarsi pale yellow; Mesonotum (Fig. 3d) transversally striated, parapsidal groves deep; propodeum (Fig. 3e) without median carinae, smooth; forewing (Fig. 3f) with marginal vein 3.1x as long as post marginal vein, and 7.7x stigmal vein; post marginal vein 1.5x as long as stigmal vein; Hind femora (Fig. 3b) 3.14x as long as width. Ovipositor sheaths (Fig. 3a) 2x length of metasoma, and almost equal to the length of the mesosoma and metasoma combined. Ovipositor index: 3.34..*M. kocakeri* sp. nov.

4- Ovipositor sheaths (Figs. 4, 5a) equal 1.7x as long as metasoma, femora and tibiae metallic blue, tarsi yellow..5
-- Ovipositor sheaths at most equal 1.12x length of metasoma (Fig. 6, 7a); color of femora and tibiae variable..6

5- Ovipositor sheaths (Fig. 4a) equal to total length of the metasoma and half of mesosoma, and equal 1.7x as long as metasoma. Scape, pedicel, tibiae metallic blue, tarsi yellow. Antenna (Fig. 4c) with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.6x as long as width; anellus 2.33x as wide as long; funicular segments distinctly transverse, with sparse longitudinal sensillae (2-5); gradually widening apically, F7 1.54x as wide as F1; F1-F7 in same length, distinctly transverse; F1 1.57; F2 2x; F3-F5 2.33x; F6 2.66x

as wide as long; F7 2.83x as wide as long; club 1.23x as wide as F7, 1.66x as long as wide; Forewing (Fig. 4f) with marginal vein 3.57x as long as post marginal vein, and 6.25x stigmal vein; post marginal vein 1.75x as long as stigmal vein. Ovipositor index 3.45..*M. yigiti* sp. nov.
-- Ovipositor sheaths (Fig. 5a) equal to total length of the metasoma and mesosoma, and equal 1.7x as long as metasoma. Scape, pedicel, femora and tibiae metallic blue, tarsi yellow. Antenna (Fig. 5c) with scape equal to pedicel plus anellus and F1+F2 and 2/3 F3; pedicel 2x as long as width; anellus 1.66x as wide as long; funicular segments with F1 quadrate, F2-F7 in same length, slightly transverse with sparse longitudinal sensillae (2-5); gradually and slightly widening apically, F7 1.43x as wide as F1; and as wide as long; club as wide as F7, 2x as long as wide; Forewing (Fig. 5f) with marginal vein 1.9x as long as post marginal vein, and 3.4x stigmal vein; post marginal vein 1.8x as long as stigmal vein. Ovipositor index 3.8...*M. balikesirensis* sp. nov.

6- Ovipositor sheaths (Figs. 6-8a) about as long as metasoma...7
-- Ovipositor sheaths (Figs. 9-12a) at most 0.8x length of metasoma....................................9

7- Scape (Fig. 6c) equal to pedicel plus anellus and F1+F2 combined; ovipositor (Fig. 3a) almost equal to lengths of metasoma (0. 95x), Ovipositor index: 1.55. Forewing (Fig. 6f) with marginal vein 7.2x stigmal vein 3.6x as long as post marginal vein; the latter 2x as long as stigmal vein. Antenna (Fig. 6c) pedicel plus flagellum 3.0x length of scape; pedicel 1.5x longer than wide; anellus about 1.67x wider than long; funicular segments distinctly transverse, slightly widening towards tip, F7 1.36x as wide as F1; club 2.7x as long as wide; Body (Fig. 6a) blue-green, antenna and legs concolorous with body, except tarsi yellow. Hind femora (Fig. 6 b) 3.9x as long as wide.. *M. sivasensis* sp. nov.
-- Scape equal to pedicel plus anellus and F1+F3 combined; ovipositor sheaths (Fig. 7a) about 1.12x length of metasoma...8

8- Ovipositor sheaths (Fig. 7a) about 1.12x length of metasoma, ovipositor index 2.04. Fore wing (Fig. 7e) with marginal vein about 6.14x stigmal vein, 3.1x post marginal vein; the latter 2x as long as stigmal vein. Stigmal vein (Fig. 4e) very long, stigma broad; antenna (Fig. 7c) pedicel plus flagellum 2.75x length of scape; pedicel 1.3x longer than wide; anellus about 2.0x wider than long; F1 as long as F2, 1.71x as wide as long; funicular segments transverse, about twice as wide as long; distinctly widening towards tip, F7 1.64x as wide as F1; club 1.6x as long as wide; Mesosoma (Fig. 7d) finely wrinkled, scutellum with deep pits, propodeum (Fig. 7e)with fine striae. Head and mesosoma black, with greenish reflexion; scape and pedicel and legs concolorous with body, except both tips of femora and tibiae and tarsi yellow; metasoma brown, except ovipositor sheaths testaceous; fore wing veins yellow. hind femora (Fig. 7b) 4.1x as long as width.....................................*M. ulukislanensis* sp. nov.
-- Ovipositor sheaths (Fig. 8a) about 1.12x length of metasoma, ovipositor index 1.66.; forewing (Fig. 8e) with marginal vein about 2.33x stigmal vein, 1.25x post marginal vein; the latter 1.5x as long as stigmal vein. Stigmal vein very long, stigma small; antenna (Fig. 8c) with pedicel plus flagellum 2.66x length of scape; pedicel 2.3x longer than wide; anellus about 3.0x wider than long; F1 distinctly shorter than F2, 1.75x as wide as long; funicular segments transverse, about twice as wide as long; filiform, F7 1.2x as wide as F1; club 1.6x as long as wide; Body (Fig. 8a) with head and mesosoma black, with greenish reflexion; antenna yellow; coxae concolorous with body, femora yellow, except dorsally brown with greenish reflexion; tibiae and tarsi yellow; metasoma brown, except basally testaceous; fore wing veins yellow. Mesosoma (Fig. 8d) finely reticulated, hind femora (Fig. 8f) 3.0x as long as width...*M. gurcukoyensis* Doğanlar

9- Ovipositor sheaths (Fig. 9a) 0.42x as long as metasoma, ovipositor index 1.3; forewing (Fig. 9f) with costal cell 1.8x marginal vein; marginal vein about 3x stigmal vein, 1.44x post marginal vein; stigmal vein almost fused with stigma; scutellum (Fig. 9e) finely reticulated, with sparse punctures; antenna (Fig. 9c) attached at level of ventral edge of eyes; pedicel plus flagellum 2.95x length of scape; F1 equal size to F2; hind femora 3.0x as long as width..*M. direklinensis* Doğanlar
-- Ovipositor sheaths at least equal 0.64x lengths of metasoma. (Fig. 10-12a).....................10

10- Ovipositor sheaths (Fig. 10a) equal 0.64x lengths of metasoma. Ovipositor index: 1.2. Mesonotum (Fig. 10d) finely wrinkled, beween them with fine reticulation; with parapsidal groove deep; propodeum (Fig. 10e) without carina, finely, longitudinally reticulated basally with shallow fovae; spicula wide apart from metanotum by half diameter of speculum. Forewing (Fig. 10f) with marginal vein 2.53x as long as post marginal vein, and 5.33x stigmal vein; post marginal vein 2.1x as long as stigmal vein, the latter long, stigma broad, with long spicula. Body (Fig. 10a) green with golden reflection, scape, pedicel concolorous with body, flagellum brown; legs concolorous with body, except tips of tibiae, and tarsi yellow. Antenna (Fig. 10c) pedicel plus flagellum 3x length of scape; with scape slightly shorter than pedicel plus anellus and F1+F3 combined; pedicel 2x longer than wide; anellus 2x wider than long; funicular segments distinctly transverse, F1 1.5x, F2 1.57x; F3-F7 slightly widening towards tip, F7 2.28x as wide as long ; F7 1.67x as wide as F1; club 1.13x wider than F7, 1.65x as long as wide; hind femora (Fig. 10b) 4.1x as long as width..*M. kayserinensis* sp. nov.
-- Ovipositor sheaths about equal 0.75-0.77x length of metasoma (Figs. 10-11a)..................11

11-- Ovipositor sheaths (Fig. 10a) about equal 0.75x lengths of metasoma; ovipositor index 1.53. Forewing (Fig. 11e) with marginal vein 3.6x post marginal vein, and 5.0x stigmal vein; post marginal vein 2.7x as long as stigmal vein. Antenna (Fig. 11b) with pedicel plus flagellum 2.5x length of scape; the latter equal to pedicel plus anellus and F1-F3 combined; pedicel 1.7x longer than wide; anellus 1.5x wider than long; F1 almost equal size to F7; club 1.7x as long as wide; Body (Fig. 11a) black, with coppery-green reflexion, antenna yellow, Mesonotum finely reticulated, and scutellum (Fig. 11d) with dense, deep punctures; propodeum smooth; hind femora (Fig. 11f) 2.7x as long as width...*M. altinekinesis* Doğanlar
-- Ovipositor sheaths (Fig. 12a) about equal 0.77x lengths of metasoma; ovipositor index 1.45. Forewing (Fig. 12f) with marginal vein 1.82x post marginal vein, and 2.6x stigmal vein; post marginal vein 1.43x as long as stigmal vein. Antenna (Fig. 12c) with pedicel plus flagellum 3.33x length of scape; the latter equal to pedicel plus anellus and F1-F2 combined; pedicel 1.57x longer than wide; anellus 2x wider than long; F1 slightly transverse (8/7); F2-F4 almost in equal size, 1.43x, and F5-F7 almost in equal size, 1.57x as wide as long; club distinctly wider than F7, 1.22x as wide as F7, and 1.7x as long as wide; Body (Fig. 12a) black, with coppery-green reflexion, antenna with scape and pedicel bronze green, flagellum dark brown. Mesonotum and scutellum (Fig. 12d) finely, transversally reticulated; propodeum (Fig. 12e) with short median and submedian carinae, finely reticulated; hind femora (Fig. 12b) 4.8x as long as width...*M. erzurumensis* sp. nov.

Microdontomerus maculosacus sp. nov.

(Figs. 1a-g)

Etymology. The name is derived from the name of host plant from which the holotype was collcted.

Diagnosis. Ovipositor sheaths 2.62x length of metasoma, and 1.2x as long as body. Antenna with pedicel plus flagellum 2.74x length of scape, the latter equal to pedicel plus anellus and F1+F3; pedicel 1.33x longer than wide; anellus almost 2.5x as wide as long; flagellum filiform, funicular segments in equal size, 1.33x as wide as long, club 1.5x wider than F7, and 1.58x as long as wide. Body blue-violet, with green reflexion; scape and pedicel blue, flagellum brown; coxae and femora concolorous with body, excepts apical tip of hind femora, tibiae, and tarsi yellow, hind tibiae with testaceous flack medially, in 2/5 length of tibiae. Mesonotum finely reticulated, parapsidal groves deep; propodeum with fine carina, finely reticulated; forewing with marginal vein 2.03x as long as post marginal vein, and 4.06x stigmal vein; post marginal vein 2x as long as stigmal vein. Hind femora without tooth at the apex, 3.0x as long as width.. Ovipositor index: 3.63.

Description:

Female. Body (Fig. 1a) blue-violet, with green reflexion; scape and pedicel blue, flagellum brown; coxae and femora concolorous with body, excepts apical tip of hind femora, tibiae, and tarsi yellow, hind tibiae with testaceous flack medially, in 2/5 length of tibiae; wings hyaline, veins yellow. Ovipositor testaceous. Length 3.25 mm + ovipositor 3.75 mm.

Head in dorsal view as wide as mesoscutum, width to length 57:20; POL 4.25 OOL; OOL equal diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 57:52; dorsal margin of torulus at level of lower orbit; malar space consists 0. 3x hight of eye. Face with fine reticulation. Antenna (Fig. 1c) with pedicel plus flagellum 2.74x length of scape, the latter equal to pedicel plus anellus and F1+F3; pedicel 1.33x longer than wide; anellus almost 2.5x as wide as long; flagellum filiform, funicular segments in equal size,having two rows of dense linear sensilae, 1.33x as wide as long, club 1.5x wider than F7, and 1.58x as long as wide.

Mesosoma (Fig. 1a) slightly bulged in profile, propodeum slightly visible dorsally; Mesonotum finely reticulated, parapsidal groves deep; propodeum with fine carina, finely reticulated; forewing with marginal vein 2.03x as long as post marginal vein, and 4.06x stigmal vein; post marginal vein 2x as long as stigmal vein. Hind femora without tooth at the apex, 3.0x as long as width.

Metasoma (Fig. 1a) excluding ovipositor slightly shorter than rest of body; tergites with posterior margin distinctly incised medially; tip of hypopygium at 0.65 metasoma length. Ovipositor sheaths 2.62x length of metasoma, and 1.2x as long as body. Ovipositor index: 3.63.

Male. Similar to female except antenna (Fig. 1g) long dense setae; with pedicel plus flagellum 4.24x length of scape, the latter equal to pedicel plus anellus and F1+1/3 F2; pedicel 1.2x longer than wide; anellus almost 5x as wide as long; flagellum filiform, funicular segments in equal size, almost quadrate, club as wide as F7, and 2.06x as long as wide.

Material examined: Holotype ♀, Turkey: Tokat, Fidanlık, 25.8.1989, reared from seed capsules of *Centauria maculosa* L. leg. H. Çam. **Paratype:** Tokat, Gümenek, 14.vi. 1989, swept from pasture, leg. H. Çam,. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Tokat.

Host: Reared from seed capsules of *Centauria maculosa* L.

Comments: Female: *Microdontomerus maculosacus* sp. nov. is similar to *M. annulata* (Spinola) and *M. kocakeri* sp. nov. in having long ovipositor sheaths. But it differs from both of them in having ovipositor sheaths 2.62x length of metasoma, and longer than body (1.2x) (in both species ovipositor sheaths shorter than body, and at most 2x as long as metasoma).

Microdontomerus annulata (Spinola, 1808)

(Figs. 2a-g)

Diplolepis annulata Spinola, 1808: 215. Neotype female, designated by Graham (1994: 99), Lago di Bolsena, Italy , (BMNH).

Synonyms, hosts and distribution: given by Noyes (2015).

Taxonomy. The generic placement of this species was discussed by Grissell (1995), and Graham (1994) discussed its taxonomy and synonyms. Zerova & Seryogina (1999) redescribed and figured the species from several parts of Ukraine and Russia. Doğanlar (2016) gave its diagnostic characters from Turkish specimens, and its distribution in Turkey, such as Erzurum, Gaziantep, Oğuzeli, Sekili.

Diagnosis. Female. Antenna (Fig. 2c) pedicel plus flagellum 2.8x length of scape; with scape equal to pedicel plus anellus and F1-F3; pedicel 1.5x longer than wide; anellus almost 3x as wide as long; funicular segments F1-F2 distinctly quadrate, F3-F7 almost quadrate, towards apex slightly broader and shorter, F7 1.1x as wide as F1; club 1.7x as long as wide. Body (Fig. 2a) blue-violet; scape and pedicel blue, coxae, femora and fore and mid tibiae dark blue-green, hind tibiae in basal half and tarsi pale yellow; Mesonotum (Fig. 2d) finely reticulated, parapsidal groves shallow; propodeum (Fig. 2e) with fine carina, finely reticulated; forewing (Fig. 2f) with marginal vein 2.2x as long as post marginal vein, and 4.1x stigmal vein; post marginal vein 1.9x as long as stigmal vein. Hind femora with indistinct tooth at the apex, 3.64-3.75x as long as width Ovipositor sheaths (Fig. 2a) 2x length of metasoma, and almost equal (0.96x) to the length of the body. Ovipositor index: 3.33-3.43.

Description:

Male. Similar to female, excepts antenna (Fig. 2g) pedicel plus flagellum 2.55x length of scape; pedicel 1.22x longer than wide; anellus almost 2x as wide as long; funicular segments almost in equal size, F1-F7 distinctly transverse,1.33-1.44x as wide as long, club 2x as long as wide.

Material examined: Turkey: Erzurum, 20.vi.1973, leg. M. Doğanlar, 1 ♀; Erzurum, 25.ix.1979, reared from seed capsules of *Carthamus* sp., leg. M. Doğanlar, 3 ♀♀; Tokat, 11.v.1986, leg. H. Çam, 1 ♂; 4.vi.1986, leg. H. Çam, 1 ♀; 25.vii.1986, leg. H. Çam, 1 ♀; 29.viii.1986, leg. H. Çam, 1 ♀; 15.ix.1986, leg. H. Çam, 1 ♀; Tokat, Taşlıçiftlik, 02.v.1989, leg. H. Çam, 1 ♀; 28.vii.1989, leg. H. Çam, 2 ♂♂; 24.viii.1989, leg. H. Çam, 1 ♀; Tokat, Fidanlık, 16.viii.1989, reared from seed capsules of *Centauria* sp., leg. H. Çam, 1 ♀, 1 ♂; Tokat, Zile, 26.v.1989, leg. H. Çam, 1 ♀; Tokat, Necip, 11.v.1989, leg. H. Çam, 1 ♀, 1 ♂; Sivas, Çermik, 06.vi.1992, Leg. L. Gençer, 1 ♂; İzmir, Seferihisar, 21.v.1987, leg. H. Çam, 1 ♀; Burdur, 10.viii.1993, leg. M. Doğanlar, 1 ♂; Antalya, Saklıkent, 21.v.1989, leg. M. Doğanlar, 1♀, 1♂; Hatay, Antakya, MKÜ Campus, 05-09.vii.2004, reared from head of *Echinops* sp., leg. M. Doğanlar, 5 ♂♂; Hatay, Belen, Kömürçukuru, 24.iv.2008, reared from cecidomyiid gall on stems of *Ferula communis* L., leg. M. Doğanlar, 1♀, 1♂; Hatay, Reyhanlı, Atçana, 5.v. 2005, swept from pasture, leg. M. Doğanlar, 1 ♀; Şanlıurfa, Akçakale, Bakacak, 26.iv.2008, swept from pasture, leg. M. Doğanlar, 1 ♂; Gaziantep, Oğuzeli, Sekili, 02.v.2010, swept from pasture, leg. M. Doğanlar, 1 ♀; Keçikuyusu, 13.v.2011, swept from pasture, leg. M. Doğanlar, 1 ♀; Ağrı, Tutak, 17.viii.2010, swept from pasture, leg. M. Doğanlar, 1 ♀; Adana, Aladağ, 16.vii.2001, swept from pasture, leg. M. Doğanlar, 1 ♂. All of the specimens were deposited in IMBC.

Distribution: Turkey: Erzurum, Tokat, Sivas, İzmir, Burdur, Antalya, Hatay, Şanlıurfa, Gaziantep, Ağrı, Adana.

Host: Reared from cecidomyiid gall on stems of *Ferula communis* L.; reared from head of *Echinops* sp.; reared from seed capsules of *Centauria* sp.; reared from seed capsules of *Carthamus* sp.

***Microdontomerus kocakeri* sp. nov.**

(Figs. 3 a-g)

Etymology. The name is derived from the name of my friend, Mr. Seyit Koçaker who helped me during collection of the specimens.

Diagnosis. Body blue-green with violet reflexion , scape blue, basally yellow, tibiae and tarsi pale yellow, coxae and femora dark blue-green, tibiae and tarsi yellow; Mesonotum with Parapsidal groves deep; Propodeum without median carinae; antenna with scape equal to pedicel plus first four flagellar segments; pedicel slightly longer than wide (7:6); anellus slightly transverse (5:3); funicular segments distinctly transverse, gradually widening apically, F7 1.3x as wide as F1; club broad, 1.4x as long as wide; forewing with marginal vein 3.1x as long as post marginal vein, and 7.7x stigmal vein; post marginal vein 1.5x as long as stigmal vein. Ovipositor equal 1.8X to the length of the metasoma. Ovipositor index: 3.34. Hind femora with indistinct tooth at the apex.

Description:

Female. Body (Fig. 3a) blue-green with violet reflexion, scape blue, basally yellow, tibiae and tarsi pale yellow, coxae and femora (Fig. 3b) dark blue-green, tibiae and tarsi yellow; wings hyaline, veins yellow. Ovipositor dark brown. Length 2.12 mm + ovipositor 1.8 mm.

Head in dorsal view as wide as mesoscutum, width to length 36:15; POL 2.8 OOL; OOL 1.5x diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 58:53; dorsal margin of torulus at level of lower orbit; malar space consists 0. 5x hight of eye. Face with fine reticulation. Antenna (Fig. 3c) with scape equal to pedicel plus first four flagellar segments; pedicel slightly longer than wide (7:6); anellus slightly transverse (5:3); funicular segments distinctly transverse, gradually widening apically, F7 1.3x as wide as F1; club broad, 1.4x as long as wide.

Mesosoma (Fig. 3a) bulged in profile, propodeum slightly visible dorsally; sculpture of mesoscutum and scutellum (Fig. 3d) horizontally striated; pronotum 0.24x as long as mesoscutum; propodeum (Fig. 3e) with long, fine striae, with anteriorly 3 deep fovae, spiracle touching metasoma. All coxae reticulated. Forewing (Fig. 3f) with marginal vein 3.1x as long as post marginal vein, and 7.7x stigmal vein; post marginal vein 1.5x as long as stigmal vein. Hind femora 3.14x as long as width.

Metasoma (Fig. 3a) excluding ovipositor slightly shorter than rest of body; basal 3 tergites with posterior margin distinctly incised medially; tip of hypopygium at 0.7 metasoma length. Ovipositor equal 1.8x to the length of the metasoma. Ovipositor index: 3.34.

Male. Unknown.

Material examined: Holotype ♀, Turkey: Tokat, Gürcüköy, 27.8.1986, swept from pasture, leg. H. Çam. **Paratypes:** Niğde, Ulukışla, Maden, 11.vi. 2006, leg. M. Doğanlar, swept from leaves of *Prunus cerasi* L. 1 ♀; Adana, Yumurtalık, 21.viii. 1982, swept from *Centauria siberica* L., leg. M. Doğanlar, 1 ♀. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Adana, Tokat, Sivas, Niğde.

Host: Swept from *Centauria siberica* L.; swept from leaves of *Prunus cerasi* L.

Comments: Female: *Microdontomerus kocakeri* sp. nov. is similar to *M. annulata* (Spinola) in having ovipositor sheaths 2x length of metasoma. But it differs from *M. annulata* in having Antenna with scape equal to pedicel plus first 4 flagellar segments; pedicel slightly longer than wide (7:6); anellus slightly transverse (5:3); funicular segments distinctly transverse, gradually widening apically, F7 1.3x as wide as F1; club 1.4x as long as wide. Legs with tibiae pale yellow; Mesonotum transversally striated, parapsidal groves deep; propodeum without median carinae, smooth; forewing with marginal vein 3.1x as long as post marginal vein, and 7.7x stigmal vein; post marginal vein 1.5x as long as stigmal vein. (in *M. annulata* antenna with scape equal to pedicel plus first 3 flagellar segments; pedicel 1.5x longer than wide; anellus almost 3x as wide as long; funicular segments F1-F2 distinctly quadrate, F3-F7 almost quadrate, towards apex slightly broader and shorter, F7 1.1x as wide as F1; club 1.7x as long as wide. Legs with hind tibiae in basal half pale yellow; Mesonotum finely reticulated, parapsidal groves shallow; propodeum with fine carina, finely reticulated; forewing with marginal vein 2.2x as long as post marginal vein, and 4.1x stigmal vein; post marginal vein 1.9x as long as stigmal vein).

Microdontomerus yigiti **sp. nov.**

(Figs. 4a-f)

Etymology. The name is derived from the name of my friend, Prof. Dr. Abdurrahman Yiğit who help me during my collection.

Diagnosis. Hind femora without tooth; scape, pedicel, tibiae metallic blue, tarsi yellow; hind coxa without dorsal sensillae; POL 2.3x OOL. Antenna with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.6x as long as width; anellus 2.33x as wide as long; funicular segments distinctly transverse, with sparse longitudinal sensillae (2-5); gradually widening apically, F7 1.54x as wide as F1; F1-F7 in same length, distinctly transverse; F1 1.57; F2 2x; F3-F5 2.33x; F6 2.66x as wide as long; F7 2.83x as wide as long; club 1.23x as wide as F7, 1.66x as long as wide; Forewing with marginal vein 3.57x as long as post marginal vein, and 6.25x stigmal vein; post marginal vein 1.75x as long as stigmal vein. Ovipositor index 3.45.

Description:

Female. Body (Fig. 4a) blue-green with metallic reflexion , scape, pedicel, tibiae metallic blue, coxae and femora (Fig. 4b) dark blue-green, tarsi yellow; wings hyaline, veins yellow. Ovipositor yellow. Length 1.62 mm + ovipositor 1.12 mm.

Head in dorsal view as wide as mesoscutum, width to length 55:15; POL 2.3 OOL; OOL 1.66x diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 55:53; dorsal margin of torulus at level of lower orbit; malar space consists 0. 3x hight of eye. Face with fine reticulation. Antenna (Fig. 4c) with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.6x as long as width; anellus 2.33x as wide as long; funicular segments distinctly transverse, with sparse longitudinal sensillae (2-5); gradually widening apically, F7 1.54x as wide as F1; F1-F7 in same length, distinctly transverse; F1 1.57; F2 2x; F3-F5 2.33x; F6 2.66x as wide as long; F7 2.83x as wide as long; club 1.23x as wide as F7, 1.66x as long as wide.

Mesosoma (Fig. 4a) slightly bulged in profile, propodeum distinctly visible dorsally; mesoscutum and scutellum (Fig. 4d) finely striated with fine reticulation. All coxae reticulated. Forewing (Fig. 4e) with marginal vein 3.57x as long as post marginal vein, and 6.25x stigmal vein; post marginal vein 1.75x as long as stigmal vein.

Metasoma (Fig. 4a) excluding ovipositor 0.65x aslong as rest of body; basal 3 tergites with posterior margin distinctly incised medially; tip of hypopygium at 0.82 metasoma length. Hind femora without tooth at the apex, 3.33x as long as width. ovipositor sheaths equal to total length of the metasoma and half of mesosoma, and equal 1.67x as long as metasoma. Ovipositor index: 3.45.

Male. Similar to female excepts as follows: antenna (Fig. 4 g) with scape equal to pedicel plus anellus and F1+1/3 F2; pedicel 1.4x as long as width; gradually widening apically, F7 1.36x as wide as F1; F1-F7 in same length, distinctly transverse; F1 1.37; F2-F5 1.5x; F6-F7 1.75x as wide as long; club 1.29x as wide as F7, 1.66x as long as wide.

Material examined: Holotype ♀, Turkey: Sivas, Kampus 12.v.1992, **Paratypes:** 7 ♂♂, same data as holotype; Sivas, Tuzlugöl, 13.viii. 1992, leg. L.

Gençer, 1 ♀. All of the types deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Sivas.
Host: Unknown.
Comments: Female: *Microdontomerus yigiti* sp. nov. is similar to *M balikesirensis* sp. nov. in having ovipositor sheaths equal to 1. 7x as long as metasoma. But it differs from *M. balikesirensis* sp. nov. by having malar space consists 0. 3x hight of eye; antenna with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.6x as long as width; anellus 2.33x as wide as long; funicular segments distinctly transverse, with sparse longitudinal sensillae (2-5); gradually widening apically, F7 1.54x as wide as F1; F1-F7 in same length, distinctly transverse; F1 1.57; F2 2x; F3-F5 2.33x; F6 2.66x as wide as long; F7 2.83x as wide as long; club 1.23x as wide as F7, 1.66x as long as wide; forewing with marginal vein 3.57x as long as post marginal vein, and 6.25x stigmal vein; post marginal vein 1.75x as long as stigmal vein (in *M. balikesirensis* sp. nov. malar space consists 0. 57x hight of eye; antenna with scape equal to pedicel plus anellus and F1+F2 and 2/3 F3; pedicel 2x as long as width; anellus 1.66x as wide as long; funicular segments with F1 quadrate, F2-F7 in same length, slightly transverse with sparse longitudinal sensillae (2-5); gradually and slightly widening apically, F7 1.43x as wide as F1; and as wide as long; club as wide as F7, 2x as long as wide; forewing with marginal vein 1.9x as long as post marginal vein, and 3.4x stigmal vein; post marginal vein 1.8x as long as stigmal vein).

Microdontomerus balikesirensis sp. nov.

(Figs. 5a-f)

Etymology. The name is derived from the name of the place from which the holotype was collected.
Diagnosis. Ovipositor sheaths equal to total length of the metasoma and mesosoma, and equal 1.7x as long as metasoma. Scape, pedicel, femora and tibiae metallic blue, tarsi yellow; antenna with scape equal to pedicel plus anellus and F1+F2 and 2/3 F3; pedicel 2x as long as width; anellus 1.66x as wide as long; funicular segments with F1 quadrate, F2-F7 in same length, slightly transverse with sparse longitudinal sensillae (2-5); gradually and slightly widening apically, F7 1.43x as wide as F1; and as wide as long; club as wide as F7, 2x as long as wide; Forewing with marginal vein 1.9x as long as post marginal vein, and 3.4x stigmal vein; post marginal vein 1.8x as long as stigmal vein. Ovipositor index 3.8.
Description:
Female. Body (Fig. 5a) bronze with metallic blue reflection, scape, pedicel metallic blue, coxae and femora (Fig. 5b) concolorous with body, tarsi yellow; wings hyaline, veins yellow. Ovipositor brown. Length 4.58 mm + ovipositor 3.12 mm.
Head in dorsal view slightly wider than mesoscutum, width to length 65:34; POL 2.8 OOL; OOL equal diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 65:60; dorsal margin of torulus above level of lower orbit; malar space consists 0. 57x height of eye. Face with fine reticulation. Antenna (Fig. 5c) with scape equal to pedicel plus anellus and F1+F2 and 2/3 F3; pedicel 2x as long as width; anellus 1.66x as wide as long; funicular segments with F1 quadrate, F2-F7 in same length, slightly transverse with sparse longitudinal sensillae (2-5); gradually and slightly widening apically, F7 1.43x as wide as F1; and as wide as long; club as wide as F7, 2x as long as wide.
Mesosoma (Fig. 4a) distinctly bulged in profile, propodeum slightly visible dorsally; mesoscutum and scutellum (Fig. 5d) with fine reticulation. All coxae

reticulated. Forewing (Fig. 5f) with marginal vein 1.9x as long as post marginal vein, and 3.4x stigmal vein; post marginal vein 1.8x as long as stigmal vein.
Metasoma (Fig. 5a) excluding ovipositor as long as rest of body; basal 4 tergites with posterior margin distinctly incised medially; tip of hypopygium at 0.71 metasoma length. Hind femora without tooth at the apex, 3.75x as long as width. Ovipositor sheaths (Fig. 5a) equal to total length of the metasoma and mesosoma, and equal 1.7x as long as metasoma Ovipositor index 3.8.
Male. Unknown.

Material examined: Holotype ♀, Turkey: Balıkesir, 17.viii.2005, swept from leaves of *Olea europae*, leg. B. Hepdurgun, deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Balıkesir.
Host: Unknown.
Comments: Female: *Microdontomerus balikesirensis* sp. nov. is similar to *M. yigiti* sp. nov.. The discussion was given above.

Microdontomerus sivasensis sp. nov.

(Figs. 6a-f)

Etymology. The name is derived from the name of the place from which the holotype was collected.
Diagnosis. Ovipositor almost equal to lengths of the metasoma; Antenna with scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.5x longer than wide; anellus about 1.67x wider than long; funicular segments with one row of dense sensillae (5-9), funicular segments distinctly transverse, slightly widening towards tip, F7 1.36x as wide as F1; club slightly wider than F7, 2.7x as long as wide; mesonotum with distinct fine reticulation; parapsidal groove shallow; propodeum without carina, medially smooth, laterally with fine reticulation, with some striae on anterior border; spiracle touching metanotum. forewing with marginal vein 3.6x as long as post marginal vein, and 7.2x stigmal vein; post marginal vein 2x as long as stigmal vein. Body blue-green. Ovipositor 0. 95x as long as metasoma. Ovipositor index: 1.55. Hind femora with indistinct tooth, 3.9x as long as wide.
Description:
Female. Body (Fig. 6a) bronze with metallic green reflection, antennae with cape and pedicel metallic blue, flagellum brown; legs concolorous with body, except basal tip of tibiae, and tarsi yellow, except last segment of tarsi black (Fig. 6b); wing hyaline, veins brown. Length 2.5 mm + ovipositor 1.12 mm.
Head in dorsal view 1.16x as wide as mesoscutum, width to length 50:27; POL 2.85x OOL; OOL 1.17x diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 50:38; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.3 hight of eye; face with fine sculpture. Antenna (Fig. 6c) with scape equal to pedicel plus anellus and F1+F2; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments distinctly transverse, distinctly widening towards tip, F7 1.12x as wide as F1; club 1.6x as long as wide.
Mesosoma (Fig. 6a) bulged in profile, propodeum visible dorsally; mesonotum and scutellum (Fig. 6d) with distinct fine reticulation; with parapsidal groove shallow; propodeum (Fig. 6e) without carina, medially smooth, laterally with fine reticulation, with some striae on anterior border; spiracle touching metanotum. forewing with marginal vein 3.6x as long as post marginal vein, and 7.2x stigmal vein; post marginal vein 2x as long as stigmal vein.

Metasoma (Fig. 6a) excluding ovipositor 0.82x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.9x metasoma length; Ovipositor 0. 95x as long as metasoma. Ovipositor index: 1.55. Hind femora with indistinct tooth., 3.9x as long as wide.

Male. Unknown.

Material examined: Holotype, ♀, Turkey: Sivas, Cumhuriyet Univ. Campus, 26.5.1992, swept from pasture, leg. L. Gençer. Paratypes: 1 ♀, same data as holotype, except 07.ix. 1992; Sivas, Kümbet, 26.vii.1990, swept from pasture, leg. L. Gençer, 1 ♀. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Sivas.

Host: Unknown.

Comments: Female: *Microdontomerus sivasensis* sp. nov. is similar to *M. ulukislanensis* sp. nov. and *M. gurcukoyensis* Doğanlar in having ovipositor sheaths about as long as metasoma. But it differs from both of them in having scape equal to pedicel plus anellus and F1+F2 combined; ovipositor almost equal to lengths of metasoma (0. 95x) (in both species scape equal to pedicel plus anellus and F1+F3 combined; ovipositor sheaths about 1.12x length of metasoma).

Microdontomerus ulukislanensis sp. nov.

(Figs. 7a-f)

Etymology. The name is derived from the name of the place from which the holotype was collected.

Diagnosis. Ovipositor sheaths about 1.12x length of metasoma, ovipositor index 2.04. Fore wing with marginal vein about 6.14x stigmal vein, 3.1x post marginal vein; the latter 2x as long as stigmal vein. Stigmal vein very long, stigma broad; antenna pedicel plus flagellum 2.75x length of scape; pedicel 1.3x longer than wide; anellus about 2.0x wider than long; F1 as long as F2, 1.71x as wide as long; funicular segments transverse, about twice as wide as long; distinctl widening towards tip, F7 1.64x as wide as F1; club 1.6x as long as wide; Mesosoma finely wrinkled, scutellum with deep pits, propodeum with fine striae. Head and mesosoma black, with greenish reflexion; scape and pedicel and legs concolorous with body, except both tips of femora and tibiae and tarsi yellow; metasoma brown, except ovipositor sheaths testaceous; fore wing veins yellow. hind femora 4.1x as long as width.

Description:

Female. Body (Fig. 7a) with head and mesosoma black, with greenish reflexion; scape and pedicel and legs concolorous with body, except both tips of femora and tibiae and tarsi yellow; metasoma brown, except ovipositor sheaths testaceous; fore wing veins yellow. Length 2.5 mm + ovipositor 1.13 mm.

Head in dorsal view as wide as mesoscutum, width to length 55:13; POL 2.2x OOL; OOL 2.0 diameter lateral ocellus. Head in frontal view as wide as high, in ratio 55:53; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.37 height of eye. face with fine sculpture. Antenna (Fig. 7c) pedicel plus flagellum 2.75x length of scape; pedicel 1.3x longer than wide; anellus about 2.0x wider than long; F1 as long as F2, 1.71x as wide as long; funicular segments transverse, about twice as wide as long; distinctl widening towards tip, F7 1.64x as wide as F1; club 1.6x as long as wide.

Mesosoma (Fig. 7a) slightly bulged in profile, propodeum slightly visible dorsally, Mesosoma (Fig. 7d) finely wrinkled, scutellum with deep pits, with parapsidal groove deep; propodeum (Fig. 7e) without carina, finely, longitudinally reticulated, spiracle touching metanotum. Fore wing (Fig. 7f) with marginal vein about 6.14x stigmal vein, 3.1x post marginal vein; the latter 2x as long as stigmal vein. Stigmal vein (Fig. 7f) very long, stigma broad.

Metasoma (Fig. 7a) excluding ovipositor 0.85x rest of body; tip of hypopygium at 0.83 metasoma length; hind femora (Fig. 7b) 4.6x as long as width. Ovipositor equal 1.12x lengths of metasoma (Fig. 4a). Ovipositor index: 2.04.

Male. Unknown.

Material examined: Holotype ♀, Turkey: Niğde, Ulukışla, Maden, 11.vi. 2006, swept from leaf of *Prunus cerasi* L. leg. M. Doğanlar. Paratype: same data as the holotype, except 07.vi.2008, 1 ♀. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Niğde, Ulukışla, Maden.

Host: Unknown.

Comments: *Microdontomerus ulukislanensis* sp. nov. is similar to *M. gurcukoyensis* Doğanlar in having scape equal to pedicel plus anellus and F1+F3 combined; ovipositor sheaths about 1.12x length of metasoma. But it differs from *M. gurcukoyensis* by having ovipositor index 2.04, Fore wing with marginal vein about 6.14x stigmal vein, 3.1x post marginal vein; the latter 2x as long as stigmal vein, antenna with pedicel 1.3x longer than wide; anellus about 2.0x wider than long; F1 as long as F2; funicular segments distinctly widening towards tip, F7 1.64x as wide as F1; Head and mesosoma black, with greenish reflexion; scape and pedicel and legs concolorous with body, except both tips of femora and tibiae and tarsi yellow (in *M. gurcukoyensis* ovipositor index 1.66.; fore wing with marginal vein about 2.33x stigmal vein, 1.25x post marginal vein; the latter 1.5x as long as stigmal vein, antenna pedicel 2.3x longer than wide; anellus about 3.0x wider than long; F1 distinctly shorter than F2,; funicular segments filiform, F7 1.2x as wide as F1; head and mesosoma black, with greenish reflexion; antenna yellow; coxae concolorous with body, femora yellow, except dorsally brown with greenish reflexion; tibiae and tarsi yellow).

Microdontomerus. gurcukoyensis Doğanlar, 2016

(Figs. 8a-f)

Microdontomerus. gurcukoyensis Doğanlar, 2016b: 509, 510. Holotype ♀, Tokat, Turkey (IMBC).

Descriptions and distribution: given by Doğanlar (2016b).

Diagnosis. Ovipositor sheaths (Fig. 8a) about 1.12x length of metasoma, ovipositor index 1.66.; forewing (Fig. 8e) with marginal vein about 2.33x stigmal vein, 1.25x post marginal vein; the latter 1.5x as long as stigmal vein. Stigmal vein very long, stigma small; antenna (Fig. 8c) with pedicel plus flagellum 2.66x length of scape; pedicel 2.3x longer than wide; anellus about 3.0x wider than long; F1 distinctly shorter than F2, 1.75x as wide as long; funicular segments transverse, about twice as wide as long; filiform, F7 1.2x as wide as F1; club 1.6x as long as wide; Body (Fig. 8a) with head and mesosoma black, with greenish reflexion; antenna yellow; coxae concolorous with body, femora yellow, except dorsally brown with greenish reflexion; tibiae and tarsi yellow; metasoma brown, except basally testaceous; fore wing veins yellow. Mesosoma (Fig. 8d) finely reticulated. Hind femora (Fig. 8f) 3.0x as long as width.

Material studied: Tokat, 15.vii.1986, swept from pasture, leg. H. Çam, 1 ♀, and the holotype.

Microdontomerus direklinensis Doğanlar, 2016

(Figs. 9. a-f)

Microdontomerus direklinensis Doğanlar, 2016b: 512, 513. Holotype ♀, Gaziantep, Turkey (IMBC).

Descriptions and distribution: given by Doğanlar (2016b).

Diagnosis. Ovipositor (Fig. 9a) sheaths 0.42x as long as metasoma, ovipositor index 1.3; forewing (Fig. 9f) with costal cell 1.8x marginal vein; marginal vein about 3x stigmal vein, 1.44x post marginal vein; stigmal vein almost fused with stigma; scutellum (Fig. 9e) finely reticulated, with sparse punctures; antenna (Fig. 9c) attached at level of ventral edge of eyes; pedicel plus flagellum 2.95x length of scape; F1 equal size to F2; hind femora 3.0x as long as width.

Material studied: Tokat, holotype.

Microdontomerus kayserinensis sp. nov.

(Figs. 10a-f)

Etymology. The name is derived from the name of the place from which the holotype was collected.

Diagnosis. Mesonotum finely wrinkled, beween them with fine reticulation; with parapsidal groove deep; propodeum without carina, finely, longitudinally reticulated basally with shallow fovae; spicula wide apart from metanotum by half diameter of speculum. Forewing with marginal vein 2.53x as long as post marginal vein, and 5.33x stigmal vein; post marginal vein 2.1x as long as stigmal vein, the latter long, stigma broad, with long spicula. Body green with golden reflection, scape, pedicel concolorous with body, flagellum brown; legs concolorous with body, except tips of tibiae, and tarsi yellow. Antenna with scape slightly shorter than pedicel plus anellus and F1+F3 combined; pedicel 2x longer than wide; anellus 2x wider than long; funicular segments distinctly transverse, F1 1.5x, F2 1.57x; F3-F7 slightly widening towards tip, F7 2.28x as wide as long ; F7 1.67x as wide as F1; club 1.13x wider than F7, 1.65x as long as wide; hind femora with distinct tooth, 4.1x as long as width; Ovipositor equal 0.64x lengths of metasoma. Ovipositor index: 1.2.

Description:

Female. Body (Fig. 10a) green with golden reflection, scape, pedicel concolorous with body, flagellum brown; legs concolorous with body, except tips of tibiae, and tarsi yellow; wing hyaline, veins yellow. Length 2.82 mm + ovipositor 0.65 mm.

Head in dorsal view as wide as mesoscutum, width to length 41:20; POL 2.6x OOL; OOL 1.6 diameter lateral ocellus. Head in frontal view 1.3x wider than high in ratio 41:32; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.32 height of eye. face with fine sculpture. . Antenna (Fig. 10c) with scape slightly shorter than pedicel plus anellus and F1+F3 combined; pedicel 2x longer than wide; anellus 2x wider than long; funicular segments distinctly transverse, F1 1.5x, F2 1.57x; F3-F7 slightly widening towards tip, F7 2.28x as wide as long ; F7 1.67x as wide as F1; club 1.13x wider than F7, 1.65x as long as wide.

Mesosoma (Fig. 10a) slightly bulged in profile, propodeum slightly visible dorsally; mesonotum (Fig. 10d) finely wrinkled, between them with fine reticulation; with parapsidal groove deep; propodeum (Fig. 10e) without carina, finely, longitudinally reticulated basally with shallow fovea; spiracle wide apart from metanotum by half diameter of spiracle. Forewing (Fig. 10f) with marginal vein 2.53x as long as post marginal vein, and 5.33x stigmal vein; post marginal vein 2.1x as long as stigmal vein, the latter long, stigma broad, with long spicula.

Metasoma (Fig. 10a) excluding ovipositor 0.75x rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.78 metasoma length; hind femora (Fig. 10b) 4.1x as long as width. Ovipositor equal 0.64x lengths of metasoma (Fig. 10a). Ovipositor index: 1.2.

Male. Unknown.

Material examined: Holotype ♀, Turkey: Kayseri, Akmescit, 08.vi. 2008, swept from *Sinapis* sp., M. Doğanlar, deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Kayseri, Akmescit.

Host: Unknown.

Comments: *Microdontomerus kayserinensis* sp. nov. is similar to *M. altinekinesis* Doğanlar and *M. erzurumensis* sp. nov. in having antenna with scape slightly shorter than pedicel plus anellus and F1+F3 combined, ovipositor sheaths equal 0.64x lengths of metasoma, and ovipositor index: 1.2. (in both species ovipositor sheaths about equal 0.75-0.77x length of metasoma, and ovipositor index at least 1.45). It also differs from *M. altinekinesis* in having forewing with marginal vein 2.53x as long as post marginal vein, F7 1.67x as wide as F1, hind femora 4.1x as long as width (in *M. altinekinesis* fore wing with marginal vein 3.6x post marginal vein; F7 almost equal size to F1, hind femora 2.7x as long as width), and from *M. erzurumensis* sp. nov. in having scape slightly shorter than pedicel plus anellus and F1+F3 combined, pedicel 2x longer than wide; forewing with marginal vein 2.53x as long as post marginal vein, and 5.33x stigmal vein; post marginal vein 2.1x as long as stigmal vein (in *M. erzurumensis* sp. nov. scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.57x longer than wide; forewing with marginal vein 1.82x post marginal vein, and 2.6x stigmal vein; post marginal vein 1.43x as long as stigmal vein).

Microdontomerus altinekinesis Doğanlar, 2016

(Figs. 11a-f)

Microdontomerus altinekinesis Doğanlar, 2016b: 511, 512. Holotype ♀, Konya, Turkey (IMBC).

Descriptions and distribution: given by Doğanlar (2016b).

Diagnosis. Ovipositor (Fig. 11a) sheaths about equal 0.75x lengths of metasoma; ovipositor index 1.53. Forewing (Fig. 11e) with marginal vein 3.6x post marginal vein, and 5.0x stigmal vein; post marginal vein 2.7x as long as stigmal vein. Antenna (Fig. 11b) with pedicel plus flagellum 2.5x length of scape; the latter equal to pedicel plus anellus and F1-F3 combined; pedicel 1.7x longer than wide; anellus 1.5x wider than long; F1 almost equal size to F7; club 1.7x as long as wide; Body (Fig. 11a) black, with coppery-green reflexion, antenna yellow, Mesonotum finely reticulated, and scutellum (Fig. 11d) with dense, deep punctures; propodeum smooth; hind femora (Fig. 11f) 2.7x as long as width.

Material studied: Konya, holotype.

Microdontomerus erzurumensis sp. nov.

(Figs. 12a-g)

Etymology. The name is derived from the name of the place from which the holotype was collected.

Diagnosis. Ovipositor sheaths about equal 0.77x lengths of metasoma; ovipositor index 1.45. Fore wing with marginal vein 1.82x post marginal vein, and 2.6x stigmal vein; post marginal vein 1.43x as long as stigmal vein. Antenna with pedicel plus flagellum 3.33x length of scape; the latter equal to pedicel plus anellus and F1-F2 combined; pedicel 1.57x longer than wide; anellus 2x wider than long; F1 slightly transverse (8/7); F2-F4 almost in equal size, 1.43x, and F5-F7 almost in equal size, 1.57x as wide as long; club distinctly wider than F7, 1.22x as wide as F7, and 1.7x as long as wide; Body black, with coppery-green reflexion, antenna with scape and pedicel bronze green, flagellum dark brown. Mesonotum and scutellum finely, transversally reticulated; propodeum with short median and submedian carinae, finely reticulated; hind femora 4.8x as long as width.

Description:

Female. Body (Fig. 12a) black, with coppery-green reflexion, antenna with scape and pedicel bronze green, flagellum dark brown; wing hyaline, veins yellow. Length 2.75 mm + ovipositor 1.05 mm.

Head in dorsal view as wide as mesoscutum, width to length 45:15; POL 2.4x OOL; OOL 1.25 diameter lateral ocellus. Head in frontal view 1.3x wider than high in ratio 45:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.45 height of eye. face with fine sculpture. Antenna (Fig. 12c) with pedicel plus flagellum 3.33x length of scape; the latter equal to pedicel plus anellus and F1-F2 combined; pedicel 1.57x longer than wide; anellus 2x wider than long; F1 slightly transverse (8/7); F2-F4 almost in equal size, 1.43x, and F5-F7 almost in equal size, 1.57x as wide as long; club distinctly wider than F7, 1.22x as wide as F7, and 1.7x as long as wide.

Mesosoma (Fig. 12a) almost flat in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 12d) finely, transversally reticulated; propodeum (Fig. 12e) with two short median and submedian carinae, finely reticulated; hind femora 4.8x as long as width; spiracle touching metanotum. Forewing (Fig. 12f) with marginal vein 1.82x post marginal vein, and 2.6x stigmal vein; post marginal vein 1.43x as long as stigmal vein, the latter short, stigma broad, with short spicula.

Metasoma (Fig. 12a) excluding ovipositor 0.82x rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.73 metasoma length; hind femora (Fig. 12b) 4.1x as long as width. Ovipositor equal 0.77x length of metasoma. Ovipositor index: 1.45.

Male: Similar to female except as follows: antenna (Fig. 12g) with pedicel plus flagellum 3.92x length of scape; the latter equal to pedicel plus anellus and F1- 1/3 F2 combined; pedicel 1.43x longer than wide; anellus 3.33x wider than long; F1 almost quadrate; F2-F7 almost in equal size, 1.71x as wide as long; club as wide as F7, and 2x as long as wide.

Material examined: Holotype ♀, Turkey: Erzurum, 17.vi. 1986, swept from *Medicago sativa* L. field, Leg. M. Doğanlar. **Paratypes:** 2 ♂♂, same data as the holotype; Erzurum, 18.vi. 1982, swept from *Medicago sativa* L. field, Leg. M. Doğanlar, 1 ♂. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Erzurum.

Host: Swept from *Medicago sativa* L. field.

Comments: *Microdontomerus erzurumensis* sp. nov. is similar to *M. kayserinensis* sp. nov.. The discussion was given before.

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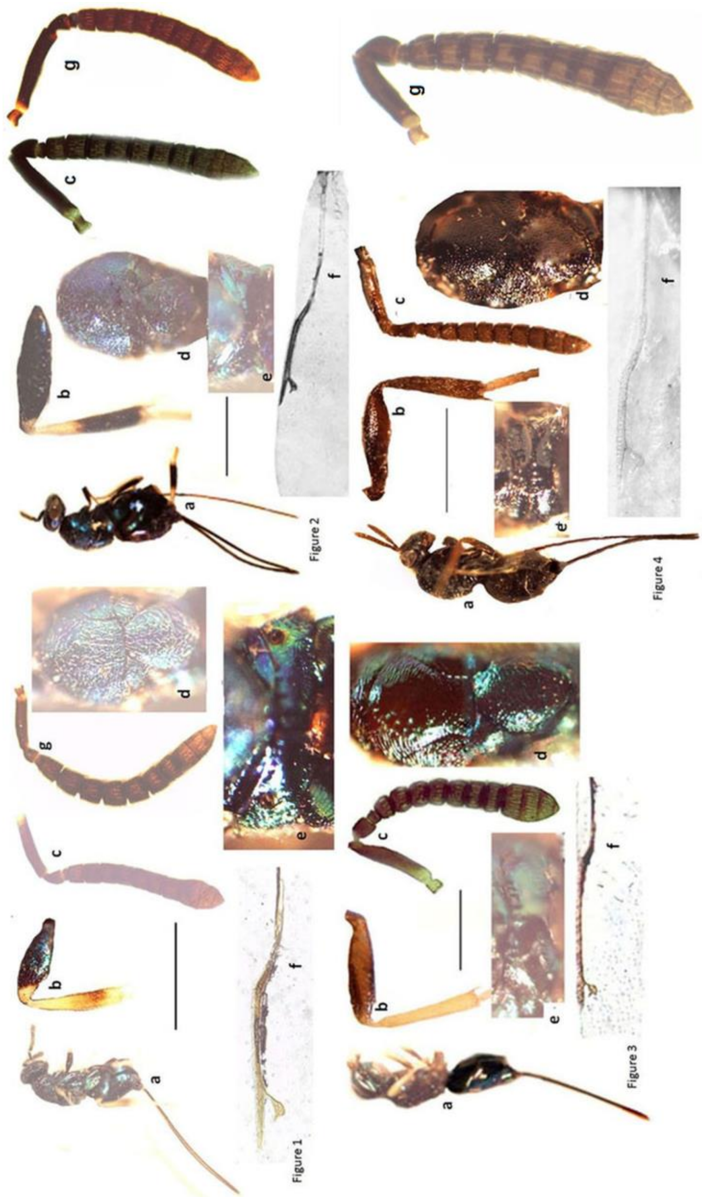

Figure 1-4. *Microdontomerus* spp. 1. *M. maculosacus* sp. nov.. Scale bar for a = 2.73 mm; for b = 1.45 mm; for c, g=0.67 mm; for d = 1.03 mm; for e = 0.53 mm.; for f = 1.0 mm.; 2. *M. annulata Spinola;* Scale bar for a= 1.62 mm: for b,d,f= 0.66mm; for c= 0.45 mm; for e= 0.6 mm; 3. *M. kocakeri* sp. nov.. Scale bar for a = 0.83 mm; for b = 0.28 mm; for c, g=0.14 mm; for d = 0.22 mm; for e = 0.38 mm.; 4. *M. yigiti* sp. nov.. Scale bar for a = 1.25 mm; for b = 0.58 mm; for c, d=0.24 mm; for e = 0.19 mm; for f = 0.5 mm; for g = 0.13 mm; a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins; g. male antenna.

Figure 5-8. *Microdontomerus* spp. 5**.** *M. balikesirensis* sp. nov.. Scale bare for a = 2.23 mm; for b = 0.96 mm; for c = 0.52 mm; for d,e = 0.76 mm; for f = 0.54 mm; 6. *M. sivasensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins; g. male antenna. Scale bare for a, d = 1.12 mm; for b = 0.58 mm; for c = 0.31 mm; for e = 0.8 mm; for f = 0.64 mm; 7. *M. ulukislanensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins; g. male antenna. Scale bare for a = 1.0 mm; for b = 0.34 mm; for c = 0.25 mm; for d- f = 0.50 mm.; 8. *M. gurcukoyensis* Doğanlar. a. body; b. head in frontal view; c. antenna; d. mesosoma; e. forewing veins; f. hind femora and tibia; Scale bar for a= 1.22 mm: for b =0.75 mm; for c =0.35 mm for d,e= 0.42 mm; for f= 0.6 mm.

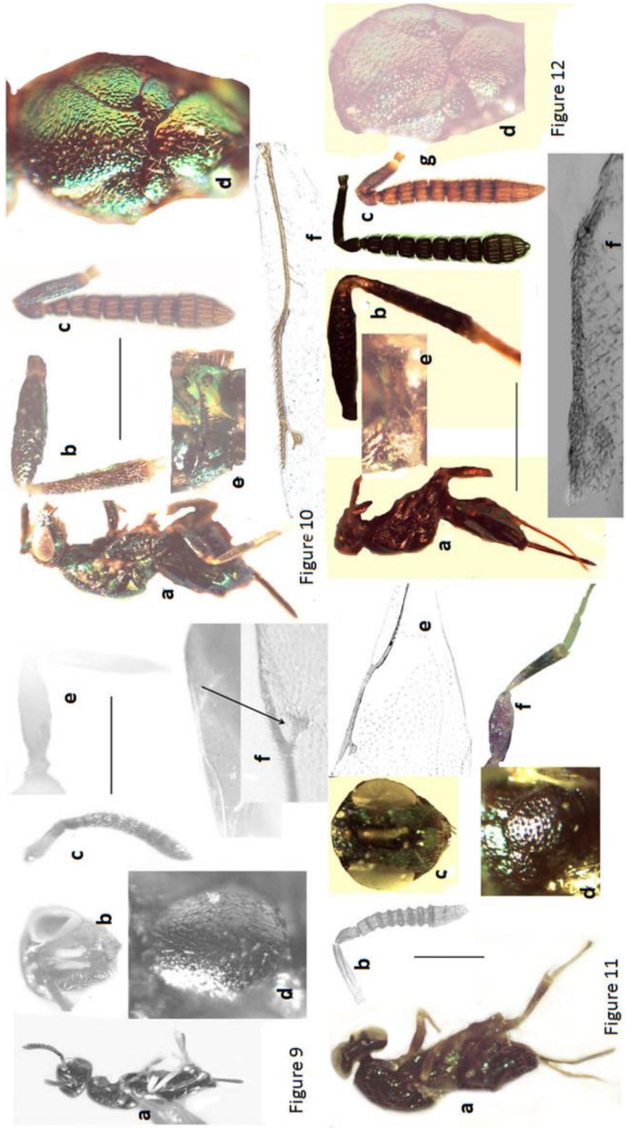

Figure 9-12. *Microdontomerus* spp. 9**.** *M. direklinensis* Doğanlar. a. body; b. head in frontal view; c. fem. antenna; d. scutellum; e. hind femora and tibia; f. forewing veins. Scale bar for a= 1.44 mm: for b, c, d = 0.59 mm; for c,d=0.43 mm; for e= 0.51 mm; for f= 0.62 mm; 10. *M. kayserinensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins. Scale bare for a = 1.4 mm; for b = 0.68 mm; for c = 0.36 mm; for d = 0.45 mm; for e = 0.4 mm; f = 0.86 mm..; 11. *M. altinekinesis* Doğanlar. a. body; b. fem. antenna; c. head in frontal view; d. scutellum; e. forewing veins; f. hind femora and tibia; Scale bar for a= 0.72 mm: for b, c, d = 0.4mm; for e,f= 0.56 mm; 12. *M. erzurumensis* sp. nov.. Scale bare for a = 1.64 mm; for b = 0.63 mm; for c = 0.55 mm; for d = 0.56 mm; for e = 0.62mm; for f = 0.35 mm. for g = 0.43 mm. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins; g. male antenna.

A NEW RECORD OF BERYTIDAE FROM TURKEY: *BERYTINUS HIRTICORNIS PILIPES* (PUTON, 1875) (HETEROPTERA)

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[Kıyak, S. 2016. A new record of Berytidae from Turkey: *Berytinus hirticornis pilipes* (Puton, 1875) (Heteroptera). Munis Entomology & Zoology, 11 (2): 382-382**]**

ABSTRACT: The paper presents *Berytinus hirticornis pilipes* (Puton, 1875) as a new record for the family Berytidae (Heteroptera) in Turkey. The specimen were collected from Kızılcahamam: Işık Mountain (Turkey, Ankara province).

KEY WORDS: Berytidae, *Berytinus hirticornis pilipes*, new record, Turkey

The species of *Berytinus* are characterised by the short 2nd antennal segment which is less than the length of the club on the 1st segment, and by the short hind femora which do not reach the apex of the corium.

In *Berytinus hirticornis*, the 1st antennal segment has long erect hairs which are longer than width of the segment. The clubs of the 1st antennal segment and femora are pale.

The species *Berytinus hirticornis* (Brullé, 1835) includes three subspecies as *Berytinus hirticornis hirticornis* (Brullé, 1835), *Berytinus hirticornis nigrolineatus* (Jakovlev, 1903) and *Berytinus hirticornis pilipes* (Puton, 1875).

Only the subspecies *Berytinus hirticornis nigrolineatus* (Jakovlev, 1903) has been reported from European Turkey for Turkey. In Turkey, neither *Berytinus hirticornis hirticornis* (Brullé, 1835) nor *Berytinus hirticornis pilipes* (Puton, 1875) have been recorded up to now.

In 1993, one male specimen of *Berytinus hirticornis pilipes* (Puton, 1875) was collected from Işık Mountain situated in Kızılcahamam (Ankara) and was identified by the author according to Stichel (1955-1962).

The specimen is deposited in the insect collection of the Zoological Museum of Gazi University, Science Faculty, Ankara, Turkey (=ZMG).

Family Berytidae
Berytinus hirticornis (Brullé, 1835)
Berytinus hirticornis pilipes (Puton, 1875)

Material examined: 1 male, Asian Turkey: Ankara, Kızılcahamam, Işık Mountain, Güvem village, 11.VIII.1993, ca. 1150 m., in grass vegetation.

Distribution: Europe (France, Greece, Italy, Portugal, Spain) and North Africa (Algeria, Canary Island, Morocco, Madeira, Tunisia) (Stichel, 1955-1962; Aukema & Rieger, 2001).

Remark: The subspecies is the first record to Turkey.

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CHRYSOLINA (*PARADIACHALCOIDEA*) DACCORDI IN PALAEARCTIC REGION AND REMARKS ABOUT THE ACTUAL SUBGENERA SITUATION OF *CHRYSOLINA* IN TURKEY (COLEOPTERA: CHRYSOMELIDAE: CHRYSOMELINAE)

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[Özdikmen, H., Coral Şahin, D. & Yetkin, C. 2016. *Chrysolina* (*Paradiachalcoidea*) Daccordi in Palaearctic region and remarks about the actual subgenera situation of *Chrysolina* in Turkey (Coleoptera: Chrysomelidae: Chrysomelinae). Munis Entomology & Zoology, 11 (2): 383-389**]**

ABSTRACT: This paper presents at first a short survey about the subgenera of *Chrysolina* in Turkey and at second a synopsis on the subgenus *Paradiachalcoidea* in Palaearctic region. *Chrysolina palmyrensis* is recorded for the second time from Turkey after Gruev & Tomov (1979). Type information of all Palaearctic taxa of the subgenus *Paradiachalcoidea* is provided. Erroneous information of type locality for *Ch. dohrnii dohrnii* (Fairmaire, 1865) and *Ch. palmyrensis palmyrensis* Bechyné, 1955 are amended as Syria, not Lebanon. The distribution area of all Palaearctic taxa of the subgenus *Paradiachalcoidea* is discussed. Consequently a key for the members of subgenus *Paradiachalcoidea* in Palaearctic region is also given.

KEY WORDS: *Chrysolina* subgenera, *Paradiachalcoidea*, *Chrysolina palmyrensis,* Turkey, Palaearctic region

Chrysolina Motschulsky, 1860 (Chrysomelidae: Chrysomelinae: Doryphorini: Chrysolinina) is a very large and diverse genus of leaf-beetles, represented in Turkey with a lot of subgenera and with some endemic species. After that the Palearctic Catalogue 6 in 2010 has presented a detailed report about Chrysomelidae some interesting supplements have been published which regard also the fauna of Turkey. Therefore at first a short summary will be given here about the actual subgenus situation in Turkey.

Subgenus *Parachalcoidea* is scarcely recorded from Turkey and besides this, treated incorrectly in the literature. A detailed discussion of this subgenus including some corrections seems to be required and will be presented.

MATERIALS AND METHODS

During the study of Chrysomelidae specimens in our collections, we have identified two female specimens of the species *Ch.* (*Paradiachalcoidea*) *palmyrensis* Bechyné, 1955 collected from the province Şanlıurfa in the South-Eastern Anatolian Region of Turkey. These specimens were deposited at Nazife Tuatay Plant Protection Museum (NTM) (Turkey, Ankara).

Kippenberg (2010) and Warchałowski (2010) are used to distributional data of the taxa in the text chiefly.

RESULTS AND DISCUSSION

Actual list of the *Chrysolina* Motschulsky subgenera reported from Turkey (with number of Turkish species)

In Turkey, genus *Chrysolina* is represented by 24 subgenera (of 57 subgenera in the Palaearctic region). These are (Ekiz et al. 2013, Özdikmen 2014, Özdikmen et al. 2014; Şen, 2015):

Bittotaenia Motschulsky, 1860 (3 species)
Chalcoidea Motschulsky, 1860 (5 species)
Chrysolina Motschulsky, 1860 (2 species)
Chrysolinopsis Bechyné, 1950 (1 species)
Chrysomorpha Motschulsky, 1860 (1 species)
Colaphodes Motschulsky, 1860 (1 species)
Colaphoptera Motschulsky, 1860 (2 species)
Colaphosoma Motschulsky, 1860 (1 species)
Diachalcoidea Bechyné, 1955 (1 species)
Erythrochrysa Bechyné, 1950 (1 species)
Euchrysolina Bechyné, 1950 (1 species)
Fastuolina Warchalowski, 1991 (1 species)
Hypericia Bedel, 1892 (5 species)
Lopatinica Kippenberg, 2012 (6 species)
Ovosoma Motschulsky, 1860 (4 species)
Ovostoma Motschulsky, 1860 (1 species)
Paradiachalcoidea Daccordi, 1978 (1 species)
Sphaeromela Bedel, 1892 (1 species)
Stichoptera Motschulsky, 1860 (2 species)
Sulcicollis J. R. Sahlberg, 1913 (4 species)
Synerga Weise, 1900 (2 species)
Taeniosticha Motschulsky, 1860 (2 species)
Threnosoma Motschulsky, 1860 (1 species)
Zeugotaenia Motschulsky, 1860 (1 species)

Subgenus *Paradiachalcoidea* Daccordi, 1978: 752

Type species: *Chrysolina vignai* Daccordi, 1978

Subgenus *Paradiachalcoidea* was described by Daccordi (1978) for three Ethiopian species: *Chrysolina vignai* Daccordi, 1978 (type species), *Ch. copta* Daccordi, 1978 and *Ch. silvanae* Daccordi, 1978. *Ch. copta* Daccordi, 1978 is a synonym of *Ch. limbatella* (Weise, 1907). Later on *Ch. palmyrensis* Bechyné, 1955 from Israel, Iraq, Iran, Lebanon, Syria and Turkey was transferred by Bieńkowski (2001) from subgenus *Diachalcoidea* Bechyné, 1955 to subgenus *Paradiachalcoidea* Daccordi. Thus Kippenberg (2010) mentioned for the Palearctic only the species *Ch. palmyrensis* Bechyné, 1955 in the subgenus *Paradiachalcoidea*. In addition *Ch. dohrnii* (Fairmaire, 1865) from Syria and Lebanon was transferred by Bieńkowski & Orlova-Bieńkowskaya (2011) from subgenus *Zeugotaenia* Motschulsky, 1860 (Kippenberg 2010) to subgenus *Paradiachalcoidea* Daccordi, 1978.

Chrysolina dohrnii (Fairmaire, 1865)

(Fig. 1)

Chrysomela dohrnii Fairmaire, 1865: 81

Chrysomela peyroni Ancey, 1876: 94
Chrysomela (*Colaphosoma*/*Zeugotaenia*) *dohrni*: Winkler, 1930: 1279
Chrysomela (*Colaphosoma*/*Zeugotaenia*) *peyroni*: Winkler, 1930: 1279
Chrysolina (*Taeniosticha*) *dohrni*: Bourdonné & Doguet, 1991: 40
Chrysolina (*Taeniosticha*) *dohrnii peyroni*: Bieńkowski, 2001:193
Craspeda (*Craspeda*) *dohrnii*: Bourdonné, 2005: 305, 2008: 20
Craspeda (*Craspeda*) *dohrnii* = *peyroni* (syn. nov.): Bourdonné, 2008: 20
Chrysolina (*Zeugotaenia*) *dohrnii dohrnii*: Kippenberg, 2010: 419
Chrysolina (*Paradiachalcoidea*) *dohrnii*: Bieńkowski & Orlova-Bieńkowskaya, 2011: 505
Chrysolina (*Zeugotaenia*) *dohrnii peyroni*: Kippenberg, 2010: 419

This species inhabiting the Near East (Syria and Lebanon) was placed by Winkler (1930) in the subgenus *Zeugotaenia*, by Bourdonné & Doguet (1991) in the subgenus *Taeniosticha* and later on by Bourdonné (2005) in the subgenus *Craspeda* (regarded as *Craspeda* subg. *Craspeda*). Bieńkowski & Orlova-Bieńkowskaya (2011) found out that *Ch. dohrnii* differs from representatives of the subgenus *Zeugotaenia* in the following characters: ultimate segment of maxillary palpus are narrow and elongate in both sexes; basal tarsal segments of male are not widened; lateral depression of pronotum is very shallow; and elytral striae are absolutely regular and paired, well visible against background of finer punctation of intervals. Based on this combination of characters, Bieńkowski & Orlova-Bieńkowskaya (2011) placed *Ch. dohrnii* in the subgenus *Paradiachalcoidea* Daccordi, 1978, sensu Bieńkowski (2001).

This species includes two subspecies: the nominal subspecies and *Ch. dohrnii peyroni* (Ancey, 1876).

***Chrysolina dohrnii dohrnii* (Fairmaire, 1865)**

Chrysomela dohrnii Fairmaire, 1865: 81
Chrysomela (*Colaphosoma*/*Zeugotaenia*) *dohrni*: Winkler, 1930: 1279
Chrysolina (*Taeniosticha*) *dohrni*: Bourdonné & Doguet, 1991: 40
Craspeda (*Craspeda*) *dohrnii*: Bourdonné, 2005: 305, 2008: 20
Chrysolina (*Zeugotaenia*) *dohrnii dohrnii*: Kippenberg, 2010: 419
Chrysolina (*Paradiachalcoidea*) *dohrnii*: Bieńkowski & Orlova-Bieńkowskaya, 2011: 505

According to Bieńkowski (2001) and Kippenberg (2010), this subspecies is known only from Lebanon. However this subspecies occurs only in Syria. Since *Ch. dohrnii* was originally described by Fairmaire (1865) with original combination *Chrysomela dohrnii* from Syria, not Lebanon, according to original description [syntype in MNHN (Museum National d'Histoire Naturelle, Paris, France), examined by Bourdonné, 2008].

***Chrysolina dohrnii peyroni* (Ancey, 1876)**

Chrysomela peyroni Ancey, 1876: 94
Chrysomela peyroni: Weise, 1916: 85
Chrysomela (*Colaphosoma*/*Zeugotaenia*) *peyroni*: Winkler, 1930: 1279
Chrysolina (*Taeniosticha*) *dohrnii peyroni*: Bieńkowski, 2001:193
Craspeda (*Craspeda*) *dohrnii* = *peyroni* (syn. nov.): Bourdonné, 2008: 20
Chrysolina (*Zeugotaenia*) *dohrnii peyroni*: Kippenberg, 2010: 419

According to Kippenberg (2010), this subspecies is reported from Lebanon and Syria erroneously. However this subspecies occurs only in Lebanon as stated by Bieńkowski (2001). Since *Ch. dohrnii peyroni* (Ancey, 1876) with original combination *Chrysomela peyroni* from Lebanon: "Mont Sannin, près de Beyrouth" [syntype in MNSB (Museum of Natural Sciences, Bruxelles, Belgium), examined by Bourdonné, 2008].

Chrysolina palmyrensis Bechyné, 1955

Chrysomela rufomarginata: Baly, 1879: 191 [homonym, nec Suffrian, 1851: 65]
Chrysomela rufomarginata: Marseul, 1887: 127 [homonym, nec Suffrian, 1851: 65]
Chrysolina palmyrensis palmyrensis: Bechyné, 1955: 350
Chrysolina palmyrensis assurensis: Bechyné, 1955: 350
Chrysolina palmyrensis: Gruev & Tomov, 1979: 263
Chrysolina palmyrensis palmyrensis: Bieńkowski, 2001: 127
Chrysolina palmyrensis assurensis: Bieńkowski, 2001: 127
Chrysolina palmyrensis: Aslan et al., 2003: 588
Chrysolina palmyrensis palmyrensis: Kippenberg, 2010: 412
Chrysolina palmyrensis assurensis: Kippenberg, 2010: 412

Ch. palmyrensis Bechyné, 1955 was originally included in the subgenus *Diachalcoidea* Bechyné, 1955. Gruev & Tomov (1979) stated that aedeagus of *Ch. palmyrensis* is somewhat different from those of other members of *Diachalcoidea*. Then, *Ch. palmyrensis* from Turkey, Syria, Lebanon, Israel, Iraq, Iran was transferred by Bieńkowski (2001) from the subgenus *Diachalcoidea* to the subgenus *Paradiachalcoidea*. Bieńkowski (2001) stated that *Ch. palmyrensis* Bechyné, 1955 corresponds to the diagnosis of the subgenus *Paradiachalcoidea* and its aedeagus structure is very close to *Ch. silvanae* and *Ch. limbatella*.

This species includes two subspecies: the nominal subspecies and *Ch. palmyrensis assurensis*. In Turkey the subspecies *Ch. palmyrensis assurensis* is represented only (Ekiz et al. 2013, Özdikmen 2014, Özdikmen et al. 2014).

Chrysolina palmyrensis palmyrensis Bechyné, 1955

Chrysomela rufomarginata: Baly, 1879: 191 [homonym, nec Suffrian, 1851: 65]
Chrysomela rufomarginata: Marseul, 1887: 127 [homonym, nec Suffrian, 1851: 65]
Chrysolina palmyrensis palmyrensis: Bechyné, 1955: 350
Chrysolina palmyrensis palmyrensis: Bieńkowski, 2001: 127
Chrysolina palmyrensis palmyrensis: Kippenberg, 2010: 412

This subspecies is distributed in Israel, Lebanon and Syria. *Ch. palmyrensis* was originally described by Bechyné (1955) from Palmyra in Syria, not Lebanon, [holotype in NMB (Naturhistorische Museum Basel (collection G. Frey), Basel, Switzerland)]. It was reported by Bechyné (1955) from Israel (Kallia env., Jericho, Jerusalem env., Gvulot, Ein Rafa, Nahalal, Kinneret, Deganya, Sha'ar Hagolan, Ein Gev). It was also recorded by Baly (1879) and Marseul (1887) from Mesopotamia (?Syria), Chikatunov et al. (1999, 2004) from Israel: Nahal (Carmel Mt.) and Bieńkowski (2001) from Israel: Jericho env..

Chrysolina palmyrensis assurensis Bechyné, 1955

(Figs. 2, 3)

Chrysolina palmyrensis assurensis Bechyné, 1955: 350
Chrysolina palmyrensis: Gruev & Tomov, 1979: 263.
Chrysolina palmyrensis assurensis: Bieńkowski, 2001: 127.
Chrysolina palmyrensis: Aslan et al., 2003: 588.
Chrysolina palmyrensis assurensis: Kippenberg, 2010: 412.

This subspecies is distributed in Iran, Iraq and Turkey. *Ch. palmyrensis assurensis* was originally described by Bechyné (1955) from Iraq: Assur [holotype in NMB (Naturhistorische Museum Basel (collection G. Frey), Basel, Switzerland)]. It was also recorded by Bieńkowski (2001) from Iran (Mehran and Khuzestan) and Iraq (Erbil and Aski Kalak). *Ch. palmyrensis* was reported by Gruev & Tomov (1979) only from Gaziantep province in South-Eastern Anatolian Region of Turkey on the base of one male specimen dated 17.5.1963. This record was regarded as the subspecies *Ch. palmyrensis assurensis*, and it was repeated by some authors for Turkey (Bieńkowski, 2001; Aslan et al., 2003; Ekiz et al., 2013; Özdikmen, 2014; Özdikmen et al., 2014). The record of Gruev & Tomov (1979) from Turkey is discussed below.

Material examined. Turkey, Şanlıurfa province, Göbeklitepe, 770 m., 28.IV.2015, 2 ♀♀. These specimens were deposited at Nazife Tuatay Plant Protection Museum (NTM) (Turkey, Ankara).

Remarks. This subspecies is recorded for the second time for Turkey after Gruev & Tomov (1979). Thus it is the first record for Şanlıurfa province that is located in Southern part of Turkey in North of Syria. Body length and width of the present female specimens changes 6.5-6.6 mm and 4.5-4.6 mm respectively. Bechyne (1955) characterized the females having a feeble furrow beneath of the first tarsomere of the hind tarsi only. According to Warchałowski (2010), in females of *Ch. palmyrensis* the underside of first tarsomere of mid and hind tarsi entirely is covered by short setae without a median nude stripe. However, the present female specimens have a clear median nude stripe underside of first tarsomere of mid and hind tarsi (Fig. 2). Anyway, *Chrysolina palmyrensis assurensis* differs from nominal subspecies by relatively smaller body (6 mm) and relatively stronger and deeper punctures of elytra according to Bechyne (1955). In connection with this, the present female specimens can be belonging to a new subspecies of *Chrysolina palmyrensis*. However, we avoid to describe a new taxon only based on 2 females now. We should study and compare material too, and make it evident.

A key for the members of *Chrysolina* (*Paradiachalcoidea*) in the Palaearctic region

1. Red lateral stripe of elytra encroach partly on anterior margin; red bordering of elytra rather broad; rows of primary punctures on elytra distinctly geminate, dense, intervals very finely and sparsely punctate; lateral impressions on pronotum feeble..2
-. Red lateral stripe of elytra does not encroach on anterior margin; red bordering of elytra rather narrow; rows of primary punctures on elytra almost equidistant; lateral impressions on pronotum stronger..3

2. First antennal segment reddish apically; red lateral stripe of elytra encroach partly on anterior margin, reaching almost to scutellum...........*Ch. dohrnii dohrnii*
-. Antennae entirely black; red lateral stripe of elytra encroach partly on anterior margin, but not reaching to scutellum......................................*Ch. dohrnii peyroni*

3. Body relatively smaller; elytra with relatively stronger punctures........................
....*Ch. palmyrensis assurensis*
-. Larger and feebly punctured...................................*Ch. palmyrensis palmyrensis*

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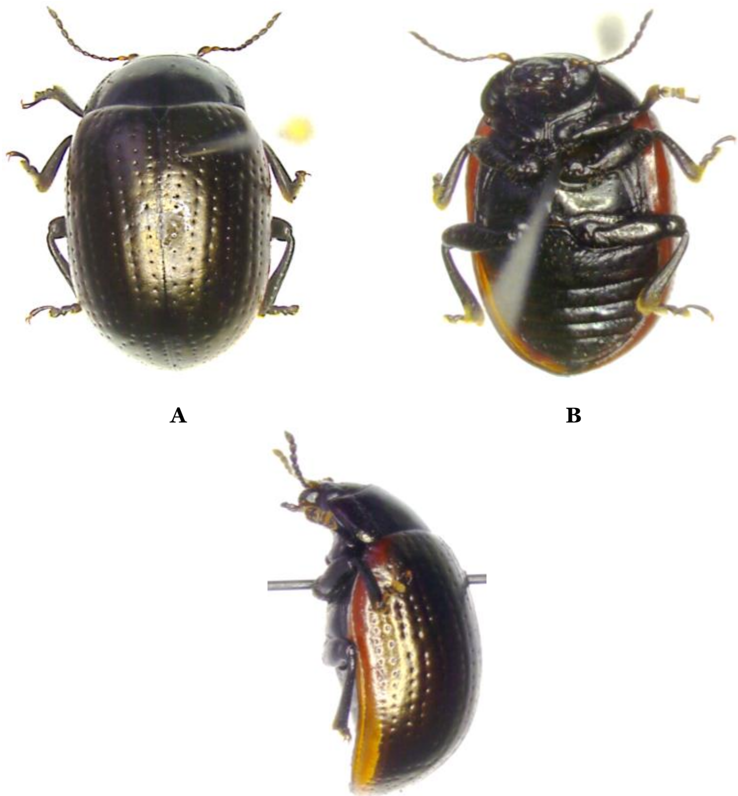
Figure 1. *Chrysolina dohrnii* (ex. coll. H. Kippenberg).

Figure 2. Median nude stripe underside of first tarsomere of hind tarsi of *Chrysolina palmyrensis* from Şanlıurfa province (♀).



A B

C

Figure 3. *Chrysolina palmyrensis* from Turkey (♀): **A.** Dorsal view, **B.** Ventral view, **C.** Lateral view.

A NEW SPECIES OF THE GENUS *ZODARION* WALCKENAER, 1833 FROM TURKEY (ARANEAE: ZODARIIDAE)

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[Akpınar, A. 2016. A new species of the genus *Zodarion* Walckenaer, 1833 from Turkey (Araneae: Zodariidae). Munis Entomology & Zoology, 11 (2): 390-392**]**

ABSTRACT: *Zodarion varoli* sp. nov. belonging to Zodaridae family, from Manisa (Turgutlu, Dağmarmara, Turkey) is described. Diagnostic features, ecological notes and distribution of this species are given. The new species is compared with similar species within the genus.

KEY WORDS: New species, Manisa, Turkey, *Zodarion varoli*, Zodaridae

The Zodaridae family of Turkey is still poorly known. Although the genus *Zodarion* Walckenaer, 1833 appears to be very rich in species in the Mediterranean region, in our country it is represented by only four genera and 19 species (Bayram et al., 2014). The most important study for this genus in Turkey was carried out by Bosmans. Bosmans (2009) reported 10 species from different areas in Turkey. This paper provides the description of one new species belonging to the family Zodariidae.

MATERIAL AND METHODS

The materials collected from Manisa province, Turgutlu district, in the Dağmarmara area of Turkey by using the pitfall trap method. Traps consisted of 200 ml cups buried in the soil in such a away that the lip of the trap would be at ground level. They were half filled with mixture of ethylene glycol and water at 1:1 ratio (Anlaş et al., 2009). Collected material was deposited in the University of Gaziantep, Zoology Museum (GAUZM, Department of Biology, Gaziantep, Turkey). Photos of sexual character were taken with Nikon Coolpix PBX6100 to an Olympus SZX12 microscope. All measurements are mm.

Specimens identified according to Bosman (2009) and Nentwig (2014).

RESULTS

Family Zodaridae Thorell, 1881
Genus *Zodarion* Walckenaer, 1833

Zodarion varoli sp. nov.

Material: Holotype; 1 ♂, (Fig. 1A). Turkey, Manisa province, Turgutlu district, Dağmarmara area, Pine forest, 13.08.2003, 930 m, 38° 22' 49" N 27° 52' 12" E, leg. Sinan Anlaş. Paratype 2 ♂♂, the same collection data as holotype. 5 subadults, the same collection data as holotype.

Diagnosis: Tibial apophysis was not curved and have a small protrusion at the head. Embolus elongated, pointed at the tip. Median apophysis large, with slender but shaped halfmoon and curved.

Colour: Prosoma brown reticulated with dark brown and annulated at the sides. Ocular area light brown, cleared. Legs whitish, Femur I and II black, not patterned. Opisthosoma black with small white spot.

Measurements (2 males): Total length 3.7 mm; prosoma 1.7 mm long, 1.2 mm wide. Leg measurement as in Table 1.

Palp (Figs. 1B, C): Tibial apophysis cylindrical, with small protrusion at the head. Embolus elongated, extending to terminal apophysis. Terminal apophysis hook shaped. Median apophysis is unclear and wavy in appearance. Sperm ducts curved, extending to the middle of cymbium.

Distribution: Turkey (Manisa).

Ecology: This species was collected from a pine forest area [*Pinus brutia* Ten. and *P. nigra* (Arnold)] are the most common plant species in the biotopes along with *Cistus laurifolius* L. and *Polypodium* sp.

Etymology: The new species name is dedicated to the teacher of the author, İsmail Varol (Turkey).

DISCUSSION

Zodarion varoli sp. nov. is very closely related to *Z. korgei* Wunderlich, 1980 from Turkey (Bosmans, 2009). *Z. varoli* sp. nov. has not curved tibial apophysis but Z. *korgei* has curved tibial apophysis. In addition, *Z. varoli* sp. nov. similar to *Z. korgei* with broad tegulum. Median apophysis, in *Z. varoli* sp. nov., slender, curved and shaped halfmoon but, *Z. korgei* has slender gradually narrowing distal part (Figs. 1B, C).

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Table 1. Leg measurements of *Zodarion varoli* sp. nov. (holotype).

Legs	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1,6	0,6	1,6	1,7	1,2
II	1,3	0,5	1,1	1,7	1,1
III	1,2	0,5	1,2	1,5	0,9
IV	1,9	0,7	1,9	1,5	1,3
palp	2,3	1,0	1,5	-	2,0

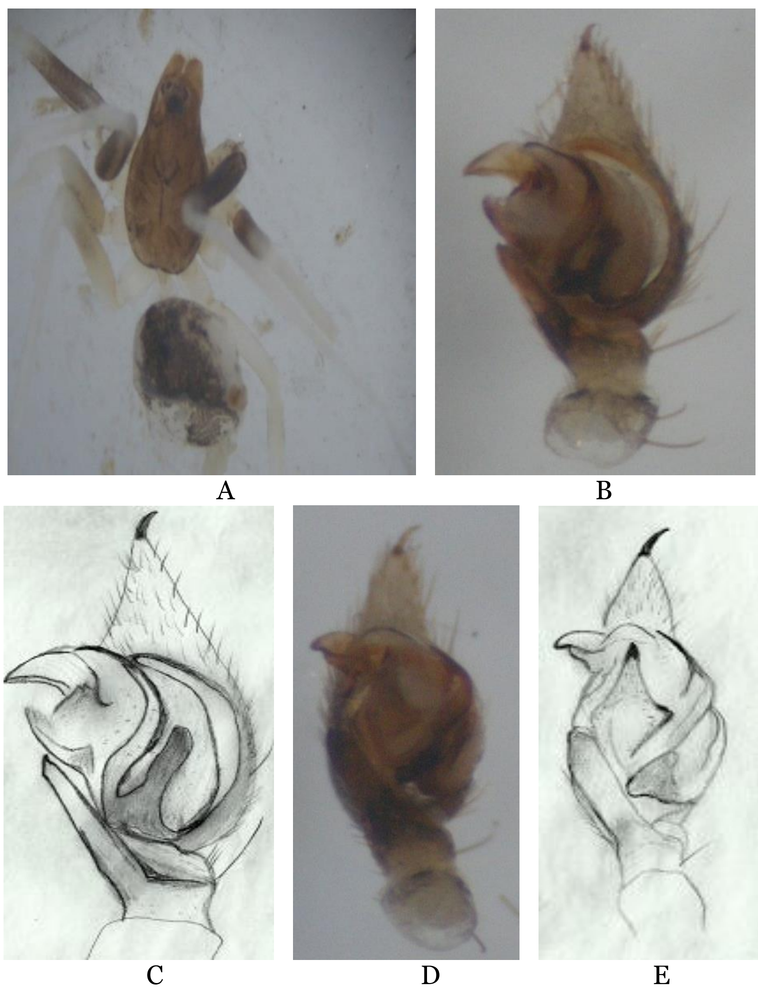

Figure 1. *Zodarion varoli* sp. nov. A. Dorsal view, B, C. palp retrolateral view, D, E. palp ventral view.

SPECIES OF *PSEUDOTORYMUS* MASI IN TURKEY (HYMENOPTERA: TORYMIDAE: MICRODONTOMERINI)

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[Doğanlar, M. 2016. Species of *Pseudotorymus* Masi in Turkey (Hymenoptera: Torymidae: Microdontomerini). Munis Entomology & Zoology, 11 (2): 393-433**]**

ABSTRACT: In Turkey 21 species of *Pseudotorymus* Masi (Hymenoptera: Torymidae), were found in several parts of Turkey. The species are: *P. sapphyrinus* (Fonscolombe, 1832), *P. verbasci* Erdös, 1955, *P. leguminus* Ruschka, 1923, *P. papaveris* (Thomson, 1876), *P. pannonicus* (Mayr, 1874), *P. bollinensis* Askew, 2002 and, 15 of them as new species: *P. adananensis* sp. nov., *P. nigdenensis* sp. nov., *P. celikhanensis* sp. nov., *P. lutfiyeae* sp. nov., *P. haliti* sp. nov., *P. keçikuyusunensis* sp. nov., *P. aratdaginensis* sp. nov., *P. dogubayezitensis* sp. nov., *P. samsatensis* sp. nov., *P. ispirlii* sp. nov., *P. aladagensis* sp. nov., *P. bedirlinensis* sp. nov., *P. ocaklii* sp. nov., *P. sivasensis* sp. nov., *P. pazarcikensis* sp. nov.. Type locality of *Pseudotorymus juniperi* Zerova, 2007 was given by following Zerova et al. (2012). The Turkish species were described and diagnostic characters were illustrasted, and an identification key for the 58 species of *Pseudotorymus* was provided.

KEY WORDS: *Pseudotorymus* spp., Torymidae, key, Turkey

The genus *Pseudotorymus* was provided as objective replacment name for *Holaspis* Mayr nec Gray, 1863 by Masi (1921) in having type species *Torymus militaris* Boheman (desig. by Ashmead, 1904: 242, 377). Grissell (1995) recorded *Pseudotorymus* as valid genus in the tribe Microdontomerini (Torymidae), and gave its synonyms, such as: *Senegalella* Risbec 1951, *Thiesia* Risbec 1951. Doğanlar (2016) studied hypopigia of some species of *Pseudotorymus* from Turkey. Up to now, fifty-one species of *Pseudotorymus* are distributed worldwide, 38 of them were present in the Palaearctic (28 spp. from Europe, 5 spp. from the Middle East, 5 spp. from other regions)(Erdös, 1955; Askew, 2002; Askew et.al, 2006; Vikberg & Askew, 2010; Noyes, 2015) 9 spp. from Afrotropical, Central Africa and North Africa (Risbec, 1951); 10 species from Oriental Region (Masi, 1921; Narendran, 1994; Narendran, 2006a,b); a single species from the Nearctic Region (Ashmead, 1890). Eleven species have been recorded from Ukraine and 10 spp. from adjacent countries (Zerova & Seryogina, 1999) and only tree species have been recorded from Turkey, such as: *Pseudotorymus pannonicus* (Mayr), *P. militaris* (Boheman) (Doğanlar, 1984; Öncüer, 1991; Grissell, 1995), and *Pseudotorymus sapphyrinus* (Fonscolombe) (Gencer, 2003).

The species have a broad host association including Bruchinae and Curculioninae (Coleoptera: Curculionidae), Cecidomyiidae (Diptera), Eurytomidae and Cynipidae (Hymenoptera) and Pyralidae (Lepidoptera) (Narendran, 1994; Grissell, 1995; Zerova & Seryogina, 1999).

In this work morphological characters of the *Pseudotorymus* species from Turkey, were studied and the new species were described. By aids of some morphological characters a new identification key was provided for the most species of *Pseudotorymus* of the world , except several regions of Africa.

MATERIAL AND METHOD

This study is based upon examination and identification of the specimens collected from several parts of Turkey. The examined specimens and types were deposited in Insect Museum of Biolocical Control Station, Yüreğir, Adana, Turkey (IMBC). 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 for further morphological studies. The species were identified by following the keys of Zerova & Seryogina (1999), and a new identification key for the most species of *Pseudotorymus* was provided by using key characters given by Ruschka (1923), Hoffmeyer (1930, 1931), Szelenyi (1973), Narendran (1994), Zerova & Seryogina (1999), Xiao (2007) and from the descriptions of species given by their authors (Mayr ,1874; Ashmead, 1904; Zerova & Seryogina, 1992; Askew, 2002; Askew et al., 2006; Narendran, 2006a,b). Wings and antennae of some Holotypes and paratypes were slide-mounted in Canada balsam. Photographs of diagnostic characters of the genera 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 Gibson (1997). Abbreviations used in the key and descriptions are: OOL= shorter distance between ocello-ocular line POL= distance between posterior ocelli, F1-7 = funicular segments.

Acronyms of the museum:

IMBC: Insect Museum of Biolocical Control Station, Yüreğir, Adana, Turkey.

ZIKU: Schmalhausen Institute of Zoology(National Academy of Sciences of Ukraine).

RESULTS AND DISCUSSION

Pseudotorymus Masi, 1921

Holaspis Mayr, 1874:83 Type species *Torymus militaris* Boheman (desig. by Ashmead 1904: 242, 377). (Preocc. by Gray, 1863 (Reptilia).

Pseudotorymus Masi, 1921: 235. Objective replacement name for *Holaspis* Mayr nec Gray, 1863.

The synonym list, distribution and host records were given by Grissell (1995).

Diagnostic characters: Marginal vein long 3-7x length of postmarginal vein and at least 6x length of stigmal vein; occipital carina present its lateral edges extending at least in line with dorsum of hypostomal foreman; antenna with 1 anellus, though exceptionally small specimens of a population may sometimes have 2 anelli; hind femur setae changes from simple to angle and to tooth; in females, metaterga 2 and 3 are at most somewhat emerginate, (Grissell 1995).

Key to most species of *Pseudotorymus* Masi

1- Ovipositor at least slightly longer than the length of the body..2
-- Ovipositor almost equal to the length of the body or shoter..3

2- Ovipositor much longer than the length of the body, the latter about 2.5x longer than gaster; hind tibia without thooth; propodeum smooth, rugulose on sides, with shallow pits on anterior margin; mv Forewing 5x pmv; stv more than 3/5 pmv; Antenna with scape a

little shorter than 3x F1, funicular segments distinctly longer than wide; POL a little shorter than 3x OOL; scape, tibiae and tarsi yellow............................*P. salamensis* Narendran, 1994
-- Ovipositor slightly longer than the length of the body; wings hyaline; scape rufous, flagellum black; apex of femora, tibiae and tarsi pale yellow. Reared from gall in the buds of *Mesembryanthemum* sp.......................................*P. mesembryanthemumi* (Cameron, 1904)

3- Ovipositor almost equal (0.95-1x) to the length of the body (Fig. 1a); hind femora with distinct tooth at apex (Figs. 1b)...4
-- Ovipositor at most equal to total length of the gaster and mesosoma; hind femora with or without tooth..5

4- Hind tibiae metallic blue-green (Fig. 1b). Ovipositor (Fig. 1a) almost equal to the length of the body, pale brown. Body blue-violet. Propodeum with fine carina, finely reticulated; callus hairy; antenna (Fig. 1c). with scape and pedicel metallic, pedicel as long as anellus plus F1, flagellum filiform; funicular segments F1-F2 slightly longer than wide, F3-F5 quadrate F6-F7 distinctly transverse, slightly widening towards tip, F7 1.6x as wide as F1;club almost twice as long as wide. Forewing (Fig. 1f). with marginal vein 3.33- 3.6x as long as postmarginal vein, and 7.2-7.5x stigmal vein; postmarginal vein 2.25- 1.4x as long as stigmal vein. Ovipositor index: 3.1................................*P. sapphyrinus* (Fonscolombe, 1832)
(Forewing with dusky discal ciliae, mesosomaic dorsum very finely, densely punctured, entirely dull..*P. sapphyrinus mongolicus* Szelenyi, 1973)
-- Tibiae and tarsi almost white; Ovipositor almost equal (0.95-1x) to the length of the body; propodeum without carina; scape yellow; scape as long as first 3 funicle segments, pedicel as long as F1, funicular segments almost quadrate, towards apex slightly broader and shorter; ovipositor brown, extrem tip white..*P. africanus* Crosby, 1909

5- Ovipositor sheath equal 2.6x gaster length; Propodeum with median carina; hind coxae dorsally bare; marginal vein less than 4x stigmal vein...........*P. carinatus* Xiao & Zhao, 2007
-- Ovipositor sheath at most equal 2x gaster length...6

6- Ovipositor sheath almost equal 2x gaster length (Fig. 2a)..7
-- Ovipositor sheath at most equal 1.6x gaster length (Fig. 3a)...10

7- Fore and mid tibiae dark, with yellowish apices, hind tibia and tarsi of all legs yellow; Propodeum with indistinct reticulations, without carina; Ovipositor equal to total length of the gaster and mesosoma; Pedicel 1.5x longer than wide; club 2x as long as width; antennae with scape and pedicel yellow; F1-F3 quadrate, other flagellar segments slightly transverse; hind femora with very small dentations, forewing with marginal vein 2.25x as long as postmarginal vein, and 6.75x stigmal vein; postmarginal vein 3.0x as long as stigmal vein. Ovipositor index: 2.86..*P. rosarum* (Zerova & Seryogina, 1995)
-- Legs with tibiae and tarsi yellow; hind femora (Fig. 2b) without tooth...............................8

8- Forewing (Fig. 2f) with marginal vein 2.93x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. POL 3.75x OOL. Antenna (Fig. 2c) with scape, pedicel, tibiae and tarsi yellow; scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.3x as long as width; anellus 2.6x as wide as long; funicular segments slightly transverse, with dense longitudinal sensillae (4-7); gradually widening apically, F7 1.2x as wide as F1; F1-F5 in same width and length, slightly transverse; 1.15-1.2x as wide as long; F6 1.54x, F7 1.58x as wide as long; club 1.63x as long as wide; Ovi. index: 3.15...*P. adananensis* sp. nov.
-- Forewing with marginal vein at least 4.23x as long as postmarginal vein...........................9

9- Forewing with marginal vein 4.8x as long as postmarginal vein, and 6.2x stigmal vein; postmarginal vein 1.3x as long as stigmal vein. Antenna with pedicel as long as wide; F1 transverse; F2 subquadrate; F3-F7 transverse; POL 3x OOL; scape, ventral half of pedicel, tibiae and tarsi yellow, wings hyaline;. Propodeum with weak median carina. Ovi. index 3.1. Length 2mm; O.l.1.82 mm..........................*P. ephedrae* Narendran & Prabha Sharma, 2006
-- Forewing with marginal vein 4.23x as long as postmarginal vein, and 6.9x stigmal vein; postmarginal vein 1.6x as long as stigmal vein. scape, pedicel, tibiae and tarsi yellow POL

3.33x OOL. Antenna (Fig. 1 of Narendran, 2006a) with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.5x as long as width; anellus 2x as wide as long; funicular segments slightly transverse, with dense longitudinal sensillae (4-7); gradually widening apically, F7 1.39x as wide as F1; F1-F5 in same width and length, slightly transverse; 1.12-1.19x as wide as long; F6 1.33x, F7 1.6x as wide as long; club 1.54x as long as wide; Propodeum with weak median carina ; hind coxa with a few widely spaced dorsal sensillae; Ovi. index 2.95. Length 4.51 mm.........................*P. annamalicus* Narendran, 2006

10- Ovipositor at most equal to total length of the gaster and mesosoma..............................11
-- Ovipositor slightly longer than gaster or shorter...16

11- Ovipositor equal to total length of gaster plus propodeum...12
-- Ovipositor at least equal to total length of the gaster and half of mesosoma; ovipositor equal 1.5x to the length of the gaster...14

12- Hind femora indistinct tooth at the apex; Ovipositor equal approximately to the length of the gaster with the propodeum. body blue-violet. Parapsidal grove shallow. From gall of *Wachtliella stachidis* on *Stachys* sp. 1,8-2 mm (Fig. 32, 1-3 of Zerova & Seryogina, 1999)......
....*P. stachidis* (Mayr, 1874)
-- Hind femora with distinct tooth...13

13- Ovipositor sheat about 1.25 as long as gaster; Propodeum without submedian carinae; Parapsidal grove shallow; scape blue?, body is blue-green with the the violet reflexion. forewing with marginal vein 4.0x as long as postmarginal vein, and 8x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. From gall of gall midges and sawflies on *Salix* spp. 2,8 - 3 mm. O.l. 2.0 mm...*P. salicis* Ruschka, 1923
-- Ovipositor almost equal to length of gaster plus propodeum; body, including tegulae green; hypopygium nearly reaches apex of gaster; forewing basal cell closed below in distal half and with a row of hairs on upper surface behind marginal vein. Parapsidal grove deep. From several larvae of *Apion* and *Bruchidius* on the bean. 1,6- 2,2 mm..................................
....*P. arvernicus* (Walker, 1833) (*P. dubius* (Nees) (= *apionis* Mayr)

14- Hind femora (Fig. 3b) without distinct tooth at the apex, 4.37x as long as width. Ovipositor (Fig. 3 a) equal to total length of the gaster and mesonotum; mesosoma (Fig. 3d) finely reticulated; propodeum (Fig. 3e) without median carina, smooth, spiracle touching metanotum ; antenna (Fig. 3 c) with scape equal to pedicel plus anellus and F1+F2 plus 1/3 of F3 combined; pedicel 1.7x longer than wide; anellus 2x as wide as long; funicular segments with one row of sparse setae (2-6), funicular segments slightly transverse, F1 1.38x; F2-F4 1.33x, F5-F6 1.55x; F7 1.9x as wide as long; F7 1.36x as wide as F1; club slightly wider than F7, 2.1x as long as wide; Body blue with greenish reflexion, antenna with scape and pedicel concolorous with body, flagellum brown, legs concolorous with body, except tips of tibiae and basal 3 segments of tarsi yellow; forewing (Fig. 3f) with marginal vein 2.94x as long as postmarginal vein, and 7.0x stigmal vein; postmarginal vein 2.43x as long as stigmal vein. Ovipositor index: 2.27..*P. nigdenensis* sp. nov.
-- Hind femora with distinct tooth at the apex. coxae and femora dark, tibiae pale yellow Ovipositor equal to total length of the gaster and half of mesosoma....................................15

15- Funicular segments with two rows of sensillae; mesosoma minutely reticulated................
....*P. regalis* Askew, 2006
-- Funicular segments with one row of sensillae; mesosoma rugose granulate. Propodeum without median carina, smooth, sidely faintly rugulose; hind coxae dorsally hairy; Forewing with marginal vein more than 6x stigmal vein, a little more than 3x postmarginal vein, postmarginal vein 2.5x as long as stigmal vein; antenna with scape equal to pedicel plus anellus and F1+F2 plus 1/2 of F3 combined; pedicel 1.2x longer than wide; anellus 2x as wide as long; F1-F3 slightly transverse,1.25x as wide as long; F4-F5 1.4x, F6 1.6x, F7 1.86x as wide as long; club almost 1.6x as long as wide..............*P. harithavarnus* Narendran, 1994

16- Ovipositor slightly longer than gaster or somewhat longer. If ovipositor very slightly longer than gaster, then hind femora with deep emargination after the tooth......................17

-- Ovipositor is almost equal to the length of the gaster, or shorter......................................20

17- Parapsidal groves shallow; body brillant green; femora green, tibiae black, tarsi yellow; ovipositor slightly longer than gaster...*P. capreae* (Walker, 1833)
-- Parapsidal groves deep; body green, by places are dark-blueish or bronze; ovipositor at most 1.1x longer than gaster (Fig. 5a)..18

18- Hind femora without tooth; funicular segments transverse; POL 2.5X OOL; tegulae brown; scape, tibiae and tarsi yellow, pedicel and flagellum yellowish brown, wings hyaline...*P. amuthae* Narendran, 1994
-- Hind femora with indistinct tooth...19

19- Tegulae yellow with the black spot; body (Fig. 5a) dark-blue with coppery reflection, base of the gaster dark-blue; antenna (Fig. 5c) with scape equal to pedicel plus first 3 flagellar segments; pedicel 1.5x longer than wide; anellus 2x wider than long; funicular segments with one row of setea, funicular segments transverse, filiform, F7 as wide as F1; club 1.62x as long as wide; mesosoma (Fig. 5d) finely wrinkled with some reticulations, with parapsidal groove deep; propodeum (Fig. 5e) without carina, with longitudinal reticulation medially. Forewing (Fig. 5f) with marginal vein 3.1x as long as postmarginal vein, and 5.6x stigmal vein; postmarginal vein 1.8-2x as long as stigmal vein. Ovipositor index: 2.16...*P. sanguinalis* Erdös, 1957
-- Tegulae dark-blue; body green, by places dark-blue, 1-2 segments of the gaster cupery-red; mesosoma thiny wrinkled, propodeum with two very thin complete keel in the middle; pedicel longer than wide. 2,8 -3 mm. O.l 1.6 mm...
........................*P. frontinus* (Walker, 1851) (=*frontalis* (Walker, 1851 = *carinata* Mayr, 1874)

20- Ovipositor at least 0.66x length of gaster (Fig. 4a)...21
-- Ovipositor at most 0.55x length of gaster (Figs. 18-20a)..49

21- Hind femora without tooth or with indistinct tooth...22
-- Hind femora with distinct tooth (Figs. 11-20b)...34

22- Hind femora with indistinct tooth (Figs. 4-5b)..23
-- Hind femora without tooth (Figs. 6-7b)..27

23- Ovipositor at most equal to 0.75x lengths of the gaster..24
-- Ovipositor at least 0.85x length of the gaster..25

24- Ovipositor (Fig. 4a) equal to 0.7x lengths of the gaster; Antenna (Fig. 4c) with scape equal to pedicel plus anellus and F1+F2; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments with F7 1.12x as wide as F1; club 1.6x as long as wide; mesonotum (Fig. 4d) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 4e) without carina, medially smooth, laterally with fine reticulation. forewing (Fig. 4f) with marginal vein 3.2x as long as postmarginal vein, and 4.4x stigmal vein. Ovipositor index: 1.1.........*P. celikhanensis* sp. nov.
-- Ovipositor (Fig. 31, 4 of Zerova & Seryogina, 1999) equal at least 0.75x length of the gaster; Antenna with scape equal to pedicel plus anellus and F1+F2, and 1/2 F3 combined; pedicel 1.9x longer than wide; anellus about 2.17x wider than long; funicular segments with F7 1.5x as wide as F1; club 1.73x as long as wide. Forewing with marginal vein 4.0x as long as postmarginal vein, and 6.4x stigmal vein; postmarginal vein 1.6x as long as stigmal vein. Body golden- green. Mesosoma in basal half with deep punctations and broad reticulations, scutellum transversely wrinkled; In gall of gall midges on *Salvia pratensis* L. 2-2,5 mm (Fig. 31, 4-6 of Zerova & Seryogina, 1999)..*P. salviae* Ruschka, 1923

25- Ovipositor 0.85x length of the gaster (O.l. 1.65 mm); Antenna with 1-3 funicular segments almost quadrate, remaining transverse; Mesonotum wholy transversely wrinkled; deep punctations present only on scutellum; postmarginalvein 1.6x stigmal vein, stigma small, with short uncus; area between postmarginal vein and stigma more than half width of

stigma. In gall of gall midges from *Dasyneura* spp. on many forms of bean. 3 mm (Fig. 31, 1-3 of Zerova & Seryogina, 1999)..*P. medicaginis* (Mayr, 1874)
-- Ovipositor (Fig. 5a) slightly shorter (0.96x) than the gaster...26

26- Antenna (Fig. 5c) with scape equal to pedicel plus anellus and F1 and half of F2; pedicel 1.25x longer than wide; anellus 2x wider than long; F7 as wide as F1; club 1.5x as long as wide; propodeum (Fig. 5e) without carina, having fine longitudinal reticulation. Forewing (Fig. 5f) with marginal vein 6.6x stigmal vein; postmarginal vein 2.4x as long as stigmal vein. Ovipositor index: 1.7..*P. lutfiyeae* sp. nov.
-- Antenna with scape equal to pedicel plus anellus and F1+F2; pedicel 1.4x longer than wide; anellus 2.5x wider than long; F7 1.83x as wide as F1; club 1.7x as long as wide; body bluish-green. propodeum with submedian carinae. Forewing with marginal vein 3.54x stigmal vein; postmarginal vein 1.4x as long as stigmal vein; 2 mm; 1,5 -1,9 mm (Fig. 33, 1-3 of Zerova & Seryogina, 1999)..*P. salicinus* Erdös, 1955

27- Ovipositor at most 0.70x length of gaster (Figs. 6a, 8a). Anellus 2x wider than long..28
-- Ovipositor at least 0.75x length of gaster (Fig. 31, 4 of Zerova & Seryogina, 1999)............30

28- Antenna (Fig. 8c) with scape equal to pedicel plus anellus and F1+F2; pedicel 1.6x longer than wide; funicular segments with one row of dense (7-9) sensillae, funicular segments distinctly transverse, slightly widening towards tip, F1 slightly transverse 1.14x as wide as long, following ones almost 1.6-2.0x as wide as long , F7 1.33x as wide as F1; club broad, 1.64x as long as wide, and about 1.47x as wide as F7; mesonotum (Fig. 8d) with transversely wrinkled; with parapsidal groove deep; propodeum (Fig. 8e) without carina, reticulated. Forewing (Fig. 8f) with marginal vein 3.0x as long as postmarginal vein, and 4.7x stigmal vein; postmarginal vein 2.25x as long as stigmal vein, stigma broad, with long uncus. Ovipositor index: 1.33...*P. keçikuyusunensis* sp. nov.
-- Antenna (Fig. 6c) with scape equal to pedicel plus anellus and F1+F3..............................29

29- Ovipositor (Fig. 6a) 0.63x length of gaster; Antenna (Fig. 6c) with pedicel 1.33x longer than wide; funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse, F1 short, almost half length of F2, 3x as wide as long, F2 2.3x; F3-F5 2.3x; F6-F7 2.86x as wide as long, slightly widening towards tip, F7 2.86x as wide as F1; club broad, 1.26x as long as wide, and about 1.5x as wide as F7; mesonotum and scutellum (Fig. 6d) with fine reticulation; with parapsidal groove deep. Forewing (Fig. 6f) with marginal vein 3.36x as long as postmarginal vein; postmarginal vein 1.83x as long as stigmal vein, stigmal vein broad, long, stigma small, with long uncus. Hind femora (Fig. 6b) 3.53x as long as width. Ovipositor index: 1.5...*P. haliti* sp. nov.
-- Ovipositor 0.70x length of gaster (Figs. 7-8a). Antenna (Fig. 7c) with pedicel 1.5x longer than wide; funicular segments with one row of sparce (2-4) sensillae, funicular segments slightly transverse, slightly widening towards tip; F1 2x as wide as long, following ones almost 0.6-0.7x as wide as long; , F7 1.2x as wide as F1, club broad, 1.5x as long as wide, and about 1.3x as wide as F7. mesonotum (Fig. 7d) with coarsely wrinkled, between them with deep pits; with parapsidal groove shallow. Forewing (Fig. 7f) with marginal vein 4.0x as long as postmarginal vein; postmarginal vein 1.6x as long as stigmal vein, stigmal vein broad, short: stigma broad, with long uncus. Ovipositor index:1.4. In gall of gall midges, *Asphondilia verbasci* on *Verbascum* spp. 2.7mm (Fig. 35, 1-3 of Zerova & Seryogina, 1999)...*P. verbasci* Erdös, 1955

30- Ovipositor (Fig. 9a) equal length of the gaster...31
-- Ovipositor at most 0.8x length of the gaster..32

31- Body (Fig. 9a) blue-green, antennae with scape and pedicel metallic blue, flagellum brown; legs concolorous with body, except tibiae, and tarsi yellow, except last segment of tarsi black (Fig. 9b); wing hyaline, veins yellow. Antenna (Fig. 9c) with scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.4x longer than wide; anellus about 2x wider than long; funicular segments with one row of sparse sensillae (3-4), funicular segments distinctly transverse, slightly widening towards tip, F7 1.1-1.17x as wide as F1;;

club slightly wider than F7, 1.9x as long as wide; mesonotum (Fig. 11d) with distinct fine reticulation. Forewing (Fig. 9f) with marginal vein 3.1x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 1.4x as long as stigmal vein. Hind femora (Fig. 9b) 5.1x as long as width. Ovipositor index: 2.0..*P. horasanensis* sp. nov.
-- Body (Fig. 1 of Zerova & Seryogina, 2007) with head and dorsal part of thorax bluish-green, mesepimeron with bluish-green round spot, rest of thorax, legs and abdomen yellow, eyes and ocelli are dark brown; scape and flagellum brown,wings with distinct dark cloud under stigmal wein ovipositor sheats brown. Antenna (Fig. 3 of Zerova & Seryogina, 2007) with scape equal to pedicel plus anellus and F1+1/3 F2 combined; pedicel 2x longer than wide; anellus slightly wider than long (5/4); funicular segments F1-F3 longer than width; F4-F5 quadrate; F6-F7 slightly wider than long (12/9), flagellum distintly widening towards tip, F7 2.2x as wide as F1; club slightly wider than F7, 2.15x as long as wide. Forewing (Fig. 5 of Zerova & Seryogina, 2007) with marginal vein 2.75x as long as postmarginal vein, and 5.13x stigmal vein; postmarginal vein 1.9x as long as stigmal vein. Hind femora (Fig. 4 of Zerova & Seryogina, 2007) 4.0x as long as width.. Ovipositor index: 1.67...............................
....*P. juniperi* Zerova, 2007

32- Postmarginal vein (Fig. 32, 6 of Zerova & Seryogina, 1999) slightly longer than stigmal vein; gaster as long as mesosoma; Antenna (Fig. 32, 7 of Zerova & Seryogina, 1999) with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.5x as long as width; anellus 2.8x wider than long; funicular segments distinctly transverse and distinctly widening towards tip, F7 1.9x as wide as F1; club slightly wider than F7, 1.86x as long as wide; propodeum (Fig. 32, 4 of Zerova & Seryogina , 1999) basaly with two incomplete keels; malar space shorter than half of eye height. Hind femora 4.4x as long as width. Ovipositor index: 1.53. 2 mm...*P. cupreus* Erdös, 1955
-- Postmarginal vein at least 1.7x stigmal vein; Antenna with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined...33

33- Postmarginal vein (Fig. 35, 6 of Zerova & Serogina, 1999) 1.7x stigmal vein; Ovipositor equal to 0.8x lengths of the gaster (Fig. 35, 4 of Zerova & Serogina, 1999); Antenna with pedicel almost quadrate; anellus 1.8x wider than long; club 1.54x as long as wide; Body emerald-vividly green. Mesonotum grainy-cellular, by places tuberous. Forewing with marginal vein 3.5x as long as postmarginal vein, and 6.5x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Hind femora 3.9x as long as width. Ovipositor index: 1.1. Gall of gall-midges from *Dasyneura* spp. on *Euphorbia* spp. 2,7-3 mm..
....*P. euphorbiae* Zerova & Seryogina, 1999
-- Postmarginal (Fig. 10f) vein 2.25x as long as stigmal vein. Antenna (Fig. 10c) with pedicel 1.4x longer than wide; anellus 2.4x wider than long; club 2.3x as long as wide; mesonotum (Fig. 10d) with distinct fine reticulation; parapsidal groove deep; propodeum (Fig. 10e) without carina, laterally with fine reticulation. Forewing (Fig. 10f) with marginal vein 2.7x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.25x as long as stigmal vein. Hind femora (Fig. 10b) 3.43x as long as width. Ovipositor index: 0.82..*P. dogubayezitensis* sp. nov.

34- Ovipositor 0.58x length of gaster; body blue-green scape green; flagellum 1.5x as broad as pedicellus, F1-F7 distinctly tranverse, clava longer than 3 proceeding segments combined. Propodeum reticulated, frequently incomplete keels; Ovipositor slightly longer than 1/2 abdomens (0.58x)...*P. hirsuticornis* Szelenyi, 1973
-- Ovipositor at most equal to length of gaster...35

35-- Ovipositor at most equal to 0.66x lengths of the gaster..36
-- Ovipositor at least 0.7x length of gaster...40

36- Ovipositor about 0. 6x length of the gaster..37
-- Ovipositor about 0. 65x length of the gaster...38

37- Forewing (Fig. 29, 2 of Zerova & Seryogina, 1999) with marginal vein 4.0x as long as postmarginal vein, and 7.4x stigmal vein; postmarginal vein 1.86x as long as stigmal vein. Antenna (Fig. 29, 2 of Zerova & Seryogina, 1999) with funicular segments slightly

transverse, except F1 quadrate, flagellum slightly widening towards tip, F7 1.38x as wide as F1; club 1.1x as wide as F7, 2x as long as wide; Hind femora (Fig. 29, 1 of Zerova & Seryogina, 1999) 4.0x as long as width. Panel of mesoscutum and scutellum finely transversely wrinkled; body blue-green. Ovipositor index: 1.0; 2-2,5 mm...*P. militaris* (Boheman, 1834) (= *parellinus* Boheman)
- Forewing (Fig. 34, 4-5 of Zerova & Seryogina, 1999) with marginal vein 3.0x as long as postmarginal vein, and 4.3x stigmal vein; postmarginal vein 1.43x as long as stigmal vein. Antenna (Fig. 34, 6 of Zerova & Seryogina, 1999) with funicular segments distinctly transverse, distinctly widening towards tip, F1-F2 1.4x, F7 1.83x as wide as long, and 1.83x as wide as F1; club 1.5x as long as wide. Propodeum reticulated, frequently with incomplete keels. Hind femora (Fig. 34, 7 of Zerova & Seryogina, 1999) 3.9x as long as width. Ovipositor index: 0.7. 2 mm..*P. semicarinatus* Erdös, 1955

38- Antenna (Fig. 11c) with scape yellow. Forewing (Fig. 11f) with marginal vein 3.0x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Antenna (Fig. 11c) with scape equal to pedicel plus anellus and F1-F2+1/3 F3; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments slightly transverse, slightly widening towards tip, F7 1.1x as wide as F1; club 1.6x as long as wide; mesonotum (Fig. 11d) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 11e) without carina, basally with fine incomplete keels, medially smooth. Hind femora (Fig. 11a) 3.6x as long as width. Ovipositor index: 0.9..*P. samsatensis* sp. nov.
-- Antenna with scape and pedicel green...39

39- Mesonotum roughly wrinkled, scutellum finely reticulated, at the apex smooth; propodeum basaly with two incomplete keels. Forewing (Fig. 34, 11 of Zerova & Seryogina, 1999) with marginal vein 3.72x as long as postmarginal vein, and 6.1x stigmal vein; postmarginal vein 1.5x as long as stigmal vein. Femora and tibiae green, tips of tibiae and tarsi yellow. Antenna with scape and pedicel green, flagellum dark brown, anellus and funicular segments quadrate. In gall of *Dasyneura* spp. on *Salix* spp. 2,3- 2,6 mm; ovipo. 1,6 -1.7 mm..*P. krygeri* Hoffmeyer, 1931
-- Mesonotum (Fig. 12d) broadly reticulated; with parapsidal groove shallow; propodeum (Fig. 12e) without carina, smooth, basally with 3 fovae. Forewing (Fig. 12f) with marginal vein 3.44x as long as postmarginal vein, and 6.2x stigmal vein; postmarginal vein 1.8x as long as stigmal vein, the latter short, stigma broad, without brown cloud. Body (Fig. 12a) including antennae blue-violet. Antenna (Fig. 12c) with scape slightly longer than pedicel plus anellus and F1+F2 combined; pedicel 1.3x longer than wide; anellus 2x wider than long; funicular segments distinctly transverse, F1 1.27x slightly widening towards tip, F7 1.1.6x as wide as long and as wide as F1; club 1.43x wider than F7, 1.65x as long as wide; hind femora (Fig. 12b) 4.0x as long as width. Ovipositor index: 0.94.............*P. leguminus* Ruschka, 1923

40- Propodeum reticulate, with longitudinally rugulose, frequently incomplete keels; Ovipositor shorter than gaster; funicular segments not enlarged gradually; malar space equal to or slightly longer than half of eye height; funicular segments with one row of sensilla..*P. reticulatus* Szelenyi, 1973
-- Propodeum smooth, or medially smooth, at most laterally with fine reticulation.............41

41- Ovipositor equal to 0.7x length of gaster. Sscape equal to pedicel plus anellus and F1-F2, and 1/3 F3 combined...42
-- Ovipositor equal to at least 0.78x lengths of the gaster...43

42- Ovipositor index: 1.2. Antenna (Fig. 13c) with scape yellow; funicular segments with one row of dense sensillae (4-9); pedicel 1.5x longer than wide; anellus 2.33x wider than long; funicular segments distinctly widening towards tip, F7 0.9x as wide as F1; club 1.4x as long as wide; mesonotum (Fig. 13d) distinctly wrinkled; with parapsidal groove deep; propodeum (Fig. 13e) medially smooth, laterally with fine reticulation. Forewing (Fig. 13f) with marginal vein 8.3x stigmal vein; postmarginal vein 2.3x as long as stigmal vein...*P. ispirlii* sp. nov.

-- Ovipositor index: 1.32. Antenna (Fig. 14c) with scape blue; funicular segments with one row of sparse sensillae (3-4). pedicel 1.22x longer than wide; anellus about 2x wider than long;, funicular segments slightly widening towards tip, F7 1.3x as wide as F1; club 1.35x as long as wide; mesonotum (Fig. 14d) finely wrinkled; parapsidal groove shallow; propodeum (Fig. 14e) smooth; forewing (Fig. 14f) with marginal vein 6.0x stigmal vein; postmarginal vein 1.8x as long as stigmal vein...*P. aladagensis* sp. nov.

43- Ovipositor 0.78x length of gaster; scape basaly yellow, apically metallic; Antenna (Fig. 15c) with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.9x longer than wide; anellus almos quadrate; funicular segments with one row of dense sensillae (4-9), funicular segments slightly transverse, slightly widening towards tip, F7 1.24x as wide as F1; club 1.17x wider than F7, 1.86x as long as wide, clava not quate as long as 3 preceeding segments combined; mesonotum and scutellum (Fig. 15d) with fine reticulation; parapsidal groove deep; propodeum (Fig. 15e) with very fine and weak longitudinal reticulation and a row of 8-10 small anterior foveae, frequently incomplete keels. Forewing (Fig. 15f) with 8.0x stigmal vein; postmarginal vein 2.75x as long as stigmal vein; Ovipositor index: 1.27. Reared from cecidomyiid feeding on seeds of *Geranium pratense* (M. Cranesbill)..............................
....*P. bollinensis* Askew, 2002
-- Ovipositor at least 0.82x length of the gaster (Fig. 16a)...44

44- Ovipositor at most 0.84x length of the gaster..45
-- Ovipositor at least 0.94x length of the gaster...46

45- Ovipositor index: 1.53; mesonotum and scutellum (Fig. 16d) with small shallow pits, parapsidal groove deep. Antenna (Fig. 16c) with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.43x longer than wide; anellus 1.83x wider than long; funicular segments F1 1.55x, F7 1.83x as wide as long, F7 1.3x as wide as F1; club 1.14x wider than F7, 1.68x as long as wide; Forewing (Fig. 16f) with postmarginal vein 1.81x as long as stigmal vein, radial vein thin, short; stigma broad, with long uncus, width of stigma 1.4x as long as space between uncus and postmarginal vein; hind femora (Fig. 16b) with width of femora at level of tooth equal to space between tooth and its apical tip..............*P. bedirlinensis* sp. nov.
-- Ovipositor index: 1.4. mesonotum and scutellum (Fig. 17d) without pits, parapsidal groove shallow. Antenna (Fig. 17c) with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.6x longer than wide; anellus 1.5x wider than long; funicular segments F1 1.75x, F7 1.67x as wide as long, F7 1.43x as wide as F1; club 1.3x wider than F7, 1.2x as long as wide; Forewing (Fig. 17f) with postmarginal vein 2.86x as long as stigmal vein, radial vein broad, short; stigma broad, with long uncus, width of stigma 1.67x as long as space between uncus and postmarginal vein; hind femora (Fig. 17b) with width of femora at level of tooth 1.2x to space between tooth and its apical tip..................................*P. ocaklii* sp. nov.

46- Forewing having short brown cloud, with the radial vein short, stigma broad,; body green, by places blue; scape metallic-green; Forewing with marginal vein 4.75x as long as postmarginal vein, and 9.5x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. In gall of gall midges, predominantly *Dasyneura* spp. on some Cruciferae. 2- 2.5 mm (Fig. 34, 8-10 of Zerova & Seryogina, 1999)...
....*P. napi* (Amerling & Kirshner, 1860) (= *brassicae*, Ruschka)
--Forewing hyaline...47

47- Funicular segments not enlarged gradually; malar space equal to or slightly longer than half of eye height; funicular segments with one row of sensilla............*P. indicus* (Mani, 1942)
-- Funicular segments slightly widening towards tip. Ovipositor almost as long as gaster (Fig. 18a)..48

48- Body wholy green; scape mostly yellow; Forewing (Fig. 18f) with marginal vein 2.2x as long as postmarginal vein, and 4.9x stigmal vein; postmarginal vein 2.22x as long as stigmal vein; radial vein long, stigma small, with long uncus; width of stigma 1.14x as long as space between uncus and postmarginal vein. Antenna (Fig. 18c) with pedicel 1.54x longer than wide; funicular segments slightly transverse, F7 1.17x as wide as F1; club 1.25x wider than

F7, 1.6x as long as wide. Hind femora (Fig. 18b) with width of femora at level of tooth 1.2x to space between tooth and its apical tip. Ovipositor index: 1.43...*P. papaveris* (Thomson, 1876)
-- Body greenish-bronze, partly coppery and golden green, scape basally yellow, flagellum brown. Forewing with marginal vein 3.5x as long as postmarginal vein, and 6x stigmal vein; postmarginal vein 1.71x as long as stigmal vein; radial vein and stigma broad, with short uncus, width of stigma equal as long as space between uncus and postmarginal vein; Antenna with pedicel 1.3x as long as width; funicular segments distinctly transverse, 1.4x as wide as long, gradully widening towards tip. Hind femora with width of femora at level of tooth 1.32x to space between tooth and its apical tip. Length 2.95 mm, ovipositor 0.75 mm...*P. pulchellus* Masi, 1929

49- Ovipositor slightly longer than half length of gaster (0.53-0.55)....................................50
-- Ovipositor at most half length of gaster (0.50)..51

50- Ovipositor equal 0.55 lengths of gaster, shorter than hind tibia (O.l. 0.8 mm); Forewing basal vein pilose with at least 5 hairs; basal cell closed below in distal half or more, with hairs on upper surpace behind marginal vein; costal cell with a row of upper surface hairs in apical third, venation testaceous; thoracic dorsum flattened, notauli shallow; antennae black, clavate; head in dorsal view 2.1x as wide as long; propodeal spiracle not raised...*P. nephthys*,Walker, 1848
-- Ovipositor (Fig. 19a) 0.53x length of the gaster. Antenna with scape and pedicel metallic blue, flagellum testaceous; mesonotum (Fig. 19d) distinctly wrinkled, between them finely reticulated with deep punctures; with parapsidal groove deep; propodeum (Fig. 19e) without carina, slightly and transversally striated. Forewing (Fig. 19f) with marginal vein 4.2x as long as postmarginal vein, and 6.25x stigmal vein; postmarginal vein 1.7x as long as stigmal vein. Head in dorsal view 2.94x as wide as long; Hind femora (Fig. 19b) with distinct tooth; Ovipositor index: 0.74..*P. sivasensis* sp. nov.

51- Ovipositor equal to 0.5 gaster...52
-- Ovipositor shorter than half of the gaster..55

52- Ovipositor 0.61x length of the gaster. POL 3.5x OOL Antenna with F1 quadrate, F2-F3 slightly transverse, 1.22x, F4-F5 1.47x and F6-F7 about twice as wide as long; funicular segments slightly widening towards tip, F7 1.2x as wide as F1; Funicular segments with two rows of sensillae (Fig. 5 of Narendran et al., 2006); club as wide as F7, 1.8x as long as wide; mesonotum strongly punctate and reticulated; with parapsidal groove deep; propodeum without carina, finely reticulated. Forewing with marginal vein 4.15x as long as postmarginal vein, and 4.5x stigmal vein; postmarginal vein 1.1x as long as stigmal vein. Body blue-green,including legs, tips of tibiae and tarsi yellow; antenna with scape yellowish brown, pedicel and anellus dark brown, flagellum brown. forewing hyaline; legs dark. Hind femora without tooth, 3.4x as long as width; Ovipositor index: 0.87..*P. grisselli* Narendran & Girish Kumar, 2006
-- Funicular segments with one row of sensillae..53

53- Hind femora with distinct tooth; propodeum sculptured; mesosoma sufficiently roughly wrinkled; body purple, the gaster at base almost black. 2,3 mm.......*P. vittiger* Ruschka, 1923
-- Hind femora without tooth or weekly indicated tooth..54

54- Hind femora without tooth; Scape metallic; tibiae pale yellow,coxae and femora dark; mesosomaic dorsum finely reticulated, without rugosity; mesosoma short (1.3-1.4x as long as broad)...*P. amethytinus* Steffan, 1962
-- Hind femora with weekly indicated tooth; Propodeum smooth; Scape yellow; F1-F3 subsquare, club shorter than 3 proceeding segments combined; ovipositor equal to 1/2 gaster..*P. ignisplendes* Szelenyi, 1973

55- Propodeum almost smooth. ovipositor of 1/3 lengths of the gaster; body is green, mesosoma and the gaster with bronze reflection. 2,9 mm..............*P. brevicaudis* Erdös, 1955
-- Propodeum sculptured...56

56- Ovipositor of 0.25x length of the gaster. Propodeum finely reticulated, this sculpture arranged on both sides in concentric rows; Forewing with a brownish cloud below tip of submarginalis and around stigmalis; marginal vein 3.0x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Head and mesosoma green with coppery luster, gaster bluish green,apically basally green in apical half coppery; legs green, knees,tip of tibiae and fore tarsi brown, basal segments of mid and hind tarsi yellow, following segments gradually darkening, claw segment black. Antenna with scape a little longer than pedicel plus anellus and F1 together; F1 and F2 slightly, other funicular segments distinctly transverse, club a little longer than combined length of two preceding segments; hind femora with distinct tooth. 2.3mm..................*P. unidentatus* (Szelenyi, 1973)
-- Ovipositor about 0.42x length of the gaster (Figs. 21a, 22a); hind femora (Fig. 20b) with distinct tooth..57

57- Antenna (Fig. 20c) with anellus 2x wider than long; funicular segments having F1 small, about half length of F2, about twice as wide as long; F2-F7 slightly widening towards tip, F7 1.33x as wide as F1; funicular segments with one row of very sparse sensillae (1-3); club 1.33x wider than F7, twice as long as wide; mesonotum (Fig. 20d) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 20e) without carina finely reticulated. Forewing (Fig. 20f) with marginal vein 2.2x as long as postmarginal vein, and 4.6x stigmal vein; postmarginal vein 2.1x as long as stigmal vein. Body (Fig. 20a) blue-green, the gaster at base bronze. Ovipositor 0.42x length of the gaster (Fig. 20a); Ovipositor index: 0.55. 2,5 mm...*P. pannonicus* (Mayr, 1874)
-- Antenna (Fig. 21c) with anellus 1.6x wider than long; funicular segments slightly transverse, slightly widening towards tip, F7 1.25x as wide as F1; F1 1.33x, F7 1.67x as wide as long; funicular segments with one row of dense sensillae (5-7); club 1.13x wider than F7, twice as long as wide; mesonotum (Fig. 21d) with distinct fine reticulation; with parapsidal groove shallow; propodeum (Fig. 21e) without carina, densely and longitudinally striated. Forewing (Fig. 21f) with marginal vein 3.6x as long as postmarginal vein, and 7.3x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Body (Fig. 21 a) blue-green,including legs, tips of tibiae and tarsii yellow; antenna scape yellow pedicel and flagellum brown. Ovipositor (Fig. 21a) 0.44x length of the gaster; Ovipositor index: 0.88..................................
....*P. pazarcikensis* sp. nov.

***Pseudotorymus* species of Turkey**

***Pseudotorymus sapphyrinus* (Fonsocolombe, 1832)**

(Figs. 1a-f)

Diagnosis. Ovipositor almost equal to the length of the body. Antenna with pedicel as long as anellus plus F1, flagellum filiform; funicular segments F1-F2 slightly longer than wide, F3-F5 quadrate F6-F7 distinctly transverse, slightly widening towards tip, F7 1.6x as wide as F1;club almost twice as long as wide. Body blue-violet, hind tibiae metallic blue-green, scape and pedicel metallic, ovipositor pale brown . propodeum with fine carina, finely reticulated; callus hairy Forewing with marginal vein 3.6x as long as postmarginal vein, and 7.2x stigmal vein; postmarginal vein 1.4x as long as stigmal vein. Ovipositor index: 3.1.

Description:

Female. Body (Fig. 1a) blue-violet, with greenish reflection, antennae with scape and pedicel metallic, flagellum pale brown; leg metallic blue, except femora and tibiae apically, tarsi yellow; wing hyaline, veins yellow. Length 2.2 mm + ovipositor 1.8 mm.

Head in dorsal view 1.14x as wide as mesoscutum, width to length 38:18; POL 2.5 OOL; OOL 1.16x diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 38:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.4x hight of eye. Face with fine sculpture. Antenna (Fig. 1c) with pedicel as long as anellus plus F1, flagellum filiform; funicular segments F1-F2 slightly longer than wide, F3-F5 quadrate F6-F7 distinctly transverse, slightly widening towards tip, F7 1.6x as wide as F1; linear sensilla in a single row on each funicle segment; clava almost twice as long as wide.

Mesosoma (Fig. 1a) bulged in profile, propodeum slightly visible dorsally; mesoscutum (Fig. 1d) and scutellum widely wrinkled; parapsidal groves deep; pronotum 0.8x as long as mesoscutum; propodeum (Fig. 1e) with fine carina, finely reticulated, callus hairy. All coxae reticulated. Forewing (Fig. 1f) with, marginal vein 3.6x as long as postmarginal vein, and 7.2x stigmal vein; postmarginal vein 1.4x as long as stigmal vein, having very short and light pubescence. Hind femora (Fig. 1b) 4.37x as long as wide, with distinct tooth.

Metasoma (Fig. 1a) excluding ovipositor almost equal rest of body; basal 3 tergites with posterior margin distinctly incised medially; tip of hypopygium at two-thirds gaster length; Ovipositor almost equal to the length of the body. Ovipositor index: 3.1.

Male. Unknown.

Material examined: Turkey: Tokat: 1 female, Necip village, 11.v.1989, M. Doğanlar; 1 female, Taşlıçiftlik, 28.iv.1989, H. Çam; 1 female, Hatay, Altınözü, 23.iv.2006, M. Doğanlar; 1 female, Gaziantep, Oğuzeli; 1 female, Keçikuyusu, 28.iv.2012; 1 female, Sekili, 02.v.2010, swept from pasture, M. Doğanlar; 1 female, Siverek, 16.iv.2013, swept from lent field, M. Doğanlar. The specimens were deposited in the Insect collection of Research Station of Biological Control, Adana.

Distribution: Turkey: Atçana, Antakya, Hatay.

Host: Reared from cecidomyiid gall on stems of *Eryngium* sp., Gall of *Thomasiella eryngii* on *Eryngium campestre* L. (Zerova & Seryogina, 1999).

Pseudotorymus adananensis sp. nov.

(Figs. 2a-f)

Diagnosis. Ovipositor sheath equal 1.95x gaster length; scape, pedicel, tibiae and tarsi yellow; hind femora without tooth; POL 3.75x OOL. Antenna with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.3x as long as width; anellus 2.6x as wide as long; funicular segments slightly transverse, with dense longitudinal sensillae (4-7); gradually widening apically, F7 1.2x as wide as F1; F1-F5 in same width and length, slightly transverse; 1.15-1.2x as wide as long; F6 1.54x, F7 1.58x as wide as long; club 1.63x as long as wide; Forewing with marginal vein 2.93x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Ovi. index 3.15.

Description:

Female. Body (Fig. 2a) blue-violet, antenna and legs concolorous with body, except tibiae, tarsi and ovipositor yellow; antenna with scape, pedicel, yellow, flagellum brown (Fig. 2b); wing hyaline, veins yellow. Length 2.38 mm + ovipositor 2.25 mm.

Head in dorsal view as wide as mesoscutum, width to length 45:13; POL 3.75x OOL; OOL 0.8 diameter of lateral ocellus. Head in frontal view slightly wider than high in ratio 44:30; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/3 hight of eye; face with fine sculpture. Antenna with scape equal to pedicel plus anellus and first 2 flagellar segments; pedicel 1.3x as long as width; anellus 2.6x as wide as long; funicular segments slightly transverse, with dense longitudinal sensillae (4-7); gradually widening apically, F7 1.2x as wide as F1; F1-F5 in same width and length, slightly transverse; 1.15-1.2x as wide as long; F6 1.54x, F7 1.58x as wide as long; club 1.63x as long as wide.

Mesosoma (Fig. 2a) distinctly bulged in profile, propodeum slightly visible dorsally; mesosoma and scutellum (Fig. 2d) with fine reticulations; propodeum

(Fig. 2e) without median carina, with fine longitudinal striae. All coxae reticulated. Forewing with marginal vein 2.93x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Hind femora without tooth, hind femora large 3.71x as long as wide.

Metasoma (Fig. 2a) excluding ovipositor as long as rest of body; basal 3tergite with posterior margin distincly incised medially; tip of hypopygium at 0.8x gaster length; Ovipositor (Fig. 2a) almost equal to total length of gaster and mesosoma, ovipositor equal 1.95x length of gaster; Ovipositor index: 3.15.

Male. Unknown.

Material examined: Holotype, female, Turkey: Adana, 22.v. 1982, swept from pasture, M. Doğanlar. Paratypes: 1 female, same data as holotype; 1 female, Hatay, Antakya, 15-27.viii.1995, reared from Cecidomyiidae gall on *Diplolepis muralis* L., M. Doğanlar. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Adana.

Host: Reared from Cecidomyiidae gall on *Diplolepis muralis* L.

Male: Unknown.

Comments: *Pseudotorymus adananensis* sp. nov. is similar to *P. rosarum* (Zerova & Seryogina, 1995) and *P. ephedrae* Narendran & Prabha Sharma, 2006, in having ovipositor sheath almost equal 2x gaster length, hind femora without distinct tooth at apex. The new species differs from *P. rosarum* in having fore and mid tibiae yellow, postmarginal vein 2.0x as long as stigmal vein and antenna with funicular segments slightly transverse (in *P. rosarum* fore and mid tibiae dark, with yellowish apices; postmarginal vein 3.0x as long as stigmal vein and antennae with F1-F3 quadrate, other flagellar segments slightly transverse). and differs from *P. ephedrae* in having forewing with marginal vein 2.93x as long as postmarginal vein and propodeum without carina (in *P. ephedrae* forewing with marginal vein at least 4.23x as long as postmarginal vein and propodeum with weak median carina).

Pseudotorymus nigdenensis sp. nov.

(Figs. 3a-f)

Etymology. The name is derived from the name of place from where the holotype was collected.

Diagnosis. Ovipositor equal to total length of the gaster and mesonotum, and equal 1.5x to the length of the gaster; antenna with scape equal to pedicel plus anellus and F1+F2 plus 1/3 of F3 combined; pedicel 1.7x longer than wide; anellus 2x as wide as long; funicular segments with one row of sparse setae (2-6), funicular segments slightly transverse, F1 1.38x; F2-F4 1.33x, F5-F6 1.55x; F7 1.9x as wide as long; F7 1.36x as wide as F1; club slightly wider than F7, 2.1x as long as wide; mesosoma finely reticulated; propodeum without median carina, smooth, spiracle touching metanotum. Body blue with greenish reflexion, antenna with scape and pedicel concolorous with body, flagellum brown, legs concolorous with body, except tips of tibiae and basal 3 segments of tarsi yellow; forewing with marginal vein 2.94x as long as postmarginal vein, and 7.0x stigmal vein; postmarginal vein 2.43x as long as stigmal vein. Hind femora without distinct tooth, 4.37x as long as width; Ovipositor index: 2.27.

Description:

Female. Body blue with greenish reflexion, antenna with scape and pedicel concolorous with body, flagellum brown, legs concolorous with body, except tips of tibiae and basal 3 segments of tarsi yellow (Fig. 4b); wing hyaline, veins yellow. Length 2.13 mm + ovipositor 1.5 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 38:18; POL 3x OOL; OOL 1.55 diameter of lateral ocellus. Head in frontal view slightly wider than high in ratio 38:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.4 hight of eye; face with fine sculpture ; antenna (Fig. 3c) with scape equal to pedicel plus anellus and F1+F2 plus 1/3 of F3 combined; pedicel 1.7x longer than wide; anellus 2x as wide as long; funicular segments with one row of sparse setae (2-6), funicular segments slightly transverse, F1 1.38x; F2-F4 1.33x, F5-F6 1.55x; F7 1.9x as wide as long; F7 1.36x as wide as F1; club slightly wider than F7, 2.1x as long as wide.
Mesosoma (Fig. 3a) distinctly bulged in profile, propodeum slightly visible dorsally; mesosoma (Fig. 3d) finely reticulated; propodeum (Fig. 3e) without median carina, smooth, spiracle touching metanotum All coxae reticulated. forewing (Fig. 3f) with marginal vein 2.94x as long as postmarginal vein, and 7.0x stigmal vein; postmarginal vein 2.43x as long as stigmal vein. Hind femora without distinct tooth, 4.37x as long as width.
Metasoma (Fig. 3a) excluding ovipositor 0.896x as long as rest of body; basal 3tergite with posterior margin distincly incised medially; tip of hypopygium at 0.83x gaster length; Ovipositor equal to total length of the gaster and mesonotum, and equal 1.5x to the length of the gaster (Fig. 3a); Hind femora without distinct tooth, 4.37x as long as width; Ovipositor index: 2.27.
Male. Unknown.
Material examined: Holotype, female, Turkey: Niğde, Ulukışla, Gümüş, 07.vi.2008, swept from pasture, M. Doğanlar, deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Niğde, Ulukışla.
Host: Unknown.
Comments: Female: *Pseudotorymus nigdenensis* sp. nov. is similar to *P. regalis* Askew and *P. harithavarnus* Narendran in having ovipositor at least equal to total length of the gaster and half of mesosoma; ovipositor equal 1.5x to the length of the gaster. But the new species differs from both species by having hind femora without distinct tooth at the apex, and ovipositor (Fig. 3a) equal to total length of the gaster and mesonotum; (in both species hind femora with distinct tooth at the apex, ovipositor equal to total length of the gaster and half of mesonotum). *Pseudotorymus nigdenensis* sp. nov. also differs from *P. regalis* in having funicular segments with one row of sparse setae (2-6) (in *P. regalis* funicular segments with two rows of sensillae), and from *P. harithavarnus* in having forewing with marginal vein 2.94x as long as postmarginal vein, and 7.0x stigmal vein; postmarginal vein 2.43x as long as stigmal vein (in *P. harithavarnus* forewing with marginal vein a little more than 3x postmarginal vein, more than 6x stigmal vein, postmarginal vein 2.5x as long as stigmal vein).

***Pseudotorymus celikhanensis* n.sp.**

(Figs. 4 a-g)

Etymology. The name is derived from the name of place fromwhere the holotype was collected.
Diagnosis. Ovipositor equal to 0.7x lengths of the gaster; Antenna with scape equal to pedicel plus anellus and F1+F2; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments distinctly transverse, distinctly widening towards tip, F7 1.12x as wide as F1; club 1.6x as long as wide; mesonotum with distinct fine reticulation; with parapsidal groove deep; propodeum without carina, medially smooth, laterally with fine reticulation. forewing with marginal vein 3.2x as long as postmarginal

vein, and 4.4x stigmal vein; postmarginal vein 1.4x as long as stigmal vein. Hind femora with indistinct tooth. Ovipositor index: 1.1.

Description:

Female. Body (Fig. 4a) bronze with metallic green reflection, antennae with scape and pedicel metallic blue, flagellum brown; legs concolorous with body, except basal tip of tibiae, and tarsi yellow, except last segment of tarsi black (Fig. 4b); wing hyaline, veins yellow. Length 2.5 mm + ovipositor 0.63 mm.

Head in dorsal view 1.16x as wide as mesoscutum, width to length 50:27; POL 2.85x OOL; OOL 1.17x diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 50:38; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.3 hight of eye; face with fine sculpture. Antenna (Fig. 4 c) with scape equal to pedicel plus anellus and F1+F2; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments distinctly transverse, slightly widening towards tip, F7 1.12x as wide as F1; club 1.6x as long as wide.

Mesosoma (Fig. 4a) bulged in profile, propodeum slighttly visible dorsally; mesonotum and scutellum (Fig. 4d) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 4e) without carina, medially smooth, laterally with fine reticulation, basallly with some fovae. Forewing (Fig. 4f) with marginal vein 3.2x as long as postmarginal vein, and 4.4x stigmal vein; postmarginal vein 1.4x as long as stigmal vein. Hind femora with indistinct tooth (Fig. 4b), 3.9x as long as wide.

Metasoma (Fig. 4a) excluding ovipositor 0.62x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.7x gaster length; Ovipositor 0. 7x as long as gaster. Ovipositor index: 1.1.

Male. Beside gaster similar to female except antenna. Antenna (Fig. 4g) with pedicel 1.25x longer than wide; anellus 3.0x wider than long; funicular segments slightly transverse, slightly widening towards tip, F7 1.25x as wide as F1; club twice as long as wide.

Material examined: Holotype, female, Turkey: Adıyaman, Çelikhan, 24.5.2007, swept from pasture, M. Doğanlar. Paratypes: 6 males, same data as holotype. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Adıyaman, Çelikhan.

Host: Unknown.

Comments: Female: *Pseudotorymus celikhanensis* sp. nov. is similar to *P. medicaginis* (Mayr) in having hind tibia with indistinct tooth and antennae with scape and pedicel metallic blue, but it differs from *P. medicaginis* in having ovipositor equal to 0.7x lengths of the gaster, Ovipositor index: 1.1; funicular segments distinctly transverse; mesonotum with distinct fine reticulation (in *P. medicaginis* ovipositor 0.85x length of the gaster, Ovipositor index: 1.66; 1-3 funicular segments almost quadrate, remaining transverse; mesonotum wholy transversely wrinkled; deep punctations present only on scutellum).

***Pseudotorymus lutfiyeae* sp. nov.**

(Figs. 5a-f)

Etymology. The name is derived from the name of the place fromwhere the holotype was collected.

Diagnosis. Ovipositor slightly shorter (0.96x) than the gaster. Antenna with scape equal to pedicel plus anellus and F1 and half of F2; pedicel 1.25x longer than wide; anellus 2x wider than long; funicular segments with one row of sensillae, funicular segments F1 quadrate, F2-F4 slightly, F5-F7 distinctly transverse, slightly widening towards tip, F7 as wide as F1; club 1.5x as long as wide. Body mesonotum with distinct reticulation, with parapsidal groove deep; propodeum without carina, having fine longitudinal reticulation. forewing with marginal vein 2.8x as long as postmarginal vein, and 6.6x stigmal vein; postmarginal vein 2.4x as long as stigmal vein. Hind femora with indistinct tooth. Ovipositor index: 1.7.

Description:

Female. Body (Fig. 5a) blue with metallic green reflection, antenna and legs concolorous with body, except fore tibiae with two yellow stripe, tip of other tibiae and tarsi yellow (Fig. 5b); wing hyaline, veins yellow. Length 2.25 mm + ovipositor 0.82 mm.

Head in dorsal view 1.15x as wide as mesoscutum, width to length 46:18; POL 2x OOL; OOL 1.25x diameter of lateral ocellus. Head in frontal view slightly wider than high in ratio 46:43; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/4 hight of eye; face with fine sculpture. Antenna (Fig. 5 c) with scape equal to pedicel plus anellus and F1 and half of F2; pedicel 1.25x longer than wide; anellus 2x wider than long; funicular segments with one row of sensillae, funicular segments F1 quadrate, F2-F4 slightly, F5-F7 distinctly transverse, slightly widening towards tip, F7 as wide as F1; club 1.5x as long as wide.

Mesosoma (Fig. 5a) slightly bulged in profile, propodeum distinctly visible dorsally; mesosoma (Fig. 5d) transversally striated between them with fine reticulation and deep pits, and scutellum (Fig. 5d) reticulated, with some deep pits; pronotum 0.32x as long as mesoscutum; propodeum (Fig. 5e) without median carina, with some fine longitudinal striae, with some deep fovae anteriorly. All coxae reticulated. Forewing (Fig. 5f) with apical part with very short and brown pubescence marginal vein 2.8x as long as postmarginal vein, and 6.6x stigmal vein; postmarginal vein 2.4x as long as stigmal vein. Hind femora with indistinct tooth, large 3.7x as long as wide.

Metasoma (Fig. 5a) excluding ovipositor 0.64x as long as rest of body; basal 3 tergite with posterior margin distincly incised medially; tip of hypopygium at 0.9x of gaster length; ovipositor slightly shorter (0.96x) than the gaster. Ovipositor index: 1.7.

Male. Unknown.

Material examined: Holotype, female, Turkey: Sivas, Paşabahçe, 06.vi.1992, swept from pasture, L. Gençer. Paratype: 1 female, Sivas, Campus of Cumhuriyet Univ., 26.5.92, swept from pasture, L. Gençer. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Sivas.

Host: Unknown.

Comments: Female: *Pseudotorymus lutfiyeae* sp. nov. is similar to *P. salicinus* Erdös in having hind femora with indistinct tooth, ovipositor slightly shorter (0.96x) than the gaster. But the new species differs from *P. salicinus* by having antenna with scape equal to pedicel plus anellus and F1 and half of F2; funicular segments F1 quadrate, F2-F4 slightly, F5-F7 distinctly transverse (in *P. salicinus* antenna with scape equal to pedicel plus anellus and F1+F2 combined; basal 3 funicular segments longer than wide).

Pseudotorymus haliti **sp. nov.**

(Figs. 6a-d)

Etymology. The name is derived from the name of prof. Dr. Halit Çam who collected the holotype.

Diagnosis. Ovipositor 0.63x length of gaster; Antenna with scape equal to pedicel plus anellus and F1+F3; pedicel 1.33x longer than wide; anellus 1.8x wider than long; funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse, F1 short, almost half length of F2, 3x as wide as long, F2 2.3x; F3-F5 2.3x; F6-F7 2.86x as wide as long, slightly widening towards tip, F7 2.86x as wide as F1; club broad, 1.26x as long as wide, and about 1.5x as wide as F7; mesonotum and scutellum with fine reticulation, parapsidal groove deep; propodeum without carina, smooth. Forewing with marginal vein 3.36x as long as postmarginal vein, and 6.2x stigmal vein; postmarginal vein 1.83x as long as stigmal vein, stigmal vein broad, long, stigma small, with long uncus. Hind femora without tooth, 3.53x as long as width. Ovipositor index: 1.5.

Description:

Female. Body (Fig. 6a) bronze with metallic blue reflection, antennae with scape and pedicel metallic blue, flagellum brown; legs concolorous with body, except tarsi yellow, except last segment black (Fig. 6b); wing hyaline, veins brown. Length 1.82 mm + ovipositor 0.55 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 36:17; POL 3.0x OOL; OOL 1.25x diameter lateral ocellus. Head in frontal view 1.2x wider than high in ratio 36:30; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/3 hight of eye; face with fine sculpture. Antenna (Fig. 6c) with scape equal to pedicel plus anellus and F1+F3; pedicel 1.33x longer than wide; anellus 1.8x wider than long; funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse, F1 short, almost half length of F2, 3x as wide as long, F2 2.3x; F3-F5 2.3x; F6-F7 2.86x as wide as long, slightly widening towards tip, F7 2.86x as wide as F1; club broad, 1.26x as long as wide, and about 1.5x as wide as F7.

Mesosoma (Fig. 6a) bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum (Fig. 6c) with finely reticulated; with parapsidal groove deep; propodeum (Fig. 6e) without carina, smooth. All coxae reticulated. Forewing (Fig. 6f) with marginal vein 3.36x as long as postmarginal vein, and 6.2x stigmal vein; postmarginal vein 1.83x as long as stigmal vein, stigmal vein broad, long, stigma small, with long uncus. Hind femora (Fig. 6b) without tooth, 3.53x as long as width.

Metasoma (Fig. 6a) excluding ovipositor almost as long as rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.57x gaster length; Ovipositor 0. 63x as long as gaster. Ovipositor index: 1.5.

Male. Unknown.

Material examined: Holotype, female, Turkey: Tokat, Taşlıçiftlik, 14.iv.1989, swept from pasture, H. Çam. Doğanlar. Paratype: 1 female, same data as holotype; All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Tokat, Taşlıçiftlik.

Host: Unknown.

Comments: Female: *Pseudotorymus haliti* sp. nov. is similar to *P. verbasci* Erdös and *P. keçikuyusunensis* sp. nov. in having hind femora without tooth. But the new species differs from both species by having ovipositor 0.63x length of gaster and mesonotum and scutellum with fine reticulation (in both species ovipositor 0.70x length of gaster; mesonotum with coarsely wrinkled, between them with deep pits in *P. verbasci* and mesonotum transversely wrinkled in *P. keçikuyusunensis* sp. nov.). *Pseudotorymus haliti* sp. nov. differs from *P. verbasci* in having antenna with funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse, F1 short, almost half length of F2, 3x as wide as long, F2 2.3x; F3-F5 2.3x; F6-F7 2.86x as wide as long, slightly widening towards tip, F7 2.86x as wide as F1. (in *P. verbasci* antenna with funicular segments with one row of sparce sensillae (2-4); funicular segments slightly transverse, slightly widening towards tip; F1 2x as wide as long, following ones almost 0.6-0.7x as wide as long; , F7 1.2x as wide as F1). *Pseudotorymus haliti* sp. nov. differs from *P. keçikuyusunensis* sp. nov. in having antenna with scape equal to pedicel plus anellus and F1-F3 combined; propodeum smooth (in *P. keçikuyusunensis* sp. nov. antenna with scape equal to pedicel plus anellus and F1+F2; propodeum reticulated).

Pseudotorymus verbasci **Erdös, 1955**

(Figs. 7a-f)

Diagnosis. Ovipositor equal to 0.7x lengths of the gaster; Antenna with scape equal to pedicel plus anellus and F1-F3 combined; pedicel 1.5x longer than wide; anellus 2x wider than long; funicular segments with one row of sparce (2-4) sensillae, funicular segments distinctly transverse, slightly widening towards tip;F1 2x as wide as long, following ones almost 0.6-0.7x as wide as long; , F7 1.2x as wide as F1, club broad, 1.5x as long as wide, and about 1.3x as wide as F7; mesonotum with coarsely wrinkled, between them with deep pits; with parapsidal groove shallow; propodeum almost smooth,with some fine striae, and deep fovae on anterior border. forewing with marginal vein 4.0x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 1.6x as long as stigmal vein, stigma broad, with long uncus. Hind femora without tooth; Ovipositor index: 1.4.

Description:

Female. Body (Fig. 7a) bronze with metallic green reflection, antennae with scape yellow and pedicel and flagellum brown; legs concolorous with body, except tips of femora and tibiae, and tarsi yellow, except last segment tibiae black (Fig. 7b); wing hyaline, veins yellow. Length 1.95 mm + ovipositor 0.7 mm.

Head in dorsal view 1.08x as wide as mesoscutum, width to length 38:18; POL 2.2x OOL; OOL 1.67x diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 38:33; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/3 hight of eye; face with fine sculpture. Antenna (Fig. 7c) with scape equal to pedicel plus anellus and F1-F3 combined; pedicel 1.5x longer than wide; anellus 2x wider than long; funicular segments with one row of sparce (2-4) sensillae, funicular segments distinctly transverse, slightly widening towards tip;F1 2x as wide as long, following ones almost 0.6-0.7x as wide as long; F7 1.2x as wide as F1, club broad, 1.5x as long as wide, and about 1.3x as wide as F7.

Mesosoma (Fig. 7a) bulged in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 7d) with coarsely wrinkled, between them with deep pits; with parapsidal groove shallow; propodeum (Fig. 7e) almost smooth,with some fine striae, and deep fovae on anterior border. All coxae reticulated. Forewing (Fig. 7f) with marginal vein 4.0x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 1.6x as long as stigmal vein, stigma broad, with long uncus. Hind femora without tooth, 3.5x as long as wide.

Metasoma (Fig. 7a) excluding ovipositor 0.77x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.54x gaster length; Ovipositor 0. 82x as long as gaster. Ovipositor index: 1.4.

Male. Unknown.

Material examined: 1 female, Turkey: Tokat, 24.vii.1989, swept from pasture, H. Çam; 2 females, 31.v. 1989, swept from pasture, H. Çam; 1 female, Sivas, Campus of Cumhuriyet Univ. 26.v. 1992, swept from pasture, L. Gençer. All of the

specimens were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Tokat.
Host: In gall of gall midges, *Asphondilia verbasci* on *Verbascum* spp.

Pseudotorymus kecikuyusunensis sp. nov.

(Figs. 8a-f)

Etymology. The name is derived from the name of the place fromwhich the holotype was collected.
Diagnosis. Ovipositor equal to 0.7x lengths of the gaster. Antenna with scape equal to pedicel plus anellus and F1+F2; pedicel 1.6x longer than wide; anellus 2x wider than long; funicular segments with one row of dense (7-9) sensillae, funicular segments distinctly transverse, slightly widening towards tip, F7 0.83x as wide as F1; club 1.2x as long as wide; mesonotum with transversely wrinkled; with parapsidal groove deep; propodeum without carina, reticulated. forewing with marginal vein 3.0x as long as postmarginal vein, and 4.7x stigmal vein; postmarginal vein 2.25x as long as stigmal vein, stigma broad, with long uncus. Hind femora without tooth. Ovipositor index: 1.33.
Description:
Female. Body (Fig. 8a) bronze with metallic green reflection, antennae with scape yellow and pedicel and flagellum brown; legs concolorous with body, except tips of femora and tibiae, and tarsi yellow, except last segment tibiae black (Fig. 8b); wing hyaline, veins yellow. Length 2.62 mm + ovipositor 0.87 mm.
Head in dorsal view 1.22x as wide as mesoscutum, width to length 55:25; POL 3.0x OOL; OOL 1.25x diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 55:45; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 2/5 hight of eye; face with fine sculpture. Antenna (Fig. 8c) with scape equal to pedicel plus anellus and F1+F2; pedicel 1.6x longer than wide; anellus 2x wider than long; funicular segments with one row of dense (7-9) sensillae, funicular segments distinctly transverse, slightly widening towards tip, F7 0.83x as wide as F1; club 1.2x as long as wide.
Mesosoma (Fig. 8a) bulged in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 8c) with transversely wrinkled; with parapsidal groove deep; propodeum (Fig. 8e) without carina, reticulated. All coxae reticulated. forewing (Fig. 8f) with marginal vein 3.0x as long as postmarginal vein, and 4.7x stigmal vein; postmarginal vein 2.25x as long as stigmal vein, stigma broad, with long uncus. Hind femora without tooth, 3.5x as long as wide.
Metasoma (Fig. 8a) excluding ovipositor 0.77x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.54x gaster length; Ovipositor 0. 82x as long as gaster. Ovipositor index: 1.4.
Male. Unknown.
Material examined: Holotype, female, Turkey: Gaziantep, Oğuzeli, Keçikuyusu, 19.v.2010, swept from pasture, M. Doğanlar. Paratypes: 2 females, same data as holotype; 1 male, same data as holotype, except 13.v. 2011. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Gaziantep, Oğuzeli.
Host: Unknown.
Comments: Female: *Pseudotorymus kecikuyusunensis* sp. nov. is similar to *P. verbasci* Erdös. in having hind femora without tooth, and ovipositor equal to 0.7x lengths of the gaster. But the new species differs from *P. verbasci* by having antenna with scape equal to pedicel plus anellus and F1+F2; funicular segments

with one row of dense (7-9) sensillae; funicular segments distinctly transverse, slightly widening towards tip, F1 slightly transverse 1.14x as wide as long, following ones 1.6-2.0x as wide as long; , F7 1.33x as wide as F1; club broad, 1.64x as long as wide, and about 1.47x as wide as F7 (in *P. verbasci* antenna with scape equal to pedicel plus anellus and F1-F3 combined; funicular segments with one row of sparce (2-4) sensillae; funicular segments slightly transverse, slightly widening towards tip; F1 2x as wide as long, following ones almost 0.6-0.7x as wide as long; , F7 1.2x as wide as F1, club broad, 1.5x as long as wide, and about 1.3x as wide as F7.

***Pseudotorymus horasanensis* sp. nov.**

(Figs. 9a-f)

Etymology. The name is derived from the name of the place from which the holotype was collected.

Diagnosis. Ovipositor equal to lengths of the gaster. Antenna with scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.4x longer than wide; anellus about 2x wider than long; funicular segments with one row of sparse sensillae (3-4), funicular segments distinctly transverse, slightly widening towards tip, F7 1.1-1.17x as wide as F1;; club slightly wider than F7, 1.9x as long as wide; mesonotum with distinct fine reticulation; parapsidal groove deep; propodeum without carina, medially smooth, laterally with fine reticulation. forewing with marginal vein 3.1-4.3x as long as postmarginal vein, and 6.0-6.6x stigmal vein; postmarginal vein 1.4-1.7x as long as stigmal vein. Body blue-green. Hind femora without tooth. Ovipositor index: 2.0.

Description:

Female. Body (Fig. 9a) blue-green, antennae with scape and pedicel metallic blue, flagellum brown; legs concolorous with body, except tibiae, and tarsi yellow, except last segment of tarsi black (Fig. 9b); wing hyaline, veins yellow. Length 2.38 mm + ovipositor 1.05 mm.

Head in dorsal view 1.1x as wide as mesoscutum, width to length 42:20; POL 1.62x OOL; OOL 1.67x diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 42:37; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.35 hight of eye; face with fine sculpture. Antenna (Fig. 9c) with scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.4x longer than wide; anellus about 2x wider than long; funicular segments with one row of sparse sensillae (3-4), funicular segments distinctly transverse, slightly widening towards tip, F7 1.1-1.17x as wide as F1;; club slightly wider than F7, 1.9x as long as wide.

Mesosoma (Fig. 9a) bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum (Fig. 9c) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 9e) without carina, medially smooth, laterally with fine reticulation, basallly with some fovae, spiracle wide apart from metanotum about half length of spiracle. Forewing (Fig. 9f) with marginal vein 3.1x as long as postmarginal vein, and 5.33x stigmal vein; postmarginal vein 1.7x as long as stigmal vein. Hind femora without tooth, 5.23x as long as wide.

Metasoma (Fig. 9a) excluding ovipositor 0.72x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.74x gaster length; Ovipositor as long as gaster. Ovipositor index: 2.0.

Male. Unknown.

Material examined: Holotype, female, Turkey: Erzurum, Horasan, Karakurt, 12.vii.2012, swept from pasture, M. Doğanlar. Paratypes: 3 females, same data as the holotype; 1 female, Ağrı, Arat Dağı, 4.vii.2009, swept from lent

field, M. Doğanlar. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Erzurum, Horasan, Karakurt, Ağrı, Arat Dağı.
Host: Unknown.
Comments: Female: *Pseudotorymus horasanensis* sp. nov. is similar to *P. salviae* Ruschka in having ovipositor equal length of the gaster and ovipositor index: 2.0. But the new species differs from *P. salviae* in having antenna with scape equal to pedicel plus anellus and F1+F2 combined; pedicel 1.4x longer than wide; flagellum slightly widening towards tip, F7 1.1-1.17x as wide as F1; club slightly wider than F7, 1.9x as long as wide, and mesonotum and scutellum with distinct fine reticulation (in *P. salviae* Antenna with scape equal to pedicel plus anellus and F1+F2, and 1/2 F3 combined; pedicel 1.9x longer than wide; flagellum distinctly widening towards tip, F7 1.5x as wide as F1; club 1.33x wider than F7, 1.73x as long as wide, and mesosoma in basal half with deep punctations and broad reticulations, scutellum transversely wrinkled).

Pseudoyorymus juniperi Zerova, 2007

(Figs. 1-5 of Zerova & Seryogina, 2007)

Pseudoyorymus juniperi Zerova 2007: 85-86. Holotype female, Paratypes 32 females, Ukraine, no type locality.
The types of *Pseudotorymus juniperi* Zerova were deposited in ZIKU, Kiev, Ukraine (Zerova et al., 2012).
Male: Unknown.
Host: Cecidomyiid galls (*Oligotrophus* sp.) on *Juniperus excelsa* (Vasilieva).

Pseudoyorymus dogubayezitensis sp. nov.

(Figs. 10a-f)

Etymology. The name is derived from the name of place fromwhich the holotype was collected.
Diagnosis. Ovipositor 0.82x length of the gaster. Antenna with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.4x longer than wide; anellus 2.4x wider than long; funicular segments with one row of sparse sensillae (3-4), funicular segments slightly transverse; slightly widening towards tip, F7 1.3x as wide as F1; club as wide as F7, 2.3x as long as wide; mesonotum with distinct fine reticulation; parapsidal groove deep; propodeum without carina, with fine striae longitudinally , spiracle touch to metanotum. Forewing with marginal vein 2.7x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.25x as long as stigmal vein. Hind femora without tooth, 3.3x as long as width. Ovipositor index: 0.82.
Description:
Female. Body (Fig. 10a) blue-green., antennae with scape and pedicel metallic blue, flagellum brown; legs concolorous with body, except tips of tibiae, and tarsi yellow, except last segment of tarsi black (Fig. 10b); wing hyaline, veins yellow. Length 1.6 mm + ovipositor 0.7 mm.
Head in dorsal view 1.1x as wide as mesoscutum, width to length 36:23; POL 2.5x OOL; OOL 2x diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 36:33; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.3 hight of eye; face with fine sculpture. Antenna (Fig. 10c) with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.4x longer than wide; anellus 2.4x wider than long; funicular segments with one row of sparse sensillae (3-4), funicular segments slightly transverse;

slightly widening towards tip, F7 1.3x as wide as F1; club as wide as F7, 2.3x as long as wide.

Mesosoma (Fig. 10a) bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum (Fig. 10d) with distinct transverse striae, lateral lobes with reticulation, parapsidal groove deep; propodeum (Fig. 10e) without carina, with fine striae longitudinally , spiracle touch to metanotum. Forewing (Fig. 10f) with marginal vein 2.7x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 2.25x as long as stigmal vein Hind femora without tooth, 3.3x as long as width.

Metasoma (Fig. 10a) excluding ovipositor 0.83x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.75x gaster length; ovipositor 0.82x length of the gaster. Ovipositor index: 0.82.

Male. Unknown.

Material examined: Holotype, female, (No:2 on card) Turkey: Ağrı, 20km from Ağrı to Doğubayezit. 4.vii.2010, swept from *Medicaco* field, M. Doğanlar. Paratypes: 2 females, same data as holotype. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Ağrı, 20km from Ağrı to Doğubayezit.

Host: Unknown.

Comments: Female: *Pseudoyorymus dogubayezitensis* sp. nov. similar to *P. euphorbiae* Zerova & Seregina in having ovipositor almost equal to 0.8x lengths of the gaster, hind femora without tooth and antenna with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined, but it differs from *P. euphorbiae* in having ovipositor index: 0.82, pedicel 1.4x longer than wide; anellus 2.4x wider than long; club 2.3x as long as wide, forewing with marginal vein 2.7x as long as postmarginal vein, mesonotum with distinct transverse striae, lateral lobes with reticulation, parapsidal groove deep propodeum with fine striae longitudinally (in *P. euphorbiae* ovipositor index: 1.1, pedicel almost quadrate; anellus 1.8x wider than long; club 1.54x as long as wide, forewing with marginal vein 3.5x as long as postmarginal vein, mesonotum grainy-cellular, by places tuberous).

***Pseudotorymus samsatensis* sp. nov.**

(Figs. 11a-f)

Etymology. The name is derived from the name of the place fromwhich the holotype was collected.

Diagnosis. Ovipositor equal to 0.65x lengths of the gaster. Forewing with marginal vein 2.2x as long as postmarginal vein, and 5.8x stigmal vein; postmarginal vein 2.7x as long as stigmal vein; Antenna with scape yellow, equal to pedicel plus anellus and F1-F2+1/3 F3; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments slightly transverse, slightly widening towards tip, F7 1.1x as wide as F1; club 1.6x as long as wide; mesonotum with distinct fine reticulation; with parapsidal groove deep; propodeum without carina, basally with fine striae, medially smooth. Hind femora with distinct tooth, 3.6x as long as width. Ovipositor index: 0.9.

Description:

Female. Body (Fig. 11a) blue with greenish reflection, gaster brown with greenish reflection, antennae with scape yellow, flagellum testaceous; femora and tibia concolorous with body, except 1/6 of both tips of tibiae and tarsi yellow, except last segment black (Fig. 13b); wing hyaline, veins yellow. Length 2.75 mm + ovipositor 0.75 mm.

Head in dorsal view as wide as mesoscutum, width to length 53:22; POL 2.6x OOL; OOL 1.1x diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 55:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.4 hight of eye; face with fine sculpture. Antenna (Fig. 11c) with scape yellow, equal to pedicel plus anellus and F1-F2+1/3 F3; pedicel 1.55x longer than wide; anellus 1.6x wider than long; funicular segments with one row of sensillae, funicular segments slightly transverse, slightly widening towards tip, F7 1.1x as wide as F1; club 1.6x as long as wide.
Mesosoma (Fig. 11a) distinctly bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum (Fig. 11d) distinct broadly wrinkled, with some shallow pits, parapsidal groove deep; propodeum (Fig. 13e) without carina, medially smooth, basally with fine crenulae ?, spiracle touch to metanotum. Forewing (Fig. 11f) with marginal vein 2.2x as long as postmarginal vein, and 5.8x stigmal vein; postmarginal vein 2.7x as long as stigmal vein. Hind femora with distinct tooth, 3.6x as long as width.
Metasoma (Fig. 11a) excluding ovipositor 0.72x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.75x gaster length; Ovipositor equal to 0.65x lengths of the gaster. Ovipositor index: 0.9.
Male. Unknown.
Material examined: Holotype, female, Turkey: Adıyaman, Samsat, 11.5.2008, M. Doğanlar. **Paratypes:** 1 female, same data as the holotype; 2 females, Hasankendi, 07.vi. 2008, swept from *Onobrychis* sp. field, M. Doğanlar. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).
Distribution: Turkey: Adıyaman, Samsat, Hasankendi.
Host: Unknown.
Comments: Female: *Pseudoyorymus samsatensis* sp. nov. similar to *P. semicarinatus* Erdös in having hind femora with distinct tooth and forewing with marginal vein 3.0x as long as postmarginal vein. But the new species differs from *P. semicarinatus* in having forewing with marginal vein 6.0x stigmal vein; postmarginal vein 2.0x as long as stigmal vein, propodeum without carina, basally with fine short striae, medially smooth, antenna with pedicel 1.55x longer than wide; anellus 1.6x wider than long, funicular segments slightly transverse, slightly widening towards tip, F7 1.1x as wide as F1 (in *P. semicarinatus* forewing with marginal vein 4.3x stigmal vein; postmarginal vein 1.43x as long as stigmal vein, propodeum reticulated, frequently with incomplete keels, antenna with pedicel 1.4x longer than wide; anellus 2.6x wider than long, funicular segments distinctly transverse, distinctly widening towards tip, F7 1.83x as wide as F1).

Pseudotorymus leguminus Ruschka, 1923

(Figs. 12a-f)

Diagnosis. Ovipositor 0.67x length of gaster; antenna with scape slightly longer than pedicel plus anellus and F1+F2 combined; pedicel 1.5-1.62x longer than wide; anellus 2x wider than long; funicular segments with one row of dense sensillae (6-9), funicular segments slightly transverse, slightly widening towards tip, F7 1.1x as wide as F1; club 1.4x wider than F7, 1.25-1.62x as long as wide; mesonotum rugulose with irregular sculpture; with parapsidal groove deep; propodeum without carina, smooth, with 3 fovae. Forewing with marginal vein 3.25x as long as postmarginal vein, and 5.8-6.5x stigmal vein; postmarginal vein 2.0x as long as stigmal vein, the latter short, stigma broad, without brown cloud. hind femora with distinct tooth. Ovipositor index: 0.94-1.03.

Description:

Female. Body (Fig. 12a) blue-violet with greenish reflection, antennae, femora, tibiae, concolorous with body, except tips of tibiae and tarsi yellow (Fig. 12b); wing hyaline, veins yellow. Length 3.2 mm + ovipositor 0.8 mm.

Head in dorsal view as wide as mesoscutum, width to length 36:15; POL 2.6x OOL; OOL 1.2 diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 36:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.3 hight of eye. face with fine sculpture. Antenna (Fig. 12c) with scape slightly longer than pedicel plus anellus and F1+F2 combined; pedicel 1.5x longer than wide; anellus 2x wider than long; funicular segments with one row of dense sensillae (6-9), funicular segments distinctly transverse, slightly widening towards tip, F7 1.1x as wide as F1; club 1.1x wider than F7, 1.62x as long as wide.

Mesosoma (Fig. 12a) bulged in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 12d) transversally reticulated, with parapsidal groove shallow; propodeum (Fig. 12e) without carina, longitudinally striated, with 3 fovae basally. Forewing (Fig. 12f) with marginal vein 3.25x as long as postmarginal vein, and 6.5x stigmal vein; postmarginal vein 2.0x as long as stigmal vein, the latter short, stigma broad, without brown cloud. hind femora with distinct tooth, 3.55x as long as width.

Metasoma (Fig. 12a) excluding ovipositor 0.74x rest of body; basal tergite with posterior margin weakly incised medially; tip of hypopygium at 0.63 gaster length; Ovipositor 0.67x length of gaster; Ovipositor index: 0.94-1.03.

Male. Unknown.

Material examined: Turkey: Tokat, 3 females, 13-30.iv.1989; 2 females, 29.v.1989; 1 female, 25.viii. 1989; 4 females, 15.ix.1989; 2 females, Taşlıçiftlik, 2.v. 1989; 2 females, Fidanlık, 16-24.iv.1989, swept from pasture, H. Çam. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Tokat.

Host: From gall of gall midges on the bean and legumes. 2.5-3 mm. (Zerova & Seryogina, 1999).

Pseudotorymus ispirlii sp. nov.

(Figs. 13a-g)

Etymology. The name is derived from the name of my friend, Mr. mustafa İspirli who has helped collecting the sample during my work.

Diagnosis. Ovipositor equal to 0.7x lengths of the gaster; Antenna with scape equal to pedicel plus anellus and F1-F2, and 1/3 F3 combined; pedicel 1.5x longer than wide; anellus 2.33x wider than long; funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse; flagellum distinctly widening towards tip, F7 0.9x as wide as F1; club 1.4x wider than F7, 1.4x as long as wide; mesonotum distinctly wrinkled; with parapsidal groove deep; propodeum without carina, medially smooth, laterally with fine reticulation. Forewing with marginal vein 3.6x as long as postmarginal vein, and 8.3x stigmal vein; postmarginal vein 2.3x as long as stigmal vein. hind femora with distinct tooth, 3.64x as long as width.. Ovipositor index: 1.2.

Description:

Female. Body (Fig. 13a) green, metallic reflexion, antennae with scape in basal 1/5 yellow, flagellum brown; femora and tibia concolorous with body, except fore tibiae and tarsi yellow, except last segment brown (Fig. 13b); wing hyaline, veins yellow. Length 2.75 mm + ovipositor 0.82 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 46:22; POL 3.25x OOL; OOL equal diameter lateral ocellus. Head in frontal view distinctly wider than high in ratio 46:37; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.3 hight of eye; face with fine sculpture. Antenna (Fig. 13c) with scape equal to pedicel plus anellus and F1-F2, and 1/3 F3 combined; pedicel 1.5x longer than wide; anellus 2.33x wider than long; funicular segments with one row of dense sensillae (4-7), funicular segments distinctly transverse; flagellum distinctly widening towards tip, F7 0.9x as wide as F1; club 1.4x wider than F7, 1.4x as long as wide.
Mesosoma (Fig. 13a) slightly bulged in profile, propodeum distinctly visible dorsally; mesonotum (Fig. 13d) distinctly wrinkled; with parapsidal groove deep, scutellum apically almost smooth; propodeum (Fig. 13e) without carina, with fine reticulation. Forewing (Fig. 13f) with marginal vein 3.6x as long as postmarginal vein, and 8.3x stigmal vein; postmarginal vein 2.3x as long as stigmal vein. hind femora with distinct tooth, 3.64x as long as width.
Metasoma (Fig. 13a) excluding ovipositor 0.7x rest of body; basal 3 tergite with posterior margin deeply incised medially; tip of hypopygium at 0.77x gaster length; Ovipositor equal to 0.7x lengths of the gaster; Ovipositor index: 1.2.
Male. Beside gaster similar to female except antenna. Antenna (Fig. 13g) with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.4x longer than wide; anellus 3x wider than long; funicular segments with one row of sparse sensillae (2-4), flagellum distinctly widening towards tip, F7 1.77x as wide as F1; club 1.1x wider than F7, 1.5x as long as wide.
Material examined: Holotype, female, Turkey: Tokat, Fidanlık, 10.iv.1989, swept from pasture, H. Çam. Paratypes: 3 females, same locality with the holotype, 24.iv. 1989; Taşlıçiftlik, 2 females, 21.vi.1989; 1 females, 28.iv.1989; 3 females, 02.v.1989; 1 female, 17.viii.1989; 1 female, Tokat, 1.vi.1989; 1 female, 2 males, 24.vii.1989, swept from pasture, H. Çam. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana(IMBC).
Distribution: Turkey: Tokat.
Host: Unknown.
Comments: Female: *Pseudoyorymus ispirlii* sp. nov. is similar to *P. aladagensis* sp. nov. in having hind femora with distinct tooth and ovipositor equal to 0.7x lengths of the gaster. But the new species differs from *P. aladagensis* sp. nov. in having funicular segments with one row of dense sensillae (4-9),tibiae yellow, scape yellow, F7 0.9x as wide as F1; club 1.4x wider than F7, 1.4x as long as wide, mesonotum with parapsidal groove deep (in *P. aladagensis* sp. nov. funicular segments with one row of sparse sensillae (3-6), scape metallic blue, F7 1.3x as wide as F1; club 1.43x wider than F7, 1.35x as long as wide, mesonotum with parapsidal groove shallow).

***Pseudotorymus aladagensis* sp. nov.**

(Figs. 14a-f)

Etymology. The name is derived from the name of place fromwhich the holotype was collected.
Diagnosis. Ovipositor equal to 0.7x lengths of the gaster; Antenna with funicular segments with one row of sparse sensillae (3-4), Scape and tibiae metallic blue; antenna with scape equal to pedicel plus anellus and F1-F2, and 1/3 F3 combined; pedicel 1.22x longer than wide; anellus about 2x wider than long;, funicular segments distinctly transverse, slightly widening towards tip, F7 1.3x as wide as F1; club 1.43x wider than F7, 1.35x as long as wide; mesonotum finely wrinkled; parapsidal groove shallow; propodeum without carina, smooth; forewing with

marginal vein 3.9x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 1.8x as long as stigmal vein. Body dark-blueish, bronze, except gaster blue-green. hind femora with distinct tooth, 3.5x as long as width. Ovipositor index: 1.32.

Description:

Female. Body (Fig. 14a) dark-blueish, bronze, except gaster blue-green., Scape metallic blue; femora and tibiae concolorous with body, except tips of tibiae and tarsi yellow, except last segment black (Fig. 14b); wing hyaline, veins yellow. Length 2.0mm + ovipositor 0.6 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 40:18; POL 3x OOL; OOL as diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 40:35; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/3 hight of eye. external margin of clypeus straight; face with fine sculpture. Antenna (Fig. 14c) with funicular segments with one row of sparse sensillae (3-4), Scape and tibiae metallic blue; antenna with scape equal to pedicel plus anellus and F1-F2, and 1/3 F3 combined; pedicel 1.22x longer than wide; anellus about 2x wider than long;, funicular segments distinctly transverse, slightly widening towards tip, F7 1.3x as wide as F1; club 1.43x wider than F7, 1.35x as long as wide.

Mesosoma (Fig. 14a) slightly bulged in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 14d) finely wrinkled; parapsidal groove shallow; propodeum (Fig. 14e) without carina, smooth; forewing (Fig. 14f) with marginal vein 3.9x as long as postmarginal vein, and 6.0x stigmal vein; postmarginal vein 1.8x as long as stigmal vein; hind femora with distinct tooth, 3.5x as long as width.

Metasoma (Fig. 14a) excluding ovipositor 0.65x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.7 gaster length; Ovipositor equal to 0.7x lengths of the gaster; Ovipositor index: 1.32.

Male. Unknown.

Material examined: Holotype, female, Turkey: Adana, Aladağ. 16.vii.2001, swept from pasture, M. Doğanlar, deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Adana, Aladağ.

Host: Unknown.

Comments: Female: *Pseudoyorymus aladagensis* sp. nov. similar to *P. fidanlikensis* sp. nov. and *P. pazarensis* sp. nov.. The discussions were given under above species.

Pseudotorymus bollinensis Askew, 2002

(Figs. 15a-f)

Diagnosis. Ovipositor 0.78x length of gaster.; Body blue-green; scape basaly yellow, apically metallic; mesonotum and scutellum with fine reticulation, Antenna with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.9x longer than wide; anellus almos quadrate; funicular segments with one row of dense sensillae (4-9), funicular segments slightly transverse, slightly widening towards tip, F7 1.24x as wide as F1; club 1.17x wider than F7, 1.86x as long as wide, clava not quate as long as 3 preceeding segments combined; mesonotum and scutellum with fine reticulation; parapsidal groove deep; propodeum with very fine and weak longitudinal reticulation and a row of 8-10 small anterior foveae, frequently incomplete keels. Forewing with marginal vein 2.9x as long as postmarginal vein, and 8.0x stigmal vein; postmarginal vein 2.75x as long as stigmal vein; stigmal vein short, stigma small, with long uncus; width of stigma 1.6x as long as space between uncus and postmarginal vein; hind femora with distinct tooth. Ovipositor index: 1.27.

Description:

Female. Body blue-green; scape basaly yellow, apically metallic; coxae, femora and tibiae concolorous with body, except both tips of tibiae and tarsi yellow, except last segment black (Fig. 17b); wing hyaline, veins brown. Length 3.5 mm + ovipositor 1.2 mm.

Head in dorsal view slightly wider than mesoscutum, width to length 55:15; POL 2.7x OOL; OOL 1.8 as diameter lateral ocellus. Head in frontal view 1.22x wider than high in ratio 55:45; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 0.4 hight of eye; face with fine sculpture. Antenna with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.9x longer than wide; anellus almos quadrate; funicular segments with one row of dense sensillae (4-9), funicular segments slightly transverse, slightly widening towards tip, F7 1.24x as wide as F1; club 1.17x wider than F7, 1.86x as long as wide, clava not quate as long as 3 preceeding segments combined.

Mesosoma (Fig. 17a) distinctly bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum with fine reticulation; parapsidal groove deep; propodeum with very fine and weak longitudinal reticulation and a row of 8-10 small anterior foveae, frequently incomplete keels. Forewing with marginal vein 2.9x as long as postmarginal vein, and 8.0x stigmal vein; postmarginal vein 2.75x as long as stigmal vein; stigmal vein short, stigma small, with long uncus; width of stigma 1.6x as long as space between uncus and postmarginal vein; hind femora with distinct tooth, 3.33x as long as width.

Metasoma (Fig. 17a) excluding ovipositor 0.7x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.73 gaster length; Ovipositor equal to 0.78x length of the gaster. Ovipositor index: 1.27.

Male. Unknown.

Material examined: Turkey: Tokat, 1 female, 23.iv.1986, swept from pasture, M. Doğanlar; 1 female, Taşlıçiftlik, 02.v.1989; 1 female, Gümenek, 12.iv.1989, swept from pasture, H. Çam. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Tokat.

Host: Unknown.

Pseudotorymus bedirlinensis sp. nov.

(Figs. 16a-f)

Etymology. The name is derived from the name of place fromwhich the holotype was collected.

Diagnosis. Ovipositor index: 1.53; Ovipositor 0.82x length of the gaster; Body wholy blue-green, including scape and pedicel, except scape at base yellow, flagellum brown; coxae and femora concolorous with body, tibiae testaceous, tarsi yellow, except last segment brown; mesonotum and scutellum with fine wrinkled, with small shallow pits, side lobes with fine reticulation. Antenna with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.43x longer than wide; anellus 1.83x wider than long; funicular segments with one row of sparse sensillae (3-6), funicular segments slightly transverse, slightly widening towards tip, F1 1.55x, F71.83x as wide as long, F7 1.3x as wide as F1; club 1.14x wider than F7, 1.68x as long as wide; Mesosoma distinctly sloping, propodeum slightly visible from dorsal view; mesonotum finely wrinkled; with parapsidal groove deep; propodeum without carina, smooth. Forewing with marginal vein 3.85x as long as postmarginal vein, and 7.1x stigmal vein; postmarginal vein 1.81x as long as stigmal vein, radial vein thin, short; stigma broad, with long uncus, width of stigma 1.4x as long as space between uncus and postmarginal vein; hind femora with distinct, small tooth, width of femora at level of tooth equal to space between tooth and its apical tip.

Description:

Female. Body (Fig. 16a) wholy blue-green, including scape and pedicel, except scape at base yellow, flagellum brown; coxae and femora concolorous with body, tibiae testaceous, tarsi yellow, except last segment brown (Fig. 16b); wing hyaline, veins yellow. Length 2.32 mm + ovipositor 0.9 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 40:20; POL 3.3x OOL; OOL 1.16 as diameter lateral ocellus. Head in frontal view 1.22x as wide as high, in ratio 44:36; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/3 hight of eye. face with fine sculpture. Antenna (Fig. 16c) with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.43x longer than wide; anellus 1.83x wider than long; funicular segments with one row of sparse sensillae (3-6), funicular segments slightly transverse, slightly widening towards tip, F1 1.55x, F71.83x as wide as long, F7 1.3x as wide as F1; club 1.14x wider than F7, 1.68x as long as wide.

Mesosoma (Fig. 16a) distinctly sloping, propodeum slightly visible from dorsal view; mesonotum and scutellum (Fig. 16d) finely wrinkled; with parapsidal groove deep; propodeum (Fig. 16e) without carina, smooth. Forewing (Fig. 16f) with marginal vein 3.85x as long as postmarginal vein, and 7.1x stigmal vein; postmarginal vein 1.81x as long as stigmal vein, radial vein thin, short; stigma broad, with long uncus, width of stigma 1.4x as long as space between uncus and postmarginal vein; hind femora (Fig. 16b) with distinct, small tooth, width of femora at level of tooth equal to space between tooth and its apical tip.

Metasoma (Fig. 16a) excluding ovipositor 0.85x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.8 gaster length; Ovipositor 0.82x length of the gaster; hind femora with distinct tooth, 4.1x as long as width . Ovipositor index: 1.53.

Male. Unknown.

Material examined: Holotype, female, Turkey: Sivas, Bedirli, 22.v.2005, swept from pasture, M. Doğanlar, deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Sivas, Bedirli.

Host: Unknown.

Comments: Female: *Pseudoyorymus bedirlinensis* sp. nov. similar to *P. bollinensis* Askew, and *P. ocaklii* sp. nov., in having ovipositor about 0.8x length of the gaster, hind femora with distinct tooth. But the new species differs from *P. bollinensis* and *P. ocaklii* sp. nov. in having anellus distinctly transverse (1.83x wider than long) (in *P. bollinensis* anellus almost quadrate to longer than wideand, ovipositor index 1.27; in *P. ocaklii* sp. nov. anellus 1.5x wider than long; ovipositor index: 1.4), and differs from *P. papaveris* (Thomson) in having ovipositor about 0.8x length of the gaster and ovipositor index: 1.53 (in *P. papaveris* ovipositor 0.94x length of the gaster, ovipositor index: 1.43).

Pseudotorymus ocaklii sp. nov.

(Figs. 17a-f)

Etymology. The name is derived from the name of my friend, Mr. Atilla Ocaklı, who helped me during collecting the types.

Diagnosis. Ovipositor 0.84x length of the gaster; Antenna with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.58x longer than wide; anellus 1.5x wider than long; funicular segments with one row of sparse sensillae (2-6), Body wholy blue-green, including scape and pedicel, except scape at base yellow, flagellum brown; coxae and femora concolorous with body, tibiae testaceous, tarsi yellow, except last segment brown; mesonotum and scutellum finely wrinkled, without pits, side lobes with fine reticulation, with parapsidal groove shallow; propodeum without carina, smooth. Forewing with marginal vein 3.35x as long as postmarginal vein, and 8.4x stigmal vein; postmarginal vein 2.86x as long as stigmal vein, radial vein broad, short; stigma broad, with long uncus, width of stigma 1.67x as long as space between uncus and postmarginal vein; hind femora with distinct tooth, width of femora at level of tooth 1.2x to space between tooth and its apical tip. Ovipositor index: 1.4.

Description:

Female. Body (Fig. 17a) wholy blue-green, including scape and pedicel, except scape at base yellow, flagellum brown; coxae and femora concolorous with body, tibiae testaceous, tarsi yellow, except last segment brown (Fig. 17b); wing hyaline, veins yellow. Length 1.63-2.05 mm + ovipositor 0.65-0.70 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 35:14; POL 2x OOL; OOL 1.67 as diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 35:33; dorsal margin of torulus distinctly above level of lower orbit; malar space consists 1/4 hight of eye. face with fine sculpture. Antenna (Fig. 17c) with scape equal to pedicel plus anellus and F1-F2+1/3 F3 combined; pedicel 1.58x longer than wide; anellus 1.5x wider than long; funicular segments with one row of sparse sensillae (2-6), funicular segments moderately transverse, distinctly widening towards tip, F1 1.75x, F7 1.67x as wide as long, F7 1.43x as wide as F1; club 1.3x wider than F7, 1.2x as long as wide.

Mesosoma (Fig. 17a) distinctly sloping, propodeum slightly visible from dorsal view; mesonotum (Fig. 17d) finely wrinkled; with parapsidal groove shallow; propodeum (Fig. 17e) without carina, smooth. Forewing (Fig. 17f) with marginal vein 3.35x as long as postmarginal vein, and 8.4x stigmal vein; postmarginal vein 2.86x as long as stigmal vein, radial vein broad, short; stigma broad, with long uncus, width of stigma 1.67x as long as space between uncus and postmarginal vein. Hind femora with distinct tooth, 3.67x as long as width; width of femora at level of tooth 1.2x to space between tooth and its apical tip.

Metasoma (Fig. 17a) excluding ovipositor 0.72x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.8 gaster length; Ovipositor equal to 0.82x lengths of the gaster. Ovipositor index: 1.4.

Male. Unknown.

Material examined: Holotype, female, Turkey: Tokat, Pazar, Soner Çiftlik. 04.vii.1989, reared from seed capsules of *Papaver* sp., M. Doğanlar. Paratype: 1 female, Tokat, Taşlıçiftlik, 28.iv. 1989, swept from pasture, H. Çam. All of the types were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Tokat, Taşlıçiftlik; Pazar.

Host: Reared from seed capsules of *Papaver* sp.

Comments: Female: *Pseudotorymus ocaklii* sp. nov. similar to *P. berdirlinensis* sp. nov.. The discussions were given under above species.

***Pseudotorymus papaveris* (Thomson, 1876)**

(Figs. 18a-g)

Diagnosis. Ovipositor 0.94x length of the gaster; Body blue-green; scape mostly yellow; mesonotum and scutellum with broad reticulation, Antenna with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.54x longer than wide; anellus 1.43x wider than long; funicular segments with one row of sparse sensillae (2-6), funicular segments slightly transverse, slightly widening towards tip, F7 1.17x as wide as F1; club 1.25x wider than F7, 1.6x as long as wide; mesonotum finely wrinkled, mesonotum and scutellum with broad deep pits; with parapsidal groove deep; propodeum without carina, smooth. Forewing with marginal vein 2.2x as long as postmarginal vein, and 4.9x stigmal vein; postmarginal vein 2.22x as long as stigmal vein; radial vein long, stigma small, with long uncus; width of stigma 1.14x as long as space between uncus and postmarginal vein; hind femora with distinct tooth. Ovipositor index: 1.43.

Description:

Female. Body (Fig. 18a) blue- green; scape mostly yellow; coxae, femora and tibiae concolorous with body, except both tips of tibiae and tarsi yellow, except last segment black (Fig. 18b); wing hyaline, veins yellow. Length 2.13 mm + ovipositor 1.0 mm.

Head in dorsal view almost as wide as mesoscutum, width to length 42:18; POL 2.2x OOL; OOL 1.3 as diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 42:35; dorsal margin of torulus distinctly below level of lower orbit; malar space consists 1/3 hight of eye; face with fine sculpture. Antenna (Fig. 18c) with scape equal to pedicel plus anellus and F1-F2 combined; pedicel 1.54x longer than wide; anellus 1.43x wider than long; funicular segments with one row of sparse sensillae (2-6), funicular segments slightly transverse, slightly widening towards tip, F7 1.17x as wide as F1; club 1.25x wider than F7, 1.6x as long as wide.

Mesosoma (Fig. 18a) slightly bulged in profile, propodeum distinctly visible dorsally; mesonotum and scutellum (Fig. 17d) with broad deep pits; with parapsidal groove deep; propodeum (Fig. 18e) without carina, transversally striated. Forewing (Fig. 18f) with marginal vein 2.2x as long as postmarginal vein, and 4.9x stigmal vein; postmarginal vein 2.22x as long as stigmal vein; radial vein long, stigma small, with long uncus; width of stigma 1.14x as long as space between uncus and postmarginal vein. Hind femora with distinct tooth, 4.0x as long as width.

Metasoma (Fig. 18a) excluding ovipositor 0.65x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.86 gaster length; Ovipositor equal to length of the gaster; Ovipositor index: 1.43.

Male. Beside gaster similar to female except antenna. Antenna (Fig. 18g) with pedicel 1.33x longer than wide; anellus 1.67x wider than long; club 1.17x wider than F7.

Material examined: Turkey: Erzurum, 2 males, 18.vi.1982, 2 females, 06-17.vi.1984, swept from pasture, M. Doğanlar; 15 females, 13 males, Tokat, Artova, 15-18.vii.1990, reared from seed capsules of Papaver sp., M. Doğanlar; Tokat, 1 male, 12.iv.1989, H. Çam; 3 males, 05.-30.v. 1989; 1 female, 1 male, 28.vii.1989; 2 females, 3 males, 01-28.viii.1989; 2 females, 05-15.v. 1989; Necip, 2 females, 11.v.1989; Fidanlık, 3 females, 24.iv.1989; Taşlıciftlik, 7 females, 1 male, 14.-28.iv.1989; 4 females, 4 males, 02.v. 1989; 1 female, 1 male, 07.ix.1989, swept from pasture, H. Çam. All of the specimens were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Erzurum.

Host: From the gall midges and, possibly, gall-flies on *Papaver* spp.

Pseudotorymus sivasensis sp. nov.

(Figs. 19a-f)

Etymology. The name is derived from the name of place fromwhich the holotype was collected.

Diagnosis. Ovipositor 0.53x length of the gaster. Antenna with anellus 2.16x wider than long; funicular segments distinctly transverse, distinctly widening towards tip, F7 1.45x as wide as F1; F1 1.47x, F7 2.3x as wide as long; funicular segments with one row of dense sensillae (4-9); club 1.27x wider than F7, 1.47x as long as wide; mesonotum distinctly wrinkled, between them finely reticulated with deep punctures; with parapsidal groove deep; propodeum without carina, slightly and transversally striated. Forewing with marginal vein 4.2x as long as postmarginal vein, and 6.25x stigmal vein; postmarginal vein 1.7x as long as stigmal vein. Body blue-green,including legs, tips of tibiae and tarsi yellow; antenna with scape and pedicel metallic blue, flagellum brown. Hind femora with distinct tooth; Ovipositor index: 0.74.

Description:

Female. Body (Fig. 19a) blue-green,including legs, tips of tibiae and tarsi yellow; antenna with scape and pedicel metallic blue, flagellum brown.wing hyaline, veins yellow. Length 2.75 mm + ovipositor 0.5 mm.

Head in dorsal view 1.1x as wide as mesoscutum, width to length 50:17; POL 3x OOL; OOL as diameter lateral ocellus. Head in frontal view 1.3x wider than high in ratio 50:38; dorsal margin of torulus distinctly below level of lower orbit; malar space consists 0.4 hight of eye. Face with fine sculpture. Antenna (Fig. 19c) with anellus 2.16x wider than long; funicular segments distinctly transverse, distinctly widening towards tip, F7 1.45x as wide as F1; F1 1.47x, F7 2.3x as wide as long; funicular segments with one row of dense sensillae (4-9); club 1.27x wider than F7, 1.47x as long as wide.

Mesosoma (Fig. 19a) slightly bulged in profile, propodeum distictly visible dorsally; mesonotum (Fig. 19d) distinctly wrinkled, between them finely reticulated with deep punctures; with parapsidal groove deep; propodeum (Fig. 19e) without carina, slightly and transversally striated. Forewing (Fig. 19f) with marginal vein 4.2x as long as postmarginal vein, and 6.25x stigmal vein; postmarginal vein 1.7x as long as stigmal vein. Hind femora with distinct tooth, 3.86x as long as width.

Metasoma (Fig. 19a) excluding ovipositor 0.6x shorter than rest of body; basal 4 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.77 gaster length; Ovipositor equal to 0.53x lengths of the gaster; Ovipositor index: 0.74.

Male. Unknown.

Material examined: Holotype, female, Turkey: Sivas, Hara, 30.5.92, swept from pasture, M. Doğanlar. **Paratypes:** 2 females, same data as holotype. All of the specimes were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Sivas.

Host: Unknown.

Comments: *Pseudotorymus sivasensis* sp. nov. is similar to *P. nephthys* Walker in having ovipositor (Fig. 19a) 0.53x length of the gaster. But it differs from *P. nephthys* in having forewing (Fig. 19f) with basal cell open, and thoracic dorsum bulged (in *P. nephthys* forewing basal vein pilose with at least 5 hairs; basal cell closed below in distal half or more, and thoracic dorsum flattened).

Pseudotorymus pannonicus (Mayr, 1874)

(Figs. 20a-f)

Diagnosis. Antenna with anellus 2x wider than long; funicular segments having F1 small, about half length of F2, about twice as wide as long; F2-F7 slightly widening towards tip, F7 1.33x as wide as F1; funicular segments with one row of very sparse sensillae (1-3); club 1.33x wider than F7, twice as long as wide; mesonotum with distinct fine reticulation; with parapsidal groove deep; propodeum without carina finely reticulated. Forewing with marginal vein 2.2x as long as postmarginal vein, and 4.6x stigmal vein; postmarginal vein 2.1x as long as stigmal vein. Body blue-green, the gaster at base bronze. Hind femora with distinct tooth; ovipositor 0.4 the length of the gaster; Ovipositor index: 0.55.

Description:

Female. Body (Fig. 20a) dark-blueish, bronze. Scape and flagellum testaceous; coxae and femora concolorous with body, except 1/3 apical part of femora, tibiae and tarsi yellow, except last segment brown (Fig. 20b); wing hyaline, veins yellow. Length 1.5 mm + ovipositor 0.25 mm.

Head in dorsal view 1.3x as wide as mesoscutum, width to length 26:12; POL 2x OOL; OOL 2x as diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 26:23; dorsal margin of torulus distinctly below level of lower orbit; malar space consists 0.36 hight of eye. face with fine sculpture. Antenna (Fig. 20c) with anellus 2x wider than long; funicular segments having F1 small, about half length of F2, about twice as wide as long; F2-F7 slightly widening towards tip, F7 1.33x as wide as F1; funicular segments with one row of very sparse sensillae (1-3); club 1.33x wider than F7, twice as long as wide.

Mesosoma (Fig. 20a) slightly bulged in profile, propodeum slightly visible dorsally; mesonotum and scutellum (Fig. 20d) with distinct fine reticulation; with parapsidal groove deep; propodeum (Fig. 20e) without carina, finely longitudinally reticulated. Forewing (Fig. 20f) with marginal vein 2.2x as long as postmarginal vein, and 4.6x stigmal vein; postmarginal vein 2.1x as long as stigmal vein. Hind femora with distinct tooth, 3.9x as long as width.

Metasoma (Fig. 20a) excluding ovipositor 0.76x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.73 gaster length; Ovipositor equal to 0.4x lengths of the gaster; Ovipositor index: 0.55.

Male. Unknown.

Material examined: 2 females, Turkey: Erzurum, 17.vi.1964, swept from pasture, M. Doğanlar. All of the specimes were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Erzurum.

Host: Unknown.

Pseudotorymus pazarcikensis sp. nov.

(Figs. 21a-g)

Etymology. The name is derived from the name of place fromwhich the holotype was collected.

Diagnosis. Antenna with anellus 1.6x wider than long; funicular segments slightly transverse, slightly widening towards tip, F7 1.25x as wide as F1; F1 1.33x, F7 1.67x as wide as long; funicular segments with one row of dense sensillae (5-7); club 1.13x wider than F7, twice as long as wide; mesonotum with distinct fine reticulation; with parapsidal groove shallow; propodeum without carina, ditinctly longitudinally striated. Forewing with marginal vein 3.6x as long as postmarginal vein, and 7.3x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Body blue-green,including legs, tips of tibiae and tarsii yellow; antenna scape yellow pedicel and flagellum brown. Hind femora with distinct tooth, 3.62 x as long as width; ovipositor 0.44x length of the gaster. Ovipositor index: 0.88.

Description:

Female. Body (Fig. 21a) blue-green,including legs, tips of tibiae and tarsii yellow; antenna scape yellow pedicel and flagellum brown (Fig. 20c); wing hyaline, veins yellow. Length 2.62 mm + ovipositor 0.58 mm.

Head in dorsal view as wide as mesoscutum, width to length 52:22; POL 2.33x OOL; OOL 1.5x as diameter lateral ocellus. Head in frontal view slightly wider than high in ratio 52:48; dorsal margin of torulus distinctly below level of lower orbit; malar space consists 0.43 hight of eye. Face with fine sculpture. Antenna (Fig. 21c) with anellus 1.6x wider than long; funicular segments slightly transverse, slightly widening towards tip, F7 1.25x as wide as F1; F1 1.33x, F7 1.67x as wide as long; funicular segments with one row of dense sensillae (5-7); club 1.13x wider than F7, twice as long as wide.

Mesosoma (Fig. 21a) slightly bulged in profile, propodeum distictly visible dorsally; mesonotum with distinct fine reticulation; with parapsidal groove shallow; propodeum (Fig. 21e) without carina, ditinctly longitudinally striated. Forewing (Fig. 21f) with marginal vein 3.6x as long as postmarginal vein, and 7.3x stigmal vein; postmarginal vein 2.0x as long as stigmal vein. Hind femora with distinct tooth, 3.62x as long as width.

Metasoma (Fig. 21a) excluding ovipositor 0.7x shorter than rest of body; basal 3 tergite with posterior margin weakly incised medially; tip of hypopygium at 0.83 gaster length; Ovipositor equal to 0.44x lengths of the gaster Ovipositor index: 0.88.

Male. Beside gaster similar to female except antenna: Antenna (Fig. 21c) with anellus 1.6x wider than long; funicular segments slightly transverse, slightly widening towards tip, F7 1.25x as wide as F1; F1 1.33x, F7 1.67x as wide as long; funicular segments with one row of dense sensillae (5-7); club 1.13x wider than F7, twice as long as wide.

Material examined: Holotype, female, Turkey: Kahramanmaraş. 24.v.2007, swept from pasture, M. Doğanlar. **Paratypes:** 9 females, 3 males, same data as holotype. All of the specimes were deposited in the Insect collection of Research Station of Biological Control, Adana (IMBC).

Distribution: Turkey: Erzurum.

Host: Unknown.

Comments: *Pseudotorymus pazarcikensis* sp. nov. similar to *P. pannonicus* (Mayr) in having ovipositor about 0.42x length of the gaster, hind femora with distinct tooth and postmarginal vein about twice as long as stigmal vein. But it differs from *P. pannonicus* in having antenna with anellus 1.6x wider than long; funicular segments with F1 almost in same size with F2, 1.67x as wide as long; F7 1.25x as wide as F1; F1 1.33x, F7 1.67x as wide as long; funicular segments with one row of dense sensillae (5-7); mesonotum with parapsidal groove shallow; propodeum without carina, densely and longitudinally striated. Forewing with marginal vein 3.6x as long as postmarginal vein, and 7.3x stigmal vein (in *P. pannonicus* antenna with anellus 2x wider than long; funicular segments having F1 small, about half length of F2, about twice as wide as long; F2-F7 slightly widening towards tip, F7 1.33x as wide as F1; funicular segments with one row of very sparse sensillae (1-3); mesonotum with parapsidal groove deep; propodeum without carina finely reticulated. Forewing with marginal vein 2.2x as long as postmarginal vein, and 4.6x stigmal vein).

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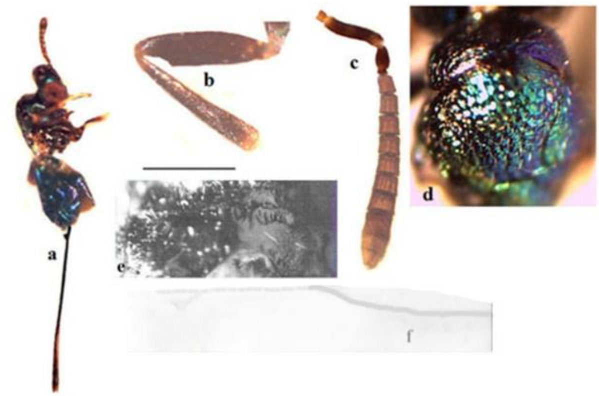

Figure 1. *Pseudotorymus sapphyrinus* (Fonscolombe). a. body; b. hind femora and tibia; c. antenna; d. mesonotum; e. propodeum; f. forewing veins. Scale bare for a = 1.0 mm; for b = 0.39 mm; for c = 0.26 mm; for d = 0.34 mm; for e = 0.44 mm; for f = 0.31 mm.

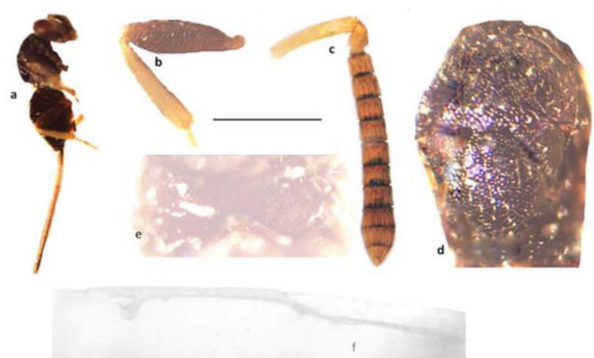

Figure 2. *Pseudotorymus adananensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins. Scale bare for a = 1.86 mm; for b = 0.64 mm; for c = 0.18 mm; for d = 0.43 mm; for e = 0.36 mm; for f = 0.45 mm.

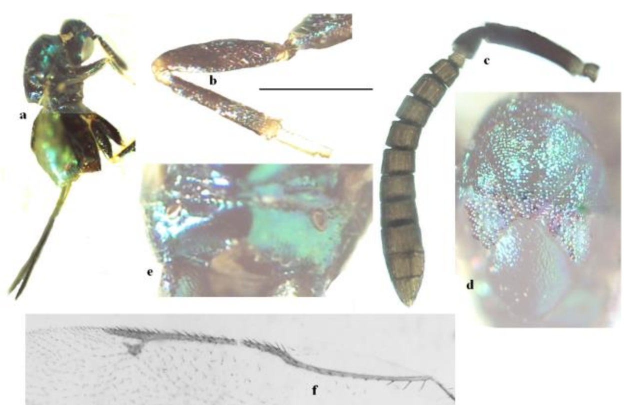

Figure 3. *Pseudotorymus nigdenensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins. Scale bare for a = 1.28 mm; for b = 0.47 mm; for c = 0.20 mm; for d, f = 0.42 mm; for e = 0.3 mm.

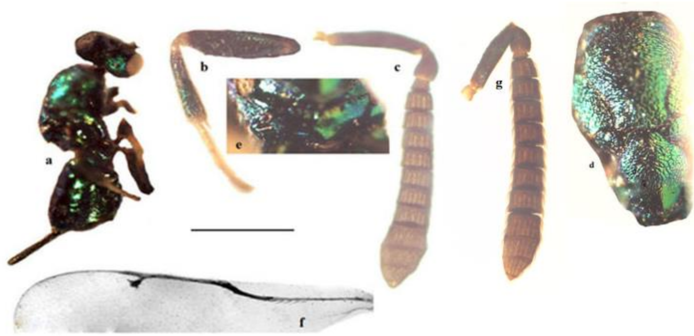

Figure 4. *Pseudotorymus celikhanensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum; f. forewing veins; g. male antenna. Scale bare for a = 1.1 mm; for b = 0.36 mm; for c-e, g = 0.28 mm; for f = 0.63 mm.

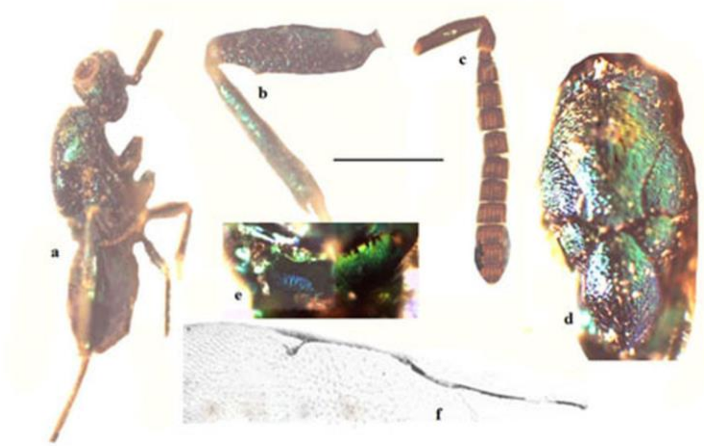

Figure 5. *Pseudotorymus lutfiyeae* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.97 mm; for b,c = 0.27 mm; for d = 0.40 mm; for e = 0.16 mm; for f = 0.52 mm.

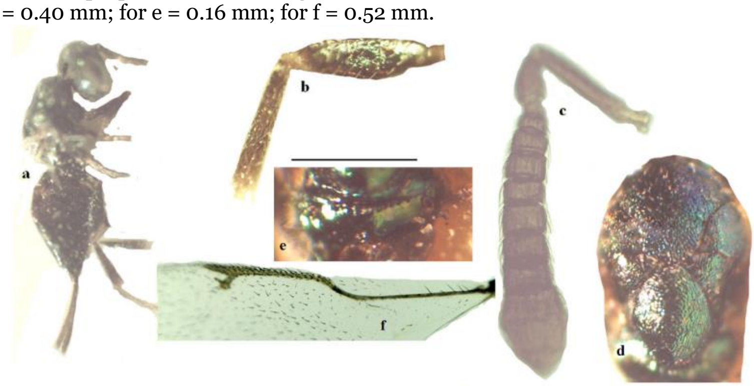

Figure 6. *Pseudotorymus haliti* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.0 mm; for b = 0.4 mm; for c = 0.2 mm; for d = 0.4 mm; for e = 0.3 mm; for f = 0.67 mm.

Figure 7. *Pseudotorymus verbasci* Erdös. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.9 mm; for b = 0.5 mm; for c = 0.2 mm; for d = 0.6 mm; for e = 0.4 mm; for f = 0.53 mm.

Figure 8. *Pseudotorymus kecikuyusunensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.26 mm; for b = 0.57 mm; for c = 0.6 mm; for d = 0.33 mm; for e, f = 0.63 mm.

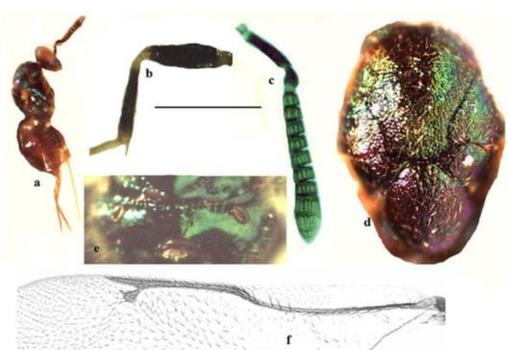

Figure 9. *Pseudotorymus horasanensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.73 mm; for b = 0.62 mm; for c = 0.36 mm; for d = 0.35 mm; for e, f = 0.32 mm.

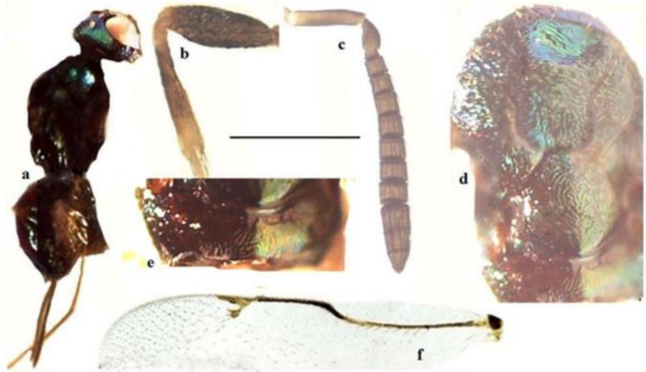

Figure 10. *Pseudotorymus dogubayezitensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.03 mm; for b = 0.57 mm; for c = 0.30 mm; for d, e = 0.44 mm; for f = 0.61 mm.

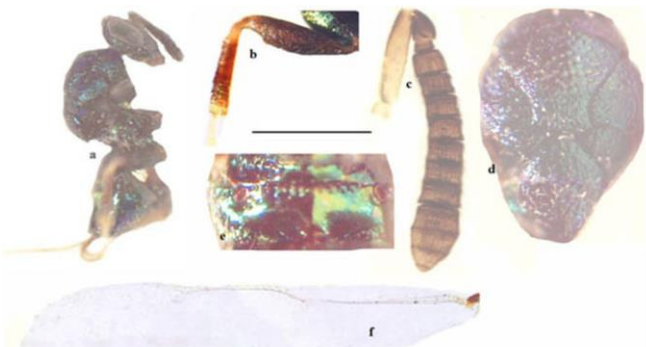

Figure 11. *Pseudotorymus samsatensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.97 mm; for b = 0.6 mm; for c = 0.48 mm; for d = 0.44 mm; for e = 0.39 mm; f = 0.41 mm.

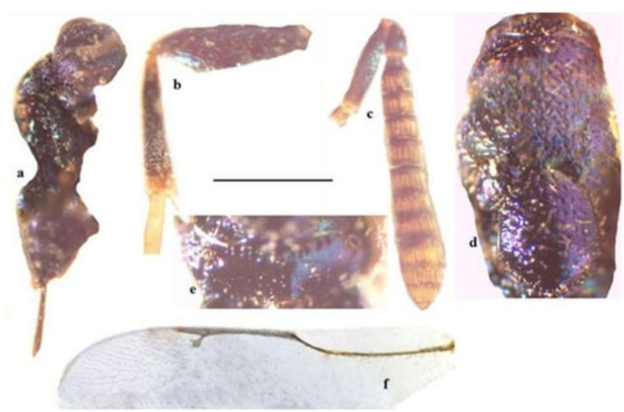

Figure 12. *Pseudotorymus leguminus* Ruschka. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.4 mm; for b = 0.68 mm; for c = 0.36 mm; for d = 0.45 mm; for e = 0.4 mm; f = 0.86 mm.

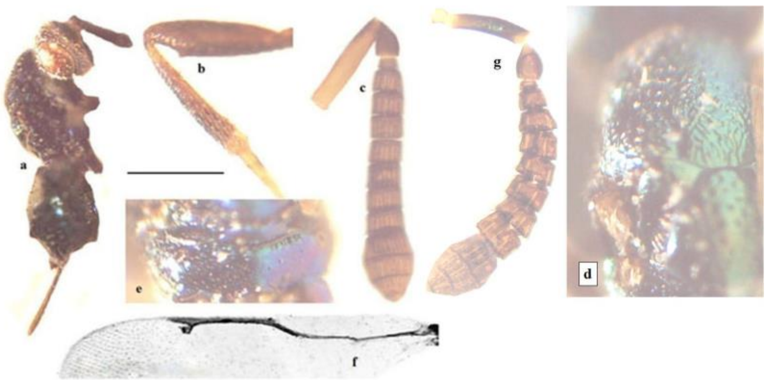

Figure 13. *Pseudotorymus ispirlii* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins; g. male antenna. Scale bare for a = 1.05 mm; for b = 0.42 mm; for c-g = 0.24 mm; for d, e = 0.42 mm; f = 0.61 mm.

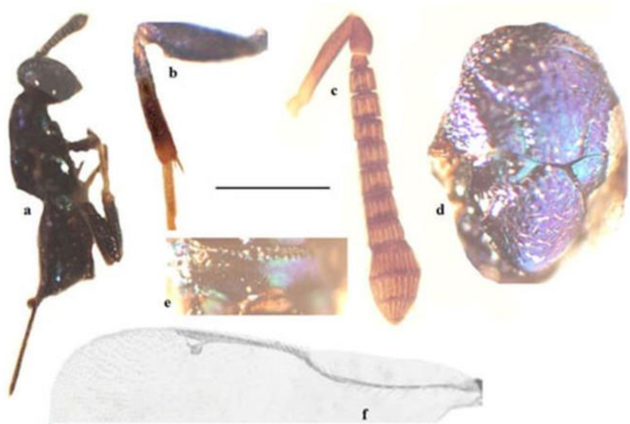

Figure 14. *Pseudotorymus aladagensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.78 mm; for b = 0.41 mm; for c = 0.16 mm; for d, e = 0.30 mm; for f = 0.46 mm.

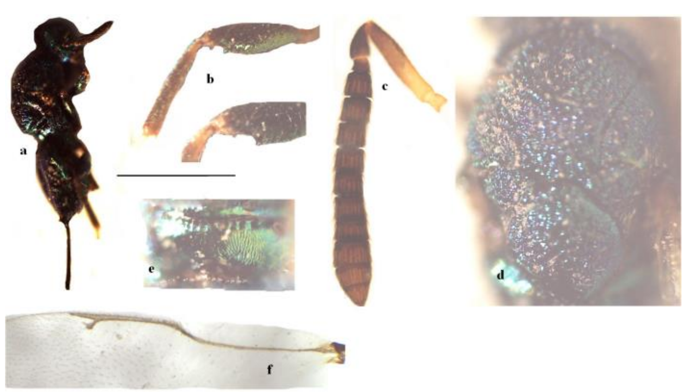

Figure 15. *Pseudotorymus bollinensis* Askew. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 2.12 mm; for b = 1.03 mm; for c = 0.43 mm; for d, e = 0.68 mm; for f = 0.1.0 mm.

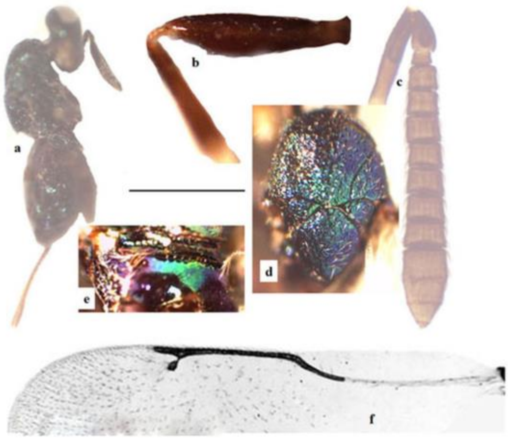

Figure 16. *Pseudotorymus bedirlinensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1.22 mm; for b = 0.51 mm; for c = 0.25 mm; for d, e = 0.65 mm; for e = 0.49 mm; for f = 0.53 mm.

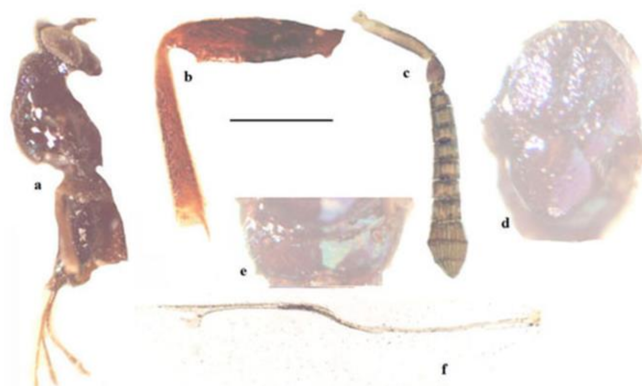

Figure 17. *Pseudotorymus ocaklii* n.sp. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.7 mm; for b = 0.35 mm; for c = 0.20 mm; for d = 0.39 mm; for e = 0.35 mm; for f = 0.9 mm.

Figure 18. *Pseudotorymus papaveris* (Thomson). a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. g. male antenna. Scale bare for a = 1.08 mm; for b = 0.46 mm; for c, g= 0.26 mm; for d, e = 0.33 mm; for f = 0.77 mm.

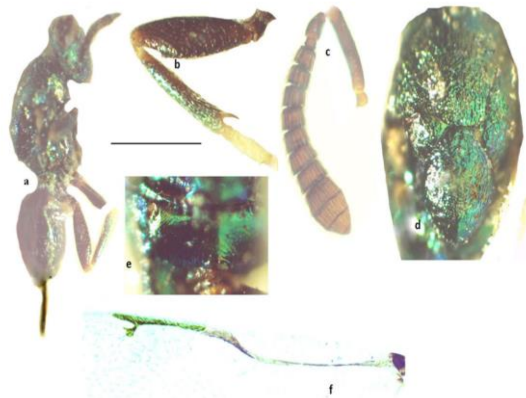

Figure 19. *Pseudotorymus sivasensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1. 1 mm; for b = 0.53 mm; for c = 0.32 mm; for d = 0.51 mm; for e = 0.46 mm; for f = 0.5 mm.

Figure 20. *Pseudotorymus pannonicus* (Mayr). a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 0.62 mm; for b = 0.28 mm; for c = 0.20 mm; for d = 0.30 mm; for e = 0.24 mm; for f = 0.8 mm.

Figure 21. *Pseudotorymus pazarcikensis* sp. nov. a. body; b. hind femora and tibia; c. antenna; d. mesosoma; e. propodeum. f. forewing veins. Scale bare for a = 1. 2 mm; for b = 0.48 mm; for c = 0.38 mm; for d = 0.5 mm; for e = 0.6 mm; for f = 0.75 mm; for g= 0.37 mm.

AN ASSESSMENT ON POPULATION DENSITY OF SAN JOSE SCALE *QUADRASPIDIOTUS PERNICIOSUS* (COMSTOCK) AND ITS BIOLOGICAL CONTROL IN KASHMIR (HEMIPTERA: DIASPIDIDAE)

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ABSTRACT: San Jose scale *Quadraspidiotus perniciosus* is a key pest of apple crop in the northern states of India. An assessment on its population density was carried out in five districts of Kashmir Valley. In district Baramulla, the pooled mean scale population ranged from 10.29 per cm^2 area to 37.32 /cm^2 over the course of its active period from April to October. This population range was 10.74–36.45 scales /cm^2 area in district Bandipora, 11.39–37.48 /cm^2 area in district Srinagar, 10.22–35.57 /cm^2 area in district Anantnag, and 10.14–33.72 /cm^2 area in district Budgam. The efficacy of entomopathogenic fungi– *Beauveria bassiana*, *Metarhizium anisopliae* sensu lato and *Lecanicillium lecanii* at three concentrations against the pest was examined in an experimental orchard. Mortality of the pest was monitored at 2-day intervals until 30 days after application and the maximum mortality was used for data analysis. All three fungal pathogens caused mortality of the pest particularly with the increase of treatment concentration. High mortality (77%) was determined with *B. bassiana* at 15×10^5 conidia /ml. concentration followed by *L. lecanii* at the same concentration (mortality 75%). However, *M. anisopliae* sensu lato was significantly less effective (mortality 53–68%) among the three concentrations tested during field trial. The results demonstrate the suitability of entomopathogenic fungi for controlling San Jose scale.

KEY WORDS: Population density, *Quadraspidiotus perniciosus,* Hemiptera, Diaspididae, biological control

San Jose scale *Quadraspidiotus perniciosus* (Comstock) (Hemiptera: Diaspididae) is a key pest of apple in certain hilly tracts of India (Malik et al., 1972; Masoodi et al., 1993). Its distribution throughout the temperate regions of the world and its expansion to additional host species make this insect a serious pest. Female San Jose scales produce crawlers which settle on the bark, leaves and fruit and because of their small size are difficult to detect visually. A single female produces up to 500 crawlers (Korchagin, 1987) and crawler emergence continues from middle of May to middle of October in Kashmir apple orchards (Masoodi & Trali, 1987; Buhroo et al., 2000). If crawlers from heavy infestations are left untreated, they may cause appreciable fruit damage.

Biological control based on parasites and predators have been tested with variable success (Masoodi & Trali, 1987; Rawat et al., 1988; Masoodi et al., 1989a,b; Thakur et al., 1989; Thakur et al., 1993; Masoodi et al., 1996). Among the causal agents of diseases in insects such as protozoans, bacteria, viruses, rickettsia and nematodes, the entomogenous fungi also play a relevant role. There are minimal effects of entomopathogenic fungi on non-targets and they offer a safer alternative for use in IPM than chemical insecticides (Goettel & Hajek, 2000; Pell et al., 2001; Hajek & Delalibera, 2010; Khan et al., 2012).

The objective of this study was to assess the population density of San Jose scale in Kashmir and to test the effectiveness of various concentrations of entomopathogenic fungi– *Beauveria bassiana* (Bals.) Vuill, *Metarhizium anisopliae* sensu lato (Metsch.) Sorokin, and *Lecanicillium lecanii* (Zimm.) Zare & Gams against the pest during field trial.

MATERIALS AND METHODS

Population density

San Jose scale population density was assessed in five districts of Kashmir viz. Baramulla, Bandipora, Srinagar, Anantnag and Budgam during the year 2008. At each district three orchards were taken and from each orchard ten apple trees (Red Delicious cultivar) were randomly selected. Orchards were categorized as high, medium and least infested on visual basis taking into account live scale population. The twigs of selected trees were examined for recording scales per square centimeter area on five spots in each tree. The observations were recorded at fortnightly intervals from last week of March to October.

Field trial

The field trial for determining efficacy of fungal applications was carried out in an apple orchard located at Pulwama district in Kashmir. At the trial site, the orchard had many apple cultivars but Red Delicious was the predominant cultivar. The orchard was spread over 0.81 hectares having 15-20 year old trees and the rows planted at a distance of 5 meters from each other. The average height of the trees was 3.5 meters (±1.5 SD) and trees were infested with San Jose scale. The orchard was taken mainly on the basis of heavy infestation caused by the pest during the preceding years and 30 infested apple trees were labeled for different applications.

Fungal treatment

The commercial forms of insect pathogenic fungi were obtained from Varsha Bioscience and Technology, Vinay Nagar, Saidabad, Hyderabad-500 059. They included *Beauveria bassiana* NCIM 1216 (spore count 1×10^8 CFU /g.), *Metarhizium anisopliae* sensu lato NCIM 1311 (CFU 1×10^8 /g.) and *Lecanicillium lecanii* NCIM 1312 (CFU 1×10^8 /g.). Each product also contained Talc as a dispersant. The products were stored under cryogenic conditions. Conidial suspensions of each fungus for bioassays were made in distilled water at three concentrations – low (5×10^5 conidia /ml.), medium (1×10^6 conidia /ml.) and high (15×10^5 conidia /ml.). The fungal treatments (5 litres of each formulation) were applied with the help of a foot sprayer to the complete tree. Treatments consisted of application to three replicate trees with each of the three fungi at each of 3 concentrations (low, medium and high). *Beauveria bassiana* at low concentration was applied to three trees, medium concentration to three trees and high concentration to three trees (and the same was done for *M. anisopliae* and *L. lecanii*). In the vicinity of these applications, three infested apple trees were sprayed with distilled water which served as control trees during the course of experimentation.

At the treatment site, the treatments were started 10 days after the emergence of first crawlers. This helped to provide the additional host material (fresh as well as old scales) to the fungal pathogen.

Live San Jose scales were counted on the surface of the bark on five, 1 cm^2 areas per tree (= 1 replicate). The areas selected for counting were based on large insect population presence. This was done one day before treatment (one spray only) and at subsequent interval of 2-days after treatment for a period of 30 days. During counting, the waxy covers of the scales were carefully removed with the help of a scalpel. The shrunk and flaccid scales under the waxy cover were treated as dead. The percentage mortality of San Jose scale was calculated at the experimental site.

Statistical analysis

Statistical analyses were performed using SPSS version 20.0 for Windows. All data were analyzed using descriptive statistics and the percentage mortalities after applications were separated using Tukey's HSD test. The treatment effects were statistically significant at $P \leq 0.05$.

RESULTS AND DISCUSSION

The data collected on population density of San Jose scale in district Baramulla is presented in Figure 1. The results revealed that the pooled mean of live scale population was 10.29 per cm^2 area at the end of March which increased to a peak of 37.32 /cm^2 at the end of July and from there onwards it gradually declined to 26.48 /cm^2 area in the first fortnight of October. The data collected in district Bandipora (Fig. 2) revealed that the pooled mean population of the scales was 10.74 /cm^2 area in the 1st week of April which reached to a maximum of 36.45 /cm^2 area at the end of July and thereafter slowly declined to a low of 25.45 /cm^2 area until the middle of October. In district Srinagar (Fig. 3) the live scale population was 11.39 /cm^2 area in the first week of April which gradually increased to a maximum of 37.48 /cm^2 area up to the first week of August. Then the population declined to a low of 26.32 /cm^2 area up to the middle of October. The data collected in district Anantnag (Fig. 4) revealed that the population of the scales was 10.22 /cm^2 area in the first week of April which increased to a maximum of 35.57 /cm^2 area in the first week of August and then it came down to 24.17 /cm^2 area in the third week of October. The data collected at district Budgam (Fig. 5) showed a population of 10.14 scales /cm^2 area in the first fortnight of April which gradually increased to 33.72 /cm^2 area in the first week of August and then it again declined to 24.39 /cm^2 area in the second fortnight of October.

The above observations showed that the sequence of population level of San Jose scale in different apple orchards remained more or less the same throughout the districts surveyed in Kashmir. The peak population was always observed in August in all the districts surveyed. However, the maximum population was observed in districts Srinagar and Baramulla followed by districts Bandipora, Anantnag and Budgam.

The data collected on percentage mortality at the Awantipora experimental site is presented in Figure 6. The treatments showed that the scales infesting apple trees were highly susceptible to the fungal species tested and the high mortality was achieved on 30th day after treatment. At low concentration (5×10^5 conidia /ml.), the mortality of scales reached a maximum of 61.66% (±1.15 SD) with *B. bassiana*, 53.16% (±1.58 SD) with *M. anisopliae,* and 62.56% (±1.41 SD) with *L. lecanii*. At medium concentration (1×10^6 conidia /ml.), mortality reached a maximum of 69.33% (±2.19 SD) with *B. bassiana*, 57.10% (±1.47 SD) with *M. anisopliae,* and 65.93% (±1.61 SD) with *L. lecanii*. At high concentration (15×10^5 conidia /ml.), mortality reached a maximum of 77.23% (±2.85 SD) with *B. bassiana*, 67.60% (±1.55 SD) with *M. anisopliae,* and 74.80% (±0.90 SD) with *L. lecanii*. The data also revealed that there were no significant differences between *B. bassiana* and *L. lecanii* among the fungal species at each of the three treatment concentrations (P = 0.723 for low concentration; P = 0.127 for medium concentration; and P = 0.343 for high concentration). However, both the species produced significantly higher mortality than *M. anisopliae* at each treatment concentration ($P \leq 0.001$ for low concentration; $P \leq 0.002$ for medium concentration; and $P \leq 0.009$ for high concentration). The overall maximum mortality was produced by *B. bassiana* at high conidial (15×10^5 conidia /ml.) concentration.

In control trees, there was almost negligible mortality (3.58% ±0.72 SD) of San Jose scale during the experimental period. This natural mortality occurs due to environmental factors including parasitic wasps and predators.

This work demonstrates that entomopathogenic fungi are capable of infecting San Jose scale and killing the early settled crawlers and nymphs on the bark of the apple tree. All three fungal pathogens used in the present study showed high efficacy against the pest especially with the increase of treatment concentration. The fungal pathogen *B. bassiana* has been tested and developed as a commercial mycoinsecticide by a number of researchers in the USA (e.g. Bradley et al., 1992; Poprawski et al., 1999; Vandenberg et al., 1998). Finally it was allowed for commercial use in 1999 by the U.S. Environmental Protection Agency. It is a promising biocontrol candidate used on a large variety of tree and field crops for control of grasshoppers, whiteflies, thrips, aphids and many other insect pests in North America (Shah & Pell, 2003). The present results showed that among the three species of entomopathogenic fungi, the highest mortality– 77.25% was caused by *B. bassiana* at 15×10^5 conidia /ml. concentration followed by *L. lecanii* (with same concentration) during the field trial. This high mortality obtained with *B. bassiana* is similar to the mortality observed by Sheeba et al. (2001) in rice weevils where *B. bassiana* produced mortality up to 75.8% when monitored at 5-day intervals until 25 days. In similar experiments, *B. bassiana* caused maximum mortality of 71.10% in plant bug (Liu et al., 2003) and 80% in broad mite (Nugroho & Ibrahim, 2004). In addition commercial preparations of *B. bassiana* are infective even after more than 12 months' storage at 25 °C (Wraight et al., 2001). *L. lecanii* also produced better results and caused more than 70% mortality of the scale pest in the present experiment. This pathogen has already been recommended for control of aphids and related insects in Europe (Shah & Pell, 2003) and good efficacy against a number of aphid species has been demonstrated (Hall, 1981; Milner, 1997; Burges, 2000; Yeo et al., 2003). It was also observed that among the three species of entomopathogenic fungi used, *M. anisopliae* was significantly less effective than the other two against San Jose scale.

CONCLUSION

The aim of this study was to find an alternative for synthetic insecticides so as to formulate the ecofriendly management strategies against San Jose scale. It has been noted (Shah & Pell, 2003) that most entomopathogenic fungi are best used when total eradication of a pest is not required, but instead insect populations are controlled below an economic threshold, with some crop damage being acceptable. Therefore, entomopathogenic fungi could be used against the scale pests in conjunction with other conventional and cultural methods in IPM.

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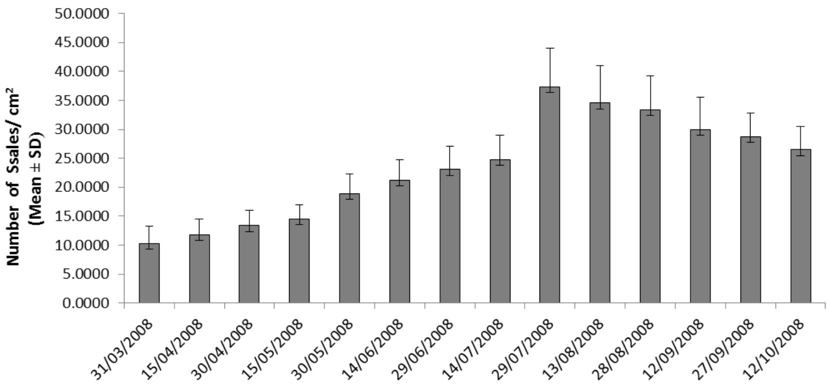

Figure 1. Pooled mean population of San José scale on Red Delicious cultivar of apple in district Baramulla.

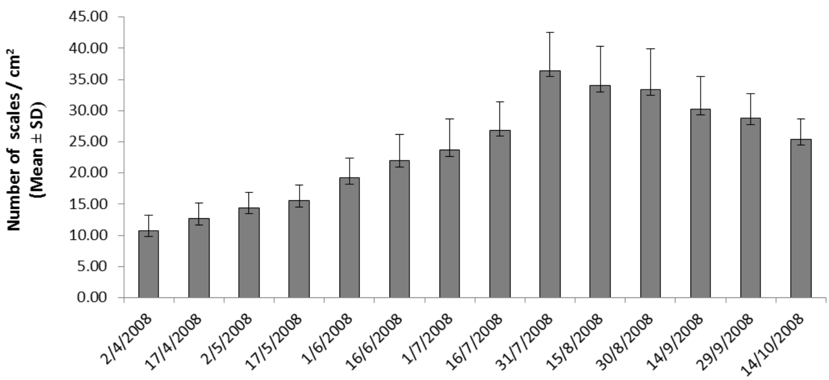

Figure 2. Pooled mean population of San José scale on Red Delicious cultivar of apple in district Bandipora.

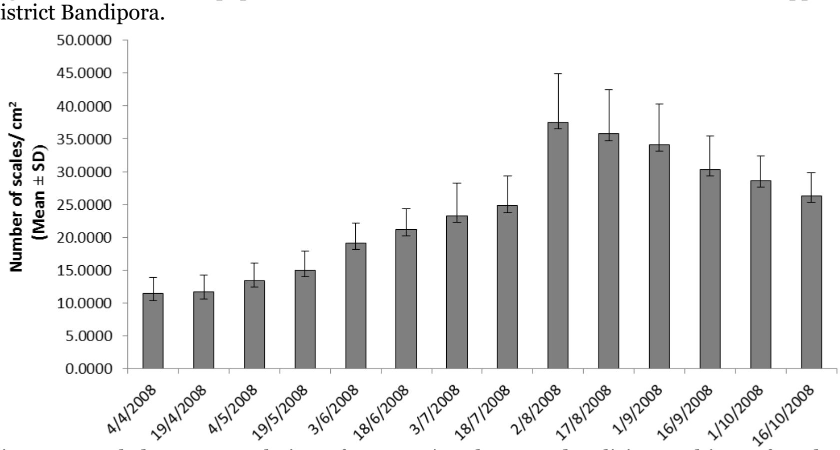

Figure 3. Pooled mean population of San José scale on Red Delicious cultivar of apple in district Srinagar.

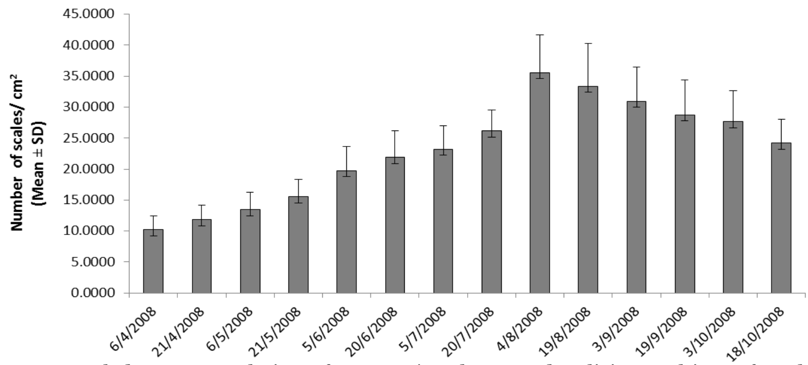

Figure 4. Pooled mean population of San José scale on Red Delicious cultivar of apple in district Anantnag.

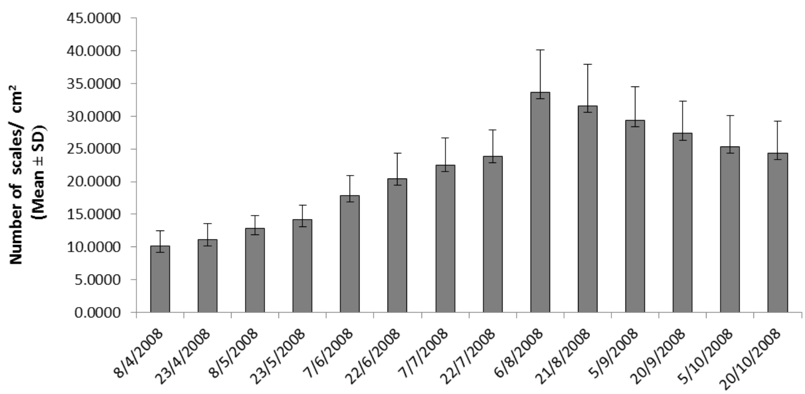

Figure 5. Pooled mean population of San José scale on Red Delicious cultivar of apple in district Budgam.

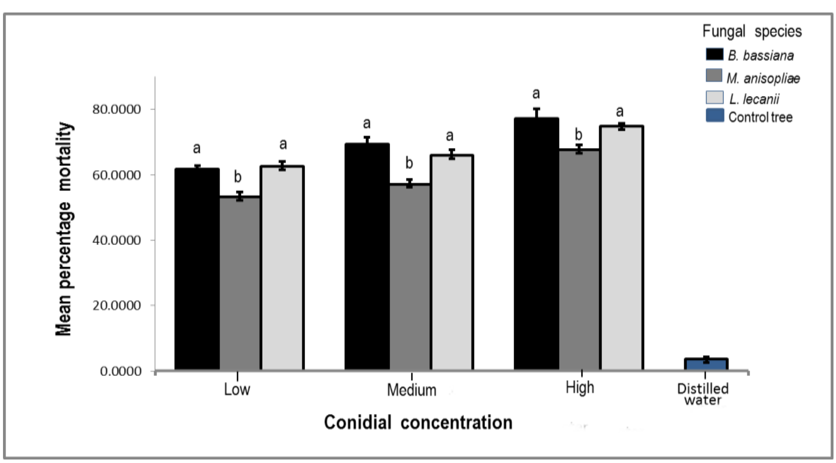

Figure 6. Pooled mean percentage mortality of San Jose scale due to entomopathogenic fungi at three different concentrations. Different letters above bars (mean ± 1SD) indicate statistical significance (Tukey's test).

ON HETEROPTERA FAUNA OF BİNBOĞA MOUNTAINS (TURKEY, KAHRAMANMARAŞ-KAYSERİ)

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[Kıyak, S. 2016. On Heteroptera fauna of Binboğa Mountains (Turkey, Kahramanmaraş-Kayseri). Munis Entomology & Zoology, 11 (2): 441-449**]**

ABSTRACT: The paper presents information on Heteroptera fauna of Binboğa Mountains (Kahramanmaraş-Kayseri). For this reason, 805 specimens of 135 species were collected from Binboğa Mountains (Kahramanmaraş-Kayseri) between May and August in 1988-1989. 115 of them are new records for fauna of Binboğa Mountains (Kahramanmaraş-Kayseri).

KEY WORDS: Binboğa Mountains, fauna, Heteroptera, Turkey

Although Heteroptera is an essential group among the insect orders. Its numbers of species are an crucial component of aquatic and terrestrial food-chains. Heteropteran species are important members of these comminities.

The current studies about faunistical, systematical and ecological state of knowledge in Binboğa Mountains are not sufficient. Until this study, just Horvath (1901) recorded 6 species from Binboğa Mountains.

The research area, Binboğa mountains, is located in the Southern Turkey, situated in two provinces (Kahramanmaraş-Kayseri). The main purpose of this study is to determine the composition of the heteroptera fauna on the research area. After having been collected, the Heteropteran specimens were identified and then the species were assessed according to systematic and faunistic concepts.

MATERIALS AND METHODS

The available 805 adult specimens of 135 species were collected by the author from 59 localities (Table 1) in Binboğa Mountains between May and August in 1988-1989. All specimens were collected by means of aerial netsand and were put into killing jars filled with 70% alcohol and then they were relaxed, and pinned.

For the identification of the material I used the keys to Heteroptera published by Ahmat & Perveen (1987), Aysev (1973, 1985, 1988, 1989), Awell (1977), Kerzner & Yachevskii (1964), Kıyak (1990a,b,c), Lodos & Önder (1980), Pehlivan (1981), Pericart (1979), Stichel (1955-1956, 1956-1958, 1958-1960, 1957-1962), Villiers (1945), Wachmann (1989) and Wagner (1970-1971, 1973, 1976, 1978).

Information on phenologies, altitudes and locality numbers of each species are given in Table 1. All materials are deposited in the collection of the Zoological Museum of Gazi University (=ZMGU), Ankara, Turkey.

Table 1. Collecting localities.

Locality	No	Locality area
Loc.	1	Dayoluk village
Loc.	2	Between Dayoluk village- Ördekli village
Loc.	3	Dayoluk village

Loc.	4	Between Dayoluk village-Yalak (Yeşilkent) district
Loc.	5	North-East of Yalak (Yeşilkent) district
Loc.	6	North-East of Yalak (Yeşilkent) district
Loc.	7	East of Yalak (Yeşilkent) district
Loc.	8	East of Yalak (Yeşilkent) district
Loc.	9	Arıtaş district, Hoda plateau, watery cave
Loc.	10	Arıtaş district, way of plateau
Loc.	11	Arıtaş district, way of plateau
Loc.	12	Arıtaş district, West of Gözübenli
Loc.	13	Arıtaş district, North of Gözübenli
Loc.	14	Arıtaş district, South of Gözübenli and North-West of Türkçayırı
Loc.	15	West of Binboğa village
Loc.	16	West of Binboğa village, near of Tomas
Loc.	17	Binboğa village
Loc.	18	South-West of Binboğa village
Loc.	19	South of Binboğa village
Loc.	20	South-East of Binboğa village
Loc.	21	South of Binboğa village, West of Türksevin village
Loc.	22	West of Türksevin village
Loc.	23	North of Türksevin village
Loc.	24	South-East of Dağlıca district, near of Yazıbelen castle
Loc.	25	South-East of Dağlıca district, east of Yazıbelen castle
Loc.	26	North-West of Arıtaş district, near of Göllüce
Loc.	27	North-West of Arıtaş district, Tavşan-hill
Loc.	28	North-West of Arıtaş district, Tavşan-hill
Loc.	29	North-West of Arıtaş district, north of Türkçayırı
Loc.	30	West of Arıtaş district
Loc.	31	South of Küçüksevin village
Loc.	32	South-West of Emirilvas village
Loc.	33	North-East of Türksevin village
Loc.	34	East of Türksevin village
Loc.	35	South-West of Büyüksevin village, West of Kızılkaya village
Loc.	36	Afşin district
Loc.	37	West of Ardıçlı- hill
Loc.	38	West of Ardıçlı- hill
Loc.	39	Ardıçlı-hill
Loc.	40	South-West of Ardıçlı hill
Loc.	41	South-West of Ardıçlı hill
Loc.	42	South of Ardıçlı hill
Loc.	43	North-West of Küçüksu village
Loc.	44	North-East of Küçüksu village
Loc.	45	Küçüksu village

Loc. 46	Taşkesen village
Loc. 47	West of Afşin district, Ufacıklar-hill, near of Ashabı Kehf
Loc. 48	North of Yazıköy village
Loc. 49	Yazıköy village
Loc. 50	Tülüce hill
Loc. 51	South of Tülüce hill
Loc. 52	South-East of Tülüce hill
Loc. 53	North of Korkmaz village
Loc. 54	North of Çardak village
Loc. 55	South of Korkmaz village
Loc. 56	South-East of Korkmaz village
Loc. 57	South-East of Korkmaz village
Loc. 58	South Korkmaz village
Loc. 59	South of Çardak village

RESULTS

Data on Heteroptera fauna of Binboğa Mountains are presented in Table 2 as follows:

Table 2. The phenologies, altitudes and locality numbers of Heteroptera specimens from Binboğa Mountains.

Species	**Phenology**	**Altitude**	**Locality numbers**
MIRIDAE Hahn, 1831			
Deraeocoris **Kirschbaum, 1855**			
D. rutilus(Herrich-Schaeffer, 1839)	May, June	1180-1680 m	17, 20, 22, 27, 32-34, 41, 42, 44, 45
Cranocapsus **Wagner, 1954**			
C. turcicus Kıyak, 1990	July	1220 m	45
Sthenarus **Fieber, 1858**			
S. ocularis (Mulsant & Rey, 1852)	May	1220 m	42
Chlamydatus **Curtis, 1833**			
C. pullus(Reuter, 1870)	May	1220 m	42
Oncotylus **Fieber, 1858**			
O. viridiflavus (Goeze, 1778)	August	1500-1550 m	3, 4, 5
Eurycolpus **Reuter, 1879**			
E. aureolus Seidenstücker, 1961	June	1410 m	27
Piezocranum **Horvath, 1877**			
P. corvinum Puton, 1895	May	1250 m	44
Orthocephalus **Fieber, 1858**			
O. melas Seidenstücker, 1962	June	2100 m	10
O. tenuicornis (Mulsant & Rey, 1852)	May	1290 m	41
Plagiotylus **Scott, 1874**			
P. dispar Reuter, 1899	June	1390 m	13
Camponotidea **Reuter, 1879**			
C. saundersi (Puton, 1874)	May	1290 m	38
C. fieberi Reuter, 1879	May	1250 m	41

***Adelphocoris* Reuter, 1896**			
A. vandalicus (Rossi, 1790)	July, August	1220-1290 m	45, 54
A. bimaculicollis Lindberg, 1948	August	1600 m	26
A. lineolatus (Goeze, 1778)	July	1220 m.	45
***Calocoris* Fieber, 1858**			
*C. quadripunctatus (*Villers, 1789)	May	1260-1350 m	39, 49
C. norvegicus (Gmelin, 1788)	May, June	1250-1480 m	33, 40
*C. roseomaculatus (*Degeer, 1773)	May, June	1250-1400 m	33, 40
***Grypocoris* Douglas & Scott, 1868**			
G. fieberi Douglas & Scott, 1868	May-July	1260-1680 m	9, 20, 22, 39, 57
*G. amoenus (*Douglas & Scott, 1868)	May	1550 m	46
***Brachycoelus* Fieber, 1858**			
Brachycoelus sp.	June	1400-1680 m	16, 17, 20, 22, 23, 33
***Liocoris* Fieber, 1858**			
L. tripustulatus (Fabricius, 1781*)*	June	1390 m	13
***Exolygus* Wagner, 1949**			
E. rugulipennis Poppius, 1911	August	1410 m	28
*E. pratensis (*Linnaeus, 1758)	July	1220 m	45
E. gemellatus (Herrich-Schaeffer, 1835*)*	August	1410 m	28
***Charagochilus* Fieber, 1858**			
C. gyllenhali (Fallen, 1807)	August	1510 m	7
***Capsodes* Dahlbom, 1850**			
C. bimaculatus (Jakowlew, 1883*)*	May, June	1180-1740 m	14, 15, 17, 20, 22, 23, 27, 32, 46
ANTHOCORIDAE Amyot & Serville, 1843			
***Anthocoris* Fallen, 1814**			
A. pilosus (Jakowlew, 1877)	June	1560 m	13
***Orius* Wolff, 1811**			
O. laticollis (Reuter, 1884)	June	1160 m	32
REDUVIIDAE Latreille, 1807			
***Nagusta* Stal 1859**			
Nagusta sp.	August	1500 m	13
***Rhynocoris* Hahn 1833**			
R İbericus (Kolenati, 1856)	August	1500-1610 m	55
R. punctiventris (Herrich-Schaeffer, 1846)	May to August	1220-1500 m	27, 28, 40, 42, 44, 45
***Sphedanolestes* Stal, 1866**			
S. pulchellus (Klug, 1830)	May	1300 m	41
***Oncocephalus* Klug, 1830**			
O. squalidus (Rossi, 1790)	June	1320 m	28
***Holotrichius* Burmeister, 1835**			
H. denudatus Costa, 1841	June	14560 m	23
***Reduvius* Fabricius, 1775**			
R. pallipes (Klug, 1830)	August	1480 m	56
NABIDAE Costa, 1855			
***Nabis* Latreille, 1802**			
N. apterus (Fabricius, 1798)	May, June	1550-2000 m	11, 46
N. capsiformis Germar, 1837	July	1220 m	45
N. viridis Brulle, 1835	July	1220 m	44
Nabis sp.	May to August	1160-1800 m	5, 14, 19, 28, 29, 3234, 38, 44, 45

SALDIDAE Costa, 1855			
***Saldula* Van Duzee, 1914**			
S. variabilis (Herrich-Schaeffer, 1835)	June	188m	19
TINGIDAE Costa, 1847			
***Elasmotropis* Stal, 1874**			
E. testacea (Herrich-Schaeffer, 1830)	May	1220 m	40, 44
***Copium* Thunberg, 1822**			
C. teucrii (Host, 1788)	August	1460-1690 m	13, 27
***Catoplatus* Spinola, 1837**			
C. hilaris Horvath, 1906	August	1490 m	13
***Dictyla* Stal, 1874**			
D. nassata (Puton, 1874)	May	1550 m	46
BERYTIDAE Fieber, 1851			
***Neides* Latreille, 1804**			
N. tipularis (Linnaeus, 1758)	May, August	1350-1500 m	5, 28, 29, 38
N. brevipennis Puton, 1895	May, August	1450-1550 m	29, 46, 55
Neides sp.	May	1550 m	46
***Berytinus* Kirkaldy, 1900**			
B. geniculatus (Horvath, 1885)	August	1550 m	46
LYGAEIDAE Schilling, 1829			
***Lygaeus* Fabricius, 1794**			
L. saxatilis (Scopoli, 1763)	May, June, August	1400-1750 m	27, 30, 48, 50-52, 58,
L. pandurus (Scopoli, 1763)	June	1160-2600 m	11, 15, 18, 22, 32
L. equestris (Linnaeus, 1758)	May to August	1220-2100 m	10, 13, 17, 27, 37, 38, 42, 43, 45, 48, 50
***Apterola* Mulsant & Rey, 1866**			
Apterola sp.	August	1550 m	55
***Nysius* Dallas, 1852**			
N. ericae (Schilling, 1829)	May, June	1350-1800 m	16, 33, 38
***Engistus* Fieber, 1864**			
Engistus sp.	August	1480 m	14
***Piocoris* Stal, 1872**			
P. erythrocephalus (LePeletier & Serville, 1825)	August	1400 m	30
***Geocoris* Fallen, 1814**			
G. pubenscens Jakowlew, 1871	August	1460 m	27
***Heterogaster* Schilling, 1829**			
H. urticae (Fabricius, 1775)	June	1160-1390 m	13, 36
***Camptotelus* Fieber, 1860**			
Camptotelus sp.	May	1350 m	38
***Microplax* Fieber, 1860**			
M. interruptus (Fieber, 1837)	May	1350 m	37
***Oxycarenus* Fieber, 1837**			
Oxycarenus sp.	August	1460 m	28
***Macroplax* Fieber, 1860**			
M. fasciata (Herrich-Schaeffer, 1835)	May	1350 m	37
***Lethaeus* Dallas, 1852**			
L. picipes (Herrich-Schaeffer, 1850)	August	2000 m	8
L. fulvovarius Puton, 1884	August	1540-2000 m	8, 21
***Ischnopeza* Fieber, 1860**			
I. hirticornis (Herrich-Schaeffer, 1860)	August	1440 m	27
Ischnopeza sp.	June	1180 m	32

***Emblethis* Fieber, 1860**			
E. brachynotus Horvath, 1897	August	1440 m	28
Emblethis sp.	August	1440 m	27
***Gonianotus* Fieber, 1860**			
Gonianotus sp.	May	1220 m	42
***Diomphalus* Fieber, 1864**			
Diomphalus sp.	August	1440 m	27
***Aphanus* Laporte de Castelnau, 1852**			
A. rolandri (Linnaeus, 1758)	August	1440 m	27
***Proderus* Amyot, 1846**			
P. crassicornis Jakowlew, 1875	June	1180 m	32
***Rhyparachromus* Hahn, 1826**			
R. zarudnyi (Jakowlew, 1905)	August	1740 m	27
R. alboacuminatus (Goeze, 1778)	August	1470 m	27
Rhyparachromus sp.	August	1480 m	13
PYRRHOCORIDAE Dohrn, 1859			
***Pyrrhocoris* Fallen, 1814**			
P. apterus (Linnaeus, 1758)	May-August	1220-1550 m	5, 13, 44, 45
STENOCEPHALIDAE Dallas, 1852			
***Dicronacephalus* Hahn, 1826**			
D. agilis (Scopoli, 1765)	June	1930 m	21
D. albipes (Fabricius, 1781)	August	1500 m	56
COREIDAE Leach, 1815			
***Syromastus* Berthelod, 1827**			
S. rhombeus Linnaeus, 1767	June	1800 m	16
***Haploprocta* Stal, 1872**			
H. sulcicornis (Fabricius, 1794)	June	1740 m	18
***Enoplos* Amyot & Serville, 1843**			
E. disciger (Kolenati, 1845)	August	1500-1520 m	1, 5
***Coreus* Fabricius, 1794**			
C. marginatus (Linnaeus, 1758)	June	1390 m	13
***Centrocoris* Kolenati, 1845**			
C. variegatus Kolenati, 1845	May	1290 m	38
***Phyllomorphus* Laporte de Castelnau, 1832**			
P.laciniata (Villers, 1789)	May, June, August	1320-1750 m	19, 27, 28, 39, 50, 51
***Arenocoris* Hahn, 1834**			
A. falleni (Schilling, 1829)	August	1570 m	50
A. waltli (Herrich-Schaeffer, 1834)	August	1460 m	28
***Bathysolen* Fieber, 1860**			
B. nubilus (Fallen, 1807)	May	1220 m	44
***Coriomeris* Westwood, 1842**			
Coriomeris sp.	May, June, August	1160-1420 m	27, 32, 42
ALYDIDAE Dallas, 1852			
***Alydus* Fabricius, 1803**			
A.calcaratus (Linnaeus, 1758)	July	1220 m	45
***Camptopus* Amyot & Serville, 1843**			
C. tragacanthae (Kolenati, 1845)	July, August	1220-1780 m	2, 28, 45, 52
C. lateralis (Germar, 1843)	July, August	1230-1430 m	27, 45
C. bifasciatis Fieber, 1864	June, August	1400-1500 m	34, 55
RHOPALIDAE Amyot & Serville, 1843			
***Corizus* Fallen, 1814**			

C. hyosciami (Linnaeus, 1758)	May-August	1220-1730 m	5, 13, 20, 21, 27, 28, 37, 40, 45, 51, 54
Coryzus sp.	August	1400 m	27
***Liorhyssus* Stal, 1870**			
L. hyalinus (Fabricius, 1794)	May, June, August	1260-1800 m	16, 17, 20, 23, 28, 38, 40, 49
***Rhopalus* Schilling, 1827**			
R. parumpunctatus Schilling, 1829	August	1420 m	27
R. rufus Schilling, 1829	May, June	1350-1800 m	16, 37
***Brachycarenus* Fieber, 1860**			
B. tigrinus (Schlilling, 1829)	August	1470 m	29
B. languidus (Horvath, 1891)	June, August	1470-1800 m	16, 29
***Stictopleurus* Stal, 1872**			
S. abutilon (Rossi, 1790)	August	1370-1500 m	27, 28, 54
S. riveti Royer, 1923	August	1450 m	28
***Maccevethus* Amyot, 1846**			
M. lutheri Wagner, 1953	June	1550 m	14
M. caucasicus (Kolenati, 1845)	May, June, August	1280-1750 m	17, 20, 25, 41, 51
Maccevethus sp.	May, August	1250-1430 m	28, 39, 40
SCUTELLERIDAE Leach, 1815			
***Odontotarsus* Laporte de Castelnau, 1832**			
O. purpureo-lineatus (Rossi, 1790)	June	1540-1650 m	14, 20-22
O. impictus Jakowlew, 1886	May	1290 m	42
O. confraginosus Hoberlandt, 1956	August	1410 m	27
***Psacasta* Germar, 1839**			
P. marmottani Puton, 1887	May, June	1250-1300 m	43, 45
P. herculeana Horvath, 1891	May	1300 m	43
***Eurygaster* Laporte de Castelnau, 1832**			
E. maura (Linnaeus, 1758)	May	1320 m.	38
E. tesdudinaria (Geoffroy, 1785)	May	1260 m	41
PENTATOMIDAE Leach, 1815			
***Crypsinus* Dohrn, 1860**			
Crypsinus sp.	August	1460 m	27
***Leprosoma* Baerensprung, 1859**			
L. tuberculatum Jakowlew, 1876	June	1220 m	45
***Ventocoris* Hahn, 1834**			
V. trigonus (Krynicki, 1871)	August	1470-1510 m	6, 27, 55
***Graphosoma* Laporte de Castelnau, 1832**			
G. lineatum (Linnaeus, 1758)	June	1930 m	21
***Mustha* Amyot& Serville, 1843**			
M. spinosula (Lefebvre, 1831)	May, June, August	1250-1500 m	27, 40, 55
***Sciocoris* Fallen, 1829**			
S. sulcatus Fieber, 1852	May	1320 m	38
***Aelia* Fabricius, 1803**			
A.cognata Fieber, 1868	August	1430-1810 m	14, 50, 58
A.albovittata Fieber, 1868	May, July	1220-1320 m	38, 45, 48
A.virgata Klug, 1841	June	1550 m	20
***Cnephosa* Jakowlew, 1880**			
C. flavomarginata Jakowlew, 1880	May	1220 m	42
***Palomena* Mulsant & Rey, 1866**			

P. prasina (Linnaeus, 1761)	August	1780 m	1
***Rhombocoris* Mayr, 1864**			
Rhombocoris sp.	June	1930 m	18
***Carpocoris* Kolenati, 1846**			
C. mediterraneus Tamanini, 1958	June, August	1300-1500 m	3, 27, 35, 55
C. fuscispinus (Boheman, 1851)	June, August	1410-1680 m	3, 13, 20, 22, 28
C. pudicus (Poda, 1761)	June, July, August	1300-1700 m	13, 50, 52, 55, 56
C. melanocerus (Mulsant & Rey, 1852)	May	1250-1300 m	38, 42, 44
***Codophila* Mulsant & Rey, 1866**			
C. varia (Fabricius, 1787)	August	1640 m	50
***Dolycoris* Mulsant & Rey, 1866**			
D. baccarum (Linnaeus, 1758)	May, June, August	1180-1790 m	2, 5, 14, 17, 19-23, 32, 34, 37, 40, 42, 50, 54, 58
***Trochiscocoris* Reuter, 1890**			
Trochiscocoris sp.	June	1420 m	14
***Eurydema* Laporte, 1832**			
E. ventrale Kolenati, 1846	August	1750 m	50
E. formosum Puton, 1895	May	1220-1290 m	42, 43
***Rhaphigaster* Laporte de Castelnau, 1832**			
R. nebulosa (Poda, 1761)	June	1290 m	43
CYDNIDAE Mulsant & Rey, 1866			
***Canthophorus* Mulsant & Rey, 1866**			
C. melanopterus (Herrich-Schaeffer, 1835)	June, July, August	1430-2130 m	9, 27, 47
PLATASPIDAE Dallas, 1851			
***Coptosoma* Laporte de Castelnau, 1832**			
C. scutellatum (Geoffroy, 1785)	August	1480 m	9

DISCUSSION

Heteroptera fauna of Binboğa mountains are listed for the first time with the present study. Heteroptera species records were not observed from Binboğa Mountains, except for Horvath (1901). He reported only 6 species from the Binboğa Mountains as *Coptosoma scutellatum*, *Adelphocoris vandalicus*, *Sehirus dubius*, *Neottiglossa leporina*, *Nabis ferus* and *Harpactor monticola* (=*Rhynocoris monticola*). In this study, two of them were collected (*Coptosoma scutellatum* and *Adelphocoris vandalicus*).

Unfortunately, 18 of 135 species group taxa are genus-level identification. 115 of 135 species in this study are new records for the studied area.

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NEW RECORDS OF BEE-FLIES FROM CHHATTISGARH, INDIA (DIPTERA: BOMBYLIIDAE)

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ABSTRACT: While studying the bee-flies (Diptera: Bombyliidae) diversity of Chhattisgarh, seven species of are added to the fauna of the state. Detailed diagnostic characters along with diagrams, key and distribution are given. The list of species of family Bombyliidae known from Chhattisgarh is also provided.

KEY WORDS: Bee-fly, Anthracinae, Bombyliinae, Chhattisgarh, India

The family Bombyliidae includes moderate to large sized, beautiful winged, pollinating insects, commonly known as bee-flies. These flies are abundant in arid and semi-arid regions. This is one of the large and diverse families of brachycerous dipterans (Yeates, 1994). These flies are mostly pollen and nectar feeders, found on flowers hovering in bright sunlight. Brunetti (1909, 1912, 1917, 1920) made useful contribution to the bee-flies fauna of Oriental region including British India. Several studies by Pal (1991), Yeates (1994), Evenhuis & Greathead (1999), Banerjee and Mitra (2004, 2006a,b), Banerjee et al. (2006, 2007), Mitra (2008), Mitra et al. (2011), Mitra & Parui (2014) provided the information on bee flies of different regions of India and globally. Scattered works documented about 4547 species of this family worldwide of which 257 species of this family are reported from Oriental region and 138 species from India (Banerjee & Mitra, 2006b). The family was known by only 5 species belonging to 3 genera recorded from Achanakmar Wildlife Sanctuary and Bilaspur districts of Chhattisgarh (Mitra et al., 2011; Mitra & Parui, 2014). The present study adds 7 species of this family to the existing list of bee-flies dipteran fauna from the state of Chhattisgarh.

MATERIALS AND METHODS

Study area: The study area of Chhattisgarh state extends between 17°46'-24°8' N latitude and 80°15'-84°24' E longitude in the central Indian landscape having a total area of 1, 35,194 sq. km. The maximum area of this covered by dry deciduous forest. The study area comprises four districts viz. Raipur, Surguja, Dhamtari and Koriya (Fig. 1).

Methodology: Specimens were collected during faunistic surveys in Chhattisgarh undertaken by the Zoological Survey of India. Usually bee- flies are collected at day time by sweeping net. The flies are generally found near warmth ground in resting state with stretched wings, and also found in flower garden hovering on from flower to flower in bright sunlight due to its nectar feeding abilities. During the survey, GPS coordinates of the collection sites were also recorded with the help of Garmin Oregon 550 device. The collected specimens are kept in an ethyl acetate filled bottle for desensitization and then moved to desiccator for relaxation before pinning. The pinned specimens were studied under Leica EZ4 HD binocular microscope for identification. Morphological characters like wing, head, eyes, abdomen and thorax were compared for identification confirmation with the description present in the published literature. Photographs of whole specimens and body parts were taken in the Leica Stereo Zoom M205A microscope. After the study, the specimens were deposited in the National Zoological Collection of Zoological Survey of India, Kolkata.

RESULTS

Key to the subfamilies:

1. Eyes widely separated in both sexes, antennae widely separated at base, 2nd longitudinal vein originates in a knee-shaped form approximately opposition to r-m cross vein, 2nd longitudinal vein often form a loop towards tip..Anthracinae
- Eyes continuous or sub continuous in male, antennae approximated at base, 2nd longitudinal vein originates acutely nearer to the origin of praefurca than to r-m cross vein, 2nd longitudinal vein (R_{2+3}) never with a loop towards apex..................................Bombyliinae

Subfamily: BOMBYLIINAE
Tribe: BOMBYLIINI
Genus: *Systoechus* Loew, 1855

1855. *Systoechus* Loew, Progr. K. Realsch. Meseritz, 1855: 34. Type-species: *Bombylius sulphurous* Mikan.

***Systoechus eupogonatus* Bigot, 1992** (Fig. 2)

1992. *Systoechus eupogonatus* Bigot, Annls. Soc. ent. Fr., 7: 365.

Material examined: Surguja (South), Mendra, 19.xi.2011, (1 female); Balrampur (23˚36.98'N & 83˚36.514'E), 14.xi.2011 (1 male), coll. A. Raha.

Diagnostic characters: Face dull yellow with grey hairs, frons black with concolourous hairs, In females, frons grey with grey pubescence, proboscis a little longer than head and thorax together, antennae black, scape covered with long blackish hairs above; thorax covered with thick, pale yellow pubescence, scutellum black with reddish apex; legs reddish with femora brownish; wings nearly clear; abdomen concolorous with thorax.

Distribution: Chhattisgarh**:** Surguja (Earlier recorded from India).

Elsewhere: Sri Lanka.

Subfamily: ANTHRACINAE

Key to the tribe:

1. Apex of antennal flagellum without hairs, basicosta spine like...2
- Apex of antennal flagellum with a circle of hairs, basicosta produced but not spine like, pulvilli not reduced, metaplurae bare, squama with a hairy fringe..........................Anthracini

2. Apex of antennal flagellum devoid of hairs, basicosta spine like, pulvilli reduced, conical in shape, squama with a scaly fringe..Exoprosopini
- One antennal flagellomere with an apical style, pulvilli rounded.................................Villini

Tribe: ANTHRACINI

Key to the genera:

1. Third antennal joint onion shaped with styliform prolongation bearing a distinct pencil of hairs at tip, submarginal cells 3..*Spogostylum* Macquart, 1840
- Third antennal joints cone-shaped with microscopic apical bristle, submarginal cells 2...*Anthrax* Scopoli, 1763

Genus: *Spogostylum* Macquart, 1840

1840. *Spogostylum* Macquart, Dipt. Exotic. Nov. ou peu connus., 1: 53. Type-species: *Spogostylum mystaceum* Macquart.

Spogostylum duvaucelii (Macquart, 1840)

1840. *Anthrax duvaucelii* Macquart, Dipt. Exot. ii, 1, pp. 63.
2006. *Spogostylum duvaucelii* (Macquart): Banerjee et al., Bionotes, 8 (2): 44.

Material examined: Raipur dist., Barnawapara WLS Lalbandha Nala (21°23'6.66"N & 82°24'34.86"E), 4.viii.2011, (1 male), coll. Sunil Gupta.

Diagnostic characters: Frons at antennal level one-third of head width, gradually narrowed towards vertex which bears short, soft hairs, vertex with distinct indentation, antennae black with greyish-white shimmer, scape and pedicel with bristles black; scutellum blackish with long, soft black hairs mixed with short yellow hairs; legs black, coxae bears long silky white hairs, femora and tibiae with small white scales; wings nearly clear, costal cell and extreme base yellowish, 1st posterior cell widely and 5th posterior cell narrowly open; abdomen blackish grey, entire dorsum covered with whitish scales.

Distribution: India: Andhra Pradesh Chhattisgarh (Raipur), Gujarat, Himachal Pradesh, Thar Desert, Uttar Pradesh, West Bengal. **Elsewhere:** Pakistan, Sri Lanka.

Genus: *Anthrax* Scopoli, 1763

1763. *Anthrax* Scopoli, Ent. Carniolica: 358. Type-species: *Musca morio* Linnaeus.

Key to the species:

1. Wings with roundish isolated spots over the fork of 3rd longitudinal vein (R_{4+5}), apex of discal cell ($1m_2$)/ and at base of the 3rd posterior cell ($2m_3$) outside the brown band, 3rd antennal joint onion-shaped , the outline of the brown band straight.. *distigma* (Wiedemann, 1828)

-Wings without such isolated spots outside the brown band, the outline of the brown band forms an irregular diagonal line with a clear spot behind base of 2nd longitudinal cell, one at fifth and second basal cell, all inside the band, third antennal joint conical in shape.. *gestroi* (Brunneti, 1912)

Anthrax distigma Wiedemann, 1828

1828. *Anthrax distigma* Wiedemann, Auss. Zweifl. i. pp. 309.
1898. *Spogostylum distigma*: Coquillett, Proc. U.S. Nat. Mus., 21: 318
1999. *Anthrax distigma* : Evenhuis & Greathead, D.J. World Catalog of Bee-flies, 299
2006. *Anthrax distigma* (Wiedemann): Banerjee et al., Bionotes, 8 (2): 44.

Material examined: Raipur dist., Badgoar Forest (21°18.240'N & 82°26.760'E), 11.xi.2011, (1 male), coll. Sunil Gupta.

Diagnostic characters: The width of frons is more than 1/3rd of the head above antennae, face dark grey with blackish pubescence, dark brown proboscis; antennae black having black bristles; black thorax, dorsum with hairy scales, scutellum black with hairy bristles; clear wings with dark baso-costal band, spots on the fork of 2nd vein and also at the base of the 3rd posterior cell, halters are dark brown in colour; blackish legs, femora with whitish scales; blackish abdomen, 1st abdominal segment bluish grey with fine black pubescence.

Distribution: India: Andaman and Nicobar Islands, Arunachal Pradesh, Bihar, Chandigarh, Chhattisgarh (Raipur), Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. **Elsewhere:** Bangladesh, Java, Myanmar, Phillipines, Sri Lanka, Sulawesi.

***Anthrax gestroi* (Brunneti, 1912)** (Fig. 2)

1912. *Argyromoeba gestroi* Brunneti, Rec. Ind. Mus., 7: pp. 470.
2006. *Anthrax gestroi*: Banerjee et al., Bionotes, 8 (2): 44.

Material examined: Raipur dist., Nawa Para Forest (21˚23.769'N & 82˚24.712'E), 9.xi.2011, (1 male), coll. Anil & Angshuman. Dhamtari, Sankra Rest House (20°17.270´N & 81°59.747´E), 19.x.2011, (1 male), coll. Sunil Gupta.

Diagnostic characters*:* Width of frons one-third of head, antennae grayish black with 3rd joint conical; thorax black with yellowish or whitish scaly hairs, dorsum with yellow hairs, scutellum with yellow and black pubescence; wings hyaline with basal half blackish, outer margin of wing band oblique, anal and axillary cells with clear tip; fore coxae with yellow hairs and black bristles; abdomen black with yellow bristly hairs, last 3rd to 4th abdominal segments bear milky white scales.

Distribution: India: Andaman and Nicobar Islands, Bihar, Chhattisgarh (Dhamtari, Raipur), Maharashtra and Tamil Nadu.

Tribe: EXOPROSOPINI
Genus: *Exoprosopa* Macquart, 1840

1840. *Exoprosopa* Macquart, Dipt. Exot., 2 (1): 35. Type-species: *Anthrax Pandora* Fabricius.

***Exoprosopa flammea* Brunetti, 1909** (Fig. 2)

1909. *Exoprosopa flammea* Brunetti, Rec. Indian. Mus., 2: 466.

Material examined: Koriya dist., GGNP, Jalpani Forest (23˚45'49.6"N & 82˚09'13.4"E), 12.v.2013, (1 male), coll. A. Raha.

Diagnostic character: Head along with frons and face orange-yellow covered with short, golden yellow hairs, mouth lemon yellow covered with short bright yellow hairs, ocelli small, close together; scutellum reddish-brown, posterior margin with a row of concolorous strong bristles directed backwards; wings with two broad, dark brown bands, the 1st one covers the two basal cells, basal fourth of discal cell, then narrows to hind border of wing and encloses the basal third of anal and auxiliary cells, the 2nd one starting from costa; coxae, femora and most of the tibiae reddish-orange, all tarsi black; whole abdomen covered with short, bright-orange hairs.

Distribution: India: Andhra Pradesh, Bihar, Chhattisgarh (Koriya), Gujarat, Kerala, Uttar Pradesh. **Elsewhere:** Sri Lanka.

Genus: *Litorhina* Bowden, 1975

1975. *Litorhina* Bowden, J. Entomol. Soc. South. Afr., 38: 314. Type species: *Litorhynchus corticeus* Bezzi, 1924.

***Litorhina lar* (Fabricius,1781)** (Fig. 2)

1781. *Bibio lar* Fabricius, Spec. Insect. Exhib.eor. duff specific.: 414.
1999. *Litorhina lar* Evenhuis & Greathead, D. J. World Catalog of Bee-flies: 414.
2007. *Litorhina lar*: Banerjee et al., J. Exp. Zool. India 10 (2): 333-336.

Material examined: Raipur dist., Nawa Para Forest (2123.769N & 8224.712E), 9.xi.2011, (1 ♂), coll. Anil & Angshuman. Gariyaband, Kodhomali Forest (2011.537N & 8214.858E), 18.x.2011, (1 male), coll. Sunil Gupta.

Diagnostic character: Head dark nut-brown covered with short, black pubescence, face similar in colour to head, 1st, 2nd antennal segments are ferrugineous while 3rd one black; thorax black covered with sparse black pubescence mixed with depressed yellowish brown scale like hairs; thorax dull

orange brown with scutellum dark reddish brown; legs reddish brown, tarsi black except basitarsi lighter, fore tibiae with rows of short bristles, mid femora with two strong bristles on inner side towards tip.
Distribution: India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh (Gariabandh, Raipur), Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Sri Lanka, Australia.

Tribe: VILLINI
Genus: *Exhyalanthrax* Becker, 1916
1916. *Exhyalanthrax* Becker, Ann. Hist. Nat. Natl. Hung., 14: 44. Type-species: *Anthrax vegans* Loew.

Exhyalanthrax afer (Fabricius, 1794)
1794. *Anthrax afra* Fabricius, Ent. Syst., 4: 258.
1804. *Anthrax fimbriatus* Meigen, Syst. Besch., 2: pp. 154
2003. *Exhyalanthrax afer*: Lutovinovas et al., Acta Zoologica Lituanica, 13: 403.
Material examined: Surguja dist., Buthuri Beat (23°34.66'N & 83°32.257'E), 14.xi.2011, (1 male), coll. A. Raha.
Diagnostic character: Ocelli pale; antennae black; thorax brownish to blackish with few yellow scales on its upper surface; on the sides of thorax covered with black hairs and base of the wings covered with yellowish hairs; clear wings with dark brownish band extending to the apex of the costal cell; legs brown with hairy femora, anterior tibiae with short pubescence and hind tibiae with brownish scales; the band of wings fills 1/3rd of the total wing.
Distribution: Throughout India: Andaman, Bihar, Chhattisgarh (Surguja), Maharashtra, Odisha, Tamil Nadu, Uttarakhand and West Bengal. **Elsewhere:** Myanmar, Sri Lanka.

List of Bombyliidae from Chhattisgarh
Superfamily: ASILOIDEA
Family: BOMBYLIIDAE
Subfamily: BOMBYLIINAE
Tribe: BOMBYLIINI
Genus: *Systoechus* Loew, 1855
 Systoechus eupogonatus Bigot, 1992*
Genus: *Bombomyia* Greathead, 1995.
 Bombomyia maculata Fabricius, 1775
Subfamily: ANTHRACINAE
Tribe: ANTHRACINI
Genus: *Anthrax* Scopoli, 1763
 Anthrax distigma Wiedemann, 1828*
 Anthrax gestroi (Brunneti, 1912)*
Genus: *Spogostylum* Macquart, 1840
 Spogostylum duvaucelii (Macquart, 1840)*
Tribe: EXOPROSOPINI
Genus: *Heteralonia* Rondani, 1863
 Heteralonia (Homolonia) lateralis (Brunetti, 1909)
 Heteralonia (Isotamia) insulata (Walker, 1852)
Genus: *Ligyra* Newman, 1841.
 Ligyra aurantiaca Guerin – Meneville, 1835
 Ligyra semifuscata (Brunetti, 1912)

Genus: *Exoprosopa* Macquart, 1840
Exoprosopa flammea Brunetti, 1909*
Genus: *Litorhina* Bowden, 1975
Litorhina lar (Fabricius,1781)*
Tribe: VILLINI Hull
Exhyalanthrax afer (Fabricius, 1794)*

DISCUSSIONS

Present paper reports twelve species of bee flies belonging to 2 subfamilies and 9 genera from the Chhattisgarh state, among them seven species are reported from the State for the first time. All seven species, newly reported from the State Chhattisgarh are exclusively Oriental in distribution. Among them *Litorhina lar* (Fabricius, 1781) and *Spogostylum duvaucelii* (Macquart, 1840) are also extended their distribution to Australian region and Palaearctic region respectively. High species diversity (12 species belonging to 9 genera) indicates very good potentiality of these flies in this state. There is further scope of discovery of many more bee-flies from the state, if more extensive and intensive surveys of the unexplored areas are undertaken.

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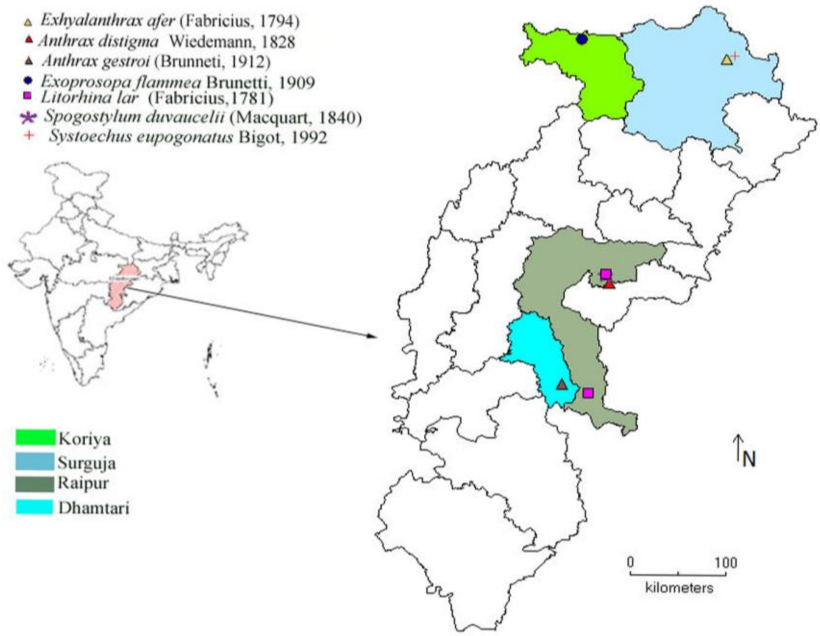

Figure 1. The study area.

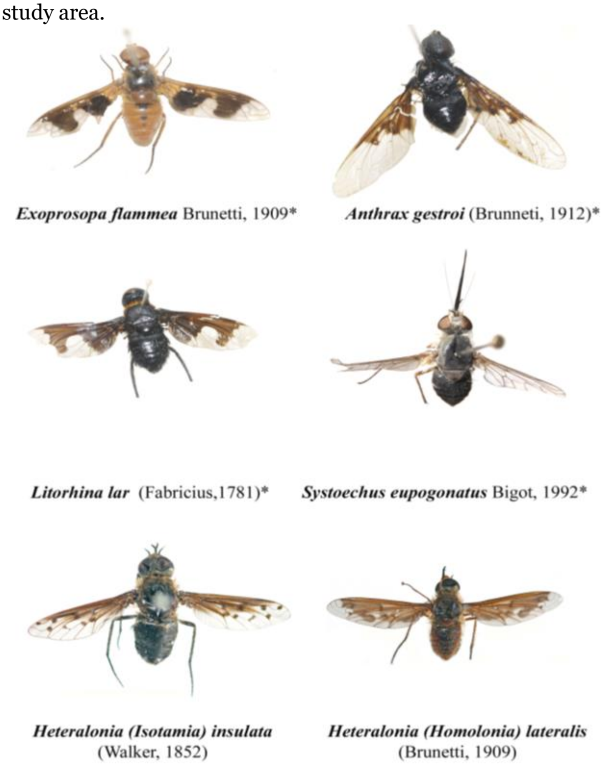

Figure 2. The species.

CASE-BEARING LEAF BEETLES OF ÇANKIRI PROVINCE IN TURKEY (CHRYSOMELIDAE: CRYPTOCEPHALINAE)

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[Bal, N., Özdikmen, H. & Kıyak, S. 2016. Case-bearing leaf beetles of Çankırı province (Chrysomelidae: Cryptocephalinae). Munis Entomology & Zoology, 11 (2): 457-468**]**

ABSTRACT: This work is the first attempt for entire case-bearing leaf beetles' fauna of Çankırı province. All known taxa from Çankırı province are given with some new faunistical data in the present text. In addition, 22 of 30 species are new to Çankırı provinces. 4 species of them are also new to Central Anatolian Region of Turkey. Moreover, *Cryptocephalus wehnckei* Weise, 1881 is newly recorded from Northern half of Anatolia. 4 species as *Cryptocephalus* (*Asionus*) *amasiensis* Weise, *Cryptocephalus* (s.str.) *paphlagonius* Sassi & Kısmalı, *Cryptocephalus* (*Lamellosus*) *angorensis* Pic and *Cryptocephalus* (*Protophysus*) *wehnckei* Weise are endemic to Turkey.

KEY WORDS: Cerambycidae, Coleoptera, fauna, new records, Çankırı, Turkey

The fauna of Cryptocephalinae of Turkey includes 102 species of 4 genera (Ekiz et al., 2013; Özdikmen et al., 2014; Özdikmen & Cihan, 2014).

Çankırı is a province in the North of Central Anatolian Region of Turkey. Northern towns of the province are in Black Sea Region. It is bordered by Karabük and Kastamonu provinces in the North, Çorum province in the East, Kırıkkale province in the South-East, Ankara province in the South and Bolu province in the West. It is situated about 800 m above sea level. It has a total of 12 towns (incl. Central town) (Map 1).

This work is the first attempt for case-bearing leaf beetles' fauna of Çankırı province. According to Ekiz et al. (2013) and Özdikmen & Cihan (2014), only 8 species of 2 genera, *Cryptocephalus* and *Pachybrachis*, of case-bearing leaf beetles were known from Çankırı province as *C.* (*Asionus*) *curda* Jakobson, *C.* (s.str.) *anticus* Suffrian, *C.* (s.str.) *bipunctatus* (Linnaeus), *C.* (s.str.) *duplicatus* Suffrian, *C.* (s.str.) *sericeus* (Linnaeus), *C.* (*Heterichnus*) *prusias* Suffrian, *P.* (s.str.) *fimbriolatus* (Suffrian) and *P.* (s.str.) *tesselatus* (Olivier).

We had the opportunity to study material of Cryptocephalinae collected during the expedition of Çankırı province in 2013-2015 and many new records of the subfamily Cryptocephalinae were detected. We determined the case-bearing leaf beetles' fauna of Çankırı province includes 30 species of 3 genera. In this work, new data are presented. Besides, all known taxa from Çankırı province are also given in the text according to cited literatures.

MATERIALS AND METHODS

The available specimens for the present study were collected by the first author from Çankırı province in Turkey in 2013-2015. As a result of identification, 29 species were determined. The available specimens for the present study are deposited at Gazi University (Turkey, Ankara).

The Turkish distribution patterns for each species are given only concerning provinces. Turkish endemic taxa are marked with the sign (*). For distribution data of the taxa, Löbl & Smetana (2010) for World and Ekiz et al. (2013) and

Özdikmen & Cihan (2014) for Turkey are used in the text chiefly. Distributional abbreviations for the works are available to Löbl & Smetana (2010).

RESULTS AND DISCUSSIONS

Cryptocephalinae from Çankırı province that includes 30 species of 3 genera, are presented as follows:

Family CHRYSOMELIDAE Latreille, 1802
Subfamily CRYPTOCEPHALINAE Gyllenhal, 1813

Genus *Cryptocephalus* Geoffroy, 1762
Subgenus *Asionus* Lopatin, 1988

**Cryptocephalus amasiensis* Weise, 1894

Material examined: Central, between Karadayı village-Külburun village, 40˚22'N 33˚47'E, 25.IV.2014, 638 m, 2 specimens; Central, Alaçatı, 40˚32'N 33˚33'E, 15.V.2015, 870 m, 1 specimen; Central, Dutağaç return, 40˚39'N 33˚40˚E, 25.V.2015, 829 m, 1 specimen.
Records in Turkey: Anatolia: Amasya and Kahramanmaraş provinces.
Range: A: TR
Remarks: The Turkish endemic species is known only from 2 provinces in Turkey until now. It is new to Çankırı province and thereby Central Anatolian Region of Turkey.

Cryptocephalus curda Jakobson, 1897

Records in Turkey: Anatolia: Afyonkarahisar, Ağrı, Çankırı, Çorum, Elazığ, Erzurum, Konya, Kars, Ordu, Sivas and Tunceli provinces.
Range: E: AB AR GG **A:** TR
Remarks: The species was known from Çankırı province.

Subgenus *Burlinius* Lopatin, 1965

Cryptocephalus connexus Olivier, 1807

Material examined: Between exit of Çankırı and Yapraklı 2nd km, 40˚35'N 33˚37'E, 23.VII.2013, 730 m, 4 specimens; Ilgaz, between Belsöğüt-Aşağıbozan village, 40˚56'N 33˚37'E, 26.VII.2013, 948 m, 1 specimen; Bayramören, Karakışla village road, 40˚57'N 33˚09'E, 27.VII.2013, 916 m, 1 specimen; Atkaracalar, between Budakpınarı village-Yakalı village, 40˚53'N 33˚8'E, 25.VIII.2013, 1314 m, 10 specimens; Atkaracalar, between Eyüpözü village-Höyük village, 40˚53'N 33˚4'E, 25.VIII.2013, 1380 m, 1 specimen; Çerkeş, Akbaş village, 40˚53'N 32˚49'E, 25.VIII.2013, 1230 m, 1 specimen; Çerkeş, Çalcıören village, 40˚52'N 32˚57'E, 26.VIII.2013, 1508 m, 1 specimen; Çerkeş, between Karaşar-Uluköy, 40˚55'N 32˚56'E, 26.VIII.2013, 901 m, 1 specimen; Orta, Kayıören return 2nd km, 40˚34'N 32˚57'E, 22.V.2014, 1602 m, 3 specimens; Orta, between Çerçi-Elmalı, 40˚32'N 33˚10'E, 08.VII.2014, 1227 m, 1 specimen; Eldivan, between Akçalı-Maruf, 40˚38'N 33˚27'E, 09.VII.2014, 805 m, 1 specimen; Şabanözü, Mart village forest, 40˚26'N 33˚24'E, 11.VII.2014, 1120 m, 2 specimens; Kızılırmak, between Karamürsel-Boyacıoğlu, 40˚26'N 34˚01'E, 12.VII.2014, 547 m, 1 specimen; Ilgaz, Aşağıdere Yukarıdere return, 40˚56'N 33˚37'E, 17.VII.2014, 992 m, 1 specimen; Ilgaz, between Çaltıpınar-Ödemiş, 40˚56'N 33˚33'E, 18.VII.2014, 996 m, 8 specimens; Kurşunlu, entry of Hacımuslu, 40˚51'N 33˚16'E, 20.VII.2014, 1146 m, 9 specimens; Atkaracalar, Budakpınarı road, 40˚51'N 33˚08'E, 20.VII.2014, 1282 m, 1 specimen; Şabanözü, Demirsahan village return, 40˚25'N 33˚17'E, 08.VIII.2014, 1035 m, 1 specimen; Şabanözü, exit of Demirsahan village, 40˚24'N 33˚18'E, 08.VIII.2014, 906 m, 3 specimens; Central, between Yukarıçavuş-Dereçatı, 40˚44'N 33˚39'E, 09.VIII.2014, 997 m, 2 specimens; Central, entry of Dereçatı village, 40˚44'N 33˚40'E, 09.VIII.2014, 1068 m, 1 specimen; Eldivan, entry of Gölezkayı, 40˚30'N 33˚32'E, 09.VIII.2014, 1022 m, 2 specimens; Kızılırmak, Ovacık return, 40˚26'N 33˚52'E, 11.VIII.2014, 575 m, 1 specimen; Atkaracalar, exit of Ilıpınar village, 40˚48'N 33˚05'E,

20.VIII.2014, 1169 m, 1 specimen; Çerkeş, Bıldırcın plateau, 40˚40'N 32˚50'E, 20.VIII.2014, 1650 m, 1 specimen; Bayramören, between Çatkase-Başovacık, 40˚53'N 33˚12'E, 22.VIII.2014, 1226 m, 6 specimens; Bayramören, entry of Çatkase, 40˚53'N 33˚12'E, 22.VIII.2014, 1225 m, 1 specimen.
Records in Turkey: Anatolia: Adıyaman, Afyon, Ağrı, Aksaray, Ankara, Artvin, Balıkesir, Bartın, Bilecik, Bolu, Bursa, Eskişehir, Erzurum, Gaziantep, Giresun, Gümüşhane, Hatay, Isparta, İzmir, Kahramanmaraş, Karaman, Kastamnu, Karabük, Kırşehir, Manisa, Mersin, Niğde, Ordu, Osmaniye, Sakarya, Samsun, Siirt, Tokat, Trabzon, Zonguldak provinces; European Turkey: Tekirdağ province.
Range: E: AB AL AR AU BH BU CR CZ FR GE GG GR HU IT MC MD PL RO SK SL ST TR UK YU **A:** IN IS JO KZ SY TM TR
Remarks: The species is widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus exiguus Schneider, 1792
Cryptocephalus exiguus variceps Weise, 1884

Material examined: Ilgaz, Sazak village, 40˚56'N 33˚43'E, 18.VI.2015, 1144 m, 2 specimens; Ilgaz, Satılar village, 40˚59'N 33˚43'E, 19.VI.2015, 1129 m, 1 specimen; Bayramören, Koçlu-Feriz return, 41˚1'N 33˚17'E, 21.VI.2015, 758 m, 1 specimen; Yapraklı, between Yüklü-Çevrecik return, 40˚40'N 33˚45'E, 29.VI.2015, 926 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Erzurum, İstanbul, İzmir, Sakarya, Tokat provinces; European Turkey (without province).
Range: E: AB AR BU GR TR **A:** IN TR
Remarks: The species and subspecies are new to Çankırı province and thereby Central Anatolian Region of Turkey.

Cryptocephalus fausti Weise, 1882

Material examined: Ilgaz, Ericek village, 40˚49'N 33˚33'E, 16.VII.2014, 1326 m, 1 specimen; Kurşunlu, entry of Hacımuslu, 40˚51'N 33˚16'E, 20.VII.2014, 1146 m, 1 specimen; Yapraklı, Topuzsaray village, 40˚38'N 33˚53'E, 29.VI.2015, 985 m, 1 specimen.
Records in Turkey: Anatolia: Erzurum, Isparta and Konya provinces.
Range: E: AB **A:** TR
Remarks: The species is known only from 3 provinces in Turkey until now. It is new to Çankırı province.

Cryptocephalus fulvus Goeze, 1777
Cryptocephalus fulvus fulvus Goeze, 1777

Material examined: Korgun, Bugay village, 40˚43'N 33˚30'E, 23.VII.2013, 864 m, 2 specimens; Çerkeş, Kışla-Beymelik-Taşanlar-Tohumlar villages return, 40˚54'N 32˚48'E, 26.VIII.2013, 1000 m, 4 specimens.
Possible Records in Turkey: Anatolia: Ankara, Çanakkale, Erzincan, Erzurum, Gümüşhane, Tokat, Tunceli provinces; European Turkey: Edirne and Kırklareli provinces.
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IT KZ LA LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** KZ TD TR WS.
Remarks: The species is represented by two subspecies in Turkey as the nominate form and *C. fulvus schatzmayri*. It was not possible to give infraspecific distributions separately according to available references. However, *C. fulvus schatzmayri* should be distributed very likely only in S and W Turkey. So the species and nominate subspecies are new to Çankırı province.

Cryptocephalus ocellatus Drapiez, 1819
Cryptocephalus ocellatus ocellatus Drapiez, 1819

Material examined: Ilgaz, between İkikavak-Kayı, 40˚55'N 33˚26'E, 19.VII.2014, 1262 m, 1 specimen; Kurşunlu, exit of Köpürlü, 40˚46'N 33˚16'E, 06.VIII.2014, 1068 m, 1 specimen; Ilgaz, between Kayı village return-Kırşlar village, 40˚56'N 33˚28'E, 29.IX.2015, 1137 m, 1 specimen; Ilgaz, Satılar village, 40˚59'N 33˚43'E, 19.VI.2015, 1129 m, 1 specimen; Yapraklı, Yukarıöz, 40˚51'N 33˚44'E, 25.VI.2015, 1380 m, 1 specimen.

Records in Turkey: Anatolia: Adıyaman, Aksaray, Amasya, Ankara, Artvin, Balıkesir, Bilecik, Bolu, Bursa, Çanakkale, Çorum, Diyarbakır, Erzincan, Erzurum, Eskişehir, Gümüşhane, Hakkari, Isparta, İstanbul, İzmir, Kars, Kastamonu, Kayseri, Kütahya, Mardin, Mersin, Niğde, Ordu, Rize, Samsun, Sinop, Sivas provinces; European Turkey (without province).
Range: E: AB AL AN AR AU BE BH BU BY CR CT CZ FR GE GG GR HU IT KZ LA LT LU MC MD NL PL RO SK SL SP ST SZ TR UK YU **A:** IN IQ TR WS.
Remarks: The species is widely distributed in Turkey. The species and subspecies are new to Çankırı province.

Cryptocephalus populi Suffrian, 1848

Material examined: Çerkeş, Kışla-Beymelik-Taşanlar-Tohumlar villages return, 40°54'N 32°48'E, 26.VIII.2013, 1000 m, 2 specimens; Çerkeş, between Cedime, Çalcıören, Coroğlu villages return-Kabak village, 40°53'N 32°54'E, 27.VIII.2013, 1557 m, 2 specimens; Ilgaz, between Çaltıpınar-Ödemiş, 40°56'N 33°33'E, 18.VII.2014, 996 m, 1 specimen; Kurşunlu, entry of Hacımuslu, 40°51'N 33°16'E, 20.VII.2014, 1146 m, 2 specimens; Atkaracalar, Budakpınarı road, 40°51'N 33°08'E, 20.VII.2014, 1282 m, 1 specimen; Çerkeş, Coroğlu village return, 40°52'N 32°56'E, 20.VII.2014, 1434 m, 2 specimens; Atkaracalar, entry of Demirli-Höyük, 40°50'N 33°03'E, 19.VIII.2014, 1275 m, 2 specimens; Yapraklı, entry of Kaymaz village, 40°43'N 33°54'E, 29.VI.2015, 1011 m, 1 specimen; Korgun, Öz, 40°42'N 33°31'E, 30.VI.2015, 758 m, 1 specimen.
Records in Turkey: Anatolia: Ankara, Gaziantep, Isparta and Niğde provinces.
Range: E: AB AL AR AU BE BH BU BY CR CT CZ FR GE HU IT LA MC PL RO SK ST SZ UK YU **A:** FE KZ TR
Remarks: The species is known only from 4 provinces in Turkey until now. It is new to Çankırı province.

Cryptocephalus pygmaeus Fabricius, 1792
Cryptocephalus pygmaeus vittula Suffrian, 1848

Material examined: Ilgaz, 1 km pass to Alıç village return, Osmangölü plateau road, 40°50'N 33°35'E, 26.VII.2013, 1373 m, 1 specimen; Çerkeş, Kadılar plateau, 40°49'N 32°37'E, 28.VIII.2013, 1154 m, 1 specimen; Kurşunlu, Çatkese return, 40°53'N 33°12'E, 20.VII.2014, 1234 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Afyon, Aksaray, Antalya, Aydın, Bursa, Denizli, Erzincan, Erzurum, Isparta, İzmir, Kocaeli, Manisa, Mersin, Muğla, Niğde provinces; European Turkey (without province).
Range: E: AB AL AR AU BH BU CR CZ FR GE GG GR HU IT KZ LA MC MD PL RO SK SL ST SZ TR YU **A:** SY TR.
Remarks: The species is rather widely distributed in Turkey. The species and subspecies are new to Çankırı province.

Subgenus *Cryptocephalus* Geoffroy, 1762

Cryptocephalus anticus Suffrian, 1848

Material examined: Şabanözü, entry of Çerçi, 40°31'N 33°13'E, 08.VII.2014, 1275 m, 8 specimens; Ilgaz, between Belsöğüt-Aşağıbozan, 40°57'N 33°35'E, 17.VII.2014, 1046 m, 1 specimen; Çerkeş, between Gelik-Ovacık, 40°51'N 32°56'E, 20.VII.2014, 1391 m, 1 specimen; Ilgaz, entry of Yaylaören village return, 40°52'N 33°30'E, 17.VI.2015, 914 m, 1 specimen; Yapraklı, Şeyhosman, 40°42'N 33°51'E, 29.VI.2015, 996 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Aksaray, Ankara, Antalya, Bayburt, Bilecik, Bolu, Bursa, Çanakkale, Çankırı, Denizli, Diyarbakır, Erzurum, Eskişehir, Gümüşhane, Hakkari, Isparta, İzmir, Karabük, Kayseri, Kocaeli, Konya, Manisa, Mardin, Mersin, Muş, Nevşehir, Niğde, Sakarya, Samsun, Sinop, Sivas, Tokat, Tunceli, Zonguldak provinces; European Turkey: Kırklareli and Tekirdağ provinces.
Range: E: AB AL AU BE BH BU BY CR CT CZ FR GE GR HU IT LT KZ MC MD PL RO SK SL SP ST TR UK YU **A:** JO KI KZ SY TR UZ WP WS.
Remarks: The species is widely distributed in Turkey. It was known from Çankırı province.

Cryptocephalus biguttatus (Scopoli, 1763)

Material examined: Çerkeş, between Gelik-Ovacık, 40°51'N 32°56'E, 20.VII.2014, 1391 m, 9 specimens.
Records in Turkey: Anatolia: Ankara, Bayburt, Bolu and Kahramanmaraş provinces.
Range: E: AB AU BE BH BU BY CR CT CZ DE EN FI FR GB GE HU IT KZ LA LS LT LU MD NL NT PL RO SK SL SP SZ UK YU **A:** KZ TR WS
Remarks: The species is known only from 4 provinces in Turkey until now. It is new to Çankırı province.

Cryptocephalus bipunctatus (Linnaeus, 1758)
Cryptocephalus bipunctatus bipunctatus (Linnaeus, 1758)

Material examined: Yapraklı, entry of Çevrecik, 40°39'N 33°49'E, 25.V.2015, 953 m, 5 specimens; Ilgaz, between Kayı village return-Kırşlar village, 40°56'N 33°28'E, 29.IX.2015, 1137 m, 2 specimens; Ilgaz, between Kayı-Kırşlar village, 40°56'N 33°27'E, 17.VI.2015, 1158 m, 1 specimen; Ilgaz, 7 km to Şeyhyunus village, 40°51'N 33°32'E, 18.VI.2015, 1015 m, 1 specimen; Ilgaz, between Şeyhyunus-Ericek village, 40°49'N 33°31'E, 18.VI.2015, 1438 m, 1 specimen; Ilgaz, Kuyupınar village, 40°51'N 33°36'E, 18.VI.2015, 1411 m, 1 specimen; Bayramören, between Boğazkaya-Koçlu, 41°0'N 33°17'E, 21.VI.2015, 1074 m, 1 specimen; Bayramören, Koçlu-Feriz return, 41°1'N 33°17'E, 21.VI.2015, 758 m, 1 specimen; Bayramören, between Feriz-Dereköy, 41°2'N 33°14'E, 21.VI.2015, 954 m, 4 specimens; Çerkeş, Çaylı village, 40°55'N 32°54'E, 22.VI.2015, 876 m, 1 specimen; Yapraklı, between Yuvasaray-Yukarıöz, 40°52'N 33°46'E, 25.VI.2015, 1077 m, 1 specimen; Eldivan, Bülbülderesi road, 40°30'N 33°30'E, 28.VI.2015, 1091 m, 4 specimens; Yapraklı, between Yüklü-Çevrecik return, 40°40'N 33°45'E, 29.VI.2015, 926 m, 1 specimen.
Records in Turkey: Anatolia: Amasya, Ankara, Antalya, Artvin, Balıkesir, Bolu, Bursa, Çanakkale, Çankırı, Çorum, Erzincan, Erzurum, Isparta, İzmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Konya, Kütahya, Manisa, Mersin, Niğde, Sinop, Sivas, Tokat, Yozgat, Zonguldak provinces; European Turkey: Edirne and Kırklareli provinces.
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT KZ LA LS LT LU MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** TR.
Remarks: The species is widely distributed in Turkey. It was known from Çankırı province.

Cryptocephalus cribratus Suffrian, 1847

Material examined: Şabanözü, entry of Kamış village, 40°33'N 33°20'E, 23.V.2014, 1221 m, 1 specimen; Orta, entry of Emalı village, 40°34'N 33°10'E, 24.V.2014, 1319 m, 19 specimens; Ilgaz, between Beyköy-Saraycık village, 40°59'N 33°44'E, 19.VI.2015, 1195 m, 1 specimen; Atkaracalar, Eyüpözü return, 40°53'N 33°7'E, 22.VI.2015, 1185 m, 1 specimen.
Records in Turkey: Anatolia: Ankara, Artvin, Bilecik, Bolu, Erzurum, Gümüşhane, İstanbul, İzmir, Kahramanmaraş, Kars, Konya, Nevşehir, Niğde, Sivas and Trabzon provinces.
Range: E: AB GG ST **A:** IN SY TM TR.
Remarks: The species is rather widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus duplicatus Suffrian, 1847

Material examined: Ilgaz, Sarmaşık village, 40°48'N 33°39'E, 25.VII.2013, 1687 m, 1 specimen; Ilgaz, exit of Alpagut village, 40°55'N 33°32'E, 26.VII.2013, 1170 m, 1 specimen; Ilgaz, 7 km to Balcı village, 41°02'N 33°28E, 26.VII.2013, 1392 m, 2 specimens; Atkaracalar, Höyük village, 40°48'N 33°3E, 27.VII.2013, 1239 m, 1 specimen; Şabanözü, between Maruf-Kamış, 40°35'N 33°21'E, 23.V.2014, 1505 m, 1 specimen; Şabanözü, Bakırlı village, 40°28'N 33°22'E, 24.V.2014, 1028 m, 1 specimen; Şabanözü, entry of Çerçi, 40°31'N 33°13'E, 08.VII.2014, 1275 m, 5 specimens; Orta, Elmalı, 40°32'N 33°09'E, 08.VII.2014, 1267 m, 1 specimen; Kızılırmak, exit of Cacıklar, 40°23'N 34°02'E, 12.VII.2014, 558 m, 1 specimen; Ilgaz, Kale village, 40°57'N 33°39'E, 17.VII.2014, 980 m, 1 specimen; Ilgaz, between Beyköy-Saraycık, 40°59'N 33°45'E, 17.VII.2014, 1211 m, 1 specimen; Ilgaz, Kırpınar plateau road, 41°00'N 33°39'E, 17.VII.2014, 1493 m, 2 specimens; Ilgaz, İki kavak village, 40°35'N 33°24'E, 19.VII.2014, 1321 m, 2 specimens; Ilgaz, between Hacıhasan-Sazak, 40°57'N 33°42', 24.VIII.2014, 1134 m, 1 specimen; Kızılırmak, Yukarıalagöz village, 40°22'N 33°53'E, 16.V.2015, 642 m, 1 specimen; Central, Dutağaç return, 40°39'N 33°40°E, 25.V.2015, 829 m, 1 specimen; Central, Dutağaç-Deyim return, 40°40'N 33°41'E, 25.V.2015, 855 m, 1 specimen; Yapraklı, Bugay, 40°42'N 33°46'E, 25.V.2015, 897 m, 1 specimen; Ilgaz, between Belören-Şeyhyunus, 40°52'N 33°31'E, 27.V.2015, 889 m, 1 specimen; Ilgaz, between Yaylaören-Eskice, 40°54'N 33°29'E, 29.V.2015, 1008 m, 1 specimen; Ilgaz, entry of Güneyköy, 40°55'N 33°28'E, 29.V.2015, 1226 m, 1 specimen; Ilgaz, entry of Eskice village, 40°54'N 33°29'E, 17.VI.2015, 983 m, 2 specimens; Ilgaz, between Eskice-Süleymancılar village, 40°54'N 33°29'E, 17.VI.2015, 1006 m, 1 specimen; Ilgaz, between Güneyköy-Aşıklar village, 40°55'N 33°27'E, 17.VI.2015, 1294 m, 1 specimen; Ilgaz, between Kayı-Kırşlar village, 40°56'N 33°27'E, 17.VI.2015, 1158 m, 4 specimens; Ilgaz, Kuyupınar village, 40°51'N 33°36'E, 18.VI.2015, 1411 m, 3 specimens; Ilgaz, Candere-Sazak-Hacı Hasan return, 40°55'N 33°39'E, 18.VI.2015, 885 m, 5 specimens; Ilgaz, Sazak village, 40°56'N 33°43'E, 18.VI.2015, 1144 m, 3 specimens; Ilgaz, Onat, 40°58'N 33°41'E, 19.VI.2015, 1024 m, 1 specimen; Ilgaz, Satılar village, 40°59'N 33°43'E, 19.VI.2015, 1129 m, 2 specimens; Ilgaz, Kazancı village-Kırkpınar-Yayla return, 40°59'N 33°41'E, 19.VI.2015, 1110 m, 8 specimens; Ilgaz, Kırkpınar plateau road, 41°00'N 33°41'E, 19.VI.2015, 1230 m, 3 specimens; Ilgaz, exit of Yukarıbozan, 40°57'N 33°35'E, 19.VI.2015, 1047 m, 1 specimen; Çerkeş, Gelikköy road, 40°49'N 32°54'E, 20.VI.2015, 1195 m, 73 specimens; Çerkeş, entry of Gelik, 40°50'N 32°55'E, 20.VI.2015, 1318 m, 4 specimens; Çerkeş, Gelikova, 40°50'N 32°56'E, 20.VI.2015, 1246 m, 3 specimens; Çerkeş, between Gelikova-Çorapoğlu return, 40°51'N 32°56'E, 20.VI.2015, 1361 m, 5 specimens; Çerkeş, İnceğiz village, 40°55'N 32°58'E, 20.VI.2015, 1133 m, 4 specimens; Çerkeş, between İnceğiz-Avşar, 40°54'N 32°59'E, 20.VI.2015, 1113 m, 1 specimen; Çerkeş, between Avşar-Kükürt, 40°54'N 33°1'E, 20.VI.2015, 1205 m, 17 specimens; Bayramören, between Boğazkaya-Koçlu, 41°0'N 33°17'E, 21.VI.2015, 1074 m, 4 specimens; Bayramören, between Feriz-Dereköy, 41°2'N 33°14'E, 21.VI.2015, 954 m, 11 specimens; Atkaracalar, Budakpınarı, 40°51'N 33°8'E, 22.VI.2015, 1096 m, 6 specimens; Atkaracalar, Eyüpözü return, 40°53'N 33°7'E, 22.VI.2015, 1185 m, 3 specimens; Çerkeş, entry of Ahırlar village, 40°52'N 32°46'E, 22.VI.2015, 1270 m, 8 specimens; Çerkeş, Kuzuören village road, 40°54'N 32°49'E, 22.VI.2015, 963 m, 10 specimens; Çerkeş, Kuzuören village road, 40°49'N 32°42'E, 22.VI.2015, 1134 m, 2 specimens; Çerkeş, Yeşilören road, 40°49'N 32°37'E, 23.VI.2015, 1122 m, 7 specimens; Yapraklı, Yukarıöz, 40°51'N 33°44'E, 25.VI.2015, 1380 m, 3 specimens; Eldivan, between Çiftlikköy-Akçalı, 40°36'N 33°28', 28.VI.2015, 1 specimen; Eldivan, Bülbülderesi road, 40°30'N 33°30'E, 28.VI.2015, 1091 m, 1 specimen.

Records in Turkey: Anatolia: Adana, Amasya, Ankara, Antalya, Artvin, Bilecik, Bitlis, Bolu, Bursa, Çankırı, Çorum, Denizli, Erzincan, Erzurum, Eskişehir, Giresun, Gümüşhane, Hakkari, Isparta, İstanbul, İzmir, Kahramanmaraş, Karabük, Kars, Kastamonu, Kocaeli, Konya, Kütahya, Manisa, Mersin, Nevşehir, Ordu, Sakarya, Samsun, Siirt, Sinop, Sivas, Tokat, Trabzon, Tunceli, Van, Yozgat, Zonguldak provinces; European Turkey: Kırklareli and Tekirdağ provinces.

Range: E: AB AR BU GG GR ST TR **A:** IS JO SY TR.

Remarks: The species is widely distributed in Turkey. It was known from Çankırı province.

Cryptocephalus flavipes **Fabricius, 1781**

Material examined: Orta, Elden plateau, 40°39'N 32°57'E, 21.V.2014, 1487 m, 1 specimen; Kurşunlu, entry of Köpürlü, 40°47'N 33°16'E, 10.VII.2014, 1006 m, 1 specimen; Ilgaz, İki kavak village, 40°35'N 33°24'E, 19.VII.2014, 1321 m, 1 specimen; Eldivan, Akbulut village return, 40°30'N 33°30'E, 14.V.2015, 1076 m, 1 specimen; Eldivan, Şahintepesi, 40°29'N 33°30'E, 14.V.2015, 1066 m, 2 specimens; Ilgaz, Yaylaören, 40°53'N 33°30'E, 29.V.2015, 999 m, 1 specimen; Ilgaz, between Okçular-Ödemiş, 40°56'N 33°33'E, 29.V.2015, 1049 m, 1 specimen; Ilgaz, Aşıklar village, 40°55'N 33°26'E, 17.VI.2015, 1260 m, 1 specimen; Ilgaz, between Kayı-Kırşlar village, 40°56'N 33°27'E, 17.VI.2015, 1158 m, 1 specimen; Ilgaz, Satılar village, 40°59'N 33°43'E, 19.VI.2015, 1129 m, 1 specimen; Ilgaz, between Beyköy-Saraycık village, 40°59'N 33°44'E, 19.V.2015, 1195 m, 2 specimens; Çerkeş, between Avşar-Kükürt, 40°54'N 33°1'E, 20.VI.2015, 1205 m, 1 specimen; Çerkeş, between Avşar-Kükürt, 40°54'N 33°1'E, 20.VI.2015, 1205 m, 1 specimen; Atkaracalar, Kükürt village, between Demirciler-Yazıören, 40°55'N 33°4'E, 20.VI.2015, 924 m, 1 specimen; Bayramören, Boğazkaya village, 40°59'N 33°16'E, 21.VI.2015, 1085 m, 2 specimens; Bayramören, between Boğazkaya-Koçlu, 41°0'N 33°17'E, 21.VI.2015, 1074 m, 1 specimen;

Bayramören, between Feriz-Dereköy, 41°2'N 33°14'E, 21.VI.2015, 954 m, 2 specimens; Çerkeş, Kuzuören village road, 40°54'N 32°49'E, 22.VI.2015, 963 m, 1 specimen; Central, Paşaköy, 40°43'N 33°39'E, 27.VI.2015, 962 m, 1 specimen; Eldivan, between Çiftlikköy-Akçalı, 40°36'N 33°28'E, 27.VI.2015, 1056 m, 1 specimen.

Records in Turkey: Anatolia: Amasya, Ankara, Artvin, Aydın, Bolu, Bursa, Çanakkale, Düzce, Erzurum, Eskişehir, Gaziantep, Isparta, İstanbul, Kars, Kastamonu, Kayseri, Kütahya, Malatya, Mersin, Ordu, Samsun, Sinop, Tokat, Trabzon, Tunceli provinces; European Turkey: Edirne, İstanbul and Tekirdağ provinces.

Range: E: AL AR AU BE BH BU BY CR CT CZ EN FR GE GR HU IT KZ LA LS LT LU MC MD NL NT PL RO SK SL SP ST SZ TR UK YU **A:** ES FE IN IS KZ TR WS.

Remarks: The species is widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus moraei (Linnaeus, 1758)

Material examined: Ilgaz, exit of Alpagut village, 40°55'N 33°32'E, 26.VII.2013, 1170 m, 1 specimen; Ilgaz, 7 km to Balcı village, 41°02'N 33°28'E, 26.VII.2013, 1392 m, 1 specimen; Yapraklı, Buluca-İgdir return, 40°45'N 33°47'E, 15.VII.2014, 1195 m, 1 specimen; Ilgaz, Kıkrpınar plateau road, 41°00'N 33°39'E, 17.VII.2014, 1493 m, 1 specimen; Ilgaz, between Alıç village-Osman plateau, 40°59'N 33°30'E, 18.VII.2014, 1504 m, 5 specimens; Ilgaz, İki kavak village, 40°35'N 33°24'E, 19.VII.2014, 1321 m, 2 specimens; Bayramören, entry of Sazak, 40°59'N 33°05'E, 21.VIII.2014, 1408 m, 1 specimen; Ilgaz, Alıç village return, 40°59'N 33°30'E, 24.VIII.2014, 1498 m, 1 specimen; Ilgaz, Kuyupınar village, 40°51'N 33°36'E, 18.VI.2015, 1411 m, 1 specimen; Bayramören, between Dalkoz-Aşağı, 40°57'N 33°13'E, 21.VI.2015, 800 m, 1 specimen; Bayramören, Boğazkaya village, 40°59'N 33°16'E, 21.VI.2015, 1085 m, 1 specimen; Central, Paşaköy, 40°43'N 33°39'E, 27.VI.2015, 962 m, 6 specimens.

Records in Turkey: Anatolia: Adana, Afyon, Aksaray, Ankara, Antalya, Ardahan, Artvin, Bilecik, Bitlis, Bolu, Bursa, Çanakkale, Çorum, Diyarbakır, Erzincan, Erzurum, Giresun, Gümüşhane, Hakkari, Isparta, İzmir, Kahramanmaraş, Karabük, Kars, Kastamonu, Kayseri, Konya, Manisa, Mersin, Muğla, Niğde, Ordu, Osmaniye, Rize, Sakarya, Samsun, Sinop, Tokat, Trabzon, Tunceli, Zonguldak provinces; European Turkey: Kırklareli and Tekirdağ provinces.

Range: E: AB AL AU BE BH BU BY CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT MC MD NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **A:** IN IQ JO TR WS.

Remarks: The species is widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus octopunctatus (Scopoli, 1763)
Cryptocephalus octopunctatus octopunctatus (Scopoli, 1763)

Material examined: Orta, exit of Doğanlar village, 40°39'N 33°10'E, 20.V.2014, 1315 m, 1 specimen.

Records in Turkey: Anatolia: Ankara, Diyarbakır, Düzce, Kars, Sakarya and Tokat provinces.

Range: E: AU BE BH BU BY CR CT CZ EN FI FR GE HU IT LA LT MC MD NL NT PL RO SB SK SL SP ST SZ TR UK **A:** KZ SCH TR WS.

Remarks: The species is known only from 6 provinces in Turkey until now. It is new to Çankırı province.

**Cryptocephalus paphlagonius* Sassi & Kısmalı, 2000

Material examined: Ilgaz, exit of Alpagut village, 40°55'N 33°32'E, 26.VII.2013, 1170 m, 1 specimen; Atkaracalar, Höyük village, 40°48'N 33°3'E, 27.VII.2013, 1239 m, 2 specimens; Ilgaz, Yaylaören, 40°53'N 33°30'E, 29.V.2015, 999 m, 1 specimen; Ilgaz, between Kayı-Kırşlar village, 40°56'N 33°27'E, 17.VI.2015, 1158 m, 1 specimen.

Records in Turkey: Anatolia: Amasya, Ankara, Artvin, Bilecik, Erzincan, Erzurum, Eskişehir, Kahramanmaraş, Karabük, Kars, Kastamonu, Konya, Kütahya, Mersin, Nevşehir, Sivas, Van provinces.

Range: A: TR.

Remarks: The Turkish endemic species is rather widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus sericeus (Linnaeus, 1758)

Records in Turkey: Anatolia: Ankara, Ardahan, Artvin, Balıkesir, Bursa, Çankırı, Çorum, Erzincan, Erzurum, Gümüşhane, Isparta, İzmir, Kars, Kastamonu, Konya, Nevşehir, Samsun, Sivas provinces; European Turkey: Kırklareli province.
Range: E: AB AL AR AU BE BH BU BY CR CT CZ DE EN FR GE GG GR HU IT LA LT MC MD NL NR NT PL RO SK SL SP ST SV TR UK YU **A:** ES FE KZ MG TR WS.
Remarks: The species is rather widely distributed in Turkey. It was known from Çankırı province.

Cryptocephalus trimaculatus Rossi, 1790

Material examined: Kurşunlu, exit of Köpürlü, 40°46'N 33°16'E, 06.VIII.2014, 1068 m, 1 specimen; Ilgaz, 7 km to Şeyhyunus village, 40°51'N 33°32'E, 18.VI.2015, 1015 m, 2 specimens; Ilgaz, entry of Saraycık village, 40°59'N 33°46'E, 19.VI.2015, 1259 m, 1 specimen; Ilgaz, Kazancı village-Kırkpınar-Yayla return, 40°59'N 33°41'E, 19.VI.2015, 1110 m, 1 specimen; Çerkeş, between Avşar-Kükürt, 40°54'N 33°1'E, 20.VI.2015, 1205 m, 1 specimen; Bayramören, between Feriz-Dereköy, 41°N 33°14'E, 21.VI.2015, 954 m, 2 specimens; Çerkeş, entry of Ahırlar village, 40°52'N 32°46'E, 22.VI.2015, 1270 m, 1 specimen; Çerkeş, Kuzuören village road, 40°49'N 32°42', 22.VI.2015, 1134 m, 1 specimen; Yapraklı, between Yüklü-Çevrecik return, 40°40'N 33°45'E, 29.VI.2015, 926 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Ağrı, Amasya, Ankara, Antalya, Artvin, Bayburt, Bilecik, Burdur, Bursa, Çorum, Erzurum, Eskişehir, Gümüşhane, Isparta, İzmir, Karabük, Karaman, Kastamonu, Kayseri, Konya, Manisa, Mersin, Muğla, Nevşehir, Osmaniye, Yozgat and Zonguldak provinces.
Range: E: AB AL AR AU BH BU CR FR GG GR HU IT MC RO SL SP SZ YU **N:** EG **A:** IS JO SY TR WS.
Remarks: The species is widely distributed in Turkey. It is new to Çankırı province.

Cryptocephalus virens Suffrian, 1847

Material examined: Korgun, Sanı plateau, 40°37'N 33°24'E, 20.V.2014, 1363 m, 1 specimen.
Records in Turkey: Anatolia: Ankara, Erzurum, Gümüşhane, Isparta and Kars provinces.
Range: E: AB AU BH BU CR CZ GE HU IT PL RO SB SK SL ST YU **A:** KZ MG TR WS.
Remarks: The species is known only from 5 provinces in Turkey until now. It is new to Çankırı province.

Subgenus *Heterichnus* Warchałowski, 1991

Cryptocephalus prusias Suffrian, 1853

Material examined: Orta, entry of Emalı village, 40°34'N 33°10'E, 24.V.2014, 1319 m, 2 specimens; Yapraklı, entry of Çevrecik, 40°39'N 33°49'E, 25.V.2015, 953 m, 1 specimen; Yapraklı, between Çevrecik-Topuzsaray, 40°38'N 33°51'E, 26.V.2015, 1084 m, 2 specimens; Ilgaz, 7 km to Şeyhyunus village, 40°51'N 33°32'E, 18.V.2015, 1015 m, 1 specimen; Çerkeş, Kuzuören village road, 40°54'N 32°49'E, 22.VI.2015, 963 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Amasya, Ankara, Balıkesir, Bilecik, Bolu, Bursa, Çankırı, Erzurum, Eskişehir, Gümüşhane, Hatay, Isparta, İstanbul, Konya, Kütahya, Mersin, Muş, Sivas, Tokat provinces; European Turkey: Kırklareli province.
Range: E: AB AR BU GG MC TR **A:** JO SY TR.
Remarks: The species is rather widely distributed in Turkey. It was known from Çankırı province.

Subgenus *Lamellosus* Tomov, 1979

**Cryptocephalus angorensis* Pic, 1908

Material examined: Ilgaz, between Belören-Şeyhyunus, 40°52'N 33°31'E, 27.V.2015, 889 m, 1 specimen.
Range: A: TR.
Records in Turkey: Anatolia: Amasya, Ankara and Çorum provinces.

Remarks: The Turkish endemic species is known only from 3 provinces in Turkey until now. It is new to Çankırı province.

Subgenus *Protophysus* Chevrolat, 1836

Cryptocephalus schaefferi Schrank, 1789
Cryptocephalus schaefferi moehringi Weise, 1884

Material examined: Ilgaz, entry of Eskikıymık village, 41°0'N 33°41'E, 26.VII.2013, 1230 m, 1 specimen; Eldivan, between Büyükhacıbey-Küçükhacıbey, 40°26'N 33°33'E, 13.V.2015, 940 m, 2 specimens; Eldivan, entry of İnandık village, 40°25'N 33°32'E, 13.V.2015, 884 m, 2 specimens.
Records in Turkey: Anatolia: Amasya, Ankara, Bilecik, Bolu, Bursa, Erzurum, Isparta, Kars, Mersin, Samsun, Tokat provinces; European Turkey: Edirne, Kırklareli and Tekirdağ provinces.
Range: E: GR TR **A:** CY JO SY TR.
Remarks: The species is probably rather widely distributed in Turkey. The species and subspecies are new to Çankırı province.

**Cryptocephalus wehnckei* Weise, 1881

Material examined: Eldivan, between Büyükhacıbey-Küçükhacıbey, 40°26'N 33°33'E, 13.V.2015, 940 m, 1 specimen.
Range: A: TR.
Records in Turkey: Anatolia: Adana, Antalya, Isparta, Mersin provinces.
Remarks: The Turkish endemic species is known only from 4 provinces in Turkey until now. It is new to Çankırı province and thereby Central Anatolian Region of Turkey and also Northern half of Anatolia.

Genus *Pachybrachis* Chevrolat, 1836
Subgenus *Pachybrachis* Chevrolat, 1836

Pachybrachis fimbriolatus (Suffrian, 1848)

Material examined: Kızılırmak, entry of Aşağıalagöz village, 40°22'N 33°54'E, 24.IV.2014, 619 m, 1 specimen; Kızılırmak, between Korçullu-Kemalli village, 40°18'N 34°02'E, 24.IV.2014, 646 m, 1 specimen; Kızılırmak, between Kemalli-Halaçlı village, 40°18'N 33°58'E, 24.IV.2014, 608 m, 1 specimen; Kızılırmak, Aşağıalagöz village, 40°21'N 33°55'E, 25.IV.2014, 556 m, 1 specimen; Kızılırmak, Central, 40°21'N 34°00'E, 25.IV.2014, 557 m, 15 specimens; Kızılırmak, Karallı village return, 40°18'N 33°56'E, 25.IV.2014, 606 m, 4 specimens; Kızılırmak, between Bostancı-Hacılar village, 40°19'N 33°51'E, 25.IV.2014, 565 m, 7 specimens; Central, between Karadayı-Külburun village, 40°22'N 33°47'E, 25.IV.2014, 638 m, 2 specimens; Kurşunlu, between Sünürlü-Sakaeli, 40°42'N 33°08'E, 21.V.2014, 1415 m, 1 specimen; Orta, Kalfat return, 40°38'N 33°06'E, 21.V.2014, 1271 m, 1 specimen; Orta, Elden village, 40°39'N 32°58'E, 21.V.2014, 1446 m, 1 specimen; Orta, exit of Yuva village, 40°36'N 33°01'E, 22.V.2014, 1306 m, 1 specimen; Korgun, between Bugay-Ildızım, 40°42'N 33°29'E, 23.V.2014, 909 m, 2 specimens; Şabanözü, entry of Kamış village, 40°33'N 33°20'E, 23.V.2014, 1221 m, 1 specimen; Şabanözü, entry of Büyükyakalı village, 40°28'N 33°14'E, 23.V.2014, 1091 m, 4 specimens; Şabanözü, entry of Mart village, 40°25'N 33°22'E, 24.V.2014, 910 m, 36 specimens; Orta, between Bulduk-Yenice, 40°33'N 33°12'E, 24.V.2014, 1400 m, 14 specimens; Orta, between Yaylakent-İnkılap, 40°35'N 33°05'E, 24.V.2014, 1273 m, 9 specimens; Orta, İnkılap village, 40°34'N 33°03'E, 24.V.2014, 1290 m, 1 specimen; Orta, Özlü, 40°29'N 33°03'E, 24.V.2014, 1484 m, 1 specimen; Orta, between Gökçeören-Yaylakent, 40°32N 33°02'E, 08.VII.2014, 1432 m, 1 specimen; Yapraklı, Buluca-İgdir return, 40°45'N 33°47'E, 15.VII.2014, 1195 m, 2 specimens; Orta, entry of Elmalı, 40°32'N 33°9'E, 07.VIII.2014, 1280 m, 1 specimen; Bayramören, entry of Oymaağaç, 40°58'N 33°14'E, 22.VIII.2014 968 m, 1 specimen; Şabanözü, between Karakoçaş-Mart, 40°26'N 33°21'E, 12.V.2015, 897 m, 1 specimen; Şabanözü, between Gündoğmuş-Karahacı village, 40°21'N 33°17'E, 12.V.2015, 975 m, 8 specimens; Şabanözü, between Gündoğmuş-Karahacı village, 40°21'N 33°17'E, 12.V.2015, 975 m, 1 specimen; Central, Balıbağı village, 40°34'N 33°46'E, 1037 m, 15.V.2015, 1 specimen; Central, between Ovacık-Kuzuköy, 40°32'N 33°53'E, 15.V.2015, 919 m, 4 specimens; Central, Cırcır, 40°31'N 33°59'E, 15.V.2015, 798 m, 25 specimens; Central, between Külburun-Karadayı, 40°26'N 33°44'E, 16.V.2015, 614 m, 3 specimens; Central, entry of Karadayı, 40°24'N 33°45'E, 16.V.2015, 856 m, 4 specimens; Kızılırmak, Yukarıalagöz village, 40°22'20"N 33°53'41"E, 16.V.2015, 642 m, 1 specimen; Kızılırmak, Tepealagöz return, 40°21'N 33°57'E, 16.V.2015, 557 m, 2 specimens; Kızılırmak, between Karadibek-Karamürsel, 40°25'N 34°2'E, 16.V.2015, 544 m, 13 specimens; Yapraklı, Bugay, 40°42'N 33°46'E, 25.V.2015, 897 m, 4 specimens; Yapraklı, between Yüklü-Çevrecik, 40°40'N 33°49'E, 25.V.2015, 983 m, 5 specimens; Yapraklı, entry of Çevrecik, 40°39'N 33°49'E, 25.V.2015, 953 m, 10 specimens; Yapraklı, entry of Topuzsaray, 40°38'N 33°53'E, 26.V.2015, 1169 m, 7 specimens; Yapraklı, Kirliakça, 40°37'N 33°54'E, 26.V.2015, 914 m, 17 specimens; Yapraklı, Sarıçay, 40°39'N 33°53'E, 26.V.2015, 1173 m, 1 specimen; Yapraklı, between Yamaçbağı-Söğütlü, 40°42'N 33°58'E, 26.V.2015, 1125 m, 2 specimens; Ilgaz, entry of Belören, 40°51'N 33°29'E, 27.V.2015, 919 m, 1 specimen; Ilgaz, Yaylaören, 40°53'N 33°30'E, 29.V.2015, 999 m, 7 specimens; Ilgaz, entry of Güneyköy village, 40°55'N 33°28'E, 29.V.2015, 1226 m, 1 specimen; Çerkeş, entry of Gelik, 40°50'N 32°55'E, 30.V.2015, 1320 m, 5 specimens; Ilgaz, between Güneyköy-Aşıklar village, 40°55'N 33°27'E, 17.VI.2015, 1294 m, 26 specimens; Ilgaz, Aşıklar village, 40°55'N 33°26'E, 17.VI.2015, 1260 m, 1 specimen; Ilgaz, Sazak road, 40°55'N 33°40'E, 18.VI.2015, 910 m, 2 specimens; Ilgaz, Onat, 40°58'N 33°41'E, 19.VI.2015, 1024 m, 1 specimen; Ilgaz, exit of Yukarıbozan, 40°57'N 33°35'E, 19.VI.2015, 1047 m, 2 specimens; Çerkeş, Gelikköy road, 40°49'N 32°54'E, 20.VI.2015, 1195 m, 4 specimens; Çerkeş, entry of Gelik, 40°50'N 32°55'E, 20.VI.2015, 1318 m, 2 specimens; Çerkeş, Gelikova, 40°50'N 32°56'E, 20.VI.2015, 1246 m, 1 specimen; Çerkeş, between Gelikova-Çorapoğlu return, 40°51'N 32°56'E, 20.VI.2015, 1361 m, 7 specimens; Çerkeş, between Cedine-Kabakköy, 40°53'N 32°55'E, 20.VI.2015, 1355 m, 1 specimen; Çerkeş, İnceğiz village, 40°55'N 32°58'E, 20.VI.2015, 1133 m, 3 specimens; Bayramören, exit of Karataş village, 40°59'N 33°15'E, 21.VI.2015, 1068 m, 1 specimen; Bayramören, between Feriz-Dereköy, 41°2'N 33°14'E, 21.VI.2015, 954 m, 1 specimen; Bayramören, Harmancık road, 41°2'N 33°13'E, 21.VI.2015, 861 m, 1 specimen; Çerkeş, Çaylı village, 40°55'N 32°54'E, 22.VI.2015, 876 m, 1 specimen; Central, Paşaköy, 40°43'N 33°39'E, 27.VI.2015, 962 m, 1 specimen; Yapraklı, between Yüklü-Çevrecik return, 40°40'N 33°45'E, 29.VI.2015, 926 m, 4 specimens.

Records in Turkey: Anatolia: Adana, Afyon, Aksaray, Ankara, Antalya, Bayburt, Bilecik, Bingöl, Bitlis, Bolu, Çankırı, Diyarbakır, Erzincan, Erzurum, Eskişehir, Gümüşhane, Iğdır, Isparta, İstanbul, Kahramanmaraş, Karaman, Kars, Konya, Manisa, Nevşehir, Niğde, Osmaniye, Sivas, Tokat, Tunceli and Van provinces; European Turkey (without province).

Range: E: AL AU BH BU BY CR CZ FR GE GR HU IT KZ PL RO SK SL SP SZ TR UK YU **A:** JIL MG TR WS.

Remarks: The species is widely distributed in Turkey. It was known from Çankırı province.

Pachybrachis hieroglyphicus (Laicharting, 1781)

Material examined: Ilgaz, between Okçular-Ödemiş, 40°56'N 33°33'E, 29.V.2015, 1049 m, 1 specimen; Ilgaz, between Güneyköy-Aşıklar village, 40°55'N 33°27'E, 17.VI.2015, 1294 m, 2 specimens; Çerkeş, İnceğiz village, 40°55'N 32°58'E, 20.VI.2015, 1133 m, 1 specimen; Yapraklı, Yukarıöz, 40°51'N 33°44'E, 25.VI.2015, 1380 m, 1 specimen.

Records in Turkey: Anatolia: Bilecik, Konya and Mersin provinces; European Turkey (without province).

Range: E: AL AU BE BH BU CR CT CZ EN FI FR GE GR HU IT LA MC MD NL NT PL RO SK SL SP SV TR UK YU **A:** TR WS.

Remarks: The species is known only from 3 provinces in Turkey until now. It is new to Çankırı province.

Pachybrachis limbatus (Ménétriés, 1836)

Material examined: Kızılırmak, between Kemalli-Halaçlı village, 40°18'N 33°58'E, 24.IV.2014, 608 m, 1 specimen; Kurşunlu, between Köprülü-Kapaklı, 40°45'N 33°16'E, 20.V.2014, 1329 m, 1 specimen; Orta, Elden village, 40°39'N 32°58', 21.V.2014, 1446 m, 1 specimen; Korgun, between Bugay-Ildızım, 40°42'N 33°29'E, 23.V.2014, 909 m, 4

specimens; Korgun, between Maruf-Akçalı, 40°37'N 33°26'E, 23.V.2014, 1250 m, 2 specimens; Şabanözü, entry of Büyükyakalı village, 40°28'N 33°14'E, 23.V.2014, 1091 m, 3 specimens; Şabanözü, entry of Mart village, 40°25'N 33°22'E, 24.V.2014, 910 m, 1 specimen; Orta, between Bulduk-Yenice, 40°33'N 33°12'E, 24.V.2014, 1400 m, 5 specimens; Orta, İnkılap village, 40°34'N 33°03'E, 24.V.2014, 1290 m, 1 specimen; Şabanözü, between Maruf-Kavuş village, 40°37'N 33°23'E, 08.VII.2014, 1361 m, 1 specimen; Ilgaz, Çaltıpınar, 40°55'N 33°35'E, 18.VII.2014, 948 m, 1 specimen; Bayramören, Boğazkaya, 40°59'N 33°17'E, 19.VII.2014, 1019 m, 1 specimen; Yapraklı, Kirliakça, 40°37'N 33°54'E, 26.V.2015, 914 m, 1 specimen; Bayramören, exit of Oynaağaç village, 40°58'N 33°14'E, 21.VI.2015, 811 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Adıyaman, Ankara, Antalya, Balıkesir, Bilecik, Bolu, Bursa, Çanakkale, Erzurum, Eskişehir, Isparta, İstanbul, İzmir, Kayseri, Kütahya, Mardin, Mersin, Niğde, Samsun, Sivas, Yalova provinces; European Turkey (without province).
Range: E: AL BH BU CR GR HU IT MC RO SB TR **A:** IS JO SY TR.
Remarks: The species is widely distributed in Turkey. It is new to Çankırı province.

Pachybrachis tesselatus (Olivier, 1791)
Pachybrachis tesselatus tauricus Suffrian, 1848

Material examined: Atkaracalar, Höyük village, 40°48'N 33°3'E, 27.VII.2013, 1239 m, 1 specimen; Eldivan, entry of Çukuröz village, 40°36'N 33°26'E, 09.VII.2014, 1102 m, 2 specimens; Çerkeş, Coroğlu village return, 40°52'N 32°56'E, 20.VII.2014, 1434 m, 3 specimens; Ilgaz, between Aşıklar-Kayı village, 40°55'N 33°26'E, 29.V.2015, 1256 m, 1 specimen; Ilgaz, Gökçeyazı village, 40°57'N 33°29'E, 29.V.2015, 1020 m, 1 specimen; Ilgaz, Satılar village, 40°59'N 33°43'E, 19.VI.2015, 1129 m, 1 specimen; Çerkeş, Gelikova, 40°50'N 32°56'E, 20.VI.2015, 1246 m, 1 specimen; Çerkeş, between Cedine-Kabakköy, 40°53'N 32°55'E, 20.VI.2015, 1355 m, 2 specimens; Çerkeş, between Avşar-Kükürt, 40°54'N 33°1'E, 20.VI.2015, 1205 m, 7 specimens; Atkaracalar, Eyüpözü return, 40°53'N 33°7'E, 22.VI.2015, 1185 m, 1 specimen; Atkaracalar, between Eyüpözü-Hüyük, 40°53'N 33°5'E, 22.VI.2015, 1294 m, 2 specimens; Çerkeş, Bölükören-Yeşilören return, 40°50'N 32°39'E, 22.VI.2015, 1076 m, 1 specimen; Central, Paşaköy, 40°43'N 33°39'E, 27.VI.2015, 962 m, 2 specimens; Eldivan, between Çiftlikköy-Akçalı, 40°36'N 33°28'E, 28.VI.2015, 1056 m, 1 specimen.
Records in Turkey: Anatolia: Adana, Afyon, Ağrı, Aksaray, Amasya, Ankara, Antalya, Bayburt, Bolu, Bursa, Çankırı, Çorum, Erzincan, Erzurum, Gaziantep, Gümüşhane, Isparta, İzmir, Kahramanmaraş, Karaman, Kars, Kayseri, Konya, Kütahya, Mardin, Mersin, Nevşehir, Niğde, Sivas, Tokat, Van and Yozgat provinces.
Range: E: AB AR UK **A:** IS JO LE SY TR.
Remarks: The species is widely distributed in Turkey. It was known from Çankırı province.

Genus *Stylosomus* Suffrian, 1848
Subgenus *Stylosomus* Suffrian, 1848

Stylosomus flavus Marseul, 1875

Material examined: Çerkeş, between Karaşar-Uluköy, 40°55'N 32°56'E, 26.VIII.2013, 901 m, 1 specimen.
Records in Turkey: Anatolia: Erzurum, Kastamonu and Van provinces; European Turkey (without province).
Range: E: AL AU BU CR GR MC RO ST TR UK **A:** CY TR.
Remarks: The species is known only from 3 provinces in Turkey until now. It is new to Çankırı province and thereby Central Anatolian Region of Turkey.

Note: This work is based on a part of Master Thesis of the first author.

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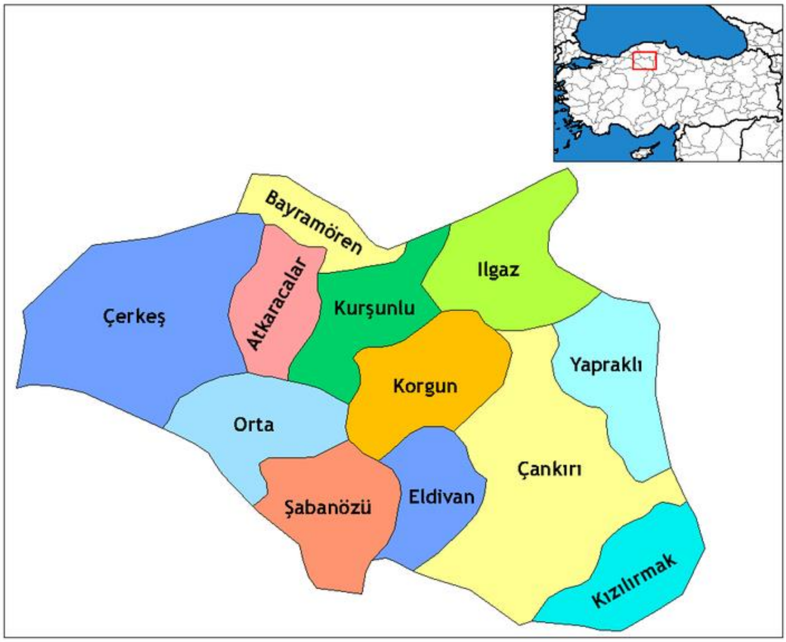

Map 1. Çankırı province.

A CONTRIBUTION TO THE FAUNA OF PRIMITIVE ORIBATID MITES OF TURKEY (ACARI: ORIBATIDA)

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[**Bezci, T., Karataş, S., Mengüloğlu, G. & Baran, Ş.** 2016. A contribution to the fauna of primitive oribatid mites of Turkey (Acari: Oribatida). Munis Entomology & Zoology, 11 (2): 469-472**]**

ABSTRACT: In the present study primitive oribatid mites (Acari: Oribatida: Macropylina) collected from the province of Sakarya were examined. Redescription and SEM images of two species *Poecilochthonius italicus* (Berlese, 1910) (Acari: Oribatida: Brachychthoniidae) and *Hypochthonius luteus* Oudemans, 1937 (Acari: Oribatida: Hypochthoniidae Berlese, 1910) were given. While *H. luteus* was previously known from Turkey, *P. italicus* (Berlese, 1910) and thereby family Brachychthoniidae Thor, 1934 are recorded for the first time in Turkey.

KEY WORDS: Acari, Oribatida, Brachychthoniidae, Hypochthoniidae, new records, Turkey

Oribatida are divided in two supercohorts: lower oribatid mites (Macropylina) and higher oribatid mites (Brachypylina). Lower oribatid mites include five cohorts; Palaeosomata, Enarthronota, Parhyposomata, Mixonomata and Desmonomata (Grandjean, 1954, 1969; Woas, 2002; Skubala, 2004). Lower oribatids differentiated from higher oribatids by contiguous genital and anal shields occupying the entire length of the anogenital region, and with genua and tibiae of legs at uniform length and shape (Krantz, 1978; Woas, 2002; Skubala, 2004).

The family Brachychthoniidae Thor, 1934 represented by 11 genera and 161 species (Subías, 2004, updated 2015). This family firstly recorded from Turkey with the species *Poecilochthonius italicus* (Berlese, 1910) redescribed in this study.

The family Hypochthoniidae Berlese, 1910 comprises 4 genera and 27 species. Previously the species *Hypochthonius luteus* Oudemans, 1937 and *H. rufulus* Koch, 1836 were recorded from Turkey (Ayyıldız, 1986; Ozkan et al., 1988; Ozkan et al., 1994; Erman et al., 2007). In this study *H. luteus* redescribed with SEM investigation.

The aims of the present paper are to identify the primitive oribatid mite species collected from Sakarya University campus and to redescribe and illustrate these species.

MATERIALS AND METHODS

Mites were extracted by a Tullgren funnel apparatus form the soil and litter samples collected from Sakarya University campus. They were fixed and stored in 70% ethanol. Mites were sorted from the samples under a stereomicroscope (Olympus SZX51) and mounted on slides in modified Hoyer's medium or 35% lactic acid. All measurements are given in micrometers (μm).

The terminology used in this paper follows Weigmann (2006). Examined materials are deposited in the Acarological Collection of the last author, Sakarya University, Sakarya, Turkey.

RESULTS

Family Hypochthoniidae Berlese, 1910
Hypochthonius luteus Oudemans, 1937

Material Examined: The examined material collected from campus of Sakarya University, Turkey, 40°74' N, 30°33' E, 07.10.2014, 3 specimens.
Measurements and color. Body length 573 µm, width 310 µm and yelowish brown.
Prodorsum (Figs. 1, 2). Prodorsum triangular, rostrum widely rounded. Prodorsal surface with minute fields of polygonal sculpture. Sensillus with 13- 15 lateral branches. Lamellar setae approximately 66 µm, interlamellar setae approximately 50 µm in length.
Notogaster (Fig. 1). Notogastral surface with minute fields of polygonal sculpture. Anterior border of notogaster nearly straight, anterior corners of notogaster protruding slightly forward. Posterior border of notogaster oval, transverse forrow curved upwards laterally. Setae *c* and *d* arising on shield *Na*. Setae *f*, *h* and *p* on shield *Py*, setae *p1*, and *p2* shifted to ventral side. Notogastral setae ciliate, seta *c1* approximately 89 µm and extending at most to insertion point of *d1*, setae *d1* approximately 81 µm. Distance between *c1* - *c1* approximately 52 µm and *c1* - *d1* approximately 97 µm.
Venter. Genital plates without transverse furrow, eight pairs of genital setae. Anal plate and anal setae reduced, aggenital setae absent, entire anal region occupied by adanal plates, three pairs of adanal setae. Epimeral setation as 3:1:3:4.
Distribution: Holarctic, North-East Oriental and New Zealand.
Remarks: The species *H. luteus* very similar to *H. rufulus* but differs from it by smaller body dimensions, blunt notogastral setae in medium length and medially widening notogaster (Weigmann, 2006).

Body dimensiones of *H. luteus* were given as 580-650 µm by Balogh and Mahunka (1983) and Weigmann (2006). In the previous record from Turkey it was given as 540-600 µm (Ayyıldız, 1986). The avarage body dimension of our specimens is 573 µm and in accordance with previously given dinemsiones.

Family Brachychthoniidae Thor, 1934
Poecilochthonius italicus (Berlese, 1910)

Material Examined: The examined material collected from campus of Sakarya University, Turkey, 40°74' N, 30°33' E, 07.10.2014, 1 specimen.
Measurements and color. Body length 185 µm, orange.
Prodorsum (Fig. 3). Conical, narrower than notogaster (notogaster width 118 µm; prodorsum width 92 µm). Rostral setae (*ro*) setiform and 14 µm, distance between *ro-ro* 16 µm. Lamellar setae closer to rostral setae than interlamellar setae (*in-le*=31 µm; *le-ro*=23 µm). Setae *le* 14 µm, thin and setiform, distance between *le-le*= 28 µm. Setae *in* 15 µm, thin and setiform. Sensillus 35 µm, apically thickened with short spines. Exobothridial setae (*ex*) strong and curved to each other.
Notogaster (Fig. 3). Anterior border of notogaster straight. Median notogastral setae long, setae *e1, f1, h1* reach insetion points of each other. Avarage lengths of

setae *c1* 19 µm, *e1* 20 µm, *f1* 18 µm and *h1* 15 µm. Cuticular ring on notogastral plate *Na* closed, setae *ps2* and *ps2* at the same level.

Venter. Adanal plates not fused posteriorly. Epimeral setation as 3:1:2:4. Seven pairs of genital setae, setae *ad2* and *ad3* widened.

Distribution: Cosmopolite.

Remarks: The species *P. italicus* is firstly recorded from Turkey by this study.

Body length of this species was given as 175-188 µm by Weigmann (2006), average body length of our specimen is 185 µm and in accordance with previously given dinemsions. The species *P. italicus* very similar to *P. spiciger* (Berlese, 1910), the differrences of this species were perviously mentioned by Weigmann (2006).

ACKNOWLEDGEMENT

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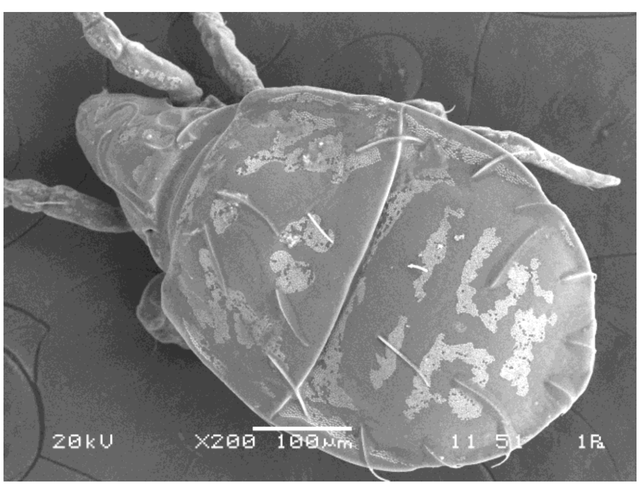

Figure 1. SEM image of dorsal view of adult of *Hypochthonius luteus*.

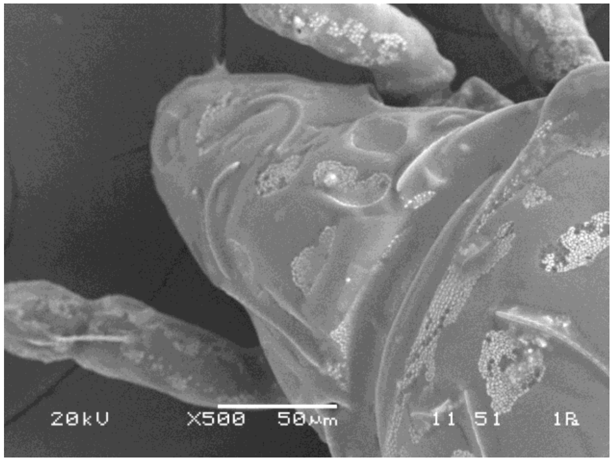

Figure 2. SEM image of prosorsum of *Hypochthonius luteus*.

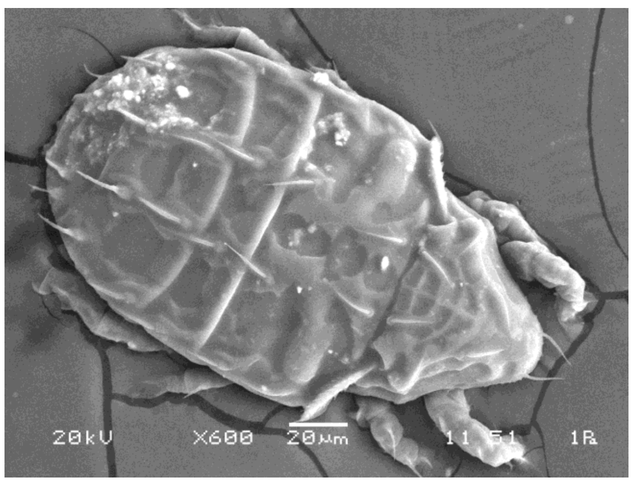

Figure 3. SEM image of dorsal view of adult of *Poecilochthonius italicus*.

FIRST DESCRIPTION OF MALE LYNX SPIDER *OXYOPES BHARATAE* GAJBE, 1999 (ARANEAE: OXYOPIDAE)

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[Malik, S., Das, S. K. & Siliwal, M. 2016. First description of male lynx spider *Oxyopes bharatae* Gajbe, 1999 (Araneae: Oxyopidae). Munis Entomology & Zoology, 11 (2): 473-476**]**

ABSTRACT: The male of lynx spider *Oxyopes bharatae* Gajbe, 1999 is first time described here along with detailed taxonomic description of female. Also natural history of the species is provided.

KEY WORDS: Delhi, taxonomy, *Oxyopes bharatae*, male

The lynx spider family Oxyopidae Thorell, 1870 is represented by nine genera and 451 species in the world, of which, 71 species under four genera *viz.*, *Hamadruas* Deeleman-Reinhold, 2009; *Hamataliwa* Keyserling, 1887; *Oxyopes* Latreille, 1804; *Peucetia* Thorell, 1869 have been reported from India (World Spider Catalog, 2014).

The genus *Oxyopes* is a diverse group with worldwide distribution that includes 300 species from all over the world (World Spider Catalog, 2014). Of which, 46 species have been reported from India (Gajbe, 2008; Sen et al., 2011; Bodkhe & Vankhede, 2012; Kulkarni & Deshpande, 2012; World Spider Catalog, 2014). During our surveys in various parts of Delhi, we collected many specimens of Oxyopes spp. The most common species in Delhi recorded was *O. bharatae* Gajbe, 1999. While going to through literature, we found that so far, the male of this species was not described. Therefore, here, we describe male of lynx spider *O. bharatae* Gajbe, 1999 for the first time based on collections made in Delhi. We also provide additional description of female.

MATERIAL AND METHOD

The specimens were collected by hand picking method and preserved in 70% ethyl alcohol with little glycerine. Measurements of body parts, except for the eyes, were taken with a Mitutoyo™ Vernier Caliper. Eye measurements were done with calibrated ocular micrometer. Legs and pedipalp measurements were taken dorsally for the left side. All measurements are in millimetres. Genitalia were dissected and cleared in concentrated lactic acid in 100°C water bath for 15–20 minutes. All illustrations were prepared with the help of a drawing attachment attached to an Olympus SZX10 stereomicroscope.

Abbreviations: AL = abdomen length, ALE = anterior lateral eye, AME = anterior median eye, AW = abdomen width, CD = copulatory duct; CL = cephalothorax length, CW = cephalothorax width, PLE = posterior lateral eye, PME = posterior median eye, ALS = anterior lateral spinnerets, PMS = posterior median spinnerets, PLS = posterior lateral spinnerets, TL = total length (excludes chelicerae), RTA = retrolateral tibial apophysis, VTA = ventral tibial apophysis. Abbreviations used for hair and spines count are d = dorsal, fe = femur, mt =

metatarsus, p = prolateral, pa = patella, r = retrolateral, ta = tarsus, ti = tibia, v = ventral. All specimens are deposited at Indraprastha University Museum (IPUM), New Delhi, India.

RESULTS

Oxyopes bharatae Gajbe, 1999

(Plates-1.A-D, 2.A,B; Tables 1, 2)

Material examined: 2 males, IPU-ARACH-72, IPU-ARACH-73; 1 female, (IPU-ARACH-71): Garhi Mandu city forest, Wazirabad, New Delhi, India (28^o 42' 35'' N and 77^o 14' 12'' E), 24.06.2014, coll. S. Sahoo.

Description (all measurements in mm)

Male: TL 7.00-8.50, CL 3.00-3.50, CW 2.00-2.75, AL 4.00-5.00, AW 1.30-1.80.

Cephalothorax: Longer than wide, brownish-yellow, convex, clothed with pubescence and provided with four thick dark hairy longitudinal stripes extending between posterior median and lateral eyes to posterior end of carapace; median stripes straight, parallel and very close to each other with small vertical inconspicuous fovea in between them, lateral stripes curved outwards and well separated from median stripes on each side. Eye diameters and inter-distances: AME 0.13, ALE 0.25, PME 0.25, PLE 0.20, AME–AME 0.13, PME–PME 0.25, PLE-PLE 0.25. Eyes black, anterior row of eyes strongly recurved, medians much smaller than laterals and nearly equidistance from each other, posterior row of eyes strongly procurved, equal in size and equidistance from each other, anterior laterals and posterior row of eyes forms hexagon, all with black rim around them; ocular quad slightly longer than wide, clypeus yellow 0.35 high, pair of dark hairy vertical band extending from AMEs till base of fangs. Sternum heart shaped, cordate, light yellowish-green, clothed with scattered long, black, erect hairs and spines, chelicerae vertical, orange in colour, fangs small, yellowish-brown and with single tooth on each margin. Labium and maxillae longer than wide, labium slightly concave anteriorly and protrudes medially, maxillae posteromedially constricted and apically scopulate.

Abdomen: Longer than wide, posteriorly narrow; mid-dorsally provided with broad dark orange band running for length; laterally with yellowish-white and black patches. Ventral side lighter than dorsal, mid ventrally provided with two longitudinal dark green stripes starting from epigastric furrow to spinnerets.

Legs: Legs long, strong and clothed with spines, yellowish-green, reddish annulations on joints of ti and mt of Leg IV, femora of all legs laterally provided with black line. Leg formula 1243 (Table 1). Spines, I: fe, v=1, r=3; pa, d=1, p=2, r=2; ti, v=1, p=3, r=3; mt, d=1, p=3, r=3, II: fe, v=2, p=2, r=2; pa, p=2, r=2, ti, p=3, r=3; mt, p=3, r=3, III: fe, d=1, v=2, p=3, r=2; pa, p=2, r=1; ti, p=2, r=2; mt, p=3, r=3, IV: fe, v=4, r=2; pa, p= 2, r=1; ti,p=3, r=2; mt, p=3, r=3.

Spinnerets: Dark brown, ecribellate and without colulus, three pairs: ALS, PMS, PLS; PMS conical, single segment, smallest and hidden between ALS and PLS; ALS and PMS cylindrical with two segments each; PLS largest.

Palp: Tibia with two tibial apophysis, RTA and VTA. RTA large, wide and nearly pentagonal. VTA digitiform. Cymbium with two ventral spines; three long hairs on tibia; two long hairs on patella Embolus long covered with conductor; conductor wider with bifurcated pointed tips; median apophysis triangular with pointed tip.

Female: TL 9.50, CL 3.50, CW 2.50, AL 6.00, AW 2.00.

Cephalothorax and abdomen almost same to males with slight difference in colour pattern; cephalothorax in females greenish-yellow, abdomen anteromedially with silvery white lanceolate patch on dorsal side and laterally bordered with silvery white stripe with black bands within. Eye diameters and inter-distances: AME 0.12; ALE 0.25; PME 0.25; PLE 0.2; AME–AME 0.13; PME–PME 0.25; PLE-PLE 0.25. Eye arrangement, chelicerae, sternum, maxillae, labium and spinnerets similar as in male. Legs also similar to males except spines (Table 2). Spines, I: fe, p=3, r=2; pa, d=1; ti, p=3, r=2; mt, d=2, p=3, r=3, II: fe, r=3; pa, p=1, r=1; ti,v=1, p=1, r=3; mt, p=3, r=3, III: fe, r=2; pa, p=2, r=1; ti, p=3, r=3; mt, p=3, r=3, IV: fe, r=2; pa, p=1, r=1; ti, p=3, r=2; mt, p=3, r=3, Palp: fe, v=3, p=1, r=1; pa, p=1, r=1; ti, p=3, r=2; ta, r=2.

Epigyne: Spermathecal lobes longer, CD very prominent and twisted in S shaped covering spermathecal lobes completely. Fertilization ducts at base near copulatory duct openings.

Natural history: *O. bharatae* was observed inside scrub vegetation near water bodies. It certainly preferred open and exposed microhabitats, as the species found on long grasses and on leaves of shrubs. Females were found nesting during most of August-October. Males and females found wandering together on vegetation.

Distribution: Endemic to India.

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The authors express their sincere thanks to Dr. B. C. Sabat, Senior Scientific Officer, Department of Environment, Govt. of NCT of Delhi for his help and support during the study. Due thanks also to Mr. Manish Joshi, Mr. Somanath Sahoo, Mrs. Monalisha Paul and Ms. Mandeep Kaur for assisting during field study.

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Table 1. Morphometry of legs of male *O. bharatae* (IPU-ARACH-72, IPU-ARACH-73).

	Leg I	Leg II	Leg III	Leg IV	Palp
Femur	4.25-4.50	4.00	3.00-3.25	4.25-4.50	1.25-1.50
Patella	1.00	0.50-1.00	1.00	0.75-1.00	0.25
Tibia	4.50	4.00-4.50	3.00	3.50	0.50
Metatarsus	4.00-4.50	4.00	2.75-3.00	4.00	-
Tarsus	1.50-2.00	1.50-1.75	0.75-1.00	1.25	1.75
Total	**15.25-16.50**	**14.50-14.75**	**10.50-11.25**	**13.75-14.25**	**3.75-4**

Table 2. Morphometry of legs of female *O. bharatae* (IPU-ARACH-71).

	Leg I	**Leg II**	**Leg III**	**Leg IV**	**Palp**
Femur	5.00	5.00	4.00	5.00	1.00
Patella	1.50	1.00	1.00	1.00	0.50
Tibia	6.00	5.25	4.00	4.00	1.00
Metatarsus	5.25	5.00	4.75	5.75	-
Tarsus	2.00	2.00	1.50	1.50	1.25
Total	**19.75**	**18.25**	**15.25**	**17.25**	**3.75**

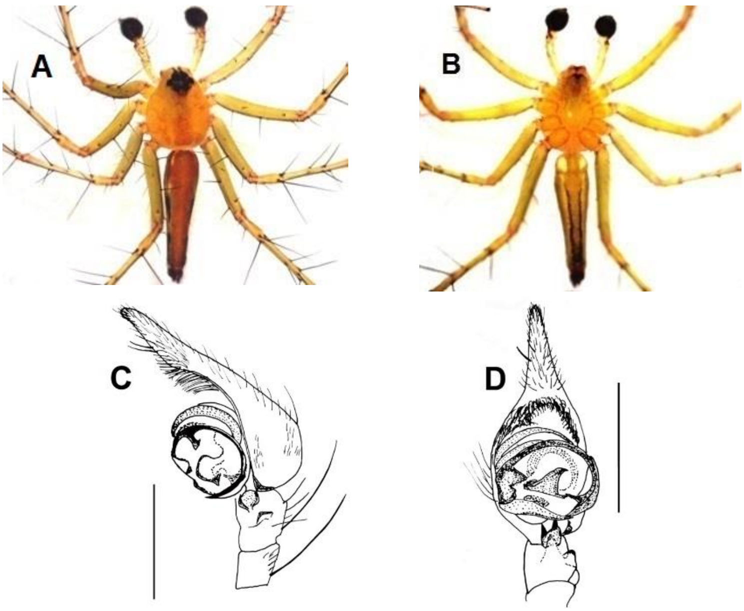

Plate-1. *Oxyopes bharatae* ♂(IPU-ARACH-72) A: Dorsal view; B: Ventral view; C: Palp retrorolateral view (scale 1mm); D: Palp ventral view (scale 1 mm).

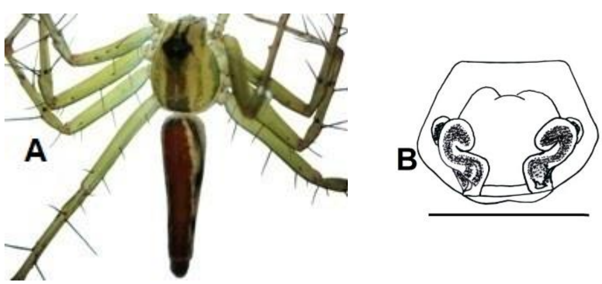

Plate-2. *Oxyopes bharatae* ♀ (IPU-Arach-71) A: Ventral view; B: Internal genitalia (scale 1 mm).

TWO SUBSPECIES OF *DORCADION INFERNALE* MULSANT & REY, 1863 FROM TURKEY (COLEOPTERA: CERAMBYCIDAE)

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[**Özdikmen, H. & Koçak, Ö.** 2016. Two subspecies of *Dorcadion infernale* Mulsant & Rey, 1863 from Turkey (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 11 (2): 477-481]

ABSTRACT: The following new subspecies are described: *Dorcadion infernale costatidorsum* ssp. nov. from Ankara province, and *Dorcadion infernale luteosutura* ssp. nov. from Karaman province.

KEY WORDS: Cerambycidae, Dorcadionini, *Dorcadion infernale*, new subspecies, Turkey

Tribe DORCADIONINI Swainson, 1840

Genus *DORCADION* Dalman, 1817: 397
[type species *Cerambyx glicyrrhizae* Pallas, 1773]

Subgenus *CRIBRIDORCADION* Pic, 1901: 12
[type species *Dorcadion mniszechi* Kraatz, 1873]

***Dorcadion infernale* Mulsant & Rey, 1863**
(Fig. 1)
Dorcadion infernale Mulsant & Rey, 1863: 158

Type information: Holotype, ex collection Petri Pellet, Muséum d'Histoire Naturelle de Perpignan (Tavakilian, 2016).

The species was described by Mulsant & Rey (1863) from “La Perse” [undoubtedly mislabeled, should be Turkey (very likely Eskişehir province: Bozdağ)]. It is an endemic species to Turkey. It is known from Amasya, Ankara, Antalya, Balıkesir, Bilecik, Burdur, Çorum, Diyarbakır, Eskişehir, İçel, İzmir, Kahramanmaraş, Karaman, Kırklareli, Konya, Kütahya, Niğde, Sivas, Uşak provinces (Bodemeyer, 1900, 1906; Breuning, 1947, 1962, 1966, 1970; Demelt, 1963; Braun, 1978; Önalp, 1990; Adlbauer, 1992; Özdikmen & Hasbenli, 2004; Özdikmen, 2006, 2010, 2012; Özdikmen et al., 2009; Sama, et al., 2012; Şenyüz & Özdikmen, 2013; Özdikmen & Koçak, 2015) (Map. 1).

This species includes 4 subspecies as the nominate subspecies, *Dorcadion infernale asperatum* Breuning, 1947 from Diyarbakır province in South-Eastern Anatolia of Turkey, *Dorcadion infernale edremitense* Breuning, 1966 from Balıkesir province in North-Western Anatolia of Turkey, and *Dorcadion infernale miminfernale* Breuning, 1970 from Kahramanmaraş province in Central part of South Anatolia of Turkey.

These subspecies with the type information according to Tavakilian (2016) are presented as follows:

D. infernale Mulsant & Rey, 1863: 158

D. infernale asperatum Breuning, 1947: 169 (Holotype ♀, ex collection S. Breuning, Muséum d'Histoire Naturelle de Genève) [type locality "Diyarbakır" (Turkey)] **A**: TR

D. infernale edremitense Breuning, 1966: 20 (Holotype ♂, Institut Royal des Sciences Naturelles de Belgique) [type locality "Edremit" (Turkey: Balıkesir)] **A**: TR

D. infernale infernale Mulsant & Rey, 1863: 158 (Holotype, ex collection Petri Pellet, Muséum d'Histoire Naturelle de Perpignan) [type locality "La Perse" undoubtedly mislabeled, should be Turkey] **E:** TR **A**: TR
rugosum J. Thomson, 1867: 46 [?Russia: Siberia]
revestitum K. Daniel, 1900: 140 (*Dorcadion infernale* var.) [Turkey]
immutatum Pic, 1903: 171 (*Dorcadion infernale* var.) [Turkey: İzmir: Bozdağ]
costidorsum Heyrovský, 1932: 103 (*Dorcadion infernale* ab.) [Turkey: Eskişehir]
subrevestitum Breuning, 1946: 115 (*Dorcadion infernale* m.) [Turkey: Bilecik]
murinum Breuning, 1946: 115 (*Dorcadion infernale* m.) [Turkey: İzmir: Bozdağ]
irrevestitum Breuning, 1946: 115 (*Dorcadion infernale* m.) [Turkey: Bilecik]

D. infernale miminfernale Breuning, 1970: 98 (Holotype ♂, Muséum National d'Histoire Naturelle de Paris [type locality "Binboğa Mts.: Göksun env." (Turkey: Kahramanmaraş)] **A**: TR

The number of subspecies of *D. infernale* Mulsant & Rey, 1863 rises up to 6 with two new subspecies that are described here. Type localities of all subspecies are shown in Map 2.

Dorcadion infernale costatidorsum ssp. nov.

(Fig. 2)

Holotype ♀: Turkey: Konya province, Ankara-Konya road 84th km (province border of Ankara and Konya), Kulu, Kömüşini village env., 18.II.2016, leg. Ö. Koçak. The specimen is deposited in collection of Özgür Koçak (Turkey: Karaman).

Body length: 16.5 mm.

The new subspecies from Konya province differs from other subspecies by the following characters:

- Upperside almost completely black – practically bald, but only with the exception of a short sutural stripe of whitish hairs on posterior part of elytra.
- Elytra with two distinct costae (as a humeral and a dorsal costae) on basal half.
- Humeral margin of elytra carinated.
- Antennae with black hairs completely.

Dorcadion infernale luteosutura ssp. nov.

(Fig. 3)

Holotype ♂: Turkey: Karaman province, Ayrancı, 2016, 2000 m, leg. Ö. Koçak. The specimen is deposited in collection of Özgür Koçak (Turkey: Karaman).

Body length: 14 mm.

The new subspecies from Karaman province differs from other subspecies by the following characters:

- Elytra with a complete sutural band of yellow hairs.
- Upperside relatively smaller and sparser punctured.
- First two and basal part of third of antennal segments with yellowish-white hairs.
- Pronotum only on basal part with a very short median stripe of white hairs.

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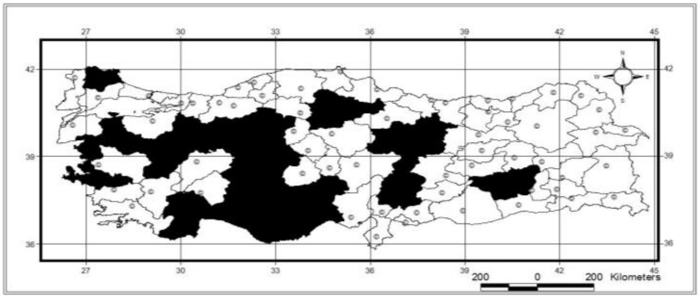
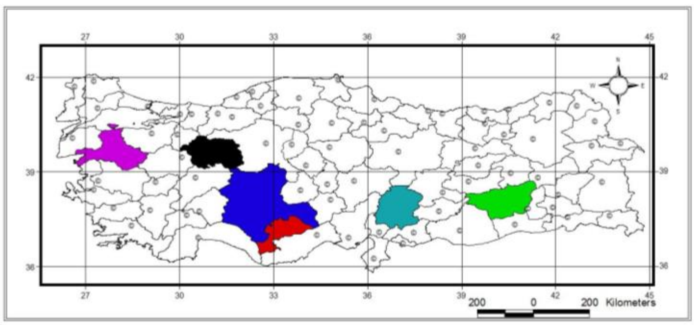


Map 1. Distribution patterns of *Dorcadion infernale*.



Map 2. Type localities of all subspecies of *Dorcadion infernale*. *D. infernale asperatum* Breuning, 1947 from Diyarbakır (light green), *D. infernale costatidorsum* ssp. nov. (blue), *D. infernale edremitense* Breuning, 1966 from Balıkesir (pink), *D. infernale infernale* Mulsant & Rey, 1863 from Eskişehir (black), *D. infernale luteosutura* ssp. nov. (red), *D. infernale miminfernale* Breuning, 1970 from Kahramanmaraş (turquoise blue).

Figure 1. *Dorcadion infernale infernale* Mulsant & Rey, 1863 from Kütahya province (♂).

Figure 3. *Dorcadion infernale costatidorsum* ssp. nov. (holotype ♀).

Figure 3. *Dorcadion infernale luteosutura* ssp. nov. (holotype ♂).

FOUR NEW RECORDS OF REDUVIIDAE FROM JAMMU AND KASHMIR, INDIA (HETEROPTERA: HEMIPTERA)

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[**Mukherjee, P. & Hassan, M. E.** 2016. Four new records of Reduviidae from Jammu and Kashmir, India (Heteroptera: Hemiptera). Munis Entomology & Zoology, 11 (2): 482-485]

ABSTRACT: The paper presents the new record of four species *viz. Ectomocoris ochropterus* Stal, *Spilodermus quadrinotatus* Fabricius, *Oncocephalus fuscinotum* Reuter and *Coranus fuscipennis* Reuter of the family Reduviidae from the state of Jammu and Kashmir, India. Key to the different taxa and distributions of each species in India and abroad have been included.

KEY WORDS: Hemiptera, Reduviidae, Jammu and Kashmir

The family Reduviidae is the largest family of predaceous terrestrial hemiptera and a few are blood suckers. Some of them are pathogenic and transmit various diseases to man and animals. They are commonly known as "assassin bugs" and occurs throughout the world but mostly common in tropical forest ecosystem than any other ecosystems. It belongs to the suborder Heteroptera under the order Hemiptera of Division Exopterygota: Pterygota of class Insecta. There are about 6878 described species and subspecies under 981 genera belonging to 25 subfamilies of the family Reduviidae recorded from the world (Henry, 2009). Of which, 465 species under 144 genera belonging to 14 subfamilies are recorded from India (Biswas & Mitra, 2011).

While working on Indian Reduviidae, we have been able to sort out a number of examples collected from Jammu and Kashmir by Raj Tilak and party of Zoological Survey of India (1964). Prior to study, 9 species under 6 genera belonging to three subfamilies *viz.* Stenopodainae, Reduviinae and Harpactorinae (Distant 1904, 1910) were recorded from Jammu and Kashmir. No comprehensive work has been yet done from this state so far. Present study is based on four new records from the state of Jammu and Kashmir *viz. Ectomocoris ochropterus* Stal and *Spilodermus quadrinotatus* Fabricius of Peiratinae, *Oncocephalus fuscinotum* Reuter of Stenopodainae and *Coranus fuscipennis* Reuter of Harpactorinae.

MATERIALS AND METHODS

This study is based on the materials collected during field surveys by different survey parties of Zoological Survey of India from Jammu and Kashmir. The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata. Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**

Infraorder **CIMICOMORPHA**

Family **REDUVIIDAE**
Subfamily **HARPACTORINAE**
Genus *Coranus* Curtis, 1833
Coranus fuscipennis Reuter, 1881
Subfamily **STENOPODAINAE**
Genus *Oncocephalus* Klug, 1830
Oncocephalus fuscinotum Reuter, 1882
Subfamily **PEIRATINAE**
Genus *Ectomocoris* Mayr, 1865
Ectomocoris ochropterus Stal, 1866
Genus *Spilodermus* Stal, 1868
Spilodermus quadrinotatus (Fabricius,1798)

SYSTEMATIC ACCOUNT

Key to the subfamilies of the family Reduviidae
1. Hemelytra with a quadrangular areolet or cell at interior area of corium near base of membrane...HARPACTORINAE
-. Hemelytra without a quadrangular areolet or cell at interior area of corium near base of membrane...2

2. Hemelytra with a discoidalareolet or cell somewhat hexangular and touching base of membrane or largely triangular..STENOPODANIAE
-. Hemelytra without a discoidalareolet or cell..PEIRATINAE

Subfamily HARPACTORINAE
Genus *Coranus* Curtis, 1833
1833. *Coranus* Curtis, Brit. Ent., 10: 453.
***Coranus fuscipennis* Reuter, 1881** (Fig. 1)
1881. *Coranus fuscipennis* Reuter, Acta Soc. Sci. Fenn., 12: 275.
1904. *Coranus fuscipennis*, Distant, Fauna Brit. India, Rhynchota, 2: 381.
2006. *Coranus fuscipennis*, Ambrose, Zoos' Print Journal, 21 (9): 7.
Material examined: 1 ex., INDIA: Jammu and Kashmir: Udhampur District: Arsa Nala: 11 km West of Chineni on Srinagar Road, 2.X.1964, coll. Raj Tilak.
Diagnostic character: Body black, sparsely covered with hair; antennae black, first segment, clay colour; corium pale yellowish brown, reddish brown on apical area; clavus, membrane, abdomen beneath black; femora nodulose totally black, sometime annulated with reddish brown band; tibiae, tarsi black, annulated with brownish yellow band near base and apex; scutellum with an erect conical spine; posterior lobe of pronotum densely granulate.
Length: 9-10 mm.
Distribution: India: Jammu and Kashmir (Udhampur), Andhra Pradesh, Maharashtra, Madhya Pradesh, Meghalaya, Tripura, Uttarakhand, Tamil Nadu, West Bengal. **Elsewhere:** China, Indonesia.

Subfamily STENOPODAINAE
Genus *Oncocephalus* Klug, 1830
***Oncocephalus fuscinotum* Reuter, 1882** (Fig. 2)
1830. *Oncocephalus* Klug, Symb. Phys., 2
1882. *Oncocephalus fuscinotum* Reuter, Acta. Soc. Sc. Fenn., 12: 731.
1904. *Oncocephalus fuscinotum*, Distant, Fauna Brit. India, Rhynchota, 2: 229.
2006. *Oncocephalus fuscinotum*, Ambrose, Zoos' Print Journ., 21 (9): 25.
Material examined: 1 ex., INDIA: Jammu and Kashmir: Udhampur District: JuhuiNala: Jhajjar: 1 mile west of Srinagar road bridge, 8.X.1964, coll. Raj Tilak.
Diagnostic character: Head, pronotum and body beneath dark brown; hemelytra, rostrum, legs and apex of scutellum brownish yellow; a yellowish spot behind each eye; apical areas of femora, obsolete medial annulations to same, basal, medial and apical annulations to tibiae and base of rostrum reddish; membrane mottled with paler colouration; antennae with first and second segment reddish, first segment slightly shorter

than anteocular area of head which is longer than postocular but not twice as long; connexivum spotted with brownish yellow above and beneath.
Length: 11.5 mm.
Distribution: India : Jammu and Kashmir (Udhampur), Madhya Pradesh. **Elsewhere:** West Pakistan.

Subfamily PEIRATINAE

Key to the genera of the subfamily Peiratinae

1. Spongyfurrowoccupying more thanhalf of anteriortibiae…………………***Ectomocoris*** Mayr
-. Spongyfurrowoccupyingless or not more thanhalf of anteriortibiae…….***Spilodermus*** Stal

Genus *Ectomocoris* Mayr, 1865

1865. *Ectomocoris* Mayr, Verh. Zool. Bot. Ges. Wien., 15: 438.

***Ectomocoris ochropterus* Stal, 1866** (Fig. 3)

1866. *Ectomocoris ochropterus* Stal, Ofv. K. Vet. Ak. Forh., 23: 256.
1904. *Ectomocoris ochropterus*, Distant, Fauna Brit. India, Rhynchota, 2: 294-295.
2006. *Ectomocoris ochropterus*, Ambrose, Zoos' Print Journal, 21 (9): 16.
Material examined: 1 ex.,INDIA: Jammu and Kashmir: Udhampur District: JhajjarNala: 1km upstream from Srinagar bridge, 6.X.1964, coll. Raj Tilak.
Diagnostic character: Body black; first segment and basal area of second segment of antennae, rostrum, clavus, corium, basal third of membrane, lateral areas of abdomen and legs yellowish brown; inner margin of clavus, a linear fascia near lateral margin of corium and apex of membrane brownish yellow; second segment of antennae shorter than anterior lobe of pronotum and granulate; legs finely granulate.
Length: 19-20 mm.
Distribution: India: Jammu and Kashmir (Udhampur), Bihar, West Bengal. **Elsewhere:** Egypt, Eritrea, Ethiopia.

Genus *Spilodermus* Stal, 1868

1868. *Spilodermus* Stal, Hem., 1: 122.

***Spilodermus quadrinotatus* (Fabricius, 1798)** (Fig. 4)

1798. *Reduvius quadrinotatus* Fabricius, Ent. Syst. Suppl., p.544.
1904. *Pirates quadrinotatus*: Distant, Fauna Brit. India, Rhynchota, 2: 300.
2006.*Spilodermus quadrinotatus***:** Ambrose, Zoos' Print Journal, 21 (9): 18.
Material examined: 1 ex., INDIA: Jammu and Kashmir: Udhampur District: near Julin Nala and its union with river Tawi, 28.X.1964, coll. Raj Tilak.
Diagnostic character: Body black, legs with greyish hairs; posterior lobe of pronotum, scutellum, clavus, corium, posterior margin of prosternum, cinnamon- brown; posterior inner area of corium black; membrane with one anterior and posterior spots and a line on basal margin white; spots to connexivum above and beneath, apices of coxae, bases of intermediate and posterior femora brownish yellow; second joint of antennae as long as pronotum.
Length: 9-10.5 mm.
Distribution: India: Jammu and Kashmir (Udhampur), Chhattisgarh, Tamil Nadu. **Elsewhere:** Sri Lanka, Bangladesh.

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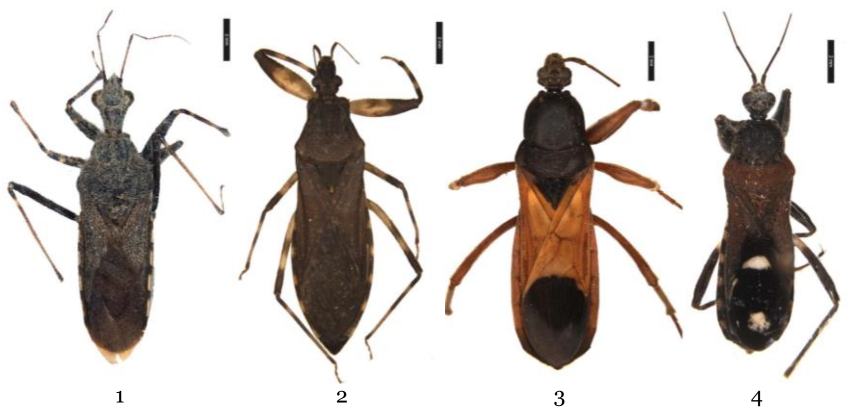

Figures 1-4. 1. *Coranus fuscipennis* Reuter, 2. *Oncocephalus fuscinotum* Reuter, 3. *Ectomocoris ochropterus* Stal, 4. *Spilodermus quadrinotatus* (Fabricius).

ADDITION TO THE LIST OF BUTTERFLIES OF SULTANPUR NATIONAL PARK, HARYANA, INDIA (LEPIDOPTERA: RHOPALOCERA)

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[Sharma, N. 2016. Addition to the list of butterflies of Sultanpur National Park, Haryana, India (Lepidoptera: Rhopalocera). Munis Entomology & Zoology, 11 (2): 486-491**]**

ABSTRACT: A total of 36 species belonging to 26 genera and 5 families were collected and identified, out of which 20 species of butterflies were added to the list of Butterflies of Sultanpur National Park for the first time. The family Nymphalidae dominated the scene with 15 species, followed by Pieridae 10 species, Lycaenidae 6 species, Papilionidae 3 species & Hesperiidae 2 species.

KEY WORDS: Butterflies, Lepidoptera, Sultanpur National Park, Haryana

The Sultanpur National Park is at a distance of about 13 Kms. from Gurgaon on Grurgaon-Farukh Road. This park is spread over an area of 352.17 acres. The National Park has been carved out of the land of Sadhrana, Chandu, Sultanpur and Saidpur villages. The park is located around the intersection of the 76° 53' east longitude and 28° 28' north latitude. Sultanpur jheel is a seasonal jheel that was described by M. Krishnan, the eminent naturalist as 'a sheet of shallow water not merely rain fed, which dries up in summer. The jheel lies in one of the natural depressions in the undulating terrain of Gurgaon district and is surrounded by gently sloping dunes which range from 214 to 225 metres above mean sea level during the monsoon, overflows from neighbouring nullahs (mainly to the south of the park) and agricultural areas fill up this hollow. As the soil is naturally clayey with high water retention capacity, this accumulated water remains in the jheel for several months after the monsoons are over.

Two types of vegetation have been identified within the Park. There is the seasonal aquatic vegetation, flourishing and disappearing with the change of seasons and the open grasslands containing the patches of planted kikar, *Acacia nilotica* forest. In addition there is the community of the plants typical of the bunds which surround the jheel and the small well maintained patch of lawn which has a mixture of planted Indian and exotic trees.The major part of the National Park is covered by seasonal vegetation which is adapted to a seasonal watery existence. Just after a good monsoon, the water fills up the jheel, in some places to the level of bund. At this time, when the water level is high, one can see the diverse aquatic vegetation in its element with several species flowering. The sides of the bunds which surround the jheel have characteristic plants that survive on dry land such as *Puthkunda, Gobi, Tulati pati.* 'Savannah woodland' is a useful term to describe the dry grassy stretches having scattered trees or groups of planted trees. There are also large open stretches of grasses with hardly any tree cover. The latter surrounds mainly the jheel-bed and cover the southeastern and western ends of the park. The dominant grasses include *khus, Vetiveria zizanioides and* moonj, *Erianthus ravennae*. Moonj grass grows tall and bear large silvery clumps of flowers which turn dry only in December. Most of the trees which are dominated by kikar, *Acacia nilotica* and Khejdi, *Prosopis cineraria* have been planted after the declaration of the area as a sanctuary.

MATERIAL AND METHODS

The collections and observations were made in Sultanpur National Park (with GPS readings: 28°27.744'N; 076° 53.188'E; Accuracy 10'; Elevation 778') on 9.12.2012 and from 24-26.09.2013.

Butterflies were collected with the help of a specified butterfly net. After netting, the voucher specimens (non-schedule species only) were collected and preserved for identification. Later, these were deposited as the National Zoological Collection (NZC) at the Northern Regional Centre, Dehradun. For the identification of butterflies, Bingham (1905, 1907), Evans (1932), Talbot (1939, 1947), Wynter-Blyth (1957), Haribal (1998) and Kehimkar (2008), etc were followed.

OBSEREVATION AND RESULTS

A total of 36 species belonging to 26 genera and 5 families were collected and identified, out of which 20 species of butterflies were added to the list of Butterflies of Sultanpur National Park for the first time. Lal et al. (1996) listed 18 species of butterflies under 6 families from Sultanpur National Park. Family Papilionidae with 3 species (*Papilio demoleus* Linnaeus, *P. polytes* Linn., *Polyandrous aristolochiae* (Fabricius), Nymphalidae 6 species (*Precis orithya* (Butler), *P. almana* (Linnaeus), *P. hierta* (Fabricius), *P. lemonias* (Linn.), *Vanessa cardui* (Linnaeus), *Hypolomnas missipusi* (Linnaeus), Danaidae 2 species (*Danais chrysippus* (Linnaeus), *Euploea core* (Cramer), Pieridae 4 species (*Colotis calais* (Cramer), *Eurema hecabe* (Linn.), *Catopsilia crocale* (Cramer), *Anapheis aurota* (Fabricius), Satyridae 2 species (*Melanitis leda* (Cramer), *Mycalesis* sp.), Hesperiidae 1 species (*Sanchus pulligo* Moore).

Family-wise analysis of the number of species revealed that the family Nymphalidae dominated with 15 species (Subfamily Nymphalinae 10 species, Danainae 3 species, Satyrinae 2 species) followed by Pieridae- 'Whites' or 'Yellows' 10 species, Lycaenidae (Blues) 6 species, Papilionidae (Swallowtails) & Hesperiidae (Skippers) with 3 species each.

The abundance status provided here is based on an arbitrary frequency scale and was quantified as follows: Common (encountered 6-10 times), Less Common (3-5 times), and Uncommon (only once or twice).

Abbreviation used: Coll.- Collector

TAXONOMIC ACCOUNT

Superfamily PAPILIONOIDEA
Family PIERIDAE (Whites & Yellows)
Subfamily PIERINAE
***Leptosia nina nina* (Fabricius)**
The Psyche

1793. *Papilio nina* Fabricius, Ent. Syst., 3 (1): 194.
1995. *Leptosia nina nina* Fabricius: Arora et al., Himalayan Ecosystem Series, Fauna of Western Himalaya, Zoological Survey of India, Part-1: 65.

Status: Less common.

Material examined/observed: Gurgaon, SNP: 1 male, 30.viii.2012, A. Bahuguna & party; 2 female, Reg. no. A-12089, 25.ix.2013, Coll. N. Sharma & party.

Wingspan: 30-50 mm.

Distribution: India: Throughout India. **Elsewhere:** Pakistan, Nepal, Bangladesh., Sri Lanka and Myanmar.

***Pieris canidia indica* Evans, Indian cabbage White**

1926. *Pieris canidia indica* Evans, J. Bombay nat. Hist. Soc., 31: 312.
Status: Less common.
***Material examined/Observed*:** Gurgaon, SNP: 1 male, 1.ix.2012, A. Bahuguna & party; 1 male, 24.ix.2013, Reg. no. A-12091, Coll. N. Sharma & party.
Wingspan: 45-60 mm.
Distribution: India: Himalayas, Nilgiris, Kerala, Karnataka, **Elsewhere:** Pakistan, Myanmar and Nepal.

***Pieris brassicae nepalensis* Doubleday, The Large cabbage White**

1846. *Pieris brassicae* var. *nepalensis* Doubleday, Gen. Diur Lep., 1: 9.
1939. *Pieris brassicae nepalensis* Doubleday: Talbot, Fauna of British India, Butterflies, 1: 427-428.
Status: Less common.
Material examined/Observed: Gurgaon, SNP: 1 male, 30.viii.2012, A. Bahuguna & party; 2 males, Reg. no. A-12092, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 65-75 mm.
Distribution: India: Himalaya to Assam and Plains adjoining the Himalayas. **Elsewhere:** Pakistan, Nepal.

Subfamily COLIADINAE

***Catopsilia pyranthe pyranthe* (Linnaeus), The Mottled Emigrant**

1758. *Papilio pyranthe* Linnaeus, Syst. Nat., (10th ed.): 469.
1939. *Catopsilia pyranthe pyranthe*: Talbot, Fauna Brit. India, Butterflies, 1: 497-498.
Status: Common.
Material examined/observed: Gurgaon, SNP: 3 males, 1 female, Reg. no. A-12096, 24.ix.2013, 2 males, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 50-70 mm.
Distribution: India: Throughout India. **Elsewhere:** Bangladesh, Bhutan, Nepal, Pakistan, Sri Lanka, Myanmar and Southeast Asia.

***Eurema laeta laeta* (Boisduval), The Spotless Grass Yellow**

1836. *Terias laeta* Boisduval, Spec. Gen. Lep., 1: 674.
1990. *Eurema laeta laeta* (Boisduval): Ghosh, Mondal & Chaudhary, Rec. zool. Surv. India, 86 (1): 22.
Status: Uncommon.
Material observed: Gurgaon, SNP: 1 male, 24.ix.2013, N. Sharma & party.
Wingspan: 30-40 mm.
Distribution: Throughout peninsular India, ascending to about 8,000 feet in North-West Himalayas. **Elsewhere:** Sri Lanka.

***Eurema blanda silhetana* (Wallace), Three Spot Grass Yellow**

1867. *Terias silhetana* Wallace, Trans. Ent. Soc. Lond., 4 (3): 324.
1939. *Eurema blanda silhetana* (Wallace): Talbot, Fauna of British India, Butterflies, 1: 523-525.
Status: Uncommon.
Material examined: Gurgaon, SNP: 1 male, Reg. no. A-11740, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 40-50 mm.
Distribution: India: Throughout India. **Elsewhere:** Sri Lanka, Bhutan, Bangladesh and Myanmar.

Family NYMPHALIDAE

Subfamily NYMPHALINAE

***Hypolimnas bolina* (Linnaeus), The Great Eggfly**

1758. *Papilio bolina* Linnaeus, Syst. Nat., (10th ed): 479, no.124.
1911. *Hypolimnas bolina* (Linnaeus): Tytler, J. Bombay nat. Hist. Soc., 21 (1): 54.
Status: Uncommon.
Material oberved: Gurgaon, SNP: 1 male, 26.ix.2013, N. Sharma & party.

Wingspan: 70-110 mm.
Distribution: India: Throughout India. **Elsewhere:** Sri Lanka, Pakistan, Bangladesh and Myanmar.

Ariadne merione tapestrina (Moore), The Common Castor

1884. *Ergolis tapestrina* Moore, J. Asiat. Soc. Bengal: 19.
1932. *Ergolis merione tapestrina*: Evans, The Identification of Indian Butterflies: 191.
1994. Ariadne merione: Varshney, Oriental Ins., 28: 167.
Status: Uncommon.
Material examined: Gurgaon, SNP, 1 male, Reg. no. A-12100, 24.ix.2013, Coll. N. Sharma & party.
Wingspan: 45-55 mm.
Distribution: India: Himachal Pradesh, Chhattisgarh, Delhi, Jammu & Kashmir, Madhya Pradesh, Orissa and Uttar Pradesh. **Elsewhere:** Sri Lanka and Myanmar.

Phalanta phalantha (Drury), The Common Leopard

1770. *Papilio phalantha* Drury, Illus. nat. Hist., 1: 21- figs.1, 2.
1992. *Phalanta phalantha* (Drury): Haribal, Butterflies of Sikkim Himalaya: 159.
Status: Less Common.
Material examined / observed: Gurgaon, SNP: 2 males, Reg. no. A-12102, 23.ix.2013, Coll. N. Sharma & party; 1 male, 1.ix.2012 Coll. A. Bahuguna & party.
Wingspan: 50-60 mm.
Distribution: India: Throughout. **Elsewhere:** Sri Lanka, Pakistan, Bangladesh and Myanmar.

Neptis hylas astola Moore, The Common Sailer

1872. *Neptis astola* Moore, Proc. Zool. Soc. Lond.: 561.
1932. *Neptis hylas astola*: Evans, The Indentification of Indian Butterflies: 166.
2004. *Neptis hylas* Moore: Gupta, Fauna of Manipur, State Fauna Series, 10: 555.
Status: Less Common.
Material examined/observed: Gurgaon, SNP: 1 male, Reg. no. A-12109, 26.ix.2013, Coll. N. Sharma & party; 2 males, 30.viii.2012, Coll. A. Bahuguna & party.
Wingspan: 45-55 mm.
Distribution: India: Kashmir to Karen Hills, Himachal Pradesh, Jammu & Kashmir, Uttarakhand.

Subfamily SATYRINAE

Mycalesis mineus mineus (Linnaeus), The Dark-band Bushbrown

1767. *Papilio mineus mineus* Linnaeus, Syst. Nat., 1 : 768.
1932. *Mycalesis mineus mineus* (Linnaeus): Evans, The Ident. Indian Butts., (2nd ed.): 98.
Status: Common.
Material examined/observed: Gurgaon, SNP: 2 males, 1 female, 24.ix.2013, Reg. no. A-12110, 2 male, 25.ix.2013, 1 female, 26.ix.2013, Coll. N. Sharma & party.
Wingspan: 45-50 mm.
Distribution: India: Andamans, Himachal Pradesh (Kangra, Kullu, Mandi), Sikkim, Uttarakhand (Mussoorie, Kumaon), West Bengal. **Elsewhere:** Myanmar and Sri Lanka.

Subfamily DANAINAE

Danaus genutia genutia (Cramer), The Common Tiger

1779. *Papilio genutia* Cramer, Pap. Exot., 3: 23.
1998. *Danaus genutia genutia* (Cramer): Mondal & Maulik, Fauna of Meghalaya, State Fauna Series, 4 (Part-6): 236.
Status: Uncommon.
Material observed: Gurgaon, SNP: 1 male, 26.ix.2013, N. Sharma & party.
Distribution: India: Throughout India. **Elsewhere:** Nepal, Myanmar, Sri Lanka, Vietnam, Thailand, South China, Pakistan and Afghanistan.

Family LYCAENIDAE

Subfamily POLYOMMATINAE

Leptotes plinius (Fabricius), The Zebra Blue

1793. *Hesperia plinius* Fabricius, Ent. Syst., 3 (1): 284.
1823. *Polyommatus plinius*: Godart, Enc. Meth., 9: 658.
1881. *Tarucus plinius* Moore, Lep. Ceylon, 1: 82.
Status: Uncommon.
Material examined: Gurgaon, SNP: 1 male, Reg. no. A-12118, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 27- 32 mm.
Distribution: India: Throughout India. **Elsewhere:** Nepal, Bangladesh, South China, Sri Lanka, Taiwan, Philippines, Papua New Guinea, East Australia.

Azanus ubaldus (Cramer), The Bright Babul Blue

1782. *Papilio ubaldus* Cramer, Pap. Exot., 4: 209.
1882. *Azanus ubaldus*: Moore, Proc. Zool. Soc. Lond.: 245.
1865. *Lycaena zena* Moore, Proc. Zool. Soc. Lond., 1865 (2): 202.
1870. *Lycaena itea* Walker, Entomologist, 5: 55.
Status: Common.
Material examined/observed: Gurgaon, SNP: 2 males, 1 female, Reg. no. A-11741-42, 24.ix.2013; 1 male, 1 female, Reg. no. A-11743, 25.ix.2013; 1 male, 1 female, Reg. no. A-12119, 26.ix.2013. Coll. N. Sharma & party.
Wingspan: 23-24 mm.
Distribution: India: Throughout India. **Elsewhere:** West Pakistan, Ceylon, Afghanistan, Nepal.

Catochrysops strabo (Fabricius), The Forget-me-not

1793. *Hesperia strabo* Fabricius, Ent. Syst., 3: 287.
1823. *Polyommatus strabo*: Godart, Enc. Meth., 9: 656.
1832. *Catochrysops strabo*: Boisduval, In d'Urville Voy. Astrolabe, 1 (Lep.): 88.
Status: Uncommon.
Material examined: Gurgaon, SNP: 1 male, Reg. no. A-12120, 24.ix.2013, Coll. N. Sharma & party.
Wingspan: 30-33 mm.
Distribution: India: Uttarakhand, Himachal Pradesh.

Euchrysops cnejus cnejus (Fabricius), The Gram Blue

1798. *Hesperia cnejus* Fabricius, Ent. Syst. Suppl.: 430.
Status: Uncommon.
Material examined: Gurgaon, SNP: 1 male, Reg. no. A-12121, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 29-35 mm.
Distribution: India: Throughout India. **Elsewhere:** Baluchistan, Sri Lanka, South China, Malay Archipelago and Australia.

Freyeria trochylus (Freyer), The Grass Jewel

1845. *Lycaena trochylus* Freyer, Neuere Beitr. Schmett., 5 (74): 98.
1862. *Polyommatus trochylus* Kirby, Eur. Butt.: 99.
1932. *Zizeeria trochylus*: Evans, Ident. Indian Butts. (2nd ed.): 233.
1963. *Freyeria trochylus*: Cantlie, Lyc. Butts Revised: 63.
Status: Less common.
Material examined: Gurgaon, SNP: 2 males, Reg. no. A-12122, 24.ix.2013, 1 male, 26.ix.2013, Coll. N. Sharma & party.
Wingspan: 24-28 mm.
Distribution: India: North-West India. **Elsewhere:** Nepal, West Pakistan, Sri Lanka, Myanmar.

Pseudozizeeria maha (Kollar), The Pale grass blue

1844. *Lycaena maha* Kollar, Hugel's Kaschmir, 4 (2): 422.
1882. *Zizera maha*: Moore, Proc. zool. Soc. Lond., 1882: 245.
1910. *Zizeeria maha*: Chapman, Trans. Ent. Soc. Lond., 1910: 484.

1955. *Pseudozizeeria maha* : Beuret, Mitt. Ent. Ges. Basel (n.f.), 5: 125.
Status: Less common.
Material examined/observed: Gurgaon, SNP: 1 male, 1 female, Reg. no. A-12123, 25.ix.2013, 1 male, 26.ix.2013, Coll. N. Sharma & party.
Wingspan: 24-26 mm.
Distribution: India : Central-North India. **Elsewhere:** Nepal, Pakistan, Baluchistan.

Family HESPERIIDAE
Borbo cinnara (Moore), The Rice Swift

1866. *Hesperia cinnara* Moore, Proc. zool. Soc. Lond.: 361.
Status: Common.
Material examined/observed: Gurgaon, SNP: 2 males, 2 females, Reg. no. A-11744, 24.ix.2013, 2 males, 25.ix.2013, Coll. N. Sharma & party.
Wingspan: 30-36 mm.
Distribution: India: Throughout India. **Elsewhere:** Sri Lanka, Myanmar.

Pelopidas mathias (Fabricius), The Small Branded Swift

1798. *Hesperia mathias* Fabricius, Ent. Syst. Suppl.: 433.
2003. *Pelopidas mathias* (Fabricius): Majumdar, Fauna of Sikkim, State Fauna Series, 9 (4): 131.
Status: Less Common.
Material examined: Gurgaon, SNP: 2 males, 1 female, Reg. no. A-11745, 25.ix.2013, 1 male, Reg. no. A-12124, 26.ix.2013, Coll. N. Sharma & party.
Wingspan: 32-38 mm.
Distribution: India: Throughout India. **Elsewhere:** Sri Lanka, Myanmar.

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UPDATED WORLD SPECIES LIST OF THE SUBGENUS *PHYTOECIA* (*NEOMUSARIA*) PLAVILSTSHIKOV, 1928 WITH TWO NEW SPECIES FROM TURKEY (CERAMBYCIDAE: LAMIINAE)

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ABSTRACT: The world species list of subgenus *Phytoecia* (*Neomusaria*) Plavilstshikov, 1928 is updated with their type information and known distribution data. *P.* (*N.*) *aligamgami* sp. nov. is described from Çorum province (Turkey), close to *P.* (*N.*) *longicornis* (Pesarini & Sabbadini, 2009) and *P.* (*N.*) *balcanica* (Frivaldszky von Frivald, 1835). Also *P.* (*N.*) *furkani* sp. nov. is described from Aksaray province (Turkey), close to *P.* (*N.*) *pauliraputii* (Sama, 1993) and *P.* (*N.*) *waltli* (Sama, 1991). Moreover, an identification key for world species of the subgenus is also given at the end of the text.

KEY WORDS: *Phytoecia* (*Neomusaria*), updated world species list, *P. aligamgami, P. furkani*, new species

The genus *Phytoecia* was described by Dejean (1835) with the type species *Cerambyx cylindricus* Linnaeus, 1758 from "Suecia" (Sweden). It is included many subgenera under discussion worldwide. Now, we think that the presence of mixed characters in the genus does not allow us to consider the subgenera as valid genera stated by some authors. Breuning's (1951) and Danilevsky's (2015) systematics, therefore, are adopted here chiefly.

According to Danilevsky (2015), *Phytoecia* includes a total of 167 species of 16 subgenera in Palaearctic region as the nominotypical subgenus *Phytoecia* Dejean, 1835 (49 species), *Opsilia* Mulsant, 1863 (14 species), *Cardoria* Mulsant, 1863 (1 species), *Pilemia* Fairmaire, 1864 (12 species), *Helladia* Fairmaire, 1864 (20 species), *Musaria* J. Thomson, 1864 (14 species), *Coptosia* Fairmaire, 1865 (11 species), *Blepisanis* Pascoe, 1866 (13 species), *Fulgophytoecia* Pic, 1900 (3 species), *Pseudocoptosia* Pic, 1900 (3 species), *Pseudomusaria* Pic, 1900 (1 species), *Neomusaria* Plavilstshikov, 1928 (11 species), *Cinctophytoecia* Breuning, 1947 (7 species), *Barbarina* Sama, 2010 (4 species), *Kalashania* Danilevsky, 2010 (3 species) and *Metallidia* Kasatkin, 2012 (1 species).

The subgenera *Fulgophytoecia*, *Pseudocoptosia*, *Pseudomusaria* and *Cinctophytoecia* are not represented in Turkey. So the genus *Phytoecia* includes a total of 79 species of 12 subgenera in Turkey as *Phytoecia* (19 species), *Opsilia* (3 species), *Cardoria* (1 species), *Pilemia* (8 species), *Helladia* (13 species), *Musaria* (9 species), *Coptosia* (9 species), *Blepisanis* (2 species), *Neomusaria* (9 species), *Barbarina* (2 species), *Kalashania* (2 species) and *Metallidia* (1 species).

Breuning (1951) stated only 5 species for the SW-Asiatic subgenus *Phytoecia* (*Neomusaria*) Plavilstshikov, 1928. With respect to Löbl & Smetana (2010), the subgenus includes 10 species for Palaearctic Region of which 8 species are for Turkey. According to the latest work of Danilevsky (2015), it includes 11 species for Palaearctic Region of which 9 species are for Turkey, with an overlooked species *Phytoecia* (*Neomusaria*) *longicornis* (Pesarini & Sabbadini, 2009) by Löbl & Smetana (2010).

In addition, during the study of collected Cerambycidae specimens in our collection, we have identified some specimens belonging to two new species that collected from Aksaray (Central Anatolian region) and Çorum provinces (Central parts of Northern Anatolia), of *Phytoecia* (*Neomusaria*) Plavilstshikov, 1928 which will be described in the present text.

MATERIALS AND METHODS

A total of 44 specimens were collected from various localities in 8 different provinces (Aksaray, Ankara, Çankırı, Çorum, Karabük, Kastamonu, Niğde and Osmaniye) of Turkey in 1997-2014, were evaluated. The holotypes of *Phytoecia* (*Neomusaria*) *aligamgami* sp. nov. from Çorum province in Southern part of Central Black Sea region of North Turkey, and *Phytoecia* (*Neomusaria*) *furkani* sp. nov. from Aksaray province in Central Anatolian region of Turkey, are measured and described. All specimens were deposited at Gazi University of Ankara (Turkey).

Information in the present text is given in following order: The subfamily and the tribe names are given simply. For the generic names, the type species is provided under the taxon name. Each species is given in alphabetical order. The distribution patterns are also given for each species. Endemic taxa are marked with the sign (*). The type information for each species group taxa are arranged under Tavakilian (2015). For distributional data of the taxa, Özdikmen (2007, 2008a,b, 2011, 2013) for Turkey and Löbl & Smetana (2010), Danilevsky (2015) for World are chiefly used in the text.

RESULTS AND DISCUSSION

The present investigation is based on a total of 44 specimens that were collected from 8 different provinces of Turkey in 1997-2014, of the subgenus *Phytoecia* (*Neomusaria*). Among them, 8 specimens from Niğde and 2 specimens from Osmaniye provinces as *Phytoecia inapicalis*, 1 specimen from Ankara, 2 specimens from Çorum, 1 specimen from Karabük and 1 specimen from Kastamonu provinces as *Phytoecia balcanica*, 11 specimens from Ankara, 12 specimens from Çankırı, 1 specimen from Çorum and 1 specimen from Osmaniye provinces as *Phytoecia merkli*, 2 specimens from Aksaray province as a new species *Phytoecia* (*Neomusaria*) *furkani* sp. nov. and 2 specimens from Çorum province as another new species *Phytoecia* (*Neomusaria*) *aligamgami* sp. nov. were identified and described.

Consequently, the world species of *Phytoecia* (*Neomusaria*) must be updated. In accordance with this, all members of *Phytoecia* (*Neomusaria*) with the new species can be presented as follows:

Subfamily Lamiinae Latreille, 1825
Tribe Phytoeciini Mulsant, 1839
Genus *Phytoecia* Dejean, 1835: 351
Subgenus *Neomusaria* Plavilstshikov, 1928: 123

[Type species *Saperda balcanica* Frivaldszky von Frivald, 1835]

***P. adusta* Reitter, 1889: 43**
(Holotype, ex collection Edmund Reitter, Magyar Természettudományi Mûzeum, Budapest) [Type locality "Erzurum" (Turkey)] **Asia:** Turkey.
Distribution patterns: Turkey: Amasya, Erzurum provinces.
Remarks: It is endemic to Turkey now.

***P. aligamgami* Özdikmen & Kaya sp. nov.**
(Holotype ♀, collection H. Özdikmen, Zoological Museum of Gazi University, Ankara) [Type locality "Sungurlu-Çorum road" (Turkey: Çorum)] **Asia:** Turkey.
Distribution patterns: Turkey: Çorum province.
Remarks: It is endemic to Turkey now.

Phytoecia aligamgami sp. nov.
(Fig. 1)

Type material. Holotype ♀: Turkey: Çorum: Sungurlu-Çorum road, Koparan II bridge env., N 40°22'-E 34°43', 01.VI.2013, 910 m. Paratype ♀: The same as holotype. The specimens were deposited at Gazi University in Ankara (Turkey).

Description. Body length in female (males unknown): 12.375 mm, width: 3.125 mm. Head black, densely covered with recumbent rusty-yellow and erect dark brown pubescence, erect pubescence of temples also yellowish; small median area on upper part of the frons, middle and posterior vertex areas without pubescence. Antennae black clothed with densely yellowish-white recumbent pubescence; smaller than body; 3rd segment relatively long, much longer than 1st, about as long as 4th.

Pronotum completely black; about 1.15 times shorter than basal width; covered with long dark brown erect setae, which are mixed pale erect setae along median and lateral hair stripes; median wide longitudinal stripe consist of rusty-yellow recumbent setae; medio-lateral pronotal areas without recumbent pubescence; lateral parts covered with densely rusty-yellow recumbent setae; two small transverse shining exposed callosities distinct.

Scutellum black entirely covered with dense pale rusty-yellow recumbent pubescence; roundish apically.

Elytra about 2.5 times longer than basal width; in basal half with numerous, moderately long dark brown erect setae, becoming apically semierect and very short; bicolored, at most part with dense recumbent dirty-yellow pubescence, and blackened apical area that one twentieth of elytral length; humeral carinae obliterated; elytral punctuation not very dense, with distinct microsculpture in interspaces; elytra rounded apically.

Pygidium almost completely red.

Legs bicolored as at most parts reddish; fore femora reddish except for a small blackened basal part, middle and hind femora reddish except for blackened basal and a rather small apical part; all tibiae almost completely reddish; 1 and 2nd segments of all tarsi reddish except for blackened apical parts; the remaining parts of tarsi black.

Abdomen black with the exception of red colored last segment and a small triangular area in sides of penultimate segment; posterior parts of abdominal segments with dense rusty-yellow recumbent pubescence.

Remarks. The new taxon belongs to a group of species, which have dark apical elytral areas. So the new species is closely related to *P. longicornis* and *P. balcanica*. The new species can easily distinguish from *P. balcanica* by completely reddish colored middle and hind tibiae (only basal one third reddish colored in *P. balcanica*), much shorter blackened apical area on elytra, one twentieth of elytral length (one fifth or one sixth of elytral length in *P. balcanica*), relatively thinner antennae (relatively thicker in *P. balcanica*), much smaller callosities on pronotal disc (much larger in *P. balcanica*). Also, the new species can easily distinguish from *P. longicornis* by completely reddish colored middle and hind tibiae (only basal one third reddish colored in *P. longicornis*), relatively shorter blackened apical area on elytra, one twentieth of elytral length (one tenth of elytral length in *P. longicornis*), much thinner antennae (much thicker in *P. longicornis*), relatively smaller callosities on pronotal disc (relatively larger in *P. longicornis*).

Distribution. According to type serie, the new species is distributed only in Southern part of Central Black Sea region in Northern Anatolia now.

Etymology. The name is dedicated to Ali Gamgam (Turkey).

***P. balcanica* Frivaldszky von Frivald, 1835: 268** (*Saperda*)

(Holotype, ex collection Imre Frivaldszky, Magyar Természettudományi Mûzeum, Budapest) [Type locality "Szlivnó" (Balkans: Bosnia-Herzegovina)] **Europe:** Bulgaria, Greece, Turkey **Asia:** Iraq, Turkey.

subvitticollis Breuning, 1951: 92 (*Phytoecia balcanica* m.) [Turkey: Amasya]

Distribution patterns: Bulgaria: Slivno; Greece: Crete: Kandia; N Iraq; Turkey: Amasya, Ankara, Hakkari, İstanbul, Karabük, Kastamonu, Mardin, Tunceli provinces.

***P. dantchenkoi* Danilevsky, 2008: 7**

(Holotype ♂, ex collection Mikhail Danilevsky, Moscow) [Type locality "Giumaratz, 6 km N of Shvanidzor" (Armenia: Meghri)] **Asia:** Armenia.

Distribution patterns: Armenia: Syunik province (Meghri).

Remarks: The species is endemic to Armenia now.

***P. furkani* Özdikmen & Kaya sp. nov.**

(Holotype ♂, collection H. Özdikmen, Zoological Museum of Gazi University, Ankara) [Type locality "Güzelyurt, Selime" (Turkey: Aksaray)] **Asia:** Turkey.

Distribution patterns: Turkey: Aksaray province.

Remarks: It is endemic to Turkey now.

Phytoecia furkani sp. nov.

(Fig. 2)

Type material. Holotype ♀: Turkey: Aksaray: Güzelyurt, Selime, N 40˚22'-E 34˚43', 27.VI.1997, 1240 m. Paratype ♀: The same as holotype. The specimens were deposited at Gazi University in Ankara (Turkey).

Description. Body length in female (males unknown): 12 mm, width: 3.25 mm. Head black, densely covered with recumbent rusty-yellow and erect dark brown pubescence, erect pubescence of temples also yellowish; just middle and posterior vertex areas without pubescence. Antennal segments black clothed with densely yellowish-white recumbent pubescence.

Pronotum completely black; about 1.23 times shorter than basal width; a large longitudinal median band and the sides largely clothed with rusty-yellow pubescence. medio-lateral pronotal areas without recumbent pubescence; In addition, the pronotum is completely covered with long dark brown erect setae, which are mixed pale erect setae along median and lateral hair stripes; two small transverse shining exposed callosities distinct; densely punctate except for collosities.

Scutellum black entirely covered with dense rusty-yellow recumbent pubescence.

Elytra black; about 2.4 times longer than basal width; in basal half with numerous, moderately long dark brown erect setae, becoming apically semierect and very short; unicolored, entirely covered with short brownish recumbent setae; humeral carinae obliterated; elytral punctuation not very dense, with distinct microsculpture in interspaces; elytra truncated apically.

Pygidium completely red except for blackened apical margin.

Legs bicolored as at most parts reddish; fore femora reddish except for a small blackened basal part, middle and hind femora reddish except for blackened basal parts (at most up to middle) and a rather small apical part; all tibiae almost completely reddish; fore tarsi almost completely reddish, middle and hind tarsi blackened apically.

Abdomen black with the exception of red colored last segment (except for blackened apical margin) and a rather large triangular area towards the sides of penultimate segment; posterior parts of abdominal segments with dense pale rusty-yellow recumbent pubescence.

Remarks. The new taxon belongs to a group of species, which do not have dark apical elytral areas. So the new species is closely related to *P. pauliraputii* by presence the pubescence on sides of pronotum and *P. waltli* by the rusty-yellow pubescence of head and pronotum, relatively much larger reddish areas in middle and hind femora, yellowish-white pubescence of antennal segments. The new species can easily distinguish from *P. pauliraputii* by the rusty-yellow pubescence of head and pronotum (head and pronotum clothed with yellowish pubescence in *P. pauliraputii*), relatively much larger reddish areas in middle and hind femora (relatively much smaller reddish areas in middle and hind femora in *P. pauliraputii*), almost completely reddish tibiae (middle and hind tibiae black except for the basis in *P. pauliraputii*), almost completely reddish fore tarsi, and blackened apically middle and hind tarsi (all tarsi black in *P. pauliraputii*), yellowish-white pubescence of antennal segments (antennal segments clothed with golden pubescence in *P. pauliraputii*), red colored last segment (except for blackened apical margin) and a rather large triangular area towards the sides of penultimate segment (only last abdominal sternite reddish in *P. pauliraputii*). Also, the new species can easily distinguish from *P. waltli* by presence the pubescence on sides of pronotum (absence the pubescence on lateral parts of pronotum in *P. waltli*), almost completely reddish tibiae (middle and hind tibiae black except for the basis in *P. waltli*), almost completely reddish fore tarsi, and blackened apically middle and hind tarsi (all tarsi black in *P. waltli*).

Distribution. According to type serie, the new species is distributed only in Central Anatolian region in Turkey now.

Etymology. The name is dedicated to Furkan Tüzün (Turkey).

***P. inapicalis* Pic, 1905a: 107** (*modesta* ssp.)

(Holotype, ex collection M. Pic, Muséum National d'Histoire Naturelle, Paris) [Type locality “Adana” (Turkey)] **Asia:** Syria, Turkey.

latepubens Pic, 1926: 6 (*Helladia merkli* var.) [Syria: Aleppo]

alepensis Pic, 1931: 2 [Syria: Aleppo]

Distribution patterns: Turkey: Adana, Niğde, Osmaniye provinces; Syria: Aleppo.

***P. longicornis* Pesarini & Sabbadini, 2009: 27** (*Neomusaria*)

(Holotype ♂, collection Carlo Pesarini & Andrea Sabbadini, Milano) [Type locality “Buğlan pass” (Turkey: Bingöl)] **Asia:** Turkey.

Distribution patterns: Turkey: Bingöl, Muş provinces.

Remarks: It is endemic to Turkey now. Some specimens that was given by Danilevsky (2008) as *P. suvorowi* erronously, from Muş province (Buğlan pass) in Turkey should be belonging to *P. longicornis* that has dark apical elytral areas and relatively thicker antennae etc. So *P. suvorowi* never has dark apical elytral areas.

***P. merkli* Ganglbauer, 1884: 560**

(Lectotype ♀, ex collection L. Ganglbauer, Naturhistorisches Museum Wien) [Type locality “Gülek” (Turkey: İçel)] **Asia:** Syria, Turkey.

Distribution patterns: Turkey: Adıyaman, Ankara, Çankırı, Çorum, Eskişehir, İçel, Konya, Niğde, Osmaniye, Tunceli provinces; N Syria.

***P. mesopotamica* Breuning, 1948: 91**

(Holotype ♀, ex collection S. Breuning, Muséum d'Histoire Naturelle de Genève) [Type locality “Mesopotamia: Ras Al-Ayn” (Syria)] **Asia:** Iran, Iraq, Syria.

Distribution patterns: NE Syria: Ras Al-Ayn; W Iran: Kordestan; N Iraq.

Remarks: The species is not known from Turkey now. Probably it can occur in Turkey too.

***P. pauliraputii* Sama, 1993: 295** (*Neomusaria*)

(Holotype ♂, collection Gianfranco Sama, Cesena) [Type locality “Akhisar” (Turkey: Manisa)] **Asia:** Turkey.

Distribution patterns: Turkey: Adıyaman, Bilecik, Eskişehir, İzmir, Manisa provinces.

Remarks: It is endemic to Turkey now.

***P. salvicola* Holzschuh, 1989: 176**

(Holotype ♂, collection Carolus Holzschuh, Villach) [Type locality “Harput” (Turkey: Elazığ)] **Asia:** Turkey.

Distribution patterns: Turkey: Elazığ province.

Remarks: It is endemic to Turkey now.

***P. suvorowi* Pic, 1905b: 38**

(Syntypes, ex collection M. Pic, Muséum National d'Histoire Naturelle, Paris) [Type locality “Oltu” (Turkey: Erzurum)] **Asia:** Turkey.

suworowi König, 1906: 26 [Turkey: Erzurum: Oltu]

Distribution patterns: Turkey: Bitlis, Erzurum, Muş provinces.

Remarks: It is endemic to Turkey now.

***P. waltli* Sama, 1991: 127** [RN]

(Lectotype ♀, ex collection Joseph Waltl, Naturhistorisches Museum Wien as *Saperda modesta*) [Type locality “Beirut” (Lebanon)] **Asia:** Israel, Jordan, Lebanon, Syria, Turkey.

modesta Waltl, 1838: 471 (*Saperda*) [HN] [Lebanon: Beirut]

Distribution patterns: Turkey: Adana, İçel provinces; Syria, Jordan, Israel: Golan Heights, Galilee, Carmel Ridge, Samaria, Jordan Valley, Northern Coastal Plain, North Negev; Lebanon: Beirut.

After the present work, the number of representing species of the subgenus *Phytoecia* (*Neomusaria*) for Palaearctic Region and Turkey raised up 11 to 13 and 9 to 11 respectively. In accordance with this, all members of *Phytoecia* (*Neomusaria*) with the new species are presented in the text and an identification key for them is presented as follows.

An identification key to world species of the subgenus *Phytoecia* (*Neomusaria*)

1. Elytra completely black..**2**
- Elytra densely clothed with light pubescence..**4**

2. Sides of pronotum clothed with dense pubescence..**3**
- Sides of pronotum without pubescence..***P. waltli***

3. Head and pronotum clothed with yellowish pubescence; reddish areas in middle and hind femora relatively much smaller; middle and hind tibiae black except for the basis; all tarsi black; antennal segments with golden pubescence; only last abdominal sternite reddish..***P. pauliraputii***
- Head and pronotum clothed with rusty-yellow pubescence; reddish areas in middle and hind femora relatively much larger; all tibiae almost completely reddish; fore tarsi almost completely reddish and middle and hind tarsi blackened apically; antennal segments with yellowish-white pubescence; last two abdominal segments at least partly reddish..***P. furkani* sp. nov.**

4. Elytra in apical part clothed with black pubescence..**5**
- Elytra entirely clothed with light pubescence..**8**

5. All femora black..***P. adusta***
- Femora at least partly reddish..**6**

6. Middle and hind tibiae completely reddish; darkened apical areas of elytra as long as about one twentieth of elytral length..***P. aligamgami* sp. nov.**
- Middle and hind tibiae not completely reddish; darkened apical areas of elytra much longer than one twentieth of elytral length..**7**

7. Darkened apical areas of elytra as long as about one fifth or one sixth of elytral length; antennae relatively thinner and shorter..***P. balcanica***
- Darkened apical areas of elytra as long as about one tenth of elytral length; antennae relatively thicker and longer..***P. longicornis***

8. The elytral pubescence velvety yellowish-brown..***P. salvicola***
- The elytral pubescence differently colored..**9**

9. Middle and hind femora and tibiae entirely black; elytral pubescence pale gray..***P. dantchenkoi***
- Middle and hind femora and tibiae at least partly reddish..**10**

10. All tibiae yellow or reddish; elytral pubescence dirty yellow..***P. suvorowi***
- Middle and hind tibiae bicolored, at least partly darkened or black; elytral pubescence yellow, yellowish-olive or yellowish-gray..**11**

11. The elytral pubescence yellow..***P. mesopotamica***
- The elytral pubescence yellowish-olive or yellowish-gray...**12**

12. The elytral pubescence yellowish-olive..***P. inapicalis***
- The elytral pubescence gray or yellowish-gray..***P. merkli***

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Figure 1. *Phytoecia* (*N.*) *aligamgami* sp. nov., holotype ♀ (left) and *Phytoecia* (*N.*) *balcanica* ♀ (right) from Çorum province.

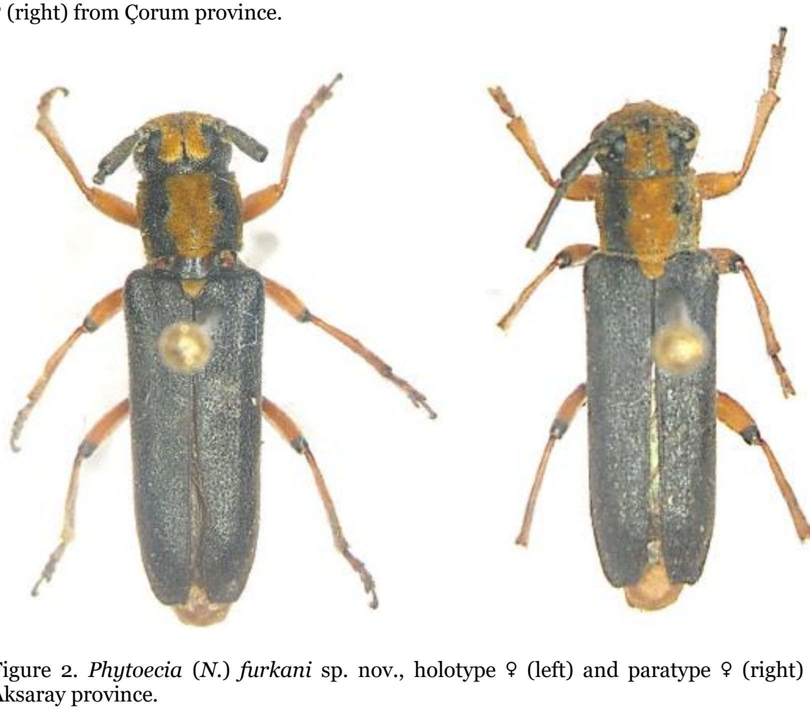

Figure 2. *Phytoecia* (*N.*) *furkani* sp. nov., holotype ♀ (left) and paratype ♀ (right) from Aksaray province.

REDUVIIDAE (HETEROPTERA: HEMIPTERA) RECORDED AS NEW FROM ODISHA, INDIA

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ABSTRACT: The paper presents ten new records *viz. Rhynocoris squalus* (Distant), *Staccia diluta* (Stal), *Oncocephalus notatus* Klug, *Oncocephalus fuscinotum* Reuter, *Ectrychotes dispar* Reuter, *Androclus pictus* (Herr-Schiff), *Ectomocoris tibialis* Distant, *Lisarda annulosa* Stal, *Acanthaspis quinquespinosa* (Fabricius) and *Acanthaspis flavipes* Stal of the family Reduviidae from the state of Odisha, India. General characters of the group, keys to various taxa, diagnostic characters, synonymies, distribution in India and elsewhere under each species are also provided.

KEY WORDS: Hemiptera, Reduviidae, Odisha

The members of the family Reduviidae are commonly known as "Assassin bugs". Most of the species of Reduviidae are nocturnal. The family Reduviidae belongs to the superfamily Reduvoidea of the suborder Heteroptera under the order Hemiptera of class Insecta. Their large size and aggressive nature enable them to predate and eat many insects. With more than 6878 described species and subspecies under 981 genera belonging to 25 subfamilies of the family Reduviidae recorded from the world (Henry, 2009) are one of the largest and morphologically most diverse group of Heteroptera or true bugs. Of which, 465 species under 144 genera belonging to 14 subfamilies are recorded from India (Biswas and Mitra, 2011). Distant (1904, 1910) recorded three species from Berhampur, Odisha *viz Acanthaspis rama* Distant of Reduviinae, *Ectomocoris ochropterus* Stal and *Peirates flavipes* (Walker) of Peiratinae. The present paper deals with 10 species under 8 genera belonging to 6 subfamilies of the family Reduviidae which are recorded as new from the state of Odisha *viz. Rhynocoris squalus* (Distant) of Harpactorinae, *Staccia diluta* (Stal), *Oncocephalus notatus* Klug, *Oncocephalus fuscinotum* Reuter of Stenopodainae, *Ectrychotes dispar* Reuter of Ectrichodiinae, *Androclus pictus* (Herr-Schiff), *Ectomocoris tibialis* Distant of Peiratinae, *Lisarda annulosa* Stal of Salyavatinae and *Acanthaspis quinquespinosa* (Fabricius), *Acanthaspis flavipes* Stal of Reduviinae.

MATERIALS AND METHODS

This study is based on the materials collected during field surveys by different survey parties of Zoological Survey of India from Odisha (1972-1986). The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata.

Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**

Infraorder **CIMICOMORPHA**

Family **REDUVIIDAE**
Subfamily **HARPACTORINAE**
Genus *Rhynocoris* Kolenati, 1857
Rhynocoris squalus (Distant, 1904)
Subfamily **STENOPODAINAE**
Genus *Staccia* Stal, 1866
Staccia diluta (Stal, 1859)
Genus *Oncocephalus* Klug, 1830
Oncocephalus notatus Klug, 1830
Oncocephalus fuscinotum Reuter, 1883
Subfamily **ECTRICHODIINAE**
Genus *Ectrychotes* Burmiester, 1835
Ectrychotes dispar Reuter, 1881
Subfamily **PEIRATINAE**
Genus *Androclus* Stal, 1863
Androclus pictus (Herr-Schiff, 1848)
Genus *Ectomocoris* Mayr, 1865
Ectomocoris tibialis Distant, 1904
Subfamily **SALYAVATINAE**
Genus *Lisarda* Stal, 1859
Lisarda annulosa Stal, 1874
Subfamily **REDUVIINAE**
Genus *Acanthaspis* Amyot & Serville, 1843
Acanthaspis quinquespinosa (Fabricius, 1781)
Acanthaspis flavipes Stal, 1881

SYSTEMATIC ACCOUNT

Key to the subfamilies of the family Reduviidae
1. Hemelytra with a quadrangular areolet or cell at interior area of corium near base of membrane..HARPACTORINAE
-. Hemelytra without a quadrangular areolet or cell at interior area of corium near base of membrane..2
2. Hemelytra with a discoidal areolet or cell touching base of membrane.STENOPODAINAE
-. Hemelytra without a discoidal areolet or cell..3
3. Scutellum with its apex broad and two or three-spined.........................ECTRICHODIINAE
-. Scutellum with its apex triangular or subtriangular..4
4. Pronotum constricted behind middle..PEIRATINAE
-. Pronotum constricted before or near middle..5
5. Anterior tarsi two-jointed..SALYAVATINAE
-. Anterior tarsi three-jointed..REDUVIINAE

Subfamily HARPACTORINAE
Genus *Rhynocoris* Kolenati, 1857
1857. *Rhynocoris* Kolenati, Fascia Bulletin Moscou, 29: 419-502.

Rhynocoris squalus (Distant, 1904) (Fig. 1)
1904. *Harpactor squalus* Distant, Fauna Brit. India, Rhynchota, 2: 333.
2006. *Rhynocoris squalus*, Ambrose, Zoos' Print Journal, 21 (9): 12.
Material examined: 1 ex., INDIA: Odisha: Deogarh District: Lulang, 21.II.1975, coll. R.L. Chowdhury and party.
Diagnostic character: Species black in colour; corium, sternum, legs pitchy black; posterior lobe of pronotum and corium coarsely rugosely granulate; anterior pronotal lobe sculptured with two small distinct tubercles and centrally excavated posteriorly; head with anteocular and postocular area equal in length; first joint of antennae almost as long as anterior femora.
Length: 21 mm.
Distribution: India: Odisha (Deogarh), Chhattisgarh, Sikkim.

Subfamily STENOPODAINAE

Key to the genera of the subfamily Stenopodainae

1. Anterior femora with two series of small spines beneath....................*Staccia* Stal
-. Anterior femora with a single series of small spines beneath..*Oncocephalus* Klug

Genus *Staccia* Stal, 1866

1866. *Staccia* Stal, Ofv. K. Vet. Ak. Forh., 3: 150.

Staccia diluta (Stal, 1859) (Fig. 2)

1859. *Oncocephalus diluta* Stal, III. Zool. Insekter., 16: p. 263.
1874. *Staccia diluta*: Stal, Kongl. Svenska Vet. Akad. Handl., 4: 86.
1904. *Staccia diluta*, Distant, Fauna Brit. India, Rhynchota, 2: 225.
2006. *Staccia diluta*, Ambrose, Zoos' Print Journal, 21 (9): 26.

Material examined: 1 ex., INDIA: Odisha: Ganjam District: Ramtha, 25.XI.1986, coll. S.S. Saha.

Diagnostic character: Body brownish yellow; first joint of antennae shorter about as long as anteocular portion of head, margins of postocular area rounded; pronotum with anterior and posterior lateral angles tuberculous; prosternal spines visible from beneath; prosternum transversely impressed at about one third from base with the anterior lobe a little rounded; hemelytra with a large cell at inner margin and reaching abdominal apex at male but not in female.

Length: 8-10 mm.

Distribution: India: Odisha (Ganjam), Tamil Nadu. **Elsewhere:** Combodia, China, Japan, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Genus *Oncocephalus* Klug, 1830

1830. *Oncocephalus* Klug, Symb. Phys., 2.

Key to the species of the genus *Oncocephalus* Klug

1. Anteocular and postocular areas of head almost equal in length.......................*notatus* Klug
-. Anteocular area of head longer, but not twice the length of postocular area.........................
....*fuscinotum* Reuter

Oncocephalus notatus Klug, 1830 (Fig. 3)

1830. *Oncocephalus notatus* Klug, Symb. Phys., 2, pl.19, f. 1.
1904. *Oncocephalus notatus*, Distant, Fauna Brit. India, Rhynchota, 2: 227.
2006. *Oncocephalus notatus,* Ambrose, Zoos' Print Journal, 21 (9): 25.

Material examined: 1 ex., INDIA: Odisha: Mayurbhanj District: Bangriposi, 3.V.1972, coll. A.R. Bhaumik and party.

Diagnostic character: Body yellowish brown; a large spot on postocular area of head, three vittae to anterior lobe and five to posterior lobe of pronotum, spots to connexivum above and beneath, head beneath, lateral areas of sternum, a broad submarginal fascia to abdomen beneath, spots and other markings to anterior femora, annulations to intermediate and posterior femora and tibiae, cell at inner angle of corium and a discal oblong spot to membrane dark brown; anteocular and postocular areas of head about equal in length; pronotum with anterior angles laterally spinously prominent, posterior lateral angles rounded, centrally sulcate on disk; hemelytra in female not reaching apex of abdomen.

Length: 10-10.5 mm.

Distribution: India: Odisha (Mayurbhanj), Kashmir, Maharashtra. **Elsewhere:** Algeria, Arabia, Caucasus, Japan, North Africa, Spain and Turkey.

Oncocephalus fuscinotum Reuter, 1883 (Fig. 4)

1883. *Oncocephalus fuscinotum* Reuter, Act. Soc. Sc. Fenn., 12: 371.
1904. *Oncocephalus fuscinotum,* Distant, Fauna Brit. India, Rhynchota, 2: 229.
2006. *Oncocephalus fuscinotum,* Ambrose, Zoos' Print Journal, 21 (9): 25.

Material examined: 1 ex., INDIA: Odisha: Deogarh District: Lulang, 15.II.1975, coll. R.L. Chowdhury and party.

Diagnostic character: Head, pronotum, scutellum and body beneath dark brown; hemelytra brownish yellow; rostrum, legs and apex of scutellum brownish yellow; a

testaceous spot behind each eye; apical areas of femora and somewhat obsolete medial annulations to same, basal, medial and somewhat obsolete apical annulations to tibiae and base of rostrum castaneous; membrane mottled with paler colouration; first and second segments of antennae castaneous, first segment slightly shorter than anteocular area of head, which is longer than postocular area but not twice as long; anterior and posterior lateral angles of pronotum obtuse; connexivum spotted with brownish yellow above and beneath.
Length: 11.5 mm.
Distribution: India: Odisha (Deogarh), Madhya Pradesh. **Elsewhere:** West Pakistan.

Subfamily ECTRICHODIINAE
Genus *Ectrychotes* Burmiester, 1835
1835. *Ectrychotes* Burm., Handb., 2: 237.
Ectrychotes dispar Reuter, 1881 (Fig. 5)
1881. *Ectrychotes dispar* Reuter, Act. Soc.Sc.Fenn., 12: 304.
1904. *Ectrychotes dispar*: Distant, Fauna of Brit. India, Rhynchota, 2: 315.
2006. *Ectrychotes dispar*: Ambrose, Zoos' PrintJourn., 21 (9): 2.
Material examined: 1 ex., INDIA: Odisha: Jajpur District: Purnakote, 26.II.1975, coll. R.L. Chowdhury and party; 2exs., Kandhamal District, Balliguda, Phulbani, 1.VII.1974, coll. Dr. A.K. Mandal.
Diagnostic character: Species violet in colour, antennae and hemelytra piceous; lateral areas of posterior lobe of pronotum, scutellum, base of clavus, corium, lateral margins of corium, connexivum, apices of coxae, trochanters, basal half of posterior femora, bases of tarsi and abdomen beneath, violaceous.
Length: 12-14 mm.
Distribution: India: Odisha (Jajpur, Kandhamal), Chhattisgarh, West Bengal, Maharashtra, Bangalore, Tamil Nadu.

Subfamily PEIRATINAE
Key to the genera of the subfamily Peiratinae
1. Anterior tibiae ampliated and incrassated; lateral angles of posterior lobe of pronotum ampliated and incrassated...*Androclus* Stal
-. Anterior tibiae normal, not ampliated and incrassated; lateral angles of posterior lobe of pronotum obtusely prominent, not ampliately rounded..............................*Ectomocoris* Mayr

Genus *Androclus* Stal, 1863
1863. *Androclus* Stal, Ann. Soc. Ent. Fr., 4: 58.
Androclus pictus (Herr-Schiff, 1848) (Fig. 6)
1848. *Pirates pictus* Herr-Schiff, Wanz. Ins., 8: 63.
1904. *Androclus pictus, Distant,* Fauna Brit. India, Rhynchota, 2: 290.
2006. *Androclus pictus,* Ambrose, Zoos' Print Journ., 21 (9): 15.
Material examined: 1 ex., INDIA: Odisha: Debagarh District: Bhutel, 27.XII.1972, coll. Dr. A.K. Mandal.
Diagnostic character: Body reddish brown; membrane and clavus (excluding base) pale smoky brown; a large central spot to clavus, a large rounded spot on corium outside claval apex, three or four small spots at base, a very large irregularly shaped discal spot to membrane, spots to connexivum above and beneath, sternum, a series of transverse segmental spots on each lateral area of abdomen and posterior legs dark black; apices of posterior femora and bases of posterior tibiae, brownish yellow; antennae pilose, second segment longest; anterior pronotal lobe straite; anterior and intermediate femora incrassated.
Length: 10.5- 11 mm.
Distribution: India: Odisha (Debagarh), Maharashtra. **Elsewhere:** Africa Dutcheast and Oriental, Cameroon, Southern Mozambique, Guinea, Indonesia, South Africa and Transvala.

Genus *Ectomocoris* Mayr, 1865
1865. *Ectomocoris* Mayr, Verh. Zool. Bot. Ges. Wien., 15: 438.
Ectomocoris tibialis Distant, 1904 (Fig. 7)
1904. *Ectomocoris tibialis* Distant, Fauna Brit. India, Rhynchota, 2: 293.

2006. *Ectomocoris tibialis*, Ambrose, Zoos' Print Journal, 21 (9): 17.
Material examined: 1 ex., INDIA: Odisha: Ganjam District: Ganjam, 17.VIII.1973, coll. Dr. A.K. Mandal.
Diagnostic character: Body black, opaque; first segment and base of second segment of antennae, rudimentary hemelytra (excluding base and spot at apex), tibiae and tarsi ochraceous; head anteriorly produced, as long as anterior lobe of pronotum; hemelytra only reaching base of first abdominal segment; spongy furrow to anterior tibiae occupying three-fourths of their under surface.
Length: 17 mm.
Distribution: India: Odisha (Ganjam), Bihar, Kerala, Maharashtra, Punjab, Sikkim, Tamil Nadu.

Subfamily SALYAVATINAE
Genus *Lisarda* Stal, 1859
1859. *Lisarda* Stal, Ofv. Vet.-Ak. Forh., 16: 192.
***Lisarda annulosa* Stal, 1874** (Fig. 8)
1874. *Lisarda annulosa* Stal, En. Hem., 4: 83.
1904. *Lisarda annulosa,* Distant, Fauna Brit. India, Rhynchota, 2:237.
2006. *Lisarda annulosa*: Ambrose, Zoos' PrintJourn., 21 (9): 23.
Material examined: 1 ex., INDIA: Odisha: Deogarh District: Lulang, 19.II.1975, coll. R.L. Chowdhury and party.
Diagnostic character: Species brownish-yellow in colour; base and annulations to second joint of antennae, mottlings to hemelytra and abdomen, connexivum and legs brownish yellow; subocellate spots to connexivum, head beneath, sternum, a broad fasciae on each side of abdomen joining a spot on apical segment and a few smaller linear central spots dark reddish brown; tibiae and femora annulated with brownish yellow; femora with a a spine on apex,anterior femora with a medial spine,spine to scutellum short and obtuse.
Length: 11 mm.
Distribution: India: Odisha (Deogarh), Chhattisgarh, Tamil Nadu. **Elsewhere:** China, Myanmar, Sri Lanka.

Subfamily REDUVIINAE
Genus *Acanthaspis* Amyot & Serville, 1843
1843. *Acanthaspis* Amyot & Serville, Histoire Naturelle des Insects Hemipteres Libraire Encyclopedique de Roret, Paris: Fain et Thunot., 336 pp.

Key to the species of the genus *Acanthaspis* Amyot & Serville
1. Posterior lobe of pronotum with two long discal spines.............*quinquespinosa* (Fabricius)
-. Posterior lobe of pronotum with two short but prominent discal tubercles.......*flavipes* Stal

***Acanthaspis quinquespinosa* (Fabricius, 1781)** (Fig. 9)
1781. *Reduvius quinquespinosa* Fabr., Spec. Ins., 2: p. 382.
1904. *Acanthaspis quinquespinosa*: Distant, Fauna Brit. India, Rhynchota, 2:257.
2006.*Acanthaspis quinquespinosa*: Ambrose, Zoos' PrintJourn., 21 (9): 20.
2007. *Acanthaspis quinquespinosa*: Biswas and Bal, Fauna of Andhra Pradesh, State fauna series, 5 (3): 342.
Material examined: 1 ex., INDIA: Odisha: Jajpur District: Purnakote, 1.III.1975, coll. R.L. Chowdhury and party; 1 ex., Keonjhar District, Ghatgaon, 22.VIII.1972, coll. S.K. Mitra and party.
Diagnostic character: Body black; two lateral and two discal spines to pronotum; a transverse discal spot to corium and spot to connexivum above and beneath luteous; anterior lobe of pronotum strongly sculptured, posterior lobe rugose with a long lateral spine on each side and with two shorter erect discal spines between them; scutellar spine long, obliquely ascending.
Length: 15.5-19 mm.
Distribution: India: Odisha (Jajpur, Keonjhar), Chhattisgarh, Assam, Madhya Pradesh, Tamil Nadu, Maharashtra, Meghalaya and West Bengal. **Elsewhere:** China, Sri Lanka, Myanmar.

***Acanthaspis flavipes* Stal, 1881** (Fig. 10)

1855.*Acanthaspis flavipes* Stal, Ofv. Vet.-Ak. Forh., 12: 187.
1904. *Acanthaspis flavipes*: Distant, Fauna Brit. India, Rhynchota, 2: 262.
2006. *Acanthaspis flavipes*: Ambrose, Zoos' Print Joun. 21 (9): 19.

Material examined: 1 ex., INDIA: Odisha: Puri District: Konark: P.H.D.L.B. compound, 18.III.1973, coll. Dr. V.K. Prem Kumar.

Diagnostic character: Body brown; large transverse spot to the middle of corium, spot to connexivum; rostrum, legs, apex of scutellar spine luteous; pronotum with anterior lobe strongly sculptured, lateral angle spinously produced; scutellar spine obliquely ascendant.

Length: 15.5-16 mm.

Distribution: India: Odisha (Puri), Chhattisgarh, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and West Bengal.

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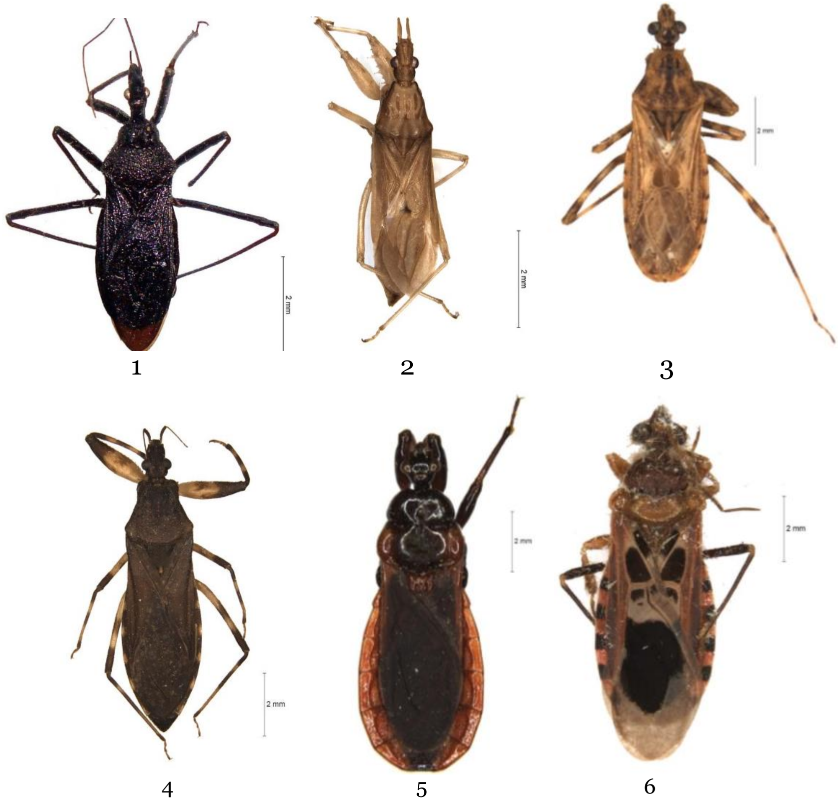
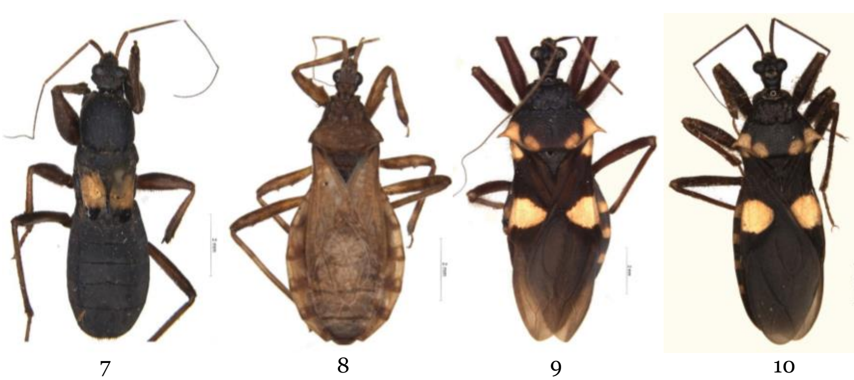


Figures 1-6. 1. *Rhynocoris squalus* (Distant), 2. *Staccia diluta* (Stal), 3. *Oncocephalus notatus* Klug, 4. *Oncocephalus fuscinotum* Reuter, 5. *Ectrychotes dispar* Reuter, 6. *Androclus pictus* (Herr-Schiff).



Figures 7-10. 7. *Ectomocoris tibialis* Distant, 8. *Lisarda annulosa* Stal, 9. *Acanthaspis quinquespinosa* (Fabricius), 10. *Acanthaspis flavipes* Stal.

CHECKLIST OF WILD SILK MOTHS OF NORTH EAST INDIA (LEPIDOPTERA: SATURNIIDAE, BOMBYCIDAE)

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ABSTRACT: More than 200 specimens were collected from six states of North East India (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur and Mizoram) and 41 species were identified belongs to Saturniidae (31 species) and 9 species (Bombycidae). The identification is validated through taxonomic treated male genitalia of all sericigenous moths. Two new subspecies have been described of genus *Loepa* from Nagaland and Arunachal Pradesh. One new report of *Antheraea* sp. is reported from Nagaland. All illustration including morphological features, external genitalic characters along with field photographs and description of illustrated characters have been completed. Color photographic plates are being prepared along with description, which will be published soon. According to conservation point of view, the species are to be recorded from the places, which can be explored and documented for future references. All the specimens have to be preserved for future references, so that other scientists can quote and refer for identification of species from voucher collection. All silk moths along with cocoons and plant's leave from where it was collected have been preserved at Insect Repository, CMERTI, Lahdoigarh. This will be utilized for correct identification of silk moth species of North East India. There were many misidentifications among *A. compta, A. pernyi, A. helferi, A. royali, A. frithii, A. mylitta* and *A. andamana* (*platessa*) (new record), which have been corrected through illustration of genitalic structure. According to genitalic structure of *A. assamensis*, it is found that this species does not match with any other species of genus *Antheraea*, because of it special characters of labidae in valvae of male genitalia. In evolutionary stage, *A. assamensis* is the oldest species among all species of *Antheraea*. A further study may be conducted for DNA barcoding for the species. *Antheraea compta, Attacus atlas, Cricula trifenstrata* have been reared for continuing the generation, but *Antheraea compta* cocoons are under diapauses and *Attacus atlas* only one generation was successful. North Eastern region is one of the biodiversity hotspots for flora and fauna among 34 biodiversity hotspots of world.

KEY WORDS: Saturniidae, Bombycidae, checklist, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur and Mizoram

North East region of India is considered as the floral and faunal gateway for main Asian land to Indian peninsula. The region is having a dense spectrum of species and considered as a rich reservoir of natural resources. The North East India is one of the major and important hot spot among 35 biodiversity hotspots of the world, which is known for the "Endemism". Due to the unique climatic conditions and varied topography, North East India occupies as a distinct and diversified ecosystem and it becomes the natural abode for lepidopterous insects. Seitz (1933) recorded 19 species of wild sericigenous lepidopterans from the entire North Eastern India including Sikkim. Arora and Gupta (1979) described 17 species of wild silk moth belongs to the family Saturniidae. Singh and Chakaravorty (2006) recorded 24 species from North East India. Recently, Kakati and Chutia (2009) recorded 14 species of wild sericigenous moths from Nagaland.

Antheraea assamensis, A. mylitta and *Samia ricini* are commercialized for obtaining silk in North East India. According to literature, there are only 24 silk moth species (Singh & Chakaravorty, 2006) available in North East India, but there may be more silk moth species. In the current study 29 species have been collected and identified, in which 2 new subspecies described and one species (*Antheraea platessa platessa*) new record to North Eastern India.

MATERIALS AND METHODS

The adults of Lepidoptera were collected from Oct. 2011 – Sept. 2014 during night with the help of light traps (200 watt mercury vapour light) and some collections were also made by hanging a makeshift source of light (200 watt mercury vapour light) on a white sheet or white washed wall. The collected insects were sacrificed by using tetra benzene. These were stretched, pinned, labelled, identified, preserved in the wooden collection boxes at Entomology Laboratory, CMERTI, Lahdoigarh**.** Eggs and larvae were also collected from forest and only few reared in the rearing chamber. The specimens collected from various localities were processed as per methodology discussed by workers such as Lindquist (1956), Zimmerman (1978), Landry and Landry (1994). For studying the wing venation the standard techniques given by Zimmerman (1978) and for genitalia Robinson (1976) had been followed.

The entomological pins of different sizes (10 x .20mm to 15 x .30mm; 38mm x .40mm; 38mm x .55mm) were used depending upon the size of the specimen. The pinned specimens were either stretched in spreading board boxes or on plastazole pasted/fixed at the bottom of a slide box. In order to accommodate the abdomen of dead specimens, triangular groves were made on the plastazole. After properly spreading, the wings were held in position with the help of translucent paper strips, the latter fixed with ordinary pins. The specimens were allowed to dry in the spreading boxes for about 4 hours at 70°C. The label having information such as locality, date of collection, altitude and name of the collector etc. was tagged to each specimen. During preservation of wild silk moths in insect storage boxes in all the four corners naphthalene bolls were kept to avoid infestation on preserved insects by other insects *i.e.* mites and silver fish (*Lepisma* sp.). All the specimens were deposited at Entomology Laboratory, CMERTI, Lahdoigarh. During the course of present study, dissections of the male and female genitalia have been made as per methodology given by Kumar & Ramamurthy (2010).

As per procedure, the male abdomen was detached from the insect (moth) body with the help of forceps by exerting a pressure on the thorax dorsally and raising the abdomen upward simultaneously. Before this, the abdomen was wetted by applying 100% per cent ethanol. Then it was shifted to 10 per cent potassium hydroxide (KOH) solution and boiled in beaker at electric hot plate for 10 min. After boiling, the abdomen transferred to glacial acetic acid in petridish for cleaning. After cleaning in acetic acid, the abdomen shifted to ethanol for taking photographs by using a 5.0 digital camera attached with RSMr 10 stereoscopic zoom microscope and finalized in plates (prepared in 300 pixels/inch) species wise using Adobe photoshop 7.0, ACDSee 9 Photo Manager.

RESULTS AND DISCUSSION

Twenty nine species of wild silk moths have been collected from Manipur, Arunachal Pradesh, Meghalaya, Mizoram, Nagaland and Assam states of North East India (Table 1, 2). All twenty nine species' name were updated from

LEPINDEX and in one species, there was confusion according to LEPINDEX for the species *Samia pryeri*, but Dr. Ian Kitching, Lepidoptera Leader, NHM, London informed that this is still in *Samia ricini,* by mistake it was entered in the LEPINDEX database.

Among all six states (Fig. 1), highest number of species (28) was recorded from Arunachal Pradesh state (Table 2). If this programme will continue, many more species will be recorded from Arunachal Pradesh. Some areas of Arunachal Pradesh are still unexplored.

The details of all the species will be presented through illustrated genitalic atlas and other morphological feature, which are part of classical taxonomy.

All the species' name updated from LEPINDEX and in one species, there is confusion according to LEPINDEX, the name is *Samia pryeri*, but Dr. Ian Kitching, Lepidoptera Leader, NHM, London informed that this is still in *Samia ricini* by mistake it entered in the Lepindex database.

DISCUSSION

All the species have been collected from Arunachal Pradesh, Nagaland, Assam, Manipur and Meghalaya. All the species' name updated from LEPINDEX and in one species, there is confusion according to LEPINDEX, the name is *Samia pryeri*, but Dr. Ian Kitching, Lepidoptera Leader, NHM, London informed that this is still in *Samia ricini*. Now, it is clarified and corrected in LEPINDEX database, which is approved by ICZN for current name of the species of order Lepidoptera.

In India, still researcher using names *Samia cynthia ricini* / *Samia cynthia* / *Philosamia ricini* / *Philosamia cynthia ricini*, which are incorrect and the correct name is *Samia ricini* for domesticated species and *Samia canningi* for wild species. Both the species have peculiar characters in size, color, wing venation and genitalic features. According to recent survey, only three species are found in North Eastern India *viz*., *Samia ricini*, *Samia canningi* and *Samia kohlii*. During study, complexity was faced to identify the *Antheraea pernyi, A. compta, A. frithii* and *A. roylei*. But, now it is clarified with the help of male genitalic features. In all these species the labide of each species have different shape and size, which is used for identification of *Antheraea* spp.

It is recommended that researcher should use current scientific and valid name of *Samia ricini* for domesticated species and for wild species *Samia canningi*. Complexity of *Antheraea compta* and *A. frithii* is also solved, the correct identification of these two species have been verified and corrected, which will be utilized by researchers and scientists. The current scientific name of muga silkworm should be named as *Antheraea assamensis* not as *Antheraea assama*.

All the information can be utilized for conservation of wild silk moths of North East India. Utilization of some species for obtaining silk may be tried and also may be collected some wild population from reported locations for breeding purpose.

The collection made under the project is preserved at Insect Repository, Entomology Section, CMERTI, Lahdoigarh, which can be utilized as reference collection in future for clarification and identification of wild silk moths. As, Thailand people are producing silk from *C. trifinistrata*, so, five species can be commercialized *viz*., *Samia canningi*, *Attacus atlas*, *Cricula trifenistrata, Antheraea roylei, A. compta.*

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Table 1. Localities surveyed in four states of North Eastern India.

S. No.	States	Location of collection
1	**Arunachal Pradesh**	Pashighat, Ziro Valley, Roing and adjoining forest areas
2	**Assam**	BTC, Lakhimpur, Tejpur, Tinisukia, Jorhat, Golaghat, Kaziranga forest areas, Dibrugarh, BTC, Darrang
3	**Manipur**	Imphal, Urkhul
4	**Meghalaya**	Barapani, Shillong, Mawflong, Nongpoh (Khasi Hills); Tura, Damalgiri, Silsela, Balpakram National Park, Bagmara, Kanai, Dalu (Garo Hills),
5	**Mizoram**	Aizawl and adjoining forest areas
6.	**Nagaland**	Mokockchung, Zuniboto districts and adjoining forest areas

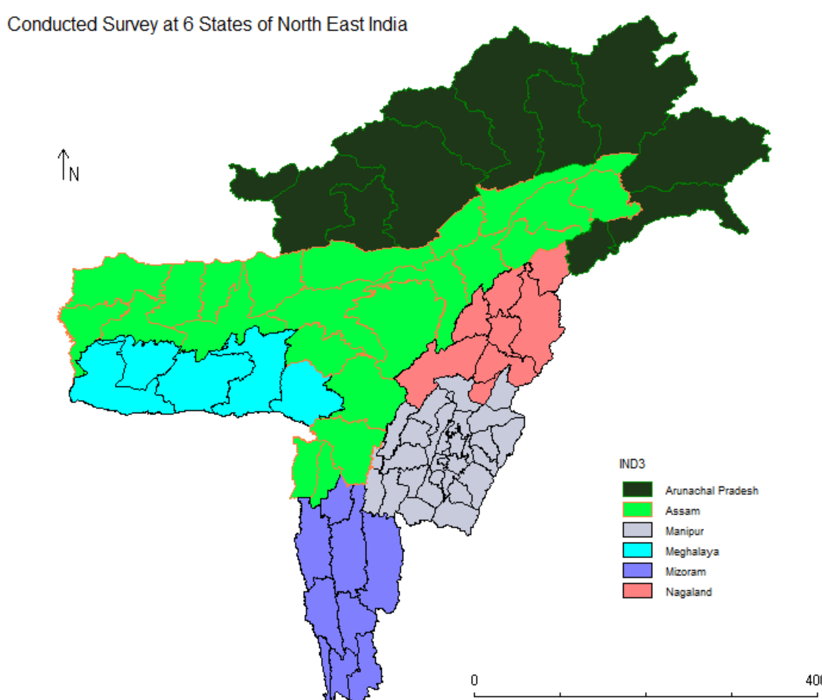

Figure 1. Covered States of North East India.

Table 2. Distribution list of all collected species.

S. No.	Scientific Name	AP	As	Man	Meg	Miz	Nag
Family Saturniidae							
1.	*Actias selene* Hübner, 1806	+	+	+	+	+	+
2.	*Antheraea assamensis* Helfer, 1837	+	+	+	+	+	+
3.	*Antheraea compta* Rothschild, 1899	+	+	+	-	+	+
4.	*Antheraea frithi* Moore, 1858	+	+	+	-	+	+
5.	*Antheraea mylitta* Drury, 1773	-	+	-	+	-	+
6.	*Antheraea pernyi* Guérin-Meneville, 1855	+	-	+	+	-	
7.	*Antheraea roylei* Moore, 1858	+	-	+	-	-	+
8.	*Antheraea helferi* Moore, 1858	+	-	+	-	-	+
9.	*Antehraea andamana* Moore, 1877	-	-	-	-	-	+
10.	*Archaeoattacus edwardsii* White, 1859	+	-	+	+	+	+
11.	*Archaeoattacus staudingeri* Rothschild, 1895	+	-	+	+	+	+
12.	*Argema maenas* Doubleday, 1847	+	-	+	+	+	+
13.	*Argema sinensis* Walker, 1855	+	-	-	-	-	-
14.	*Attacus atlas* Linnaeus, 1758	+	+	+	+	+	+
15.	*Cricula andrei* Jordan, 1909	+	-	-	+	+	-
16.	*Cricula trifenestrata* Helfer, 1837	+	+	+	+	-	
17.	*Loepa katinka* Westwood, 1848	+		+	+	-	+
18.	*Loepa megacore* Jordan, 1911	+	-	-	-	-	-
19.	*Loepa sikkima* Moore, 1865	+	-	-	-	-	-
20.	*Loepa* subsp. nov.	-	-	-	-	-	+
21.	*Loepa* subsp. nov.	+	-	-	-	-	-
22.	*Loepa miranda* Moore, 1865	-	-	-	+	-	-
23.	*Rhodinia newara* moo, 1872	+	-	-	+	-	-
24.	*Salasa tonkiniana* Le Moult, 1933	+	-	-	-	+	-
25.	*Samia canningii* Hutton, 1860	+	+	+	+	+	+
26.	*Samia kohlli*	+	-	+	-	-	-
27.	*Samia ricini* Boisduval, 1854	+	+	+	+	+	+
28.	*Satrunia pyretorum* Westwood, 1847	+	-	-	-	-	-
29.	*Saturnia simlaensis* Westwood, 1847	+	-	+	-	-	-
30.	*Saturnia thibeta* Westwood	+	-	+	-	-	-
31.	*Saturnia* sp.	+	-	+	-	-	-
Family Bombycidae							
32.	*Andraca* sp.	+	-	-	+	-	-
33.	*Bombyx mori* Linnaeus, 1758	+	+	+	+	+	+
34.	*Bombyx incomposita* van Eecke, 1929	+	-	-	+	-	-
35.	*Norasuma javanica* Moore, 1872	+	-	-	+	-	-
36.	*Gunda ochracea* Walker, 1862	+	-	-	+	-	-
37.	*Gunda* sp.	+	-	-	+	-	-
38.	*Ocinara bifurcula* Dierl, 1978	+	-	-	+	-	-
39.	*Triuncina religiosae* Helfer, 1837	+	+	+	+	+	+
40.	*Triuncina* sp.	+	-	-	+	-	-
41.	*Trilocha varians* walk, 1855	+	+	+	+	+	+

Abb: AP-Arunachal Pradesh, As-Assam, Man-Manipur, Meg-Meghalaya, Miz-Mizoram and Nag-Nagaland.

Table 3. Synonyms of species of family Saturniidae.

S. No.	Scientific valid name	Synonyms
1.	*Actias selene* Hübner, 1806	*dianae* Hutton, 1846 *mandschurica* Staudinger, 1892
2.	*Antheraea assamensis* Helfer, 1837	*assama* Westwood, 1848 *mezankooria* Moore, 1862 *subvelata* Bouvier, 1930 *mezops* Bryk, 1944
3.	*Antheraea compta* Rothschild, 1899	
4.	*Antheraea frithi* Moore, 1858	*fraterna* Moore, 1888 *confusa* Niepelt, 1932
5.	*Antheraea mylitta* Drury, 1773	*tusseh* Hutton, 1856 *kolisurra* Sykes., 1834 *kausalia* Rondot, 1887 *fasciata* Moore, 1892
6.	*Antheraea pernyi* Guérin-Meneville, 1855	*bignaulti* Clement, 1880 *fantoni* Rondot, 1887 *cinnamomea* Niepelt, 1929 *constans* Staudinger, 1911 *lugubris* Niepelt, 1928 *melaina* John, 1928
7.	*Antheraea roylei* Moore, 1858	
8.	*Antheraea helferi* Moore, 1858	*knyvetti* Hampson, 1892
9.	*Antehraea andamana* Moore, 1877	*platessa* Rothschild, 1903
10.	*Archaeoattacus edwardsii* White, 1859	
11.	*Archaeoattacus staudingeri* Rothschild, 1895	
12.	*Argema maenas* Doubleday, 1847	*leto* Doubleday, 1848 *rosenbergii* Kaup, 1866
13.	*Argema sinensis* Walker, 1855	*virescens* Mell, 1950 *heterogyna* Mell, 1914
14.	*Attacus atlas* Linnaeus, 1758	*ethra* Olivier, 1797 *vitrea* Perry, 1811 *talas* Hübner, 1820 *sumatranus* Fruhstorfer, 1904 *roseus* Fruhstorfer, 1904 *gladiator* Fruhstorfer, 1904 *trumphator* Fruhstorfer, 1904 *simalurana* Watson, 1915 *baliensis* Juriaanse & Lindemans, 1921 *mcmulleni* Watson, 1914 *burmaensis* Juriaanse, 1920 *burmana* Seitz, 1928 *javanensis* Bouvier, 1932 *strandi* Schüssler, 1933 *similis* Bouvier, 1936 *mysorensis* Bouvier, 1936 *varia* Bouvier, 1936 *tonkiensis* Bouvier, 1936 *chinensis* Bouvier, 1936 *pallida* Bouvier, 1936 *opaca* Bouvier, 1936 *incerta* Bouvier, 1936 *silhetica* Helfer, 1837
15.	*Cricula andrei* Jordan, 1909	*zuleika* Westwood, 1848 *vinosa* Watson, 1912

		afenestra Watson, 1912
16.	*Cricula trifenestrata* Helfer, 1837	*haumpottonee* Hugon., 1837 *ampotoni* Rondot., 1887 *burmana* Swinhoe, 1890 *nadari* Bouvier, 1929
17.	*Loepa katinka* Westwood, 1848	*sivalica* Moore, 1881 *sivalensis* Silbermann, 1897 *sikkimensis* Silberman, 1897
18.	*Loepa megacore* Jordan, 1911	
19.	*Loepa sikkima* Moore, 1865	
20.	*Loepa miranda* Moore, 1865	
21.	*Loepa* subsp. nov.	
22.	*Loepa* subsp. nov.	
23.	*Rhodinia newara* moo, 1872	
24.	*Salasa tonkiniana* Le Moult, 1933	
25.	*Samia canningii* Hutton, 1860	*viridis* Mezger., 1928
26.	*Samia kohlli*	
27.	*Samia ricini* Boisduval, 1854	
28.	*Satrunia pyretorum* Westwood, 1847	*tegusomushi* Chujiro Sasaki, 1908 *melli* Bryk, 1939 *microps* Bryk, 1939
29.	*Saturnia simlaensis* Westwood, 1847	
30.	*Saturnia thibeta* Westwood	
31.	*Saturnia* sp.	

Table 4. Synonyms of species of family Bombycidae.

S. No.	Scientific valid name	Synonyms
1.	*Andraca* sp.	
2.	*Bombyx mori* Linnaeus, 1758	*arracanensis* Moore & Hutt., 1864 *brunnea* Grünberg, 1911 *croesiformis* Moore & Hutt., 1864 *fortunatus* Moore & Hutt., 1864 *fuscata* Motschulsky *mandarina* Moore, 1872 *meridionalis* Wood-Mason, 1886 *sinensis* Moore & Hutt., 1864 *textor* Moore & Hutt., 1864
3.	*Bombyx incomposita* van Eecke, 1929	
4.	*Norasuma javanica* Moore, 1872	
5.	*Gunda ochracea* Walker, 1862	
6.	*Gunda* sp.	
7.	*Ocinara bifurcula* Dierl, 1978	
8.	*Triuncina religiosae* Helfer, 1837	*affinis* Hutton *bengalensis* Hutton *huttoni* Ww., 1847 *sherwilli* Hutton
9.	*Triuncina* sp.	
10.	*Trilocha varians* walk, 1855	

THE GENUS *LABIDOSTOMIS* GERMAR OF TURKEY WITH A NEW SPECIES AND A NEW RECORD (COLEOPTERA: CHRYSOMELIDAE: CLYTRINAE)

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ABSTRACT: All members of Turkish *Labidostomis* is introduced on the base of 1351 specimens of 21 species from 36 different provinces in Turkey. Correspondingly *Labidostomis* (s. str.) *atkaracalarica* sp. nov. from Çankırı province in North part of Central Anatolian Region of Turkey is described. Holotype (male) and its genitalia are photographed. The newly described species is distinct with external and genital morphologies whereby are easily distinguished from other known species of the genus. *Labidostomis* (s. str.) *medvedevi* Warchalowski is recorded for the first time from Turkey. Accordingly Turkish *Labidostomis* fauna is included 29 species. Many new data are also presented for Turkish fauna: *Labidostomis* (s. str.) *kaszabi* Medvedev is firstly reported after original description. In connection with this, *Labidostomis* (s. str.) *beckeri* Weise and *Labidostomis* (s. str.) *kaszabi* Medvedev are recorded for the second time from Turkey. *Labidostomis* (s. str.) *basanica* Sahlberg, *Labidostomis* (s. str.) *beckeri* Weise and *Labidostomis* (s. str.) *brevipennis* Faldermann are also reported for the first time from Western half of Anatolia. Moreover 12 species from Çankırı province, 3 species from Kayseri province, 1 species from Ankara province, 1 species from Bartın province, 1 species from Burdur province, 1 species from Düzce province, 1 species from Gaziantep province, 1 species from Hakkari province, 1 species from Isparta province, 1 species from Konya province, 1 species from Şanlıurfa province and 1 species from Zonguldak province are newly recorded. A list of the members of Turkish *Labidostomis* fauna is provided. Keys of Turkish species of the genus *Labidostomis* Germar are also presented.

KEY WORDS: Coleoptera, Chrysomelidae, Clytrinae, *Labidostomis*, taxonomy, new species, new records, Turkey

The leaf-beetle genus *Labidostomis* includes 89 species distributed in Europe, North Africa, and Asia. The genus has 4 subgenera as *Aphobera* Warchalowski, 1985 (1 species), *Chlorostola* Weise, 1881 (10 species), *Labidostomis* Germar, 1822 (77 species) and *Welleschmiedia* Warchalowski, 1985 (1 species). In Europe, the genus is represented by 34 species of 3 subgenera as *Chlorostola* Weise, 1881 with 6 species, *Labidostomis* Germar, 1822 with 27 species and *Welleschmiedia* Warchalowski, 1985 with 1 species (Regalin & Medvedev in Löbl & Smetana, 2010; Audisio & Regalin, 2016).

From the territory of Turkey 27 species of only the nominal subgenus of *Labidostomis* Germar, 1822 were recorded until now (Ekiz et al., 2013; Özdikmen et al., 2014; Özdikmen & Mercan, 2014). All of them are distributed in the whole territory of the country. With respect to this large and diverse area of Turkey one might expect future records of more species that occur in adjacent countries or new to science.

We had the opportunity to study material of the genus *Labidostomis* collected during the expedition of Çankırı province in 2013-2015 and a new species and a new record of the genus *Labidostomis* were detected. In addition many deposited and unidentified specimens at Gazi University and Nazife Tuatay Plant Protection

Museum (Turkey, Ankara) collected from Ankara, Bartın, Burdur, Düzce, Gaziantep, Hakkari, Isparta, İzmir, Kayseri, Konya, Şanlıurfa and Zonguldak provinces in previous years were also evaluated. The description of the new species is presented below.

MATERIALS AND METHODS

Turkey is divided into 81 provinces in 7 regional parts (Figs. 1, 2). Turkish *Labidostomis* is evaluated on the base of 1351 specimens from 36 different provinces in 6 regional parts of Turkey with the present work (Fig. 3). The available specimens for the present study are into two categories: a) New (unpublished) material: 567 specimens were collected mostly by present authors mostly from Çankırı province and Ankara, Bartın, Burdur, Düzce, Gaziantep, Hakkari, Isparta, İzmir, Kayseri, Konya, Şanlıurfa and Zonguldak provinces in Turkey in 1939, 1961, 1962, 1964, 1966, 1988, 1990-1991, 2013-2015. b) Old (published) material: 784 specimens were collected mostly by the first author from 31 different provinces in Turkey as Adana, Ağrı, Aksaray, Ankara, Antalya, Bolu, Çankırı, Çorum, Düzce, Eskişehir, Gaziantep, Hatay, Kahramanmaraş, Karabük, Karaman, Kars, Kastamonu, Kayseri, Kırşehir, Kilis, Konya, Malatya, Mersin, Muş, Nevşehir, Niğde, Osmaniye, Samsun, Sinop, Şanlıurfa and Zonguldak provinces in 1961, 1966, 1969-1971, 1984, 1988, 1991-1994, 1996-2003, 2006-2009. As a result of identification mostly on the base of aedeagus and spermatheca, 19 known species, a new species and a new record of *Labidostomis* were determined. The holotype of *Labidostomis atkaracalarica* sp. nov. is described, discussed and illustrated in the present text. The available specimens for the present study are deposited at Gazi University and Nazife Tuatay Plant Protection Museum (Turkey, Ankara).

Information in the present text is given in following order:

For the genus group names, the type species is provided under the taxon name. For each species group taxa, reported from Turkey, are given alphabetically. The Turkish distribution patterns for each species group taxon are given only concerning provinces. Turkish endemic taxa are marked with the sign (*).

For distribution data of the taxa, Regalin & Medvedev in Löbl & Smetana (2010) for World are used in the text chiefly. Distributional abbreviations for the works are available to Regalin & Medvedev in Löbl & Smetana (2010). The data are newly given in addition to the distribution data in Turkey, marked underlined. Key to Turkish species of the genus is proposed on the base of the keys of Warchalowski (2003, 2010).

RESULTS AND DISCUSSIONS

Labidostomis includes 29 species in Turkey with a newly described species and a newly recorded species. Turkish *Labidostomis* is reviewed on the base of 1351 specimens of 21 species from 36 different provinces in Turkey with the present work. All members of Turkish *Labidostomis* are presented as follows:

Genus *Labidostomis* Germar, 1822
Type species: *Cryptocephalus taxicornis* Fabricius, 1792
Subgenus *Labidostomis* Germar, 1822
Type species: *Cryptocephalus taxicornis* Fabricius, 1792

Labidostomis asiatica Faldermann, 1837

The species is widely distributed in 27 provinces of Turkey. It is known only from Asian Turkey (Adana, Afyon, Amasya, Ankara, Aydın, Balıkesir, Bilecik, Bolu, Çankırı, Elazığ, Eskişehir, Erzurum, Düzce, Isparta, İzmir, Karabük, Kastamonu, Kayseri, Konya, Manisa, Mersin, Muğla, Niğde, Osmaniye, Sinop, Trabzon and Zonguldak provinces) (Sahlberg, 1913; Tomov & Gruev, 1975; Warchałowski, 1985, 2003; Kasap 1987; Aydın & Kısmalı, 1990; Aslan & Özbek, 1998; Gök, 2003; Gök & Çilbiroğlu, 2005; Şen & Gök, 2009; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed only in Asia (AR Checheno Respublika GG IN SY TR).

New material. Çankırı prov.: Orta, entry of Emalı village, 40°34'16" N, 33°10'01" E, 1319 m, 24.V.2014, 1 ♂; Yapraklı, Bugay, 40°42'00" N, 33°46'18" E, 897 m, 25.V.2015, 1 ♂; Yapraklı, between Çevrecik-Topuzsaray, 40°38'53" N, 33°51'37" E, 1084 m, 26.V.2015, 1 ♂; Ilgaz, entry of Güneyköy, 40°55'14" N, 33°28'44" E, 1226 m, 29.V.2015, 1 ♂; **Kayseri prov.:** Between Erciyes-Develi, 38°26'42" N, 35°30'06" E, 1582 m, 09.VI.2015, 1 ♀; Pazarören, 38°42'05" N, 36°09'39" E, 1630 m, 10.VI.2015, 2 ♂♂ and 4 ♀♀.

Old material. Ankara prov.: Çal Mountain, 1200 m, 17.VI.1984, 7 exs.; Kızılcahamam, Soğuksu National Park, 1400 m, 03.VII.1991, 1 ex.; Kızılcahamam, Yenimahalle, 30.VI.1993, 1 ex.; Kızılcahamam, Işık Mountain, 30.VI.1993, 1 ex.; Kızılcahamam, Aköz village, 16.VI.1997, 2 exs.; Kızılcahamam, Yenimahalle, 1100 m, 05.VII.1997, 1 ex.; Ayaş road, 11.V.1999, 1 ex.; Çubuk dam II, 20.V.1999, 2 exs.; **Bolu prov.:** between Yeniçağa–Gerede, exit of Yeniçağa, 1045 m, 17.V.2003, 1 ex.; Gerede–Bolu road, 8 km to Bolu, 710 m, 17.V.2003, 2 exs.; Bolu-Gerede road, Susuz Kınık village, 720 m, 17.V.2003, 1 ex.; Gerede-Kızılcahamam, 15 km to Gerede, 1200 m, 17.V.2003, 10 exs.; Gerede–Karabük road, entry of Koçumlar village, 1400 m, 14.VI.2003, 3 exs.; Entry of Gerede highway, 1400 m, 14.VI.2003, 2 exs.; Gerede–Karabük road, entry of Koçumlar village, 1400 m, 14.VI.2003, 4 exs.; Gerede–Karabük road, Dikmen and Sungur villages, 1450 m, 14.VI.2003, 2 exs.; **Düzce prov.:** Akçaören village, At Yolu district, Hasanlar Dam, 225 m, 11.V.2003, 7 exs.; Yığılca, Dutlar village, 200 m, 12.V.2003, 1 ex.; Yığılca, Karakaş village, 290 m, 12.V.2003, 2 exs.; Yığılca, Karataş–Yoğunpelit turn, 320 m, 12.V.2003, 2 exs.; **Karabük prov.:** Safranbolu, Balkuşu village, 275 m, 13.V.2003, 16 exs.; Safranbolu, Kırıklar village, 830 m, 14.V.2003, 2 exs.; Eflani, 910 m, 15.V.2003, 6 exs.; Eflani, Yağlıca village, 975 m, 15.V.2003, 10 exs.; Eflani–Daday, Karaağaç village, 1080 m, 15.V.2003, 1 ex.; Eflani, Örencik village, 970 m, 15.V.2003, 5 exs.; Hanköy, Aşağıbağ district, 575 m, 16.V.2003, 9 exs.; Bulak village, Bağ Evleri, 670 m, 15.VI.2003, 4 exs.; **Kastamonu prov.:** Araç road, Kastamonu Polis Ormanı, 975 m, 16.V.2003, 2 exs.; Kastamonu-Safranbolu road, 56 km to Safranbolu, 695 m, 15.VI.2003, 1 ex.; Kastamonu-Safranbolu road, 56 km to Safranbolu, 695 m, 15.VI.2003, 1 ex.; exit of Tosya, Zincirli Kuyu village, 650 m, 16.VI.2003, 2 exs; **Kayseri prov.:** Yahyalı, Derebağı, Şelale district, 1280 m, 25.VI.1997, 1 ex.; **Konya prov.:** Derebucak, 1221 m, 16.V.2007, 3 exs.; Gencek-Derebucak, 1212 m, 20.V.2008, 1 ex.; **Niğde prov.:** Çamardı, Bademdere-Elmalı, 1750 m, 24.VI.1997, 1 ex.; Azatlı-Tepeköy road, Murozu dam, 02.VII.1997, 7 exs.; **Osmaniye prov.:** Zorkun-Karıncalı-Hassa road, Küllü plateau, 1603 m, 25.VI.2006, 1 ex.; **Sinop prov.:** 35 m, 17.VI.2003, 1 ex.; Boyabat, Bürnük village, 1235 m, 17.VI.2003, 1 ex.; **Zonguldak prov.:** between Yedigöller–Devrek, 230 m, 13.V.2003, 1 ex.; Devrek, Alparslan village, 425 m, 13.V.2003, 1 ex..

**Labidostomis atkaracalarica* Özdikmen & Bal sp. nov.

(Figs. 4, 5A-D, 6, 7D, 8D, 9D)

Type material. Holotype ♂: Turkey: Çankırı prov.: Atkaracalar, Eyüpözü return (Budakpınarı), 40°53'8" N, 33°7'50" E, 1185 m, 22.06.2015; Paratypes: 4 ♂♂: Same locality and data with holotype; 1 ♂: Turkey: Çankırı prov.: Yapraklı, entry of Çevrecik, 40°39'36" N, 33°49'52" E, 953 m, 25.V.2015.

Etymology. The name is dedicated to the type locality of holotype, Atkaracalar (Çankırı province, Turkey).

Description of holotype.

Coloration: Body greenish-black; head almost entirely black with yellowish labrum, reddish-yellow antennomere 1 on ventral parts and antennomeres 2-4 completely; elytra dirty yellow or yellowish with a black humeral spot (Figs. 4, 5A,B).

Male. Body cylindrical. Anterior margin of clypeus quadrangular with distinct lateral teeth and without any tooth in central part (Figs. 5A,C). Mandibles baseball glove-like; external margin of mandibles highly elevated; top margin distinctly curved inward, in lateral view not emarginate; mandibles curved (Figs. 5A,C). Clypeus and frons roughly, dense, deeply punctured (Fig. 5A). Punctures on vertex considerably finer (Fig. 5A). Vertex convex with an indistinct median furrow. Head between eyes and antenna with broad round impression (Fig. 5A). Head covered by dense, long, erect, yellowish-white pubescence (Fig. 4). Antennae serrate from segment 5 to 10; antennomere 4 long triangular, almost two times as long as broad; length ratio of antenomeres 1.75 : 0.75 : 0.85 : 1.25 : 1.40 : 1.25 : 1.00 : 1.00 : 0.90 : 1.00 : 1.25 (Fig. 5B).

Pronotum 1.57 times as wide as long; moderately strongly and densely punctured; covered with dense, long, erect, yellowish-white pubescence (Figs. 4, 5A).

Scutellum elongated tongue-like, pubescent and punctured (Fig. 4).

Elytra 1.75 times as long as wide; distinctly and not too densely punctured, punctures denser along the suture; elytra not pubescent (Fig. 4).

Length ratio of fore tarsomeres 2.75 : 2.25 : 2.00 : 2.35. Underside and legs covered by yellowish-white pubescence.

Macropterous.

Aedeagus as in Fig. 6.

Length of body 7.5-8.5 mm (holotype 8.5) (males).

Female. Unknown.

Distribution. Known only from the type locality Çankırı province (Atkaracalar and Yapraklı counties) in Northern part of Central Anatolian region of Turkey.

Diagnosis. *Labidostomis atkaracalarica* sp. nov. is defined by yellowish labrum, pale elytra with dark humeral spot and pubescent pronotum. According to characters cited above this newly described species can be placed in auxillary Group C, following Warchalowski (2010). This group included 4 species as *L. martensi* Medvedev, 1983, *L. oertzeni* Weise, 1889, *L. mesopotamica* Heyden, 1886 and *L. peregrina* Weise, 1900. *L. martensi* is endemic to Iran. The remaining 3 species occur in Turkey.

Hairs on pronotum are very long, erect, often shaggy in the new species, *L. martensi* and *L. oertzeni* (Figs. 4, 5A) while hairs on pronotum are short, never shaggy in *L. mesopotamica* and *L. peregrina*. Thus the new species is close to *L. martensi* and *L. oertzeni* than *L. mesopotamica* and *L. peregrina*. Also top margin of mandible in lateral view is emarginated in *L. oertzeni* while top margin of mandible in lateral view is not emarginated in the new species and *L. martensi* (Figs. 5D,E). Thus the new species is close to *L. martensi* than *L. oertzeni*. The shape of clypeus and mandible of *L. martensi* clearly differ from the new species (Figs. 5A,C,E). Anyway, in the new species, baseball glove-like mandibles are unique character that does not occur in other species (Figs. 5A,C).

Besides, aedeagal structures of these 4 species were given by Warchalowski (2010) with figures. Thus the new species is unique.

Aedeagi of all species in this group have lateral impressions on ventral side (Figs. 7, 9). In this respect, *L. martensi* in which lateral impressions on ventral side of aedeagus is shallow, never encroaching on lateral borders (Fig. 9A), differs from the other species (including the new species) in which lateral impressions on ventral side encroach upon the lateral margin (Figs. 6, 7, 9). Thus, the new species is closer to *L. mesopotamica* than the other species. Since lateral impressions on ventral side of aedeagus encroach very deeply upon the lateral margin in the new species like *L. mesopotamica* (Figs. 6, 7A,D, 9B,D). In *L. oertzeni* and *L. peregrina*, lateral impressions on ventral side of aedeagus encroach not very deeply on the lateral margin (Figs. 7B,C, 9C). Accordingly the new species is also closer to *L. mesopotamica* than the other species by distinctly curved shape in lateral view and dorsal shape of apex of aedeagus (Figs. 6, 7). Besides the new species is closer to *L. oertzeni* than the other species by a distinct swelling situated immediately before median orifice on median lobe in dorsal view (Fig. 8). *L. mesopotamica* and *L. peregrina* have a depression on the same part (Figs. 8A,B). The new species is easily distinguished from *L. martensi* in which lateral impressions on ventral side of aedeagus is shallow, never encroaching on lateral borders and *L. peregrina* in which apex of aedeagus elongate (Figs. 8B, 9A). Also apex of aedeagus in ventral view is arrow-like in the new species (Fig. 9D). In *L. martensi* and *L. peregrina*, apex of aedeagus in ventral view is not arrow-like (Fig. 9A). Therein, the new species is closer to *L. oertzeni* and *L. mesopotamica*. Anyway aedeagal structures of the new species much differs from that of other species in the group.

Differentiation of aedeagal structure from other *Labidostomis* species cited above is indicated below (Figs. 6-9):

In *L. martensi*, lateral impressions on ventral side of aedeagus are shallow, never encroaching on lateral borders (Fig. 9A).

In *L. oertzeni*, lateral impressions on ventral side of aedeagus are deep, encroaching on lateral borders (Figs. 7C, 9C). Apex of aedeagus is not short, in ventral view is an arrow-like. Mid part of median lobe before arrowhead is thick (Fig. 9C).

In *L. mesopotamica*, lateral impressions on ventral side encroach very deeply upon the lateral margin (Figs. 7A, 9B). Apex of aedeagus is short, in ventral view is an arrow-like. Mid part of median lobe before arrowhead is very thin like a costa (Fig. 9B).

In *L. peregrina*, lateral impressions on ventral side encroach not deeply upon the lateral margin (Figs. 7B). Apex of aedeagus is elongate, in ventral view is not an arrow-like.

In the new species, lateral impressions on ventral side encroach very deeply upon the lateral margin (Figs. 6, 7D, 9D). Apex of aedeagus is not short, in ventral view is arrow-like. Mid part of median lobe before arrowhead is very thick, roundly enlarged (Figs. 6, 9D).

***Labidostomis axillaris* (Lacordaire, 1848)**

The species was reported only in 3 provinces of Turkey. It is known from Asian Turkey (Erzurum province) and European Turkey (Edirne and İstanbul provinces) (Aslan & Özbek, 1998; Regalin, 2002a; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (AU BU CR CZ FR GE HU IT MD PL RO SB SL ST TR UK) and Asia (AB GG IN KZ TR).

***Labidostomis basanica* Sahlberg, 1913**

The species was reported only in 2 provinces of Turkey. It is known only from Asian Turkey (Çankırı, Erzurum, Diyarbakır and Gaziantep provinces) (Regalin, 2002b; Aslan & Warchałowski, 2005; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).It is recorded for the first time from Çankırı and Gaziantep provinces and thereby Western half of Anatolia.

It is distributed only in Asia (IQ JO SY TR).

New material. Çankırı prov.: Central, Balıbağı village, 40°34'4" N, 33°46'35" E, 1037 m, 15.V.2015, 1 ♀; Yapraklı, entry of Topuzsaray, 40°38'28" N, 33°53'11" E, 1169 m, 26.V.2015, 1 ♂; Ilgaz, Yaylaören, 40°53'7" N, 33°30'28" E, 999 m, 29.V.2015, 1 ♂ and 1 ♀; **Gaziantep prov.:** Islahiye, 13.IV.1962, 3 ♂♂; Central, 29.IV.1966, 1 ♂.

Labidostomis beckeri Weise, 1881

The species was reported only in 1 province of Turkey. It is known only from Asian Turkey (Bartın, Düzce, Erzurum and Zonguldak provinces) (Aslan & Özbek, 1998; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Bartın, Düzce and Zonguldak provinces and thereby Western half of Anatolia.

It is distributed in Europe (RO ST UK) and Asia (KZ TR WS).

New material. Bartın prov.: Central, 13.V.1988, 1 ♀; Güzelcehisar, 11.V.2015, 4 ♂♂ and 2 ♀♀; **Düzce prov.:** Cumayeri, 10-28.VI.1988, 2 ♂♂ and 3 ♀♀; **Zonguldak prov.:** Ereğli, Çayköy, 11.V.1988, 2 ♂♂ and 3 ♀♀;

Labidostomis brevipennis Faldermann, 1837

The species were reported only in 3 provinces of Turkey. It is known only from Asian Turkey (Bingöl, Çankırı, Hakkari, Konya, Malatya and Şırnak provinces) (Warchałowski, 1985, 2003; Regalin, 2002b; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı, Hakkari and Konya provinces and thereby Western half of Anatolia.

It is distributed only in Asia (AB AR GG IN IQ SY TR).

New material. Çankırı prov.: Ilgaz, between Güneyköy-Aşıklar village, 40°55'19" N, 33°27'30" E, 1294 m, 17.VI.2015, 1 ♀; Çerkeş, Gelikköy road, 40°49'36" N, 32°54'43" E, 1195 m, 20.VI.2015, 1 ♂; Çerkeş, entry of Ahırlar village, 40°52'51" N, 32°46'26" E, 1270 m, 22.VI.2015, 1 ♀; Çerkeş, Kuzuören village road, 40°49'46" N, 32°42'52" E, 1134 m, 22.VI.2015, 1 ♂; **Hakkari prov.:** 25.V.1966, 2 ♂♂ and 4 ♀♀; **Konya prov.:** Central, Sarıcalar, 13.VI.1991, 1♀.

Labidostomis cyanicornis (Germar, 1822)

The species were reported only in 3 provinces of Turkey. It is known only from Asian Turkey (Adana, Düzce and Konya provinces) (Warchałowski, 1985; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (AL AU BH BU BY CR CT CZ EN FR GE HU LA LT IT MD ME PL PT RO SB SK SL SP ST SZ UK) and Asia (ES KZ MG TR WS).

Old material. Düzce prov.: 14.VI.1994, 1 ex.; **Konya prov.:** Taşkent, Feslikan plateau, Avşar, 1726 m, 17.VII.2006, 1 ex..

Labidostomis decipiens Faldermann, 1837

The species is rather widely distributed in Turkey. It is known only from Asian Turkey (Adana, Amasya, Ankara, Antalya, Çankırı, Gaziantep, Hatay, İzmir, Kahramanmaraş, Kayseri, Konya, Malatya, Mersin, Niğde, Osmaniye and Şanlıurfa provinces) (Tomov & Gruev, 1975; Gruev & Tomov, 1979; Kasap, 1987; Aydın & Kısmalı, 1990; Warchałowski, 2003; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı and Kayseri provinces.

It is distributed in Europe (CY) and Asia (AB AR GG IN IQ IS JO SY TR).

New material. Çankırı prov.: Kızılırmak, entry of Kemallı village, 40˚18'6" N, 34˚02'37" E, 686 m, 24.IV.2014, 1 ♂; Eldivan, entry of İnandık village, 40˚25'53" N, 33˚32'23" E, 884 m, 13.V.2015, 1 ♀; Central, Dutağaç return, 40˚39'15" N, 33˚40˚49" E, 829 m, 25.V.2015, 1 ♀; Eldivan, between Çiftlikköy-Akçalı, 40˚36'16" N, 33˚28'39" E, 1056 m, 28.VI.2015, 1 ♀; **Kayseri prov.:** Yahyalı, Delialiuşağı, 37˚56'04" N, 35˚31'57" E, 1039 m, 11.VI.2015, 2 ♂♂; **Şanlıurfa prov.:** Ceylanpınar, 04.VI.1969, 1 ♂.

Old material. Adana prov.: Pozantı, entry of Fındıklı, 1200 m, 23.VI.1997, 1 ex.; Pozantı-Mersin road, Çamlıyayla turn, 690 m, 30.V.2001, 4 exs.; **Ankara prov.:** Işık Mountain, 29.V.1962, 2 exs.; 11.VI.1972, 6 exs.; Çubuk-II- dam, 1 ex.; Şereflikoçhisar, Tuz Lake, 27.V.1998, 2 exs.; **Antalya prov.:** between Sarımut-Karapınar, 1092 m, 09.VII.2007, 2 exs.; **Gaziantep prov.:** Fevzipaşa, Türkbahçe village, 521 m, 18.V.2007, 18 exs.; Nurdağı, 814 m, 17.V.2007, 2 exs.; **Hatay prov.:** Akbez, 527 m, 18.V.2007, 1 ex.; Aktepe, 207 m, 18.V.2007, 4 exs.; **Kahramanmaraş prov.:** Göksun, Çardak, 1338 m, 26.V.2003, 1 ex.; Pazarcık, Armutlu village, Kartalkaya Dam env., 950 m, 29.V.2003, 1 ex.; Kahramanmaraş-Kavaklı road, entry of Kavaklı, 700 m, 02.VI.2003, 1 ex.; Göksun, A. Türkeş excursion spot place- Mehmet Beyli, 1488 m, 24.VI.2003, 1 ex.; Göksun, Göksun-Çardak, 1498 m, 25.VI.2003, 1 ex.; Göksun, Göksun-Çardak road, exit of Saraycık, 1320 m, 25.VI.2003, 1 ex.; Göksun, Kamışcık village, 1340 m, 25.VI.2003, 1 ex.; Ekinözü, 1015 m, 27.VI.2003, 2 exs.; Andırın, Geben, Ardıççalısı district, 1510 m, 16.VII.2003, 1 ex.; **Malatya prov.:** 01.IX.1969, 3 exs.; **Mersin prov.:** Entry of Fındıkpınarı, 1035 m, 31.V.2001, 1 ex.; Çağlayan, exit of Fındıkpınarı road, 1070 m, 25.VI.2001, 2 exs.; **Niğde prov.:** 19.V.1961, 23 exs.; Altunhisar-Çiftlik road, entry of Çiftlik, 29.VII.1997, 1 ex.; **Osmaniye prov.:** Akyar village, 151 m, 17.V.2006, 11 exs.; Kesmeburun village Castabala, 107 m, 22.IV.2007, 3 exs.; Castabala, Ören Yeri, 100 m, 03.VI.2007, 6 exs.; Kaypak, 524 m, 21.IV.2007, 1 ex.; Bahçe, Kızlaç, 761 m, 19.V.2007, 2 exs.; **Şanlıurfa prov.:** Ceylanpınar, 18.V.1961, 10 exs.; 01.V.1966, 3 exs.; 02.V.1966, 4 exs.; 30.V.1969, 18 exs..

Labidostomis diversifrons Lefèvre, 1872

The species is rather widely distributed in Turkey. It is known only from Asian Turkey (Adana, Aksaray, Ankara, Çankırı, Erzurum, Hatay, Mersin, Karaman, Kayseri, Kilis, Konya, Nevşehir and Niğde provinces) (Aslan & Özbek, 1998; Warchałowski, 2003; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed in Europe (CY) and Asia (IN IS JO LE SY TR).

New material. Çankırı prov.: Kızılırmak, exit of Tepealagöz, 40˚23'2" N, 33˚58'32" E, 595 m, 01.V.2015, 1 ♀.

Old material. Adana prov.: Pozantı, Entry of Fındıklı, 1200 m, 23.VI.1997, 17 exs.; Pozantı-Mersin road, Çamlıyayla return, 690 m, 30.V.2001, 3 exs.; **Aksaray prov.:** Ağzıkarahan, 1220 m, 20.V.1997, 1 ex.; Entry of Nevşehir-Aksaray, 20.V.1997, 1 ex.; Entry of Nevşehir, 1040 m, 03.VI.1997, 3 exs.; Güzelyurt, 1700 m, 27.VI.1997, 1 ex.; Aksaray-Ulukışla road, 1135 m, 29.V.2001, 11 exs.; **Ankara prov.:** Şereflikoçhisar, 950 m, 20.V.1997, 2 exs.; Çaldağ, 1050 m, 28.V.1997, 1 ex.; Çubuk dam II, 20.V.1999, 14 exs.; Ayaş Beli, Atbayırı, 1100 m, 18.V.2002, 1 ex.; **Karaman prov.:** Karaman-Ereğli road, 995 m, 02.VI.2001, 4 exs.; **Kayseri prov.:** Yahyalı, Yeşilköy, 1380 m, 26.VI.1997, 21 exs.; **Kilis prov.:** 2006, 1 ex.; **Konya prov.:** Kulu, Tavşançalı, 1000 m, 31.V.1997, 4 exs.; **Mersin prov.:** Fındıkpınar, 1035 m, 31.V.2001, 5 exs.; Uzuncaburç return env., 845 m, 01.VI.2001, 1 ex.; Entry of Çukurbağ, 1035 m, 01.VI.2001, 1 ex.; Mut-Silifke road, entry of Kurtsuyu, 120 m, 01.VI.2001, 1 ex.; Mut-Karaman road, Değirmenbaşı turn, 1430 m, 02.VI.2001 and 26.VI.2001, 10 exs.; **Nevşehir prov.:** Avanos, 1000-1100 m, 20.VII.1992, 2 exs.; **Niğde prov.:** Bor, Üstünkaya, 07.VI.1997, 1 ex.; Çamardı, Yelatan village, 1280 m, 23.VI.1997, 4 exs.; Altunhisar-Çiftlik road, Yeşilyurt plateau, 02.VII.1997, 1 ex.; Niğde-Bor, Okçu village, 06.VII.1997, 3 exs.; Exit of Ulukışla, Tabaklı village, 1145 m, 29.V.2001, 6 exs.; Exit of Ulukışla-Pozantı, 1290 m, 24.VI.2001, 1 ex.; **Turkey:** 2000, 6 exs..

Labidostomis elegans **Lefèvre, 1876**

The species were only reported to Asian Turkey without any exact locality data. Therefore provincial distribution of the species is unknown (Regalin & Medvedev, 2010; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed only in Asia (AB AR IN TR).

Labidostomis hebraea **(Lacordaire, 1848)**

The species is known only from a single record in Asian Turkey (Hatay province) (Regalin, 2002b; Warchałowski, 2003; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed only in Asia (IS JO LE SY TR).

Labidostomis humeralis **(Schneider, 1792)**

The species were reported only in 3 provinces of Turkey. It is known only from Asian Turkey (Bolu, Çorum and İzmir provinces) (Tomov & Gruev, 1975; Gruev & Tomov, 1984; Aydın & Kısmalı, 1990; Warchałowski, 2003; Gruev, 2004; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (AU BE BH BU BY CR CT CZ FR GE HU IT MC MD ME PL RO SB SK SP ST SV SZ UK) and Asia (TR).

Old material. Çorum prov.: Kargı, Uzunyurt, 822 m, 16.VI.2003, 7 exs.; Kargı, 940 m, 16.06.2003, 1 ex..

Labidostomis karamanica **Weise, 1900**

The species probably is rather widely distributed in Turkey. It is known only from Asian Turkey (Adana, <u>Ankara</u>, Antalya, Bilecik, <u>Çankırı</u>, Isparta, <u>Kayseri</u>, Konya and Mersin provinces) (Weise, 1900a; Tomov & Gruev, 1975; Warchałowski, 1985, 2003; Kasap, 1987; Gök, 2003; Gök & Çilbiroğlu, 2005; Şen & Gök, 2009; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).It is recorded for the first time from Ankara, Çankırı and Kayseri provinces.

It is distributed in Europe (CY) and Asia (IS SY TR).

New material. Ankara prov.: 11.VI.1972, 6 ♀♀.**Çankırı prov.:** Şabanözü, entry of Çerçi, 40°31'07" N, 33°13'40" E, 1275 m, 08.VII.2014, 1 ♀; Orta, between Elmalı-Kayılar, 40°32'14" N, 33°06'35,4" E, 1370 m, 08.VII.2014, 2 ♀♀; Orta, between Gökçeören-Yaylakent, 40°32'19,7" N, 33°02'31,3" E, 1432 m, 08.VII.2014, 2 ♀♀; Kurşunlu, between Kapaklı-Taşkaracalar, 40°43'30,6" N, 33°16'40,2" E, 1438 m, 10.VII.2014, 4 ♀♀; Orta, Dodurga plateau, 40°37'12,2" N, 32°59'34,3" E, 1390 m, 10.VII.2014, 1 ♀; Ilgaz, between Çaltıpınar-Ödemiş, 40°56'46,9" N, 33°33'40,5" E, 996 m, 18.VII.2014, 1 ♀; Ilgaz, between Alıç village-Osman plateau, 40°59'46,3" N, 33°30'45,8" E, 1504 m, 18.VII.2014, 3 ♀♀; Çerkeş, between Gelikova-Çorapoğlu return, 40°51'47" N, 32°56'47" E, 1361 m, 20.VI.2015, 2 ♀♀; **Kayseri prov.:** Between Hacılar-Erciyes, 38°35'46" N, 35°30'36" E, 1944 m, 09.VI.2015, 15 ♂♂ and 9 ♀♀.

Old material. Antalya prov.: Cevizli, Teke pass env., 1237 m, 14.V.2006, 1 ex.; **Konya prov.:** Beyreli env., 1096 m, 16.V.2006, 1 ex..

Labidostomis kaszabi **Medvedev, 1962**

The species was known only from the type locality in Asian Turkey (Konya province) (Medvedev, 1962; Gruev & Tomov, 1979; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from <u>Isparta</u> province.

It is distributed only in Asia (TR). Therefore it is endemic to Turkey.

New material. Isparta prov.: 19.VII.1966, 1 ♂; **Konya prov.:** Central, Sarıcalar, 04.VI.1990, 1 ♀.

**Labidostomis korbi* Weise, 1902

The species is known only from the type locality in Asian Turkey (Konya province) (Weise, 1902; Warchałowski, 1985; Kasap, 1987; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed only in Asia (TR). Therefore it is endemic to Turkey.

Labidostomis longimana (Linnaeus, 1760)

The species is widely distributed in Turkey. It is known from Asian Turkey (Ağrı, Ankara, Ardahan, Balıkesir, Bayburt, Bilecik, Bolu, Çankırı, Düzce, Eskişehir, Erzurum, Gümüşhane, Isparta, Kahramanmaraş, Kastamonu, Kayseri, Kırşehir, Konya, Kars, Nevşehir, Niğde, Osmaniye, Samsun, Siirt, Sivas, Yozgat and Zonguldak provinces) and European Turkey (Edirne, Kırklareli and Tekirdağ) (Tomov & Gruev, 1975; Gruev & Tomov, 1979, 1984; Kasap, 1987; Aydın & Kısmalı, 1990; Aslan & Özbek, 1998; Gök, 2003; Özgen & Tok, 2009; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed in Europe (AL AN AU BE BH BU BY CR CT CZ DE EN FR GE GR HU IT LA LT MC MD ME NL NR NT PL RO SB SK SL SP ST SV SZ UK) and Asia (AB AR ES GG KZ TR WS).

New material. Ankara prov.: Esenboğa, 20.VI.1961, 1 ♂ and 1 ♀; Çubuk, Sarıkoz, 14.VI.1990, 1 ♀; **Çankırı prov.:** Şabanözü, entry of Çerçi, 40˚31'07" N, 33˚13'40" E, 1275 m, 08.VII.2014, 1 ♂; Orta, between Gökçeören-Yaylakent, 40˚32'19,7" N, 33˚02'31,3" E, 1432 m, 08.VII.2014, 1 ♂; Kurşunlu, between Kapaklı-Taşkaracalar, 40˚43'30,6" N, 33˚16'40,2" E, 1438 m, 10.VII.2014, 4 ♂♂; Ilgaz, between Alıç village-Osman plateau, 40˚59'46,3" N, 33˚30'45,8" E, 1504 m, 18.VII.2014, 4 ♂♂; Bayramören, Koçlu-Feriz return, 41˚1'9" N, 33˚17'58" E, 758 m, 21.VI.2015, 1 ♂.

Old material. Ağrı prov.: Ağrı Mountain, 3600 m, 29.VIII.2002, 1 ex.; **Ankara prov.:** Kızılcahamam, Güvem, 30.VI.1993, 1 ex.; Kızılcahamam, Işık Mountain, 02.VII.1994, 7 ex.; Kızılcahamam, Yukarı Çanlı, 1300-1400 m, 14.VI.1997 and 11.VII.1997, 8 exs.; Kızılcahamam, Aköz village, 1150 m, 26.VI.1997, 4 exs.; Kızılcahamam, Yenimahalle, 1150 m, 05.VII.1997, 4 exs.; Kızılcahamam, Karagöl, 1650 m, 11.VII.1997, 66 exs.; Kızılcahamam, Yasin village, 1400 m, 11.VII.1997, 31 exs.; **Bolu prov.:** Gerede, 1240 m, 19.VI.2003, 1 ex.; Mengen, Gökçesu road, 615 m, 06.VII.2009, 3 exs.; Hacıayaz pass, 1100 m, 07.VII.2009, 6 exs.; **Düzce prov.:** Kaynaşlı, 27.VI.1988, 1 ex.; **Kahramanmaraş prov.:** Göksun, Göksun-Çardak, 1498 m, 25.VI.2003, 7 exs.; Göksun, Göksun-Çardak road, exit of Saraycık, 1320 m, 25.VI.2003, 6 exs.; Göksun, Çardak, 1330 m, 25.VI.2003, 1 ex.; Göksun, Mehmetbey, 1490 m, 17.VII.2003, 1 ex.; **Kars prov.:** Sarıkamış, 11.VII.1970, 2 exs.; **Kastamonu prov.:** Küre, 1030 m, 18.VI.2003, 2 exs.; Ağlı-Azdavay road, 1 km to Yumacık village, 825 m, 18.VI.2003, 3 exs.; Azdavay, Yumacık village, 870 m, 18.VI.2004, 1 ex.; Daday- Araç road, Akılçalmaz village, 958 m, 19.VI.2004, 1 ex.; **Kayseri prov.:** Yahyalı, Derebağı, Şelale district, 1280 m, 02.VI.1997, 1 ex.; **Konya prov.:** Beyşehir, 14.V.1991, 1 ex.; **Nevşehir prov.:** Tilköy, 1270 m, 25.VI.1997, 2 exs.; **Niğde prov.:** Melendiz-Çiftlik road, Göllü Mountain, 1580 m, 27.VI.1997, 2 exs.; **Osmaniye prov.:** Boğaz plateau, 713 m, 18.V.2006, 1 ex.; **Samsun prov.:** Alaçam, Dürtmen hill, 1460 m, 16.VI.2004, 9 exs.; **Zonguldak prov.:** Çayköy, 27.VI.2003, 2 exs..

Labidostomis lucida (Germar, 1824)

The species were reported only in 2 provinces of Turkey. It is known only from Asian Turkey (Antalya and Erzurum provinces) (Aslan & Özbek 1998; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (AN AU BH BU CT FR GE IT NT PL SK SP ST SZ YU) and Asia (KZ TR WS).

Labidostomis maculipennis Lefèvre, 1870

The species is rather widely distributed in Turkey. It is known only from Asian Turkey (Amasya, Ankara, Antalya, Çankırı, Erzurum, İzmir, Kayseri, Kırıkkale, Konya, Nevşehir, Niğde, Sivas, Van and Yozgat provinces) (Lefevre, 1870; Tomov & Gruev, 1975; Warchałowski, 1985, 2003; Kasap, 1987; Aydın & Kısmalı, 1990; Aslan & Özbek 1998; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed only in Asia (IN LE TR).

New material. Çankırı prov.: Çerkeş, 03.VII.1964, 1 ♂; Şabanözü, entry of Büyükyakalı village, 40°28'38" N, 33°14'25" E, 1091 m, 23.V.2014, 2 ♂♂ and 4 ♀♀; Kurşunlu, entry of Köpürlü, 40°47'12,5" N, 33°16'49,7" E, 1006 m, 10.VII.2014, 1 ♂; **İzmir prov.:** 06.V.1961, 1 ♂ and 1 ♀.

Old material. Kayseri prov.: Yahyalı, Derebağı, Şelale district, 1280 m, 25.VI.1997, 1 ex.; **Konya prov.:** Bozkır, 1 km to Yalnızca, 1437 m, 13.VI.2007, 1 ex.; **Nevşehir prov.:** Entry of Nevşehir, 1040 m, 03.VI.1997, 2 exs.; **Niğde prov.:** Exit of Ulukışla, 1350 m, 29.V.2001, 1 ex..

Labidostomis medvedevi Warchalowski, 1985

The species is new to Turkey. It is known only from Asian Turkey (Çankırı province).

It is distributed only in Asia (AB AR IN TM TR).

New material. Çankırı prov.: Eldivan, 17.V.2000, 1 ♀; Central, between Balıbağı-Ovacık, 40°33'4" N, 33°53'24" E, 1015 m, 15.V.2015, 1 ♀; Central, Değim, 40°41'8" N, 33°41'27" E, 916 m, 25.V.2015, 3 ♀♀; Yapraklı, Sarıçay, 40°39'45" N, 33°53'54" E, 1173 m, 26.V.2015, 2 ♀♀.

Labidostomis mesopotamica Heyden, 1886

The species is widely distributed in Turkey. It is known only from Asian Turkey (Aksaray, Ankara, Antalya, Bilecik, Bursa, Çankırı, Denizli, Erzincan, Erzurum, Eskişehir, Hatay, Isparta, İzmir, Kahramanmaraş, Kastamonu, Kayseri, Kırşehir, Kocaeli, Konya, Malatya, Mersin, Muğla, Muş, Nevşehir, Niğde, Sivas, Şanlıurfa and Yozgat provinces) (Weise, 1897, 1900a; Gruev & Tomov, 1979; Warchałowski, 1985, 2003; Kasap, 1987; Aydın & Kısmalı, 1990; Aslan & Özbek, 1998; Gök, 2003; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı and Şanlıurfa provinces.

It is distributed only in Asia (SY TR).

New material. Ankara prov.: Polatlı, Düç, 08.V.1990, 1 ♂; **Çankırı prov.:** Ilgaz, entry of Eskikıymık village, 41°0'19" N, 33°41'15" E, 1230 m, 26.VII.2013, 1 ♂; Kızılırmak, exit of Tepealagöz village, 40°21'49" N, 34°00'56" E, 557 m, 24.IV.2014, 10 ♂♂; Orta, entry of Sakarcaören village, 40°37'16" N, 33°08'46" E, 1305 m, 20.V.2014, 1 ♂; Korgun, between Maruf-Akçalı, 40°37'48" N, 33°26'55" E, 1250 m, 23.V.2014, 1 ♂; Şabanözü, entry of Büyükyakalı village, 40°28'38" N, 33°14'25" E, 1091 m, 23.V.2014, 2 ♂♂; Şabanözü, Çaparkayı, 40°31'22,3" N, 33°21'12,3" E, 1229 m, 11.VII.2014, 1 ♂; Kızılırmak, exit of Tepealagöz, 40°23'2" N, 33°58'32" E, 595 m, 01.V.2015, 1 ♂; Central, Tuzlu-Yapraklı return, 40°35'51" N, 33°40'42" E, 885 m, 15.V.2015, 1 ♂; **Şanlıurfa prov.:** Ceylanpınar, 18.V.1961, 2 ♂♂.

Old material. Aksaray prov.: Entry of Nevşehir-Aksaray, 20.V.1997, 7 exs.; Ağzıkarahan, 1220 m, 20.V.1997, 2 exs.; Sivrihisar, 1710 m, 02.VI.1997, 1 ex.; Belisırma, 1280 m, 03.VI.1997, 1 ex.; Entry of Nevşehir, 1040 m, 03.VI.1997, 1 ex.; **Ankara prov.:** Şereflikoçhisar-Ankara road, 1250 m, 20.V.1997, 1 ex.; Şereflikoçhisar, Kaçarlı, 1050 m, 21.VI.1997, 1 ex.; **Antalya prov.:** Akseki, Büyükalan village, 937 m, 16.IV.2007, 16 exs.; **Hatay prov.:** Dörtyol-Erzin, Kuzuculu, 188 m, 17.VIII.2006, 1 ex.; **Kahramanmaraş prov.:** Ekinözü, Ortaören village, 1271 m, 23.V.2003, 1 ex.; Püren pass, 1600 m, 28.V.2003, 2 exs.; **Kastamonu prov.:** Kastamonu–Araç road, 960 m, 16.V.2003, 1 ex.; **Konya prov.:** Kulu, Tavşançalı, 1000 m, 31.V.1997, 1 ex.; Sorkun, 1281 m, 18.V.2007, 1 ex.; **Muş prov.:** 07.VII.1971, 3 exs.; **Nevşehir prov.:** Avanos, Zelbe, 19.V.1997, 1 ex.; Tilköy, 1270 m, 25.VI.1997, 1 ex.; **Niğde prov.:** Altunhisar, Karacaören, 1440 m, 18.V.1997, 1 ex.; Melendiz-Çiftlik road, Göllü Mountain, 1580 m, 27.VI.1997, 1 ex.; **Turkey:** 2 exs..

Labidostomis metallica Lefèvre, 1872

The species is represented only by the nominal subspecies *Labidostomis metallica metallica* Lefèvre, 1872 in Turkey. The subspecies is known only from a single record in Asian Turkey (Iğdır province) (Warchałowski, 1985, 2003; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (ST) and Asia (IN KZ TR UZ).

Labidostomis oertzeni Weise, 1889

The species is widely distributed in Turkey. It is known from Asian Turkey (Amasya, Ankara, Antalya, Çankırı, Eskişehir, Erzurum, Isparta, İstanbul, İzmir, Kahramanmaraş, Kayseri, Manisa, Mardin, Muğla and Niğde provinces) and European Turkey (İstanbul and Kırklareli provinces) (Weise, 1900b; Tomov & Gruev, 1975; Warchałowski, 1985, 2003; Kasap, 1987; Aydın & Kısmalı, 1990; Gök, 2003; Gök & Çilbiroğlu, 2003; Gruev, 2005; Aslan et al., 2009; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Kayseri province.

It is distributed in Europe (BU GR MC TR) and Asia (AR GG TR).

New material. Kayseri prov.: Toklar, 38°35'58" N, 36°07'55" E, 1425 m, 10.VI.2015, 1 ♀.

Old material. Ankara prov.: Kızılcahamam, Yasin village, 1450 m, 11.VII.1997, 1 ex.; Kızılcahamam, Pazar village return, 26.V.2002, 2 exs.; **Çankırı prov.:** Ilgaz, 20.VII.1994, 1 ex.; **Eskişehir prov.:** Central, Çavlum village, 23.VI.1997, 1 ex.; **Kahramanmaraş prov.:** Göksun, A. Türkeş excursion spot place-Mehmet Beyli, 1488 m, 24.VI.2003, 2 exs.; **Niğde prov.:** Bor, Üstünkaya, 07.VI.1997, 1 ex..

Labidostomis pallidipennis (Gebler, 1830)

The species probably is rather widely distributed in Turkey. It is known from Asian Turkey (Ankara, Artvin, Çankırı, Denizli, Erzurum and İstanbul provinces) and European Turkey (İstanbul province) (Kasap, 1987; Aslan, 1997; Aslan & Özbek, 1998; Gruev, 2005; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed in Europe (AL AU BH BU CR CT CZ FR GR HU IT MC ME RO SB SK SP ST TR UK) and Asia (AB AR ES GG IN KI KZ TR WS XIN).

New material. Çankırı prov.: Orta, Elmalı, 40°32'27,2" N, 33°09'21,6" E, 1267 m, 08.VII.2014, 1 ♂; Orta, between Elmalı-Kayılar, 40°32'14" N, 33°06'35,4" E, 1370 m, 08.VII.2014, 2 ♂♂ and 3 ♀♀; Kurşunlu, entry of Köpürlü, 40°47'12,5" N, 33°16'49,7" E, 1006 m, 10.VII.2014, 1 ♂; Kurşunlu, between Köpürlü-Kapaklı, bank of Devrez stream, 40°46'43,1" N, 33°17'10,7" E, 1010 m, 10.VII.2014, 1 ♂; Ilgaz, Ericek village, 40°49'46,9" N, 33°33'18,8" E, 1326 m, 16.VII.2014, 2 ♂♂; Ilgaz, Mesutören village, 40°49'43,3 " N, 33°34'26,3" E, 1226 m, 16.VII.2014, 1 ♂; Ilgaz, exit of Mesutören village, 40°49'55,3 " N, 33°34'4" E, 1252 m, 16.VII.2014, 2 ♂♂ and 2 ♀♀; Kurşunlu, entry of Hacımuslu, 40°51'3" N, 33°16'20" E, 1146 m, 20.VII.2014, 1 ♀; Orta, between Sanar-Kırsakal, 40°39'6,1" N, 33°10'18,8" E, 1277 m, 06.VIII.2014, 1 ♂; Çerkeş, Kuzuören village road, 40°54'4" N, 32°49'13" E, 963 m, 22.VI.2015, 1 ♀; Çerkeş, Yürük village, 40°54'52" N, 32°52'45" E, 970 m, 22.VI.2015, 1 ♀.

Labidostomis peregrina Weise, 1900

The species probably is rather widely distributed in Turkey. It is known only from Asian Turkey (Aksaray, Burdur, Erzincan, Erzurum, Isparta, Kırşehir, Mersin and Nevşehir provinces) (Warchałowski, 1985, 2003; Aslan & Özbek, 1998; Gök, 2003; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Burdur province.

It is distributed in Europe (ST) and Asia (AB AR GG TR).

New material. Burdur prov.: Hacılar, 21.V.1969, 3 ♀♀.

Old material. Aksaray prov.: Belisırma, 1280 m, 03.VI.1997, 1 ex.; **Kırşehir prov.:** Özbağ, 27.V.1992, 1 ex.; **Mersin prov.:** Exit of Kırobası, 1335 m, 01.VI.2001, 1 ex.; **Nevşehir prov.:** Avanos, 26.V.1998, 1 ex..

Labidostomis propinqua Faldermann, 1837

The species is widely distributed in Turkey. It is known from Asian Turkey (Adana, Aksaray, Amasya, Ankara, Antalya, Bolu, Çankırı, Erzincan, Erzurum, Gümüşhane, İstanbul, İzmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kocaeli, Konya, Mersin, Nevşehir, Niğde, Sakarya, Samsun, Sivas and Trabzon provinces) and European Turkey (Medvedev, 1970; Gül-Zümreoğlu, 1972; Tomov & Gruev, 1975; Gruev & Tomov, 1984; Warchałowski, 1985, 2003; Kasap, 1987; Aydın & Kısmalı, 1990; Aslan & Özbek, 1998; Ulusoy et al., 1999; Gruev, 2004, 2005; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed in Europe (AL BU GR MC RO ST TR UK) and Asia (AB AR GG IQ SY TR).

New material. Ankara prov.: Elmadağ, 16.V.1939, 1 ♂; Central, 11.VI.1972, 5 ♂♂ and 6 ♀♀; **Çankırı prov.:** Korgun, Alpsarı, 40°42'12" N, 33°32'20" E, 830 m, 22.IV.2013, 1 ♂; Şabanözü, entry of Kamış village, 40°33'45" N, 33°20'13" E, 1221 m, 23.V.2014, 3 ♂♂; Orta, entry of Elmalı village, 40°34'16" N, 33°10'01" E, 1319 m, 24.V.2014, 4 ♂♂; Kurşunlu, Köprülü village return, 40°48'10" N, 33°16'49" E, 1153 m, 11.V.2015, 1 ♀; Orta, Kayılar, 40°31'56" N, 33°4'59" E, 1342 m, 11.V.2015, 1 ♂; Eldivan, Büyükhacıbey-Küçükhacıbey road, 40°27'43" N, 33°33'56" E, 906 m, 13.V.2015, 1 ♂; Eldivan, entry of İnandık village, 40°25'53" N, 33°32'23" E, 884 m, 13.V.2015, 1 ♀; Eldivan, Sarıtarla village road, 40°35'37" N, 33°30'30" E, 937 m, 14.V.2015, 1 ♀; Central, entry of Dedeköy, 40°35'15" N, 33°43'55" E, 979 m, 15.V.2015, 18 ♂♂ and 8 ♀♀; Central, Çiviköy, 40°34'52" N, 33°45'20" E, 1018 m, 15.V.2015, 3 ♂♂; Central, Balıbağı village, 40°34'4" N, 33°46'35" E, 1037 m, 15.V.2015, 1 ♂; Central, between Balıbağı-Ovacık, 40°33'4" N, 33°53'24" E, 1015 m, 15.V.2015, 32 ♂♂ and 21 ♀♀; Central, between Külburun-Karadayı, 40°26'20" N, 33°44'57" E, 614 m, 16.V.2015, 2 ♂♂; Central, Dutağaç-Deyim return, 40°40'7" N, 33°41'8" E, 855 m, 25.V.2015, 5 ♂♂ and 4 ♀♀; Central, Değim, 40°41'8" N, 33°41'27" E, 916 m, 25.V.2015, 4 ♂♂ and 5 ♀♀; Yapraklı, between Yüklü-Çevrecik, 40°40'5" N, 33°49'22" E, 983 m, 25.V.2015, 4 ♂♂; Yapraklı, entry of Çevrecik, 40°39'36" N, 33°49'52" E, 953 m, 25.V.2015, 2 ♂♂; Yapraklı, Çevrecik-Topuzsaray-Kirliakça return, 40°39'00" N, 33°51'15" E, 1068 m, 26.V.2015, 20 ♂♂ and 15 ♀♀; Yapraklı, between Çevrecik-Topuzsaray, 40°38'53" N, 33°51'37" E, 1084 m, 26.V.2015, 36 ♂♂ and 29 ♀♀; Yapraklı, entry of Topuzsaray, 40°38'28" N, 33°53'11" E, 1169 m, 26.V.2015, 24 ♂♂ and 39 ♀♀; Yapraklı, Sarıçay, 40°39'45" N, 33°53'54" E, 1173 m, 26.V.2015, 7 ♂♂ and 6 ♀♀; Yapraklı, between Yamaçbağı-Söğütlü, 40°42'16" N, 33°58'12" E, 1125 m, 26.V.2015, 2 ♂♂; Ilgaz, between Belören-Şeyhyunus, 40°52'3" N, 33°31'33" E, 889 m, 27.V.2015, 1 ♀; Ilgaz, between Şeyhyunus-Ericek, 40°49'54" N, 33°33'16" E, 1361 m, 27.V.2015, 1 ♂ and 1 ♀; Ilgaz, Yaylaören, 40°53'7" N, 33°30'28" E, 999 m, 29.V.2015, 2 ♀♀; Ilgaz, Eskice-Aşıklar return, 40°55'20" N, 33°29'44", 1014 m, 29.V.2015, 1 ♂ and 1 ♀; Ilgaz, entry of Güneyköy village, 40°55'14" N, 33°28'44" E, 1226 m, 29.V.2015, 1 ♂ and 1 ♀; Ilgaz, entry of Yaylaören village return, 40°52'44" N, 33°30'32" E, 914 m, 17.VI.2015, 4 ♀♀; Ilgaz, 7 km to Şeyhyunus village, 40°51'49" N, 33°32'7" E, 1015 m, 18.VI.2015, 1 ♀; Ilgaz, entry of Saraycık village, 40°59'56" N, 33°46'2" E, 1259 m, 19.VI.2015, 1 ♀; Çerkeş, between Gelikova-Çorapoğlu return, 40°51'47" N, 32°56'47" E, 1361 m, 20.VI.2015, 1 ♀; Çerkeş, between Cedine-Kabakköy, 40°53'12" N, 32°55'2" E, 1355 m, 20.VI.2015, 2 ♀♀; Atkaracalar, Kükürt village, between Demirciler-Yazıören, 40°55'25" N, 33°4'46" E, 924 m, 20.VI.2015, 1 ♀; Atkaracalar, Eyüpözü return, 40°53'8" N, 33°7'50" E, 1185 m, 22.VI.2015, 10 ♀♀; Yapraklı, Çevrecik return, 40°39'00" N, 33°51'16" E, 992 m, 29.VI.2015, 1 ♀; **Kayseri prov.:** Pazarören, 38°42'05" N, 36°09'39" E, 1630 m, 10.VI.2015, 1 ♂ and 2 ♀♀; Between Hacılar-Erciyes, 38°35'46" N, 35°30'36" E, 1944 m, 09.VI.2015, 3 ♀♀.

Old material. Adana prov.: Pozantı, Entry of Fındıklı, 1200 m, 23.VI.1997, 1 ex.; **Aksaray prov.:** Ağzıkarahan, 1220 m, 20.V.1997, 1 ex.; Akçakent, 1280 m, 01.VI.1997, 1 ex.; Central, 1040 m, 03.VI.1997, 1 ex.; **Ankara prov.:** Kızılcahamam, Soğuksu National Park, 1100-1400 m, 21.VI.1991 and 03.VII.1991 and 07.VI.1997, 5 exs.; Şereflikoçhisar, Hüsrev village, 990 m, 20.V.1997, 1 ex.; Kızılcahamam, Yukarı Çanlı, 1540 m, 14.06.1997, 4 exs.; Konya Makası-Şereflikoçhisar, 950 m, 21.VI.1997, 3 exs.; Şereflikoçhisar, Kaçarlı, 1000 m, 21.VI.1997, 3 exs.; Şereflikoçhisar, Büyükkışla, 920 m, 21.VI.1997, 1 ex.; Kızılcahamam, Karagöl, 1650 m, 11.VII.1997, 1 ex.; Çubuk-II- dam, 20.V.1999, 9 exs.; Asartepe dam, 18.V.2002, 1 ex.; **Bolu prov.:** Gerede, 1329 m, 06.VII.2009, 6 exs.; **Çankırı prov.:** Eldivan, 04.VI.1997, 1 ex.; **Kahramanmaraş prov.:** Elbistan, Elbistan-Taşburun road, Taşoluk, 100 m, 23.V.2003, 1 ex.; **Karabük prov.:** Eflani–Daday, Karaağaç village, 1080 m, 15.V.2003, 1 ex.; **Kastamonu prov.:** Kastamonu–Araç road, 960 m, 16.V.2003, 2 exs.; **Kayseri prov.:** Yahyalı, Yeşilköy, 1380 m, 26.VI.1997, 3 exs.; **Konya prov.:** Entry of Gevne, 80 km to Alanya (Şeker district), 1482 m, 18.VII.2006, 3 exs.; **Mersin prov.:** Erdemli-Güzeloluk Memory Forest, 1340 m, 30.V.2001, 1 ex.; **Nevşehir prov.:** Tilköy, 1270 m, 25.VI.1997, 1 ex.; **Niğde prov.:** Melendiz, Hançerli-Küçükköy, 03.VII.1996, 1 ex.; Bor, Karanlıkdere, 1150 m, 18.V.1997, 1 ex.; Melendiz-Çiftlik road, Göllü Mountain, 1580 m, 27.VI.1997, 2 exs.; **Turkey:** 2000, 2 exs..

Labidostomis rufa (Waltl, 1838)

The species is widely distributed in Turkey. It is known from Asian Turkey (Adana, Afyon, Amasya, Ankara, Antalya, Bilecik, Bolu, Bursa, Çankırı, Çorum, Denizli, Erzincan, Erzurum, Eskişehir, Gaziantep, Isparta, İstanbul, İzmir, Konya, Kütahya, Manisa, Nevşehir, Niğde, Osmaniye provinces) and European Turkey (İstanbul and Kırklareli provinces) (Sahlberg, 1913; Medvedev, 1970; Tomov & Gruev, 1975; Gruev & Tomov, 1979, 1984; Warchałowski, 1985, 2003; Kasap, 1987; Aslan & Özbek, 1998; Gök, 2003; Gök & Çilbiroğlu, 2003; Gruev, 2005; Şen & Gök, 2009; Özdikmen, 2011; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed in Europe (BU GR MC TR) and Asia (TR).

New material. Ankara prov.: Karagöl, 09.VI.1966, 1 ♀; **Çankırı prov.:** Korgun, Alpsarı, 40°42'12" N, 33°32'20" E, 830 m, 22.IV.2013, 1 ♂; Kızılırmak, exit of Tepealagöz village, 40°21'49" N, 34°00'56" E, 557 m, 24.IV.2014, 4 ♀♀; Kızılırmak, Karamürsel village return, 40°26'18" N, 34°01'19" E, 550 m, 24.IV.2014, 1 ♀; Kızılırmak, 4 km to Cacıklar village, 40°23'43" N, 34°04'18" E, 597 m, 24.IV.2014, 1 ♀; Kızılırmak, entry of Kuzeykışla village, 40°22'14" N, 34°03'00" E, 600 m, 24.IV.2014, 12 ♀♀; Kızılırmak, Saraycık village return, 40°20'01" N, 33°58'29" E, 565 m, 25.IV.2014, 1 ♀; Korgun, between Maruf-Akçalı, 40°37'48" N, 33°26'55" E, 1250 m, 23.V.2014, 2 ♀♀; Şabanözü, entry of Kamış village, 40°33'45" N, 33°20'13" E, 1221 m, 23.V.2014, 1 ♂; Şabanözü, Çapar village road, 40°29'19" N, 33°22'33" E, 1046 m, 24.V.2014, 1 ♂; Orta, between Bulduk-Yenice, 40°33'21" N, 33°12'03" E, 1400 m, 24.V.2014, 1 ♂; Orta, entry of Elmalı village, 40°34'16" N, 33°10'01" E, 1319 m, 24.V.2014, 2 ♂♂; Eldivan, between Yukarıpelitözü-Elmalı, 40°28'27" N, 33°34'4" E, 909 m, 13.V.2015, 1 ♂; Central, Dutağaç-Deyim return, 40°40'7" N, 33°41'8" E, 855 m, 25.V.2015, 1 ♂; **Gaziantep prov.:** 08.IV.1962, 1 ♂.

Old material. Ankara prov.: Karagöl, 07.V.1968, 1 ex.; **Antalya prov.:** Border of province, Bademli Beli pass, 1432 m, 14.V.2006, 2 exs.; **Bolu prov.:** Seben, 26.IV.2001, 1 ex.; **Çorum prov.:** Kargı, Karaköse district, 580 m, 24.IV.2003, 1 ex.; **Gaziantep prov.:** Fevzipaşa, Türkbahçe village, 521 m, 18.V.2007, 1 ex.; **Konya prov.:** Hadim, exit of Bozkır, 1569 m, 14.V.2007, 1 ex.; Bozkır, Üçpınar village, 1471 m, 15.V.2007, 1 ex.; Derebucak, 1221 m, 16.V.2007, 5 exs.; **Niğde prov.:** Melendiz, Hançerli-Küçükköy, 03.VII.1996, 1 ex.; Altunhisar, 1200 m, 18.V.1997, 1 ex.; Çamardı, Bademdere-Elmalı, 1750 m, 24.VI.1997, 1 ex.; **Osmaniye prov.:** Akyar village, 230 m, 07.IV.2006, 3 exs.; Karagedik village, 189 m, 08.IV.2006, 1 ex.; Hasanbeyli, 711 m, 21.IV.2007, 1 ex.; Bahçe, Taşoluk village, 514 m, 21.IV.2007, 1 ex..

Labidostomis subfasciata **Weise, 1885**

The species were reported only in 2 provinces of Turkey. It is known only from Asian Turkey (Hakkari and Van provinces) (Weise, 1898; Warchałowski, 1985, 2003; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed only in Asia (AB AR IN TM TR).

Labidostomis sulcicollis **(Lacordaire, 1848)**

The species probably is rather widely distributed in Turkey. It is known from Asian Turkey (Ankara, Çankırı, Isparta, İstanbul, Konya, Nevşehir and Yozgat provinces) and European Turkey (İstanbul province) (Warchałowski, 1985, 2003; Kasap, 1987; Gruev, 2005; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014). It is recorded for the first time from Çankırı province.

It is distributed in Europe (TR) and Asia (AR TR).

New material. Çankırı prov.: Kızılırmak, 4 km to Cacıklar village, 40°23'43" N, 34°04'18" E, 597 m, 24.IV.2014, 1 ♂.

Labidostomis testaceipes **Pic, 1904**

The species were reported only in 3 provinces of Turkey. It is known only from Asian Turkey (Diyarbakır, Gaziantep and Hatay provinces) (Warchałowski, 1985, 2003; Ekiz et al., 2013; Özdikmen & Mercan, 2014; Özdikmen et al., 2014).

It is distributed only in Asia (IQ SY TR).

CONCLUSION

Turkey is divided into 81 provinces in 7 regional parts. Turkish *Labidostomis* is evaluated on the base of 1351 specimens of 21 species from 36 different provinces in 6 regional parts of Turkey with the present work.

Turkish *Labidostomis* includes 29 species with a newly described species and a newly recorded species. 8 of 29 species did not examine on the base of collected specimens in the present work. Since they are recorded from Turkey rarely. Most of them are known from one record or locality only [*L. elegans* Lefèvre, *L. hebraea* (Lacordaire), *L. korbi* Weise and *L. metallica* Lefèvre]. 2 species are reported only from two localities [*L. lucida* (Germar) and *L. subfasciata* Weise] and also 2 species are recorded only from three localities [*L. axillaris* (Lacordaire) and *L. testaceipes* Pic].

Consuquently, this work provides essential information to understand and conserve the existing biodiversity of a particular region (Turkey). Although the *Labidostomis* fauna of Turkey is not well studied, there is always a need to present updated information because of the changes in the taxonomic nomenclature and many surveys resulting new records and localities. This is a crucial attempt to present a synthesized and updated list of *Labidostomis* species of Turkey. In all, 29 species of nominal subgenus of the genus *Labidostomis* are listed. Other subgenera have no species in Turkey. The *Labidostomis* fauna of Turkey presents an unremarkable endemism with 3 species as *L. atkaracalarica* spec. nov., *L. kaszabi* Medvedev and *L. korbi* Weise, which constitute about 10% of the total number. We suggest future investigations in localities that are not well collected. Forthcoming surveys will most likely contribute the *Labidostomis* fauna of Turkey with new records and new species or subspecies.

Sexual dimorphism is typical for the genus *Labidostomis* Germar (Warchałowski, 1985). For this reason, keys to males and females of Turkish species are presented separately.

Key to males of Turkish species

1. Labrum yellowish or reddish, at most with a little darker spot in the middle......................2
-. Labrum usually entirely pitchy or blackish, at least with a great dark spot in the middle, often with anterior margin reddish..16

2. Elytra with or without a humeral dot, always with a dark spot on disc...............................3
-. Elytra uniformly pale or with a dark humeral spot only...6

3. External margin of mandible high elevated; Anatolian or Turano-Anatolian species.........4
-. External margin of mandible not elevated; SW-Asiatic species..5

4. Body length at most 8.5 mm; aedeagus underside before apex on both sides with an elongate hollow; body length to 8.1 mm; Anatolian species.....................*L. korbi* Weise, 1902
-. Body length more than 9.5 mm; aedeagus underside before apex on both sides without an elongate hollow; Turano-Anatolian species...................................*L. subfasciata* Weise, 1885

5. Body length over 8.2 mm; aedeagus very broad; on each elytron apart from humeral spot a roundish black spot immediately before midlength; body length 8.4-9.4 mm; SW-Asiatic (Irano-Palaestinian) species...*L. maculipennis* Lefèvre, 1870
-. Body length always under 7.6 mm; aedeagus not very broad; on each elytron apart from humeral spot a great black patch with bluish metallic lustre; body length 6.3-7.6 mm; SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian) species.............................
....*L. elegans* Lefèvre, 1876

6. Hairs on pronotum adpressed...7
-. Hairs on pronotum erect or semierect...13

7. At least all legs testaceous, but usually the whole upper side pale coloured; body length 6.9-7.3 mm; SW-Asiatic (Syro-Anatolian) species..............................*L. testaceipes* Pic, 1904
-. Legs, head, pronotum and underside black with distinct bluish or greenish metallic reflex...8

8. Outer edge of mandible blunt; Sibero-European species..9
-. Outer edge of mandible sharp, it forms an elevated border; Anatolian or SW-Asiatic species..10

9. Pronotum finely punctate; hairs on pronotum long; ground colour of elytra very finely reticulate; body length 8.2-10.7 mm; Sibero-European species...*L. pallidipennis* (Gebler, 1830)
-. Pronotum strongly punctate; hairs on pronotum rather short, in the middle of disc sometimes almost entirely reduced; elytra uniformly pale; body length 6.6-8.5 mm; Sibero-European species...*L. cyanicornis* (Germar, 1822)

10. In anterior part of pronotum run a transverse, bent furrow..11
-. Pronotum at most with a shallow impression, without furrow in anterior part.................12

11. Furrow in anterior part of pronotum deep and sharp; body length 5.8-7.1 mm; SW-Asiatic (Anatolo-Caucasian) species..*L. sulcicollis* (Lacordaire, 1848)
-. Furrow in anterior part of pronotum shallower; body length 6.7-7.8 mm; Anatolian species..*L. kaszabi* Medvedev, 1962

12. Mandible curved; body length 8.4-9.6 mm; SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian) species..........*L. decipiens* Faldermann, 1837
-. Mandible straight; body length 9.6-10.6 mm; SW-Asiatic (Irano-Anatolian + Irano-Palaestinian + Syro-Anatolian) species..*L. diversifrons* Lefèvre, 1872

13. Hairs on pronotum very long, erect, often shaggy; aedeagus with a distinct swelling situated immediately before median orifice on median lobe in dorsal view..........................14
-. Hairs on pronotum short, never shaggy; aedeagus with a depression on the same part.....15

14. Impressions on underside of aedeagus deep, encroaching on lateral borders, in consequence apex of aedeagus in ventral view arrow-like; aedeagus immediately before apex slightly bulged on both sides in dorsal view (Fig. 8C); top margin of mandible in lateral view emarginate (Fig. 5D); body length 7.1-9.2 mm; Balkano-Caucasian species..*L. oertzeni* Weise, 1889
-. Impressions on underside of aedeagus deep, encroaching on lateral borders, in consequence apex of aedeagus in ventral view arrow-like; aedeagus immediately before apex distinctly bulged on both sides in dorsal view (Fig. 8D); top margin of mandible in lateral view not emarginate (Fig. 5C); body length 7.5-8.5 mm; Anatolian species..*L. atkaracalarica* sp. nov.

15. Apex of aedeagus (Fig. 8A) short, in ventral view arrow-like; hairs on pronotum shorter; body length 6.9-8.6 mm; SW-Asiatic (Syro-Anatolian) species...*L. mesopotamica* Heyden, 1886
-. Apex of aedeagus (Fig. 8B) elongate, in ventral view not arrow-like, lateral impressions on ventral side encroach not very deeply upon the lateral margin; hairs on pronotum short and sparse; body length 8.0-10.2 mm; SW-Asiatic (Anatolo-Caucasian) species..*L. peregrina* Weise, 1900

16. Apical margins of aedeagus on dorsal side with two small teeth......................................17
-. Apical margins of aedeagus on dorsal side without teeth...20

17. Outer margin of mandible not elevated, mandible uniformly bent, at basis moderately broadened; body length 6.0-6.6 mm; Turano-Caucasian species...*L. metallica metallica* Lefèvre, 1872
-. Outer margin of mandible elevated...18

18. Outer margin of mandible very high elevated; inner side of mandible almost vertical; body length 6.5-7.8 mm; Sibero-E-European or E-European species..*L. beckeri* Weise, 1881
-. Outer margin of mandible moderately high elevated; inner side of mandible not vertical...19

19. Clypeus with a very small tooth in the middle, clypeus almost quadrangularly excised; body length 7.0-10.0 mm; Turano-Anatolian species.........*L. medvedevi* Warchalowski, 1985

-. Clypeus with a rather large, distinctly triangular tooth in the middle; body length 8.5-10.7 mm; Balkano-Caucasian or Turano-Balkan species...............*L. propinqua* Faldermann, 1837

20. Aedeagus conspicuously formed, its apex broad, almost transversely cut, with a finger-like process; body length 4.5-6.3 mm; Palaestino-Cyprioto-Taurian species..*L. karamanica* Weise, 1900
-. Aedeagus formed normally..21

21. Pronotum bare..22
-. Pronotum covered by hairs..26

22. Pronotum finely punctate..23
-. Pronotum strongly punctate..25

23. Fore teeth on clypeus very broad, reaching lateral edges; body length 7.7-9.2 mm; SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian) species...*L. brevipennis* Faldermann, 1837
-. Fore teeth on clypeus smaller, nor reaching lateral edges...24

24. Body smaller, length 5.6-7.9 mm; external margin of mandible not emarginate; humeral spot sometimes absent; Sibero-European species.............................*L. lucida* (Germar, 1824)
-. Body larger; external margin of mandible deeply emarginate; humeral spot always present; Turano-European species..*L. axillaris* (Lacordaire, 1848)

25. Body larger, length 8.5-11.0 mm; humeral spot great, black, always very distinctly pronounced; European species...*L. humeralis* (Schneider, 1792)
-. Body smaller, length 4.2-6.8 mm; humeral spot small, brownish, often absent; Sibero-European species..*L. longimana* (Linnaeus, 1760)

26. Elytron with a humeral spot and a longitudinal stripe in posterior part, suture also often narrowly blackened; body length 8.6-9.4 mm; Palaestino-Taurian species..*L. hebraea* (Lacordaire, 1848)
-. Elytron with a humeral spot only..27

27. Pronotum very densely punctate, interstices on average narrower than diameter of punctures; body length 7.6-10.4 mm; Balkano-Anatolian species...........*L. rufa* (Waltl, 1838)
-. Pronotum not particularly densely punctate, interstices not narrower than diameter of punctures...28

28. Mandibles bowl-like; body length 8.0-11 mm; Palaestino-Taurian species...*L. basanica* Sahlberg, 1913
-. Mandibles not bowl-like; body very large, length rarely under 10.5 mm; body length 10.8-13.8 mm; SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian) species...*L. asiatica* Faldermann, 1837

Key to females of Turkish species

Only *Labidostomis atkaracalarica* spec. nov. is not included in the key. Since female of the new species is unknown.

1. Elytra with or without a humeral dot, each elytron apart from humeral spot with a dark spot...2
-. Elytra uniformly pale or with a dark humeral spot only...7

2. On each elytron a humeral dot and a longitudinal stripe..3
-. Elytra without longitudinal stripe...4

3. On each elytron a normal humeral dot and a longitudinal stripe in the middle of posterior part; body length 6.3-8.5 mm...*L. decipiens* Faldermann, 1837

- On each elytron a great humeral dot and a longitudinal stripe on the side of posterior part; body length 7.8-8.9 mm...*L. hebraea* (Lacordaire, 1848)

4. In the middle of each elytron a great, bluish, shining patch, always considerably greater (15-20 X) than humeral dot; body length 5.6-6.8 mm.........................*L. elegans* Lefèvre, 1876
-. Elytra with black discal spots...5

5. Body length under 7.5 mm; black discal spot situated in the middle of elytron; ductus spermatheca very long; body length 6.8-7.1 mm......................................*L. korbi* Weise, 1902
-. Body length over 8.0 mm; black discal spot situated in anterior part of elytron; ductus spermatheca shorter and thicker..6

6. Body length under 9.5 mm; pronotum nude; one discal spot only; body length 8.2-9.2 mm...*L. maculipennis* Lefèvre, 1870
-. Body length over 9.5 mm; posterior part of pronotum covered by hairs; in anterior part of elytron two black spots side by side, the external spot sometimes absent; body length 9.6-10.3 mm...*L. subfasciata* Weise, 1885

7. Elytra uniformly pale without humeral spot..8
-. Elytra pale with a dark humeral spot only..10

8. Legs, sometimes also pronotum pale; body length about 6.8 mm....*L. testaceipes* Pic, 1904
-. Legs black or black with metallic lustre..9

9. Pronotum finely punctate; body length 7.5-9.1 mm..............*L. pallidipennis* (Gebler, 1830)
-. Pronotum strongly punctate; body length 5.6-7.9 mm..........*L. cyanicornis* (Germar, 1822)

10. Labrum dark 11
-.. Labrum pale..24

11. Pronotum bare..12
-. Pronotum covered by hairs...16

12. Pronotum finely or moderately strongly punctate; ductus spermatheca short.................13
-. Pronotum strongly punctate; ductus spermatheca longer..15

13. Ductus spermatheca not spirally coiled, at most 2 x longer than vasculum; bulbus spermatheca relatively smaller; body length 6.6-7.8 mm.....*L. brevipennis* Faldermann, 1837
-. Ductus spermatheca spirally coiled; bulbus spermatheca relatively larger.........................14

14. Body smaller, length 5.1-8.5 mm; Sibero-European species.........*L. lucida* (Germar, 1824)
-. Body larger; Turano-European species..................................*L. axillaris* (Lacordaire, 1848)

15. Body length over 8.0 mm; proximal part of ductus spermatheca swollen............................ ....*L. humeralis* (Schneider, 1792)
-. Body length under 7.0 mm; proximal part of ductus spermatheca not swollen...................... .... *L. longimana* (Linnaeus, 1760)

16. Body length under 5.5 mm; ductus spermatheca shorter; body length 4.6-5.4 mm............. ....*L. karamanica* Weise, 1900
-. Body length over 5.5 mm; ductus spermatheca usually longer...17

17. Pronotum finely punctate, diameter of punctures less than 30 µm..................................18
-. Pronotum moderately strongly or strongly punctate, diameter of punctures about 40 µm and more...21

18. Hairs on pronotum long (160-180 µm); body length about 8.2 mm.................................... ....*L. basanica* Sahlberg, 1913
-. Hairs on pronotum much shorter (under 100 µm)..19

19. Bulbus spermatheca large, irregular, sack-shaped; body length about 7.0 mm..................
....*L. beckeri* Weise, 1881
-. Bulbus spermatheca normal, not sack-shaped...20

20. Bulbus spermatheca slightly swollen and elongated; body length 6.5-6.7 mm...................
....*L. metallica* Lefèvre, 1872
-. Bulbus spermatheca large, but not elongated; body length about 8.5 mm............................
....*L. medvedevi* Warchalowski, 1985

21. Pronotum very strongly and densely punctate, covered by erect hairs; body length 7.1-8.9 mm...*L. rufa* (Waltl, 1838)
-. Punctures of pronotum moderately strong, not particularly dense...................................22

22. Ductus spermatheca thicker, 1.5 x longer than vasculum; body length 9.2-11.2 mm.........
....*L. asiatica* Faldermann, 1837
-. Ductus spermatheca thinner, at least 2 x longer than vasculum..23

23. Ductus at least 4 x longer than vasculum; bulbus spermatheca large, Y-shaped; body length about 9.5 mm...*L. propinqua* Faldermann, 1837
-. Ductus at most 2 x longer than vasculum; bulbus spermatheca normal; body length 6.8-8.1 mm..*L. peregrina* Weise, 1900

24. Pronotum anteriorly with a deep transverse furrow..25
-. Pronotum anteriorly without any furrow..26

25. Furrow on pronotum deep and sharply incised; ductus spermatheca relatively longer; bulbus spermatheca relatively more elongated; body length 5.9-6.2 mm................................
....*L. kaszabi* Medvedev, 1962
-. Furrow on pronotum distinct, but shallower; ductus spermatheca relatively shorter; bulbus spermatheca relatively less elongated;body length about 5.8 mm................................
....*L. sulcicollis* (Lacordaire, 1848)

26. Hairs on pronotum adpressed, forming in posterior part a transverse stripe or two densely haired fields...27
-. Hairs on pronotum erect or semierect; pronotum without densely haired areas...............28

27. Elytra almost matt; ductus spermatheca with more than 100 twists; body length 7.5-8.3 mm...*L. diversifrons* Lefèvre, 1872
-. Elytra shining; ductus spermatheca with less than 100 twists; body length 6.3-8.5 mm...*L. decipiens* Faldermann, 1837

28. Hairs on pronotum longer (60-100 µm) or very long (over 200 µm); body length 6.8-7.5 mm...*L. oertzeni* Weise, 1889
-. Hairs on pronotum very short (35-45 µm), erect, distinctly visible in lateral view.............29

29. Ductus spermatheca relatively shorter and thinner; body length 6.7-7.2 mm.....................
....*L. mesopotamica* Heyden, 1886
-. Ductus spermatheca relatively longer and thicker; body length 6.8-8.1 mm.........................
....*L. peregrina* Weise, 1900

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APPENDIX. An updated list of all members of Turkish *Labidostomis* Germar.

Genus *Labidostomis* Germar, 1822
Subgenus *Labidostomis* Germar, 1822

Labidostomis asiatica Faldermann, 1837
Labidostomis atkaracalarica* Özdikmen & Bal, **sp. nov.
Labidostomis axillaris (Lacordaire, 1848)
Labidostomis basanica Sahlberg, 1913
Labidostomis beckeri Weise, 1881
Labidostomis brevipennis Faldermann, 1837
Labidostomis cyanicornis (Germar, 1822)
Labidostomis decipiens Faldermann, 1837
Labidostomis diversifrons Lefèvre, 1872
Labidostomis elegans Lefèvre, 1876
Labidostomis hebraea (Lacordaire, 1848)
Labidostomis humeralis (Schneider, 1792)
Labidostomis karamanica Weise, 1900
**Labidostomis kaszabi* Medvedev, 1962
**Labidostomis korbi* Weise, 1902
Labidostomis longimana (Linnaeus, 1760)
Labidostomis lucida (Germar, 1824)
Labidostomis maculipennis Lefèvre, 1870
Labidostomis medvedevi Warchalowski, 1985 **new record**
Labidostomis mesopotamica Heyden, 1886
Labidostomis metallica Lefèvre, 1872
Labidostomis oertzeni Weise, 1889
Labidostomis pallidipennis (Gebler, 1830)
Labidostomis peregrina Weise, 1900
Labidostomis propinqua Faldermann, 1837
Labidostomis rufa (Waltl, 1838)
Labidostomis subfasciata Weise, 1885
Labidostomis sulcicollis (Lacordaire, 1848)
Labidostomis testaceipes Pic, 1904

Figure 1. Locations of the provinces in Turkey.

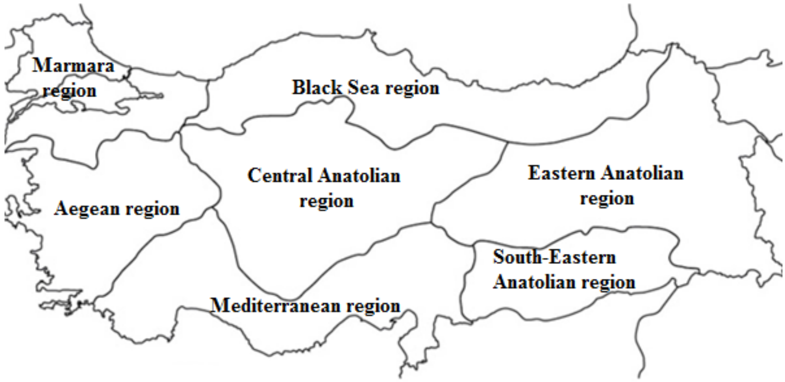


Figure 2. Regional parts of Turkey.

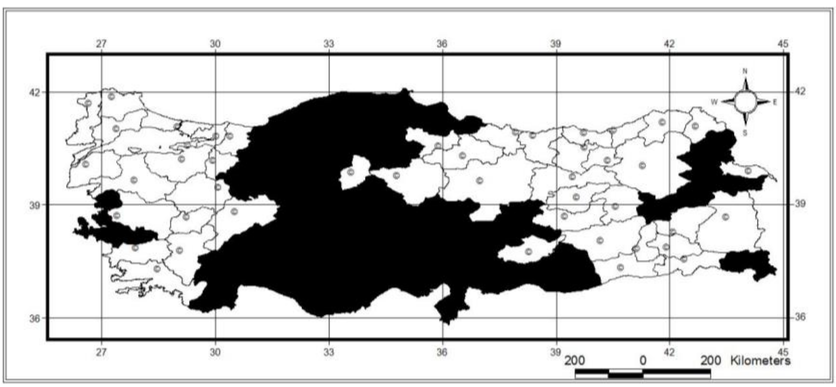


Figure 3. Provinces of collected specimens of *Labidostomis* in Turkey.

Figure 4. *Labidostomis atkaracalarica* sp. nov. (holotype ♂).

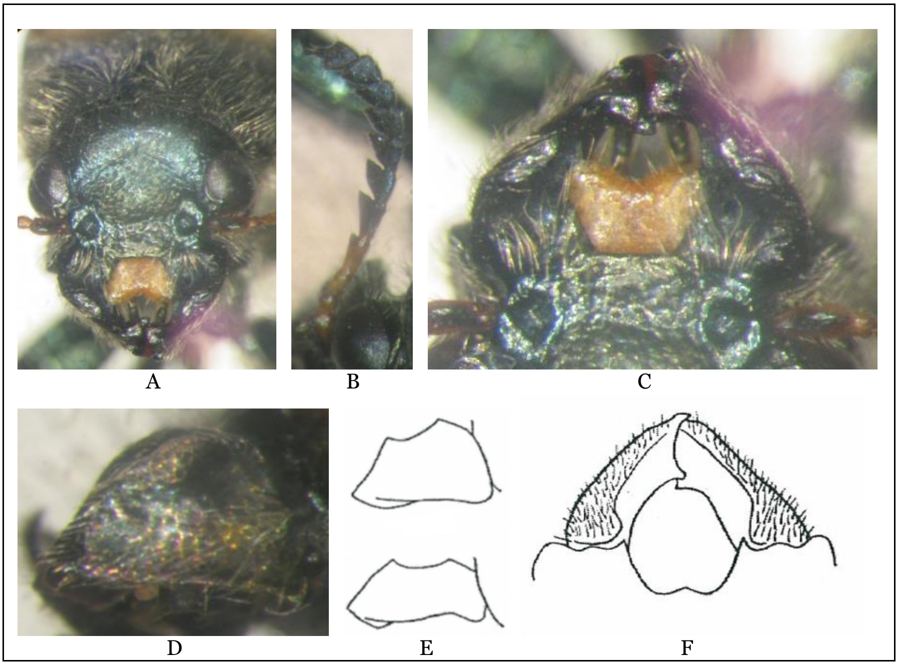


Figure 5. A. Head in front view of *Labidostomis atkaracalarica* sp. nov., B. Antenna of *Labidostomis atkaracalarica* sp. nov., C. Mandibles, labrum and clypeus in dorsal view of *Labidostomis atkaracalarica* sp. nov., D. Mandible in lateral view of *Labidostomis atkaracalarica* sp. nov., E. Emarginations on top margin of mandible in lateral view of *Labidostomis oertzeni* Weise (after Warchalowski, 2010), F. Mandibles and clypeus in dorsal view of *Labidostomis martensi* Medvedev (after Warchalowski, 2010).

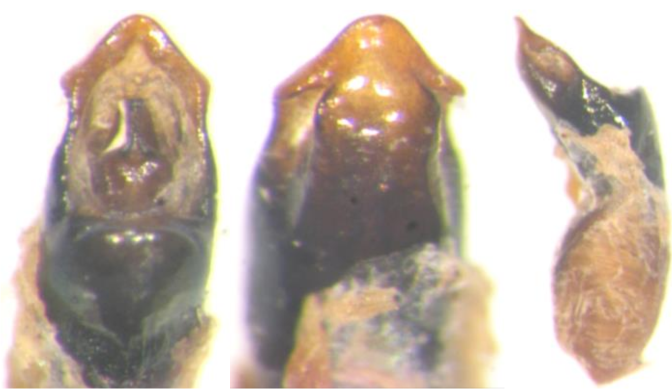
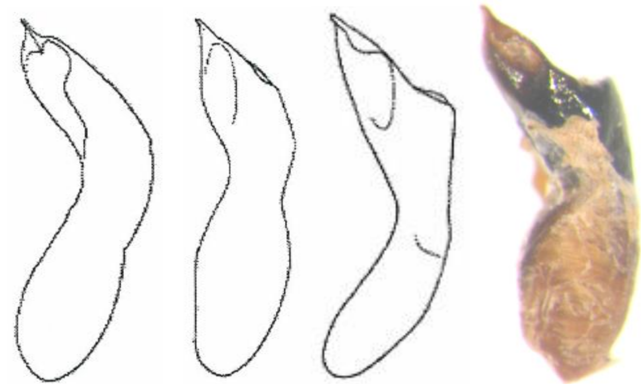
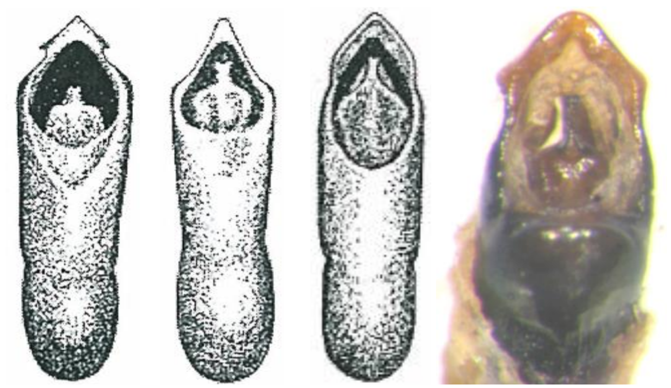


Figure 6. Aedeagus in dorsal, ventral and lateral view of *Labidostomis atkaracalarica* sp. nov..



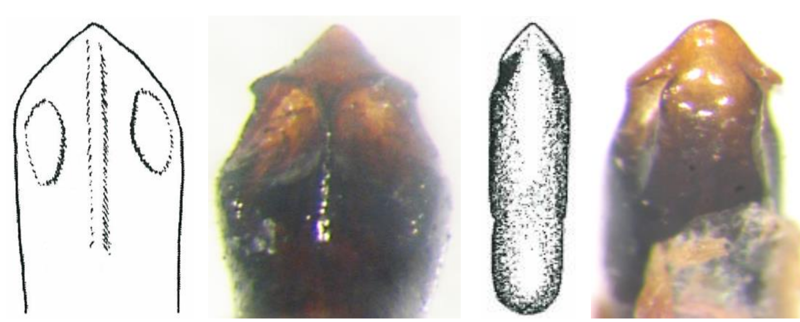
A B C D

Figure 7. Aedeagus in lateral view of A. *Labidostomis mesopotamica* (after Warchalowski, 2010), B. *Labidostomis peregrina* (after Warchalowski, 2010), C. *Labidostomis oertzeni* (after Warchalowski, 2010), D. *Labidostomis atkaracalarica* sp. nov..



A B C D

Figure 8. Aedeagus in dorsal view of A. *Labidostomis mesopotamica* (after Warchalowski, 2010), B. *Labidostomis peregrina* (after Warchalowski, 2010), C. *Labidostomis oertzeni* (after Warchalowski, 2010), D. *Labidostomis atkaracalarica* sp. nov..



A B C D

Figure 9. Aedeagus in ventral view of A. *Labidostomis martensi* (after Warchalowski, 2010), B. *Labidostomis mesopotamica*, C. *Labidostomis oertzeni* (after Warchalowski, 2010), D. *Labidostomis atkaracalarica* sp. nov..

THREE NEW RECORDS OF REDUVIIDAE FROM JHARKHAND, INDIA (HETEROPTERA: HEMIPTERA)

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[Mukherjee, P. & Hassan, M. E. 2016. Three new records of Reduviidae from Jharkhand, India (Heteroptera: Hemiptera). Munis Entomology & Zoology, 11 (2): 539-541**]**

ABSTRACT: The paper presents the new record of three species *viz. Polididus armatissimus* Stal and *Rhynocoris fuscipes* (Fabricius) of subfamily Harpactorinae and *Ectomocoris cordiger* Stal of subfamily Peiratinae of family Reduviidae from the state of Jharkhand, India. Key to taxa and distributions of each species in India and abroad have been included.

KEY WORDS: Hemiptera, Reduviidae, new record, Jharkhand

Reduviidae, commonly known as "assassin bugs" are small to large, robust or elongated, somewhat flattened, smooth, hairy or spiny bugs, which may vary in size, ranging from 2 mm (*Holoptilus*) to large and extremely hardy (*Haematorrhophus*) 40 mm. This family is represented globally by more than 6878 species and subspecies under 981 genera belonging to 25 subfamilies (Henry, 2009). Of which 465 species under 144 genera belonging to 14 subfamilies are recorded from India (Biswas & Mitra, 2011). The classification of the family has been mainly adopted after Ambrose (2006). Distant (1904, 1910) recorded three species from Jharkhand *viz. Ectomocoris ochropterus* Stal of Peiratinae from Sahebganj, *Coranus siva* Kirkaldy of Harpactorinae from Ranchi and *Acanthaspis quinquespinosa* Fabricius of Reduviinae from Ranchi. Present study deals with three new records from the state of Jharkhand *viz. Polididus armatissimus* Stal and *Rhynocoris fuscipes* (Fabricius) of subfamily Harpactorinae and *Ectomocoris cordiger* Stal of subfamily Peiratinae of family Reduviidae. Keys to various taxa, diagnostic characters, references, distribution in India and elsewhere under each species are given in the paper.

MATERIALS AND METHODS

The present study is based on the materials collected by Dr. R. Babu and party of Zoological Survey of India during field surveys from Jharkhand (2008-2009). The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata.

Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**
Infraorder **CIMICOMORPHA**
Family **REDUVIIDAE**
Subfamily **HARPACTORINAE**
Genus *Polididus* Stal, 1858
Polididus armatissimus Stal, 1859
Genus *Rhynocoris* Kolenati, 1857
Rhynocoris fuscipes (Fabricius, 1787)

Subfamily **PEIRATINAE**
Genus *Ectomocoris* Mayr, 1865
Ectomocoris cordiger Stal, 1866b

SYSTEMATIC ACCOUNT

Key to the subfamilies of the family Reduviidae

1. Pronotum with or without any constriction; hemelytra with a quadrangular areolet or cell at interior area of corium near base of membrane....................................HARPACTORINAE

-. Pronotum with constriction behind the middle; hemelytra without a quadrangular areolet or cell at interior area of corium near base of membrane...................................PEIRATINAE

Subfamily HARPACTORINAE

Key to the genera of the subfamily Harpactorinae

1. Specimen always spinous in body and legs...*Polididus* Stal

-. Specimen not spinous in body and legs..*Rhynocoris* Kolenati

Genus *Polididus* Stal, 1858

1858. *Polididus* Stal, Ofv. K. Vet. Ak. Forh., 15: 448.

***Polididus armatissimus* Stal, 1859** (Fig. 1)

1859. *Polididus armatissimus* Stal, Ofv. Vet.-Ak. Forh., 16: 376.
1904. *Polididus armatissimus* Distant, Fauna Brit. India, Rhynchota, 2: 386.
2006. *Polididus armatissimus* Ambrose, Zoos' Print Journ., 21 (9): 11.

Material examined: 1 ex., INDIA: Jharkhand: East Singhbhum District: Margo: Forest Rest House, 24.XI.2008, Coll. Dr. R. Babu and team.

Diagnostic character: Pale brownish yellow in colour; abdomen beneath with black fasciae on each side; sternum pilose; anterior pronotal angle with greyish narrow vittae; head with long spines at base of each antennae and with smaller discal spines; pronotumspinose, with two erect long spines on anterior lobe and long lateral spines on posterior lobe; femora and tibiae spinous.

Length: 10 mm.

Distribution: India: Jharkhand (East Singhbhum), Chhattisgarh, Tamil Nadu, Maharashtra,West Bengal. **Elsewhere:** China, Japan, Sri Lanka.

Genus *Rhynocoris* Kolenati, 1857

1857. *Rhynocoris* Kolenati, Fascia Bulletin Moscou, 29: 419-502.

***Rhynocoris fuscipes* (Fabricius, 1787)** (Fig. 2)

1787. *Reduvius fuscipes* Fabricius, Mant. Ins., 2: 312.
1904. *Harpactor fuscipes*: Distant, Fauna Brit. India, Rhynchota, 2: 333.
1986. *Rhynocoris fuscipes*: Ambrose and Livingstone, J. Bombay Nat. Hist. Soc., 83 (1): 176.
2006. *Rhynocoris fuscipes*: Ambrose, Zoos' Print Journ., 21 (9): 11.

Material examined: 1 ex., INDIA: Jharkhand: Pakur District: Torai river side, 9.XI.2009, coll. Dr. R. Babu and team.

Diagnostic character: Body coral red; rostrum, antennae, anterior area of the posterior lobe of pronotum, disk of scutellum, an oblong spot between antennae, upper surface of post ocular area, legs, two spots to pronotum, black; pronotum with the anterior lobe distinctly sculptured, posteriorly centrally a little impressed; membrane passing abdominal apex with its posterior margin pale fuliginous.

Length: 14-16 mm.

Distribution: India: Jharkhand (Pakur), Chhattisgarh, Maharashtra, Tamil Nadu, West Bengal. **Elsewhere:** China, Sri Lanka.

Subfamily PEIRATINAE

Genus *Ectomocoris* Mayr, 1865

1865. *Ectomocoris* Mayr, Verh. Z.-b. Ges. Wien., p. 438.

***Ectomocoris cordiger* Stal, 1866** (Fig. 3)

1866. *Ectomocoris cordiger* Stal, Ofv. Vet.-Ak. Forh., 23: 256.
1904. *Ectomocoris cordiger*: Distant, Fauna Brit. India, Rhynchota, 2: 295.
2006.*Ectomocoris cordiger*: Ambrose, Zoos' Print Journ., 21 (9): 16.

Material examined: 1 ex., INDIA: Jharkhand: Dumka District: Santhal Pargana division: Dumka, 12.X.2009, coll. Dr. R. Babu and team.
Diagnostic character: Black, opaque; pronotum and scutellum olivaceous black; antennae, greater part of second and third joints of rostrum, small spots to connexivum above and beneath, legs, yellowish brown in colour; apical half of clavus confluent with somewhat similar sized spot on corium, small spot on outer area of basal cell to membrane, brownish yellow; legs and antennae hairy.
Length: 12-15 mm.
Distribution: India: Jharkhand (Dumka), Chhattisgarh, West Bengal, Maharashtra, Tamil Nadu, Kerala. **Elsewhere:** Sri Lanka, New Guinea, Iran, Iraq, United Arab Emirates.

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Fabricius, J. C. 1787. Mantissa Insectorum, Hafniae. 1: xx+348; 2: 1-374, appendix 375-382.
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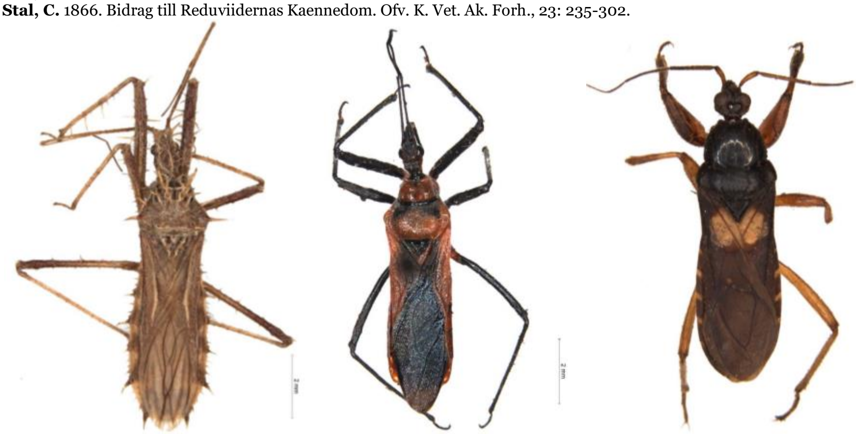

1 2 3

Figures 1-3. 1. *Polididus armatissimus* Stal, 2. *Rhynocoris fuscipes* (Fabricius), 3. *Ectomocoris cordiger* Stal.

AN IMPROVED REVIEW OF TURKISH SAPROXYLIC CERAMBYCIDAE (COLEOPTERA) FROM THE EUROPEAN RED LIST WITH ADDITIONAL TWENTY-ONE SPECIES

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[Özdikmen, H. 2016. An improved review of Turkish saproxylic Cerambycidae (Coleoptera) from the European Red List with additional twenty-one species. Munis Entomology & Zoology, 11 (2): 542-572**]**

ABSTRACT: The researches on saproxylic beetles are very limited. Therefore the threat status of these beetles is not sufficiently known in Turkey. Recently, an important study titled “a review of Turkish saproxylic beetles from the European Red List”was published by Avgın et al. in the year of 2014. Although the mentioned study helped determine the list of Turkish saproxylic beetles from the European Red List for family Cerambycidae, the list needs further investigations to be fully and correctly realized. Consequently an improved list of all Turkish saproxylic beetles from the European Red List for family Cerambycidae is provided with additional twenty-one species. Red List status of Turkish saproxylic Cerambycidae as a preliminary assessment is also achieved.

KEY WORDS: European Red List of saproxylic beetles, diversity, Coleoptera, Cerambycidae, Turkey

The European Red List of Saproxylic Beetles was published by International Union for Conservation of Nature (IUCN) in the year of 2012. Then an important study titled “a review of Turkish saproxylic beetles from the European Red List” was published by Avgın et al. in the year of 2014 on the base of The European Red List of Saproxylic Beetles (Nieto & Alexander, 2010; IUCN, 2012).

Avgın et al. (2014) determined saproxylic beetle species living in Turkey from the list. Accordingly 77 species were determined for Cerambycidae. However the number of species for saproxylic Cerambycidae in Turkey from the European Red List is 98. Thus, the aim of this paper is to identify saproxylic species native to Turkey that appear on the European Red List completely and to realize a correct list for Cerambycidae.

MATERIAL AND METHOD

The material of this work is “the European Red List of Saproxylic Beetles” published by International Union for Conservation of Nature (IUCN 2012) and “A review of Turkish saproxylic beetles from the European Red List” published by Avgın et al. (2014). This study is based on both publications.

During this study, no collected specimens from any locations has been used. Firstly, I examined the European Red List of Saproxylic Beetles and I determined saproxylic beetle species living in Turkey from the list for family Cerambycidae. For detecting these species I benefited from many references. After this I obtained information about their distribution in Turkey and around the world from Özdikmen (2007, 2008a,b, 2011a, 2013) and Löbl & Smetana (2010) and Danilevsky (2015a,b) chiefly. Finally, I prepared the sections for each species with a map that shows the provincial distribution in Turkey. In the maps, Edirne province for the records of European Turkey (without province) and Ardahan and Kars provinces for the records of North-Eastern Anatolia (without province) were marked with a light colored sign. I used ArcView GIS version 3.1 for Windows for these maps. Red List status of Turkish saproxylic Cerambycidae as a preliminary assessment is also achieved (Appendix 1).

RESULTS AND DISCUSSIONS

The European Red List of Saproxylic Beetles includes 153 species of threatened saproxylic Cerambycidae living in Europe. The European Red List includes 98 species of threatened saproxylic Cerambycidae living in Turkey.

In fact the European Red List includes 151 species of Cerambycidae. Since *Purpuricenus caucasicus* T. Pic, 1902 is a synonym of *Purpuricenus kaehleri menetriesi* Motschulsky, 1845 according to Rapuzzi & Sama (2014) and *Purpuricenus renyvonae* Sláma, 2001 is a subspecies of *Purpuricenus graecus* Sláma, 1993 according to Danilevsky (2015a). Both species occur in Turkey. Therefore the following list comprises of 96 species.

Turkish saproxylic Cerambycidae from the European Red List

Aegosoma scabricorne (Scopoli, 1763)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Ankara, Antalya, Balıkesir, Bartın, Gümüşhane, Hatay, Isparta, İçel, Kahramanmaraş, Karabük, Konya, Niğde, Osmaniye, Samsun and Van provinces] and European Turkey [İstanbul and Kırklareli provinces] (Öymen, 1987; Tozlu et al., 2002; Özdikmen & Şahin, 2006; Özdikmen, 2006, 2007; Sama et al., 2012; Cihan, Özdikmen, Aytar, 2013; Avgın et al., 2014) (Fig. 2). **Global distribution.** Europe (including European Turkey), Caucasus and Middle East (Iran, Iraq, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available also for Turkey in my opinion.

Anaglyptus (*Anaglyptus*) *arabicus* (Küster, 1847)

Red List category in Europe. NA. **Distribution in Turkey.** The species was reported both from Asian Turkey and European Turkey. Turkey (Küster, 1847; Lodos, 1998); Artvin province: Borçka (Tournier, 1872); İstanbul province: Alem Mt. (Bodemeyer, 1906); European Turkey (Althoff & Danilevsky, 1997); Artvin province (Tozlu et al., 2002); Erzurum province: Hasankale (Özdikmen, 2006); Artvin province: Şavşat, Çankırı province: Ilgaz Mt., Erzurum province: Hasankale (Özdikmen, 2007) (Fig. 3). **Global distribution.** Europe (South European part of Russia, European Turkey), Caucasus and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey. This species was described by Küster (1847) from Turkey. It is newly reported for Turkey.

Anaglyptus (*Anaglyptus*) *mysticus* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey and European Turkey. Gümüşhane province: Torul and N of Şiran (Gfeller, 1972; Tauzin, 2000); Amasya province: Merzifon (Adlbauer, 1992); European Turkey (Althoff & Danilevsky, 1997; Sama, 2002); Kırklareli: Yenice env. (pers. comm.) (Fig. 4). **Global distribution.** Europe (including European Turkey) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey.

Aromia moschata (Linnaeus, 1758)

Red List category in Europe: LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Ankara, Artvin, Balıkesir, Bursa, Erzurum, Kocaeli, Samsun, Tokat and Tunceli provinces] and European Turkey [İstanbul province] (Acatay, 1943; Çanakçıoğlu, 1956; Villiers, 1967; Öymen, 1987; Adlbauer, 1992; Althoff & Danilevsky, 1997; Tozlu et al., 2002; Özdikmen, et al., 2005; Özdikmen & Şahin, 2006; Özdikmen, 2014b; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 5). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Mongolia, Siberia and Asian Turkey. **Remarks.** Red List category is available also for Turkey in my opinion. The species is represented only by the nominal subspecies, *Aromia moschata moschata* (Linnaeus, 1758) in Turkey. *Aromia ambrosiaca* (Steven, 1809) that was regarded as a subspecies of *Aromia moschata* (Linnaeus, 1758) is a separate species. Thus the old records from Antalya, Burdur, Kahramanmaraş and Osmaniye provinces are belonged to *Aromia ambrosiaca.*

Axinopalpis gracilis (Krynicki, 1832)

Red List category in Europe: LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Burdur, Hatay, Isparta and İçel provinces] (Sama et al., 2011, 2012; Avgın et al., 2014) (Fig. 6). **Global distribution.** Europe, Caucasus and Middle East (Israel and Syria) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey. The species is represented only by the nominal subspecies in Turkey.

Calchaenesthes oblongomaculata (Guérin-Méneville, 1844)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from European Turkey. İstanbul province (Frivaldzky, 1845); European Turkey (Özdikmen et al., 2013) (Fig. 7). **Global distribution.** Europe (Bulgaria, Greece, Romania and European Turkey), ?Cyprus and ?Jordan. **Remarks.** Red List category is available also for Turkey in my opinion. According to current data, it is EN for Turkey. This species is newly reported for Turkey. According to Özdikmen et al. (2013), the species is very likely distributed only in European Turkey. Since, the synonym taxon *Callidium nogeli* Frivaldszky von Frivald, 1845 was desribed from İstanbul province. However, *C. oblongomaculata* is not distributed in Anatolia for Turkey. Since old records of the species from Anatolia should be belong to *C. primis* Özdikmen, 2013 that was recorded by Ambrus et al. (2014) from Cyprus. The records of Cyprus and Jordan need to be confirmed.

Callergates gaillardoti (Chevrolat, 1854)

Red List category in Europe: EN. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, Antalya, Aydın, Düzce, Hatay, İçel, Konya, Muğla and Osmaniye provinces] (Özdikmen & Demir, 2006; Avgın et al., 2014) (Fig. 8). **Global distribution.** Europe (Greece: Rodos and Samos Islands), Cyprus, North Africa (Egypt) and Middle East (Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be VU for Turkey in my opinion. According to current data, it is VU for Turkey.

Callidium (*Callidostola*) *aeneum* (DeGeer, 1775)

Red List category in Europe: LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Artvin, Giresun, Gümüşhane, İçel, Rize and Trabzon provinces] (Sekendiz, 1981; Yüksel, 1996; Özdikmen & Aytar, 2014; Avgın et al., 2014; Özbek et al., 2015) (Fig. 9). **Global distribution.** Europe, Caucasus, Siberia, Far East Russia, China, Japan, Kazakhstan, Mongolia and Asian Turkey. **Remarks.** Red List category is available also for Turkey in my opinion. This species is represented by two subspecies in Turkey as *Callidium aeneum longipenne* Plavilstshikov, 1940 is distributed South European Russia, Azerbaijan, Georgia and Asian Turkey, and *Callidium aeneum pilosicollis* Özdikmen & Aytar, 2014 is distributed only in Southern Anatolia.

Callidium (*Callidium*) *violaceum* (Fabricius, 1775)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey. Karabük province: Büyükdüz research forest (Besçeli, 1969; Cebeci et al., 2011) (Fig. 10). **Global distribution.** Europe, Caucasus, China, Far East Russia, Japan, Kazakhstan, Korea, Mongolia, Siberia, Thailand, Asian Turkey and introduced USA. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is EN for Turkey. This species is newly reported for Turkey.

Callimoxys gracilis (Brullé, 1832)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [İzmir and Konya provinces] (Bodemeyer, 1906; Avgın et al., 2014) (Fig. 11). **Global distribution.** Europe, Caucasus, Iran, Turkmenistan and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is VU for Turkey.

Callimus (*Callimus*) *angulatus* (Schrank, 1789)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Antalya, Bolu, Burdur, Hatay, Isparta, İçel, İstanbul, Niğde, Ordu, Samsun and Tokat provinces] and European Turkey [İstanbul and Kırklareli provinces] (Pic, 1892; Demelt & Alkan, 1962; Demelt, 1963; Villiers, 1967; Öymen, 1987; Althoff & Danilevsky, 1997; Özdikmen, 2011a; Sama et al., 2012; Avgın et al., 2014; Özbek et al., 2015) (Fig. 12). **Global distribution.** Europe (including European Turkey), North Africa (Algeria and Morocco), Caucasus, Middle East (Iran and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented only by the nominal subspecies in Turkey and Europe.

Callimus (*Lampropterus*) *femoratus* (Germar, 1824)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Amasya, Ankara, Antalya, Artvin, Balıkesir, Bingöl, Bitlis, Burdur, Bursa, Çanakkale, Diyarbakır, Elazığ, Erzurum, Gaziantep, Hakkari, Hatay, İçel, İzmir, Kahramanmaraş, Kırıkkale, Konya, Malatya, Manisa, Mardin, Muğla, Muş, Niğde, Osmaniye, Tokat, Tunceli and Yozgat provinces] and European Turkey [Edirne and Kırklareli provinces] (Bodemeyer, 1900; Villiers, 1967; Fuchs & Breuning, 1971; Gfeller, 1972; Gül-Zümreoğlu, 1975; Sama, 1982; Adlbauer, 1988; Rejzek & Hoskovec, 1999; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen, et al., 2005; Özdikmen, 2007; Ozdikmen & Turgut, 2010; Özdikmen et al., 2012a; Sama et al., 2012; Küçükkaykı et al., 2013; Avgın et al., 2014; Özbek et al., 2015) (Fig. 13). **Global distribution.** East Europe (including European Turkey), Caucasus, Middle East (Cyprus, Iran, Israel, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. European Red List includes the species as *Lampropterus femoratus* (Germar, 1824).

Callimus (*Procallimus*) *egregius* Mulsant & Rey, 1863

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, Antalya, Hatay and İçel provinces] (Pic, 1907a,b; Avgın et al., 2014) (Fig. 14). **Global distribution.** East Europe (South European part of Russia, Ukraine), Caucasus, Middle East (Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is VU for Turkey. European Red List includes the species as *Procallimus egregius* (Mulsant & Rey, 1863). This species was described by Mulsant & Rey (1863) from İçel province in Southern Turkey.

***Callimus* (*Procallimus*) *semicyaneus* Pic, 1905**

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey. Antalya province: Alanya (Adlbauer, 1988); Antalya province: Büyük Soğanlı pass (pers. comm. with Tauzin, 2007) (Fig. 15). **Global distribution.** Europe (Greece and Macedonia) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is EN for Turkey. This species is newly reported for Turkey. It was given *Procallimus semicyaneus* (Pic, 1905) in the European Red List.

***Cerambyx* (*Cerambyx*) *carinatus* (Küster, 1845)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Ankara, Aydın, Denizli, İçel, İzmir, Kütahya and Manisa provinces] (Şenyüz & Özdikmen, 2013; Avgın et al., 2014; Özbek et al., 2015) (Fig. 16). **Global distribution.** South-East Europe and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is NT for Turkey.

***Cerambyx* (*Cerambyx*) *cerdo* Linnaeus, 1758**

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Ankara, Antalya, Artvin, Bartın, Bilecik, Bingöl, Bursa, Çanakkale, Denizli, Düzce, Hatay, İçel, İstanbul, İzmir, Kahramanmaraş, Kastamonu, Kocaeli, Konya, Manisa, Muğla, Niğde, Osmaniye, Sakarya, Samsun, Sinop, Şırnak and Tunceli provinces] and European Turkey [Kırklareli province] (Kanat, 1998; Ulusoy et al., 1999; Rejzek & Hoskovec, 1999; Özdikmen & Şahin, 2006; Özdikmen & Demir, 2006; Özdikmen, 2006; Özdikmen & Turgut, 2009a; Turgut & Özdikmen, 2010; Sama et al., 2012; Özdikmen et al., 2012b; Şenyüz & Özdikmen, 2013; Avgın et al., 2014; Özbek et al., 2015) (Fig. 17). **Global distribution.** Europe (including European Turkey), North Africa (Morocco), Caucasus, Middle East (Iran, Iraq, Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be LC for Turkey in my opinion. According to current data, it is LC for Turkey. This species is represented by two subspecies in Turkey as the nominal subspecies and *Cerambyx cerdo acuminatus* Motschulsky, 1853.

***Cerambyx* (*Cerambyx*) *dux* (Faldermann, 1837)**

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Ankara, Antalya, Bilecik, Bingöl, Burdur, Bursa, Denizli, Elazığ, Erzincan, Erzurum, Gaziantep, Hatay, Isparta, İçel, İzmir, Kahramanmaraş, Karabük, Kars, Kastamonu, Kayseri, Konya, Malatya, Muğla, Niğde, Osmaniye, Tokat, Tunceli and Van provinces] and European Turkey [İstanbul and Kırklareli provinces] (Demelt, 1963; Tozlu et al., 2002; Yardibi & Tozlu, 2013; Avgın et al., 2014) (Fig. 18). **Global distribution.** East Europe (Bulgaria, Macedonia, South European Russia and Ukraine, European Turkey), Caucasus, Middle East (Iran, Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be LC for Turkey in my opinion. According to current data, it is LC for Turkey.

***Cerambyx* (*Cerambyx*) *miles* Bonelli, 1812**

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Afyon, Antalya, Bitlis, Denizli, Diyarbakır, İçel, Kahramanmaraş, Konya, Niğde, Osmaniye and Uşak] and European Turkey [Edirne and İstanbul provinces] (Avgın et al., 2014) (Fig. 19). **Global distribution.** Europe (including European Turkey), Caucasus and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

***Cerambyx* (*Cerambyx*) *nodulosus* Germar, 1817**

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Antalya, Artvin, Bingöl, Bitlis, Bursa, Erzurum, Isparta, İçel, İzmir, Kahramanmaraş, Konya, Manisa, Mardin, Muğla, Osmaniye and Uşak provinces] and European Turkey [İstanbul province] (Çanakçıoğlu, 1956; Althoff & Danilevsky, 1997; Tozlu et al., 2002; Avgın et al., 2014) (Fig. 20). **Global distribution.** Europe (including European Turkey), Caucasus, Middle East (Cyprus, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented only by the nominal subspecies in Turkey.

***Cerambyx* (*Microcerambyx*) *scopolii* Fuessly, 1775**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Ankara, Antalya, Artvin, Bingöl, Bolu, Düzce, Hatay, İçel, İstanbul, Kahramanmaraş, Kars, Niğde, Osmaniye, Rize, Sakarya, Samsun, Sinop, Tokat and Trabzon provinces] and European Turkey [Edirne, İstanbul and Kırklareli provinces] (Pic, 1892a; Bodemeyer, 1900;Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; Villiers, 1967; İren & Ahmed, 1973; Sekendiz, 1981; Öymen, 1987; Adlbauer, 1988, 1992; Tozlu, 2001b; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen & Demir, 2006; Özdikmen, 2007; Özdikmen & Turgut, 2009a; Ozdikmen et al., 2010; Sama et al., 2012; Özdikmen et al., 2012b; Avgın et al., 2014; Özbek et al., 2015) (Fig. 21). **Global distribution.** Europe (including European Turkey), Caucasus, Middle East (Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as the nominal subspecies and *Cerambyx scopolii nitidus* Pic, 1892 occurs only in Southern Anatolia.

Cerambyx (*Cerambyx*) *welensii* (Küster, 1845)

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Antalya, Burdur, Gaziantep, Hatay, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karaman, Konya, Niğde and Osmaniye provinces] and European Turkey [İstanbul province] (Czwalina, 1891; Pic, 1897a; Tezcan & Can, 2009; Özdikmen & Turgut, 2009a; Turgut & Özdikmen, 2010; Sama et al., 2011; Özbek et al., 2015) (Fig. 22). **Global distribution.** Europe (including European Turkey), Caucasus, Middle East (Cuprus, Iran, Iraq, Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as the nominal subspecies and *Cerambyx welensii centurio* Czwalina, 1891 that occurs only in Southern Anatolia.

Chlorophorus (*Crassofasciatus*) *aegyptiacus* (Fabricius, 1775)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Amasya, Ankara, Balikesir, Bolu, Bursa, Çanakkale, Çankırı, Denizli, Hatay, İstanbul, İzmir, Manisa, Muğla and Tokat provinces] (Fairmaire, 1884; Bodemeyer, 1906; Villiers, 1959; Demelt, 1963; Fuchs et Breuning, 1971; Özdikmen, 2007, 2011a; Küçükkaykı et al., 2013; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014) (Fig. 23). **Global distribution.** South-East Europe (Bulgaria, Greece and Macedonia) and Asian Turkey. **Remarks.** Red List category should be LC for Turkey in my opinion. According to current data, it is NT for Turkey.

Chlorophorus (*Crassofasciatus*) *convexifrons* Holzschuh, 1981

Red List category in Europe. EN. **Distribution in Turkey.** The species was reported only from Asian Turkey. Samsun province, Manisa province: Gördes, İzmir province: Çeşme (Holzschuh, 1981); Osmaniye province: Karataş Dam env., Karacalar village as *C. trifasciatus* (Ozdikmen et al., 2010) (Fig. 24). **Global distribution.** Greece (Samos Island) and Asian Turkey. **Remarks.** Red List category must be VU for Turkey in my opinion. According to current data, it is VU for Turkey. This species is newly reported for Turkey.

Chlorophorus (*Humeromaculatus*) *figuratus* (Scopoli, 1763)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Antalya, Gümüşhane, İçel, İstanbul, Kastamonu, Kocaeli, Konya, Samsun, Tokat and Trabzon provinces] and European Turkey [Kırklareli province] (Özdikmen & Demirel, 2005; Özdikmen, 2007, 2011a; Şenyüz & Özdikmen, 2013; Avgın et al., 2014) (Fig. 25). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Kazakhstan, Middle East (Iran) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

Chlorophorus (*Chlorophorus*) *herbstii* (Brahm, 1790)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey. İstanbul province: Alem Mt. (Bodemeyer, 1906); İstanbul province: Polonez village (Demelt & Alkan, 1962; Demelt, 1963); Balıkesir province: Gönen, Çanakkale province: Biga (Gfeller, 1972); Bolu province: Abant (Özdikmen, 2007) (Fig. 26). **Global distribution.** Europe (including European Turkey), Siberia, Kazakhstan and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is VU for Turkey. This species is newly reported for Turkey.

Chlorophorus (*Perderomaculatus*) *sartor* (O. F. Müller, 1766)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Amasya, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bartın, Bilecik, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Denizli, Düzce, Elazığ, Erzurum, Eskişehir, Gaziantep, Gümüşhane, Hatay, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kırıkkale, Konya, Kütahya, Manisa, Muğla, Niğde, Osmaniye, Rize, Samsun, Sinop, Tokat and Yozgat provinces] and European Turkey [Kırklareli and Tekirdağ provinces] (Bodemeyer, 1906; Villiers, 1959; Villiers, 1967; Öymen, 1987; Adlbauer, 1988; Lodos, 1998; Tozlu, 2002; Özdikmen et al., 2005; Özdikmen & Demirel, 2005; Özdikmen, 2006, 2007, 2011b; Özdikmen et al., 2012a,b; Sama et al., 2012; Şenyüz & Özdikmen, 2013; Avgın et al., 2014; Tekin & Özdikmen, 2015; Özbek et al., 2015) (Fig. 27). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Kazakhstan, Turkmenistan, Middle East (Cyprus, Iran, Iraq, Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

Chlorophorus (*Chlorophorus*) *varius* (O. F. Müller, 1766)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Aksaray, Amasya, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bartın, Bilecik, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Çorum, Denizli, Düzce, Erzincan, Erzurum, Eskişehir, Gaziantep, Gümüşhane, Hakkari, Hatay, Iğdır, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Karaman, Kastamonu, Kayseri, Kırıkkale, Kırşehir, Kocaeli, Konya, Malatya, Manisa, Mardin, Muğla, Muş, Nevşehir, Niğde, Osmaniye, Şanlıurfa, Tokat, Trabzon, Uşak, Van and Zonguldak provinces] and European Turkey [İstanbul and Kırklareli provinces] (Bodemeyer, 1906; Villiers, 1959, 1967; Gül-Zümreoğlu, 1975; Özbek, 1978; Sekendiz, 1981; Sama, 1982; Öymen, 1987; Lodos, 1998; Rejzek & Hoskovec, 1999; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen et al., 2005; Özdikmen & Demirel, 2005; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007, 2011b; Özdikmen et al., 2012a,b; Şenyüz & Özdikmen, 2013; Küçükkaykı et al., 2013; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 28). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Kazakhstan and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to Özdikmen & Cihan (2015), *Clytus damascenus* Chevrolat, 1854 that was regarded as a subspecies of *Chlorophorus varius* (O. F. Müller, 1766), is a separate species as *Chlorophorus damascenus* (Chevrolat, 1854).

Clytus (*Clytus*) *arietis* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Amasya, Ankara, Artvin, Bolu, Çanakkale, Çankırı, Düzce, Erzincan, Erzurum, Gümüşhane, İstanbul, Kastamonu, Kocaeli, Samsun, Trabzon and Zonguldak provinces] and European Turkey [İstanbul province] (Öymen, 1987; Avgın et al., 2014) (Fig. 29). **Global distribution.** Europe (including European Turkey), North Africa (Madeira Archipelago) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as the nominal subspecies and *Clytus arietis oblitus* Roubal, 1932 occurs only in North-Eastern Anatolia.

Clytus (*Clytus*) *rhamni* Germar, 1817

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Amasya, Ankara, Antalya, Artvin, Balıkesir, Bayburt, Bilecik, Bitlis, Bolu, Bursa, Çanakkale, Çankırı, Düzce, Elazığ, Gaziantep, Gümüşhane, Hatay, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kocaeli, Konya, Malatya, Niğde, Osmaniye, Rize, Samsun, Sinop, Sivas, Tokat, Tunceli, Yalova and Yozgat provinces] and European Turkey [Kırklareli province] (Bodemeyer, 1906; Schimitschek, 1944; Villiers, 1959, 1967; Demelt & Alkan, 1962; Fuchs & Breuning, 1971; Gfeller, 1972; Adlbauer, 1988; Rejzek & Hoskovec, 1999; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen & Demirel, 2005; Özdikmen, 2006, 2007, 2011b; Sama et al., 2012; Özdikmen et al., 2012b; Avgın et al., 2014; Tekin & Özdikmen, 2015; Özbek et al., 2015) (Fig. 30). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Middle East (Cyprus, Iran, Israel, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented only by the subspecies *Clytus rhamni temesiensis* (Germar, 1824) in Turkey.

Clytus (*Clytus*) *tropicus* (Panzer, 1795)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from European Turkey (Avgın et al., 2014) (Fig. 31). **Global distribution.** Europe (including European Turkey). **Remarks.** Red List category must be EN for Turkey in my opinion. According to current data, it is DD for Turkey.

Deilus fugax (Olivier 1790)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Bolu, Denizli, Hatay, İzmir and Manisa provinces] (Özdikmen, 2007; Avgın et al., 2014) (Fig. 32). **Global distribution.** Europe, Caucasus, Kazakhstan, Middle East (Cyprus, Israel, Lebanon and Syria), North Africa (Algeria, Libya, Morocco and Tunisia) and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is DD for Turkey.

Delagrangeus (*Delagrangeus*) *angustissimus* Pic, 1892

Red List category in Europe. VU. **Distribution in Turkey.** The species was reported only from Asian Turkey [Hatay, İçel, Konya and Mardin provinces] (Reitter, 1899; Pic, 1920; Holzschuh, 1975; Avgın et al., 2014) (Fig. 33). **Global distribution.** Europe (Greece: Rodos), Middle East (Cyprus and Lebanon) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented only by the nominal subspecies in Turkey.

Dolocerus reichii Mulsant, 1862

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Aydın, Bursa and İçel provinces] and European Turkey [? province] (Heyden, 1863; Lacordaire, 1868; Avgın et al., 2014) (Fig. 34). **Global distribution.** Europe (Albania, Bulgaria, Croatia, Italy, Switzerland and European Turkey), Caucasus and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is DD for Turkey. European Red List includes the species as *Brachypteroma ottomanum* Heyden, 1863 that is a synonym of this species.

Ergates faber (Linnaeus, 1760)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Antalya, Artvin, Bolu, Bursa, Düzce, Kahramanmaraş, Kastamonu, Kocaeli, Sinop and Trabzon provinces] and European Turkey [? province] (Avgın et al., 2014) (Fig. 35). **Global distribution.** Europe (including European Turkey), Caucasus, Middle East (Iraq and Syria), North Africa (Morocco) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

Gracilia minuta (Fabricius, 1781)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian and European Turkey. İstanbul province: Polonez village (Demelt & Alkan, 1962; Demelt, 1963; İren & Ahmed, 1973); European Turkey (Althoff & Danilevsky, 1997); Turkey (Lodos, 1998; Sama, 2002) (Fig. 36). **Global distribution.** Europe (including European Turkey), Caucasus, China, Iran, all North Africa, Asian Turkey, Oriental region and introduced Australian, Nearctic, Neotropical regions.

Remarks. Red List category must be DD for Turkey in my opinion. According to current data, it is VU for Turkey. This species is newly reported for Turkey.

Hesperophanes sericeus (Fabricius, 1787)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Aydın, Denizli, Erzincan, Isparta, İzmir and Osmaniye provinces] (Bahadıroğlu et al., 2009; Avgın et al., 2014) (Fig. 37). **Global distribution.** Europe, Caucasus, Turkmenistan, almost all North Africa, Middle East (Iran, Iraq, Israel, Jordan and Syria) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey.

Hylotrupes bajulus (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Amasya, Ankara, Antalya, Artvin, Aydın, Bartın, Bilecik, Bolu, Bursa, Çanakkale, Denizli, Düzce, Erzincan, Erzurum, Giresun, Gümüşhane, Hatay, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Kars, Kastamonu, Kayseri, Kırıkkale, Konya, Kütahya, Osmaniye, Rize, Sinop, Sivas, Trabzon, Uşak and Zonguldak provinces] and European Turkey [İstanbul province] (Bodemeyer, 1906; Acatay, 1943; Schimitschek, 1944; Defne, 1954; Çanakçıoğlu, 1956, 1983; Villiers, 1959, 1967; Besçeli, 1969; Gül-Zümreoğlu, 1975; Erdem & Çanakçıoğlu, 1977; Özbek, 1978; Sekendiz, 1981; Öymen, 1987; Adlbauer, 1988; Yüksel, 1996; Althoff & Danilevsky, 1997; Tozlu, 2001a,b; Tozlu et al., 2002; Özdikmen, et al., 2005; Özdikmen & Şahin, 2006; Özdikmen, 2006, 2007; Özdikmen et al., 2012a; Yardibi & Tozlu, 2013; Küçükkaykı et al., 2013; Avgın et al., 2014) (Fig. 38). **Global distribution.** Europe (including European Turkey), Caucasus, China, Siberia, all North Africa, Middle East (Cyprus, Israel, Jordan, Lebanon and Syria), Asian Turkey, Afrotropical, Australian, Nearctic, Neotropical and Oriental regions. **Remarks.** Red List category is available for Turkey in my opinion.

Icosium tomentosum P. H. Lucas, 1854

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, İçel and İzmir provinces] (Özdikmen, 2014c; Avgın et al., 2014; Özbek et al., 2015) (Fig. 39). **Global distribution.** South Europe, Caucasus, North Africa (Algeria, Libya, Morocco and Tunisia), Middle East (Cyprus, Israel, Jordan and Syria) and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the subspecies *Icosium tomentosum atticum* Ganglbauer, 1882 in Turkey.

Isotomus comptus (Mannerheim, 1825)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey. Turkey (Lodos, 1998; Özdikmen, 2006); Artvin, Giresun, Gümüşhane, Ordu, Rize, Trabzon provinces (Tozlu et al., 2002); Artvin province: Hopa (Özdikmen & Demir, 2006); Osmaniye province: Karatepe (Özdikmen & Aytar, 2012) (Fig. 40). **Global distribution.** Europe (South European part of Russia and Ukraine), Caucasus, Iran and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey. It is represented by two subspecies in Turkey as the nominal subspecies and *Isotomus comptus meridionalis* Özdikmen & Aytar, 2012 that occurs only in Southern Anatolia.

Isotomus speciosus (D. H. Schneider, 1787)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey. Giresun province: Harşit stream as *Isotomus semipunctatus* (Fabricius, 1775) (Sekendiz, 1981); Tokat province: Mezra (Adlbauer, 1992); Turkey (Lodos, 1998; Sama, 2002; Özdikmen, 2006); Gümüşhane province, Trabzon province: Maçka as *Isotomus semipunctatus* (Fabricius, 1775) (Alkan & Eroğlu, 2001); Samsun: Havza (Özdikmen, 2006) (Fig. 41). **Global distribution.** Europe, Caucasus and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey. It is represented only by the nominal subspecies in Turkey.

Lioderina linearis (Hampe, 1871)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey. Niğde province: Çiftehan (Adlbauer, 1988); Turkey (Sama, 2002) (Fig. 42). **Global distribution.** Europe and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is EN for Turkey. This species is newly reported for Turkey.

Mesoprionus asiaticus (Faldermann, 1837)

Red List category in Europe. DD. **Distribution in Turkey.** The species has not been recorded from Turkey from any exact locality, although Lodos (1998), Drumont & Komiya in Löbl & Smetana (2010), Özdikmen (2014a) and Danilevsky (2015a,b) mentioned that the species occurs in Turkey (North-Eastern Anatolia: ?Kars and ?Ağrı provinces) (Fig. 43). **Global distribution.** Europe (Kazakhstan and South European part of Russia), Caucasus, Iran, Kazakhstan and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is newly reported for Turkey. It was given *Prionus asiaticus* Faldermann, 1837 in the European Red List.

Mesoprionus besikanus (Fairmaire, 1855)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Ankara, Antalya, Bilecik, Burdur, Bursa, Çanakkale, Denizli, Erzincan, Erzurum, Hatay, Isparta, İçel, İstanbul, İzmir, Kayseri, Kırıkkale, Kilis, Konya, Kütahya, Muğla, Nevşehir, Niğde, Osmaniye and Uşak provinces] and European Turkey [? province] (Özdikmen & Turgut, 2009c; Sama et al., 2011; Cihan et al., 2013; Avgın et al., 2014) (Fig. 44). **Global distribution.** Europe (Albania, Bulgaria, Greece, Macedonia, Yugoslavia, European Turkey), Middle East (Cyprus) and Asian Turkey. **Remarks.** Red List category must be LC for Turkey in my opinion. According to current data, it is LC for Turkey. It was given *Prionus besikanus* Fairmaire, 1855 in the European Red List.

Molorchus (*Molorchus*) *kiesenwetteri* Mulsant & Rey, 1861

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported both from Asian Turkey [Amasya, Ankara, Antalya, Bilecik, İçel, İzmir, Kahramanmaraş, Kastamonu, Kocaeli, Konya and Niğde provinces] and European Turkey [? province] (Bodemeyer, 1900; Villiers, 1967; Adlbauer, 1992; Sama, 1995a; Althoff & Danilevsky, 1997; Turgut & Ozdikmen, 2010; Avgın et al., 2014) (Fig. 45). **Global distribution.** Europe (including European Turkey), Caucasus, Iran and Asian Turkey. **Remarks.** Red List category must be LC for Turkey in my opinion. According to current data, it is LC for Turkey. European Red List includes the species as *Glaphyra kiesenwetteri* (Mulsant & Rey, 1861). This species is represented only by the subspecies *Molorchus kiesenwetteri hircus* Abeille de Perrin, 1881 in Turkey.

Molorchus (*Molorchus*) *marmottani* Brisout de Barneville, 1863

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Kars and Osmaniye provinces] (Sama, 2002; Özdimen, 2014d; Avgın et al., 2014) (Fig. 46). **Global distribution.** Europe and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. European Red List includes the species as *Glaphyra marmottani* (Brisout de Barneville, 1863). This species is represented by two subspecies in Turkey as the nominal subspecies occurs only in North-Eastern Anatolia, and *Molorchus marmottani frischi* (Sama, 1995) occurs only in Southern Anatolia.

Molorchus (*Caenoptera*) *minor* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Bilecik, Bolu, Burdur, Bursa, Düzce, Giresun, İçel, Kastamonu and Niğde provinces] (Bodemeyer, 1900; Sama, 1982; Adlbauer, 1992; Yüksel, 1996; Özdikmen, 2007; Özdikmen et al., 2012b; Avgın et al., 2014) (Fig. 47). **Global distribution.** Europe, Caucasus, China, Siberia, Kazakhstan, Mongolia, Korea, Asian Turkey and introduced Neotropical region. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

Molorchus (*Molorchus*) *umbellatarus* (Schreber, 1759)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Ankara, Artvin, Bolu, İzmir, Kastamonu and Trabzon provinces] and European Turkey [? province] (Pic, 1897b; Villiers, 1967; Demelt, 1967; Öymen, 1987; Sama, 1995a, 2002; Özdikmen, 2007; Avgın et al., 2014) (Fig. 48). **Global distribution.** Europe (including European Turkey), Caucasus, Turkmenistan and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. European Red List includes the species as *Glaphyra umbellatarum* (Schreber, 1759). This species is represented only by the nominal subspecies in Turkey.

Monochamus (*Monochamus*) *galloprovincialis* (Olivier, 1795)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Antalya, Artvin, Aydın, Balıkesir, Bolu, Bursa, Çanakkale, Denizli, Isparta, İçel, Kahramanmaraş, Karabük, Kars, Kastamonu, Konya, Muğla, Niğde, Ordu, Osmaniye, Samsun, Sinop, Tokat and Trabzon provinces] and European Turkey [? province] (Schimitschek, 1944; Erdem, 1947; Erdem & Çanakçıoğlu, 1977; Sekendiz, 1981; Öymen, 1987; Adlbauer, 1992; Yüksel, 1996; Lodos, 1998; Alkan & Eroğlu, 2001; Tozlu, 2001a; Tozlu et al., 2003; Özdikmen et al., 2005; Özdikmen & Şahin, 2006; Özdikmen, 2006, 2007, 2011b; Turgut & Ozdikmen, 2010; Sama et al., 2012; Yardibi & Tozlu, 2013; Küçükkaykı et al., 2013; Cihan et al., 2013; Avgın et al., 2014) (Fig. 49). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, China, Mongolia, Kirgizia, Kazakhstan, Middle East (Jordan and Syria), North Africa (Algeria, Morocco and Tunisia) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as *Monochamus galloprovincialis pistor* (Germar, 1818) and *Monochamus galloprovincialis tauricola* Pic, 1912.

Monochamus (*Monochamus*) *sartor* (Fabricius, 1787)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey. Karabük province: Büyükdüz research forest (Besçeli, 1969); Balıkesir province: Dursunbey (Öymen, 1987); Trabzon province: Maçka and Sürmene, Giresun province: Dereli, Bulancak, Kemerköprü, Artvin province: Şavşat, Ardanuç, Atila, Borçka, Taşlıca, Rize province: Pazar, Dereköy, Ordu province: Mesudiye (Yüksel, 1996); Turkey (Lodos, 1998); Osmaniye province: Issızca village, Karaçay (Bahadıroğlu et al., 2009) (Fig. 50). **Global distribution.** Europe and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey.

Nathrius brevipennis (Mulsant, 1839)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Antalya, Hatay, İçel, İstanbul, İzmir, Kahramanmaraş and Niğde provinces] and European Turkey [İstanbul province] (Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; Adlbauer, 1988; Avgın et al., 2014) (Fig. 51). **Global distribution.** Europe (including European

Turkey), Caucasus, China, Kazakhstan, Middle East (Iran, Israel, Lebanon and Syria), North Africa (Algeria, Egypt, Libya, Morocco and Tunisia), Asian Turkey and introduced Nearctic and Neotropical regions. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is NT for Turkey.

Obrium brunneum (Fabricius, 1793)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Artvin, Bilecik, Bolu, Giresun, Gümüşhane, Kastamonu and Trabzon provinces] (Sekendiz, 1991; Yüksel, 1996; Özdikmen, 2007; Avgın et al., 2014) (Fig. 52). **Global distribution.** Europe, Caucasus and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey.

Obrium cantharinum (Linnaeus, 1767)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Bolu and Isparta provinces] (Özdikmen, 2007; Avgın et al., 2014) (Fig. 53). **Global distribution.** Europe, Caucasus, Siberia, Far East Russia, Kazakhstan, Mongolia, China, Japan, Asian Turkey and introduced Neotropical region. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

Penichroa fasciata (Stephens, 1831)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Amasya, Ankara, Antalya, Bursa, İçel, Kırıkkale, Samsun Tokat and Yozgat provinces] and European Turkey [? Province] (Althoff & Danilevsky, 1997; Tozlu et al., 2002; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 54). **Global distribution.** South Europe (including European Turkey), Caucasus, North Africa (Algeria, Libya, Morocco and Tunisia), Middle East (Cyprus, Iran, Israel and Syria) and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey.

Phymatodes (*Poecilium*) *alni* (Linnaeus, 1767)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Bolu, İstanbul, Osmaniye and Sakarya provinces] and European Turkey [İstanbul province] (Bodemeyer, 1900; Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; İren & Ahmed, 1973; Holzschuh, 1977; Althoff & Danilevsky, 1997; Özdikmen, 2007; Avgın et al., 2014) (Fig. 55). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Iran and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. European Red List includes the species as *Poecilium alni* (Linnaeus, 1767). This species is represented by two subspecies in Turkey as the nominal subspecies and *Phymatodes alni pici* Aurivillius, 1912 that occurs only in North-Eastern Anatolia.

Phymatodes (*Paraphymatodes*) *fasciatus* (Villers, 1789)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, İçel and Niğde provinces] (Özdikmen et al., 2014; Avgın et al., 2014; Özbek et al., 2015) (Fig. 56). **Global distribution.** Europe, Middle East (Cyprus, Israel and Syria) and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. European Red List includes the species as *Poecilium fasciatum* (Villers, 1789).

Phymatodes (*Phymatoderus*) *lividus* (Rossi, 1794)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, İçel, İstanbul and Sakarya provinces] (Bodemeyer, 1900; Demelt, 1963; Özdikmen 2008a; Avgın et al., 2014; Özbek et al., 2015) (Fig. 57). **Global distribution.** Europe, Caucasus, North Africa (Algeria), Middle East (Israel, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. European Red List includes the species as *Poecilium lividum* (Rossi, 1794).

Phymatodes (*Phymatoderus*) *pusillus* (Fabricius, 1787)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Konya and Tunceli provinces] and European Turkey [İstanbul province] (Avgın et al., 2014) (Fig. 58). **Global distribution.** Europe (including European Turkey), Caucasus, Iran and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is VU for Turkey. European Red List includes the species as *Poecilium pusillum* (Fabricius, 1787). The species is represented only by the nominal subspecies in Turkey.

Phymatodes (*Phymatodellus*) *rufipes* (Fabricius, 1777)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Bolu, Hatay, İçel, Niğde, Osmaniye, Sakarya and Samsun provinces] (Bodemeyer, 1900; Avgın et al., 2014) (Fig. 59). **Global distribution.** Europe, Middle East (Israel and Syria) and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. European Red List includes the species as *Poecilium rufipes* (Fabricius, 1777). The species is represented by two subspecies in Turkey as the nominal subspecies and *Phymatodes rufipes syriacus* (Pic, 1891) occurs only in Southern Anatolia.

Phymatodes (*Phymatodes*) *testaceus* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adıyaman, Ankara, Antalya, Artvin, Bingöl, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Düzce, Gümüşhane, Hatay, Isparta, İçel, İstanbul, Kahramanmaraş, Kırıkkale, Konya, Niğde and Osmaniye provinces] and European Turkey [İstanbul province] (Reitter, 1901; Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; Öymen, 1987; Adlbauer, 1988; Althoff & Danilevsky, 1997; Rejzek & Hoskovec, 1999; Alkan & Eroğlu, 2001; Tozlu et al., 2002; Özdikmen, 2007; Özdikmen et al., 2012a,b; Sama et al., 2012; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015; Özbek et al., 2015) (Fig. 60). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Far East Russia, Kazakhstan, Korea, Japan, North Africa (Algeria, Madeira Archipelago, Morocco and Tunisia), Middle East (Cyprus, Iraq, Israel and Syria), Asian Turkey and Nearctic region. **Remarks.** Red List category is available for Turkey in my opinion.

***Plagionotus* (*Plagionotus*) *arcuatus* (Linnaeus, 1758)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Artvin, Bilecik, Bingöl, Çanakkale, Düzce, Hatay, Isparta, İstanbul, Kastamonu, Muş, Osmaniye, Samsun and Tokat provinces] and European Turkey [İstanbul province] (Pic, 1892a; Schimitschek, 1944; Demelt, 1967; Erdem & Çanakçıoğlu, 1977; Sekendiz, 1981; Öymen, 1987; Adlbauer, 1992; Althoff & Danilevsky, 1997; Tozlu et al., 2002; Özdikmen 2007, 2008a; Sama et al., 2012; Avgın et al., 2014) (Fig. 61). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Kirgizia, Turkmenistan, North Africa (Algeria, Morocco and Tunisia), Middle East (Iran and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as the nominal subspecies and *Plagionotus arcuatus multiinterruptus* Pic, 1933 occurs only in North-Eastern Anatolia.

***Plagionotus* (*Plagionotus*) *detritus* (Linnaeus, 1758)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Antalya, Erzurum, Hatay, İstanbul, Kahramanmaraş, Manisa and Sinop provinces] and European Turkey [İstanbul province] (Schimitschek, 1944; Öymen, 1987; Althoff & Danilevsky, 1997; Avgın et al., 2014) (Fig. 62). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Syria and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as the nominal subspecies and *Plagionotus detritus caucasicola* Plavilstshikov, 1936 occurs only in North-Eastern Anatolia.

***Prinobius myardi* Mulsant, 1842**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Antalya, Artvin, Aydın, Burdur, Çanakkale, Hatay, Isparta, İçel, İstanbul, İzmir, Kastamonu, Muğla, Tokat and Trabzon provinces] and European Turkey [İstanbul province] (Pic, 1892a; Bodenheimer, 1958; Demelt & Alkan, 1962; Demelt, 1963; Sama, 1982; Öymen, 1987; Alkan & Eroğlu, 2001; Tozlu et al., 2002; Özdikmen & Demir, 2006; Avgın et al., 2014) (Fig. 63). **Global distribution.** South Europe (including European Turkey), Caucasus, almost all North Africa, Middle East (Cyprus, Iran, Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as *Prinobius myardi slamorum* Danilevsky, 2012 and *Prinobius myardi atropos* Chevrolat, 1854 that occurs only in Southern Anatolia.

***Prionus coriarius* (Linnaeus, 1758)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bolu, Burdur, Çanakkale, Hatay, İçel, Kahramanmaraş, Karabük, Kastamonu, Kırıkkale, Kocaeli, Konya, Kütahya, Niğde, Osmaniye, Rize, Sinop and Trabzon provinces] and European Turkey [Kırklareli province] (Schimitschek, 1944; Erdem, 1977; Çanakçıoğlu, 1983; Öymen, 1987; Althoff & Danilevsky, 1997; Lodos, 1998; Kanat, 1998; Özdikmen & Çağlar, 2004; Özdikmen & Demir, 2006; Özdikmen, 2007, 2011b; Yardibi & Tozlu, 2013; Şenyüz & Özdikmen, 2013; Cihan, Özdikmen, Aytar, 2013; Avgın et al., 2014) (Fig. 64). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Siberia, North Africa (Algeria and Tunisia), Middle East (Iran and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

***Purpuricenus budensis* (Götz, 1783)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Afyon, Amasya, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bingöl, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Çorum, Denizli, Erzurum, Gaziantep, Gümüşhane, Hatay, Isparta, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Kırıkkale, Kocaeli, Konya, Manisa, Muğla, Niğde, Osmaniye, Rize, Samsun, Siirt, Sinop, Tokat, Tunceli and Yozgat provinces] and European Turkey [Edirne and İstanbul provinces] (Bodemeyer, 1900; Çanakçıoğlu, 1956; Villiers, 1959; Fuchs & Breuning, 1971; Gül-Zümreoğlu, 1975; Özbek, 1978; Adlbauer, 1988; Sabbadini & Pesarini, 1992; Lodos, 1998; Rejzek & Hoskovec, 1999; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen, et al., 2005; Özdikmen & Demirel, 2005; Özdikmen & Şahin, 2006; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007, 2011b; Özdikmen et al., 2012a; Sama et al., 2012; Yardibi & Tozlu, 2013; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015; Özbek et al., 2015) (Fig. 65). **Global distribution.** Europe (including European Turkey), Caucasus, West Siberia, Middle East (Cyprus, Israel, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

Purpuricenus dalmatinus Sturm, 1843

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adıyaman, Antalya, Aydın, Bingöl, Gaziantep, Hatay, İçel, İzmir, Kahramanmaraş, Manisa, Mardin, Muğla, Muş, Osmaniye, Siirt and Tunceli provinces] (Sama et al., 2012; Avgın et al., 2014; Özbek et al., 2015) (Fig. 66). **Global distribution.** South-East Europe, Middle East (Israel, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category must be LC for Turkey in my opinion. According to current data, it is LC for Turkey. *Purpuricenus apicalis* Pic, 1905 is a separate species.

Purpuricenus desfontainii (Fabricius, 1793)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported both from Asian and EuropeanTurkey. Denizli province: Menderes valley (Schimitschek, 1944, 1953); Antalya province: Antitoros (Demelt & Alkan, 1962); Antalya province: Toros Mt. (Demelt, 1963); İzmir province: Karabağlar, Karaburun (Balıklıova) (Gül-Zümreoğlu, 1975); Manisa province: Akhisar (Sama, 1982); Antalya province: Yeni Karaman, Central, Osmaniye province: Nurdağı pass (Adlbauer, 1988); İzmir province: Yenisakran, Artvin province: Yusufeli, Adana province: Bahçe (Tauzin, 2000); Hatay province: Hassa (Aktepe) (Özdikmen & Demirel, 2005); Antalya province: Kemer (Özdikmen & Demir, 2006); Çanakkale province: Kirazlı, İzmir province: Selçuk (Meryemana) (Özdikmen 2008a); Antalya province: Gündoğmuş, Akseki-Güzelsu, Akseki (Mahmutlu village) (Turgut & Özdikmen, 2010) European Turkey (Danilevsky, 2015a) (Fig. 67). **Global distribution.** Europe (Greece), North Africa (Algeria, Libya, Morocco and Tunisia), Middle East (Israel, Jordan and Syria) and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey. It is represented only by the subspecies *Purpuricenus desfontainii inhumeralis* Pic, 1891 in Turkey.

Purpuricenus graecus Sláma, 1993

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported both from Asian and EuropeanTurkey. European Turkey and North-West Anatolia as *Purpuricenus renyvonae* ssp. *renyvonae* Sláma, 2001 (Rapuzzi & Sama, 2014; Danilevsky, 2015a); Kastamonu province: Yaralıgöz, Bolu province: Abant lake, Çorum province: between Çorum and Mecitözü, Tokat province: Central as *Purpuricenus renyvonae* ssp. *neocaucasicus* Rapuzzi & Sama, 2014 (Rapuzzi & Sama, 2014) (Fig. 68). **Global distribution.** Europe (Bulgaria, Croatia, Greece, Macedonia, South European Russia, European Turkey, Ukraine, Yugoslavia), Caucasus and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey. It was given in the European Red List as *Purpuricenus graecus* Sláma, 1993 and also *Purpuricenus renyvonae* Sláma, 2001. This species is represented by two subspecies in Turkey as *Purpuricenus graecus renyvonae* Sláma, 2001 that occurs only in European Turkey and North-Western Anatolia and *Purpuricenus graecus neocaucasicus* Rapuzzi & Sama, 2014 that occurs in Northern Anatolia (Kastamonu to Caucasus).

Purpuricenus kaehleri (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Artvin, Bolu, Denizli, Erzurum, Gümüşhane, İstanbul, Kastamonu, Muğla, Ordu, Rize, Tokat and Trabzon provinces] and European Turkey [İstanbul and Kırklareli provinces] (Sabbadini & Pesarini, 1992; Özdikmen, 2007; Danilevsky, 2007; Avgın et al., 2014) (Fig. 69). **Global distribution.** Europe (including European Turkey), Caucasus, Iran and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. European Red List includes the species as *Purpuricenus caucasicus* T. Pic, 1902 and also *Purpuricenus kaehleri* (Linnaeus, 1758). Since *Purpuricenus caucasicus* T. Pic, 1902 is a synonym of *Purpuricenus kaehleri menetriesi* Motschulsky, 1845 according to Rapuzzi & Sama (2014). This species is represented by two subspecies in Turkey as the nominal subspecies and *Purpuricenus kaehleri menetriesi* Motschulsky, 1845 (=*Purpuricenus caucasicus* T. Pic, 1902).

Purpuricenus nudicollis Demelt, 1968

Red List category in Europe. EN. **Distribution in Turkey.** The species was reported only from Asian Turkey. Konya province: Kızılören (Sama, 1982); Antalya province: Korkuteli, Karaman province: Central (Adlbauer, 1988); İçel province (Özdikmen, 2007); Antalya province: Alanya (Dikmetaş plateau), Konya province: Hadim-Alanya road (Turgut & Özdikmen, 2010); Osmaniye province: Zorkun road (Karacalar village) (Özdikmen et al., 2010); Adana province, Gaziantep province and Kahramanmaraş province (Özdikmen et al., 2014); Adana province: Karaisalı, Gaziantep province: Nur Mt., İçel province: Erdemli, Silifke, Tarsus, Kahramanmaraş province: Göksun (Özbek et al., 2015) (Fig. 70). **Global distribution.** Cyprus and Asian Turkey. **Remarks.** Red List category must be VU for Turkey in my opinion. According to current data, it is VU for Turkey. This species is newly reported for Turkey.

Pyrrhidium sanguineum (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Gümüşhane and Hatay provinces] and European Turkey [İstanbul province] (Pic, 1892a; Öymen, 1987; Althoff & Danilevsky, 1997; Avgın et al., 2014) (Fig. 71). **Global distribution.** Europe (including European Turkey), Caucasus, North Africa (Algeria and Tunisia), Middle East (Iran and Syria) and Asian Turkey. **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is NT for Turkey.

Rhaesus serricollis (Motschulsky, 1838)

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Antalya, Bilecik, Burdur, Denizli, Düzce, Hatay, İçel, İstanbul İzmir, Kahramanmaraş, Konya, Muğla and Osmaniye provinces] and European Turkey [?İstanbul province] (Bodemeyer, 1906; Demelt, 1963; Althoff & Danilevsky, 1997; Kanat, 1998; Lodos, 1998; Tozlu et al., 2002; Özdikmen & Demir, 2006; Avgın et al., 2014) (Fig. 72). **Global distribution.** South-East Europe (including European Turkey), Caucasus, North Africa (Egypt), Middle East (Cyprus, Iran, Israel, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

Rhaphuma gracilipes (Faldermann, 1835)

Red List category in Europe. DD. **Distribution in Turkey.** The species was reported only from Asian Turkey [Hatay province] (Avgın et al., 2014) (Fig. 73). **Global distribution.** East Europe (Belarus, European parts of Russia, ?Lithuania, Poland, ?Romania, ?Ukraine), Siberia, Far East Russia, China, Kazakhstan, Mongolia, Korea and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is EN for Turkey.

Ropalopus (*Ropalopus*) *clavipes* (Fabricius, 1775)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Ankara, Balıkesir, Bolu, Bursa, Çankırı, Çorum, Denizli, Erzincan, Hatay, İçel, İstanbul, İzmir, Kocaeli, Kütahya, Manisa, Muş, Niğde, Osmaniye and Uşak provinces] and European Turkey [Edirne and İstanbul provinces] (Bodemeyer, 1906; Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; İren & Ahmed, 1973; Öymen, 1987; Lodos, 1998; Ulusoy et al., 1999; Rejzek & Hoskovec, 1999; Tozlu et al., 2002; Özdikmen & Şahin, 2006; Özdikmen, 2007, 2011b; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 74). **Global distribution.** Europe (including European Turkey), Caucasus, Kazakhstan, Iran and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion.

Ropalopus (*Ropalopus*) *femoratus* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from European Turkey. European Turkey (Althoff & Danilevsky, 1997; Özdikmen, 2008a). Turkey (Lodos, 1998) (Fig. 75). **Global distribution.** Europe (including European Turkey). **Remarks.** Red List category must be DD for Turkey in my opinion. According to current data, it is DD for Turkey. This species is newly reported for Turkey.

Ropalopus (*Ropalopus*) *insubricus* (Germar, 1824)

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [İstanbul province] and European Turkey [İstanbul province] (Bodemeyer, 1906; Cebeci et al., 2011) (Fig. 76). **Global distribution.** Europe (including European Turkey) and Asian Turkey. **Remarks.** Red List category should be VU for Turkey in my opinion. According to current data, it is EN for Turkey. This species is represented only by the nominal subspecies in Turkey.

Ropalopus (*Ropalopus*) *lederi* (Ganglbauer, 1882)

Red List category in Europe. NA. **Distribution in Turkey.** The species was reported only from Asian Turkey. Amasya province: Merzifon (Adlbauer, 1992; Sama, 1996); Turkey (Lodos, 1998) (Fig. 77). **Global distribution.** Europe (South European Russia and Ukraine), Caucasus and Asian Turkey. **Remarks.** Red List category is available for Turkey in my opinion. According to current data, it is EN for Turkey. This species is newly reported for Turkey.

Ropalopus (*Ropalopus*) *macropus* (Germar, 1824)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Artvin, Erzurum, Giresun, Gümüşhane, İstanbul, Kocaeli, Rize, Samsun and Trabzon provinces] and European Turkey [İstanbul and Kırklareli provinces] (Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; Villiers, 1967; Sekendiz, 1981; Tauzin, 2000; Tozlu et al., 2002; Avgın et al., 2014) (Fig. 78). **Global distribution.** Europe (including European Turkey), Caucasus, Iran and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey.

Rosalia (*Rosalia*) *alpina* (Linnaeus, 1758)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Balıkesir, Bolu, Çanakkale, Giresun, Hatay, İstanbul and Sinop provinces] and European Turkey [İstanbul and Kırklareli provinces] (Schimitschek, 1944; Demelt, 1967; Gfeller, 1972; Sekendiz, 1981; Öymen, 1987; Özdikmen & Çağlar, 2004; Özdikmen, 2008a; Avgın et al., 2014) (Fig. 79). **Global distribution.** Europe (including European Turkey), Caucasus and Asian Turkey. **Remarks.** Red List category must be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented by two subspecies in Turkey as the nominal subspecies and *Rosalia alpina syriaca* Pic, 1895 that occurs only in Southern Anatolia (Hatay province).

Saperda (*Lopezcolonia*) *octopunctata* (Scopoli, 1772)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Bartın and Trabzon provinces] and European Turkey [İstanbul province] (Schimitschek, 1944; Özdikmen, 2007; Avgın et al., 2014) (Fig. 80). **Global distribution.** Europe (including European Turkey), Caucasus and Asian Turkey. **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is VU for Turkey.

***Saperda* (*Lopezcolonia*) *perforata* (Pallas, 1773)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian and European Turkey. Kırklareli province: Demirköy (Sekendiz, 1974); Turkey (Lodos, 1998); Kars province: Sarıkamış (Tozlu, 2001b; Tozlu et al., 2003) (Fig. 81). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Far East Russia, Kaakhstan, Mongolia, China, Iran, Asian Turkey and North Africa (Algeria). **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is VU for Turkey. This species is newly reported for Turkey.

***Saperda* (*Lopezcolonia*) *punctata* (Linnaeus, 1767)**

Red List category in Europe. NT. **Distribution in Turkey.** The species was reported both from Asian Turkey [Antalya, Artvin, Bayburt, İzmir and Trabzon provinces] and European Turkey [? province] (Sekendiz, 1981; Althoff & Danilevsky, 1997; Avgın et al., 2014) (Fig. 82). **Global distribution.** Europe (including European Turkey), Caucasus, Cyprus, Asian Turkey and North Africa (Algeria). **Remarks.** Red List category is available for Turkey in my opinion.

***Saperda* (*Compsidia*) *quercus* Charpentier, 1825**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Antalya, Hatay, İçel, Kahramanmaraş and Osmaniye provinces] and European Turkey [? province] (Abeille de Perrin, 1895; Pic, 1892a; Althoff & Danilevsky, 1997; Rejzek & Hoskovec, 1999; Avgın et al., 2014) (Fig. 83). **Global distribution.** Europe (Bosnia & Herzegovina, Bulgaria, Greece, Yugoslavia, European Turkey), Middle East (Israel, Jordan and Syria) and Asian Turkey. **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented by two subspecies in Turkey as the nominal subspecies occurs only in European Turkey and *Saperda quercus ocellata* Abeille de Perrin, 1895.

***Saperda* (*Lopezcolonia*) *scalaris* (Linnaeus, 1758)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian and European Turkey. Amasya province (Breuning & Villiers, 1967); Artvin province: From Borçka to Hopa (Sama, 1982); İstanbul province: Belgrad forest, Trabzon province: Sürmene (Öymen, 1987); Trabzon province: Maçka, Meryemana, Mars (Yüksel, 1996); European Turkey (Althoff & Danilevsky, 1997); Turkey (Lodos, 1998; Sama, 2002); Trabzon province: Akçaabat (Alkan & Eroğlu, 2001); Tunceli province: road to Pülümür, Erzurum province: 10 km East of Ispir (Sama et al., 2012) (Fig. 84). **Global distribution.** Europe (including European Turkey), Caucasus, Siberia, Far East Russia, China, Kazakhstan, Mongolia, Korea, Asian Turkey and North Africa (Algeria). **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is newly reported for Turkey. It is represented only by the nominal subspecies in Turkey.

***Semanotus russicus* (Fabricius, 1777)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, Antalya, İçel, İzmir and Niğde provinces] (Cebeci et al., 2011; Avgın et al., 2014; Özbek et al., 2015) (Fig. 85). **Global distribution.** Europe, Caucasus, Turkmenistan, Middle East (Iran, Jordan, Lebanon and Syria) and Asian Turkey. **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

***Stenhomalus* (*Obriopsis*) *bicolor* (Kraatz, 1862)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Hatay, İçel, Nevşehir, Niğde and Osmaniye provinces] (Pic, 1892a; Avgın et al., 2014) (Fig. 86). **Global distribution.** Europe, Middle East (Cyprus, Israel and Syria) and Asian Turkey. **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is NT for Turkey.

***Stenopterus atricornis* Pic, 1891**

Red List category in Europe. VU. **Distribution in Turkey.** The species was reported only from Asian Turkey [Antalya, Hatay, İçel, Kastamonu, Konya and Tunceli provinces] (Pic, 1892a; Avgın et al., 2014) (Fig. 87). **Global distribution.** Europe (Greece) and Asian Turkey. **Remarks.** Red List category should be NT for Turkey in my opinion. According to current data, it is NT for Turkey.

***Stenopterus flavicornis* Küster, 1846**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Antalya, Düzce, Hakkari, Hatay, İzmir and Konya provinces] and European Turkey [? province] (Adlbauer, 1992; Althoff & Danilevsky, 1997; Özdikmen et al., 2012b; Avgın et al., 2014) (Fig. 88). **Global distribution.** Europe (including European Turkey), Middle East (Israel, Jordan and Syria) and Asian Turkey. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey.

***Stenopterus rufus* (Linnaeus, 1767)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Adıyaman, Amasya, Ankara, Antalya, Artvin, Bartın, Bilecik, Bolu, Bursa, Çanakkale, Çankırı, Çorum, Düzce, Erzurum, Gaziantep, Gümüşhane, Hatay, İçel, İstanbul, İzmir, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kırıkkale, Kocaeli, Konya, Manisa, Muş, Niğde, Ordu, Osmaniye, Rize, Samsun, Sinop, Tokat, Trabzon, Tunceli, Yalova and Yozgat provinces] and European Turkey [İstanbul and Kırklareli provinces] (Villiers, 1967; Fuchs & Breuning, 1971; Gfeller, 1972; Sama, 1982; Öymen, 1987; Adlbauer, 1988; Althoff & Danilevsky, 1997; Rejzek & Hoskovec, 1999; Tauzin, 2000;

Alkan & Eroğlu, 2001; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen, et al., 2005; Özdikmen & Demirel, 2005; Özdikmen, 2006, 2007, 2008a; Özdikmen et al., 2012a,b; Sama et al., 2012; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015; Özbek et al., 2015) (Fig. 89). **Global distribution.** Europe (including European Turkey), Caucasus, Turkmenistan, Middle East (Iran, Iraq, Israel, Lebanon and Syria), Asian Turkey and North Africa (Canary Island). **Remarks.** Red List category is available for Turkey in my opinion. This species is represented by two subspecies in Turkey as *Stenopterus rufus geniculatus* Kraatz, 1863 that occurs in Northern Turkey and *Stenopterus rufus syriacus* Pic, 1892 that occurs in Southern Turkey.

Stromatium atratum (Böber, 1793)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Afyon, Amasya, Ankara, Antalya, Balıkesir, Bursa, Çanakkale, Denizli, Elazığ, Erzincan, Erzurum, Gaziantep, Giresun, Gümüşhane, Hatay, İçel, İstanbul, İzmir, Kahramanmaraş, Malatya, Manisa, Muğla, Ordu, Osmaniye, Samsun and Trabzon provinces] and European Turkey [İstanbul and Kırklareli provinces] (Schimitschek, 1944; Gül-Zümreoğlu, 1975; Özbek, 1978; Sekendiz, 1981; Sama, 1982; Öymen, 1987; Althoff & Danilevsky, 1997; Lodos, 1998; Tozlu et al., 2002; Özdikmen & Çağlar, 2004; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007; Avgın et al., 2014) (Fig. 90). **Global distribution.** Europe (including European Turkey), Caucasus, Turkmenistan, Middle East (Cyprus, Iran, Iraq, Israel, Jordan, Lebanon and Syria), Asian Turkey and North Africa (Algeria, Libya, Morocco and Tunisia). **Remarks.** Red List category is available for Turkey in my opinion. European Red List includes the species as *Stromatium unicolor* (Olivier, 1795) that is a synonym of *Stromatium atratum* (Böber, 1793).

Trichoferus fasciculatus (Faldermann, 1837)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Ankara, Antalya, Bartın, Bursa, Hatay, İzmir, Manisa, Muğla and Trabzon provinces] (Pic, 1896; Alkan & Eroğlu, 2001; Tozlu et al., 2002; Avgın et al., 2014) (Fig. 91). **Global distribution.** South Europe, Caucasus, Middle East (Cyprus, Iran, Iraq, Israel, Jordan, Lebanon and Syria), Asian Turkey and all North Africa. **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

Trichoferus griseus (Fabricius, 1793)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Adana, Antalya, Aydın, Gaziantep, Hatay, İçel, İzmir, Konya, Manisa and Osmaniye provinces] (Avgın et al., 2014) (Fig. 92). **Global distribution.** South Europe, ?Caucasus, Middle East (Cyprus, Iraq, Israel, Jordan, Lebanon and Syria), Asian Turkey and almost all North Africa. **Remarks.** Red List category is available for Turkey in my opinion.

Trichoferus holosericeus (Rossi, 1790)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Aydın, Düzce, İstanbul, İzmir and Ordu provinces] (Bodemeyer, 1906; Schimitschek, 1944; Öymen, 1987; Adlbauer, 1992; Özdikmen, 2006; Avgın et al., 2014) (Fig. 93). **Global distribution.** Europe (South European part of Russia, Ukraine), Caucasus, Asian Turkey and North Africa (Algeria, Libya, Morocco and Tunisia). **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey.

Trichoferus pallidus (Olivier, 1790)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported only from Asian Turkey [Isparta province] (Avgın et al., 2014) (Fig. 94). **Global distribution.** Europe and Asian Turkey. **Remarks.** Red List category is DD for Turkey in my opinion. According to current data, it is EN for Turkey.

Xylotrechus (*Xylotrechus*) *antilope* (Schönherr, 1817)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Burdur, Bursa, Isparta, İçel, İstanbul and Manisa provinces] and European Turkey [İstanbul and Kırklareli provinces] (Schimitschek, 1944; Demelt & Alkan, 1962; Demelt, 1963; Adlbauer, 1992; Althoff & Danilevsky, 1997; Özdikmen, 2008a; Avgın et al., 2014; Özbek et al., 2015) (Fig. 95). **Global distribution.** Europe (including European Turkey), Caucasus, Middle East (Cyprus), Asian Turkey and North Africa (Algeria, Morocco and Tunisia). **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented by two subspecies in Turkey as the nominal subspecies and *Xylotrechus antilope bitlisiensis* S. Marklund & D. Marklund, 2013 occurs in Eastern Anatolia.

Xylotrechus (*Xylotrechus*) *arvicola* (Olivier, 1795)

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Adana, Bursa, Giresun, Hakkari, Hatay, Niğde and Trabzon provinces] and European Turkey [Kırklareli and Tekirdağ provinces] (Sekendiz, 1981; Alkan & Eroğlu, 2001; Özdikmen, 2006, 2008a; Özdikmen & Tezcan, 2011; Sama et al., 2012; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 96). **Global distribution.** Europe (including European Turkey), Caucasus, ?Kazakhstan, Middle East (Iran and Syria), Asian Turkey and North Africa (Algeria and Morocco). **Remarks.** Red List category should be available for Turkey in my opinion. According to current data, it is NT for Turkey. This species is represented only by the nominal subspecies in Turkey.

***Xylotrechus* (*Rusticoclytus*) *rusticus* (Linnaeus, 1758)**

Red List category in Europe. LC. **Distribution in Turkey.** The species was reported both from Asian Turkey [Ankara, Antalya, Artvin, Bolu, Burdur, Bursa, Çankırı, Düzce, Erzincan, Erzurum, Eskişehir, Hatay, İstanbul, İzmir, Kars, Kastamonu, Kayseri, Kocaeli, Konya, Muş, Sakarya, Samsun, Tokat, Tunceli and Yozgat provinces] and European Turkey [Kırklareli province] (Pic, 1892a; Demelt, 1963; Fuchs & Breuning, 1971; Sekendiz, 1974; Öymen, 1987; Adlbauer, 1992; Tozlu, 2001b; Tozlu et al., 2002; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007, 2008a; Özdikmen et al., 2012b; Sama et al., 2012; Al-Hamadani & Özdikmen, 2014; Avgın et al., 2014; Tekin & Özdikmen, 2015) (Fig. 97). **Global distribution.** Europe, Caucasus, Siberia, Far East Russia, Kazakhstan, Mongolia, Korea, Tadjikistan, Turkmenistan, Iran, Asian Turkey and North Africa (Algeria and Morocco). **Remarks.** Red List category is available for Turkey in my opinion.

CONCLUSIONS

Turkey is adjacent to large bodies of water to the south, west and north, it has continental properties. Turkey is the center of origin of many taxa and its exceptionally diverse topography has provided refugia in which many species have survived in spite of harsh geological and climatic changes. The great biological importance of Turkey is evident from the remarkable variety of beetles. Nevertheless the fauna of Turkey has not been thoroughly studied and documented.

Also Turkey is one of the most diverse areas of the west Palaearctic region with its unique geographic position as a land bridge between Asia, Europe and North Africa (also linking to the Ethiopian Region via the Arabian Peninsula) and accumulating natural complexes typical of several climatic zones. Three of four hotspots of Europe and Central Asia recognized by Conservation International are partly included within the boundary of Turkey: Caucasus, Irano-Anatolian and Mediterranean Basin hotspots. Hence, Turkey contains a rich flora and fauna with a considerable number of endemic species.

Thus, the aim of this paper is to identify saproxylic species native to Turkey that appear on the European Red List completely. This study is based on "the European Red List of Saproxylic Beetles" published by International Union for Conservation of Nature (IUCN 2012) and "A review of Turkish saproxylic beetles from the European Red List" published by Avgın et al. (2014).

The European Red List of Saproxylic Beetles includes 153 species of threatened saproxylic Cerambycidae living in Europe, while 98 species from the list live also in Turkey.

In fact the European Red List includes 151 species of Cerambycidae. Since *Purpuricenus caucasicus* T. Pic, 1902 is a synonym of *Purpuricenus kaehleri menetriesi* Motschulsky, 1845 according to Rapuzzi & Sama (2014). In addition *Purpuricenus renyvonae* Sláma, 2001 is a subspecies of *Purpuricenus graecus* Sláma, 1993 according to Danilevsky (2015a). Therefore the presented list for Turkey comprises of 96 species.

Approximately 64% of the longhorned beetle species assessed by the European Red List are present in Turkey. Twenty-one species as *Anaglyptus arabicus* (Küster), *Anaglyptus mysticus* (Linnaeus), *Calchaenesthes oblongomaculata* (Guérin-Méneville), *Callidium violaceum* (Fabricius), *Callimus semicyaneus* Pic, *Chlorophorus convexifrons* Holzschuh, *Chlorophorus herbstii* (Brahm), *Gracilia minuta* (Fabricius), *Isotomus comptus* (Mannerheim), *Isotomus speciosus* (D. H. Schneider), *Lioderina linearis* (Hampe), *Mesoprionus asiaticus* (Faldermann), *Monochamus sartor* (Fabricius), *Purpuricenus desfontainii* (Fabricius), *Purpuricenus graecus* Sláma, *Purpuricenus renyvonae* Sláma (as a subspecies of *P. graecus* Sláma, 1993 now), *Purpuricenus nudicollis* Demelt, *Ropalopus femoratus* (Linnaeus), *Ropalopus lederi* (Ganglbauer), *Saperda perforata* (Pallas) and *Saperda scalaris* (Linnaeus) are newly reported with the present study.

As known, geographic range and population density are very important to determine the threat categories of these beetles. Therefore the present study provides the lacking information on the species.

The present data demonstrate that threatened categories of saproxylic longhorned beetles show similarities with the European Red List for 33 of 96 species (34%). Therefore the threat categories of saproxylic beetles in the European Red List is unsuitable for the status of these species in Turkey. Some saproxylic species have limited distribution in Turkey. For example, *Axinopalpis gracilis* (Krynicki), *Callidium violaceum* (Fabricius), *Callimoxys gracilis* (Brullé), *Chlorophorus herbstii* (Brahm), *Clytus tropicus* (Panzer), *Gracilia minuta* (Fabricius), *Icosium tomentosum* P. H. Lucas, *Obrium cantharinum* (Linnaeus), *Phymatodes fasciatus* (Villers), *Phymatodes pusillus* (Fabricius), *Ropalopus femoratus* (Linnaeus), *Ropalopus insubricus* (Germar), *Saperda octopunctata* (Scopoli), *Saperda perforata* (Pallas) and *Trichoferus pallidus* (Olivier). On the other side some saproxylic species such as *Cerambyx cerdo* Linnaeus, *Cerambyx dux* (Faldermann), *Cerambyx miles* Bonelli and *Mesoprionus besikanus* (Fairmaire) are widespread in Turkey.

The European Red List provides information about the general threat status, but the regional threat status of these beetles is very different. The threat categories of these beetles can change because of geographic range and population density. Therefore Red List status of Turkish saproxylic Cerambycidae from the European Red List is achieved as a preliminary assessment (Appendix 1). In addition the number of saproxylic beetle species in Turkey should be higher than the number of indicated species in this study. Researches should be done on saproxylic beetle species in Turkey to determine their number and actual Red List threatened categories and criteria as published by IUCN (2012).

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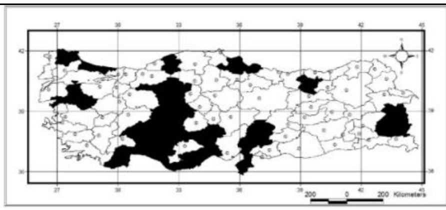
Figure 1. The provinces in Turkey.

APPENDIX 1. Red List status of Turkish saproxylic Cerambycidae.

Species	IUCN Red List Category (Europe)	In my opinion Red List Category (Turkey)	According to current data Red List Category (Turkey)
Aegosoma scabricorne	LC	LC	LC
Anaglyptus arabicus	NA	DD	NT
Anaglyptus mysticus	LC	DD	NT
Aromia moschata	LC	LC	LC
Axinopalpis gracilis	LC	DD	NT
Calchaenesthes oblongomaculata	DD	DD	EN
Callergates gaillardoti	EN	VU	VU
Callidium aeneum	LC	LC	LC
Callidium violaceum	LC	DD	EN
Callimoxys gracilis	LC	DD	VU
Callimus angulatus	LC	LC	LC
Callimus femoratus	LC	LC	LC
Callimus egregius	DD	DD	VU
Callimus semicyaneus	DD	DD	EN
Cerambyx carinatus	LC	LC	NT
Cerambyx cerdo	NT	LC	LC
Cerambyx dux	NT	LC	LC
Cerambyx miles	NT	NT	NT
Cerambyx nodulosus	NT	NT	NT
Cerambyx scopolii	LC	LC	LC
Cerambyx welensii	NT	NT	NT
Chlorophorus aegyptiacus	DD	LC	NT
Chlorophorus convexifrons	EN	VU	VU
Chlorophorus figuratus	LC	LC	LC
Chlorophorus herbstii	LC	NT	VU
Chlorophorus sartor	LC	LC	LC
Chlorophorus varius	LC	LC	LC
Clytus arietis	LC	LC	LC
Clytus rhamni	LC	LC	LC
Clytus tropicus	LC	EN	DD
Deilus fugax	LC	LC	DD
Delagrangeus angustissimus	VU	VU	VU
Dolocerus reichii	LC	LC	DD
Ergates faber	LC	LC	NT
Gracilia minuta	LC	DD	VU
Hesperophanes sericeus	LC	DD	NT
Hylotrupes bajulus	LC	LC	LC
Icosium tomentosum	LC	NT	NT
Isotomus comptus	DD	NT	NT
Isotomus speciosus	LC	NT	NT
Lioderina linearis	DD	DD	EN
Mesoprionus asiaticus	DD	DD	DD
Mesoprionus besikanus	DD	LC	LC
Molorchus kiesenwetteri	DD	LC	LC
Molorchus marmottani	DD	DD	DD
Molorchus minor	LC	LC	NT
Molorchus umbellatarus	LC	LC	NT
Monochamus galloprovincialis	LC	LC	LC
Monochamus sartor	LC	LC	NT

Nathrius brevipennis	DD	DD	NT
Obrium brunneum	LC	LC	NT
Obrium cantharinum	LC	DD	NT
Penichroa fasciata	LC	LC	NT
Phymatodes alni	LC	LC	NT
Phymatodes fasciatus	LC	NT	NT
Phymatodes lividus	DD	NT	NT
Phymatodes pusillus	LC	NT	VU
Phymatodes rufipes	LC	NT	NT
Phymatodes testaceus	LC	LC	LC
Plagionotus arcuatus	LC	LC	LC
Plagionotus detritus	LC	LC	LC
Prinobius myardi	LC	LC	LC
Prionus coriarius	LC	LC	LC
Purpuricenus budensis	LC	LC	LC
Purpuricenus dalmatinus	DD	LC	LC
Purpuricenus desfontainii	DD	NT	NT
Purpuricenus graecus	DD	DD	NT
Purpuricenus kaehleri	LC	LC	LC
Purpuricenus nudicollis	EN	VU	VU
Pyrrhidium sanguineum	LC	DD	NT
Rhaesus serricollis	NT	NT	NT
Rhaphuma gracilipes	DD	DD	EN
Ropalopus clavipes	LC	LC	LC
Ropalopus femoratus	LC	DD	DD
Ropalopus insubricus	NT	VU	EN
Ropalopus lederi	NA	NA	EN
Ropalopus macropus	LC	LC	NT
Rosalia alpina	LC	NT	NT
Saperda octopunctata	LC	NT	VU
Saperda perforata	LC	NT	VU
Saperda punctata	NT	NT	NT
Saperda quercus	LC	NT	NT
Saperda scalaris	LC	NT	NT
Semanotus russicus	LC	NT	NT
Stenhomalus bicolor	LC	NT	NT
Stenopterus atricornis	VU	NT	NT
Stenopterus flavicornis	LC	LC	NT
Stenopterus rufus	LC	LC	LC
Stromatium atratum	LC	LC	LC
Trichoferus fasciculatus	LC	LC	NT
Trichoferus griseus	LC	LC	LC
Trichoferus holosericeus	LC	LC	NT
Trichoferus pallidus	LC	DD	EN
Xylotrechus antilope	LC	LC	NT
Xylotrechus arvicola	LC	LC	NT
Xylotrechus rusticus	LC	LC	LC



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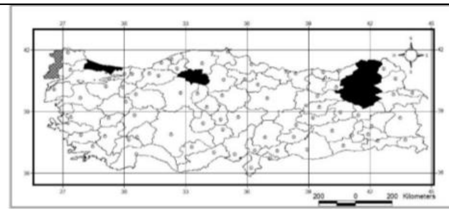

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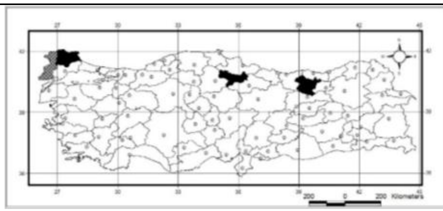

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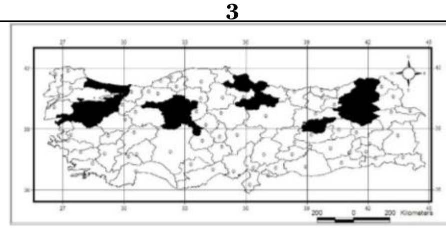

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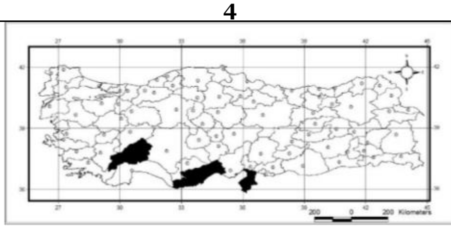

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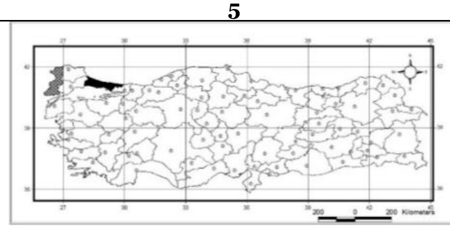

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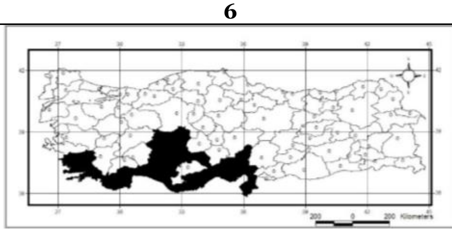

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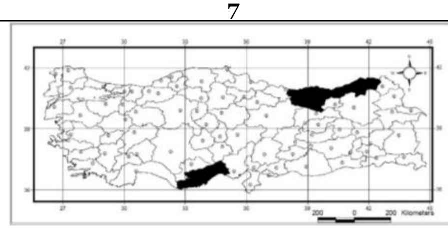

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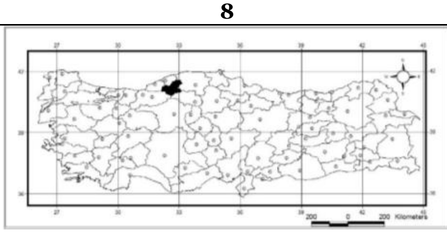

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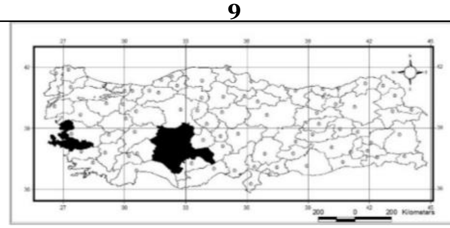

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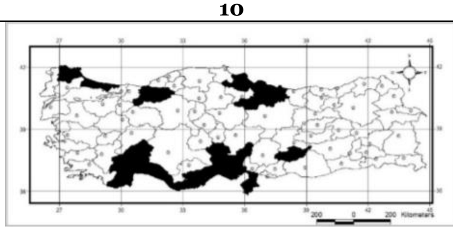

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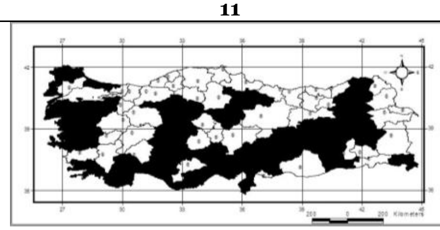

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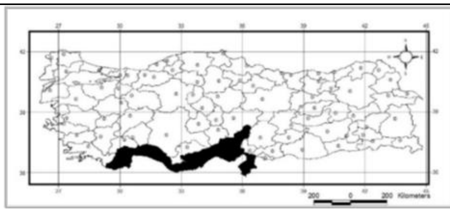

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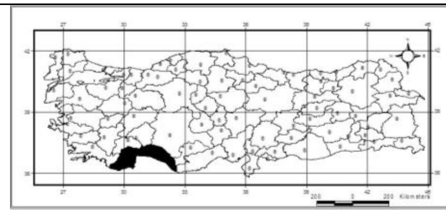

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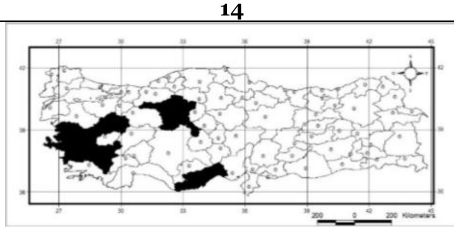

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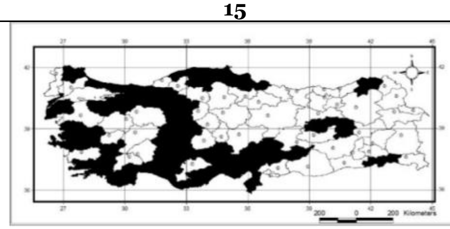

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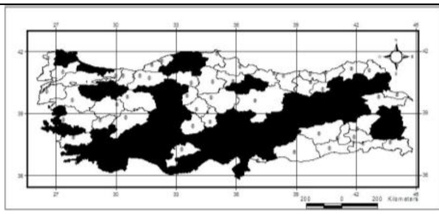

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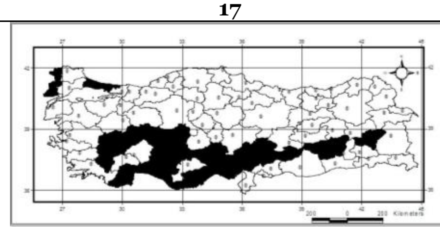

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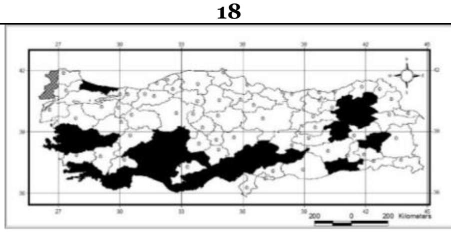

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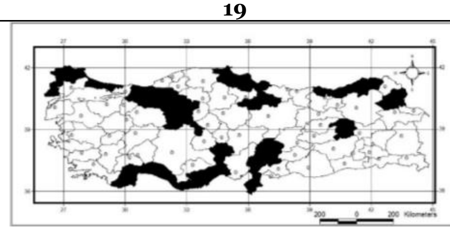

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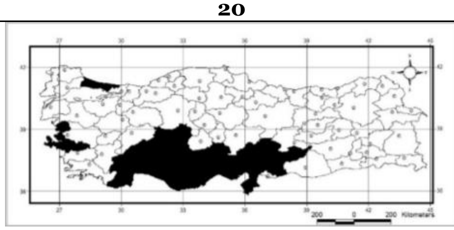

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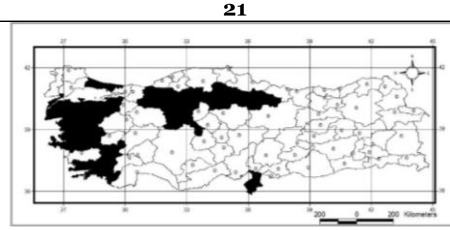

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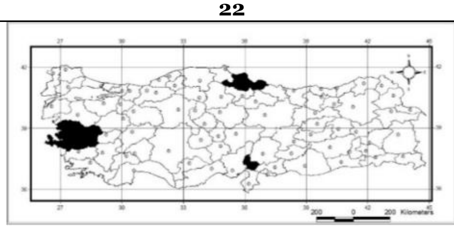

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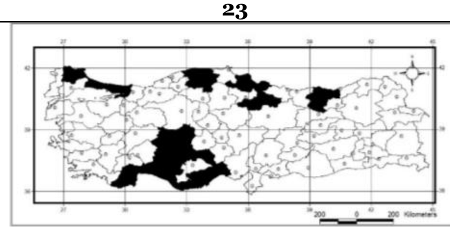

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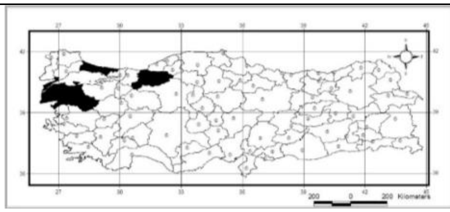
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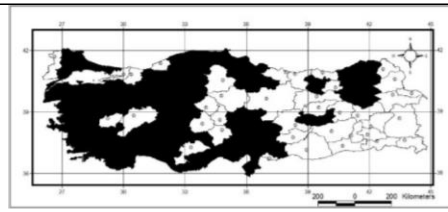
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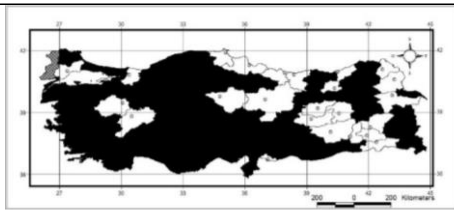
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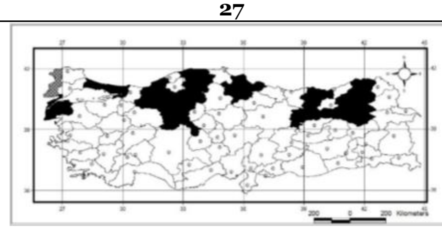
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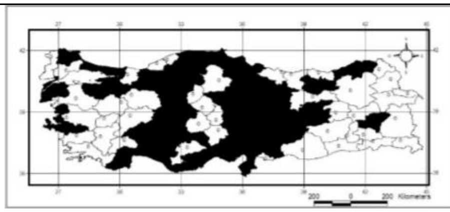
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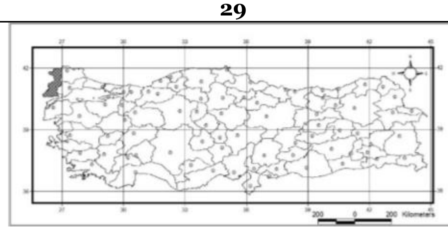
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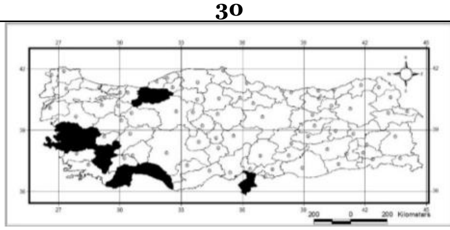
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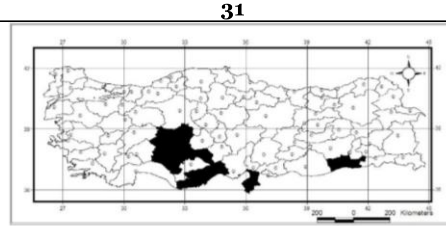
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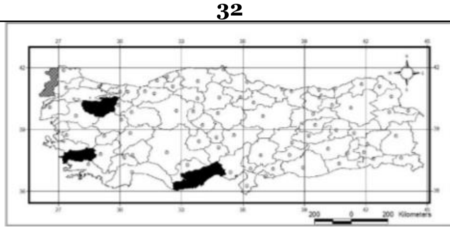
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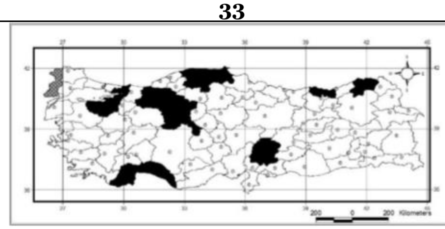
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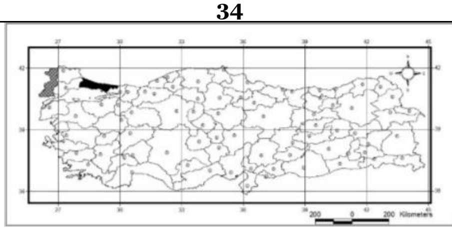
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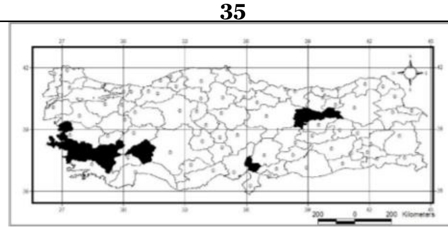
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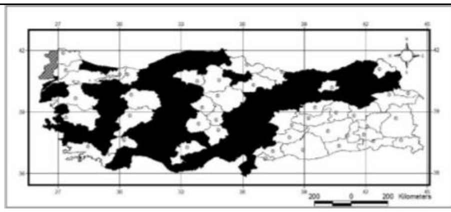

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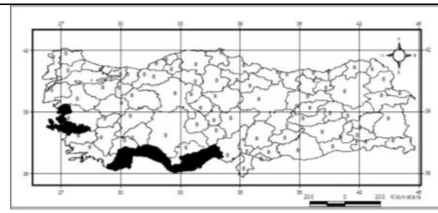

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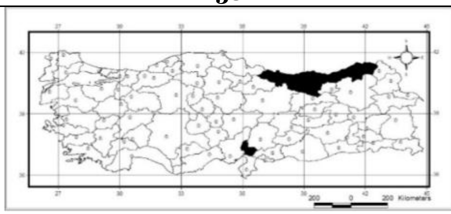

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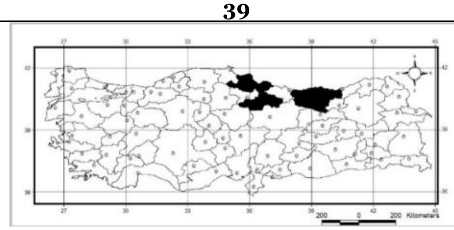

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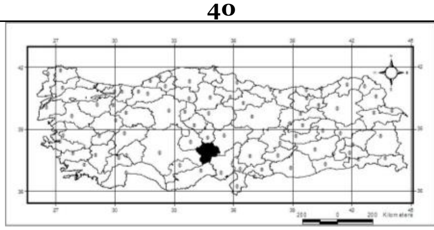

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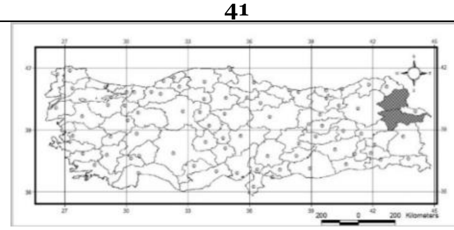

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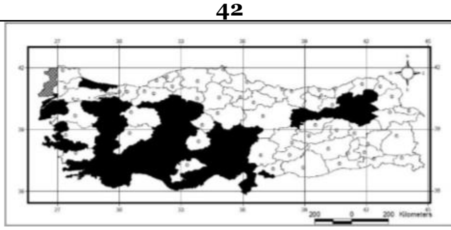

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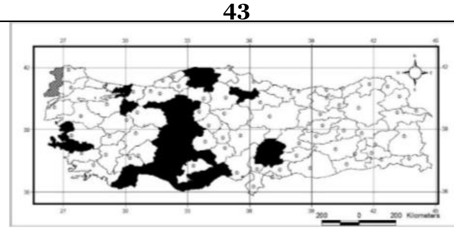

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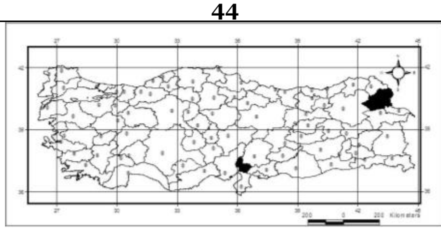

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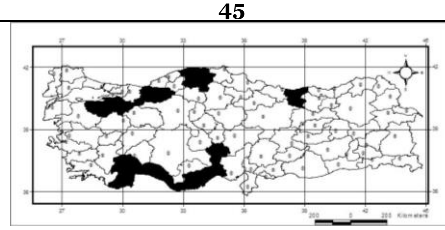

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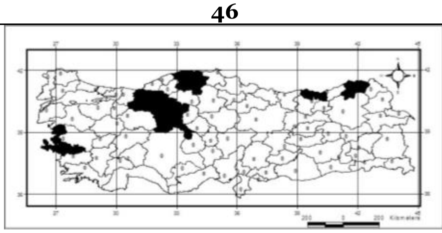

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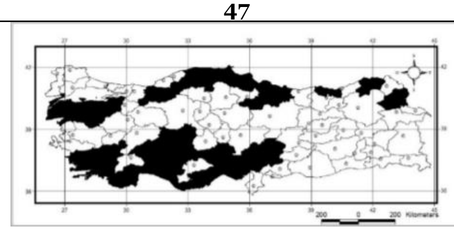

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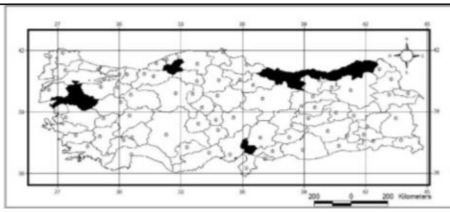

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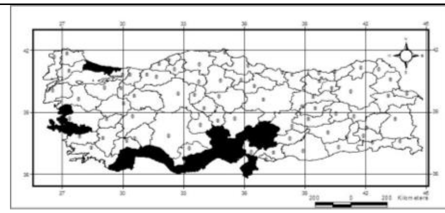

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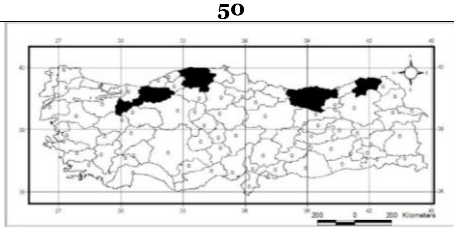

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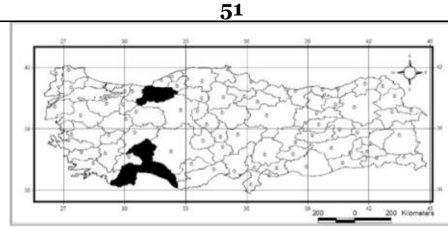

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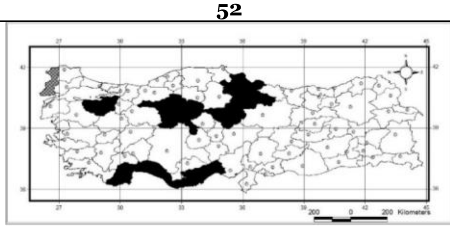

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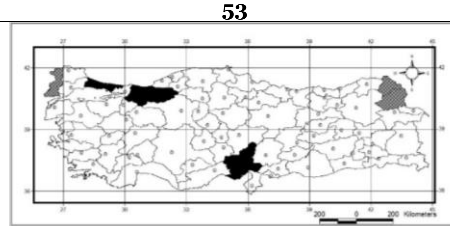

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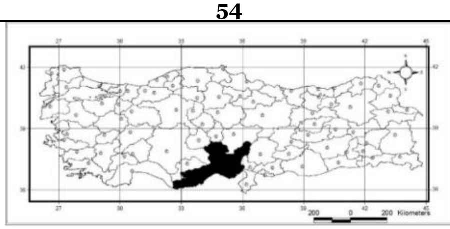

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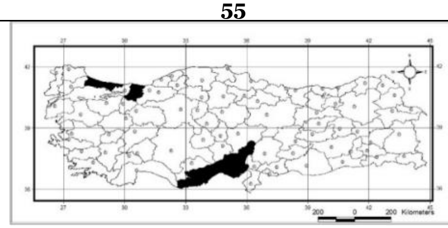

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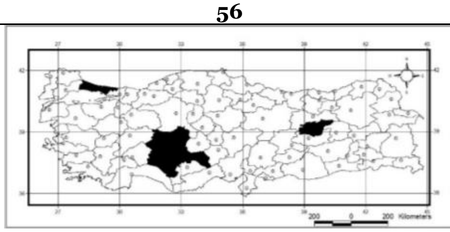

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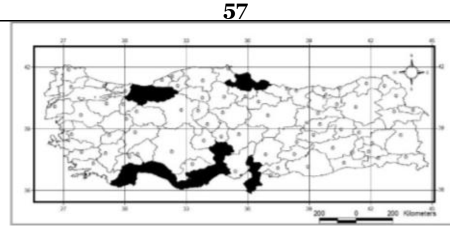

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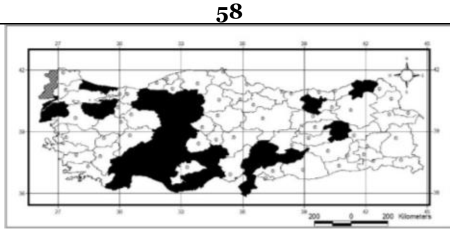

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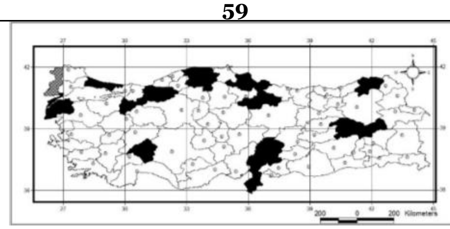

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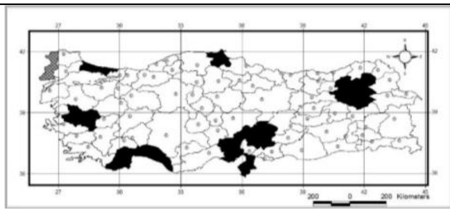

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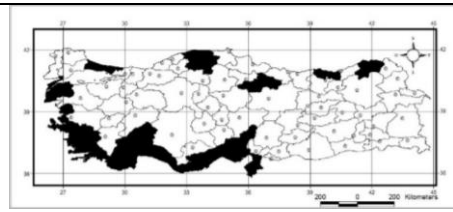

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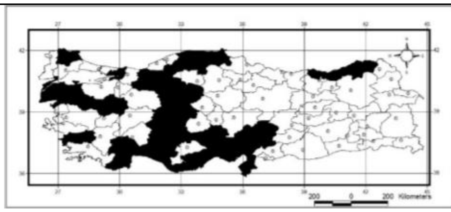

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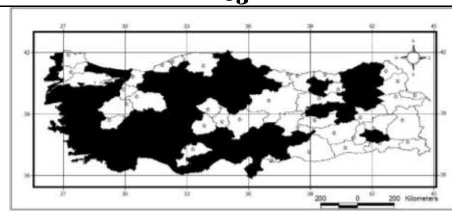

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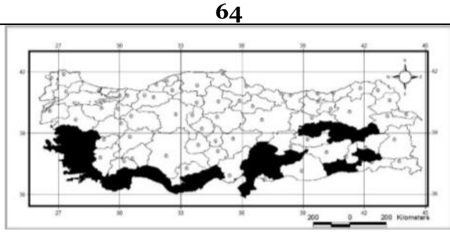

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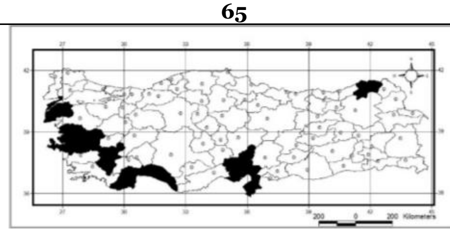

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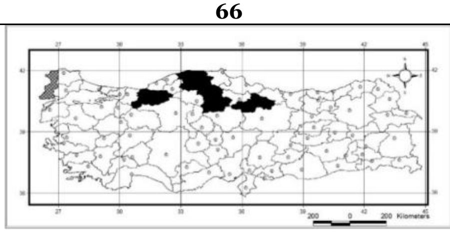

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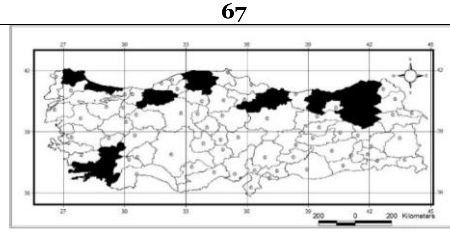

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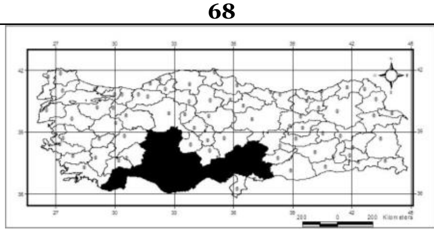

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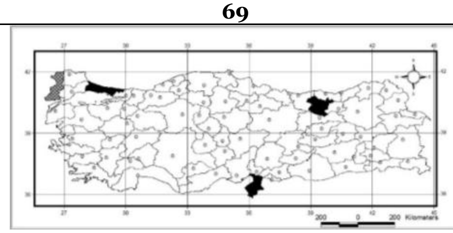

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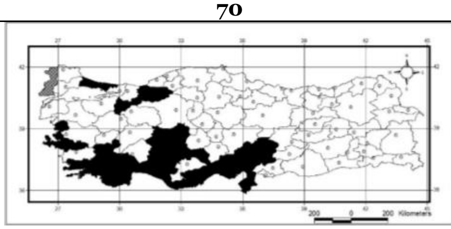

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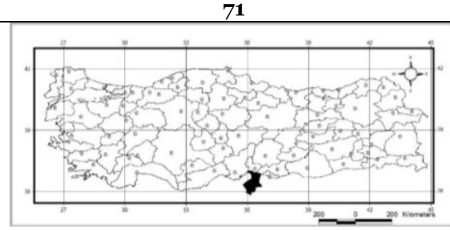

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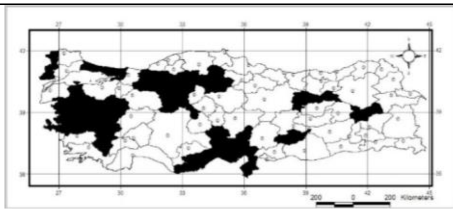
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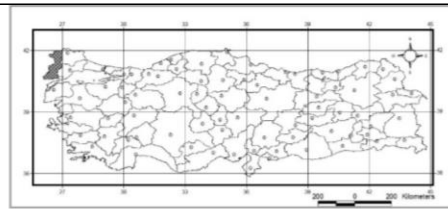
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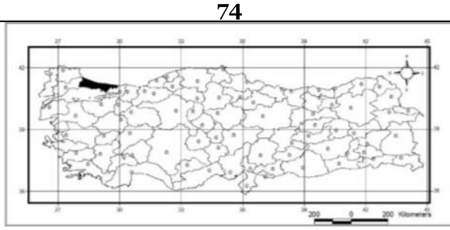
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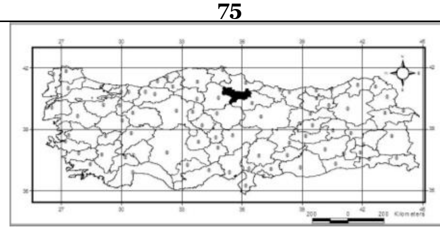
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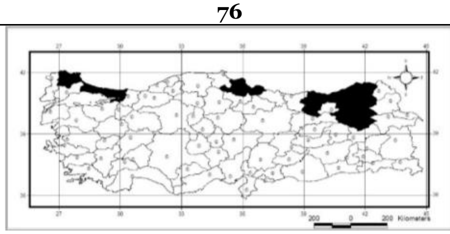
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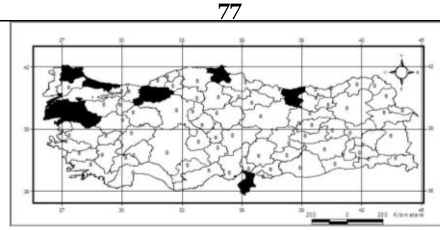
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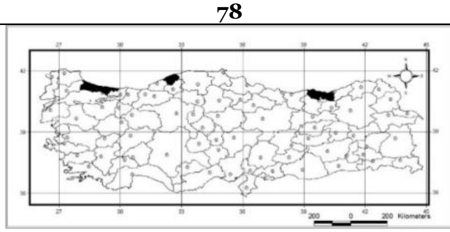
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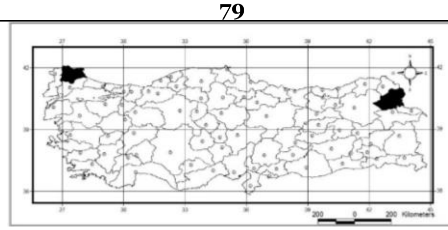
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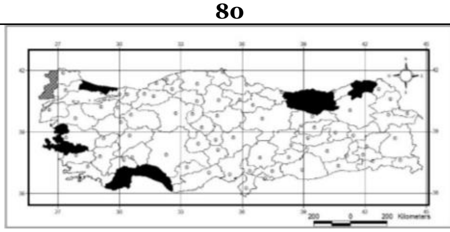
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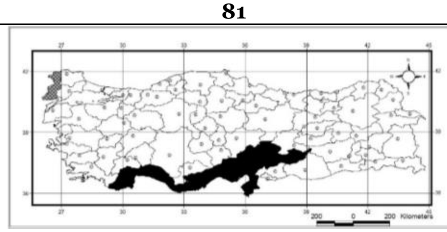
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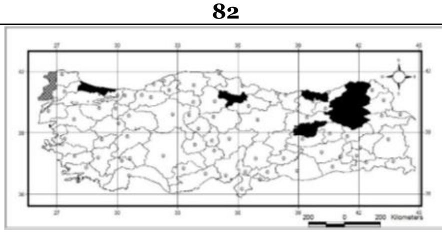
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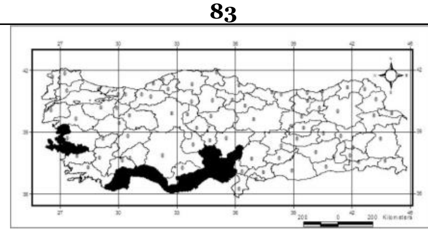
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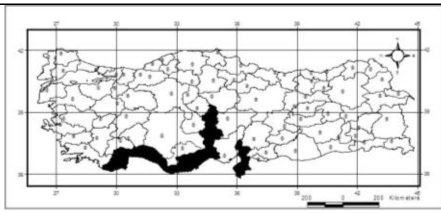

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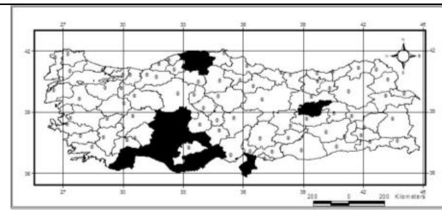

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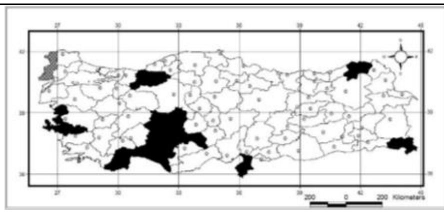

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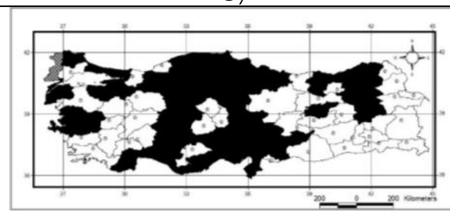
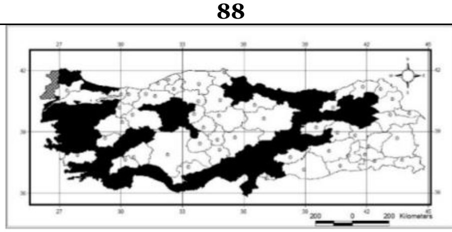
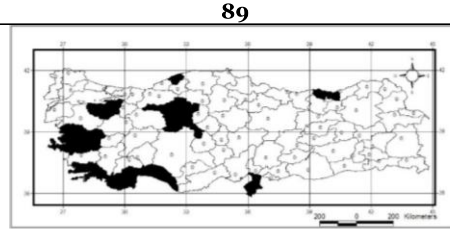


89



90



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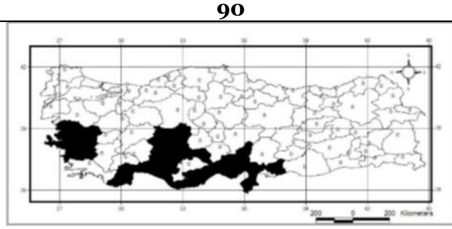

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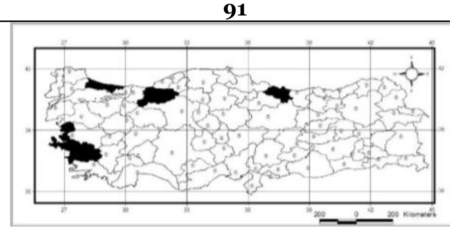

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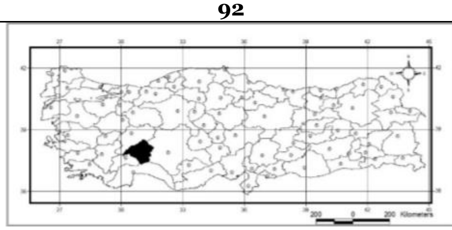

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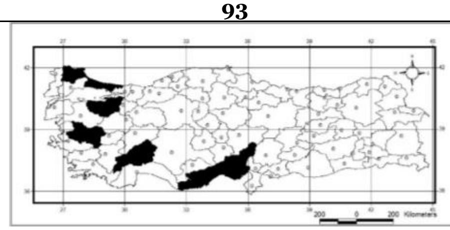

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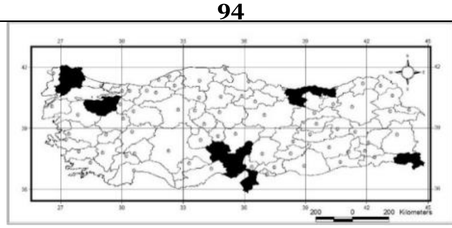

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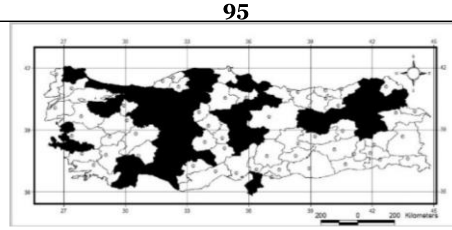

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Figures 2-97. Provincial distribution in Turkey of **2.** *Aegosoma scabricorne*, **3.** *Anaglyptus* (*Anaglyptus*) *arabicus*, **4.** *Anaglyptus* (*Anaglyptus*) *mysticus*, **5.** *Aromia moschata*, **6.** *Axinopalpis gracilis*, **7.** *Calchaenesthes oblongomaculata*, **8.** *Callergates gaillardoti*, **9.** *Callidium* (*Callidostola*) *aeneum*, **10.** *Callidium* (*Callidium*) *violaceum*, **11.** *Callimoxys gracilis*, **12.** *Callimus* (*Callimus*) *angulatus*, **13.** *Callimus* (*Lampropterus*) *femoratus*, **14.** *Callimus* (*Procallimus*) *egregius*, **15.** *Callimus* (*Procallimus*) *semicyaneus*, **16.** *Cerambyx* (*Cerambyx*) *carinatus*, **17.** *Cerambyx* (*Cerambyx*) *cerdo*, **18.** *Cerambyx* (*Cerambyx*) *dux*, **19.** *Cerambyx* (*Cerambyx*) *miles*, **20.** *Cerambyx* (*Cerambyx*) *nodulosus*, **21.** *Cerambyx* (*Microcerambyx*) *scopolii*, **22.** *Cerambyx* (*Cerambyx*) *welensii*, **23.** *Chlorophorus* (*Crassofasciatus*) *aegyptiacus*, **24.** *Chlorophorus* (*Crassofasciatus*) *convexifrons*, **25.** *Chlorophorus* (*Humeromaculatus*) *figuratus*, **26.** *Chlorophorus* (*Chlorophorus*) *herbstii*, **27.** *Chlorophorus* (*Perderomaculatus*) *sartor*, **28.** *Chlorophorus* (*Chlorophorus*) *varius*, **29.** *Clytus* (*Clytus*) *arietis*, **30.** *Clytus* (*Clytus*) *rhamni*, **31.** *Clytus* (*Clytus*) *tropicus*, **32.** *Deilus fugax*, **33.** *Delagrangeus* (*Delagrangeus*) *angustissimus*, **34.** *Dolocerus reichii*, **35.** *Ergates faber*, **36.** *Gracilia minuta*, **37.** *Hesperophanes sericeus*, **38.** *Hylotrupes bajulus*, **39.** *Icosium tomentosum*, **40.** *Isotomus comptus*, **41.** *Isotomus speciosus*, **42.** *Lioderina linearis*, **43.** *Mesoprionus asiaticus*, **44.** *Mesoprionus besikanus*, **45.** *Molorchus* (*Molorchus*) *kiesenwetteri*, **46.** *Molorchus* (*Molorchus*) *marmottani*, **47.** *Molorchus* (*Caenoptera*) *minor*, **48.** *Molorchus* (*Molorchus*) *umbellatarus*, **49.** *Monochamus* (*Monochamus*) *galloprovincialis*, **50.** *Monochamus* (*Monochamus*) *sartor*, **51.** *Nathrius brevipennis*, **52.** *Obrium brunneum*, **53.** *Obrium cantharinum*, **54.** *Penichroa fasciata*, **55.** *Phymatodes* (*Poecilium*) *alni*, **56.** *Phymatodes* (*Paraphymatodes*) *fasciatus*, **57.** *Phymatodes* (*Phymatoderus*) *lividus*, **58.** *Phymatodes* (*Phymatoderus*) *pusillus*, **59.** *Phymatodes* (*Phymatodellus*) *rufipes*, **60.** *Phymatodes* (*Phymatodes*) *testaceus*, **61.** *Plagionotus* (*Plagionotus*) *arcuatus*, **62.** *Plagionotus* (*Plagionotus*) *detritus*, **63.** *Prinobius myardi*, **64.** *Prionus coriarius*, **65.** *Purpuricenus budensis*, **66.** *Purpuricenus dalmatinus*, **67.** *Purpuricenus desfontainii*, **68.** *Purpuricenus graecus*, **69.** *Purpuricenus kaehleri*, **70.** *Purpuricenus nudicollis*, **71.** *Pyrrhidium sanguineum*, **72.** *Rhaesus serricollis*, **73.** *Rhaphuma gracilipes*, **74.** *Ropalopus* (*Ropalopus*) *clavipes*, **75.** *Ropalopus* (*Ropalopus*) *femoratus*, **76.** *Ropalopus* (*Ropalopus*) *insubricus*, **77.** *Ropalopus* (*Ropalopus*) *lederi*, **78.** *Ropalopus* (*Ropalopus*) *macropus*, **79.** *Rosalia* (*Rosalia*) *alpina*, **80.** *Saperda* (*Lopezcolonia*) *octopunctata*, **81.** *Saperda* (*Lopezcolonia*) *perforata*, **82.** *Saperda* (*Lopezcolonia*) *punctate*, **83.** *Saperda* (*Compsidia*) *quercus*, **84.** *Saperda* (*Lopezcolonia*) *scalaris*, **85.** *Semanotus russicus*, **86.** *Stenhomalus* (*Obriopsis*) *bicolor*, **87.** *Stenopterus atricornis*, **88.** *Stenopterus flavicornis*, **89.** *Stenopterus rufus*, **90.** *Stromatium atratum*, **91.** *Trichoferus fasciculatus*, **92.** *Trichoferus griseus*, **93.** *Trichoferus holosericeus*, **94.** *Trichoferus pallidus*, **95.** *Xylotrechus* (*Xylotrechus*) *antilope*, **96.** *Xylotrechus* (*Xylotrechus*) *arvicola*, **97.** *Xylotrechus* (*Rusticoclytus*) *rusticus*.

THREE NEW RECORDS OF ASSASSIN BUGS FROM ANDAMAN AND NICOBAR ISLANDS, INDIA

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[Mukherjee, P. & Hassan, M. E. 2016. Three new records of Assassin Bugs from Andaman and Nicobar Islands, India. Munis Entomology & Zoology, 11 (2): 573-575**]**

ABSTRACT: The paper deals with three new records*viz. Scipinia horrid* (Stal), *Endochus nigricornis* Stal and *Biasticus flavus* (Distant)of the family Reduviidae from Andaman and Nicobar Islands, India.Key to the genera of subfamily Harpactorinae and distributions of each species in India and abroad have been included.

KEY WORDS: Reduviidae, new records, Andaman and Nicobar Islands

Assassin bugs are aggressive in nature and it enables them to predate and eat many insects. Many assassin bugs can inflict a painful bite, so they should be carefully handled. With more than 6878 described species and subspecies under 981 genera belonging to 25 subfamilies of the family Reduviidae recorded from the world are one of the largest and morphologically most diverse group of Heteroptera or true bugs. Of which, 465 species under 144 genera belonging to 14 subfamilies are recorded from India (Biswas & Mitra, 2011). Distant (1904, 1910) recorded a total of 9 species under 8 genera belonging to 4 subfamilies from Andaman and Nicobar Islands. Later on, *Chandra* et al. (2013) added a total of 10 species under 8 genera belonging to 5 subfamilies from Great Nicobar Biosphere Reserve, Andaman and Nicobar Islands. Prior to study a total of 19 species under 17 genera belonging to 8 subfamilies *viz.* Reduviinae, Triatominae, Ectrichdiinae, Harpactorinae, Peiratinae, Emesinae, Stenopodainae and Saicinae are so far recorded from Andaman and Nicobar Islands. Present study is based on three new records*viz. Scipinia horrida* (Stal), *Endochus nigricornis* Stal and *Biasticus flavus* (Distant) belonging to subfamily Harpactorinae of the family Reduviidae from Andaman and Nicobar Islands.

MATERIALS AND METHODS

This study is based on the materials collected from Andaman and Nicobar Islands in the year 1964-1966. The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata. Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**
  Infraorder **CIMICOMORPHA**
    Family **REDUVIIDAE**
      Subfamily **HARPACTORINAE**
        Genus *Scipinia* Stal, 1861
          Scipinia horrida (Stal, 1859)
        Genus *Endochus* Burmiester, 1859
          Endochus nigricornis Stal, 1859

Genus *Biasticus* Stal, 1866
Biasticus flavus (Distant, 1903)

SYSTEMATIC ACCOUNT

Subfamily HARPACTORINAE

Key to the genera of the subfamilyHarpactorinae

1. Specimen always spinous in body and legs...*Scipinia* Stal
-. Specimen not spinous...2
2. Head armed with a spine or tubercle behind the base of each antennae; lateral pronotal angles spinous..*Endochus* Burmiester
-. Head unarmed; lateral pronotal angles without any processes........................*Biasticus* Stal

Genus *Scipinia* Stal, 1861

1861. *Scipinia* Stal, Stett. Ent. Zeit., 22: 137 and 138.

***Scipinia horrida* (Stal, 1859)** (Fig. 1)

1859. *Sinea horrida* Stal, III. Zool. Insekter., 16: 262.
1861. *Scipinia horrida*: Stal, Stett. Ent. Zeit., 22: 138.
1904. *Scipinia horrida* Stal, Distant, Fauna Brit. India, Rhynchota, 2: 384.
2006. *Scipinia horrida*, Ambrose, Zoos' Print. Journal, 21 (9): 12.

Material examined: 1 ex., INDIA: Andaman and Nicobar Islands: South Andaman: Bamboo flat road, 8.III.1964, coll. B.S. Lamba.

Diagnostic character: Body yellowish brown with black spots to the upper surface of head and connexivum with the largest on 4^{th} and 5^{th} segments; head above with three long spines on each side and with a number of small spines between or around them; anterior lobe of pronotum with four long and a number of smaller spines, posterior lobe of pronotum granulate, its lateral angle acute, upwardly directed; intermediate and posterior femora subnodulose near apices; abdomen dilated at 4^{th} and 5^{th} segments.

Length: 10 mm.

Distribution: India: Andaman and Nicobar Islands (South Andaman), Sikkim, Tripura, Tamil Nadu, West Bengal. **Elsewhere:** China, Indonesia, Myanmar, Philippines, SriLanka.

Genus *Endochus* Burmiester, 1859

1859. *Endochus* Stal, Ofv. K. Vet. Ak. Forh., 16: 194.

***Endochus nigricornis* Stal, 1859** (Fig. 2)

1859. *Endochus nigricornis* Stal, Ofv. K. Vet. Ak. Forh., 16: 194.
1904. *Endochus nigricornis*, Distant, Fauna Brit. India, Rhynchota, 2: 365-366.
2006. *Endochus nigricornis*, Ambrose, Zoos' Print. Journal, 21 (9): 8.

Material examined: 1 ex., INDIA: Andaman and Nicobar Islands: Great Nicobar, 17.IV.1966, coll. Daniel and Bhowmik.

Diagnostic character: Body yellowish brown; two central lines to posterior lobe of head (broken in middle), two central spots preceded by a small arcuated fascia to anterior pronotal lobe, disk of posterior lobe and lateral spines, disk of scutellum, corium (except base, base of clavus, lateral margins and veins), about seven lateral spots to sternum, sublateral spots to abdomen beneath, spots to coxae; under surface of intermediate and posterior femora and subapical annulation to all the femora black; head about as long as pronotum; first segment of antennae subequal to head, pronotum and scutellum together; anterior pronotal lobe impressed at base, posterior lobe with horizontal lateral spines directed upward; antennae dark brown annulated with yellowish markings; membrane brownish.

Length: 22-23 mm.

Distribution: India: Andaman and Nicobar Islands (Great Nicobar), Assam. **Elsewhere:** Indonesia, Myanmar.

Genus *Biasticus* Stal, 1866

1866. *Biasticus* Stal, Ofv. K. Vet. Ak. Forh., 23: 284 & 290.

***Biasticus flavus* (Distant, 1903)** (Fig. 3)

1903. *Harpactor flavus* Distant, A.M.N.H., (7) 6 : 206.
1904. *Harpactor flavus* Distant, Fauna Brit. India, Rhynchota, 2: 336-337.

2006. *Biasticus flavus* (Distant), Ambrose, Zoos' Print. Journal, 21 (9): 7.

Material examined: 3 exs.,INDIA: Andaman and Nicobar Islands: South Andaman: Burmah Nallah, 17.IV.1964, coll. B.S. Lamba; 2 exs., South Andaman: Burmah Nallah, 15.IV.1964, coll. B.S. Lamba; 1 ex., South Andaman: Burmah Nallah, 12.IV.1964, coll. B.S. Lamba; 1 ex., South Andaman: BurmahNallah, 13.IV.1964, coll. B.S. Lamba.

Diagnostic character: Body beneath and posterior lobe of pronotum brownish yellow; head above, lateral fascia on each side of head behind eyes, antennae, rostrum, anterior lobe of pronotum, anterior area of prosternum, disk of meso and metasterna, coxae and legs black; abdomen with black lateral, segmental, transverse fasciae; scutellum black with apex luteous; corium brownish yellow; membrane bronzy brown; connexivum brownish spotted with black; rostrum with first segment longer than anteocular portion of head; postocular portion longer than anteocular; head about as long as pronotum; first segment of antennae shorter than anterior femora; posterior pronotal lobe twice as long as anterior pronotal lobe.

Length: 10-11 mm.

Distribution: India: Andaman and Nicobar Islands (South Andaman), Assam. **Elsewhere:** China, Hong-kong, Japan, Myanmar.

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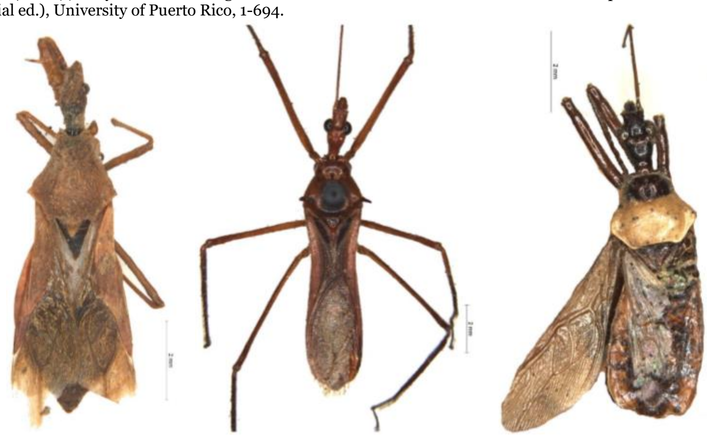

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Figures 1-3. 1. *Scipinia horrida* (Stal), 2. *Endochus nigricornis* Stal, 3. *Biasticus flavus* (Distant).

AN INTERESTING OBSERVATION ON *PHYTOECIA* (*HELLADIA*) *PRAETEXTATA* (STEVEN, 1817) FROM TURKEY (COLEOPTERA: CERAMBYCIDAE: LAMIINAE)

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[**Özdikmen, H. & Cihan, N.** 2016. An interesting observation on *Phytoecia* (*Helladia*) *praetextata* (Steven, 1817) from Turkey (Coleoptera: Cerambycidae: Lamiinae). Munis Entomology & Zoology, 11 (2): 576-578]

ABSTRACT: The paper gives an interesting observation from Çankırı province of a color variation [*Phytoecia praetextata* var. *implagiata* that was described by Reitter (1898) from Caucasus (Armenia: Nakhichevan: Araxesthal, Ordubad)] of *Phytoecia* (*Helladia*) *praetextata* (Steven, 1817).

KEY WORDS: Coleoptera, Cerambycidae, Lamiinae, *Phytoecia* (*Helladia*) *praetextata,* Turkey

The species *Phytoecia praetextata* (Steven, 1817) is in the subgenus *Helladia* Fairmaire, 1864. It includes two subspecies as the nominal subspecies and *Phytoecia praetextata nigricollis* Pic, 1891. The nominal subspecies is distributed in South-Eastern Europe (Bulgaria, Romania, South parts of European Russia, Ukraine and European Turkey), Caucasus (Armenia, Azerbaijan, Georgia) and Asian Turkey. The other subspecies *Phytoecia praetextata nigricollis* is distributed only in Syria and South of Asian Turkey. While *Phytoecia praetextata nigricollis* Pic, 1891 has no synonym taxa, *Phytoecia praetextata praetextata* (Steven, 1817) has a synonym taxon as *Phytoecia praetextata* var. *implagiata* Reitter, 1898.

The nominal subspecies was reported Asian Turkey (Ankara, Bayburt, Bolu, Düzce, Erzincan, Erzurum, Gümüşhane, Kastamonu, Sivas and Zonguldak provinces) and European Turkey (Kırklareli province) from Turkey (Tozlu et al., 2003; Özdikmen & Hasbenli, 2004; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007, 2011; Sama et al., 2012; Özdikmen et al., 2012; Georgiev et al., 2015). Namely it is known only from North of Turkey for Turkey.

Phytoecia praetextata var. *nigricollis* was described by Pic (1891) from Akbez (Turkey, Hatay province) as a variety. This subspecies is easily distinguished from nominal subspecies by entirely black pronotum and even extended and widened sutural black band. It was reported Adana, Hatay and İçel provinces from Turkey (Pic, 1891; Breuning, 1951; Demelt, 1963; Öymen, 1987; Adlbauer, 1988; Rejzek et al., 2001; Sama et al., 2012). Namely it is known only from Southern Anatolia for Turkey.

Also *Phytoecia praetextata* var. *implagiata* was described by Reitter (1898) from Caucasus (Armenia: Nakhichevan: Araxesthal, Ordubad) as a variety. According to Reitter (1898), this variety is similar to the forma typica, but the longitudinal black sutural band of elytra is absent. However, two ordinary black spots on shoulders and on anterior parts of lateral margins are present (Fig. 1). It is accepted as a synonym of *Phytoecia praetextata praetextata* (Steven, 1817). This color variation of *Phytoecia praetextata* (Steven, 1817) is known only from type locality.

Many specimens of *Phytoecia praetextata* (Steven, 1817) from Ankara, Bolu, Düzce, Gümüşhane, Kastamonu, Sivas and Zonguldak provinces have been reported by the first author from Turkey until now (Özdikmen & Hasbenli, 2004; Özdikmen & Demir, 2006; Özdikmen, 2006, 2007, 2011; Özdikmen et al., 2012). All mentioned specimens from Northern Anatolia are similar to typical form of *Phytoecia praetextata* (Steven, 1817) undoubtedly. Thus these belong to the nominal subspecies of *P. praetextata*.

Besides, we had the opportunity to study of new material of *P. praetextata* collected during the expedition of Çankırı province in 2015 and a color variation, *Phytoecia praetextata* var. *implagiata* Reitter, 1898, of the species was firstly detected from Turkey (Fig. 2). Although specimen from Çankırı province of *Phytoecia praetextata* var. *implagiata* Reitter, 1898 is somewhat different from typical population by having a small reduced black area just after scutellar area and yellowish elytral coloration (Fig. 2).

As seen below, 4 specimens were collected from Çankırı province in 2015. Three of them belong to the typical form of nominal subspecies and one of them is similar to *Phytoecia praetextata* var. *implagiata* Reitter, 1898. Consequently, *Phytoecia praetextata* (Steven, 1817) is new to Çankırı province, while *Phytoecia praetextata* var. *implagiata* Reitter, 1898 is new to Turkey.

Material examined:

As *Phytoecia praetextata praetextata* (Steven, 1817): Çankırı prov.: Ilgaz, Gökçeyazı village, 40°57'27" N, 33°29'42" E, 1020 m, 29.V.2015, 1 specimen; Çankırı prov.: Ilgaz, exit of Kırşlar village, 40°56'5" N, 33°29'9" E, 914 m, 17.VI.2015, 1 specimen; Çankırı prov.: Ilgaz, Candere-Sazak-Hacı Hasan return, 40°55'29" N, 33°39'29" E, 885 m, 18.VI.2015, 1 specimen.

As *Phytoecia praetextata* var. *implagiata* Reitter, 1898: Çankırı prov.: Ilgaz, exit of Kırşlar village, 40°56'5" N, 33°29'9" E, 914 m, 17.VI.2015, 1 specimen.

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Figure 1. *Phytoecia praetextata* var. *implagiata* Reitter, 1898 from Armenia: Nakhichevan: Araxesthal, Ordubad (Holotype, ex collection Edmund Reitter, Magyar Természettudományi Mûzeum, Budapest).

Figure 1. Elytral coloration of *Phytoecia praetextata* var. *implagiata* Reitter, 1898 from Çankırı province in Turkey.

NEW RECORDS OF *CORANUS SIVA* KIRKALDY AND *LISARDA ANNULOSA* STAL FROM ANDHRA PRADESH, INDIA (HEMIPTERA: REDUVIIDAE)

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[**Mukherjee, P. & Hassan, M. E.** 2016. New records of *Coranus siva* Kirkaldy and *Lisarda annulosa* Stal from Andhra Pradesh, India (Hemiptera: Reduviidae). Munis Entomology & Zoology, 11 (2): 579-581]

ABSTRACT: The paper presents two new records *viz. Coranus siva* Kirkaldy and *Lisarda annulosa* Stal of the family Reduviidae from Andhra Pradesh, India. Key to subfamilies, diagnostic characters, original references, distribution in India and abroad have been cited in the present paper.

KEY WORDS: Hemiptera, Reduviidae, Andhra Pradesh

Reduviidae are exclusively predaceous terrestrial Heteropteran bugs comprising of 6878 species and subspecies under 981 genera belonging to 25 subfamilies (Henry, 2009). Of which 465 species under 144 genera belonging to 14 subfamilies (Biswas & Mitra, 2011) are recorded from India. Being a voracious predator and larger in size than other predaceous terrestrial bugs, assassin bugs which is also polyphagous in nature consume a wider range of prey. The classification of the family has been mainly adopted after Ambrose (2006). The present paper deals with two species *viz. Coranus siva* Kirkaldy of Harpactorinae and *Lisarda annulosa* Stal of Salyavatinae, which are recorded as new from the state of Andhra Pradesh, India.

MATERIALS AND METHODS

This study is based on the materials collected by different survey parties of Zoological Survey of India during field surveys from the state of Andhra Pradesh in the year 1996-1997. The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata.

Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**
- Infraorder **CIMICOMORPHA**
  - Family **REDUVIIDAE**
    - Subfamily **HARPACTORINAE**
      - Genus *Coranus* Curtis, 1833
        - *Coranus siva* Kirkaldy, 1891
    - Subfamily **SALYAVATINAE**
      - Genus *Lisarda* Stal, 1859
        - *Lisarda annulosa* Stal, 1874

SYSTEMATIC ACCOUNT

Key to the subfamilies of the family Reduviidae

1. Hemelytra with a quadrangular areolet or cell at interior area of corium near base of membrane……………………………………………………………………………………HARPACTORINAE

-. Hemelytra without a quadrangular areolet or cell at interior area of corium near base of membrane……………………………………………………………………………………SALYAVATINAE

Subfamily HARPACTORINAE

Genus *Coranus* Curtis, 1833

1833. *Coranus* Curtis, Brit. Ent.,10: 453.

***Coranus siva* Kirkaldy, 1891** (Fig. 1)

1881. *Coranus spiniscutis* Reuter, Act. Soc. Sc. Fenn., 12: 275.
1904. *Coranus spiniscutis*: Distant, Fauna Brit. India, Rhynchota, 2: 381.
2006. *Coranus siva*: Ambrose, Zoos' Print Journ., 21 (9): 7.

Material examined: 1 ex., INDIA: Andhra Pradesh: Vizianagaram District: Bhogapuram, 5.XI.1997, coll. Dr. P. Mukhopadhyay and party.

Diagnostic character: Body brownish yellow to dark brown covered with hairs; corium blackish brown membrane bronzy blackish brown; connexivum yellowish brown spotted with blackish brown,; abdomen beneath yellowish brown, its apex pitchy black; legs brownish yellow; bases and apices of tibiae , annulations to femora and apices of the tarsi pitchy black, extreme base of the tibiae with pale annulations.

Length: 9-10 mm.

Distribution: India: Andhra Pradesh (Vizianagaram), Chhattisgarh, Uttar Pradesh, Assam, Jharkhand, Meghalaya,West Bengal. Elsewhere: Myanmar.

Subfamily SALYAVATINAE

Genus *Lisarda* Stal, 1859

1859. *Lisarda* Stal, Ofv. Vet.-Ak. Forh., 16: 192.

***Lisarda annulosa* Stal, 1874** (Fig. 2)

1874. *Lisarda annulosa* Stal, En. Hem., 4: 83.
1904. *Lisarda annulosa,* Distant, Fauna Brit. India, Rhynchota, 2: 237.
2006.*Lisarda annulosa*: Ambrose, Zoos' Print Journ., 21 (9): 23.

Material examined: 1 ex., INDIA: Andhra Pradesh: E. Godavari District: Addatigala village, 6.IV.1996, coll. S.K. Chatterjee and T.P. Bhattacharjee.

Diagnostic character: Species brownish-yellow in colour; base and annulations to second joint of antennae, mottlings to hemelytra and abdomen, connexivum and legs brownish yellow; subocellate spots to connexivum, head beneath, sternum, a broad fasciae on each side of abdomen joining a spot on apical segment and a few smaller linear central spots dark reddish brown; tibiae and femora annulated with brownish yellow; femora with a a spine on apex,anterior femora with a medial spine,spine to scutellum short and obtuse.

Length: 11 mm.

Distribution: India: Andhra Pradesh (E. Godavari), Chhattisgarh, Tamil Nadu. **Elsewhere:** China, Myanmar, Sri Lanka.

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Stal, C. 1859. Till Kannedomen om Reduviini. Ofv. K. Vet. Ak. Forh., 16: 363-386.

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Figures 1-2. 1. *Coranus siva* Kirkaldy, 2. *Lisarda annulosa* Stal.

A RECORD OF *CORANUS* (HETEROPTERA: REDUVIIDAE: HARPACTORINAE) FROM WESTERN GHATS OF SOUTH INDIA AND ITS DESCRIPTION

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[**Sahayaraj, K. & Muthupandi, M.** 2016. A record of *Coranus* (Heteroptera: Reduviidae: Harpactorinae) from Western Ghats of South India and its description. Munis Entomology & Zoology, 11 (2): 582-587]

ABSTRACT: A new species of *Coranus* Curtis, 1833 (Reduviidae, Harpactorinae) namely *Coranus caprilesi* sp. nov. is described on adult male and female collected on native *Abutilon indicum* (Malvaceae) in the Western ghats of south India.

KEY WORDS: *Coranus caprilesi,* new species, description, Reduviidae, taxonomy

Reduviidae are abundant, worldwide, highly successful predators, and play an important role in the biocontrol of insect pests (Grundy & Maelzer, 2002; Sahayaraj, 2014). The Harpactorinae is the largest reduviid subfamily with more than 300 genera and 2000 species described worldwide (Putshov & Putshkov, 1985, Maldonado Capriles, 1990). *Coranus* Curtis, 1833 comprises about 96 species described world-wide. The genus is predominantly distributed in Palearctic, Ethiopian, Oriental, and Australian regions however, the highest diversity occurs in Paleartic and Ethiopian regions. Prior to this study the genus was represented in India by 12 species such as *Coranus ambrosii* Livingstone & Ravichandran, *C. atricapillus* Distant, *C. carinata* Livingstone & Ravichandran, *C. emodicus* Kiritshenko, *C. fuscipennis* Reuter, *C. militaris* Distant, *C. niger* (Ramber), *C. nodulosus* Ambrose & Sahayaraj, *C. ruthii* Livingstone & Ravichandran, *C. siva* Kirkaldy, *C. vitellinus* Distant and *C. wolffi* Lethierry & Severin (Ambrose, 2006**;** Biswas & Animesh, 2010). In 1990, Maldonado Capriles listed six species of strictly Indian *Coranus*, i.e., *C. militaris* Distant, *C. niger* (Rambur), *C. siva* Kirkaldy, *C. vitellinus* Distant, in addition to *C. wolffi* Leth. Sev and *C. spiniscutis* Reuter from Indian faunal limits. Ambrose & Vennison (1989) and Ambrose & Sahayaraj (1993) described *C. soosaii* and *C. nodulosus* respectively. In the present paper, *Coranus caprilesi* sp. nov. is described and illustrated.

MATERIALS AND METHODS

This study is based on two each males and females collected on moderately high elevations (400–520 ma.s.l.) by the authors in April 2010 from Kalakad forest area (N 08’34^{o} 15.6” E 077^{o}33’09.2), Tirunelveli district, Tamil Nadu, India. After death, the specimens were preserved in 70% alcohol. Wings were examined and based on right wings mounted on dry permanent slides or temporary slides in glycerine. Head and thoracic characters were examined on specimens being permanent mounted in Distyrene Plasticizer Xylene (DPX) medium and glycerin (95:5 ratio). The abdomen of the specimens was cleared, mounted and genitalia illustrated following the procedure of Olah & Johanson (2008). Microphotographs were recorded using a light microscope at 10-40x magnifications (Olympus CV41, Japan). All the measurements are in millimeters.

Abbreviations of parts measured are the following: TL-Total length, WACE-width across compound eye, HL-head length, HW-head width, AO-ante-ocular region, PO-post-ocular region, AL-Antenna length, FA1, FA2, FA3, FA4-first, second, third,and fourth antennomere, RL-rostral length, R1, R2 and R3-basal, medial and last rostral segment, PL-pronotum length, PW-pronotum width, FT, MT, HT-fore, mid and hind tibial length, FTC, MTC, HTC- fore, mid and hind tibial comb lengths, br-bristles, sp-spines, hr-hairs, AL-abdomen length, AW-abdomen width, HL-hemielytra length, HW-hemielytra width, mpp -pygophore, mpr - medial process of the paramere, pgo - process of genital opening, ppm - prolongation of posterior margin of phygophore, ps - paramere socket, po -genital posterior opening of the pygophore, br -transverse bridge of the pygophore, ap - anterior opening of the pygophore. The types and other specimens studied are deposited in the Insectary, Crop Protection Research Centre, St. Xavier's College, Manonmanian Sundaranar University, Palayamkottai, Tamil Nadu, India.

RESULTS

Coranus caprilesi sp. nov.

(Figs. 1a,b)

Type material. Male holotype. INDIA: Kalakad forest area, Tirunelveli district, Tamil Nadu, N 08'34° 15.6" E 077°33'09.2 April 2010. Authors college. Paratypes. 2 males, 5 females, same data as holotye. The holotype and paratypes are deposited in the insect collection (KD), Crop Protection Research Center, St. Xavier's College, Palayamkottai, India.

Etymology. *Coranus caprilesi* is dedicated to Dr. Maldonado Capriles, honoring his outstanding contributions to the systematics of Reduviidae.

Geographic distribution. *Coranus caprilesi* has been collected only from the Western ghats of south India.

Description.

Male (Figs. 1a,b): Total length 7.4, width across compound eye 0.6, across pronotum 2.2 at transverse furrow, and width of abdomen 3.8 at the middle. Piceous, antennae, tibiae, tarsi; Pale piceous with prominent protrusions, endocorium pale fuscescent; head, thorax and abdomen above and beneath bear stramineous fine hairs.

Coranus caprilesi sp. nov. (Figs. 1a,b) is closely related to both *C. vitellinus* and *C. soosaii*. *Coranus caprilesi* can be easily differentiated from *C. soosaii* by smaller size (21.2% reduced size) as well as *C. vitellinus* (23.7% reduced size); all legs are continuously shiny black in *C. vitellinus* and *C. soosaii*. Rostrum rest at prosternal groove. Pronotum decorated with four ovals and six bean shaped projections. Fore femorae slightly nodulose. Base of the remigium has many hairs and marking. Proximal and distal part of the fore tibia is having dark band. The hemelytron has numerous erected stramineous fine hairs. Membrane with longitudinal black lines throughout. The connexivum is having black shiny spots near the dorsal side between the segments. Parameres long, apical is pilose.

Head oblong and bulbous, length 1.6, width 2.2 across the eye region; transverse behind the eyes, megacephalus ante-ocular 0.4 mm long, slightly shorter than post-ocular (0.7 mm); post-ocular region slightly raised. The long hairs, excrescence, scoli, and spines are more dense in anterior than in posterior region of the head. Eyes well separated in both sexes, moderately larger in male. Width across eyes 0.60, interocular distance 1.0. One pair of prominent coma shaped markings present in front, and back of the scape. Antenna brown, first antennomere lighter yellowish brown color, other segments are darkened. Antenna long (6.2), the first antennomere is the longest (3.8), as long as remaining segments together and passing the apex of the head. Pedicel is sorter, flagellar segments sub-equal. Rostrum slightly curvate, basal (0.8) and medial (0.90) segments almost sub-equal and third segment the shortest (0.3); rostral tip extended up to the prosternal groove at rest (Fig. 2).

Pronotum long (2.1) and broad (2.9), bicolorous, longitudinally divided exactly in the middle by the longitudinal impression; anterolateral angles of the pronotum obtuse with a prominent upward projection and posterolateral angles of pronotum rounded. Transverse furrow dividing the pronotum in 2 distinct parts; posterior pronotum deeply incised with sharp internal angles; Scutellum triangular with shiny black elevation in the middle and apex. Tibia with tibial comb; fore, mid and hind tibia and comb lengths: 2.3, 0.4; 2.2, 0.3 and 2.6, 0.2 respectively. All legs pale brown. Fore leg, femur slightly nodules. Fore, mid and hind femurs distally (1/6 part) and fore tibia proximally and distally (1.5/6 part) with dark band; Mid and hind femora are dark brown. Three kinds of hairs bristles (br), spins (sp) and hairs (hr) were observed in legs (Fig. 2). Hemelytron length 4.2, width 1.8, slightly passing apex of the abdomen. Venation of hemelytra and hind wing follows the same pattern than harpactorin reduviids.

Abdomen elongately oval, Length 3.8, width 2.9. Abdominal segments bear dark brown bands on the aboral side. Soft silvery setae present throughout the abdomen.

The male genitalis of *Coranus caprilesi* are illustrated in figure 3. The male genitalia composed of the pygophore at ninth segment that carries the paired parameres (Figs. 3a,b) and the phallus. The pygophore is almost round having genital (posterior) opening (po) and anterior opening (ap) slightly bifid, separated by transverse bridge (br). The lateral margin of the anterior opening is entire. The dorsal area adjacent to the genital opening is membranous. The dorsal carina is rounded medially (ppm). The posterior margin of pygophore has a large, wider medial process (mpp). The paramere is inserted in the apical region of pygophore with as socket (ps). The parameres are elongate (Fig. 3c), the basal area is slightly curved, apically and terminally pilose.

Female. Female has longer postocular (0.9) and shorter anteocular (0.6) areas, distance between the eyes (0.6), slightly longer antenna (6.6) and rostrum (2.2). Fore, mid and hind tibial lengths and widths: 2.5, 0.5; 2.3, 0.3 and 2.9, 0.4 respectively. Longer abdomen (4.3) and hemelytron (4.7); broader abdomen (3.1) and hemelytron (2.3). Totally this specie is larger than *Coranus soosaii* (9.4 mm).

Taxonomic summary.

Ecology. More than 4 insects were collected from by a canopy net through sweeping on *Abutilon indicum* (Malvaceae) about 1 meter above the ground. Both male and female habitus similar. The habitat is close to a human intervention. Male fly and move faster than the females and were present in group of three to four insects. *Coranus caprilesi* sp. nov. is distributed in tropical rain forest, whereas the *Coranus vitellinus* Distant (Ambrose and Livingstone, 1985), *Coranus soosaii* Ambrose & Livingston (1989); *Coranus nodulosus* Ambrose & Sahayaraj (1993) are distributed in the semi-arid zones as well as agro-ecosystems. We observed *Coranus caprilesi* sp. nov. from March to September during both hot period and south west monsoon in tropical forest-Western Ghats, India.

DISCUSSION

Coranus Curtis have been recorded from the peninsular India (Distant, 1902; Ambrose & Vennison, 1989; Ambrose & Sahayaraj 1993, Biswas & Animesh, 2010). In the present paper a new species of *Coranus* namely *caprilesi* is described and illustrated. *Coranus caprilesi* sp. nov. is closely related to *Coranus soosaii* (Ambrose & Vennison 1989) in having the four segmented antenna and antennomere I is the shortest and antennomere II, antennomere III segments are longest antennal segments. *Coranus caprilesi* sp. nov. smaller than *C. soosaii* (Ambrose & Vennison, 1989) and *C. vitellinus* (Ambrose, 1980) distinctly shiny black lack in the femur, tibia, and tarsus of fore, mid and hind legs; presence of longitudinal impression in pronotum up to the middle and bean shaped projection at the base; slight annulations in the femorae of *C. vitellinus*. However, venation is almost similar to both *C. soosaii* and *C. caprilesi.*

Rostrum is slightly curved with almost equal first and second segments and third the shortest segment; pronotum transversely divided exactly at the middle by an impression; three projections on either side of the pronotum; scutellum triangular with raised apical region. Fore femorae is highly nodulous, whereas in *C. soosaii*, both fore and hind femorae distinctly noduloses and hind femorae subnodulose. Silvery soft hairs are either alone or in tuft throughout the body. All femora with annulations. *C. vitellinus* is piceous, densly sericeous greyisly and pilose, both fine obscure, membrane shining bronzy black, tip of rostrum, eyes, apex and base of tibia gray (Ambrose, 1980). Pygophore apex strongly bifid in *C. soosaii,* but slightly bifid on *C. caprilesi.*

Adults are arboreal; live on *Abutilon indicum* (Malvaceae) in group at Western Ghats of south India. Under laboratory condition, adults feed *Corcyra cephalonica* Stainton larvae. *C. vitellinus* habits in scrub jungles.

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a b

Figure 1. *Coranus capriles* sp. nov. photograph dorsal (a) and lateral view (b).

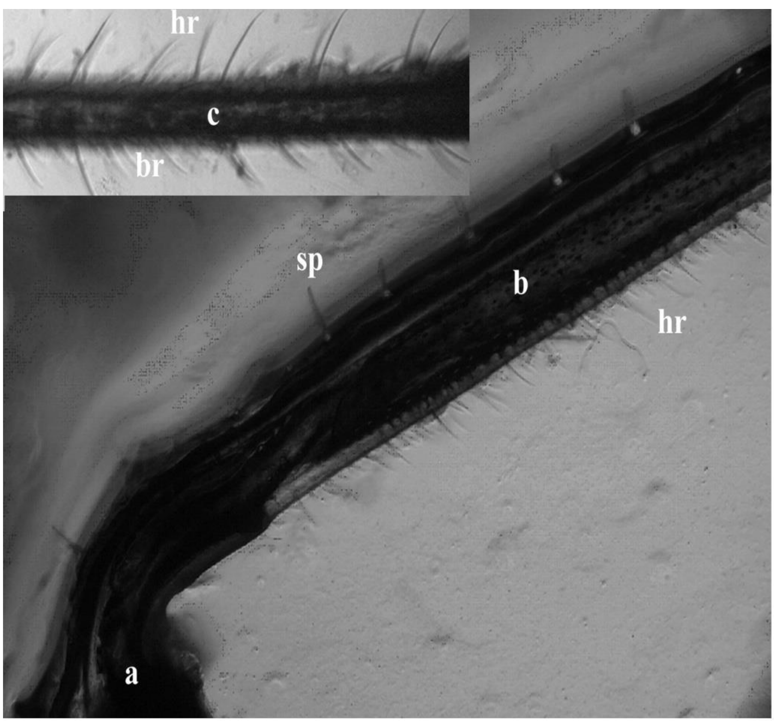

Figure 2. Microphotograph of (4x) coxa (a), femur (b) and tibia (c) with bristles (br), spines (sp) and hairs (hr).

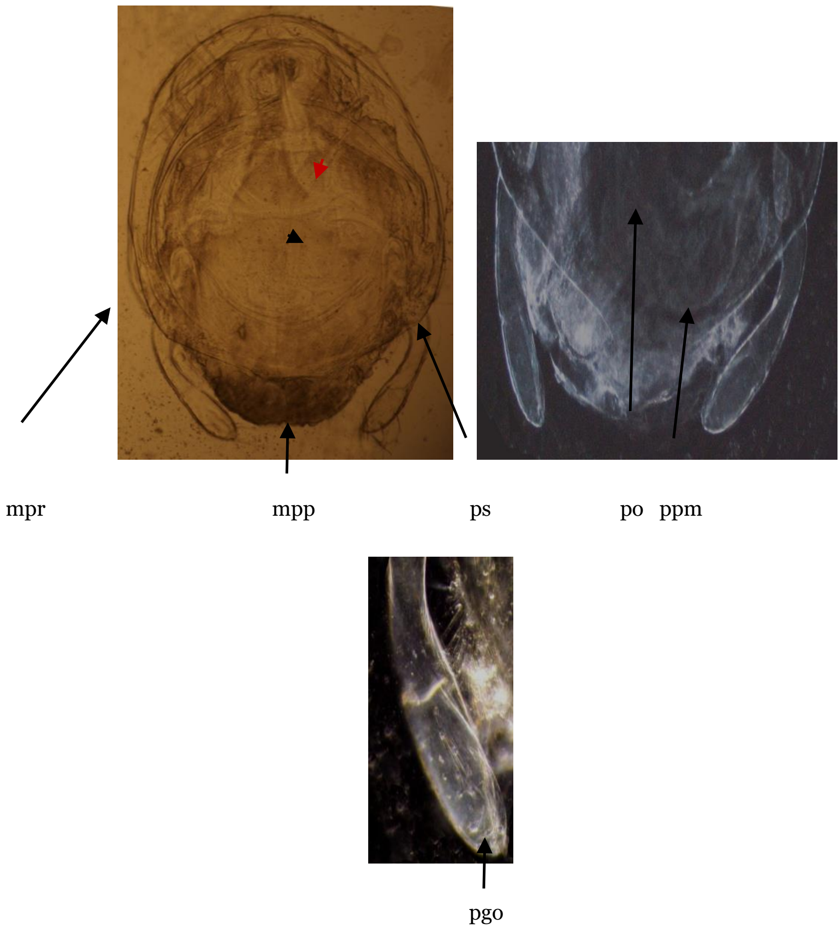

Figure 3. Microphotograph (10x) of *Coranus caprilesi* sp. nov pygophore in dorsal view (a), same but only lower portion lateral view in dark-filed microscope (b) and right paramere (C): showing medial process of pygophore (mpp), medial process of the paramere (mpr), process of genital opening (pgo), prolongation of posterior margin of phygophore (ppm), paramere socket (ps), genital posterior opening of the pygophore (po), transverse bridge of the pygophore (br) and anterior opening of the pygophore (ap).

A NEW RECORD OF *APHELOCHEIRUS NEPALENSIS* ZETTEL, 1998 FROM NORTHEASTERN HIMALAYAN REGION OF INDIA (HETEROPTERA: APHELOCHEIRIDAE)

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[Basu, S. & Subramanian, K. A. 2016. A new record of *Aphelocheirus nepalensis* Zettel, 1998 from Northeastern Himalayan Region of India (Hemiptera: Heteroptera: Aphelocheiridae). Munis Entomology & Zoology, 11 (2): 588-590**]**

ABSTRACT: *Aphelocheirus* (*Aphelocheirus*) *nepalensis* Zettel, 1998 of the family Aphelocheiridae was earlier described from Nepal. During a recent expedition to Arunachal Pradesh, the second author had collected this species from Talley Valley Wildlife Sanctuary. This is the first record of this species from India and with this new record, a total of nine species of the genus *Aphelocheirus* Westwood now reported from India.

KEY WORDS: Aphelocheiridae, *Aphelocheirus*, Himalayan, Northesatern States, Arunachal Pradesh, India

Aphelocheirus Westwood, of the family Aphelocheiridae inhabiting the bottom substratum of streams or lakes, shows its greatest diversity on the Southeast Asian mainland (Zettel & Tran, 2009). Most of the species are restricted to small distributional ranges. They have poor dispersal abilities and hence restricted geographic distribution. Globally, this species contain single genus *Aphelocheirus* Westwood accommodated under two subgenera *Aphelocheirus* Westwood and *Micraphelocheirus* Hoberlandt & Štys, 1979 (Polhemus & Polhemus, 1989; Thirumalai, 2008).

Among the 91 described species described globally, a total of eight species were described from India (Basu et al., 2013). However, a good number of species still remain undescribed and unexplored. The present study extends the geographic distribution of *Aphelocheirus* (*Aphelocheirus*) *nepalensis* Zettel, 1998 to Arunachal Pradesh of India, which was earlier, described from Nepal.

MATERIALS AND METHODS

The materials were collected from Pange stream flowing at the periphery of Talley Valley Sanctuary of Arunachal Pradesh. The specimens were collected from under the cobbles and gravel of fast flowing cold water stream and preserved in 75% ethyl alcohol. The materials were examined under Leica M205A and the photographs were taken by the same. The genitalia of male individuals were dissected and kept for 30 minutes in 10% KOH. All the measurements of body parts were taken in millimeters (mm).

RESULTS

Aphelocheirus (*Aphelocheirus*) *nepalensis* Zettel, 1998

Material examined: 1 female, India: Arunachal Pradesh, Pange stream (upstream), Talley Valley Sanctuary, Lower Subanshri, 12.04.2015, Coll: Dr. K. A. Subramanian; 3 males, 2 females, 2 nymphs, India: Arunachal Pradesh, Pange stream (downstream), Talley Valley Sanctuary, Subanshri, 10.4.2015, Coll: Dr. K.A. Subramanian. Alt: 1875 m. Lat. N27.546781; Long. E93.89648.

Diagnostic characters.
Size: Male (Figs. 1, 2), body length ranges from 9.15 to 9.30 and maximum body width across 3rd abdominal segment varies from 5.98 to 6.14. Female (Fig. 3) attains a length of 9.98 to10.08 and maximum body width across 3rd abdominal segment varies from 6.47 to 6.64.
Colour: Head yellowish brown with black distinct markings in the middle. Pronotum dark brown with yellowish margin laterally on each side and with central yellowish spot. Scutellum yellowish. Hemelytra dark brown, coarsely rugose and embolium pale dirty brown. Abdominal tergites dark brown. Ventrally head including antenna yellow. Abdominal sternites dark brown with bright yellow genital segment in male.
Description: Head shining yellow with pale fine spots. Length of head 1.16 and width 2.15 (including eyes), head is much longer and wider in females. Eye length 0.65 and width 0.43. Interocular width 1.17. Rostrum 4.12 in length and reaches upto mid coxa. Length of antennal segments 1st to 4th: 0.11:0.23:0.33:0.39. Pronotum rugose with dense pale dots, slightly elevated on disc, length 1.04 and width 4.60. Lateral margins pale yellow, without erect setae. Scutellum 1.23 in length and 3.38 in width, tip acuminated. Hemelytra touching each other medially, 2.61 in length and 1.94 in width, with projected corners on embolar margin. Abdominal tergites symmetrical, with a pair of glandular openings on posterior margin of 3rd segment, corners of each segment more or less acuminated on both sides. Propleura acuminated tip posteriorly with blunt inner propleural projection as in fig. no. 6. Metasternum carinated medianly. Metaxyphus small, tip pointed. Fore femora long, 1.92 in length. Fore, mid and hind leg golden with shining long golden setae, claws well developed and curved. Abdominal sternites IV-VI elevated medianly, with 5 peg-like setae on anterior margin. VII and VIII abdominal sternites bent downward medially. Genital segments shining and enlarged.
Genitalia: Male genital capsule with aedagus and left and right parandria as in fig.9. Left and right paramere elongated, as in fig.10 and 11, right paramere is sickle-shaped. Female subgenital plate (Fig. 8) with one pair of long setae laterally and one pair of small erected setae medially on posterior margin, dense golden setae distributed throughout the subgenital plate.

Distribution. Nepal (Kotku, Tikabhairab, Bagmati, Kathmamdu valley), India (Arunachal Pradesh).

DISCUSSION

Aphelocheirus (*A.*) *nepalensis* Zettel was first described by Zettel on 1998. The present study reports the occurrence of this cryptic species from north-eastern Himalayan ecosystems of India (Arunachal Pradesh). These benthic water bugs are mainly associated with freshwater habitats and found mostly under the stones or pebbles. Hence, they are very difficult to collect and can easily escape routine collections. Consequently, it is suggested that an extensive survey should be carried out in the Eastern Himalayan Ecosystems of India as it might harbors many more diverse and elusive species which were hitherto unknown from India or new to science.

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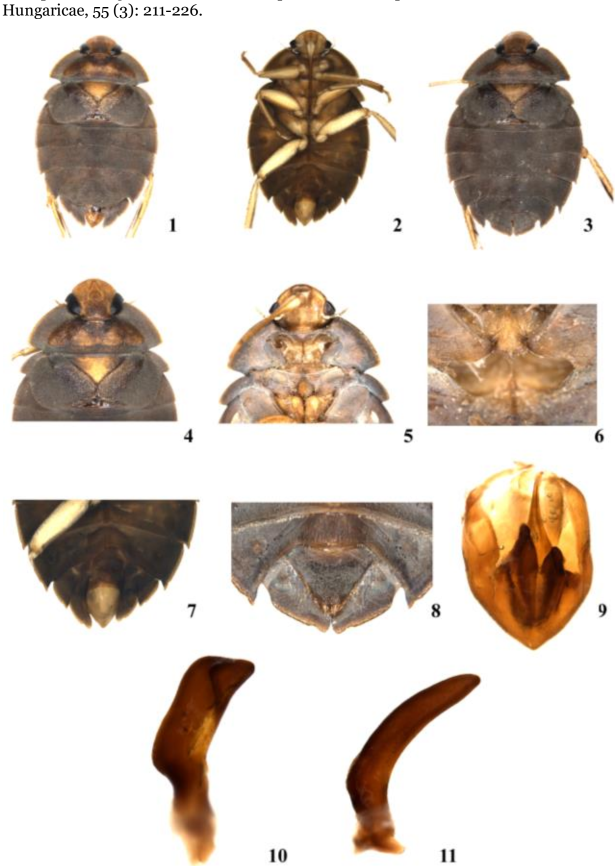

Figures 1-11. 1. Dorsal view of male, 2. Ventral view of male, 3. Dorsal view of female, 4. Head, pronotum and hemelytra of male, 5. Propleura and inner propleural projection, 6. Metaxyphus, 7. Male genital segment, ventral view, 8. Female genital segment, ventral view, 9. Male genital capsule, 10. Left paramere of male, 11. Right paramere of male.

SOME NEW RECORDS OF REDUVIIDAE FROM TELANGANA, INDIA (HEMIPTERA: HETEROPTERA)

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[Mukherjee, P. & Hassan, M. E. 2016. Some new records of Reduviidae from Telangana, India (Heteroptera: Hemiptera). Munis Entomology & Zoology, 11 (2): 591-595**]**

ABSTRACT: The paper presents six new record of family Reduviidae *viz. Ectomocoris ochropterus* Stal, *Spilodermus quadrinotatus* Fabricius, *Oncocephalus fuscinotum* Reuter and *Coranus fuscipennis* Reuter, from the state of Telangana, India. Key to the different taxa, diagnostic characters and distributions of each species in India and abroad have been included.

KEY WORDS: Hemiptera, Reduviidae, Telangana

The family Reduviidae belongs to the Superfamily Reduvioidea of the Suborder Heteroptera of the Order Hemiptera under the Division Exopterygota of Class Insecta. This is the largest and most diverse group of predacious terrestrial Hemiptera or true bugs.They are commonly known as "Assassin bugs".They are usually found on shrubs, grasses, under boulders, under bark, leaflitter, at light, human dwellings and different agro-ecosystems. This family is represented globally by more than 6878 species and subspecies under 981 genera belonging to 25 subfamilies (Henry, 2009). Of them 465 species under 144 genera belonging to 14 subfamilies are recorded from India (Biswas & Mitra, 2011). The classification of the family has been mainly adopted after Ambrose (2006).

Present study deals with new records of 6 species under 6 genera belonging to 5 subfamilies *viz. Polytoxus maculatus* Distant of Saicinae, *Rhaphidosoma atkinsoni* Berger, *Euagoras plagiatus* (Burmiester) of Harpactorinae, *Oncocephalus annulipes* Stal of Stenopodainae, *Catamiarus brevipennis* (Serville) of Peiratinae and *Acanthaspis flavipes* Stal of family Reduviinae from the state of Telangana.

MATERIALS AND METHODS

This study is based on the materials collected during field surveys by different survey parties of Zoological Survey of India from the state of Telangana. The specimens were collected in 70% alcohol and then set pinned. The specimens are deposited in the National Zoological Collection of Zoological Survey of India, Hemiptera Section, Kolkata.

Measurement and photographs of the species were taken with the aid of Leica M 205A. All measurements are in millimetres.

RESULTS AND DISCUSSION

SYSTEMATIC LIST

Suborder **HETEROPTERA**

Infraorder **CIMICOMORPHA**

Family **REDUVIIDAE**

Subfamily **SAICINAE**

Genus *Polytoxus* Spinola, 1840

Polytoxus maculatus Distant, 1903

Subfamily **HARPACTORINAE**
Genus *Rhaphidosoma* Amyot and Serville, 1843
Rhaphidosoma atkinsoni Berger, 1893
Genus *Euagoras* Burmiester, 1835
Euagoras plagiatus (Burmiester, 1834)
Subfamily **STENOPODAINAE**
Genus *Oncocephalus* Klug, 1830
Oncocephalus annulipes Stal, 1855b
Subfamily **PEIRATINAE**
Genus *Catamiarus* Amyot & Serville, 1843
Catamiarus brevipennis (Serville, 1831)
Subfamily **REDUVIINAE**
Genus *Acanthaspis* Amyot & Serville, 1843
Acanthaspis flavipes Stal, 1855a

SYSTEMATIC ACCOUNT

Key to the subfamilies of the family Reduviidae
1. Ocelli absent..SAICINAE
-. Ocelli present...2
2. Hemelytra with a quadrangular areolet or cell at interior area of corium near base of membrane...HARPACTORINAE
-. Hemelytra without a quadrangular areolet or cell at interior area of corium near base of membrane...3
3. Hemelytra with a discoidalareolet or cell touching base of membrane..STENOPODAINAE
-. Hemelytra without a discoidalareolet or cell...4
4. Pronotum constricted behind middle...PEIRATINAE
-. Pronotum constricted before or near middle..REDUVIINAE

Subfamily SAICINAE
Genus *Polytoxus* Spinola, 1840

1840. *Polytoxus* Spinola, Essaisur les Insectes Hemipteres Rhyngotesou Heteropteres, 47 pp.

Polytoxus maculatus Distant, 1903 (Fig. 1)

1903. *Polytoxus maculatus* Distant, Ann. Soc. Entomol. Belg., 47: 53.
1904. *Polytoxusmaculatus,* Distant, Fauna Brit. India, Rhynchota, 2: 218.
2006. *Polytoxusmaculatus,* Ambrose, Zoos' Print Journal, 21 (9): 23.

Material examined: 1 ex., INDIA: Telangana: Mahbubnagar District: Gadwal: PWD (R&D) IB12.XII.1987, coll. B. Nandi and party; 1 ex., Mahbubnagar District, Gadwal, PWD (R&D) IB, 14.XII.1987, coll. B. Nandi and party; 1 ex., Mahbubnagar District, Gadwal, PWD (R&D) IB, 13.XII.1987, coll. B. Nandi and party; 1 ex., Mahbubnagar District: Mannanur (Nagarjuna Sagar Tiger Reserve), 11.IV.1985, coll. C. Chatterjee and party.

Diagnostic character: Body pale ochraceous; posterior lobe of pronotum reddish ochraceous; hemelytra and legs pale luteous; a spot on each lateral area of sternal segments, sublateral area of abdomen, apices of femora, bases and apices of tibiae and tarsi black or piceous; antennae fuscous, base of first segment ochraceous; apices of lateral angles of pronotum and scutellar spine fuscous; anterior lobe of pronotum obscurely centrally sulcate; legs moderately pilose, posterior femora about as long as the abdomen.

Length: 12 mm.

Distribution: India: Telangana (Mahbubnagar), Tamil Nadu. **Elsewhere:** Myanmar.

Subfamily HARPACTORINAE

Key to the genera of the Subfamily Harpactorinae
1. Specimen apterous...***Rhaphidosoma*** Amyot and Serville
-. Specimen macropterous...***Euagoras*** Burmiester

Genus *Rhaphidosoma* Amyot and Serville, 1843

1843. *Rhaphidosoma* Amyot and Serville, Histoire Naturelle des Insects Hemipteres Libraire Encyclopedique de Roret, Paris: Fain et Thunot., 336 pp.

***Rhaphidosoma atkinsoni* Berger, 1893** (Fig. 2)

1893. *Rhaphidosoma atkinsoni* Berger, Ent. Month. Mag.: 63.

Material examined: 6 exs., INDIA: Telangana: Mahbubnagar District: Mannanur (Nagarjuna Sagar Tiger Reserve), 11.IV.1985, coll. C. Chatterjee and party.

Diagnostic character: Body fuscous, with a narrow, lateral, pale ochraceous fascia on each side extending from apex of pronotum to abdominal apex, interrupted at the bases of the abdominal segments; body beneath very pale ochraceous, abdomen with a fuscous central longitudinal line, which is obsolete on the two basal segments; first segment of antennae about as long as from eyes to base of thorax; apex of head unarmed or very obsoletely spinous; pronotum distinctly convexly tumid, a little shorter than mesonotum, and slightly longer than metanotum.

Length: 25 mm.

Distribution: India: Telangana (Mahbubnagar), Kerala, Tamil Nadu. **Elsewhere:** SriLanka.

Genus *Euagoras* Burmiester, 1835

1835. *Euagorus*Burmiester, Handb., 2: 226.

***Euagoras plagiatus* (Burmiester, 1834)** (Fig. 3)

1834. *Zelus plagiatus* Burmiester, Nov. Act. Ac. Nat. Cur., 16 (1): 303.

1904. *Euagorus plagiatus*: Distant, Fauna Brit. India, Rhynchota, 2: 363.

2006. *Euagorus plagiatus*: Ambrose, Zoos' Print Journ., 21 (9): 8.

Material examined: 1 ex., INDIA: Telangana: Hyderabad District: Secunderabad, 19.I.04, coll. D.R. Mullik and party.

Diagnostic character: Head, pronotum, scutellum reddish yellow with slight brownish tinge, hemelytron pronotum, a broad central spot to pronotum black; posterior spines to the pronotum curved and reflexed; first joint of antennae about as long as anterior femora or head, pronotum and scutellum together, rostrum reddish with its apex black.

Length: 13-14 mm.

Distribution: India: Telangana (Hyderabad), Chhattisgarh, Assam, Maharashtra, Tamil Nadu, Andaman Islands, Kashmir, Kerala, West Bengal, Meghalaya. **Elsewhere:** Myanmar, China, Japan, Indonesia, Malaysia, Philippines, Singapore.

Subfamily STENOPODAINAE

Genus *Oncocephalus* Klug, 1830

1830. *Oncocephalus* Klug, Symb. Phys., 2**.**

***Oncocephalus annulipes* Stal, 1855b** (Fig. 4)

1855b. *Oncocephalus annulipes* Stal, Ofv. K. Vet. Ak. Forh., 12: 345-347.

1904. *Oncocephalus annulipes*, Distant, Fauna Brit. India, Rhynchota, 2: 231-232.

2006. *Oncocephalus annulipes*, Ambrose, Zoos' Print Journal, 21 (9): 24.

Material examined: 1 ex., INDIA: Telangana: Chittoor District: Tirupati, 26. X. 1986, coll. M.S. Shishodia and party; 1 ex., Nalgonda District, Sirsaila Tiger Reserve, 23.XI.1998, coll. P.H. Roy.

Diagnostic character: Body very pale brownish ochraceous; first segment of antennae binnulated, four obsolete lines on anteocular area of head and a large medial spot on postocular area, rostrum beyond middle, three distinct longitudinal fasciae on anterior area of pronotum, lateral areas of scutellum, a central streak to clavus, a posterior oblong subclaval spot, with a much smaller outer spot, and a large subquadrate spot in inner areola to corium, a small basal and a large discal elongate spot to membrane, marginal spots to abdomen, irregular spots to sternum, apical areas of intermediate and posterior tibiae, the apices of the tarsi dark fuscous; anterior femora variable marked with fuscous;anteocular more than twice of postocular portion of head; first segment of antennae as long as anteocular portion of head; lateral margins of pronotum armed medially with a small tubercle.

Length: 14-24 mm.

Distribution: India: Telangana (Chittoor, Nalgonda),Kashmir, Maharashtra, Tamil Nadu. **Elsewhere:** Africa, Australia, Brazil, China, Malaysia, Myanmar, Philippines, Rodriguez Island, SriLanka.

Subfamily PEIRATINAE

Genus *Catamiarus* Amyot & Serville, 1843

1843. *Catamiarus* Amyot & Serville, Hem.: 323.

***Catamiarus brevipennis* (Serville, 1831)** (Fig. 5)

1831. *Pirates brevipennis* Serv., Ann. Sc. Nat., 23: 217.
1904. *Catamiarus brevipennis*: Distant, Fauna Brit. India, Rhynchota, 2: 302.
2006.*Catamiarus brevipennis*: Ambrose, Zoos' Print Journ., 21 (9): 15.

Material examined: 1 ex., INDIA: Telangana: Mahbubnagar District: Mannanur (Nagarjuna Sagar Tiger Reserve), 11.IV.1985, coll. C. Chatterjee and party; 1 ex., Guntur District: Nagarjuna Kunda, 6.II.1963, coll. K. Reddish.

Diagnostic character: Body black; a large rounded spot adjoining to the apex of the clavus and a very large discal spot to membrane brownish yellow; antennae hairy; head with the lateral margin hirsute; legs and margins of the body with long hair or hirsute.

Length: 20-26 mm.

Distribution: India: Telangana (Mahbubnagar, Guntur), Chhattisgarh, Uttaranchal, Rajasthan, Tamil Nadu, Karnataka.

Subfamily REDUVIINAE

Genus *Acanthaspis* Amyot & Serville, 1843

1843. *Acanthaspis* Amyot & Serville, Histoire Naturelle des Insects Hemipteres Libraire Encyclopedique de Roret, Paris: Fain et Thunot., 336 pp.

***Acanthaspis flavipes* Stal, 1855a** (Fig. 6)

1855a. *Acanthaspis flavipes* Stal, Ofv. Vet.-Ak. Forh., 12: 187.
1904. *Acanthaspis flavipes*: Distant, Fauna Brit. India, Rhynchota, 2: 262.
2006. *Acanthaspis flavipes*: Ambrose, Zoos'Print Joun., 21 (9): 19.

Material examined: 1 ex., INDIA: Telangana: Karimnagar District: PWD Irrigation IB comp: Jamikunta night collection, 4.XII.1987, coll. B. Nandi and party; 1 ex., Karimnagar District, PWD Irrigation IB comp., Jamikunta night collection, 5.XII.1987, coll. B. Nandi and party.

Diagnostic character: Body brown; large transverse spot to the middle of corium, spot to connexivum; rostrum, legs, apex of scutellar spine luteous; pronotum with anterior lobe strongly sculptured, lateral angle spinouslyproduced; scutellar spine obliquely ascendant.

Length: 15.5-16 mm.

Distribution: India: Telangana (Karimnagar), Chhattisgarh, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and West Bengal.

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Stal, C. 1855a. Nya Hemiptera. Ofv. K. Vet. Ak. Forh., 12: 181-192.
Stal, C. 1855b. Hemiptera from Kafferlandet. Ofv. K. Vet. Ak. Forh., 12: 345-347.

Figures 1-6. 1.*Polytoxus maculatus* Distant, 2. *Rhaphidosoma atkinsoni* Berger, 3. *Euagoras plagiatus* (Burmiester), 4. *Oncocephalus annulipes* Stal, 5. *Catamiarus brevipennis* (Serville), 6. *Acanthaspis flavipes* Stal.

SPECTROSCOPIC ANALYSIS OF CHORION (EGGSHELL) OF TWO INDIAN GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE)

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[Shyam Roy, A., Ghosh, D. 2016. Spectroscopic analysis of chorion (eggshell) of two Indian grasshoppers (Orthoptera: Acrididae). Munis Entomology & Zoology, 11 (2): 596-612**]**

ABSTRACT: *Oxya hyla hyla* and *Gesonula punctifrons* are Orthopteran insects and representative of Acrididae family. Spectroscopic analysis of chorion of these two insects revealed involvement of Calcium, Zinc, Iron and Copper in the hardening of chorion. High abundance of tryptophan and tyrosine has been detected. A protein with 55 kDa molecular weight was commonly available in both insects without any conserved sequence. Structural analysis executes different 3D structure of this protein and also indicated about their differential role in chorion formation in case of these two insects.

KEY WORDS: AAS, chorion, *Gesonula punctifrons*, mass spectra, *Oxya hyla hyla*

The chorion or eggshell is a complex extracellular structure providing protection to the developing embryo (Chapman, 1998). Main components of chorion are protein and some inorganic components (Hinton, 1981). In Lepidoptera, chorion contained large amount of sulphur, phosphate and calcium which is stabilized in the proteinaceous structure of the chorion by forming di-sulphide and phosphodiester bond (Hinton, 1981). But studies on Orthopteran chorion about inorganic components and their role in maturation of developing embryo is little in literature. On the other hand, protein constituents of the chorion have been extensively studied in Orthoptera as well as in insects of other order also. Amino acid composition has also been studied in different insects by earlier researchers. Abundance of amino acids was determined in silk moth (Reiger et al., 1980). With mass spectral analysis proteins were identified with functional properties (Fakhouri et al., 2006). Three proteins have been identified with their amino acid constituents and abundance in the proteins in *Aedes aegypti* through mass spectral analysis (Li & Li, 2006). But in Orthoptera, little is known about the amino acid composition of the protein and inorganic constituents. This study concerns the identification of inorganic components, amino acid abundance and the structural analysis of a single protein of same molecular weight was in two different insects through computational analysis.

MATERIALS AND METHODS

Egg collection: *G. punctifrons* and *O. hyla hyla* (paddy grasshopper) were collected from the paddy fields in and around Agartala city in India. Mature eggs were dissected out and collected from the mature ovarian follicle, oviduct and after laying eggs were collected just after laying of the eggs before pod formation.

Isolation of chorion and solubilization: After collection of eggs, the eggs were cut by blade and washed in 100mM Tris-HCl (pH 8.2). The chorion was solubilized in a solution developed by the authors (400 mM Tris-HCl, pH 8.4, 4% β-marcaptoethanol, 6 M Urea,). This solution produced satisfactory result and most of the portions of the eggshell were solubilized. After solubilization the solution was centrifuged at 5,000 rpm for 5 minutes and the resulting supernatant was used for spectroscopic analysis.

Atomic Absorption Spectroscopy: For Atomic Absorption Spectroscopy eggshells or chorions were cut with sharp blade and washed with brush in de-ionized distilled water to remove the yolk materials. The insoluble chorions further washed in 95% and 100% ethanol followed by repetitive washes in de-ionized distilled water to remove the aldehyde contents. After air drying 0.5g chorion samples were treated with few drops of hydrogen peroxide, kept overnight and evaporated to dryness. After that 0.5ml of perchloric acid was added and heated, this process was repeated for 2-3times. After drying, 2-3 ml of HCl was added to the sample and the solution diluted with de-ionized distilled water (Dey et al., 2003). The analysis was carried out in Atomic Absorption Spectrophotometer, Perkin-Elmer, A Analyst 200.

Spectroflurimetry: *Oxya* and *Gesonula* samples were diluted 100x with water and scanned at 280 nm and 295 nm for the abundance of protein (Tyrosine and Tryptophan) and Tryptophan. Millipore water served as a blank. Excitation and emission slit widths were maintained at 5 nm in a Hitachi F4500 spectroflurimeter. The instrument was attached to a constant temperature water bath (Poly science, USA) set at 25 ±0.50C. A 3ml quartz cuvette was used.

Size exclusion HPLC: *Oxya* and *Gesonula* chorion solutions were diluted to 10x with water and applied for the detection of proteins and analyzed using Waters gel filteration protein- pakTM 125 Å (78 X 300 mm, fractionation range, 5-80 kDa) isocratically where the coloumn was equilibrated and eluted with 20 mM Na-phosphate and 0.5 M NaCl, pH -7.5 at a flow rate of 1ml/min.Elution and was monitored at 220 nm and 280 nm. 50 µl of sample was applied to the column. Blank runs with 10 µl of water served as a control where no spurious peak appeared.

Mass spectroscopy:

In-gel digestion: The major Protein bands of 55 kDa from commasie stained -gels were selected and marked a & b alphabetically. These bands were excised manually using a clean scalpel blade, sliced into 1 mm cube, placed in a 2 ml eppendorf tube and dehydrated in acetonitrile, which was then removed and further dried in vacuum (Shevchenko et al., 1996). 0.05 ml, 20 mM DTT in 100 mM NH_4HCO_3 was added to cover the gel pieces and the protein was reduced for 1 h at 60 °C. After cooling to room temperature, DTT solution was replaced by same volume of 55 mM iodoacetamide (IAA) in100 mM NH_4HCO_3 and incubated for 45 min at room temperature in dark. The IAA solution was removed and the gel pieces were rinsed thrice with 100 mM NH_4HCO_3 and acetonitrile successively using vortex. The liquid phase was removed and gel pieces were completely dried in vacuum. The gel pieces were swollen in 0.025 ml digestion buffer containing 100 mM NH_4HCO_3, 5 mM $CaCl_2$ and 1 µg of trypsin gold in ice bath for 1 h; after which another 0.025 ml of digestion buffer was added and incubated overnight at 37 °C. Peptides were extracted with three changes of 50% acetonitrile/0.1% TFA which was then dried or concentrated using vacuum centrifugation.

Maldi-Tof Analysis: All analysis was performed using a 4800 MALDI TOF/TOF (Applied Biosystems) operated in reflectron mode. Peptide mixture was desalted using C18 zip tip and analyzed using a saturated solution of CHCA (α-cyano-4-hydroxycinnamic acid) in 50% acetonitrile/0.1% trifluoroacetic acid. The MS/MS peak of the most intense tryptic peptide mass ion peak were searched against MSDB database of all sequences using Mascot (Matrix Science, Ltd., London,United Kingdom; http://www.matrixscience.com search program with fixed and variable modifications; Carbamidomethyl (C) and Oxidation (M) respectively.

2.8. Computational analysis of protein structure: In the present study we have used Homology Modeling to build the three- dimensional protein structure from protein sequence. Homology modeling is currently the most accurate computational method to generate reliable structural models and is routinely used in many biological applications. Using experimentally determined structures of related protein sequence as template the three-dimensional protein structure has been generated. SWISS-MODEL workspace, an integrated web-based modeling system, has been used for this purpose.

RESULT AND DISCUSSION

Atomic Absorption Spectroscopic Study

Atomic absorption spectroscopic studies revealed the composition of several inorganic elements in the chorion of *O. hyla hyla* and *G. punctifrons*, in three stages of maturity i.e. follicle stage, oviduct stage and after laying stage. Four elements were found in both insects and were Calcium, Zinc, Iron and Copper. Stage wise concentrations are presented in Table 1 and Table 2.

Calcium was found in very high concentration in every stage of development in both insects. It had highest concentration among all the elements of chorion composition. As chorion is a proteinaceous structure, calcium may play a vital role in the organization of protein component (Williams, 1989).

Presence of Iron in chorion had been described by William (Williams, 1990) and it was suggested that its presence in chorion may be due to its role in photobiology and electrical properties of chorion (Dey et al., 1998).

It was suggested by Strobel (Li & Li, 2006) that because of thermal properties of Zinc and Copper, they have been found in chorion at a very high concentration.

Surprisingly the concentrations of the components increased with the stage of maturation. It can be concluded from the present study that as chorion is a very complex structure, these components may play important role to increase the complexity and hardening of the chorion.

With these observations it can be concluded that with relation to stage wise surface ultrastructure modification the inflow of the inorganic materials also increased. It might be related to the increased structure of the surface ridges, spicules, micropylar pore, cap region etc. But no such relation was found in amount of different inorganic materials and this indicated that the inflow of the materials were different. Williams (Williams, 1990) found same kind of feature in different biological structures. The amount of inorganic materials were different in case of these two insects and it can be concluded that the amount of these inorganic materials might vary in respect of species. But the pattern of increasing amount in every case of inorganic components was similar in both insects.

Spectrofluorimetric analysis

To understand the content of amino acids of *Oxya* and *Gesonula* chorions, absorption and fluorescent emission spectra were taken at 280nm and 295nm separately and it was observed that both the solution had absorption at 295nm (λmax ex: 295nm) and emission at 360nm (λmax ex: 360nm), but in this case we found a wide range of emission in case of *Gesonula* and *Oxya* it was at 348nm (λmax ex: 348nm). The result of the emission study is presented in Figure 4. When the excitation wavelength was changed to 295nm to 280nm shifting of the curve towards left side and emission was at 329nm and the curve was little bit ignited than the curve at emission at 295nm in case of *Gesonula*. In case *Oxya* the curve was little bit quenched and emission observed at 307nm. In grasshopper such study was conducted earlier (Ghosh et al., 2013) and they got tryptophan and tyrosine in vitellin protein. From the present study it can be concluded that in *Gesonula,* amino acid like tyrosine, tryptophan and phenylalanine should be present, where content of tryptophan was higher in content than of other amino acids. Presence of different amino acids including tyrosine and phenylalanine were detected through electron microscopy by earlier scientists (Furneaux & Mackay, 1972). On the other hand in *O. hyla hyla* it was confirmed that tyrosine and tryptophan was present. Tryptophan had much greater concentration. Presence of trytophan and tyrosine in mosquito chorion were established by earlier scientists (Fuchs et al., 2014).

3.3. Size- Exclusion HPLC

SDS-PAGE analysis revealed a protein with 55 kDa mass. Because of limited sensitivity of SDS-PAGE gel analysis we moved towards the Size- Exclusion HPLC for purification and determining the accurate mass of the particular protein which was present in both the insect with great intensity. After In-gel digestion of the protein the solution was diluted with water and subjected to HPLC analysis. Elutions were taken at 220nm and 280nm. In case of *Oxya* a sharp pick came with a small single pick at the retention time 12/min. The small pick may be due to presence of some disulphide bond or covalent, non-covalent binding of different subunits of the protein. In *Gesonula* a single sharp pick came with retention time 11.59/min. From these result it was confirmed that molecular mass of the protein ranged from 50 kDa to 60 kDa.

Mass Spectroscopy

For doing MALDI analysis the first proteomics approach was SDS- PAGE electrophoresis of solubilized eggshell proteins with Urea, Tris-HCl, β-Marcaptoethanol, followed by in-gel trypsin- gold digestion and MALDI-ToF MS/MS analysis. SDS-PAGE electrophoresis was performed using an acrylamide percentage of 15% that allowed clear separation of several proteins in the 15.1 kDa to 83.2 kDa range in *Oxya* and in *Gesonula* 18.2 kDa to 97.7 kDa range, that may be the major eggshell proteins. The SDS-PAGE gel identifed differences between the amount of migration of the proteins of the samples of two different insects. Results were reproducible to identify distinct proteins on SDS-PAGE gel. MALDI-ToF MS/MS analysis was done for specific band of SDS-PAGE gel. In this approach trypsinized peptides were generated directly from the SDS-PAGE gel. MALDI-ToF MS/MS has a great dynamic range and good sensitivity. One protein was identified from SDS-PAGE analysis (Fig. 7.) and the protein ranged between 50-60 kDa. This protein was commonly available in both insects and also in two developing stages. This protein generated multiple tryptic peptides that provided identification of this protein and comprehensive analysis of the eggshell structural protein. BLAST search of the partial sequences against the NCBI protein database method matched different proteins. Table 3-4 provides details about these proteins.

MS Data of *Oxya* sample:

1 glycosyl transferase, group 1 family protein CC3345 [imported] - Caulobacter crescentus G87663 61 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.4335	848.468	0.0345	41	91	96	ICLEWK	Carbamidomethyl (C)[2]
1051.5275	1051.6313	0.1038	99	136	144	LMVATPTMR	Oxidation (M)[2,8]
1147.6106	1147.6602	0.0496	43	161	170	GVDTDIFKPR	
1151.6459	1151.6439	-0.002	-2	226	235	YPEVKFLGAK	
1334.6838	1334.7992	0.1154	86	220	230	EELAEKYPEVK	
2015.0466	2015.1399	0.0933	46	128	144	WFHKPSGRLMVATPTMR	
2225.0332	2224.9641	-0.0691	-31	327	344	ACAEEFFRNLQPYPEPEK	Carbamidomethyl (C)[2]
2325.2349	2325.0039	-0.231	-99	171	191	QPGEPDLFEGLARPIFLNVGR	

2 AE005673 NID: - Caulobacter crescentus CB15 AAK25307 61 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.4335	848.468	0.0345	41	91	96	ICLEWK	Carbamidomethyl (C)[2]
1051.5275	1051.6313	0.1038	99	136	144	LMVATPTMR	Oxidation (M)[2,8]
1147.6106	1147.6602	0.0496	43	161	170	GVDTDIFKPR	
1151.6459	1151.6439	-0.002	-2	226	235	YPEVKFLGAK	
1334.6838	1334.7992	0.1154	86	220	230	EELAEKYPEVK	
2015.0466	2015.1399	0.0933	46	128	144	WFHKPSGRLMVATPTMR	
2225.0332	2224.9641	-0.0691	-31	327	344	ACAEEFFRNLQPYPEPEK	Carbamidomethyl (C)[2]
2325.2349	2325.0039	-0.231	-99	171	191	QPGEPDLFEGLARPIFLNVGR	

3 Putative transmembrane protein.- Bacteroides thetaiotaomicron. Q8ABI3_BACTN 59 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
866.4553	866.4865	0.0312	36	1083	1089	LCLSAFR	Carbamidomethyl (C)[2]
882.5043	882.5037	-0.0006	-1	207	214	GIIDHSIK	
951.475	951.5552	0.0802	84	498	505	MKAMVEAR	Oxidation (M)[1]
1017.5662	1017.5958	0.0296	29	694	701	YLLGMKHR	
1033.5789	1033.6285	0.0496	48	429	436	NIRFENLK	
1166.6576	1166.6576	0	0	193	202	VLIENVHDVK	
1514.7849	1514.6956	-0.0893	-59	815	827	KQETPWEPTGLTK	
1571.7673	1571.708	-0.0593	-38	846	859	SGRWESVNISSHGR	
1845.8477	1846.0149	0.1672	91	69	84	HYVENASMAIFDFTGK	Oxidation (M)[8]
2015.1073	2015.1399	0.0326	16	44	60	VRLQDGVWHTLSSYLIK	
2383.1638	2383.0151	-0.1487	-62	998	1017	YVVVQVEDGEWMNYTVNIPK	
2922.2981	2922.1516	-0.1465	-50	901	924	YGCENWGVAPNWFYEWTGWGTLTK	Carbamidomethyl (C)[3]

4 AE015928 NID: - Bacteroides thetaiotaomicron VPI-5482 AAO75234 59 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
866.4553	866.4865	0.0312	36	1083	1089	LCLSAFR	Carbamidomethyl (C)[2]
882.5043	882.5037	-0.0006	-1	207	214	GIIDHSIK	
951.475	951.5552	0.0802	84	498	505	MKAMVEAR	Oxidation (M)[1]
1017.5662	1017.5958	0.0296	29	694	701	YLLGMKHR	
1033.5789	1033.6285	0.0496	48	429	436	NIRFENLK	
1166.6576	1166.6576	0	0	193	202	VLIENVHDVK	
1514.7849	1514.6956	-0.0893	-59	815	827	KQETPWEPTGLTK	
1571.7673	1571.708	-0.0593	-38	846	859	SGRWESVNISSHGR	
1845.8477	1846.0149	0.1672	91	69	84	HYVENASMAIFDFTGK	Oxidation (M)[8]
2015.1073	2015.1399	0.0326	16	44	60	VRLQDGVWHTLSSYLIK	
2383.1638	2383.0151	-0.1487	-62	998	1017	YVVVQVEDGEWMNYTVNIPK	
2922.2981	2922.1516	-0.1465	-50	901	924	YGCENWGVAPNWFYEWTGWGTLTK	Carbamidomethyl (C)[3]

5	Hypothetical protein.- Beet leafhopper transmitted virescence phytoplasma.	Q6JKN6_9MOLU	56	0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.4182	848.468	0.0498	59	200	206	TPNMLEK	Oxidation (M)[4]
1562.752	1562.8422	0.0902	58	207	219	YLQKMTSDSAYQK	
1571.8639	1571.708	-0.1559	-99	43	55	VINEVTEIREIEK	
1772.865	1772.7732	-0.0918	-52	225	239	QHPQSNKPHCPPFAK	Carbamidomethyl (C)[10]
1845.9316	1846.0149	0.0833	45	150	165	HPPMDLVGIYFDKGTR	
1900.96	1901.1051	0.1451	76	224	239	KQHPQSNKPHCPPFAK	Carbamidomethyl (C)[11]
2225.0254	2224.9641	-0.0613	-28	99	116	DCSYIVFEPDEKPTLMHK	Carbamidomethyl (C)[2], Oxidation (M)[16]

6	Putative amino acid-binding periplasmic protein.- Bordetella parapertussis.	Q7WB05_BORPA	53	0

Protein Group

Putative amino acid-binding periplasmic protein.- Bordetella pertussis. Q7VY31_BORPE

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
864.421	864.4959	0.0749	87	138	144	FEDLQGR	
982.5502	982.52	-0.0302	-31	71	79	HLGVAMNLK	
1165.6841	1165.6576	-0.0265	-23	217	226	KWHVGLAVQK	
1562.8611	1562.8422	-0.0189	-12	146	159	IGVLVDSVQFNMIK	
1731.9098	1731.9769	0.0671	39	95	110	ADVMSAPLFVTPERAK	
2015.0193	2015.1399	0.1206	60	166	183	VSTYQDYSTLLADVRAGR	
2282.1406	2281.9756	-0.165	-72	146	165	IGVLVDSVQFNMIKDMPDTK	Oxidation (M)[12,16]

7	Envelope glycoprotein, c2-v3 region (Fragment).- Human immunodeficiency virus 1.	Q71498_9HIV1	53	0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.4736	848.468	-0.0056	-7	79	84	LREQFR	
982.525	982.52	-0.005	-5	36	44	KSIHMGPGR	
1051.528	1051.6313	0.1033	98	5	13	SKNFTNNAR	
1731.9501	1731.9769	0.0268	15	7	21	NFTNNARSIIVQLNK	
2293.1394	2293.0176	-0.1218	-53	37	57	SIHMGPGRAFYTTGDIIGDIR	Oxidation (M)[4]

8	Prolyl endopeptidase.- Pyrococcus furiosus.	Q8U2K9_PYRFU	52	0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
864.4573	864.4959	0.0386	45	362	368	KVEGEFR	
882.429	882.5037	0.0747	85	173	178	MFWKDR	
1017.5727	1017.5958	0.0231	23	577	585	EIGAPVYLR	
1147.5782	1147.6602	0.082	71	339	347	YTSFTIPYR	
1165.6099	1165.6576	0.0477	41	304	313	LEVYTLNGEK	
1279.6317	1279.6818	0.0501	39	76	85	WFNGDVIVDSK	
1562.9039	1562.8422	-0.0617	-39	603	616	ELTDLLAFVLKTLS	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

In case of *Oxya* these proteins represented well characterized transporting protein, transmembrane protein, periplasmic protein, prolyl edopeptidase and other proteins that had not previously been shown to be physically associated with the eggshell structure. The assignments to these groups of protein were in some cases supported by structural features similar to known eggshell structural proteins, e.g., glycosyl transferase and putative transmembrane protein. These proteins construct some statement of known function in the eggshell (Table 3). So it was correlated to the closely related two proteins based on their scoring, species closeness and habitat.

Two proteins had been considered to get a wide range of specificity about the accurate sequence of the protein and the amino acid richness in this particular protein. Other proteins had been discarded which got low score and dissimilarity with the species of investigation in the mass spectral analytical result. Two closely related proteins i.e. Glycosyl transferase and Putative transmembrane protein had been considered on basis of highest scoring and species closeness with the species of investigation according to mass spectral results. The Glycosyl transferase had the highest scoring with 61. Six polypeptide fragments of 55 kDa protein of *Oxya hyla hyla* matched with this sequence of Glycosyl transferase. Details of these polypeptide fragments were presented in Table 4. The second protein which was taken under consideration was Putative transmembrane protein. This protein was taken under consideration because of its membranous nature which might have resemblance of eggshell's protective covering nature. Twelve polypeptide fragments of 55 kDa protein of *Oxya hyla hyla* matched the sequence of Putative transmembrane protein (Table 4).

According to the proteins of consideration of mass spectral analysis, the protein in case of *Oxya* contained Leucine, Glutamic acid, Proline, valine and Glycine dominantly. In *Aedes aegypti* also these amino acids were found in abundance (Li & Li, 2006). Second most abundant aminoacids were tyrosine, tryptophan and serine. Presence of anionic amino acid like glutamic acid suggested about the electrostatic or ionic bond crosslinking which might be responsible for the hardening of the chorion proteins. The evaluation of tryptophan was also detected by fluorescence spectroscopy. Tyrosine residues might be responsible for the complexity and hardening of the eggshell. This tyrosine was also responsible for the formation of the di-tyrosine which was also involved in the chorion hardening. Chorion hardening due to di-tyrosine formation was established in *Drosophila* & *Aedes* (Petri et al., 1976; Mindrinos et al., 1980; Li et al., 1996).

MS Data of *Gesonula* sample:

Gel Idx/Pos	46/B19	Instr./Gel Origin	AK170/Ragini300113	Process Status	Analysis Succeeded
Plate [#] Name	[1] 40	Instrument Sample Name		Spectra	1

Rank	Protein Name	Accession No.	Protein Score	Protein Score C. I. %	Total Ion C. I. %
1	Testes-specific heterogenous nuclear ribonucleoprotein G-T.- Homo sapiens (Human).	Q6PEZ2_HUMAN	63	0.355	

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.3896	848.4682	0.0786	93	188	195	DGYSGPPR	
864.5049	864.4964	-0.0085	-10	197	203	EPLPPRR	
882.4904	882.5016	0.0112	13	163	171	RAAPSGPAR	
1004.4908	1004.4285	-0.0623	-62	188	196	DGYSGPPRR	
1005.4748	1005.431	-0.0438	-44	297	307	GTPPSYGGGGR	
1018.4985	1018.4905	-0.008	-8	1	9	MVEADRPGK	Oxidation (M)[1]
1061.5123	1061.4454	-0.0669	-63	186	195	GRDGYSGPPR	
1118.4862	1118.4629	-0.0233	-21	218	226	DGYSSRDYR	
1391.7278	1391.5919	-0.1359	-98	81	93	VAQATKPAFESSR	
1866.7711	1866.7185	-0.0526	-28	308	323	CEEYRGYSPDAYSGGR	Carbamidomethyl (C)[1]
1980.8682	1980.765	-0.1032	-52	125	143	GGPDDDGGYAADFDLRPSR	
2400.2332	2400.0842	-0.149	-60	1	22	MVEADRPGKLFIGGFNLETDEK	

Rank	Protein Name	Accession No.	Protein Score	Protein Score C. I. %	Total Ion C. I. %
2	Hypothetical protein.- uncultured archaeon GZfos23H9.	Q64CD8_9ARCH	56	0	

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
864.4825	864.4964	0.0139	16	285	291	FEKELAK	
905.5203	905.6082	0.0870	97	50	56	VQRDFIK	
1004.4829	1004.4285	-0.0544	-54	131	139	DPSVDGRMK	
1005.4894	1005.431	-0.0584	-58	223	230	NSLARCER	Carbamidomethyl (C)[6]
1018.5778	1018.4905	-0.0873	-86	431	439	TKSILEEAK	

1062.5071	1062.4502	-0.0569	-54	1	8	MNHKELMK	Oxidation (M)[1,7]
1075.5055	1075.4705	-0.035	-33	181	189	HVEAEAEYK	
1151.5942	1151.6233	0.0291	25	288	297	ELAKAEAEYK	
1258.5909	1258.5596	-0.0313	-25	415	425	VHDEESSQSIK	
1447.7209	1447.6123	-0.1086	-75	253	265	MENLEGEAAIKAR	Oxidation (M)[1]
2036.946	2037.0164	0.0704	35	195	211	TDDEVGWANYGHFLEKR	
2483.168	2483.0945	-0.0735	-30	105	127	DVCAAYVADDLSSVEGVPDMIIK	Carbamidomethyl (C)[3], Oxidation (M)[20]

3 ENSANGP00000026727.- Anopheles gambiae str. PEST. Q5TSC6_ANOGA 55 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
1338.5805	1338.5892	0.0287	21	50	59	AWWCAECEVK	Carbamidomethyl (C)[4,7]
1570.7306	1570.63	-0.1006	-60	50	61	AWWCAECEVKIK	Carbamidomethyl (C)[4,7]
1772.7468	1772.7768	0.03	17	19	33	ADSVDSLLQCDFCDK	Carbamidomethyl (C)[10,13]
1942.8522	1942.7773	-0.0749	-39	2	18	QEESAVIADFTCAVCDK	Carbamidomethyl (C)[12,15]
2093.9497	2094.0259	0.0762	36	34	49	WYHYECAHVDKTVETR	Carbamidomethyl (C)[6]

4 Blr6815 protein.- Bradyrhizobium japonicum. Q89F86_BRAJA 52 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
1075.4651	1075.4705	0.0054	5	112	121	DAAEADQAER	
1391.6914	1391.5919	-0.0995	-71	76	86	ELLQRDEFDAR	
1617.9547	1617.9445	-0.0102	-6	173	187	DAALAQLLRIHVAAR	
1817.8446	1817.7406	-0.104	-57	5	21	QRLDGEDVEAGMGDVAR	
1829.8678	1829.7953	-0.0725	-40	38	54	GVDQDAAWAHHPDALAR	
1888.8817	1888.7699	-0.1118	-59	7	24	LDGEDVEAGMGDVARAQR	
2483.3364	2483.0945	-0.2419	-97	157	181	AFGDGGVAIALDGVNRDAALAQLLR	

5 Hypothetical protein.- Arabidopsis thaliana (Mouse-ear cress). Q8LEN4_ARATH 52 0

Protein Group

hypothetical protein T22F8.220 - Arabidopsis thaliana T08580

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
1051.532	1051.6329	0.1009	96	111	118	KNQSFWNK	
1151.6241	1151.6233	-0.0008	-1	1	9	MAFIQEIKR	Oxidation (M)[1]
1448.7156	1448.7998	0.0842	58	200	211	LDFEPDEETIIK	
1980.947	1980.765	-0.182	-92	196	211	MEQKLDFEPDEETIIK	Oxidation (M)[1]
2466.2275	2466.0842	-0.1433	-58	169	189	NPLIQHANSFQVFPFDVAMFK	Oxidation (M)[19]
3575.6936	3575.4548	-0.2388	-67	63	93	MPKPLENPKTLWVMMSSSLGLCGQHNTNMNK	Carbamidomethyl (C)[22], Oxidation (M)[1,14]
3632.8433	3632.4822	-0.3611	-99	160	189	ICIIYTQFKNPLIQHANSFQVFPFDVAMFK	Carbamidomethyl (C)[2], Oxidation (M)[28]

7 RecA (Fragment).- Vibrio parahaemolyticus. Q6TDV6_VIBPA 51 0

Protein Group

RecA (Fragment).- Vibrio parahaemolyticus. Q6TDV0_VIBPA

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
868.4015	868.4832	0.0817	94	86	92	MLSQAMR	Oxidation (M)[1,6]
996.4966	996.5221	0.0256	26	86	93	MLSQAMRK	Oxidation (M)[1,6]
1772.9463	1772.7766	-0.1697	-96	51	68	SGAIDVMVVDSVAALTPK	
1942.9119	1942.7773	-0.1346	-69	100	114	QSNCMCIFINQIRMK	Carbamidomethyl (C)[4,6]
2094.0359	2094.0259	-0.01	-5	113	132	MKIGVMFGNPEPTTGGNALK	Oxidation (M)[1,6]
3632.7241	3632.4822	-0.2419	-67	51	85	SGAIDVMVVDSVAALTPKAEIEGEMGDSHMGLQAR	Oxidation (M)[7,25,30]

8 Oleosin-like protein.- Oryza sativa (japonica cultivar-group). Q6YSH4_ORYSA 51 0

Peptide Information

Calc. Mass	Obsrv. Mass	± da	± ppm	Start Seq.	End Seq.	Sequence	Modification
848.3995	848.4682	0.0687	81	32	38	EEKEGEK	
1005.4231	1005.431	0.0079	8	50	60	GEGSGGDAAER	
1118.5623	1118.4629	-0.0994	-89	1	11	MGGQAGELALR	Oxidation (M)[1]
1923.7773	1923.7384	-0.0389	-20	77	96	GPGGDDGDDGGMVWSGATTR	Oxidation (M)[12]

Groups of proteins were obtained in *Gesonula* from the mass spectral analysis. These were testes specific heterogeneous nuclear ribonuclear protein, hypothetical proteins of uncultured archaeon, *Arabidopsis thaliana*, Oleosin-like protein, protein ENSANGP00000028727- *Anopheles gambie* and other proteins. Some of these proteins have known functions in construction of chorion. Detail of these protein functions are presented in Table 5.

Among these proteins, two proteins had been selected here mainly on basis of species closeness. These two proteins were ENSANGP00000028727- *Anopheles gambie* selected on basis of species closeness as this protein belonged to an insect (mosquito) and it was a structural protein. Four fragments of 55 kDa protein of *Gesonula punctifrons* matched with this ENSANGP00000028727- *Anopheles gambie* (Table 6).The other protein of consideration was Oleosin-like protein of *Oryza sativa*. This protein was taken under consideration because the species of investigation was a pest of rice and might resemble structural protein of eggshell. Four polypeptide fragments of 55 kDa protein of *Gesonula* matched with Oleosin-like protein. Details of these polypeptide fragments are presented in Table 6.

In case of *Gesonula* this protein was predominant with alanine, Cystein, Glutamic acid, aspartic acid and Glysine. Valine, tyrosine and tryptophan like amino acids were also available. Here also dominancy of anionic amino acid suggested about the ionic or electrostatic bond formation. In *Gesonula* presence of cysteine residue indicated about the crosslinking of disulphide bridge formation in chorion hardening. Li & Li, (2006) found cysteine residue responsible for chorion hardening in *Aedes aegypti* eggshell. Here also presence of tyrosine indicated about the formation of the di-tyrosine residue which were actively involved in chorion hardening and undergo further structural modification (Mattinen et al., 2005).

Two closely related proteins were considered from mass spectral analysis in each case of insect species under investigation. But considerable richness of aminoacids were found in those two proteins which were under consideration. Irles (Irles et al., 2009; Irles & Maria-Dolors, 2011) identified two insect chorion proteins which had similar kind of amino acid richness. But could not able to get high homology with any other structural protein with these two identified proteins. This 55 kDa protein was taken under consideration because this protein was present in both insects in two developing stages. But on analysis of the sequence no similarity was found among this protein of two species of investigation. While abundance of amino acids were quite similar in case of this 55 kDa protein in these two insects. No conserve sequence was also found. But richness in anionic amino acids of this protein explained their same behavioral property. So it may be concluded that although the Rm of 55 kDa proteins were same those might had evolved separately but were composed of similar amino acids for serving similar function.

Computational analysis of the protein structure:

In the Homology Modeling approach, for a given target protein, a library of experimental protein structures was searched to identify suitable templates. On the basis of a sequence alignment between the target protein and the template structure, a three-dimensional model for the target protein was generated (Konstantin et al., 2006).The structural analysis revealed that in *Oxya*, the 55kDa protein had structurally closest identity with envelope glycoprotein (Fig. 8). In *Oxya,* presence of 39 groups, 305 atoms and 309 bonds were revealed through computational analysis (using Rasmol).

In *Gesonula* the 55 kDa protein has identity with ATPase (Fig. 9). Computational analysis revealed presence of 28 groups, 216 atoms and 220 bonds in this structure (using Rasmol). Structural analysis showed the functional differences of a same molecular weight protein (55 kDa) in these two grasshoppers.

α–helix and β-sheet were identified from the structures of this 55 kDa proteins in both insects. It can be inferred from the study that this 55 kDa protein had different structural identity and also had different role in the formation of chorion in these two different insect. As there was no conserved sequence found in 55 kDa protein of these insects and functionally also they are different, it can be concluded from this observation that this 55 kDa protein are not exists as polymorphic form of same protein. They are may be two different chorionic proteins having the same molecular weight and actively involved in major roles of chorionic functions. Although most of the works on chorion of different insects have suggested the structural roles of the chorion proteins and glycoproteins recently some works have been published which have suggested that apart from the structural role and works in protecting the egg from dessication other roles are also played by some chorion proteins. In *Anopheles gambiae* (Amenya *et al.*, 2010) it has been shown that, out of the 44 proteins present there one of those works as receptor. In *Blatella germanica* (Irles *et al.*, 2013) it has been shown that one protein present there serves as Na+-K+ ATPase.

ACKNOWLEDGEMENTS

Authors are thankful to the authorities of Tripura University for giving necessary financial support to carry out the work. Thanks are also to Dr. D. Bhattacharya, Chief Scientist, Indian Institute of Chemical Biology for helping us in spectroscopical analysis. Thanks are also due to Dr. Surajit Basak, Assistant Professor, Department of Molecular Biology & Bioinformatics, Tripura University for helping us in computational analysis of the protein structure.

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Table 1. Inorganic elements present in *Oxya hyla hyla*.

Elements	Amount of inorganic element present in chorion (µg/mg)			
		Follicle Stage	Oviduct Stage	After Laying Stage
Calcium		2.22 ±0.070	3.13±0.053	4.10±0.045
Zinc		0.77±0.039	1.45±0.025	2.15±0.018
Iron		0.695±0.026	1.41±0.038	2.14±0.048
Copper		0.265±0.003	0.294±0.002	0. 325±0.006

Table 2. Inorganic elements present in *Gesonula punctifrons*.

Elements	Amount of inorganic element present in chorion (µg/mg)			
		Follicle Stage	Oviduct Stage	After Laying Stage
Calcium		4.47±0.118	10.77±0.135	15.36±0.112
Zinc		1.3±0.097	6.22± 0.084	12.1±0.076
Iron		0.235±0.033	2.15±0.028	8.61±0.044
Copper		0.112±0.008	0.315±0.012	3.55±0.005

Table 3. List of identified proteins grouped in functional categories in *Oxya*.

NCBI acc. no.	Protein name and species	Mascot score	Molecular function
G87663	Glycosyl transferase, group 1 family protein [*Caulobacter crescentus*]	61	Biosynthesis of disaccharides, oligosaccharides and polysaccharides.
AAK25307	AA005673 [*Caulobacter crescentus*]	61	Catalyze the transfer of sugar moieties from activated donor molecules to specific acceptor molecules forming glycosidic bonds.

G87663	Glycosyl transferase, group 1 family protein [*Caulobacter crescentus*]	61	Biosynthesis of disaccharides, oligosaccharides and polysaccharides.
AAK25307	AA005673 [*Caulobacter crescentus*]	61	Catalyze the transfer of sugar moieties from activated donor molecules to specific acceptor molecules forming glycosidic bonds.
Q8AB13_BACTN	Putative transmembrane protein [*Bacteroides thetaiotaomicron*]	59	Biosynthesis of peroxisomes
AA075234	AE015928 NID [*Bacteroides thetaiotaomicron* VPI-5482]	59	Catalyzes the reversible oxidation of malate to oxaloacetate
Q7VY31_BORPE	Putative amino acid-binding periplasmic protein [*Bordetella pertussis*]	53	Binding protein dependent transport system for amino acids
Q71498_9HIV1	Envelope glycoprotein, c2-v3 region (fragment) [HIV 1]	53	Vital role in attachment to specific cell surface receptors.
Q8U2K9_PYRFU	Prolyl endopeptidase [*Pyrococcus furiosus*]	52	Involved in maturation an degradation of peptide hormones and neuropeptides. Trans configuration of the peptide bond proceedind proline.
Q6JKN6_9MOLU	Hypothetical protein- Beet leafhopper transmitted virescence phytoplasma	56	Uncharacterized

Table 4. Identification of chorion protein of *Oxya hyla hyla*.

First protein of consideration which have homology with 55 kDa protein of *Oxya*

Fragment masses that matched 55 kDa protein				
Calculated mass	**Observed mass**	**Start**	**End**	**Sequences***
848.43	848.46	91	96	ICLEWK
1051.52	1051.63	136	144	LMVATPTMR
1147.63	1147.66	161	170	GVDTDIFKPR
2325.23	23.25.0	171	191	QPGEPDLFEGLARPIFLNVGR
1334.79	1334.68	220	230	EELAEKYPEVK
1151.65	1151.64	226	235	YPEVKFLGAK
MRILLATDAWEPQVNGVVRTLSRVTEELRAMGHIVDVVSPDQFPTFPLPTYPEIKLAIGA YEPVQERFKLFEPEAIHIATEGPIGLAARRICLEWKLPFTTSYHTKFPEYVSARLPLPLA AGYTYMRWFHKPSGRLMVATPTMRDELAKHGFRNLSPWSRGVDTDIFKPRQPGEPDLFEG				

LARPIFLNVGRVAVEKNIEAFASLDLPGTKVVIGDGPQREELAEKYPEVKFLGAKFGDEL GRYFGCADVFCFPSLTDTFGLVILEAMAAGVPVAAFSAPGPVDIIPGSNAGVLAPGQTEG LREACLACLDLDRTVVRKFAERFSWRACAEEFFRNLQPYPEPEKTRFWRRLRRLARLRKK TAA

*artificial modification of amino acid residues, i.e. Carbamidomethyl (C) and Oxidation (M) are not shown. The sequence at the bottom of the table is Glycosyl transferase, group 1 family protein with the identification peptides underlined.

Second protein of consideration which have homology with 55 kDa protein of *Oxya*

Fragment masses that matched 55 kDa protein

Calculated mass	Observed mass	Start	End	Sequences*
2015.11	2015.14	44	60	VRLQDGVWHTLSSYLIK
1845.85	1846.01	69	84	HYVENASMAIFDFTGK
1165.66	1165.66	193	202	VLIENVHDVK
882.50	882.50	207	214	GIIDHSIK
1033.57	1033.62	429	436	NIRFENLK
951.47	951.55	498	505	MKAMVEAR
1017.56	1017.59	694	701	YLLGMKHR
1514.78	1514.69	815	827	KQETPWEPTGLTK
1571.77	1571.70	846	859	SGRWESVNISSHGR
2922.29	2922.15	901	924	YGCENWGVAPNWFYEWTGWGTLTK
2383.16	2383.02	998	1017	YVVVQVEDGEWMNYTVNIPK
866.45	b 866.48	1083	1089	LCLSAFR

MKKYWFLLLAALLGGATCIFAKDTLATWKAPAGVALNSDFTVKVRLQDGVWHTLSSYLIK VDEVRDTRHYVENASMAIFDFTGKVEVAVTYNLGEVQTAKVRPLSYDIPFQIDGNTVTFT LEHPRNLSVEVNGDIFHNFHLFTGSPERTIPDKDNPEVIYFGPGIHTVKNGELRVPSGKT VYLAGGAVLMGRVLIENVHDVKLLGRGIIDHSIKGGIRIANSRDVYVEGIVATQCATGGS ENVTIRNVKSISYYGWGDGMNVFASNNVLFDGVFCRNSDDCTTVYGTRLGFEGGCRNITM QNSTLWADVAHPIFIGIHGNSKAPEVLEDLNYINIDILDHREKQVDYQGCMAINAGDNNL IRNVHFEDIRVENFRQGQLVNLRIFYNEKYCTAPGRGIENVLFKNISYTGENAELSIIEG YDEKRKVKNIRFENLKINGKLIDDNMPDKPRWYKTSDMARIYVGPHVENIVFTSDVAQSQ RRFVHPGITYTQGDLDRMKAMVEARQEPYYSTFLKLKESSYSSLDAPVVNRGEQIKEGRF NATIGVDGRRAHDLALLWHLTGEEAYARKAVEYLNANSYYTNTSSRGTGPLDNGKIYLLI DAAEMMRDYSGWTRQDQQRFKDMLVYPGYSNTENYSAKYANYLDDTKNGVTFYWNIYNFD AARFGNQGLFAARSMMAMAIYLDNEIMYDRAYRYLLGMKHRKDDLPYPSGPAISSDQPIH VSPTMIDYKLLQRKNDIQDYGYDEQLQYYIYPNGQCQESSRDQGHVLAGLHNYVAIAEMA WNQGDSLYSSLDNRLLLGLEWSYRYNLSSIQSYKKQETPWEPTGLTKDMNEVTFDNGKYL QIKSRSGRWESVNISSHGRGDVAGTGGTREMALAHYAVRSGLPAEKYTWLQRYRDYMIER YGCENWGVAPNWFYEWTGWGTLTKRLTPWMAGDPVTFSTGKRVSGLHQLPSTILAADYDY YCISENPEGHTYHNIGTVRGNEYRPDGAVELQKIDNKYVVVQVEDGEWMNYTVNIPKSGA YAVYLTYSANSSSHVAMASDQGLEISSSIPSSKKWKETKLGELSLSAGACVLRLRVDKAG QKLCLSAFRLEKVERDR

*artificial modification of amino acid residues, i.e. Carbamidomethyl (C) and Oxidati are not shown on (M). The sequence at the bottom of the table is Putative transmembrane protein – Bacteroides thetaiotaomicron with the identification peptides underlined.

Table 5. List of identified proteins grouped in functional categories in *Gesonula*.

NCBI acc. no.	Protein name and species	Mascot score	Molecular function
Q6PEZ2_HUMAN	Testis-specific heterogenous nuclear ribonucleoprotein	63	Nucleotide binding protein
Q5TSC6_ANOGA	ENSANGP00000028727- [*Anopheles gambie*]	55	uncharacterized
Q89F86_BRAJA	Blr6815 protein- [*Bradyrhizobiu m japonicum*]	52	uncharacterized
S62848	H+-transporting two sector ATPase gamma chain [*Mycoplasma pneumoniae*]	52	Produces ATP from ADP

Q6TDV6_VIBPA	ReacA [*Vibrio parahaemolyticus*]	51	Catalyzes pairing of ssDNA to dsDNA
Q6YSH4_ORYSA	Oleosin-like protein [*Oryza sativa*]	51	Interacts with both lipid and phospholipids moieties of lipid bodies and stabilizes the lipid body.
Q64CD8_9ARCH	Hypothetical protein [uncultured archaeon]	56	uncharacterized
Q8LEN4_ARATH	Hypothetical protein [*Arabidopsis thaliana*]	52	uncharacterized

Table 6. Identification of chorion protein of *Gesonula punctifrons*.

First protein of consideration which have homology with 55 kDa protein of *Gesonula*

Fragment masses that matched 55 kDa protein

Calculated mass	Observed mass	Start	End	Sequences*
1942.85	1942.78	2	18	QEESAVIADFTCAVCDK
1772.75	1772.78	19	33	ADSVDSLLQCDFCDK
2093.95	2094.03	34	49	WYHYECAHVDKTVETR
1579.74	1579.63	50	61	AWWCAECEVKIK

MQEESAVIADFTCAVCDKADSVDSLLQCDFCDKWYHYECAHVDKTVETRAWWCAECEVKI
KLASGKKDDE

*artificial modification of amino acid residues, i.e. Carbamidomethyl (C)are not shown. The sequence at the bottom of the table is ENSANGP00000028727- *Anopheles gambie* str pest with the identification peptides underlined.

Second protein of consideration which have homology with 55 kDa protein of *Gesonula*

Fragment masses that matched 55 kDa protein

Calculated mass	Observed mass	Start	End	Sequences*
1118.56	1118.46	1	11	MGGQAGELALR
848.4	848.47	32	36	EEKEGEK
1005.42	1005.43	50	60	GEGSGGDAAER
1923.77	1923.74	77	96	GPGGDDGDDGGMVWSGATTR

MGGQAGELALRLASKAATGGDAGERGKRGGKEEKEGEKGGLPLCRFGKKGEGSGGDAAER
GGARPPFLGGLCAEWRGPGGDDGDDGGMVWSGATTRATGAGWRGRG

*artificial modification of amino acid residues, i.e. Oxidation (M) are not shown. The sequence at the bottom of the table is Oleosine-like protein *Oryza sativa* (japonica cultivar group) with the identification peptides underlined.

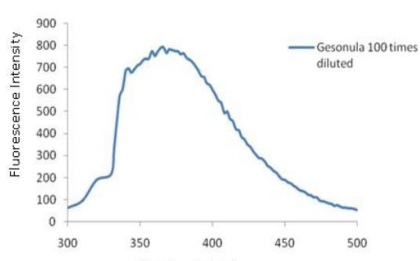


Figure 1. Emission spectrum of *Gesonula* 100x diluted with scanned (Ex: 295; Em: 300-500 nm).

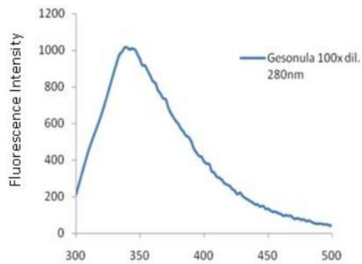


Figure 2. Emission spectrum of *Gesonula* 100x diluted with scanned (Ex: 280; Em: 300-500nm).

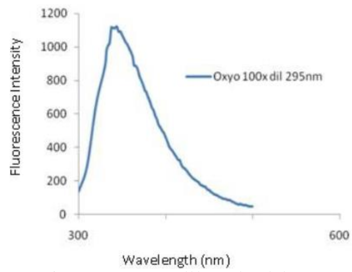


Figure 3. Emission spectrum of *Oxya* 100x diluted with scanned (Ex: 295; Em: 300-500 nm).

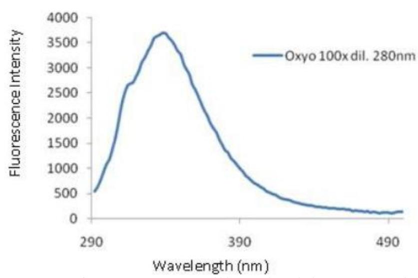
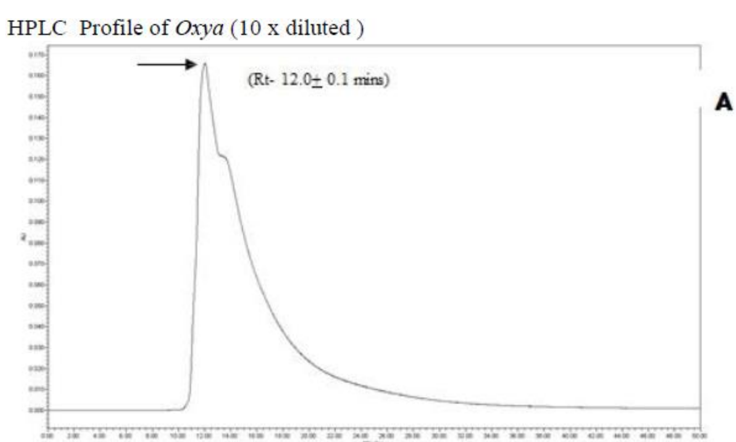


Figure 4. Emission spectrum of *Oxya* 100x diluted with scanned (Ex: 280; Em: 290-500 nm).



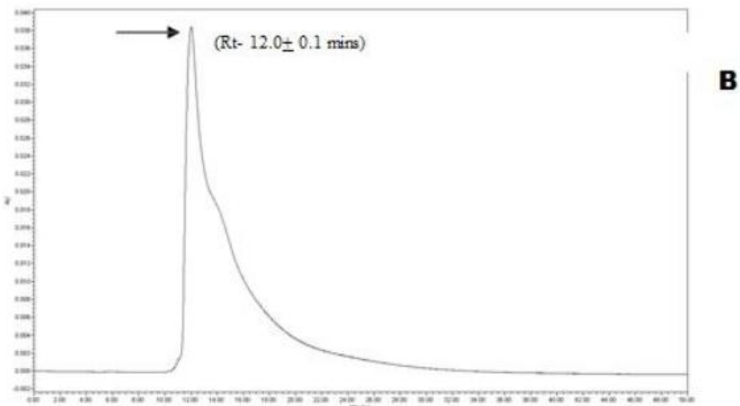


Figure 5. HPLC chromatogram of *Oxya* (10x diluted) with water. Single and major peak observed at Retention time- 12.0+ 0.1 mins (A) Eluted at 220nm. (B) Eluted at 280nm.

HPLC Profile of *Gesonula* (10 x diluted)

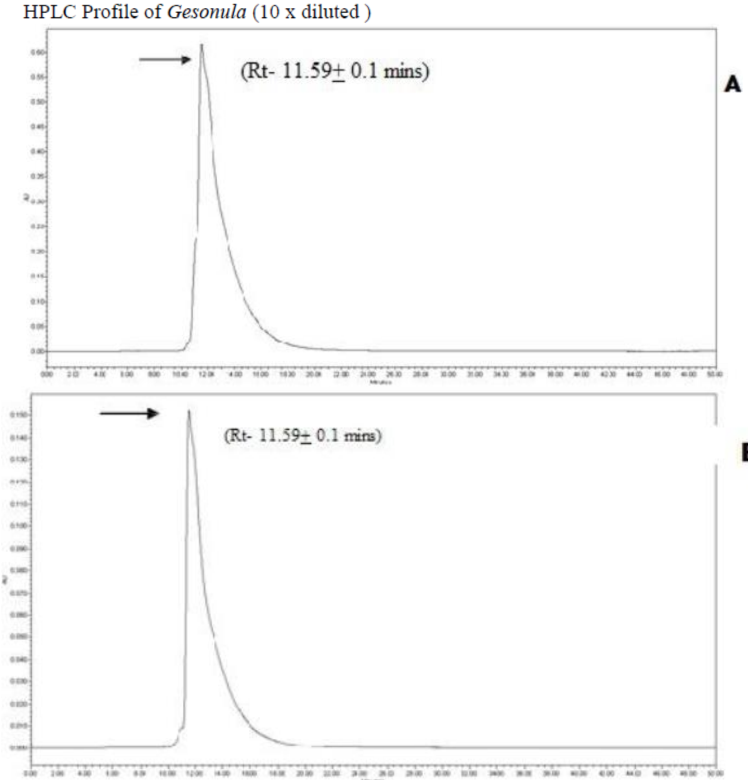


Figure 6. HPLC chromatogram of *Gesonula* (10x diluted) with water. Single and major peak observed at Retention time- 11.59+ 0.1 mins (A) Eluted at 220nm. (B) Eluted at 280nm.

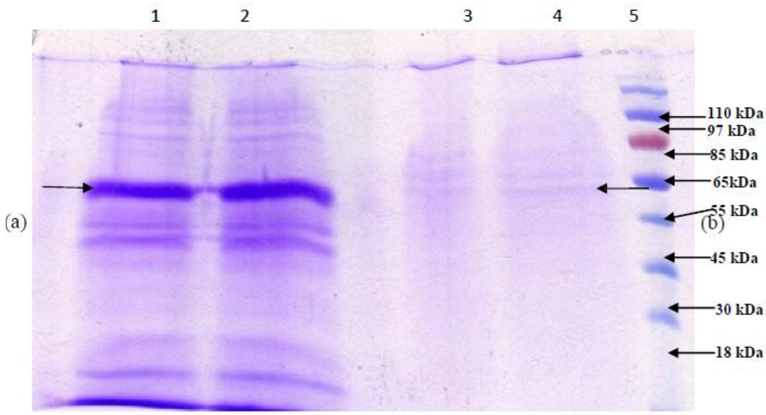


Figure7. SDS PAGE Profile of *Oxya* and *Gesonula* comprising 10% polyacrylamide. Samples were electrophoresed at constant voltage of 100 V for 2 hours followed with coomassie staining. Lane 1 & 2: *Oxya* (40µl and concentration was 2.5mg/ml).Lane 3 & 4: *Gesonula* (40µl and concentration was 1.6mg/ml) as supplied.Lane 5: Protein Molecualr weight marker. In both samples the most intense and major band were observed at 55 kDa.

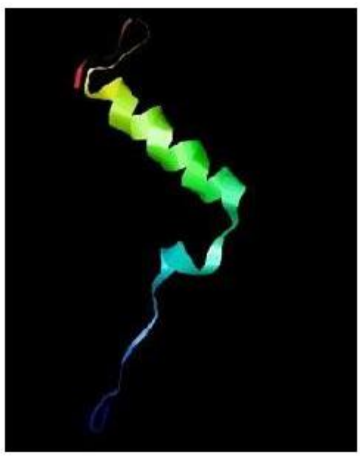


Figure 8. 3D structure of *Oxya* 55 kDa chorion protein.

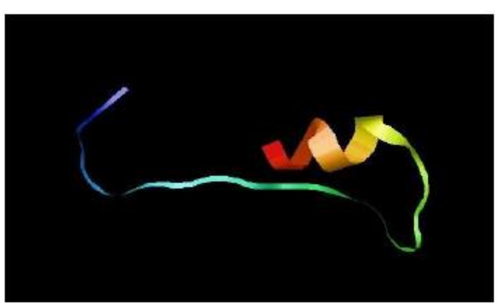


Figure 9. 3D structure of *Gesonula* 55 kDa chorion protein.

LONGHORNED BEETLES FROM GOMARDA WILDLIFE SANCTUARY, CHHATTISGARH, INDIA (COLEOPTERA: CERAMBYCIDAE)

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[**Majumder, A., Halder, S., Raha, A., Mitra, B. & Chandra, K.** 2016. Longhorned beetles from Gomarda Wildlife Sanctuary, Chhattisgarh, India (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 11 (2): 613-618]

ABSTRACT: Faunal survey of Gomarda Wildlife Sanctuary, Chhattisgarh reported eight species of long horned beetles belonging to three subfamilies, of these six species are recorded for the first time from the sanctuary and three species are recorded for the first time from Chhattisgarh. The paper deals with a comprehensive taxonomic account, photographs of these species along with its geographic distribution.

KEY WORDS: Gomarda Wildlife Sanctuary, Chhattisgarh, Long horned beetle, Cerambycidae

Longhorned beetles (Coleoptera: Cerambyidae), an important group of insects are regarded as impending bio indicator for forest regulation (Vance et al., 2003). These small to large sized beetles are easily recognized by their long antenna. Adults are xylophagus, feed on the plant sap, pollen, nectar, and foliage. Despite of its importance as a major forest pest they are poorly studied. This family stands for one of the largest families of Coleoptera with 5232 genera, 30079 species globally (Zang, 2011). The first attempt with major taxonomic and biological studies on this group was taken in 20th century. Gahan (1906) explored these long horned beetles from the Indian regions which were documented in "*Fauna of British India*". The fauna was lacked the information on the subfamily Lamiinae. The inventory on this family from the state Chhattisgarh was done by Majumder et al. (2014) and reported two species from Gomarda Wildlife Sanctuary. The present communication reports 6 species new to Gomarda WLS, of which three species, namely *Chlorophorus annularis* (Fabricius, 1787), *Stromatium barbatum* (Fabricius, 1775), *Diorthus cinereus* (Fabricius, 1793) are new record to Chhattisgarh state.

MATERIALS AND METHODS

Field trips are frequently undertaken for the collection of different species from various habitats. Collections are made during daytime using forceps, from logs, decayed matters, ground, sometimes by beating bushes with a stick and collecting the dropping one on a piece of cloth. Beetles are also collected at night by installing light traps at different locations. Specimens are collected in different sized jars, vials which are filled with benzene for desensitizing the beetles. Specimens are preserved in dry form in paper packets. The specimens collected are brought to the laboratory at The Headquarters, Zoological Survey of India, Kolkata, for further processing of fixation and preservation.

Study area: Faunal exploration was undertaken in the different parts of the Sanctuary. Biogeographically the state Chhattisgarh is placed in Deccan Plateau zone with three provinces namely 6D Chota Nagpur plateau, 6C Eastern Highlands and 6E Central high land (Rodgers et al., 2002). The Sanctuary comes under the district Raigarh, in this State. It lies between 21°30′24″ N to 83°06′47″ E and with an elevation of 400 m. The Sanctuary derives its name from the village Gomarda in Sarangarh tehsil of Raigarh district. It is situated about 15 km south of Sarangarh on Raigarh-Sarangarh-Saraipali state highway.

Abbreviation used: GWLS: Gomarda Wildlife Sanctuary, RH: Rest House, Alt: Altitude, Coll: Collector.

RESULTS

Subfamily Prioninae
Tribe Acanthophorini

Acanthophorus serraticornis (Olivier, 1795)

1795. *Prionus serraticornis* Olivier, Ent., Coléoptères. Imprimerie de Lanneau, Paris, 4 (66): 14.
1906. *Acanthophorus serraticornis*: Gahan, Fauna British India, including Ceylon and Burma (Cerambycidae), I: 23.

Material examined: Raigarh, GWLS, 910RF Watch Tower (Saranger beat) 21°28'56.9", 83°03'17.4" Alt-437 m; 27.vi.2015, coll. Amitava & party.

Diagnostic character: Body very large, measuring about 72mm, robust, glossy, dark brown to black; antenna smaller than body or almost equal, twelve segmented, segment I globular, small, segment III longest, lateral margins of segment III- XI apically gradually angulate towards segment XI; head globular, punctate, eyes large almost covering the gena, frons and clypeus covered with golden hairs, basal margin of vertex with dense golden hairs; pronotum large, much broader than long, glossy dark brown, strongly punctate, baso-lateral area covered with dense pubescence, two raised portion on either side of pronotum, lateral margin with thin spines on either side of pronotum, apico-lateral spine small, comparatively blunt, baso lateral spine much acute and larger than apico-lateral spine, the median spine largest and more acute and more close to apico-lateral spine; elytra, broad, elongated, dark brown, darker towards basal margin, lateral margins with fine yellowish pubescence, apex of the elytra broadly sub rounded; coxal cavities closed, femur robust, flattened, tibia elongated, with sharp spines on the anterior margin; tarsal claw more than 90° angle.

Distribution: India: Chhattisgarh, Andaman and Nicobar Islands, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Sikkim and Tamil Nadu. *Elsewhere:* Sri Lanka.

Subfamily Cerambycinae
Tribe Clytini

Chlorophorus annularis (Fabricius, 1787)

1787. *Callidium annulare* Fabricius, Hafniae, Proft, 1: 156.
1863. *Chlorophorus annularis* Chevrolat, Mémoires de la Société Royale des Sciences de Liège, 18 (4): 290.
1900. *Chlorophorus annularis*: Gahan, The Annals and Magazine of Natural History, 5 (7) 28: 348.
1906. *Caloclytus annularis*: Gahan, The Fauna of British India, including Ceylon and Burma (Cerambycidae), I: 261.
2008. *Chlorophorus annularis*: Makihara, Mannakkara, Fujimura & Ohtake, Bulletin of the Forestry and Forest Products Research Institute, Ibaraki, 7 (2) 407: 106.
2013. *Chlorophorus annularis*: Weigel, Meng & Lin, Formosa Ecological Company, Taiwan: 76.

Material examined: Raigarh, GWLS, 910RF Watch Tower (Saranger beat) 21°28'56.9", 83°03'17.4" Alt-437 m; 27.vi.2015, coll. Amitava & party.

Diagnosis: Body medium, measuring about 12mm, ornamented with black and yellowish patches of pubescence; head small, horizontal, covered with yellowish pubescence, more towards gena and frons; mandibles small, prominent; vertex small, pubescent, narrow, deeply incised in between the antennal tubercles; eyes large almost covered the gena, semicircular, anterior lobe much large than posterior lobe; antenna smaller than body, 11-segmented, dark brown with off white pubescence, more towards apical segments, segment I large, almost equal to IV, but smaller than III; pronotum large globular finely punctate, densely covered with yellowish pubescence, ornamented with some black patches: one on

either side of baso-lateral margins, the second one sub oval, on either side of the apico-lateral region, the third or central one broad, along the median line, somewhat swollen on the basal region of the pronotum; scutellum, large densely whitish yellowish pubescence; elytra elongated, covered with densely golden-yellow pubescence throughout, ornamented with black patches of pubescence: first black patch in between mid and hind legs, elongated, semi-oval, second started from one third of basal margin, along the sutural margin, more broadened at the middle, ended in lateral margin beyond the hind leg, the third one very near to apex, broad, semicircular, more close to lateral margin than sutural margin, apex sub truncated with lateral and sutural spines; ventral side densely covered with pale whitish pubescence, prosternum narrow lower than the coxal cavity; mesosternum broad almost at the height of the coxa, mesocoxal cavity closed, legs elongated, hind femur and tibia much elongated, femur with two spines, first tarsal segment of the hind femur much longer, third tarsal segment bilobed; tarsal claw more than 90° angle.
Distribution: India: Chhattisgarh, Maharashtra, Arunachal Pradesh, Assam. *Elsewhere:* China, Japan.

Tribe Hesperophanini

Stromatium barbatum (Fabricius, 1775)

1775. *Callidium barbatum* Fabricius, Systema Entomologiae, 30: 189.
1798. *Callidium variolosum* Fabricius, Supplementum entomologiae systematicae Proft & Storch, Hafniae: 149.
1835. *Callidium funestum* Boisduval, In Voyage de Découvertes. sous le commandement de M. J. Dumont d'Urville, 2: 481.
1840. *Stromatium barbatum* Laporte and Castelnau, Histoire Naturelle des Insectes Coléoptères P. Duménil, Paris, 2: 452.
1906. *Stromatium barbatum*: Gahan, The Fauna of British India, including Ceylon and Burma (Cerambycidae), I: 114.
2004. *Stromatium barbatum*: Mukhopadhyay & Halder, State Fauna Series, Zoological Survey of India, 10: 426.
2014. *Stromatium barbatum*: Švácha & Lawrence, In Walter de Gruyter, Handbook of Zoology, 3: 90.

Material examined: Raigarh, GWLS, 910RF Watch Tower (Saranger beat) 21°28'56.9", 83°03'17.4" Alt-437 m; 27.vi.2015, Coll. Amitava & party.

Diagnosis: Body medium, measuring about 14-24mm, brown to deep brown in color, densely punctate throughout, covered with fine hairs; head, pronotum, elytra, leg and scape dark brown, other antennal segments brown; head small, dark brown, sparsely hairy, clypeus transverse, frons dark brown depressed, eyes large almost subdivided, anterior portion large, vertex large, suddenly depressed and broad in between the posterior lobe of the eyes, little raised and narrowly incised in between the antennal tubercles; antenna 11-segmented, longer than body, slender with long hairs on the inner margin, segment I dark brown small, densely punctate, segment II to XI brown or light brown in color, segment III much longer than segment I, little longer than segment IV; pronotum sub-squarish, dark brown, surface strongly punctate with five blunt tubercles, in male lateral sides with large concavity covered with dense hairs, absent in female; elytra sub-squarish, densely granule, dark brown with erect hairs, two prominent longitudinal ridges started from the sides of scutellum ended near to the apex, the third longitudinal ridges started from the hind leg and ended near to the apex, apex sub rounded, sutural angle with small spine; ventral side dark brown, densely hairy; prosternum broad at the height of coxa, mesosternum much broad, almost at the height of coxa, coxal cavities closed; legs dark brown third tarsal segment bilobed; tarsal claw more than 90° angle.
Distribution: India: Chhattisgarh, Andaman, Meghalaya, Manipur, Maharashtra, Tripura, West Bengal. *Elsewhere:* Sri Lanka, Africa, Myanmar.

Tribe Cerambycini

Neoplocaederus pedestris (White, 1853)

1853. *Hammaticherus pedistris* White, Catalogue of the coleopterous insects in the collection of the British Museum., Longicornia, I: 127.
1906. *Plocaederus humeralis*: Gahan, Fauna Brit. India including Ceylon & Burma, Col: Cerambycidae: 123.
1906. *Plocaederus pedestris*: Gahan, Fauna Brit. India including Ceylon & Burma, Col: Cerambycidae: 123.

1991. *Neoplocaederus pedestris* Sama, Bollettino della Società Entomologica Italiana, 123 (2): 121-128.

Material examined: Raigarh, GWLS, 910RF Watch Tower (Saranger beat) 21°28'56.9", 83°03'17.4" Alt-437 m; 27.vi.2015, coll. Amitava & party.

Diagnosis: Body large, measuring about 24-32mm, elongate, deep black throughout, female more paler, almost brown; head protuberant, horizontal, eyes very large, finely faceted, black in color, weakly subdivided, both the eyes separated by a narrow carina, antenna 11-segmented, ferruginous, segment I small, thick, as long as segment III, segment V to X dorso- apically raised; pronotum broader than long, surface rough with ridges and punctures, sparsely pubescent, these gradually dense towards lateral margins, small distinct tubercle on either side of the mid lateral margins of the pronotum; elytra elongated, parallel sided black with dense grayish pubescence, female sometimes deep ferruginous, humeral angel raised, few indistinct longitudinal ridges on the elytra, basal margin widened, compressed at the middle, gradually widened towards apex, apex narrowly truncated, sutural spine acute, lateral spine blunt; legs ferruginous, pubescence, femur thick, elongated, tibia slender, elongated, tarsal claws less than 90° angle.

Distribution: India: Chhattisgarh, Tamil Nadu, Madhya Pradesh, Maharashtra. *Elsewhere:* Myanmar.

Diorthus cinereus (Fabricius, 1793)

1793. *Cerambyx cinereus* Fabricius, Hafniae, C. G. Proft, 1 (2): 265.

1795. *Cerambyx holosericeus* Olivier, Coléoptères. Imprimerie de Lanneau, Paris, 4: 14.

1853. *Hammaticherus simplex* White, Longicornia I. Catalogue of the coleopterous insects in the collection of the British Museum, London, 7: 130.

1906. *Diorthus simplex* Gahan, The Fauna of British India (Cerambycidae), I: 133.

1912. *Diorthrus cinereus* Aurivillius, Coleopterorum Catalogus, pars 39 (22): 56.

2008. *Diorthrus cinereus*: Makihara, Mannakkara, Fujimura & Ohtake, Bulletin of the Forestry and Forest Products Research Institute, Ibaraki, 7 (2) 407: 100.

Material examined: Raigarh, GWLS, Tamtora FRH, 21°26'39.6", 83°04'58.6" Alt. 372 m, 31.v.2014, coll. S. Gupta & Party.

Diagnosis: Body large, measuring about 32 mm, brown to black in color, covered with velvety greyish pubescence; head small almost covered by the eyes, frons small, mandibles strong, clypeus large black, eyes black, vertex large, black, narrow in between the posterior lobe of eyes and antennal tubercles, feebly sulcated; antenna 11 segmented hardly surpassing the body in female, longer in male, stout, densely pubescence, segment I and III almost equal but longer than segment IV, segment I with apical cicatrix, III to V apically broadened, segment V to X apically outwardly angulate; pronotum globular shaped, longer than broad irregularly strongly wrinkled formed crown shaped impression, densely pubescent; elytra brown to black covered with velvety greyish pubescence, apex sub-straight with acute sutural spine; ventral side densely pubescent, prosternum broad, raised at the height of coxa, mesosternum much broader at the height of coxa, coxal cavities closed, legs elongated covered with greyish pubescence, femora stumpy, tarsal claw more than 90 angle.

Distribution: India: Chhattisgarh, Chennai, Maharashtra, Tamil Nadu, West Bengal. *Elsewhere:* Sri Lanka, West Africa, Myanmar, Mauritius.

Subfamily Lamiinae
Tribe Batocerini

Batocera rufomaculata (Degeer, 1775)

1775. *Cerambyx rufomaculatus* Degeer, Imprimerie Pierre Hesselberg, 5: 127.

1950. *Batocera rufomaculata m. flavescens* Breuning, Longicornia, I: 519.

2007. *Batocera rufomaculata rufomaculata*: Dalens & Touroult, Lambillionea, 107 (2) 2: 292.

2012. *Batocera rufomaculata*: Weigel, Verein der Freunde und Förderer des Naturkunde museums Erfurt e. V: 408.

2006. *Batocera rufomaculata*: Özdikmen, Munis Entomology & Zoology, 1 (1): 81.

Material examined: Raigarh, GWLS, 910RF Watch Tower (Saranger beat) 21°28'56.9", 83°03'17.4" Alt-437 m; 27.vi.2015, coll. Amitava & party.

Diagnosis: Body large, measuring about 50 mm, robust, covered with finely greyish pubescence; head vertical, clypeus trapezoid glossy, mandible large, frons broad, black with sparsely greyish pubescence, eyes large almost covered the gena, subdivided, anterior portion much larger than posterior one, vertex large with sparsely yellowish pubescence, broaden in between the antennal tubercles, depressed; antenna 11 segmented longer than body on male and almost equal in female, dark brown in colour, segment I large robust, with apical cicatrix, surface wrinkled, strongly in male, segment III much longer than IV and I, strongly, densely punctate, inner margin of all the antennal segments with small spines except segment I; pronotum large, sub squarish, surface roughened with some ridges, two irony red kidney shaped patches at the centre on either side of the median line of the pronotum, lateral margin out curved, ended with long strong spine, basal margin with some wavy ridges, scutellum large tongue shaped with bright whitish yellow pubescence, elytra elongated covered with fine densely greyish pubescence, ornamented with yellowish orange spots and patches, humeral angle with acute spine, basal margin strongly warty gradually converging towards apex, elytral apex sub straight, sutural margin with acute spine, ventral side covered with densely finely greyish pubescence, one broad pale whitish band running along the ventro-lateral margin from last abdominal segment to base of the eye, prosternum broad anteriorly, depressed, mesosternum broad little depressed, coxal cavities open; legs elongated, fore femur and tibia strongly warty in male, fore tibia apically flattened and little bend in both sexes, tarsal claw more than 90° angle.

Distribution: India: Chhattisgarh, Tamil Nadu, Maharashtra, West Bengal. *Elsewhere:* Sri Lanka, Africa, Myanmar.

Species list from Gomarda Wildlife Sanctuary

No	Species	Remarks
1.	*Acanthophorus serraticornis* (Olivier, 1795)	New record to GWLS
2.	*Chlorophorus annularis* (Fabricius, 1787)	New record to Chhattisgarh
3.	*Stromatium barbatum* (Fabricius, 1775)	New record to Chhattisgarh
4.	*Neoplocaederus pedestris* (White, 1853)	New record to GWLS
5.	*Diorthus cinereus* (Fabricius, 1793)	New record to Chhattisgarh
6.	*Batocera rufomaculata* (Degeer, 1775)	New record to GWLS
7.	*Nyphasia apicalis* Gahan, 1893	Reported Majumder et al., 2014
8.	*Apomecyna saltator* (Fabricius, 1781)	Reported Majumder et al., 2014

DISCUSSION

Protected areas are critical for the conservation of residual tropical forest biodiversity, yet many of these are being deforested by humans both within and outside of their administrative boundaries. It has been observed that, sanctuaries, parks and reserves consistently recorded higher number of endemic species, in addition to larger population densities, than in their surrounding human-modified areas across the protected areas. Therefore, it is essential to document the faunal diversity of the protected areas which are still undisturbed with human interference. In view to above, an attempt has been made to document the cerambycid faunal diversity of Gomarda WLS which is also a notorious pest of the forest ecosystem.

Present study reports eight species of long horned beetles from Gomarda WLS, of which 2 species have been reported by Majumder et al. (2014) from Gomarda WLS. The remaining six species are new record to Gomarda WLS and three species of them, namely, *Chlorophorus annularis* (Fabricius, 1787), *Stromatium barbatum* (Fabricius, 1775) and *Diorthus cinereus* (Fabricius, 1793) are reported for the first time from the state of Chhattisgarh. Present communication will significantly help as a base line data for the future worker of Cerambycidae of Chhattisgarh.

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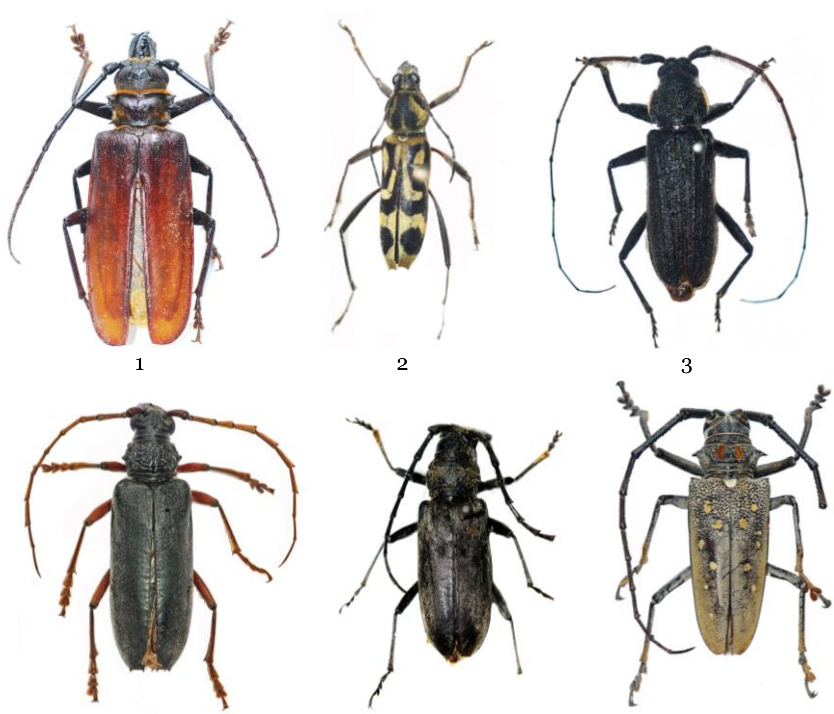

1 2 3

4 5 6

Figure 1. Cerambycid beetles collected during the present study. 1. *Acanthophorus serraticornis* (Olivier, 1795), 2. *Chlorophorus annularis* (Fabricius, 1787), 3. *Stromatium barbatum* (Fabricius, 1775), 4. *Neoplocaederus pedestris* (White, 1853), 5. *Diorthus cinereus* (Fabricius, 1793), 6. *Batocera rufomaculata* (Degeer, 1775).

SOME ADDITIONAL NOTES ON THE GENUS *QUEDIUS* STEPHENS, 1829 (COLEOPTERA: STAPHYLINIDAE: STAPHYLININAE) FAUNA OF TURKEY

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[Özgen, İ., Khachikov, E. A. & Örgel, S. 2016. Some additional notes on the genus *Quedius* Stephens, 1829 (Coleoptera: Staphylinidae: Staphylininae) fauna of Turkey. Munis Entomology & Zoology, 11 (2): 619-621**]**

ABSTRACT: In this study, 10 species of the genus *Quedius* Stephens were recorded from different regions of Turkey. Additional notes on most of them new to certain Turkish regions and provinces are given. *Quedius sofiri* Khachikov, 2005 is recorded for the first time from Turkey.

KEY WORDS: Coleoptera, Staphylinidae, Staphylininae, *Quedius*, fauna, new record, Turkey

The beetle family Staphylinidae is the most diverse group of the order Coleoptera, comprising more than 56.000 valid species belonging to 33 subfamilies in the world (Newton, 2007; Grebennikov & Newton, 2009). According to recent contributions, about 1900 species of the family Staphylinidae are known from Turkey (Anlaş, 2007, 2009; Schülke & Smetana, 2015).

78 species of the genus *Quedius* Stephens are currently distributed in Turkey (Anlaş, 2009; Anlaş & Rose, 2009; Abacıgil et al., 2013; Fırat & Sert, 2016), 20 of them occur only in Turkey and represent more than 25% of the Turkish *Quedius* fauna. Nevertheless, the *Quedius* fauna of Turkey and its distribution are still poorly investigated and many species are known only from a small number of localities.

The aim of this study is to enhance scientific knowledge on the distribution of Turkish *Quedius*.

MATERIALS AND METHODS

The present paper is based on material collected between the dates of 2007-2010 in the different parts of Turkey. The reference specimens in this study are deposited in the private collection of the first author. Classification and nomenclature of the genus *Quedius* suggested by Herman (2001) and Schülke & Smetana (2015) has been followed in this study.

RESULTS

Quedius cinctus Paykull, 1790

Material examined: Adıyaman: 1 ex., 05.IV.2008, Gölbaşı, Karakuyu village, 1 km W, 1210 m, 37°41'52"N, 37°38'14"E, leg. Yağmur. **Kastamonu**: 2 exs., 06.IX.2010, Ilgaz Dağı, 1858 m, 41°04'41"N, 33°43'56"E, leg. Kunt.

Distribution in Turkey: Ankara, Antalya, Bolu, Eskişehir, Istanbul, Izmir, Karaman, Kırşehir, Mersin, Nevşehir, Rize, Siirt (Anlaş, 2009; Anlaş & Rose, 2009; Özgen & Anlaş, 2010; Assing, 2013; Çiftçi & Hasbenli, 2016; Fırat & Sert, 2016).

Quedius cruentus (Olivier, 1795)

Material examined: Bursa: 2 exs., 28.VIII.2007, Uludağ, Aynalı lake, leg. Koç.
Distribution in Turkey: Balıkesir and Manisa (Anlaş, 2009; Abacıgil et al., 2013).

Quedius lateralis (Gravenhorst, 1802)

Material examined: Uşak: 2 exs., Eşme, Kısık 2 km NE, Gediz river bank, 470 m., 38˚38'06"N, 28˚57'19"E, 23.IV.2010, leg. Anlaş.
Distribution in Turkey: Balıkesir, Eskişehir, Isparta, Istanbul, Izmir (Anlaş, 2009; Assing, 2013; Abacıgil et al., 2013, Fırat & Sert, 2016).

Quedius levicollis Brulle, 1832

Material examined: Elazığ: 2 exs., 17.V.2011, Harput, leg. Özgen, **Izmir:** 10 exs., 10.XII.2008, Bayındır, Yakapınar, leg. Anlaş; 6 exs., 29.V.2010, Bozdağ Kayak Merkezi, 2000 m, leg. Anlaş; 2 exs., 28.V.2010, Buca, Kaynaklar, leg. Anlaş; 3 exs., 03.IV.2010, Menemen, Emiralem, pitfall traps, leg. Yağmur; 2 exs., 11.XII.2010, Buca, Kaynaklar, pitfall traps, leg. Yağmur. **Kütahya:** 6 exs., 24.IV.2010, Şaphane, Ilıcasu 1 km N, 723 m, 38°56'58"N, 29°17'29"E, leg. Anlaş. **Malatya**: 2 exs., 14.IX.2007, Arapgir 3 km NE, 912 m, 39°04'13"N, 38°30'34"E, leg. Anlaş & Yağmur. **Manisa:** 2 exs., 30.X.2010, Turgutlu, Çıkrıkçı-Baktırlı road, leg. Anlaş; 1 ex., 30.X.2010, Gölmarmara, Beyler 1 km NE, 120 m, 38°42'10"N, 27°58'56"E, leg. Anlaş.
Distribution in Turkey: Adana, Ankara, Balıkesir, Çanakkale, Erzurum, Eskişehir, Izmir, Manisa (Anlaş, 2009; Anlaş & Rose, 2009; Kesdek et al., 2009; Abacıgil et al., 2013; Surgut & Varlı, 2012; Çiftçi & Hasbenli, 2016; Fırat & Sert, 2016).

Quedius ochripennis Menetries, 1802

Material examined: Izmir: 1 ex., 29.V.2010 Bozdağ Kayak Merkezi, ca. 2000 m, leg. Anlaş.
Distribution in Turkey: Adana, Ankara, Çankırı, Eskişehir, Hatay, Isparta, Istanbul, Kayseri, Kırşehir, Mardin, Nevşehir, Niğde, Yozgat (Anlaş, 2009; Japoshvili & Anlaş, 2011; Çiftçi & Hasbenli, 2016; Fırat & Sert, 2016).
Remarks: First record for the Aegean Region of Turkey.

Quedius nitipennis (Stephens, 1833)

Material examined: Adıyaman: 1 ex., 02.VII.2007, Gölbaşı, Akçalar road inside 1 km, leg. Yağmur; 1 ex., 05.IV.2008, Gölbaşı, Karakuyu village, 1 km W, 1210 m, 37°41'52"N, 37°38'14"E, leg. Yağmur.
Distribution in Turkey: Adana, Ardahan, Artvin, Erzurum, Kayseri, Kocaeli, Mersin, Niğde (Anlaş, 2009; Kesdek et al., 2009; Assing, 2013).

Quedius semiobscurus Marsham, 1802

Material examined: Izmir: 7 exs., 04.V.2010, 03.IV.2010 and 11.XII.2010, Buca, Kaynaklar, pitfall traps, leg. Yağmur; Menemen, Emiralem, pitfall traps, leg. Yağmur.
Distribution in Turkey: Balıkesir and Bursa (Anlaş, 2009; Abacıgil et al., 2013).
Remarks: First record for the Aegean Region of Turkey.

Quedius sofiri Khachikov, 2005

Material examined: Kastamonu: 2 exs., 06.IX.2010, Ilgaz Dağı, 1858 m, 41°04'41"N, 33°43'56"E, leg. Kunt.
Remarks: This species is known only from its type locality in Russian South European Territory (Khachikov, 2005). Thus, this species is recorded for the first time from Turkey.

Quedius suramensis Eppelsheim, 1880

Material examined: Kastamonu: 1 ex., 06.IX.2010 Ilgaz Dağı, 1858 m, 41°04'41"N, 33°43'56"E, leg. Kunt.
Distribution in Turkey: Artvin, Bolu, Bursa, Gümüşhane, Kastamonu, Ordu, Rize, Sakarya, Sinop, Trabzon (Coiffait, 1977, 1978; Anlaş, 2009).

Quedius vicinus Menetries, 1832

Material examined: Şanlıurfa: 2 exs, 11.XI.2010, Birecik, Kelaynak Valley, leg. Anlaş & Yağmur.
Distribution in Turkey: Bolu, Giresun, Kastamonu, Kırıkkale, Ordu, Rize, Sakarya, Trabzon (Korge, 1964, Bordoni, 1976, Anlaş, 2009; Fırat & Sert, 2016).
Remarks: First record for the southeastern Anatolia.

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SURVEY ON SPIDER FAUNAL DIVERSITY OF DARJEELING TEA PLANTATIONS

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[Saha, S., Roy, T. K. & Raychaudhuri, D. 2016. Survey on spider faunal diversity of Darjeeling Tea Plantations. Munis Entomology & Zoology, 11 (2): 622-635**]**

ABSTRACT: Effect of pesticides in the crop fields is now well known. Tea is no exception to this. Idea behind the present study is to appreciate the biological potential of spiders against tea pests. The study area included 6 tea estates viz. Badamtam T.E., Ging T.E., Salim Hill T.E. (organic), Castleton T.E., Namring T.E., and Thurbo T.E. (conventional). Altogether 85 species under 52 genera distributed over 18 families could be recorded. These can broadly be categorized into 7 trophic groups. The decreasing order of the groups are Orb weavers (48.24%) > Ambushers (22.35%) > Ground dwellers (11.76%) ≥ Stalkers (11.76%) > Foliage hunters (9.41%) > Sheet web weavers (2.35%) > Space web builders (1.18%). Out of the total species encountered 1 species is considered new to world, 4 species from the country, 1 from the state and 36 species from the study area. Based on the species richness, the decreasing order of the tea estates are BTE (61.18%) > NTE (54.12%) > GTE (51.76%) > STE (12.35%) > CTE (28.24%) > TTE (25.88%). This leads to infer 'organic tea system' exhibits higher spider heterogeneity. Araneids and salticids are the dominant groups. Other than the Oriental representatives, Australian and Palaearctic are the next major groups. Nearly 32.94% of the species are found to be endemic.

KEY WORDS: Spider fauna, diversity, tea plantations, Darjeeling, West Bengal, India

Spiders constitute an important component of the fauna distributed in tropical and subtropical areas of the world. Being nature's master spinners of silken webs, they are the highly potential predators, certainly putting a check to the insect pests. Of late Entomologists/Plant Protection Specialists are laying emphasis on this tiny group as a proficient candidate of biological control. In depth knowledge on the biodiversity of spider communities of crop fields is important both in terms of enhancing pest control and understanding the driving forces influencing conservation strategies (Mansour et al., 1983; Maloney et al., 2003; Jayakumar & Sankari, 2010; Sharma, 2014).

Tea, unlike other perennials, is unique because only of its vegetative parts 'two leaves and bud' that are commercially exploited. Cultivation practice of tea has made the monoculture ecosystem distinctive, accommodating 1031 species of arthropods and 82 species of nematodes globally (Chen & Chen, 1989; Hazarika et al., 2009); it is 230 in Asia (Muraleedharan, 1992) while 173 arthropods and 16 nematodes are known to be pests in North-East India (Hazarika et al., 1994). Their attack is supposed to cause yield loss to about 10-15%. India is the world's 4th largest exporter of tea. Over the last few decades, India's share in world tea export declined consistently for several reasons. One of the most important reasons is residual effect of pesticides in made tea. On the contrary, recent agricultural practices like organic farming towards reduced pesticide use and ecological sustainability have lead to increased interests in spiders as potential tools (Hazarika et al., 1994).

The spider fauna of several crop ecosystem have been well documented in some parts of the world (Sengupta et al., 2014). In India the araneofauna of tea ecosystem are well documented by Raychaudhuri & Saha (2012), Roy (2014) and Saha & Raychaudhuri (2015). Nestling in the foothills of snow-covered Himalayan range, Darjeeling, 'the Queen of Hills' grows one of the world's most exclusive teas at altitudes ranging from 300 to 2000 meters. Currently there are 87 operational tea gardens in Darjeeling district (Coordinates: 27°3'N 88°16'E) covering an aggregated area of about 19,000 hectares. In recent times growing appreciation and demand for the organic products has driven some tea gardens of Darjeeling to produce 'organic tea'. But unfortunately attempt to document diversity of the spider fauna of Darjeeling tea gardens is still wanting under the changed scenario.

Above prompted to study the spider species assemblage in tea ecosystem of Darjeeling, West Bengal.

The study area included six tea estates namely Castleton T.E., Salim Hill T.E., Thurbo T.E. (in Kurseong Subdivision) Namring T.E. (in Kalimpong Subdivision) and Badamtam T.E. and Ging T.E. (in Darjeeling Sadar Subdivision). Among them Badamtam T.E., Ging T. E. and Salim Hill T. E. are organic gardens while Castleton T.E., Namring T.E. and Thurbo T.E. are conventional.

MATERIAL AND METHODS

Survey was conducted during the period August, 2011 to March, 2013 in different sections of the referred tea estates in almost every month of any calendar year. Sampling was done by visual search, hand picking, inverted umbrella, bush beating, foliage, trunk and branch scanning, pitfall and leaf litter extraction. Collected samples were preserved following Tikader (1987) and Barrion & Litsinger (1995). The collected samples were studied under Stereo Zoom Binocular Microscopes model Zeiss SV-6 & 11 and Olympus SZX7. Status of the taxa were determined with the help of Tikader (1970, 1980, 1982 & 1987), Tikader & Malhotra (1980), Majumder & Tikader (1991), Barrion & Litsinger (1995), Sebastian & Peter (2009), Keswani et al. (2012), Metzner (2015) and WSN (2015). Later they were confirmed by comparing with the type specimens deposited in Zoological Survey of India.

All materials are in the deposition of Department of Agricultural Biotechnology, Ramakrishna Mission Vivekananda University.

RESULTS AND DISCUSSION

The present study unfolds the spider diversity of six tea estates of Darjeeling. A total of 2072 individuals belonging to 85 morphospecies under 52 genera and 18 families are recognized (Tables 1 & 2; Fig. 1). Araneids and salticids are the dominant groups (Fig. 3). Out of 85 species one species is recognized as new to world while four are recoded first time from the country, one from the state and 36 species from the district Darjeeling (Table 1; Fig. 2). Twenty seven species are reported as native to India (Fig. 3) exhibiting high endemicity (32.94%). Of these, most of the species are recorded from the family Araneidae (9). The generated data represents 5.04%, 11.87% and 30.0% of the Indian species, genera and family respectively. Even though species richness is little higher during premonsoon, always there remains a state of equilibrium throughout seasons. Six species viz. *Araneus mitificus* (Simon), *Agriope pulchella* Thorell, *Neoscona bengalensis* Tikader & Bal, *Dendrolycosa gitae* (Tikader), *Thiana bhamoensis* Thorell and *Leucauge decorata* (Blackwall) are the dominant members and encountered in most of the months of the year. Analysis of the zoogeographical distribution reveals that the fauna apart from Oriental, includes Australian (12.94%), Palaearctic (12.94%), Ethiopian (7.05%), Nearctic (2.35%) and Neotropical (1.18%) elements. Number of recorded spider taxa from the study areas shows that species diversity is maximum in Badamtam T.E. (possesses 52 morphospecies) and minimum in Thurbo T.E. (no. of species 22). Based on species diversity, the decreasing order of the tea estates are BTE (61.18%) > NTE (54.12%) > GTE (51.76%) > STE (42.35%) > CTE (28.24%) > TTE (25.88%). This leads to infer 'organic tea system' exhibits higher spider heterogeneity (exception in NTE). There may be two way explanation to such a fact. One may be that Namring T.E. being close to Teesta Valley experiences a tropical situation promoting heterogeneity or the in house species are tolerant to insecticides or both. Spiders such as wolf spider *Pardosa* are highly tolerant to botanicals such as neem-based chemicals (Theiling & Croft, 1988; Markandeya & Divakar, 1999). They are also generally more tolerant of organophosphates and carbamates than of pyrethroids, organochlorines and various acaricides. Tolerance may due to genetic resistance bred over a period of continuous exposure (Theiling & Croft, 1988; Wisniewska & Prokopy, 1997; Yardim & Edwards, 1998; Marc et al., 1999; Tanaka et al., 2000). For example, *Pardosa*, *Tetragnatha* are highly sensitive to the inorganic chemicals, but not to botanical pesticides (Tanaka et al., 2000). Species homogeneity is more common in conventional gardens. Both diversity and density of spiders are more in organic gardens as compared to conventional ones. At any point of time diversity and density of predators are more in organic gardens. Succession of species is more in organic gardens while conventional gardens are with dominant species in more numbers. All these gardens are dominated by the members of the family Araneidae. The dominant guild is constituted by the Orb weavers (48.24%) followed by Ambushers (22.35%), Ground dwellers (11.76%) and Stalkers (11.76%), Foliage hunters (9.41%), Sheet web weavers (2.35%) and Space web builders (1.18%) (Table 3). The common explanation for the observed pattern of spider guilds are structural diversity, microenvironment or the level of disturbance of the habitat (Jiang and Li, 2006). Guild composition can provide insight into the effect of habitat alteration and disturbances on arthropod diversity (Stork, 1987). So, the most promising option for utilizing the predatory characteristics of spiders for the biological control of pests is to increase their density and diversity within crops as physically close to pests as possible (Sunderland & Samu, 2000).

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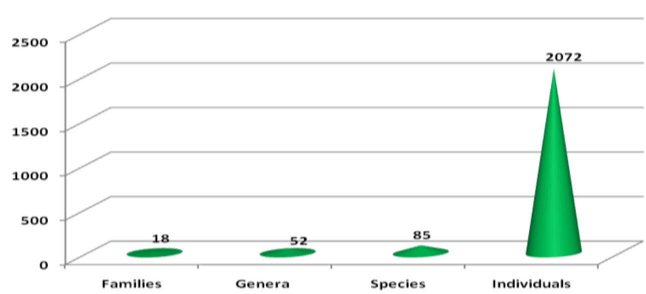

Figure 1. Summary of the recorded spider taxa trapped from tea estates of Darjeeling.

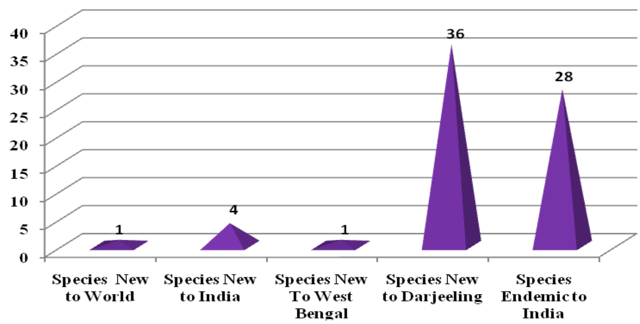

Figure 2. Spider fauna of Darjeeling – highlights.

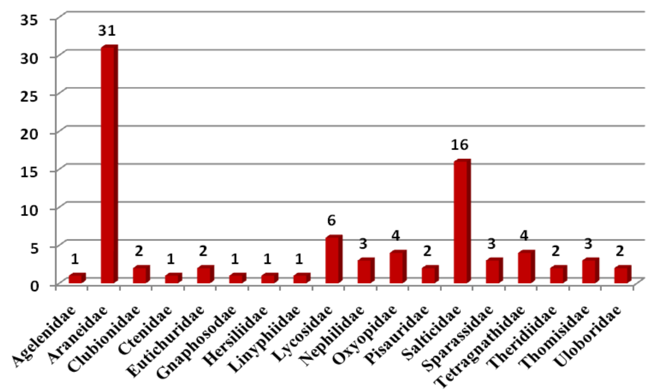

Figure 3. Spider species trapped under different families from the Tea Estates of Darjeeling.

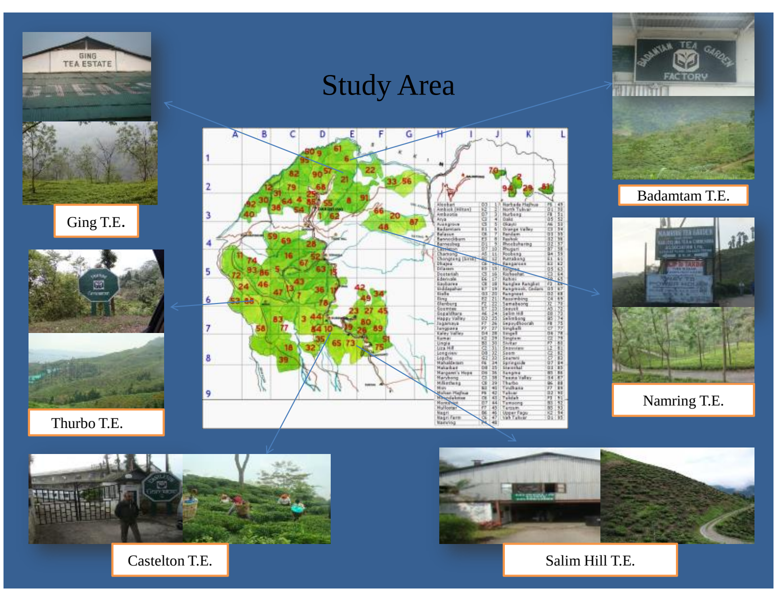

Table 1. Spider taxa recorded from tea estates of Darjeeling.

Family	Taxa	Distribution		
		Tea Estates	India	Elsewhere in World
Agelenidae (Funnel web spiders)	●♦1. *Agelena barunae* Tikader	BTE,GTE,NTE	Sikkim, West Bengal	-
Araneidae (Typical orb weavers)	●♦2. *Arachnura angura* Tikader	NTE	Kerala, Sikkim, West Bengal	-
	3. *Araneus mitificus* (Simon)	BTE,CTE,GTE, NTE,STE,TTE	Assam, Andhra Pradesh, Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, West Bengal	Bangladesh, Hongkong, Japan, Malaysia, Myanmar, Pakistan, Philippines, New Guinea, Singapore, Thailand, Vietnam
	♣4. *Araneus* n. sp.	CTE	West Bengal	-
	5. *Argiope aemula* (Walckenaer)	NTE,STE	Assam, Andaman & Nicobar Island, Andhra Pradesh, Chhattisgarh, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, West Bengal	China, Indonesia, Malaysia, Myanmar, New Hebrides, Philippines, Sri Lanka, Taiwan, Thailand, Vanuatu
	6. *Ariope pulchella* Thorell	BTE,CTE,GTE, NTE,STE	Andaman Island, Arunachal Pradesh, Assam, Kerala, Madhya Pradesh, Maharashtra, Manipur, Orissa, Tamil Nadu, West Bengal	China, Indonesia; Malaysia, Myanmar
	♦7. *Chorizopes bengalensis* Tikader	TTE	West Bengal	-
	8. *Cyclosa bifida* (Doleschall)	NTE,STE	Assam, Arunachal Pradesh, Kerala, Meghalaya, Sikkim, West Bengal	Malaysia, New Guinea, Philippines, Sri Lanka
	♦9. *Cyclosa bilobata* Sen et al.	NTE,TTE	West Bengal	-
	10. *Cyclosa insulana* (Costa)	BTE,STE	Meghalaya, Sikkim, West Bengal	Australia, Mediterranean to Philippines

	●11. *Cyclosa mulmeinensis* (Thorell)	BTE	Assam, Maharashtra, West Bengal	Africa, Japan, Malaysia, Myanmar, Philippines, Singapore, Taiwan
	♦12. *Cyclosa neilensis* Tikader	BTE	Andaman Island, West Bengal	-
	●13. *Cyclosa quinqueguttata* (Thorell)	BTE, GTE,NTE	Assam, Sikkim, West Bengal	Bhutan, China, Myanmar, Taiwan
	♦14. *Cyclosa simoni* Tikader	BTE,CTE,GTE, NTE,STE,TTE	Assam, Sikkim, West Bengal	-
	15. *Cyclosa spirifera* Simon	BTE,CTE,GTE, NTE,STE,TTE	Assam, Arunachal Pradesh, Chhattisgarh, Madhya Pradesh, West Bengal	Pakistan
	●◘16.*Cyclosa krusa* Barrion & Litsinger	BTE	West Bengal	Pakistan, Philippines
	●17. *Cyrtarachne raniceps* Pocock	GTE	Karnataka, Orissa, West Bengal	Sri Lanka
	18. *Cyrtophora moluccensis* (Doleschall)	GTE,STE	Andaman & Nicobar Islands, Karnataka, Kerala, Madhya Pradesh, Sikkim, West Bengal	Australia, Fiji, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, Sri Lanka, Tonga
	●19. *Cyrtophora exanthematica* (Doleschall)	GTE,STE	West Bengal	Australia, Indonesia, Japan, Myanmar, New South Wales, Papua New Guinea, Philippines, Singapore
	20. *Eriovixia excelsa* (Simon	NTE	Assam, Arunachal Pradesh, Chhattisgarh, Madhya Pradesh, West Bengal	Pakistan
	21. *Gasteracantha diadesmia* Thorell	STE	Assam, Andaman & Nicobar Islands, Sikkim, West Bengal	Myanmar, Philippines, Thailand
	22. *Gasteracantha kuhlii* C.L. Koch	BTE, GTE, NTE, STE	Andaman & Nicobar Island, Assam, Bihar, Kerala, Sikkim,	Bhutan, Hongkong, Indonesia, Japan, Malaysia, Myanmar,

			West Bengal	Philippines
	●23. *Gasteracantha unguifera* Simon	BTE,NTE,STE, TTE	Sikkim, West Bengal	China
	●24. *Gea zaragosa* Barrion & Litsinger	GTE	West Bengal	Philippines
	●25. *Larinia chloris* (Audouin)	NTE	Maharashtra , Madhya Pradesh, West Bengal	Bangladesh, Egypt, Israel, Libya, Mozambique , Syria, Turkey, Uganda
	♦26. *Neoscona bengalensis* Tikader & Bal	BTE,CTE,GTE, NTE,STE,TTE	Assam, Andhra Pradesh, Kerala, Manipur, West Bengal	-
	♦27. *Neoscona mukerjei* Tikader	BTE,CTE,GTE, NTE,STE, TTE	Assam, Andhra Pradesh, Arunachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Manipur, West Bengal	-
	28. *Neoscona nautica* (L. Koch)	BTE,CTE,GTE, NTE,STE	Assam, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, West Bengal	Cosmo tropical
	●29. *Neoscona theisi* (Walckenaer)	CTE,STE,TTE	Gujarat, Madhya Pradesh, Maharashtra, Orissa, West Bengal	China to Pacific Island, New Guinea
	●30. *Neoscona vigilans* (Blackwall)	BTE	Assam, West Bengal	Africa to Philippines, New Guinea
	31. *Neoscona yptinica* Barrion & Litsinger	BTE, CTE, GTE, NTE, STE, TTE	Assam, West Bengal	Philippines
	32. *Parawixia dehaani* (Doleschall)	BTE	Assam, Karnataka, Kerala, Sikkim, West Bengal	Indonesia, Japan, Malaysia, Myanmar, New Guinea, Philippines, Polynesia
Clubionidae (Sac spiders)	●33. *Clubiona drassodes* O. P. Cambridge	BTE, CTE	Andaman, Bihar, Maharashtra, Karnataka, Uttarakhand, West Bengal	Bangladesh, China

	◘34. *Clubiona rama* Dankittipakul and Singtripop	BTE	West Bengal	Thailand
Ctenidae (Wandering spiders)	♦35. *Ctenus sikkimensis* Gravely	BTE, GTE	Sikkim, West Bengal	-
Eutichuridae (Dark sac spiders)	♦36. *Cheiracanthium himalayense* Gravely	BTE, CTE, GTE, NTE, STE, TTE	Gujarat, Maharashtra, Meghalaya, Uttarakhand, West Bengal	-
	37. *Cheiracanthium triviale* Thorell	BTE, CTE, GTE	Andhra Pradesh, Goa, Madhya Pradesh, Maharashtra, Manipur, Tamil Nadu, Uttar Pradesh, West Bengal	Myanmar
Gnaphosidae (Mouse spiders)	●♦38. *Zelotes pseudopusillus* Caporiacco	TTE	Jammu & Kashmir, West Bengal	-
Hersiliidae (Two tailed spiders)	●39. *Hersilia savignyi* Lucas	BTE, GTE	Assam, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal	Myanmar, Philippines,Sri Lanka
Linyphiidae (Sheet web spiders)	●♦40. *Lepthyphantes rudrai* Tikader	BTE, CTE, GTE, NTE, TTE	Sikkim, West Bengal	-
Lycosidae (Wolf spiders)	41. *Hippasa agelenoides* (Simon)	GTE, NTE	Arunachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal	Myanmar, Taiwan
	●42. *Hippasa greenalliae* (Blackwall)	GTE	Andhra Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal	Bangladesh, China, Sri Lanka
	♦43. *Hippasa himalayensis* Gravely	BTE, GTE, STE	Assam, Himachal Pradesh; Karnataka West Bengal	-

	●44. *Lycosa phipsoni* Tikader	TTE, NTE, STE	Assam, Maharashtra, West Bengal	China, Myanmar, Taiwan
	●45. *Pardosa heteropthalma* (Simon)	BTE	Tamil Nadu, West Bengal	Indonesia
	46. *Pardosa songosa* Tikader & Malhotra	NTE, TTE, GTE	Assam, Uttar Pradesh, West Bengal	Bangladesh, China
Nephilidae (Long legged orb weavers)	●47. *Herennia multipuncta* (Doleschall)	BTE, GTE, NTE, STE	Assam, Arunachal Pradesh, Kerala, Maharashtra, Meghalaya, Tamil Nadu, West Bengal	China, Indonesia, Malaysia, Myanmar, Nepal, New Guinea; Philippines, Taiwan, Thailand
	48. *Nephila clavata* L. Koch	BTE, CTE, GTE, NTE, STE	Andaman & Nicobar Islands, Lakshadweep Island, Meghalaya, Sikkim, West Bengal	Bhutan, China, Indonesia, Japan, Korea, Myanmar, Pakistan, Taiwan, Thailand
	49. *Nephila pilipes* (Fabricius)	BTE, CTE, GTE, NTE	Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Gujarat, Kerala, Maharashtra, Madhya Pradesh, Sikkim, Uttar Pradesh, West Bengal	China, Philippines to Australia
Oxyopidae (Lynx spiders)	●♦50. *Oxyopes kamalae* Gajbe	BTE, GTE	Madhya Pradesh, West Bengal	-
	♦51. *Oxyopes naliniae* Gajbe	BTE, GTE, NTE, STE	Assam, Madhya Pradesh, West Bengal	-
	52. *Oxyopes shweta* Tikader	BTE, CTE, NTE, TTE	Assam, Arunachal Pradesh, Kerala, Manipur, Meghalaya, Sikkim, Tripura, West Bengal	China
	♦53. *Oxyopes sitae* Tikader	BTE, GTE	Andaman Islands, Gujarat, Meghalaya, Sikkim, WestBengal	-
Pisauridae (Nursery web spiders)	¤54. *Dendrolycosa robusta* (Thorell)	BTE	West Bengal	China, Laos, Myanmar, Vietnam
	♦55. *Dendrolycosa gitae* (Tikader)	BTE, CTE, GTE, NTE, STE, TTE	Assam, Andaman Islands, Kerala, Sikkim, West Bengal	-

Salticidae (Jumping spiders)	♠56. *Carrhotus viduus* (C. L. Koch)	BTE	Assam	Bintan Island, China, Indonesia, Malacca, Malaysia, Myanmar, Nepal, Penang Island, Singapore, Sri Lanka, Sumbawa
	57. *Epocilla aurantiaca* (Simon)	CTE, STE	Assam, Kerala, West Bengal	Malacca, Malaysia, Myanmar, Sri Lanka, Vietnam
	58. *Hyllus semicupreus* (Simon)	BTE, GTE, NTE, STE	Assam, West Bengal	Sri Lanka
	59. *Menemerus brevibulbis* (Thorell)	BTE	Assam, West Bengal	Africa, South America
	●♦60. *Myrmarachne bengalensis* Tikader	BTE, GTE, NTE	West Bengal	-
	●61. *Myrmarachne caliraya* Barrion & Litsinger	GTE	West Bengal	Philippines
	●62. *Phintella vittata* (C.L. Koch)	NTE	Assam, West Bengal	China, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam
	63. *Plexippus paykullii* (Audouin)	BTE, CTE, GTE, NTE, STE, TTE	Assam, Arunachal Pradesh, Kerala, Manipur, West Bengal	Africa, Europe, Myanmar, Philippines, Sri Lanka, and all warmer regions of the World
	●♦64. *Plexippus pseudopaykullii* Sen, Dhali, Saha & Raychaudhuri	NTE, STE	West Bengal	-
	●65. *Portia fimbriata* (Doleschall)	BTE	Kerala, West Bengal	Amboina, Australia, Indonesia, Japan, Krakatau, Malaysia, Nepal, Papua New Guinea, South Africa, Sri Lanka, Taiwan
	●♦66. *Rhene danieli* Tikader	CTE, GTE, NTE, STE	Maharashtra, West Bengal	-

	●67. *Rhene indica* Tikader	STE	West Bengal	Andaman Islands, China
	●68. *Rhene rubrigera* (Thorell)	BTE, NTE	West Bengal	China, Hawaii, Indonesia, Karakatau, Malaysia, Mexico, Myanmar, Vietnam
	●69. *Siler semiglaucus* Simon	BTE, GTE, NTE	Kerala, West Bengal	China, Indonesia, Krakatau, Nepal, Philippines, Singapore, Sri Lanka, Vietnam
	70. *Telamonia dimidiata* (Simon)	BTE, GTE, NTE, STE	Assam, Gujarat, Kerala, Maharashtra, West Bengal	Bhutan, Indonesia, Singapore
	71. *Thiania bhamoensis* Thorell	BTE, CTE, GTE, TTE	Assam, Andaman Island, Kerala, West Bengal	China, Indonesia, Myanmar, Singapore
Sparassidae (Giant crab spiders)	72. *Bhutaniella sikkimensis* (Gravely)	GTE	Manipur, Meghalaya, Sikkim, West Bengal	Bhutan, Nepal
	●♦73. *Heteropoda andamanensis* Tikader	NTE	Andaman Islands, Kerala, West Bengal	-
	●♦74. *Olios obesulus* (Pocock)	BTE, CTE, NTE, STE	Bihar, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal	-
Tetragnathidae (Long jawed orb weavers)	75. *Leucauge decorata* (Blackwall)	BTE, CTE, GTE, NTE, STE, TTE	Assam, Bihar, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal	Africa, America, Bangladesh, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand
	76. *Leucauge tessellata* (Thorell)	GTE, NTE	Assam, Arunachal Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Manipur, Sikkim, West Bengal	Bhutan, China, Laos, Moluccas, Myanmar, Taiwan
	77. *Opadometa fastigata* (Simon)	BTE, GTE	Kerala, Orissa, Uttar Pradesh, West Bengal	Indonesia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand

	◘78. *Tetragnatha caudicula* (Karsch)	BTE,NTE, TTE	West Bengal	China, Japan, Korea, Russia, Taiwan
Theridiidae (Cobweb spiders)	♦79. *Chrysso urbasae* Tikader	GTE, NTE, TTE	Kerala, Sikkim, West Bengal	-
	●♦80. *Theridion indicum* Tikader	BTE, GTE, NTE, TTE	Assam, Andaman & Nicobar Island, West Bengal	-
Thomisidae (Crab spiders)	81. *Camaricus formosus* Thorell	BTE	Andaman Island, Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Manipur, West Bengal	Bangladesh, China, Indonesia, Myanmar, Philippines
	●♦82. *Thomisus andamanensis* Tikader	NTE	Andaman Island, West Bengal	-
	●♦83. *Ozyptila khasi* Tikader	GTE, STE	Meghalaya, West Bengal	-
Uloboridae (Hackled web spiders)	♦84. *Uloborus khasiensis* Tikader	BTE, STE	Assam, Meghalaya, West Bengal	-
	●♦85. *Miagrammopes* nr. *kirkeensis* Tikader	STE	Maharashtra, West Bengal	-

Legends:

♦ Endemic to India

♠ New record from West Bengal

◘ New record from India

● New record from Darjeeling

♣ New to science

BTE – Badamtam Tea Estate

CTE – Castleton Tea Estate

GTE – Ging Tea Estate

NTE – Namring Tea Estate

STE – Salim Hill Tea Estate

TTE – Thurbo Tea Estate

Table 2. Summary of the recorded spider taxa of the tea estates of Darjeeling.

	Badamtan Tea Estate	**Ging Tea Estate**	**Salim Hill Tea Estate**	**Namring Tea Estate**	**Castleton Tea Estate**	**Thurbo Tea Estate**	**Total**
No. of family	17	16	12	14	10	10	18
No. of genera	35	34	24	34	16	18	52
No. of species	52	44	36	46	24	22	85
No. of individuals	504	299	351	428	299	191	2072

Table 3. Spider guilds.

Spider Guilds	**Family**
Orb weavers	Agelenidae, Araneidae, Nephilidae, Tetragnathidae, Uloboridae
Ground dwellers	Clubionidae, Ctenidae, Gnaphosidae, Lycosidae
Foliage hunters	Eutichuridae, Hersiliidae, Pisauridae, Sparassidae
Stalkers	Lycosidae, Oxyopidae
Ambushers	Salticidae, Thomisidae
Sheet web builders	Linyphiidae
Space web builders	Theridiidae

A NEW RECORD TO THE GENUS *PACHNEPHORUS* CHEVROLAT OF TURKEY (CHRYSOMELIDAE: EUMOLPINAE)

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[Bal, N., Özdikmen, H. & Kıyak, S. 2016. A new record to the genus *Pachnephorus* Chevrolat of Turkey (Chrysomelidae: Eumolpinae). Munis Entomology & Zoology, 11 (2): 636-637**]**

ABSTRACT: This work gives is the species, *Pachnephorus corinthius* Fairmaire, 1862, as a new record for *Pachnephorus* Chevrolat of Turkey. In addition *Pachnephorus villosus* (Duftschmidt, 1825) is reported for the first time from Çankırı province.

KEY WORDS: Coleoptera, Chrysomelidae, Eumolpinae, *Pachnephorus corinthius*, new record, Turkey

Eumolpinae of Turkey includes 23 species of 11 genera. The genus *Pachnephorus* Chevrolat, 1836 is represented by 7 species of the nominate subgenus in Turkey as *P. bistriatus* Mulsant & Wachanru, 1852 (Anatolia without exact locality), *P. canus* Weise, 1882 (Anatolia: İstanbul and İzmir provinces; European Turkey: İstanbul province), *P. cylindricus* Lucas, 1849 (Anatolia: Adana province), *P. pilosus* (Rossi, 1790) (Anatolia without exact locality), *P. robustus* Desbrochers, 1870 (Anatolia: Ankara province), *P. tessellatus* (Duftschmid, 1825) (Anatolia without exact locality), *P. villosus* (Duftschmid, 1825) (Anatolia: Adana, Ankara, Antalya, Balıkesir, Bursa, Çanakkale, Hatay, Isparta, Konya, Mersin, Osmaniye, Sakarya, Samsun and Sinop provinces; European Turkey without province) (Ekiz et al., 2013; Özdikmen et al., 2014; Özdikmen & Kavak, 2014).

As seen above, 3 of 7 species of Turkish *Pachnephorus* Chevrolat are known from Anatolia without exact locality and 2 of 7 species are known only from one province. Thus the knowledge of Turkish *Pachnephorus* Chevrolat is inadequate. We had the opportunity to study material of the genus *Pachnephorus* Chevrolat, 1836 collected during the expedition of Çankırı province in 2013-2015 and new records of the genus *Pachnephorus* Chevrolat, 1836 were detected.

MATERIALS AND METHODS

The available specimens for the present study were collected by the first author from Çankırı province in Turkey in 2013-2015. As a result of identification, 2 species were determined. The available specimens for the present study are deposited at Gazi University (Turkey, Ankara).

The Turkish distribution patterns for each species are given only concerning provinces. For distribution data of the taxa, Löbl & Smetana (2010) for World and Ekiz et al. (2013) and Özdikmen & Kavak (2014) for Turkey are used in the text chiefly. Distributional abbreviations for the works are available to Löbl & Smetana (2010).

RESULTS

Family CHRYSOMELIDAE Latreille, 1802

Subfamily EUMOLPINAE Hope, 1840

Genus *Pachnephorus* Chevrolat, 1836

Subgenus *Pachnephorus* Chevrolat, 1836

***Pachnephorus corinthius* Fairmaire, 1862**

Material examined: Çankırı, Bayramören, entry of Sazak, 40°59'N 33°05'E, 21.VIII.2014, 1408 m, 1 specimen; Çankırı, Central, exit of Kuzuköy, 40°30'N 33°56'E, 29.IV.2015, 637 m, 3 specimens; Çankırı, Şabanözü, between Mart-Şabanözü, 40°25'N 33°20'E, 12.V.2015, 899 m, 1 specimen.
Range: E: AL GR IT **A:** TR.
Remarks: The species is new to Turkey.

***Pachnephorus villosus* (Duftschmid, 1825)**

Material examined: Çankırı, Kızılırmak, entry of Kuzeykışla village, 40°22'N 34°03'E, 24.IV.2014, 600 m, 1 specimen; Çankırı, Kızılırmak, Saraycık village return, 40°20'N 33°58'E, 25.IV.2014, 565 m, 1 specimen; Çankırı, Eldivan, entry of Gölezkayı, 40°30'N 33°32'E, 09.VIII.2014, 1022 m, 1 specimen; Çankırı, Central, exit of Kuzuköy, 40°30'N 33°56'E, 29.IV.2015, 637 m, 1 specimen; Çankırı, Eldivan, entry of Çiftlik village, 40°34'N 33°30'E, 14.V.2015, 844 m, 1 specimen; Çankırı, Central, entry of Dedeköy, 40°35'N 33°43'E, 15.V.2015, 979 m, 1 specimen; Çankırı, Central, Alaçatı, 40°32'N 33°33'E, 15.V.2015, 870 m, 2 specimen; Çankırı, Central, entry of Karadayı, 40°24'N 33°45'E, 16.V.2015, 856 m, 3 specimens; Çankırı, Kızılırmak, Karamürsel village, 40°25'N 34°2'E, 16.V.2015, 539 m, 1 specimen; Çankırı, Central, Değim, 40°41'N 33°41'E, 25.V.2015, 916 m, 1 specimen; Çankırı, Yapraklı, Balıbıdık, 40°40'N 33°44'E, 25.V.2015, 877 m, 1 specimen; Çankırı, Yapraklı, Bugay, 40°42'N 33°46'E, 25.V.2015, 897 m, 1 specimen; Çankırı, Yapraklı, entry of Topuzsaray, 40°38'N 33°53'E, 26.V.2015, 1169 m, 1 specimen; Çankırı, Yapraklı, Kirliakça, 40°37'N 33°54'E, 26.V.2015, 914 m, 1 örnek.
Records in Turkey: Anatolia: Adana, Ankara, Antalya, Balıkesir, Bursa, Çanakkale, Hatay, Isparta, Konya, Mersin, Osmaniye, Sakarya, Samsun and Sinop provinces; European Turkey (without province).
Range: E: AB AL AU BH BU CR CZ GR HU IT RO SK ST TR UK YU **A:** TR.
Remarks: The species is rather widely distributed in Turkey. It is new to Çankırı province.

Note: This work is based on a part of Master Thesis of the first author.

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THRESHOLD OF DEVELOPMENT AND THERMAL CONSTANT FOR DIFFERENT STAGES OF THE SEYCHELLES FLUTED SCALE, *ICERYA SEYCHELLARUM* (WESTWOOD)

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[Helmi, A. 2016. Threshold of development and thermal constant for different stages of the Seychelles fluted scale, *Icerya seychellarum* (Westwood). Munis Entomology & Zoology, 11 (2): 638-642**]**

ABSTRACT: Different biological features of *Icerya seychelarum* were carried out at three constant temperatures (25°C, 30°C and 35°C) on mulberry seedlings, *Morus alba* L. throughout one complete generation. Durations and rate of development percentage for different developmental stages were estimated. Results revealed that egg incubation period, durations of nymphal stage were decreased as temperature increased from 25°C to 35°C. Rates of development percentage of both egg and nymphal stages were increased as temperature increased from25°C to 35°C. Also, results revealed that temperature had highly significant effects on durations of female pre-oviposition, oviposition and post-oviposition periods. These durations were decreased as temperature increased from 25°C to 35°C. Hypothetical threshold (zero) of development was 12.25, 17.62. 21.9 and 21.4 days for egg, nymphal stage, pre-oviposition and oviposition periods; respectively. Mean thermal units were 86.75, 552.64, 84.58 and 204.92 degree/days for egg, nymphal stage, pre-oviposition and oviposition periods; respectively. All these parameters revealed that 25°C seemed to be optimal temperature for rearing the Seychelles fluted scale.

KEY WORDS: Zero of development, *Icerya seychelarum,* mulberry, thermal constant, mealybug, Seychelles fluted scale

The Seychelles fluted scale, *Icerya seychellarum* is polyphagous phloem-feeding. It was first recorded in Egypt by Ezz & Samhan (1965) on five ornamental plant species at Suez Governorate, since that time it was spread rapidly and infests many economic horticultural plants. Damage caused by *Icerya* sp. was described by several authors. Siddpapji et al. (1984) described the damage caused by *Icerya aegyptiaca* (Douglas) on mulberry in India. *I. seychellarum* feeds on the plant sap by sucking it from the tissues of the host plant. Plant sap contains few concentration of protein, so this insect sucks a great amount of the sap to collect sufficient amount of protein for its growth (Mogahed & Abbas, 2003). In addition to high population of *I. seychellarum* can reduce the vigor of the plant, making it susceptible to other pests (Osman, 2005). The present work aims at estimating of some bionomics parameters of the Seychelles fluted scale at different three constant temperatures on mulberry seedlings to investigate the optimum temperature for this insect.

MATERIAL AND METHODS

Biological studies of *I. seychellarum* on mulberry seedlings (*Morus alba*) were carried out under three different temperatures. A stock culture of *I. seychellarum* on mulberry seedlings were obtained by collecting some highly infested (25, 30 and 35°C) leaves and branches of mulberry trees with *I. seychellarum* from different areas and different periods in the field and transferred to another healthy mulberry seedlings transplanted in pots in the laboratory. To obtain newly hatched crawler's, infested leaves and branches were placed in paper bags, brought to the laboratory, the female separated from them and examined daily with the aid of stereomicroscope to obtain newly hatched crawlers. Newly hatched crawlers were isolated from the ovipositing females and ovisacs and transferred to seedlings for about 4-6 months old and 40-45cm height were cultivated in plastic pots 15cm in diameter. These pots were filled with a mixture of sand and peat moss and kept inside a wooden cage. newly hatched crawlers of the same age were transferred to seedling by the aid of a fine moistened camel hair brush (one to two crawler per leaf). For studying the duration of adult females, the periods from the day of attaining these nymphs to the adult female stages till the death of these females were recorded. Duration of different developmental stages at three constant temperatures were used to estimate the zero of development for each stage as well as thermal requirements. Lower threshold of development for each stage was calculated according the equation of (Stinner et al., 1974).

The rate of development % was calculated from the following formula:

$$\text{Rate of development} = 1/ t \times 100$$

Where: t = duration of considered stage in days .

The thermal units (degree-days) required for complete development of each stage was determined according to Campbell et al. (1974) and Ramadan (2008). The degree-days (DD's) were calculated from the following equation:

$$DD = d\,(T - t_o)$$

Where: DD : Thermal units (degree-days) .

d: the developmental duration of a given developmental stage at constant temperature

T: Temperature of incubation.

t_o: threshold temp. in degree centigrade

RESULTS AND DISCUSSION

Influence of constant temperatures on the biological parameters of *I. seychellarum* and its relation to degree-days of *Icerya seychellarum* were carried out under three constant temperatures of 25, 30, 35 °C ±1 on mulberry seedlings throughout one complete generation inside incubators.

1. Egg stage: Incubation period of egg was decreased gradually as the temperature increased from 25 to 35°C with mean numbers of incubation periods of 7.45, 4.21 and 3.98 days at the three constant temperatures; respectively. The rate of development was increased gradually as the temperature increased from 25 to 35°C. which being 13.42, 23.75 and 25.13 at 25, 30 and 35°C., respectively. The lower developmental threshold (t_o) was 12.25°C. Also thermal units (k) expressed as degree-days required for complete embryonic development of incubation period for *I. seychellarum* eggs were 94.98, 74.73 and 90.54 DD's with an average of 86.75 DD's at 25, 30 and 35°C, respectively.

2. Nymphal Stage: Nymphal stage of *I. seychellarum* is passed throughout three nymphal instars. Results obtained about the effects of the three constant temperatures and durations of nymphal stage and their rate of development are given in Table 2 and Figure 1.

These results showed that the three tested temperatures had highly significant effect on mean duration of this stage whereas mean duration for nymphal stage was decreased gradually as the temperature increased from 25°C to 35°C. Mean durations were 72.74, 46.42 and 31.44 days at 25, 30 and 35°C; respectively. Rate of development was increased gradually as the temperature increased from 25 to 35°C. The lowest rate was occurred at 25°C (1.37) followed by 30°C (2.15);

while the highest rate was occurred at 35°C (3.18). The threshold of development (t_o) for nymphal stage was 17.62°C. The mean values of thermal units required for development of nymphal stage were 536.82, 574.68 and 546.43 DD's at 25, 30 and 35 °C; respectively.

3. Adult stage: Females passed throughout three periods, pre-oviposition, oviposition and postoviposition periods. Results in Table (3) summarized the effects of three constant temperatures on mean durations of different periods of adult female.

3.1. Pre–oviposition period: Mean duration of pre-oviposition were 19.13, 14.77 and 5.77 at 25, 30 and 35°C; respectively. The lower threshold of development was 21.9 °C. The thermal units required for the development of ovary *I. seychellarum* at tested temperature were 58.92, 119.34 and 75.47 DD'S at 25, 30 and 35°C; respectively.

3.2. Oviposition period: Mean duration of oviposition period was decreased when temperature increased from 25 to 35°C being 49.70, 27.70 and 14.60 at 25, 30 and 35°C, respectively. The rate of development was increased gradually as the temperature increased from 25 to 35°C which being 2.01, 3.61 and 6.85 with an average of 4.16 days. The lower threshold of development was 21.4°C. The thermal units required for oviposition period of *I. seychellarum* at three constant temperatures were 178.42, 237.94 and 198.41 DD'S at 25, 30 and 35°C; respectively.

3.3. Post-oviposition period: Post oviposition period was found to be the shortest one mean duration of this period were 10.57, 8.80 and 3.83 at 25, 30 and 35°C; respectively. The rate of development was increased gradually as the temperature increased from 25 to to35°C which being 9.46, 14.70 and 26.11 at 25, 30 and 35°C; respectively.

These results are in harmony with those obtained by Abdel-Aleem (2008a) mentioned that the incubation periods in summer and winter were 5.2± 0.2 and 18.2± 1.2 days, respectively, the duration of nymphal stage was 25.2 ± 18 days in summer and 42.8 ± 1.8 days in winter. Duration of pre-oviposition increased in winter; being 22.3 days than summer which was 8.6 days. Duration of oviposition in winter reached 13.3 days; while in summer it was 7.6 days. post oviposition period was 16.5 days; while in summer it reached 9.6 days. Abdel-Aleem (2008b) calculated zero of development of *I. seychellarum* under four constant temperatures (15, 21.27, 27 and 33°C) was 9.2°C. Also, means of thermal units 85.5 degree days for incubation period. Sayed (2008) revealed that mean of egg incubation period were 14.42, 8.53 and 7.87 days at 20, 25 and 30°C respectively. Duration of pre-oviposition at 20,25 and 30°C were 102, 26 and 24 days, respectively. Mean duration of oviposition were 25.37, 49.10 and 56.50 days at 20, 25 and 30 °C; respectively. Post- oviposition period ranged between 8-26 days. Osman (2005) did not find big difference between the incubation periods at 30.6 and 27.3°C which were 14.32 and 14.97 day; respectively. nymphal stage duration was 59.35± 1.63 days at 34 °C; while it was 152.97± 4.29 days at 27°C. The period of pre-oviposition varied from generation to another being 21.8 days at 32°C and 38.27 days at 26°C. Post oviposition period was the shortest one (11-13 days) in the two generations. Nabil et al. (2013) found duration of pre-oviposition period were 27.5 and 20.4 days for winter and summer generation, respectively. Duration of oviposition was lasted 48.3 and 34.0 days during winter and summer generations, respectively. The post oviposition period were 12.0 and 11.3 days throughout winter and summer generations, respectively.

On the other hand , these results do not agree with Osman (2005) stated that the oviposition period was 182.26 days at 30°C; while it was 75.7 days at 26 °C.

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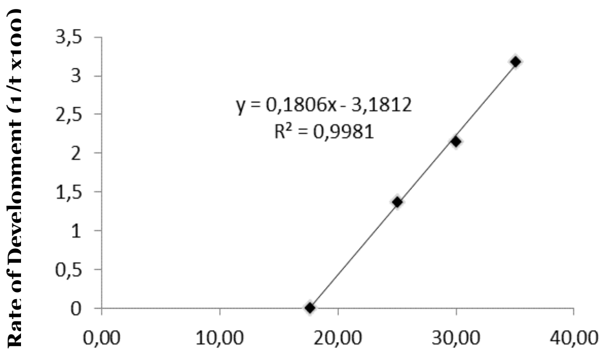

Figure 1. Relation between the constant temperature and rate of development of the nymphal stage of *I. seychellarum*.

Table 1. Effect of three constant temperatures on egg incubation period of *I. seychellarum,* rate of development and thermal constant units.

Temp. (°C).	Incubation period/day.	Rate of Development %	T_o (°C).	Thermal constant (DD'S)
25	7.45 ± 0.19 a	13.42		94.98
30	4.21 ± 0.26 b	23.75	12.25	74.73
35	3.98 ± 0.11 c	25.13		90.54
Average	5.21	20.77		86.75
" F "	271.38***			
LSD	0.39			

Table 2. Effect of three constant temperatures on nymphal stage of *I. seychellarum,* rate of development and thermal constant units.

Temp. (°C).	Duration of nymphal stage	Rate of Development %	T_o (°C).	Thermal constant (DD'S)
25	72.74 ± 3.8 a	1.37		536.82
30	46.42 ± 1.84 b	2.15	17.62	574.68
35	31.44 ± 0.9 c	3.18		546.43
Average	50.2	2.23		552.64
" F "	74.93**			
LSD	10.22			

Table 3. Effect of three constant temperatures on mean durations of pre- oviposition, Oviposition and Post-oviposition periods of *I. seychellarum.*

Temp. (°C).	Pre-oviposition				Oviposition				Post-oviposition	
	Duration	R %	T_0	DD'S	Duration	R %	T_0	DD'S	Duration	R %
25	19.13 ± 2.11 a	5.23		58.92	49.70 ± 2.36 a	2.01		178.42	10.57± 0.79 a	9.46
30	14. 77± 0.97 b	**6.77**	21.9	119.34	27.70 ± 3.49 b	3.61	21.4	237.94	6.80 ± 0.45 b	14.70
35	5.77 ± 0.99 c	17.33		75.47	14.60 ± 4.88 c	6.85		198.41	3.83 ± 0.20 c	26.11
Average	13.22	9.78		84.58	30.67	4.16		204.92	3.4	16.76
"F"	107.14***				86.74***				13.31***	
LSD	3.03				5.45				1.52	

DETERMINATION OF GENETIC RELATIONSHIPS AMONG THREE GROUND SPIDERS (ARANEAE: GNAPHOSIDAE) BY USING RAPD-PCR FROM TURKEY

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[**Seyyar, O., Ercan, F. S. & Demir, H.** 2016. Determination of genetic relationships among three ground spiders (Araneae: Gnaphosidae) by using Rapd-Pcr from Turkey. Munis Entomology & Zoology, 11 (2): 643-649]

ABSTRACT: Random amplified polymorphic DNA (RAPD-PCR), was used to determine three Gnaphosidae species, in the study. RAPD-PCR was carried out by using fifty random primers each of them consisted of ten base pairs. Fourteen of these primers gave sufficiently clear and distinguishable bands. Forty eight samples that represented three Gnaphosidae species, *Drassodes lapidosus* Walckenaer, 1802, *Haplodrassus signifer* Koch, 1839 and *Nomisia ripariensis* Cambridge, 1872, were used for RAPD-PCR and they were identified by their molecular characteristics. Genetic polymorphism among these samples was recorded by UPGMA method. The aim of this study was to achieve genetic marker to clearly differentiate and determine the genetic variation of these three samples that collected from different locations of Turkey. Our results showed that RAPD-PCR is an effective, fast and simply alternative method for identification of the spider species.

KEY WORDS: *Drassodes lapidosus*, *Haplodrassus signifer*, *Nomisia ripariensis*, RAPD-PCR, genetic polymorphism

Many researchers have focused on phylogenetic and evolutionary studies of the Araneidae. Several methods have been used to describe the variation within a species of spiders. The common way of classification of spiders is based on morphological characteristics, particularly structural features of genitalia but morphology based identification of spiders such as web form, stabilimenta, genitalia, mating and predatory behaviour are problematic and time consuming (Scharff, 1997).

Gnaphosidae is one of the largest families of spiders in regard to numbers of species and genera. Up to now, it includes 2147 species and 121 genera worldwide (Platnick, 2015). According to literatures, this family is one of the most diverse and abundant families of ground spiders. They are nocturnal hunters that move very fast on the ground (Chatzaki, 2008; Seyyar et al., 2009).

The limitations of morphological, physiological and cytological markers for identifying the genetic diversity in many species have been overcomen by the development of the DNA markers such as random amplified polymorphic DNAs. Polymerase chain reaction (PCR) technology allows for analysis of DNA polymorphism in many invertebrate organisms, especially systematically problematic species. RAPD is a PCR based tecnique that showed the genetic polymorphism by using random and short primers without any information about DNA sequences of target samples. This tecnique has advantages in high efficiency, easy detection, small usage of samples and relatively simple. RAPD analysis generates species specific banding profiles by using a single 10 base pair (bp) oligonucleotide primers. So, it has been widely used for systematic and genetic polymorphism studies of many organisms (Williams et al., 1990).

Also, molecular markers based on the PCR are confirmed as precious tools for ecological studies (Gariepy et al., 2007). RAPD-PCR has been used for identification of spiders in recent years (Gurdebeke et al., 2000). Approximately, 44.000 spider species and subspecies are known relating to 112 families identified worlwide. Basically 46% and 1.5% of spider specifications are based on only one sex and juvenils, respectively (Platnick, 2015). For supporting the identification of known species, molecular based tecniques is most likely to be helpful for species diagnose of spiders.

Bond (2004), identified morphologically indistinguishable females of two reputed species of genus *Apomastus* by using molecular tecniques. Agnarsson (2010), used the ribosomal internal transcribed spacer ITS2 for the phylogenetic analysis of *Anelosimus* species, however it was found that ITS2 had an inadequate variation within species and among closely related species. Defining the genetic variability of Mexican populations of *Brachypelma vagans* Ausserer, 1875, seven ISSR (Inter Simple Sequence Repeat) primers were used and four of these primers gave sufficiently clear and reproducible bands (Machkour-M'rabet et al., 2009). Not only DNA markers, but also enzymatic studies were done by distinguishing the relationship between spider species. Twelve gene loci from ten enzymes of *Phidippus* species were analyzed by using poliacrylamide gel electrophoresis (Terranova & Roach, 1987). Baert et al. (2008) investigated the allozyme characterization of *Hogna* species and they found a highly similar allele frequencies within species. Due to the results, Bond et al. (2001) suggested that morphology based identification was the most conservative approach. Consequently, the combination of morphological and molecular datas will allow the most accurate identification of species (Gibss, 2009).

The aim of our study is to evaluate RAPD-PCR as a molecular marker system for taxonomic studies of three spider species of the Gnaphosidae. We use this tecnique for getting inferences about phylogenetic relationship among *D. lapidosus*, *H. signifer* and *N. ripariensis*.

MATERIALS AND METHODS

Sample vouchering

Specimens were collected from Central and South of Turkey (Fig. 1). Also, some of samples were obtanied from NUAM (Nigde University Museum of Arachnology) (Table 1).

DNA extraction and quality

Ethanol-preserved specimens were used for DNA extraction. Total genomic DNA was extracted from one or two legs of each spider specimen. Legs were removed with a clean forceps and rest of the body was stored at -20 °C as voucher specimen. Legs of each spider were placed in a 1.5 ml eppendorf tube and Qiagene DNeasy kit were used for extraction following the manufacturer's protocol. The concentration of the DNA obtained was determined by UV spectrophotometer, we quantified the concentration of DNA in 48 extracts (19 *D. Lapidosus,*19 *H. signifer* and 10 *N. ripariensis*).

RAPD-PCR Analysis

The RAPD analyses were performed using fifty oligomers obtained from Bio Basic Inc.. Fourteen of these primers gave sufficiently clear and distinguishable bands. The sequences of these oligomers are shown in Table 2. Samples were amplified with arbitrary primers in a total volume of 15µl and contained 2µl DNA template, 1.5µl PCR buffer (10X buffer with $(NH_4)_2SO_4$, Fermentas), 0.5µl dNTPs (10mM stock solution), 2µl random primer (10µM, Bio Basic Inc.), 0.25µl Taq

Polymerase (5 u/µl, Fermentas), 1.2µl $MgCl_2$ (25mM stock solution, Fermentas), 1.5µl BSA (10mg/ml) and 6.05µl of sterile distilled water. A negative control that contains water instead of template was included in each reaction set. The temperature profile for the RAPD-PCR was a pre-denaturing step of 2.5 min at 94 °C, followed by 35 cycles of 45 s at 94°C, 1.45 min at 35°C and 1.00 min at 72°C, with a final extension step of 7 min at 72°C. PCR amplification was carried out in a Thermal Cycler (Applied Biosystems). Following amplification, the PCR products were electrophoresed in a Tris-Asedic Acid-EDTA buffer by 1% agarose gel for 1.5h at 80V. The DNA was stained with ethidium bromide (0.1µg/ml) and the bands were photographed under UV light. The results were captured using Quantum- ST4 1100/20M image analysis system.

The banding patterns of the samples were scored for the presence (1) or absence (0) of each amplified band. Data were then converted to a distance matrix and a dendogram was constructed with the UPGMA (Unweighted Pair-Group Method with Arithmetic Mean) method (Sneath & Sokal, 1973), using the software NTSYS-pc (Numerical Taxonomy and Multiware Analysis System) (version 2.0) (Rohlf, 1988).

RESULTS

In our study fifty random primers were selected for a band sharing analysis of 48 Gnaphosidae species that contain *D. lapidosus*, *H. signifer* and *N. ripariensis* from different localities of Turkey. Fourteen primers gave scorable bands and a total of 64 RAPD bands were scored. Fourty of these bands were polymorphic.

Genetic distances were calculated among 48 Gnaphosidae samples that represent *D. lapidosus*, *H. signifer* and *N. ripariensis* from the RAPD data by using NTSYS-pc (Numerical Taxonomy and Multiware Analysis System) (version 2.0) (ROHLF, 1988). While the lowest intra-species genetic distance was 40% between *H. signifer* and *N. ripariensis*, the highest was 73% between *H. signifer* and *D. lapidosus*.

According to the dendogram that was constructed with the UPGMA, *D. lapidosus*, *H. signifer* and *N. ripariensis* were clearly seperated from each other (Fig. 2). It has been seen that there isn't any difference about genetic features between the population of *H. signifer* which was sampled from six different population and two areas, so this regional varieties hasn't caused huge differences on population. In the species of *N. ripariensis* which was sampled from different population in Mediterranean Region has been seen the same results. However when we examined the species of *D. lapidosus* which was sampled from six different population from Central Anatolia and Mediterranean Region, it has been seen that there are significant differences in the population of these two regions as different from other two species.

Especially the effectiveness of the elevation difference has been thought in this distinction. It was seen that the population living between 250-600 meters makes a group and the populations living over 1000 meters makes different groups according to the elevation difference (Table 1). It has been marked that especially the population of Melendiz Mountain in Niğde and the population of Erciyes Mountain in Kayseri are separated from each other significantly, and the population of Erciyes is more similar to the population of Mediterranean Region than the population of Melendiz Mountain. This situation showed that the gene flow between Central Anatolia and Mediterranean Region populations of *D. lapidosus* is on the highest point of Toros Mountains and this gene flow is provided by tunnels in the North of Adana (Saimbeyli, Feke Kezan) and in Kahramanmaraş either than the tunnel of Gülek.

Moreover, it was examined that there are small differences between the main population and the samples taken from the same population of Central Anatolian Region especially the sample species of D11 (Melendiz Mountain in Niğde) and D15 (Erciyes Mountain in Kayseri) because of the elevation differences in mountainous regions.

DISCUSSION

Geographic features of an area that populations live have an effective role on the occurence of the genetical differences between species. RAPD-PCR is a powerful and technically accessible tool for clarifying the systematics of closely related and uncharacterized species (Wilkerson et al., 1993).

In recent years, DNA markers have widely used in molecular studies of genetic relatedness, phylogeny and population dynamics (Loxdale & Lushai, 1998). RAPD technique has been successfully used to detect genetic variation and for taxonomic studies. This technique doesn't require any prior information about specific sequences, so it became a useful method for classification studies.

Many researchers used RAPD-PCR for determining genetic variation among species; Black et al. (1992) differentiated four aphid species by RAPD-PCR. Chapini et al. (1999) determined four genetically distinct *Anagrus* species by same method. Using RAPD markers Aljanabi et al. (1998) showed genetic variability in stink bug egg parasitoids. Genetic polymorphisim in two *Trichogramma* species were detected by RAPD-PCR (Ercan et al., 2012). A'hara et al. (1998), determined RAPD profiling of tree spider species, *Lepthyphantes tenuis* Blackwall, 1852, *Enoplognatha ovata* Clerk, 1757 and *Clubiona reclusa* Cambridge, 1863, members of the Linyphiidae, Theridiidae and Clubionidae, respectively. They demonstrated that this technique can easily used and gaved repeatable results for arachnological studies.

In our study, samples of ground spiders, taken from Central Anatolia and Mediterranean region are evaluated, it was indicated that the population of *H. signifer* and *N. ripariensis* were spread out in both region homogeneously. Regional differences didn't cause so big differences on populations, however the population of *D. lapidosus* was separated from the population of Central Anatolia and Mediterranean Region significantly and this separation was mainly the result of elevation differences.

Our results supported the usage of RAPD-PCR for detecting the genetic variability of different ground spiders. This method was used for the first time in systematic studies on the spider in Turkey.

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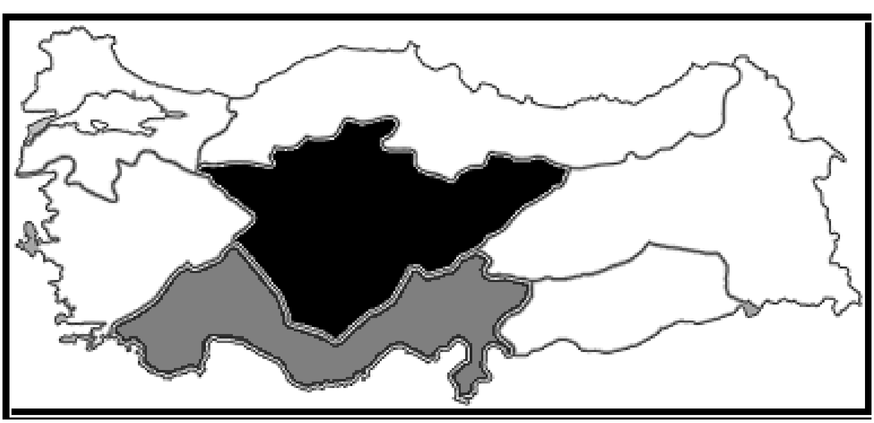

Figure 1. Study area. Black: Central Anatolia Region, Grey: Mediterranean Region.

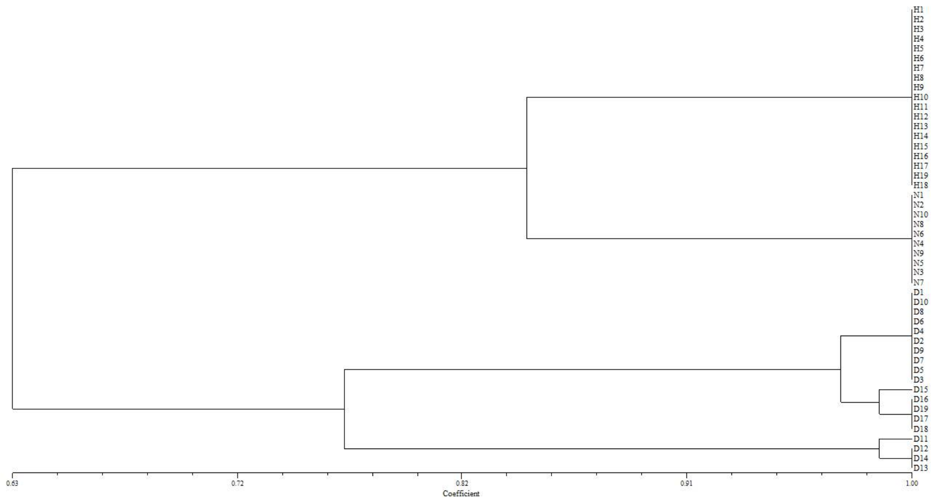

Figure 2. Phylogenetic tree constructed on the basis of UPGMA among three spider species, *D. lapidosus*, *H. signifer* and *N. ripariensis*, using data of RAPD-PCR.

Table 1. Location knowledges of species.

Code	Species	Region in Turkey	Altitude (m)	Location
D 1	*D. lapidosus*	Mediterranean	587	***Osmaniye*** Boğaz plateau
D2				
D3				
D4				
D5	*D. lapidosus*	Mediterranean	252	***Mersin***, Çamlıyayla
D6				
D7				
D8	*D. lapidosus*	Mediterranean	611	***Kahramanmaraş,*** Andırın
D9				
D10				
D11	*D. lapidosus*	Central Anatolia	1534	***Niğde***, Melendiz mountains
D12				
D13				
D14				
D15	*D. lapidosus*	Central Anatolia	1765	***Kayseri***, Erciyes Mountain
D16				
D17				
D18	*D. lapidosus*	Central Anatolia	1146	***Konya***, Seydişehir
D19				
D 1	*H. signifer*	Mediterranean	1581	***Kahramanmaraş***, Göksun, Püren Pass, Andırın
D2				
D3				
D4				
D5	*H. signifer*	Mediterranean	652	***Kilis***, Polateli
D6				
D7				
D8	*H. signifer*	Mediterranean	823	***Adana***, Pozantı, Belemedik
D9				
D10				

D11	*H. signifer*	Central Anatolia	1534	***Niğde***, Melendiz Mountains
D12				
D13				
D14				
D15	*H. signifer*	Central Anatolia	1208	***Konya***, Akseki
D16				
D17				
D18	*H. signifer*	Central Anatolia	1052	***Kayseri***, Erkilet
D19				
N1	*N. ripariensis*	Mediterranean	917	***Kahramanmaraş***, Pazarcık
N2				
N3				
N4				
N5	*N. ripariensis*	Mediterranean	598	***Mersin***, Çamalan
N6				
N7				
N8	*N. ripariensis*	Mediterranean	450	***Hatay***, Hassa, Akbez
N9				
N10				

Table 2. RAPD primers gaved polymorphic bands in RAPD-PCR of spider species.

No	**Sequence (5'→3')**	**%GC**
S34	TCT GTG CTG G	60
S39	CAA ACG TCG G	60
R4	CTG ATC GCG G	70
R5	CAG GCC CTT C	70
R6	GTT GCG ATC C	60
R8	AGC GTC TGT G	60
R12	TAC GTA CGT C	50
R17	TTG ACA GTA A	50
R26	CCG ATA CCA G	60
R28	CGA TCA GCT C	60
R39	GCT AGA ATC G	50
R43	CGC TCG TCG T	70
R47	GAT AGG GAT G	50
R49	CAG CTG GCT C	70

THE DISTRIBUTION, HOST PLANTS AND NATURAL ENEMIES OF WHITE PEACH SCALE, *PSEUDAULACASPIS PENTAGONA* (TARGIONI-TOZZETTI) (HEMIPTERA: DIASPIDIDAE), IN ANKARA PROVINCE

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ABSTRACT: The distribution, host plants, and natural enemies of the white peach scale, *Pseudaulacaspis pentagona* (Targioni-Tozzetti) (Hemiptera: Diaspididae), were investigated in 25 districts of Ankara Province, Turkey, during 2013-2015. Thirteen districts were infested with harmful white peach scale; infestation was most common in parks, roadsides, private and institution gardens in centrum and old silkroad parts of Ankara. Twenty-two host plant species were found in these 13 districts, five of which (*Aesculus carnea*, *Hibiscus* sp., *Paulownia tomentosa, Rhus thyphina* and *Salix babylonica*) had not previously been recorded as host plants in Turkey. Some host plant species, including *Catalpa bignonioides, Cornus alba Fraxinus americana*, *F. excelsio, Forsythia intermedia*, *Morus alba, M. nigra* and *Sophora japonica*, were found to be very highly infested. Five species of predators and three species of parasitoids were associated with white peach scale. *Orius minutus* L, *Chrysoperla pallida* are new record as predator of *P. pentagona* in World *and Epitetracnemus comis* Noyes &Ren Hui are first time record in Turkey.

KEY WORDS: *Rhus thyphina, Salix babylonica*, *Epitetracnemus comis*, *Chrysoperla pallida, Orius minutus*

The white peach scale (WPS), *Pseudaulacaspis pentagona* (Targioni-Tozzetti) (Hemiptera: Diaspididae) is covered by a waxy scale that is oval to circular in shape and a creamy-white to reddish-orange in color female. By contrast, adult males are tiny, yellow, two-winged insects. Immature males are also covered with a scale, but this is elongate and snowy white.

WPS is Oriental species and widely distributed all over the world (Ben-Dov et al., 2015). In 1886, this species was seriously pest of mulberry trees and a menace to the silk industry and neighboring countries (Rosen, 1990). After years their spreading towards the north has been observed in central Europe and Mediterranean basin (Bodenheimer, 1953; Kozstarab & Kozar, 1988; Hanks & Denno, 1994; Şişman & Ülgentürk, 2010; Kaydan et al., 2013). It is polyphagous species that infests mulberry, beside of various kinds of deciduous fruit trees, ornamental and wild plants (Ben-Dov et al., 2015). It develops 2-5 generations per year up hanging climatic and geographic conditions (Kosztarab, 1990; Park & Kim, 1990; Branscome, 2012).

WPS is a pest of economic importance for mulberry, peach trees and woody ornamentals. In USA, crop losses from WPS, plus control costs were only $94000, but on the untreated peach trees the yield loss was valued at $480000 (Kosztarab, 1990). In Hawaii, it is only known as a crop pest in papaya (*Carica* *papaya*); WPS poses a serious quarantine problem here, as they move into the papaya fruit in heavily infested trees (Neumann et al., 2010).

WPS is also attacked by several natural enemies (Collins & Whitcomb, 1975). Some parasites have since provided good control of WPS under most conditions (Collins & Whitcomb, 1975).

WPS is one of the most widely distributed insect species on fruit trees in Turkey (Kozár et al., 1979) and is considered the primary pest for peach trees in the Black Sea region (Kıroğlu, 1981) and the East Mediterranean region (Erkılıç & Uygun, 1997). In Turkey, it has two generations per year in mountainous areas, and three generations per year in coastal areas (Kıroğlu, 1981; Erkılıç & Uygun, 1997). WPS infests fruit plants such as almond, apricot, cherry, kiwi, medlar, mulberry, peach, plum, walnut and ornamental trees in Turkey (Zeki et al., 2004; Kaydan et al., 2013; Ülgentürk & Ayhan, 2014).

In recent years, WPS has also become a pest of great importance for mulberry trees (*Morus* spp.) in Ankara, due to the increased number of mulberry. This study aims to find out the size and spread of this insect and also determine the possibility of using biological control elements within integrated control program in Ankara province.

MATERIALS AND METHODS

Surveys were conducted to determine the distribution, host plants, and natural enemies of WPS in 17 districts and eight areas of Centrum of Ankara in the Spring–Autumn period of 2013-2015 (Fig. 1). Sampling areas were randomly selected, and infested twigs and/or branches were collected and placed in labelled plastic bags. The samples were then taken to the laboratory and examined under a stereomicroscope. Some WPS females were placed in 70% ethyl alcohol for identification, while others were put into plastic jars to rear their natural enemies. Adult predators of WPS that were found feeding with WPS on the same plant were collected directly by hand, while immature stages were reared on the WPS in climate room. The identification of host plants was made by the Landscape Department of Faculty of Agriculture, University of Ankara, Turkey.

RESULTS AND DISCUSSION

In total, 23 host plant species of WPS were found in 13 districts of Ankara province in 2013-2015. 7 of them were fruit trees (*Juglans regia*, *Morus alba*, *M. nigra*, *Prunus avium*, *P. persica*, *Vitis vinifera*, *Ficus carica*), while 16 were woody trees (*Aesculus carnea*, *Catalpa bignonioides*, *Cornus alba*, *Forsythia intermedia*, *Fraxinus americana*, *F. excelsior*, *Hibiscus syriacus*, *Koelreuteria paniculata*, *Paulownia tomentosa*, *Rhus thyphina* var. *laciniata*, *Ribes aureum*, *Robinia pseudoacacia*, *Salix babylonica*, *Sophora japonica*, *Syringa vulgaris*, and *Tilia tomentosa*) and one ornamental species *Pelargonium peltatum* (Table 1). WPS was determined to very high level infestation in centrum of Ankara and some districts, especially Ayaş, Beypazarı, Nallıhan on old silkroad with *C. bignonioides*, *Cornus* spp., *Forsythia intermedia*, *Fraxinus* spp., *M. alba*, *M. nigra*, and *S. japonica*, being most common. While *P. peltatum*, *R. thyphina* var. *laciniata*, *S. babylonica, Ficus carica* and *V. vinifera* were found rare host plant with high infestation. Interestingly, *Fraxinus americana, F. excelsior, Hibiscus* sp., *P. peltatum*, *V. vinifera, Paulownia tomentosa*, *A. carnea*, *R. thyphina* var. *laciniata* and *S. babylonica* are found for the first time as host plants of WSP in Ankara and last four of them are recorded for the first time in Turkey.

In Ankara, *Crataegus* oxyacantha, *C. bignonioides*, *F. intermedia*, *K. paniculata*, *M. alba*, *M. nigra* var. *pendula*, *R. aureum*, S. *japonica, S. vulgaris* have been recorded by previous researchers as host of WSP (Çobanoğlu & Düzgüneş 1986; Ülgentürk & Toros, 1996; Ülgentürk & Toros, 2000; Zeki et al., 2004). In Aegean, Black Sea, Central Anatolia, Marmara and Mediterranean regions of Turkey, many fruit and ornamental plant species like *Actinia chinensis, A. deliciosa, Aesculus* sp., *Ailanthus altissima, Buxus sempervirens, Prunus avium, P. amygdalus, P. laurocerasus, Pelarganium* sp.*, Ribes aureum, Robinia pseudoacacia, Tamarix* sp., *Sophora japonica, Syringia, vulgaris* and *V. vinifera* were found as host plants of WPS (Çanakçıoğlu, 1977; Kıroğlu, 1981; Erkılıç & Uygun, 1995; Ülgentürk & Çanakçıoğlu, 2004; Ülgentürk et al., 2009). *P. pentagona* is a cosmopolitan and polyphagous scale insect, and its wide range host spectrum points its adaptation and survival capacity.

In these study 5 species are found as predators of WPS; *Orius minutus* L. (Hemiptera: Anthocoridae), *Chilocorus bipustulatus* L., *Brumus quadripustulatus* L. (Coleoptera: Coccinellidae), *Cybocephalus* sp. (Coleoptera: Cybocephalidae) and *Chrysoperla pallida* (Henry et al.) (Neuroptera: Chrysopidae). The most common predator is *C. bipustulatus* followed by *Cybocephalus* sp. whereas the other predators are in few numbers. *C. bipustulatus* and *Cybocephalus* sp. are well known general predators on WPS and other scale insects in Turkey and all the world (Soylu & Ürel, 1977; Kıroğlu, 1981; Koztarab & Kozar 1988; Erkılıç & Uygun, 1995; Erler & Tunç, 2001; Ülgentürk & Toros, 2001). In spring, *C. bipustulatus* had controlled successfully of population of WSP but this success was not permanently in peach orchards of Black Sea region (Kıroğlu, 1981). The other general predators are *Chrysoperla pallidus* and *Orius minutus* are detected first time on WPS in Turkey and the world. Both predators prey mites, thrips, whiteflies, aphids, many other soft-bodied arthropods and their immature stages (Soylu & Ürel, 1977; Hagen et al., 1999; Efe et al., 2015). Graora & Spasi (2008) were recorded first time *Chrysopa carnea* Stephens and *Deraeocoris ruber* Linnaeus feeding *P. pentagona*. We think omnivorous characters of these predators are limited to control of WPS populations in Ankara.

As parasitoid of white peach scale, 3 species namely *Aphytis proclia* (Walker), *Encarsia berlesei* (Howard) (Hymenoptera: Aphelinidae) and *Epitetracnemus comis* Noyes & Ren Hui (Hymenoptera: Encyrtidae) were found in Ankara. *E. berlesei* and *A. proclia* are common respectively while *E. comis* is few number in Ankara. This parasitoid is recorded for the first time in Turkey. *E. berlesei* is thelytokous, endophagous parasitoids, reproducing young female and both immature stages of WPS (Bennassy, 1958; Habibian & Assadi, 1989; Pedata et al., 1995). *E. berlesei* was introduced to Italy from Japan and U.S.A. for the control of heavy infestation of WPS on mulberry trees that use silk production. Releasing of *E. berlesei* was complete success in Italy and parasitoid distributed all over the areas in Europe (Rosen, 1990). *E. berlesei* was the most abundant parasitoid of WPS in Italian orchards (Goranna & Viggiani, 1997). According Bodenheimer (1958), few number of *E. berlesei* from Florida was introduced to control WSP on mulberry trees that used silk production in Bursa by director of Silk research Institute in in year 1930. Releasing was limited success in the beginning. Although *E. berlesi* was most common parasitoid of WPS in Antalya (Erler & Tunç, 2001), surprisingly it was unsufficient to control WPS on peach in Black sea region (Kıroğlu, 1981) and in Mediteranean, Turkey (Erkılıç & Uygun, 1995). Gürkan (1982) reported *E.* (*Praspaltella*) *berlesei* and *Aphitis diaspidis* how were parasited 57.4% of *P. pentagona* of population in Marmara region.

General ectoparasitoid, *A. proclia* was recorded in the previous work in Ankara (Ülgentürk & Toros, 2001). Benassy (1961) was conducted ectoparasitoids like *Aphytis* were highly dependent on climatic influences. Endoparasitod species like *Encarsia* more dependent their host than climatic conditions. Graora & Spasi (2008) were reported *E. berlesei* and *A. proclia* were found to be the most important regulators of *P. pentagona* population density with parasitism mounting to 60, even 64% in Serbia.

As a result of this study, among the 25 areas in Ankara, only 13 of them were infected insects armored with *P. pentagona*, 22 plant species has been found infected with. 4 of them are recorded for the first time in Turkey. In the affected areas with *P. pentagona*, 5 predators and 3 parasites were recorded. 2 predators and 1 parasite were not recorded in Turkey before. In a future study there is hope to see the relationship between *E. berlesei* and the WPS, and the extent of its ability to control this pest.

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Table 1. Host plants of white peach scale (*Pseudaulacaspis pentagona*) in Ankara Province.

District	Host plant	Location / date
Altındağ	*Cornus alba, C. alba, Fraxinus americana Forsythia intermedia, Juglans regia, Morus alba, M. nigra, Prunus avium, Sophora japonica, Syringa vulgaris*	Altın Park, 25.08.2013
	M. nigra var. *pendula*	Gençlik Park, 16.08.2014
	M. alba var. *pendula, Paulownia tomentosa*	Ankara Railway Station Garden, 16.08.2014
	M.nigra	Hasköy, 03.06.2015
	S. japonica	Aydınlık Evler, 03.06.2015
Ayaş	*M. alba*	Centrum, 12.04.2013
Beypazarı	*Ficus carica, M. alba, Salix babylonica, S. japonica*	Centrum, 21.09.2015
Cayırhan	*Paulownia tomentosa, M. alba*	Cumhuriyet Park, 21.9.2015
Çankaya	*Aesculus x carnea, Catalpa bignonioides, C. alba, F. excelsior, F. intermedia, J. regia, Koelreuteria paniculata, M. alba, M. nigra, Robinia pseudoacacia, S. japonica, Tilia tometosa*	Dikmen Park 1, 2 Etap, 27.09.2013
	M. alba	Birlik quarter, 28.09.2014
	M. alba	Oran quarter, 28.10.2014
	F. americana, S. japonica, Koelreuteria paniculata, M. nigra, Prunus persica	Kurtuluş Park, 25.09.2013
	M. alba, P. tomentosa	Tandoğan, 01.10.2013
	M. alba	Ahlâtlıbel, 28.09.2015
	M. alba	Ulus Kale, 03.08.2014
	M. alba, M. nigra	Botanik Park, 20.04.2013
	M. nigra	Seğmenler Park, 20.04.2015
	S. japonica	İncek, 20.4.2015
	M. alba, M. nigra	Hoşdere, 20.04.2015
Çubuk	*S. japonica*	Esenboğa Airport Road , 30.06.2015
Gölbaşı	*M. alba*	Centrum
	M. alba	Hacıhasan village, 17.04.2013
	F. excelsior	Eymir Forest, 13.03.2014
Keçiören	*J. regia , M. alba, M. nigra*	İncirli Basın Evler Park, 12.06.2013
	C. bignonioides, C. alba, F. excelsior, F. intermedia, Hibiscus syriacus, M. alba, M. nigra	Faculty of Agriculture /Campus, 23.05.2015
	Fraxinus excelsior	Ankara University Campus
	M. alba	General Directorate of Meteorology /garden
	S. japonica	Keçiören Casino Park, 18.05.2015
	S. japonica	Sanatoryum Hastanesi Bahçesi, 06.06.2015
Mamak	*F. intermedia, M. nigra , S. japonica, S. vulgaris*	Ankara Üniversitesi Dikimevi-Kampusu, 25.09.2013
	R. pseudoacacia	Samsun Highway, 15.09.2014
Nallıhan	*C. bignonioides, F. intermedia, M. nigra, M. alba, Prunus persica, Vitis vinifera*	Centrum and road, 21.09.2015
Polatlı	*M. alba, R. pseudoacacia, S. japonica*	Centrum, 20.09.2014

Pursaklar	*C. bignonioides, M. alba*	Bağla quarter, 15.05.2013
Yenimahalle	*M. alba, S. japonica, S. vulgaris*	TAGEM / garden, 10.07.2013
	C. bignonioides, C. alba, F. intermedia, F. americana, M. alba, M. nigra, J. regia	Demet Evler Cemre Park, 12.06.2013
	C. bignonioides, Ribes aureum	Ministry of Agriculture Logistics Facilities/ garden, 15.11.2013

Table 2. Predators of white peach scale (*Pseudaulacaspis pentagona*) in Ankara Province.

Predator	Host plant Date / location
Chilocorus bipustulatus	*Morus alba,* 26.08.2014, Altınpark; *M. alba* var. *pendula*, *M. alba, Morus alba,* 12.04.2013, Oran *Aesculus hippocastanum, Catalpa bignonioides, Cornus alba, Fraxinus americana, M. alba, M. alba* var. *pendula*, *Morus nigra, Robinia pseudoacacia, S. japonica,* 27.09.2015, Dikmen 1, 2 etap; *C. bignonioides, Fraxinus excelsior, M. alba, Morus nigra* var. *pendula*, 23.05.2015, Ankara University Campus, Tandoğan; *M. alba, C. bignonioides,* 17.05.2015, Faculty of Agriculture Campus; *S. japonica* 25.09.2014, Ankara University Dikimevi Campus; *C. bignonioides, F. americana, M. alba,* 10.08.2014, Cemre park; *C. bignonioides,* 15.11.2015, Campus of Agriculture, Yenimahalle
Brumus quadripustulatus	*M. alba,* 15.11.2015, Campus of Agriculture, Yenimahalle
Cybocephlus sp	*M. alba,* 26.08.2014, Altınpark; *Morus alba,* 12.04.2013, Oran; *M. alba,* 12.07.2014, Seymenler park; *M. alba, S. japonica,* 23.05.2015, Ankara University Campus, Tandoğan; *Forsythia intermedia, F. excelsior,* 17.05.2015, Faculty of Agriculture Campus; *C. bignonioides, M. alba,* 21.09.2015, Centrum: *M. alba*, Cemrepark Demetevler, Ankara, 21.10.2015
Orius minutus	*F. excelsa,* 20.07.2015; *F. excels,* 22.09.2015; Altınpark, *M. alba, Salix babylonica,* 21.09.2015, Beypazarı
Chrysoperla pallida	*M. alba,* 21.09.2015, Botanik park

Table 3. Parazitoits of white peach scale (*Pseudaulacaspis pentagona*) in Ankara province.

Parazitoit	Host plant Location / Date
Aphytis proclia (Walker)	*M. alba*, Ayaş, 24.03.2013; *M. alba*, Ayaş, 13.05.2013; *M. alba*, Bağlar, 11.06.2013; *M.* alba, Cemrepark Demetevler, Ankara, 21.10.2015
Encarsia berlesei (Howard)	*M. alba*, Altınpark, 22.05.2013; *M. alba*, Bağlar, 20.05.2013; *M. alba*, Ayaş, 13.05.2013; *M. alba*, Botanik park, 10.05.2013; *M. alba*, Gölbaşı, 03.04.2013
Epitetracnemus comis Noyes& Ren Hui	*M. alba*, Beypazarı (centrum), 21.09.2015; *M. alba*, Cemrepark Demetevler, Ankara, 21.10.2015

NEW SYNONYMS AND COMBINATION IN THE TRIBE PARALIMNINI (HEMIPTERA: CICADELLIDAE: DELTOCEPHALINAE) FROM CHINA

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[Xing, J. & Li, Z. 2016. New synonyms and combination in the tribe Paralimnini (Hemiptera: Cicadellidae: Deltocephalinae) from China. Munis Entomology & Zoology, 11 (2): 657-660**]**

ABSTRACT: In the present paper, one genus and one species are synonymized in the tribe Paralimnini of the subfamily Deltocephalinae. *Didymotettix* Yang, 1996 (previously placed in the tribe Athysanini) is a junior synonym of *Falcitettix* Linnavuori, 1953, *Didymotettix kunlunicus* Yang, 1996 is a junior synonym of *Falcitettix guttiger* (Kusnezov, 1929). And, *Sorhoanus longivittatus* Kuoh, 1981 is transferred to the genus *Emeljanovianus* based the characters of male genitalia.

KEY WORDS: Homoptera, taxonomy, leafhopper, nomenclatural change, China

The deltocephaline tribe Paralimnini is distributed worldwide, including 2 subtribes, 139 genera and 931 species (Zahniser & Dietrich, 2013). Most members of the tribe are closely associated with grass dominated habitats. During a study of the Chinese Paralimnini, we recognized one genus and one species as junior synonyms, and also proposed one new combination. The examined specimens are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

NOMENCLATURAL CHANGES AND NOTES

Family Cicadellidae
Subfamily Deltocephalinae Dallas, 1870
Tribe Paralimnini Distant, 1908

Genus *Falcitettix* Linnavuori, 1953

Falcitettix Linnavuori, 1953: 58. Type species: *Falcitettix sibiricus* Linnavuori, 1953: 58, by original designation.

Didymotettix Yang, 1996: 85. Type species: *Didymotettix kunlunicus* Yang, 1996: 86, by original designation. **syn. n.**

Notes. Yang (1996) established the genus *Didymotettix* with the type species *D. kunlunicus* Yang, 1996 from Xinjiang, China. Recently, Zahniser & Dietrich (2013) placed this genus in the tribe Athysanini of the subfamily Deltocephalinae. Based on investigation of the descriptions and illustrations by Linnavuori (1953) and Yang (1996) and the examined specimens from type locality, we recognize the genus *Didymotettix* Yang, 1996 as a junior synonym of *Falcitettix* Linnavuori, 1953.

The genus *Falcitettix* was established by Linnavuori (1953) for *F. sibiricus* Linnavuori, 1953 as its type species. Later, Emeljanov (1962) placed *Falcitettix* Linnavuori, 1953 as a junior subjective synonym of *Mocuellus* Ribaut, 1946, and placed *Falcitettix sibiricus* Linnavuori, 1953 as a junior synonym of *Deltocephalus* *guttiger* Kusnezov, 1929. Oman, Knight & Nielson (1990) listed it as a subgenus of *Mocuellus* Ribaut, 1946, and indicated that *Mocuellus* contains five subgenera (*Erzaleus*, *Mocuola*, *Falcitettix*, *Mocuastrum* and *Promocuus*). However, Hamilton (1975), Emeljanov (1989, 1999) and Zahniser & Dietrich (2013) reinstated *Falcitettix* as a separate genus. Here, we also treat *Falcitettix* as a genus distinct from *Mocuellus*. The species of *Falcitettix* appears to be sufficiently different to justify generic rank on the basis of aedeagal differences.

Distribution. Palaearctic Region.

Falcitettix guttiger **(Kusnezov, 1929)**

(Figs. 1-10)

Deltocephalus guttiger Kusnezov, 1929:181
Mocuellus guttiger (Kusnezov, 1929), n. comb. by Emeljanov, 1962: 178
Falcitettix guttiger(Kusnezov, 1929), n. comb. Emeljanov, 1989: 124
Falcitettix sibiricus Linnavuori, 1953:58, synonymized by Emeljanov, 1962: 178
Falcitettix minor Vilbaste, 1965: 59, synonymized by Emeljanov, 1989: 124
Mocuellus (Falcitettix) minor (Vilbaste, 1965), Li, Dai & Xing, 2011: 137.
Didymotettix kunlunicus Yang, 1996: 86 **syn. n.**

Notes. *Didymotettix kunlunicus* Yang, 1996 was described and illustrated from Xinjiang Autonomous Region, China. After examination of specimens from type locality, we found the characters of male genitalia described by Yang (1996) are the same as the species *Falcitettix minor* described by Vilbaste (1965). Li, Dai & Xing (2011) recorded this species *Mocuellus (Falcitettix) minor* from China flowing Vilbaste (1965) and Oman, Knight & Nielson (1990).

Material examined. 1 ♂, China: Xinjiang Autonomous Region, Buerjing, 14. Ⅷ.1997, coll. Zizhong Li (GUGC).

Measurement. Length (including tegmen): ♂, 2.9 mm.

Distribution. European Russia, Mongolia, Tajikistan, China (Xinjiang).

Genus ***Emeljanovianus*** **Dlabola, 1965**

Sorhoanus (Emeljanovianus) Dlabola, 1965:125. Type species: *Sorhoanus suncharicus* Dlabola, 1965: 126, by original designation.

Notes. *Emeljanovianus* was established with the type species *Sorhoanus suncharicus* Dlabola, 1965, as a subgenus in *Sorhoanus* by Dlabola (1965). Later, Vilabste (1980) placed *S. (E.) suncharicus* Dlabola, 1965 as a junior synonym of *Deltocephalus hilaris* Melichar 1900, and raised *Emeljanovianus* to the genus level based on male genitalia. Recently, Zhang *et al.* (2013) recorded *Emeljanovianus* for the first time from China and reviewed this genus.

Distribution. Palaearctic Region.

Emeljanovianus longivittatus **(Kuoh, 1981), comb. n.**

(Figs. 11-20)

Sorhoanus longivittatus Kuoh, 1981: 111.

Notes. Kuoh (1981) described this species in *Sorhoanus* from Qinghai Province, China. After examination of specimens from type locality, we here transfer it to

Emeljanovianus mainly based on the characters of male genitalia.

Diagnosis. This species differs from *Emeljanovianus medius* (Mulsant & Rey, 1855) and *Emeljanovianus hilaris* (Melichar, 1900) in having pronotum with two black longitudinal bands originating from vertex, aedeagal shaft medially on ventral side with a forked process.

Material examined. 1 ♂, China: Qinghai Province, Datong, 3000 m, 9.Ⅶ.2007, coll. Xiangsheng Chen (GUGC); 3 ♂♂, China: Qinghai Province, Kanbula, 2600 m, 7.Ⅶ.2008, coll. Maofa Yang (GUGC).

Measurement. Length (including tegmen): ♂, 4.0-4.2 mm.

Distribution. China (Qinghai).

ACKNOWLEDGEMENTS

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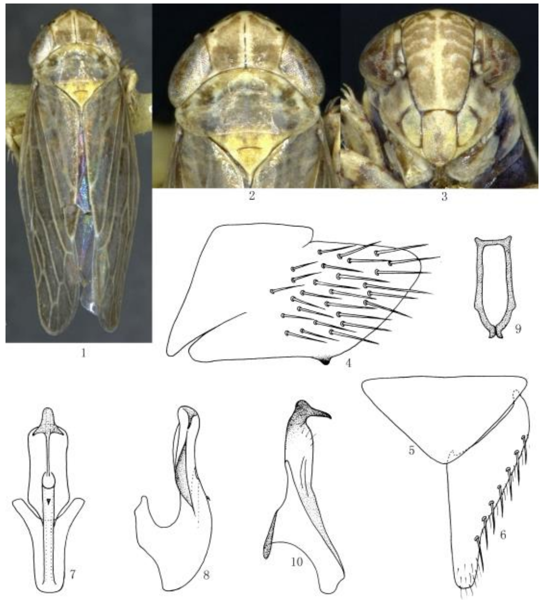
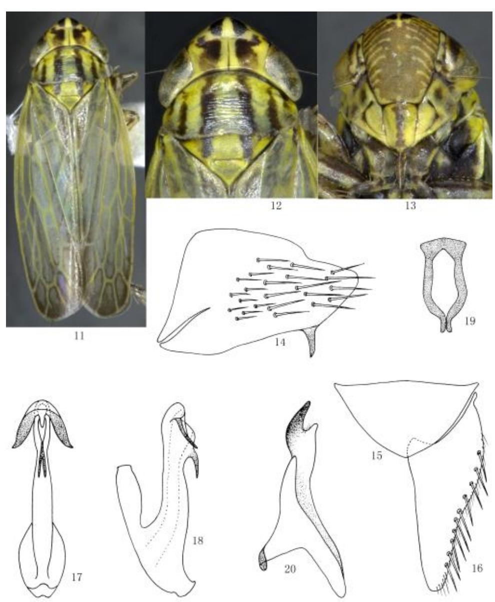


Figures 1-10. *Falcitettix guttiger* (Kusnezov, 1929): 1. ♂, dorsal view; 2. Head and thorax, dorsal view; 3. face; 4. Male pygofer side, lateral view; 5. Valve; 6. Subgenital plate; 7. Aedeagus, ventral view; 8. Aedeagus, lateral view; 9. Connective; 10. Style, dorsal view.



Figures 11-20. *Emeljanovianus longivittatus* (Kuoh, 1981): 11. ♂, dorsal view; 12. Head and thorax, dorsal view; 13. face; 14. Male pygofer side, lateral view; 15. Valve; 16. Subgenital plate; 17. Aedeagus, ventral view; 18. Aedeagus, lateral view; 19. Connective; 20. Style, dorsal view.

LONGHORNED BEETLES OF BELGRAD FOREST IN ISTANBUL PROVINCE WITH NEW RECORDS TO EUROPE, EUROPEAN TURKEY, MARMARA REGION OF TURKEY AND ISTANBUL PROVINCE (COLEOPTERA: CERAMBYCIDAE)

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ABSTRACT: In the present work, fauna of longhorned beetles of Belgrad forest in İstanbul province was researched. As a result of the study, 46 species of 5 subfamilies were identified and determined. While 20 of them are known from Belgrad forest, 26 of them are newly recorded to the fauna of Belgrad forest. In addition 1 taxon for Europe, 4 taxa for Marmara region of Turkey, 10 taxa for European Turkey (=Thracian Peninsula) and 16 taxa for İstanbul province are new records according to the available literatures. Furthermore, 6 taxa are recorded for the first time from European Turkey with exact locality. Also tribal name Dolocerini nov. is proposed for Brachypteromini Sama, 2008. Accordingly, the faunal list of longhorned beetles in Belgrad forest of İstanbul is also given in appendix 1.

KEY WORDS: Coleoptera, Cerambycidae, new records, Belgrad forest, İstanbul, Turkey

This study was carried out between the years of 2011 and 2012 in Belgrad Forest of İstanbul. Belgrad Forest is a mixed deciduous forest lying 15 kilometers North-West of Istanbul province, Turkey. Geographically, the forest is located at the easternmost point of the Thracian Peninsula. Forest terrain is divided between Sarıyer and Eyüp districts of İstanbul province (Fig. 1). With a region around 5,500 hectares of forest it houses many plant, bird and animal species. The most common tree in the forest is sessile oak (*Quercus petraea*). Belgrad Forest is under protection.

Only Acatay (1943) has directly been subjected longhorned beetles' fauna of Belgrad forest until now. He reported 30 species of 3 subfamilies from Belgrad forest. Furthermore, important contributions to the knowledge of fauna of Belgrad forest were provided by the works of Schimitschek (1944) and Öymen (1987). Also a few species were recorded by the works of Bodemeyer (1906), Villiers (1959) and Önalp (1988, 1989) to the fauna of Belgrad forest. Consequently a total of 47 species of 5 subfamilies were known from Belgrad forest.

MATERIAL AND METHOD

The available specimens of longhorned beetles were collected by the first author from various parts of Belgrad forest in İstanbul province by using net, pheromone traps and light traps in 2011 and 2012. For determination of new records was used Acatay (1943), Schimitschek (1944), Öymen (1987) and Özdikmen (2008, 2010) chiefly.

RESULTS

With the present work, fauna of longhorned beetles of Belgrad forest in İstanbul province was studied. As a result of the study, 46 species of 5 subfamilies were identified and determined. These taxa are presented as follows:

Family CERAMBYCIDAE Latreille, 1802
Subfamily PRIONINAE Latreille, 1802
Tribe PRIONINI Latreille, 1802

Prionus coriarius **(Linnaeus, 1758)**
(Fig. 2)

Cerambyx coriarius Linnaeus, 1758: 389
Material examined: Arboretum of Atatürk, 41°09'29.33"N 28°58'56.57"E, 110 m, 04.VII.2011, 1 ♀; Kurtkemeri woodyard, 41°11'34.18"N 28°55'82"E, 57 m, 15.VII.2011, on the ground, 1 ♂; Bahçeköy forest nursery, 40°10'33.28"N 28°59'18.91"E, 152 m, 18.VII.2011, with net, 1 ♂.
Remarks: It is newly recorded from İstanbul procince.

Subfamily LEPTURINAE Latreille, 1802
Tribe RHAGIINI Kirby, 1837

Cortodera flavimana flavimana **(Waltl, 1838)**
(Fig. 3)

Leptura villosa var. *flavimana* Waltl, 1838: 471
Material examined: Arboretum of Atatürk, 41°08'31.57"N 28°59'4.78"E, 153 m, 01.V.2011, with net on flowers, 2 ♂♂; Kurtkemeri woodyard, 41°12'34.36"N 28°56'8.29"E, 57 m, 03.VI.2011, on log, 1 ♀; Ayvat Bendi, 41°10'37.28"N 28°59'24.43"E, 145 m, 18.VI.2011, with net on flowers, 3 ♂♂, 4 ♀♀; Bahçeköy forest nursery, 41°10'47.21"N 28°59'17.29"E, 143 m, 17.VII.2011, with light trap, 2 ♂♂, 1 ♀.

Tribe LEPTURINI Latreille, 1802

Alosterna tabacicolor tabacicolor **(DeGeer, 1775)**
(Fig. 4)

Leptura tabacicolor DeGeer, 1775: 139
Material examined: Arboretum of Atatürk, 41°10'35.92"N 28°59'7.10"E, 156 m, 06.VI.2011, with net on flowers, 2 ♀♀.
Remarks: It is newly recorded from İstanbul procince.

Anoplodera sexguttata **(Fabricius, 1775)**
(Fig. 5)

Leptura sexguttata Fabricius, 1775: 198
Material examined: Büyük Bent, 41°11'04.36"N 28°57'47.54"E, 123 m, 02.VI.2011, with net on flowers, 2 ♂♂; Arboretum of Atatürk, 41°10'35.92"N 28°59'7.10"E, 148 m, 21.VI.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey.

Stictoleptura (Aredolpona) rubra rubra **(Linnaeus, 1758)**
(Fig. 6)

Leptura rubra Linnaeus, 1758: 397

Material examined: Kirazlı Bent, 41°09'41.15"N 28°57'41.36"E, 147 m, 06.VI.2011, with net on flowers, 1 ♂; Arboretum of Atatürk, 41°10'28.40"N 28°59"5.05"E, 167 m, 19.VI.2011, with net on flowers, 1 ♂.

Stictoleptura (s.str.) *cordigera cordigera* (Fuessly, 1775)

(Fig. 7)

Leptura cordigera Fuessly, 1775: 14
Material examined: Arboretum of Atatürk, 41°10'33.46"N 28°58'58.82"E, 155 m, 01.V.2011, with net on flowers, 1 ♂, 1 ♀; Kurtkemeri woodyard, 41°11'37.86"N 28°55'9.99"E, 57 m, 18.VI.2011, on woods, 1 ♂; Neşet Suyu, 41°11'17.85"N 28°58'7.92"E, 132 m, 01.VII.2011, with net on flowers, 1 ♂; Bahçeköy forest nursery, 41°11'3.33"N 28°59'18.99"E, 122 m, 14.VII.2011, with net on flowers, 1 ♂.

Stictoleptura (s.str.) *fulva* (DeGeer, 1775)

(Fig. 8)

Leptura fulva DeGeer, 1775: 137
Material examined: Deer breeding station, 41°12'15.33"N 28°56'50.75"E, 61 m, 22.V.2011, with net on flowers, 2 ♀♀; Arboretum of Atatürk, 41°10'25.89"N 28°58'58.86"E, 151 m, 09.VI.2011, with net on flowers, 1 ♂, 1 ♀; Kurtkemeri woodyard, 41°11'46.90"N 28°55'3.32"E, 55 m, 14.VII.2011, on woods, 1 ♂.

Stictoleptura (s.str.) *pallens* (Brullé, 1832)

(Fig. 9)

Leptura pallens Brullé, 1832: 264
Material examined: Bahçeköy forest nursery, 41°10'54.28"N 28°59'19.71"E, 127 m, 23.V.2011, with net on flowers, 2 ♀♀, 28.V.2011, with net on flowers, 2 ♀♀; Kurtkemeri woodyard, 41°11'29.36"N 28°55'5.78"E, 55 m, 06.VI.2011, on log, 1 ♀; Arboretum of Atatürk, 41°10'30.43"N 28°59'9.20"E, 158 m, 22.VI.2011, with net on flowers, 1 ♀.
Remarks: It is newly recorded from İstanbul procince.

Stictoleptura (s.str.) *scutellata scutellata* (Fabricius, 1781)

(Fig. 10)

Leptura scutellata Fabricius, 1781: 247
Material examined: Bahçeköy forest nursery, 41°11'1.10"N 28°58'57.98"E, 126 m, 09.VI.2011, with net on flowers, 1 ♀; Arboretum of Atatürk, 41°10'44.44"N 28°58'32.91"E, 168 m, 01.V.2011, with net on bushes, 1 ♀.

Stictoleptura (s.str.) *tonsa* (K. et J. Daniel, 1891)

(Fig. 11)

Leptura tonsa K. Daniel & J. Daniel, 1891: 31
Material examined: Bahçeköy forest nursery, 41°11'26.72"N 28°57'33.82"E, 128 m, 06.VI.2011, with net on flowers, 1 ♂, 1 ♀; Arboretum of Atatürk, 41°10'6.09"N 28°58'14.70"E, 154 m, 03.VII.2011, with net on flowers, 1 ♀.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey.

Judolia erratica (Dalman, 1817)

(Fig. 12)

Leptura erratica Dalman, 1817: 490
Material examined: Arboretum of Atatürk, 41°12'25.04"N 28°57'41.92"E, 147 m, 09.V.2011, with net on flowers, 1 ♀, 1 ♂; Kurtkemeri woodyard, 41°11'39.44"N 28°55'6.42"E, 53 m, 18.06.2011, on ground, 1 ♂, 1 ♀.

Leptura aurulenta Fabricius, 1793

(Fig. 13)

Leptura aurulenta Fabricius, 1793: 348
Material examined: Deer breeding station, 41°12'8.48"N 28°56'47.06"E, 64 m, 18.VI.2011, with net on flowers, 1 ♂; Arboretum of Atatürk, 41°12'25.14"N 28°57'41.72"E, 161 m, 28.VI.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from European Turkey with exact locality.

Strangalia attenuata **(Linnaeus, 1758)**
(Fig. 14)

Leptura attenuata Linnaeus, 1758: 398
Material examined: Kirazlı Bent, 41°10'10.84"N 28°57'45.07"E, 139 m, 05.VI.2011, with net on flowers, 1 ♂, 1 ♀; Kurtkemeri woodyard, 41°11'43.49"N 28°54'52.09"E, 55 m, 28.VI.2011, on ground, 1 ♂.

Rutpela maculata manca **(Schaufuss, 1863)**
(Fig. 15)

Strangalia armata var. *manca* Schaufuss, 1863: 121
Material examined: Büyük Bent, 41°10'50.19"N 28°57'6.22"E, 112 m, 05.VI.2011, with net on bush, 1 ♀; Arboretum of Atatürk, 41°11'54.55"N 28°57'6.09"E, 157 m, 28.VI.2011, with net on flowers, 1 ♂, 1 ♀.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey and Marmara region of Turkey.

Stenurella **(*Priscostenurella*)** ***bifasciata bifasciata*** **(Müller, 1776)**
(Fig. 16)

Leptura bifasciata O. F. Müller, 1776: 93
Material examined: Kurtkemeri woodyard, 41°11'48.73"N 28°55'13.78"E, 56 m 18.V.2011, on woods, 5 ♂♂, 3 ♀♀; Arboretum of Atatürk, 41°10'41.89"N 28°59'4.38"E, 151 m, 22.VI.2011, with net on flowers, 3 ♂♂, 2 ♀♀, 04.VII.2011, with net on flowers, 2 ♂♂, 1 ♀; Neşet Suyu, 41°11'11.03"N 28°58'12.08"E, 91 m, 06.VII.2011, with net on flowers, 4 ♂♂, 3 ♀♀; Bahçeköy forest nursery, 41°10'29.17"N 28°59'1.95"E, 126 m, 08.VI.2011, with net on flowers, 2 ♂♂, 2 ♀♀.
Remarks: It is newly recorded from İstanbul procince.

Stenurella **(s.str.)** ***melanura*** **(Linnaeus, 1758)**
(Fig. 17)

Leptura melanura Linnaeus, 1758: 397
Material examined: Arboretum of Atatürk, 41°10'31.96"N 28°58'51.82"E, 137 m, 23.VI.2011, with net on flowers, 1 ♀.

Stenurella **(*Priscostenurella*)** ***septempunctata latenigra*** **(Pic, 1915)**
(Fig. 18)

Strangalia septempunctata var. *latenigra* Pic, 1915: 5
Material examined: Arboretum of Atatürk, 41°10'17.40"N 28°57'53.39"E, 142 m, 08.VI.2011, with net on flowers, 2 ♂♂; Büyük Bent, 41°10'40.21"N 28°579'26.08"E, 108 m, 06.VII.2011, with net on flowers, 1 ♀.

Subfamily ASEMINAE J. Thomson, 1861
Tribe ASEMINI J. Thomson, 1861

Arhopalus rusticus rusticus **(Linnaeus, 1758)**
(Fig. 19)

Cerambyx rusticus Linnaeus, 1758: 395

Material examined: Kurtkemeri woodyard, 41°11'39.66"N 28°55'5.34"E, 53 m, 26.VI.2011, on logs, 1 ♀; Valide Sultan Bendi, 41°11'32.81"N 28°59'15.42"E, 167 m, 03.VII.2011, with net, 1 ♂.

Subfamily CERAMBYCINAE Latreille, 1802
Tribe HESPEROPHANINI Mulsant, 1839

Trichoferus griseus (Fabricius, 1792)

(Fig. 20)

Callidium griseus Fabricius, 1793: 325
Material examined: Kömürcü Bendi, 41°10'17.43"N 28°57'55.39"E, 87 m, 20.VI.2011, with net on *Quercus* sp., 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey and Marmara region of Turkey.

Tribe OBRIINI Mulsant, 1839

Obrium cantharinum cantharinum (Linnaeus, 1767)

(Fig. 21)

Cerambyx cantharinum Linnaeus, 1767: 637
Material examined: Arboretum of Atatürk, 41°10'31.30"N 28°59'4.76"E, 156 m, 17.VI.2011, with net on flowers, 1 ♀.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey and Marmara region of Turkey.

Tribe STENOPTERINI Gistel, 1848

Stenopterus rufus geniculatus Kraatz, 1863

(Fig. 22)

Stenopterus rufus var. *geniculatus* Kraatz, 1863: 104
Material examined: Topuzlu Bent, 41°11'17.55"N 28°59'41.48"E, 157 m, 02.VI.2011, with net on flowers, 1 ♂; Kurtkemeri woodyard, 41°11'40.20"N 28°55'5.58"E, 51 m, 05.VII.2011, on logs, 1 ♂; Arboretum of Atatürk, 41°10'42.16"N 28°58'47.22"E, 165 m, 18.VII.2011, with net on flowers, 1 ♂.

Tribe DOLOCERINI Özdikmen nov.

Type genus: *Dolocerus* Mulsant, 1862: 230.

Brachypteromini Sama, 2008: 229 [Type genus: *Brachypteroma* Heyden, 1863: 128]

Notes: Tribe Brachypteromini was erected by Sama (2008) with the type genus *Brachypteroma* Heyden, 1863. The tribe includes only 3 species of the genus *Dolocerus* Mulsant, 1862. Since the type genus *Brachypteroma* Heyden, 1863 is a junior synonym of the senior generic name *Dolocerus* Mulsant, 1862. Thus the tribe name should be Dolocerini Özdikmen nov. with the type genus *Dolocerus* Mulsant, 1862.

Tribe Dolocerini Özdikmen nov. includes only 1 genus and 3 species:

Brachypteroma holtzi Pic, 1905: 114 [Lebanon, Syria and Asian Turkey]
Brachypteroma magnanii Sama, 1987: 51 [North Africa: Algeria]
Dolocerus reichii Mulsant, 1862: 231 [Europe (Albania, Bulgaria, Croatia, Greece, Italy and Switzerland) and Asia (Armenia, Azerbaijan, Georgia and Asian Turkey]
mulsanti Stierlin, 1866: 30 (*Molorchus*)
ottomanus Heyden, 1863: 128 (*Brachypteroma*)

Dolocerus reichii Mulsant, 1862

(Fig. 23)

Dolocerus reichii Mulsant, 1862: 231
Material examined: Arboretum of Atatürk, 41°12'3.26"N 28°54'55.62"E, 143 m, 22.V.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey.

Tribe CERAMBYCINI Latreille, 1802

Cerambyx (s.str.) *cerdo cerdo* Linnaeus, 1758

(Fig. 24)

Cerambyx cerdo Linnaeus, 1758: 392
Material examined: Kurtkemeri woodyard, 41°11'39.51"N 28°55'4.97"E, 52 m, 10.VI.2011, on log of *Quercus* sp., 1 ♂; Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♀; Deer breeding station, 41°12'16.26"N 28°56'57.99"E, 60 m, with net, 1 ♂.

Cerambyx (s.str.) *dux* (Faldermann, 1837)

(Fig. 25)

Hammaticherus dux Faldermann, 1837: 264
Material examined: Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♀.

Cerambyx (*Microcerambyx*) *scopolii scopolii* Fuessly, 1775

(Fig. 26)

Cerambyx scopolii Fuessly, 1775: 12
Material examined: Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♂.

Tribe CALLICHROMATINI Swainson & Shuckard, 1840

Aromia ambrosiaca ambrosiaca (Steven, 1809)

(Fig. 27)

Cerambyx ambrosiaca Steven, 1809: 40
Material examined: Arboretum of Atatürk, 41°10'41.70"N 28°58'53.14"E, 163 m, 22.V.2011, with net on flowers, 1 ♂; Bahçeköy forest nursery, 41°10'46.09"N 28°59'17.73"E, 103 m, 09.VI.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey.

Tribe HYLOTRUPINI Zagajkevitch, 1991

Hylotrupes bajulus (Linnaeus, 1758)

(Fig. 28)

Cerambyx bajulus Linnaeus, 1758: 396
Material examined: Kurtkemeri woodyard, 41°11'8.35"N 28°56'7.73"E, 58 m, 01.VII.2011, on woods, 1 ♀; Büyük Bent, 41°11'10.84"N 28°57'46.19"E, 87 m, 09.VII.2011, with light trap, 1 ♀.

Tribe CALLIDIINI Kirby, 1837

Ropalopus (s.str.) *clavipes* (Fabricius, 1775)

(Fig. 29)

Callidium clavipes Fabricius, 1775: 188

Material examined: Ayvat Bendi, 41°12'42.55"N 28°56'18.72"E, 126 m, 06.VII.2011, on ground, 1 ♀.

Phymatodes (*Melasmetus*) *femoralis demelti* Heyrovský, 1962

(Fig. 30)

Phymatodes femoralis demelti Heyrovský, 1962: 41
Material examined: Neşet Suyu, 41°11'26.18"N 28°57'58.77"E, 112 m, 20.V.2011, with net on flowers, 2 ♂♂, 1 ♀; Deer breeding station, 41°12'19.94"N 28°56'56.80"E, 172 m, 03.VI.2011, with light trap, 2 ♂♂, 5 ♀♀; Arboretum of Atatürk, 41°10'24.84"N 28°58'52.07"E, 164 m, 19.VI.2011, on bushes, 2 ♂♂, 1 ♀; Kurtkemeri woodyard, 41°11'8.35"N 28°56'7.73"E, 58 m, 01.VII.2011, with net on newly cutting branches, 7 ♂♂, 4 ♀♀.
Remarks: It is newly recorded from European Turkey and thereby from Europe.

Phymatodes (s.str.) *testaceus* (Linnaeus, 1758)

(Fig. 31)

Cerambyx testaceus Linnaeus, 1758: 396
Material examined: Kömürcü Bent, 41°11'26.37"N 28°59'58.87"E, 49 m, 05.V.2011, on branch of drying tree, 3 ♂♂, 4 ♀♀; Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♂, 3 ♀♀; Kurtkemeri woodyard, 41°11'8.35"N 28°56'7.73"E, 58 m, 01.VII.2011, with light trap, 2 ♂♂, 1 ♀.

Tribe CLYTINI Mulsant, 1839

Plagionotus (s.str.) *arcuatus arcuatus* (Linnaeus, 1758)

(Fig. 32)

Leptura arcuatus Linnaeus, 1758: 399
Material examined: Büyük Bent, 41°10'54.99"K 28°57'3.22"E, 100 m, 12.VI.2011, with net on flowers, 1 ♀; Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♀.

Plagionotus (s.str.) *detritus detritus* (Linnaeus, 1758)

(Fig. 33)

Leptura detritus Linnaeus, 1758: 399
Material examined: Kurtkemeri Orman Fidanlığı, 41°11'44.48"N 28°55'53.33"E, 55 m, 28.V.2011, with net on flowers, 1 ♀; Arboretum of Atatürk, 41°09'29.33"N 28°58'56.57"E, 143 m, 02.VI.2011, with net on flowers, 1 ♀; Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♂, 1 ♀; Kömürcü Bendi, 41°12'26.22"N 28°57'41.85"E, 134 m, 01.VII.2011, on brach of *Quercus* sp., 1 ♂, 1 ♀.

Chlorophorus (s.str.) *varius* (Müller, 1766)

(Fig. 34)

Leptura varia O. F. Müller, 1766: 188
Material examined: Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♀.

Clytus (s.str.) *arietis arietis* (Linnaeus, 1758)

(Fig. 35)

Leptura arietis Linnaeus, 1758: 399
Material examined: Arboretum of Atatürk, 41°10'29.03"N 28°57'56.47"E, 148 m, 04.VI.2011, with net on flowers, 1 ♂, 1 ♀; Kurtkemeri woodyard, 41°11'8.34"N 28°56'7.75"E, 58 m, 23.VI.2011, on woods, 1 ♀, 41°11'8.35"N 28°56'7.73"E, 58 m, 01.VII.2011, with light trap, 1 ♀.
Remarks: It is newly recorded from European Turkey with exact locality.

Xylotrechus (s.str.) *antilope antilope* (Schoenherr, 1817)
(Fig. 36)

Clytus antilope Schoenherr, 1817: 465
Material examined: Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♀; Arboretum of Atatürk, 41°10'29.33"N 28°58'56.57"E, 145 m, 21.VI.2011, with net on flowers, 1 ♂, 1 ♀.

Subfamily LAMIINAE Latreille, 1825
Tribe MONOCHAMINI Gistel, 1848

Monochamus (s.str.) *galloprovincialis pistor* (Germar, 1818)
(Fig. 37)

Lamia galloprovincialis pistor Germar, 1818: 242
Material examined: Arboretum of Atatürk, 41°10'29.45"N 28°58'58.66"E, 141 m, 12.VI.2011, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey with exact locality.

Tribe LAMIINI Latreille, 1825

Morimus orientalis Reitter, 1894
(Fig. 38)

Morimus orientalis Reitter, 1894: 43
Material examined: Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♂; Kurtkemeri woodyard, 41°11'8.34"N 28°53'7.34"E, 54 m, 27.VI.2011, on woods, 1 ♀.

Tribe POGONOCHERINI Mulsant, 1839

Pogonocherus (*Pityphilus*) *decoratus* Fairmaire, 1855
(Fig. 39)

Pogonocherus decoratus Fairmaire, 1855: 320
Material examined: Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey and Marmara region of Turkey.

Tribe ACANTHOCININI Blanchard, 1845

Acanthocinus (s.str.) *aedilis* (Linnaeus, 1758)
(Fig. 40)

Cerambyx aedilis Linnaeus, 1758: 392
Material examined: Kurtkemeri woodyard, 41°11'37.32"N 28°55'5.51"E, 52 m, 29.V.2011, with pheromone trap, 1 ♀.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey with exact locality.

Acanthocinus (s.str.) *griseus* (Fabricius, 1793)
(Fig. 41)

Cerambyx griseus Fabricius, 1793: 261
Material examined: Deer breeding station, 41°12'19.87"N 28°56'57.99"E, 169 m, 23.VI.2011, with net on newly cutting branches, 1 ♂; Kurtkemeri woodyard, 41°11'37.31"N 28°55'5.56"E, 51 m, 24.VI.2011, with pheromone trap, 1 ♂, 1 ♀; Büyük Bent, 41°10'28.50"N 28°56'37.12"E, 112 m, 06.VII.2011, 1 ♂.
Remarks: It is newly recorded from İstanbul procince.

***Leiopus* (s.str.) *nebulosus nebulosus* (Linnaeus, 1758)**
(Fig. 42)

Cerambyx nebulosus Linnaeus, 1758: 391
Material examined: Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♂; Kurtkemeri woodyard, 41°11'56.03"N 28°56'5.57"E, 53 m, 24.VI.2011, on woods, 1 ♂, 41°11'37.31"N 28°55'5.56"E, 51 m, 24.VI.2011, with pheromone trap, 1 ♂, 1 ♀.

Tribe EXOCENTRINI Pascoe, 1864

***Exocentrus lusitanus* (Linnaeus, 1767)**
(Fig. 43)

Cerambyx lusitanus Linnaeus, 1767: 1067
Material examined: Kurtkemeri forest nursery, 41°11'34.23"N 28°56'4.95"E, 58 m, 05.VI.2011, on log of *Quercus* sp., 1 ♂; Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♂; Kömürcü Bent, 41°11'34.59"N 28°57'28.66"E, 99 m, 18.VI.2011, on newly cutting woods, 1 ♂.

***Exocentrus punctipennis punctipennis* Mulsant et Guillebeau, 1856**
(Fig. 44)

Exocentrus punctipennis Mulsant & Guillebeau, 1856: 103
Material examined: Büyük Bent, 41°10'43.35"N 28°57'41.72"E, 125 m, 25.V.2011, with light trap, 1 ♂; Neşet Suyu, 41°13'16.11"N 28°56'29.81"E, 127 m, 09.VI.2011, with light trap, 1 ♂; Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♂; Deer breeding station, 41°10'43.20"N 28°55'41.51"E, 113 m, 28.VI.2011, on newly cutting woods, 1 ♀.

Tribe SAPERDINI Mulsant, 1839

***Saperda* (*Compsidia*) *populnea* (Linnaeus, 1758)**
(Fig. 45)

Cerambyx populnea Linnaeus, 1758: 394
Material examined: Arboretum of Atatürk, 41°10'27.51"N 28°58'46.38"E, 163 m, 20.VI.2011, with light trap, 1 ♀.

Tribe PHYTOECIINI Mulsant, 1839

***Oberea* (s.str.) *linearis* (Linnaeus, 1760)**
(Fig. 46)

Cerambyx linearis Linnaeus, 1760: 191
Material examined: II. Sultan Mahmut Bendi, 41°11'32.02"N 28°58'50.50"E, 194 m, 26.VI.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from European Turkey.

***Oberea* (s.str.) *oculata* (Linnaeus, 1758)**
(Fig. 47)

Cerambyx oculata Linnaeus, 1758: 394
Material examined: Arboretum of Atatürk, 41°10'32.45"N 28°5'8.71"E, 128 m, 29.VI.2011, with net on flowers, 1 ♂.
Remarks: It is newly recorded from İstanbul procince and thereby from European Turkey with exact locality.

CONCLUSION

In the present work, fauna of longhorned beetles of Belgrad forest in İstanbul province was researched. As a result of the study, 46 species of 5 subfamilies were identified and determined. While 20 of them are known from Belgrad forest, 26 of them are newly recorded to the fauna of Belgrad forest. In addition, 1 taxon as *Phymatodes* (*Melasmetus*) *femoralis demelti* Heyrovský, 1962 for Europe; 4 taxa as *Rutpela maculata manca* (Schaufuss, 1863), *Trichoferus griseus* (Fabricius, 1792), *Obrium cantharinum cantharinum* (Linnaeus, 1767), *Pogonocherus* (*Pityphilus*) *decoratus* Fairmaire, 1855 for Marmara region of Turkey; 10 taxa as *Anoplodera sexguttata* (Fabricius, 1775), *Stictoleptura* (s.str.) *tonsa* (K. et J. Daniel, 1891), *Rutpela maculata manca* (Schaufuss, 1863), *Trichoferus griseus* (Fabricius, 1792), *Obrium cantharinum cantharinum* (Linnaeus, 1767), *Dolocerus reichii* Mulsant, 1862, *Aromia ambrosiaca ambrosiaca* (Steven, 1809), *Phymatodes* (*Melasmetus*) *femoralis demelti* Heyrovský, 1962, *Pogonocherus* (*Pityphilus*) *decoratus* Fairmaire, 1855, *Oberea* (s.str.) *linearis* (Linnaeus, 1760) for European Turkey (=Thracian Peninsula) and 16 taxa as *Prionus coriarius* (Linnaeus, 1758), *Alosterna tabacicolor tabacicolor* (DeGeer, 1775), *Anoplodera sexguttata* (Fabricius, 1775), *Stictoleptura* (s.str.) *pallens* (Brullé, 1832), *Stictoleptura* (s.str.) *tonsa* (K. et J. Daniel, 1891), *Rutpela maculata manca* (Schaufuss, 1863), *Stenurella* (*Priscostenurella*) *bifasciata bifasciata* (Müller, 1776), *Trichoferus griseus* (Fabricius, 1792), *Obrium cantharinum cantharinum* (Linnaeus, 1767), *Dolocerus reichii* Mulsant, 1862, *Aromia ambrosiaca ambrosiaca* (Steven, 1809), *Monochamus* (s.str.) *galloprovincialis pistor* (Germar, 1818), *Pogonocherus* (*Pityphilus*) *decoratus* Fairmaire, 1855, *Acanthocinus* (s.str.) *aedilis* (Linnaeus, 1758), *Acanthocinus* (s.str.) *griseus* (Fabricius, 1793), *Oberea* (s.str.) *oculata* (Linnaeus, 1758) for İstanbul province are new records according to the available literatures. Furthermore, 6 taxa as *Alosterna tabacicolor tabacicolor* (DeGeer, 1775), *Leptura aurulenta* Fabricius, 1793, *Clytus* (s.str.) *arietis arietis* (Linnaeus, 1758), *Monochamus* (s.str.) *galloprovincialis pistor* (Germar, 1818), *Acanthocinus* (s.str.) *aedilis* (Linnaeus, 1758), *Oberea* (s.str.) *oculata* (Linnaeus, 1758) are also recorded for the first time from European Turkey with exact locality.

Consequently a total of 47 species of 5 subfamilies were known from Belgrad forest. With newly recorded 26 species, fauna of Belgrad forest consists 63 species of 5 subfamilies (Appendix 1).

Note: This study is based on the master thesis of the first author.

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APPENDIX 1. A list of longhorned beetles in Belgrad forest of İstanbul province. In the list below, the taxa determined in the present study are marked with the sign of "*", and the taxa known only from available literatures have no sign.

Family CERAMBYCIDAE Latreille, 1802
Subfamily PRIONINAE Latreille, 1802
Tribe AEGOSOMATINI J. Thomson, 1861
Aegosoma scabricorne (Scopoli, 1763)
Tribe PRIONINI Latreille, 1802
**Prionus coriarius* (Linnaeus, 1758)
Subfamily LEPTURINAE Latreille, 1802
Tribe RHAGIINI Kirby, 1837
**Cortodera flavimana flavimana* (Waltl, 1838)
Tribe LEPTURINI Latreille, 1802
Grammoptera (s.str.) *ruficornis* (Fabricius, 1781)
**Alosterna tabacicolor tabacicolor* (DeGeer, 1775)
**Anoplodera sexguttata* (Fabricius, 1775)
**Stictoleptura* (*Aredolpona*) *rubra rubra* (Linnaeus, 1758)
**Stictoleptura* (s.str.) *cordigera cordigera* (Fuessly, 1775)
**Stictoleptura* (s.str.) *fulva* (DeGeer, 1775)
**Stictoleptura* (s.str.) *pallens* (Brullé, 1832)
**Stictoleptura* (s.str.) *scutellata scutellata* (Fabricius, 1781)
**Stictoleptura* (s.str.) *tonsa* (K. et J. Daniel, 1891)
**Judolia erratica* (Dalman, 1817)
**Leptura aurulenta* Fabricius, 1793
**Strangalia attenuata* (Linnaeus, 1758)
**Rutpela maculata manca* (Schaufuss, 1863)
**Stenurella* (*Priscostenurella*) *bifasciata bifasciata* (Müller, 1776)
**Stenurella* (*Priscostenurella*) *septempunctata latenigra* (Pic, 1915)
**Stenurella* (s.str.) *melanura* (Linnaeus, 1758)
Subfamily ASEMINAE J. Thomson, 1861
Tribe ASEMINI J. Thomson, 1861
**Arhopalus rusticus rusticus* (Linnaeus, 1758)
Subfamily CERAMBYCINAE Latreille, 1802
Tribe HESPEROPHANINI Mulsant, 1839
**Trichoferus griseus* (Fabricius, 1792)
Trichoferus holosericeus (Rossi, 1790)
Stromatium auratum (Böber, 1793)
Tribe CERAMBYCINI Latreille, 1802
**Cerambyx* (s.str.) *cerdo cerdo* Linnaeus, 1758
**Cerambyx* (s.str.) *dux* (Faldermann, 1837)
Cerambyx (s.str.) *miles* Bonelli, 1812
Cerambyx (s.str.) *nodulosus* Germar, 1817
Cerambyx (s.str.) *welensii welensii* (Küster, 1845)
**Cerambyx* (*Microcerambyx*) *scopolii scopolii* Fuessly, 1775
Tribe ROSALIINI Fairmaire, 1864
Rosalia (s.str.) *alpina alpina* (Linnaeus, 1758)
Tribe CALLICHROMATINI Swainson & Shuckard, 1840
**Aromia ambrosiaca ambrosiaca* (Steven, 1809)
Tribe OBRIINI Mulsant, 1839
**Obrium cantharinum cantharinum* (Linnaeus, 1767)
Tribe HYLOTRUPINI Zagajkevitch, 1991
**Hylotrupes bajulus* (Linnaeus, 1758)
Tribe CALLIDIINI Kirby, 1837
**Ropalopus* (s.str.) *clavipes* (Fabricius, 1775)
Ropalopus (s.str.) *macropus* (Germar, 1824)
Pyrrhidium sanguineum (Linnaeus, 1758)
**Phymatodes* (*Melasmetus*) *femoralis demelti* Heyrovský, 1962

Phymatodes (s.str.) *testaceus* (Linnaeus, 1758)
Phymatodes (*Phymatoderus*) *pusillus pusillus* (Fabricius, 1787)
Phymatodes (*Poecilium*) *alni alni* (Linnaeus, 1767)
Tribe CLYTINI Mulsant, 1839
Plagionotus (s.str.) *arcuatus arcuatus* (Linnaeus, 1758)
Plagionotus (s.str.) *detritus detritus* (Linnaeus, 1758)
Plagionotus (*Echinocerus*) *floralis* (Pallas, 1773)
Chlorophorus (s.str.) *varius* (Müller, 1766)
Xylotrechus (s.str.) *antilope antilope* (Schoenherr, 1817)
Clytus (s.str.) *arietis arietis* (Linnaeus, 1758)
Tribe STENOPTERINI Gistel, 1848
Stenopterus rufus geniculatus Kraatz, 1863
Tribe NATHRIINI Arnett, 1962
Nathrius brevipennis (Mulsant, 1839)
Tribe DOLOCERINI Özdikmen nov.
Dolocerus reichii Mulsant, 1862
Tribe HYBODERINI Linsley, 1840: 367
Callimus (s.str.) *angulatus angulatus* (Schrank, 1789)
Subfamily LAMIINAE Latreille, 1825
Tribe DORCADIONINI Swainson, 1840
Dorcadion (*Cribridorcadion*) *obsoletum* Kraatz, 1873
Neodorcadion (s.str.) *pelleti* (Mulsant & Rey, 1863)
Tribe MONOCHAMINI Gistel, 1848
Monochamus (s.str.) *galloprovincialis pistor* (Germar, 1818)
Tribe LAMIINI Latreille, 1825
Morimus asper asper (Sulzer, 1776)
Morimus orientalis Reitter, 1894
Tribe APODASYINI Lacordaire, 1872
Anaesthetis testacea testacea (Fabricius, 1781)
Tribe POGONOCHERINI Mulsant, 1839
Pogonocerus (s.str.) *hispidulus* (Piller & Mitterpacher, 1783)
Pogonocherus (*Pityphilus*) *decoratus* Fairmaire, 1855
Tribe ACANTHODERINI J. Thomson, 1860
Aegomorphus clavipes (Schrank, 1781)
Tribe ACANTHOCININI Blanchard, 1845
Acanthocinus (s.str.) *aedilis* (Linnaeus, 1758)
Acanthocinus (s.str.) *griseus* (Fabricius, 1793)
Leiopus (s.str.) *nebulosus nebulosus* (Linnaeus, 1758)
Tribe EXOCENTRINI Pascoe, 1864
Exocentrus lusitanus (Linnaeus, 1767)
Exocentrus punctipennis punctipennis Mulsant et Guillebeau, 1856
Tribe SAPERDINI Mulsant, 1839
Saperda (s.str.) *carcharias* (Linnaeus, 1758)
Saperda (*Lopezcolonia*) *octopunctata* (Scopoli, 1772)
Saperda (*Lopezcolonia*) *punctata* (Linnaeus, 1767)
Saperda (*Lopezcolonia*) *scalaris* (Linnaeus, 1758)
Saperda (*Compsidia*) *populnea* (Linnaeus, 1758)
Tribe PHYTOECIINI Mulsant, 1839
Oberea (s.str.) *linearis* (Linnaeus, 1760)
Oberea (s.str.) *oculata* (Linnaeus, 1758)
Tribe AGAPANTHIINI Mulsant, 1839
Agapanthia (s.str.) *cardui* (Linnaeus, 1767)
Agapanthiola leucaspis (Steven, 1817)

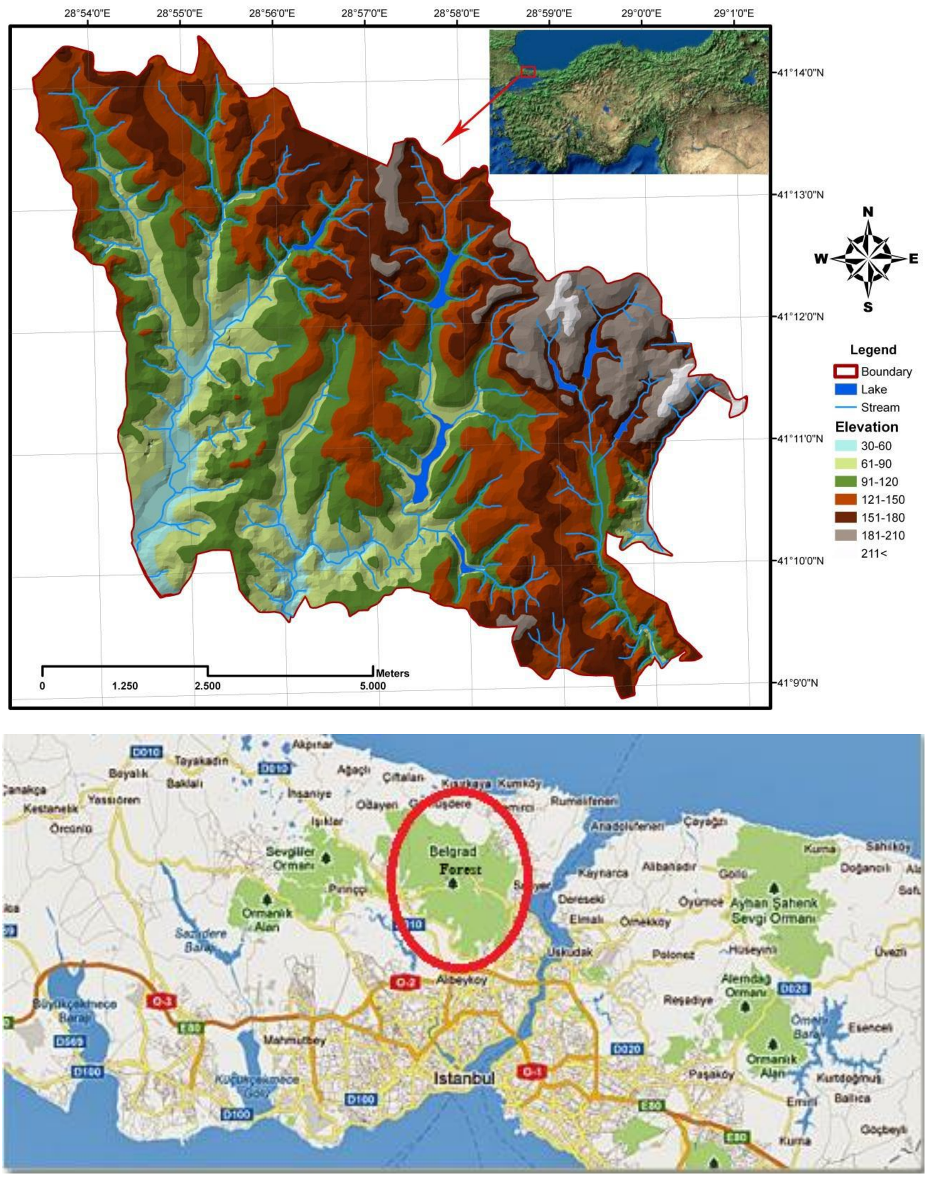
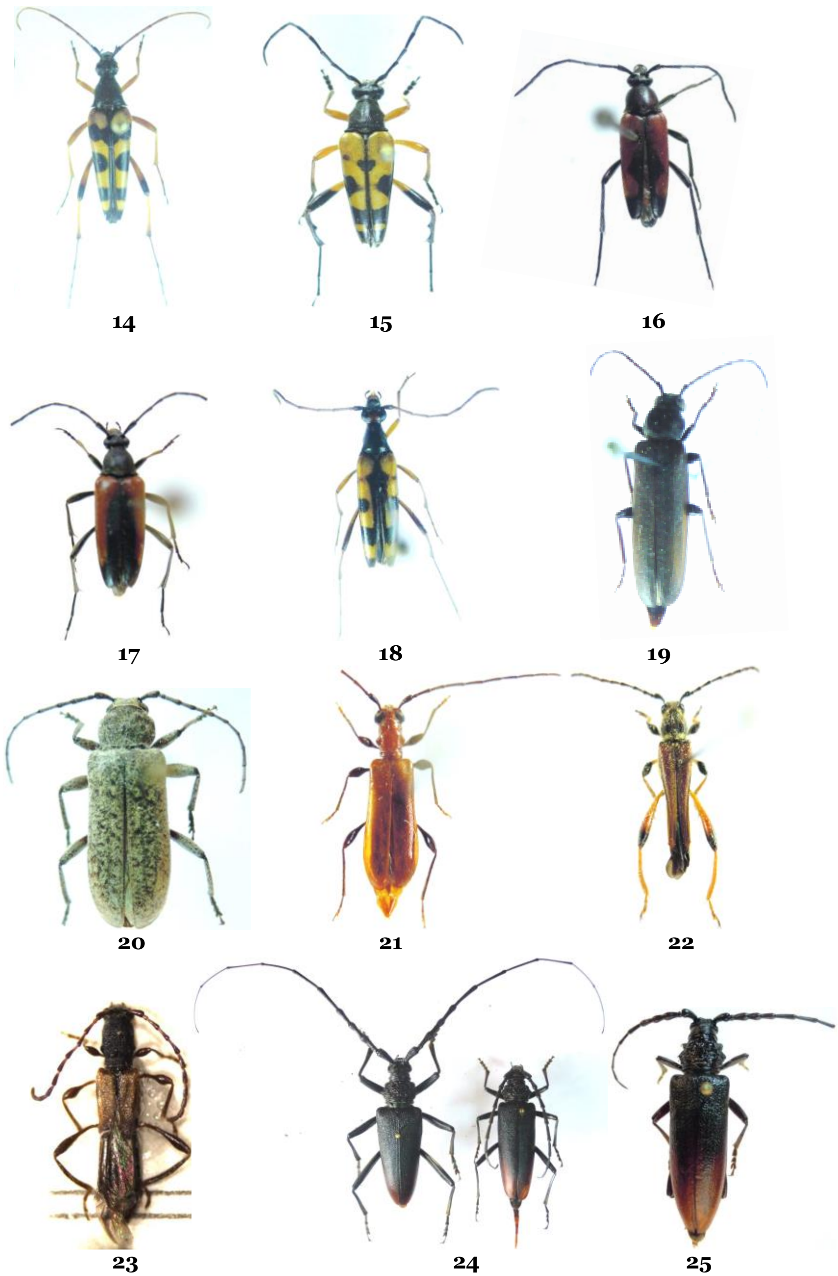
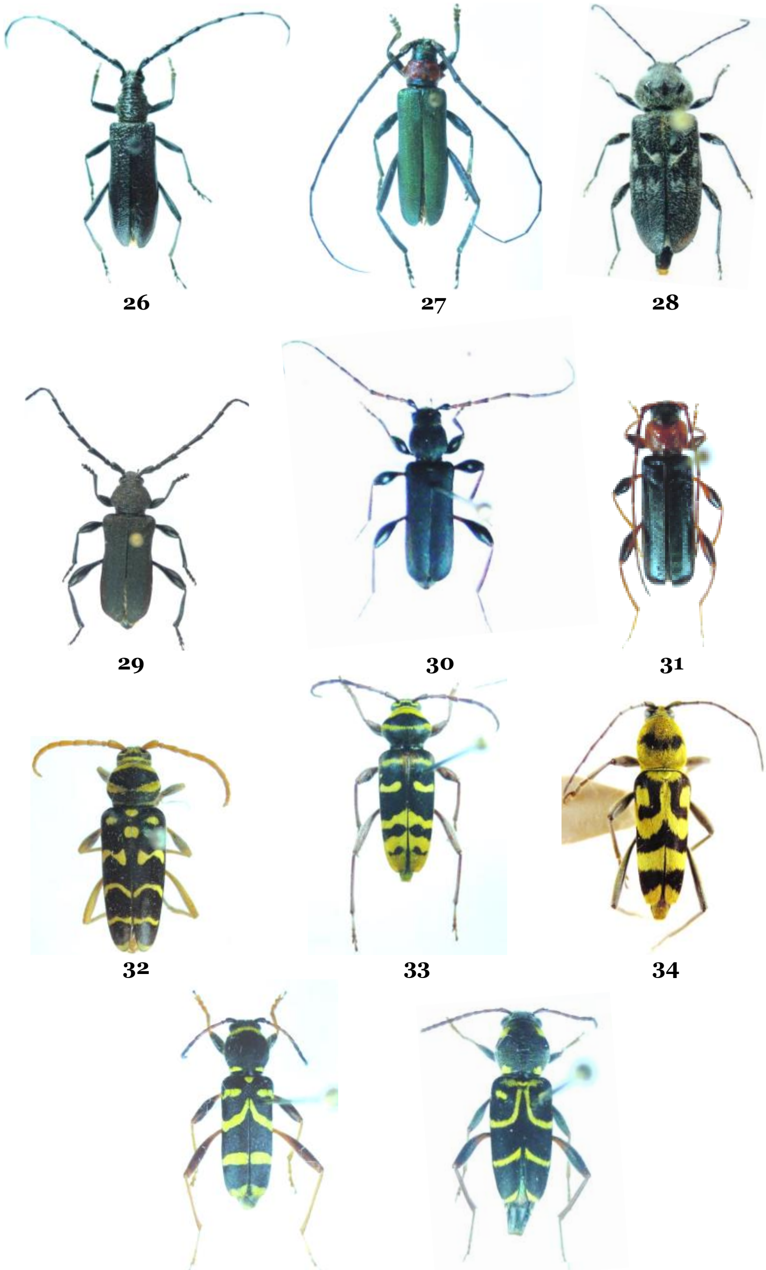


Figure 1. Location of Belgrad Forest in İstanbul province.

Figures 2-13. 2. *Prionus coriarius*, 3. *Cortodera flavimana flavimana*, 4. *Alosterna tabacicolor tabacicolor*, 5. *Anoplodera sexguttata*, 6. *Stictoleptura rubra rubra*, 7. *Stictoleptura cordigera*, 8. *Stictoleptura fulva*, 9. *Stictoleptura pallens*, 10. *Stictoleptura scutellata scutellata*, 11. *Stictoleptura tonsa*, 12. *Judolia erratica*, 13. *Leptura aurulenta*.



Figures 14-25. 14. *Strangalia attenuata*, 15. *Rutpela maculata manca*, 16. *Stenurella bifasciata bifasciata*, 17. *Stenurella melanura*, 18. *Stenurella septempunctata latenigra*, 19. *Arhopalus rusticus rusticus*, 20. *Trichoferus griseus*, 21. *Obrium cantharinum cantharinum*, 22. *Stenopterus rufus geniculatus*, 23. *Dolocerus reichii*, 24. *Cerambyx cerdo cerdo*, 25. *Cerambyx dux*.



26 27 28
29 30 31
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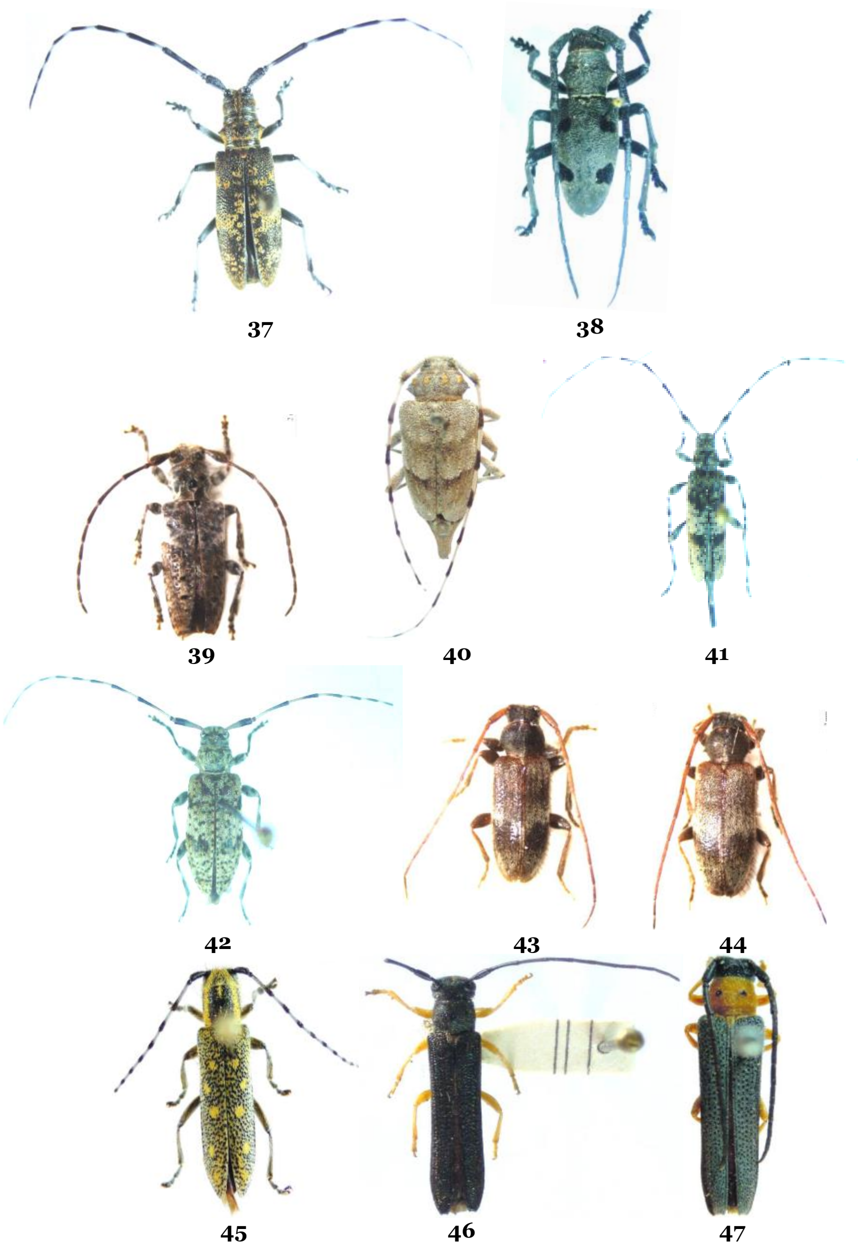
Figures 26-36. 26. *Cerambyx scopolii scopolii*, 27. *Aromia ambrosiaca ambrosiaca*, 28. *Hylotrupes bajulus*, 29. *Ropalopus clavipes*, 30. *Phymatodes femoralis demelti*, 31. *Phymatodes testaceus*, 32. *Plagionotus arcuatus arcuatus*, 33. *Plagionotus detritus detritus*, 34. *Chlorophorus varius*, 35. *Clytus arietis arietis*, 36. *Xylotrechus antilope antilope*.



Figures 37-47. 37. *Monochamus galloprovincialis pistor*, 38. *Morimus orientalis*, 39. *Pogonocherus decoratus*, 40. *Acanthocinus aedilis*, 41. *Acanthocinus griseus*, 42. *Leiopus nebulosus nebulosus*, 43. *Exocentrus lusitanus*, 44. *Exocentrus punctipennis punctipennis*, 45. *Saperda populnea*, 46. *Oberea linearis*, 47. *Oberea oculata*.

VADONIA SAMOSENSIS SP. NOV., DESCRIPTION OF A NEW SPECIES FROM GREECE–THE ISLAND SAMOS (COLEOPTERA: CERAMBYCIDAE)

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[**Vartanis, J.** 2016. *Vadonia samosensis* sp. nov., description of a new species from Greece–the island Samos (Coleoptera: Cerambycidae). Munis Entomology & Zoology, 11 (2): 678-681]

ABSTRACT: A new species, *Vadonia samosensis* sp. nov., is described from the Greek island Samos. For the time being, the species is endemic to the island Samos. *Vadonia samosensis* sp. nov. was compared with taxa known from Greece and Turkey, i.e. with *V. bisignata bisignata* (Brullé, 1832), *V. bisignata laurae* (Pesarini & Sabbadini, 2007), *V. dojranensis dojranensis* (Holzschuh, 1984), *V. dojranensis mahri* (Holzschuh, 1986), *V. soror soror* (Holzschuh, 1981), *V. soror tauricola* (Holzschuh, 1993) and *V. frater* (Holzschuh, 1981).

KEY WORDS: Coleoptera, Cerambycidae, *Vadonia*, new species, Europe, Greece- Samos (island), Palearctic Region.

Vadonia samosensis sp. nov.

The new species from South-East Europe, the island Samos, Greece, was caught on different plants of the genera *Knautia* L. and *Leucanthemum* Mill., in a steppe area of the island, in 2015. The location of its occurrence is known only on the island Samos, Kampos Marathokampou, at an altitude above the sea level of 300 m. For the time being, the species is endemic to the island Samos. *Vadonia samosensis* sp. nov., falls into a group of large *Vadonia* species, where the body lengths of male and female individuals reaches up to 17-18 mm. In addition, the main characteristic feature of the whole group is that males have one terminal spine on the metatibia. *Vadonia samosensis* sp. nov. was compared with taxa known from Greece and Turkey. The comparison was focused on all the different characters including aedeagi. As to the species from Greece, the following congeners were considered: *Vadonia bisignata* (Brullé, 1832), which occurs in Peloponnesus, *Vadonia bisignata laurae* (Pesarini & Sabbadini, 2007) found in Central Greece, in the Thessaly Region, Sterea Ellada, Epirus, *Vadonia dojranensis mahri* (Holzschuh, 1986) known from North Greece, Thraki Region, and *Vadonia dojranensis* (Holzschuh, 1984), penetrating to an only small area in North-West Greece from Macedonia. The new species was furthermore compared with the following taxa known from Turkey: *Vadonia soror soror* (Holzschuh, 1981) from the provinces Denizli, Burdur, *Vadonia soror tauricola* (Holzschuh, 1993) from the province Mersin: Erdemli, and *Vadonia frater* (Holzschuh, 1981) from the province Adana: Nurdagi pass.

HOLOTYPUS: ♂, Greece-Samos island ins. mer. occ., Kampos Marathokampou, 07.VI.2015, lgt. MUdr. M. Mantič, coll. J. Vartanis (Czech Republic, Uherský Brod). ALLOTYPUS: ♀, Greece-Samos island ins. mer. occ., Kampos Marathokampou, 07.VI.2015, lgt. MUdr. M. Mantič, coll. J. Vartanis. PARATYPUS: 6 ♂♂, Greece-Samos island ins. mer. occ., Kampos

Marathokampou, 07-10.VI.2015, lgt. MUdr. M. Mantič, all coll. MUdr. M. Mantič (Czech Republic, Ostrava), J. Vartanis (Czech Republic, Uherský Brod).

Description.

Body: Completely black including legs and antennae. Abdominal ventrites dark red, with decumbent pubescence. Hairlike setae oriented in the same direction.

Head: On frons and tempora with long, yellow, hairlike setae. Black, erect setae present on clypeus. Head punctation very dense.

Antennae: Black, with decumbent hairlike setae. Rather narrow than serrate. None of antennomeres dilated outward. Male antennae reaching 2/3 elytra length, female antennae exceeding 1/2 elytra length.

Pronotum: Black, shining, continuously round, vaulted, flat at base. Its length 1.1 times as large as its width at broadest point at pronotum middle. Lateral margins with very long, erect and outward directed pubescence. On vertex of upper part also with black, erect, very long and perpendicular setae. Middle surface area very coarsely and densely punctate. Punctation on sides also coarse but less dense, intervals between punctures larger than puncture diameter.

Scutellum: Black, with straight sides and acute angles, triangular, about as long as wide.

Elytra: Yellowish- brown, shining, suture and elytral apex black. Each elytron with a smallish black spot. Male elytra 2.28 times longer than wide at base. Female elytra 2.2 times longer than wide at base. Whole elytra surface with yellow pubescence; very long and erect setae present on humeri and sideward of humeri. Elytral apex black. Black pubescence present only at middle of elytra, about the black spot, and extending along elytra outer side up to elytral apex in form of narrow stripe. Male elytra very strongly narrowing from humeri toward apex. Female elytra stout, rather parallel. Elytra punctation very fine, dense, distances between punctures larger than puncture diameter.

Legs: Black, with decumbent hairlike setae on femora, without any erect setae. Male metatibiae apically extended in a long spine. Tarsi long, basal tarsomere as long as second to third ones including claw combined.

Aedeagus: Very characteristic of the new species. Considerably different from other Greek and Turkish species. Aedeagus tip rapidly reaching apex. Tip apically neither narrowed nor extended, rather wide on sides, with strongly widened arc. Tip strongly arcuate (see the photo).

Length: males: 16- 17 mm, female: 18 mm.

Diferential diagnosis.

The new species from the island Samos, *Vadonia samosensis* sp. nov., was compared with all the large *Vadonia* species from Greece and Turkey represented by numerous specimens in my collection. Aedeagi of males of all the above mentioned taxa were studied. The new species *Vadonia samosensis* sp. nov., has a very different aedeagus exerting features characteristic for this, for the time being endemic, species. In the new species, the aedeagus suddenly reaches the apex, the tip being strongly arcuate. In addition to the aedeagus shape, there are also other different features markedly characterizing the species and differentiating it from other taxa. In the following text, characteristic features of each particular species will be specified. *Vadonia bisignata bisignata* (Brullé, 1832) has very decumbent pronotal pubescence, punctuation on pronotum vertex is very coarse, but interspaces between punctures are larger than puncture diameter. The species has a big middle black spot and its elytra are completely covered with yellow pubescence. Only the elytral apex is black. There are no erect setae on lateral parts of elytra and on humeri. The species is endemic and occurs on Peloponnese, Greece only. The subspecies *Vadonia bisignata laurae* (Pesarini & Sabbadini, 2007) has a very sparse punctuation on the pronotum, the interspaces between punctures being larger than puncture diameter. There is black pubescence on the frons and behind tempora. A proportion of 4/5 elytral surface is covered with black pubescence; the hairlike setae are yellow on humeri only. The central black spot on elytra is large. The taxon is known from Central Greece. The subspecies *Vadonia dojranensis mahri* (Holzschuh, 1986) has long but decumbent pubescence on the pronotum. There is black pubescence on the frons and behind tempora. A proportion of 2/3 elytral surface is covered with black pubescence extending along the suture toward the scutellum. Yellow pubescence is present on humeri only and a large black spot is present on each elytron. The taxon is known from East Greece. The subspecies *Vadonia dojranensis dojranensis* (Holzschuh, 1984) is extended to a very restricted location in Greece, close to the borderline, from Macedonia. The pronotum has yellow, erect setae laterally, its punctuation is very coarse and dense. A proportion of 2/3 elytral surface is covered with black pubescence extending along the suture toward the scutellum. Only humeri are covered with yellow pubescence. The black spot is larger. The subspecies *Vadonia soror soror* (Holzschuh, 1981), endemic to South Turkey, has the pronotum with yellow and decumbent pubescence. The punctation is very coarse and dense. There is no pubescence behind eyes. The whole elytra are covered with yellow pubescence; only the elytral apex is black. There is a very distinct black spot on each elytron. *Vadonia soror tauricola* (Holzschuh, 1993) comes from the Central South of Turkey. The pronotum has yellow, erect pubescence on sides. A proportion of 4/5 elytral surface is covered with black pubescence and only humeri (1/5 surface) bear yellow pubescence. There is a very distinct, larger black spot on each elytron. *Vadonia frater* (Holzschuh, 1981) is a species from South to South-West Turkey. The pronotum has yellow pubescence on sides, the punctuation is coarse but sparse; the punctures are separated by distances larger than the puncture diameter. A proportion of 1/2 elytral surface bears black pubescence, the second half being covered with yellow pubescence in direction of humeri. In addition, there is a stripe of black hairlike setae on humeri on each side from the scutellum, extending throughout the humeri width. There is a larger black spot on each elytron. In addition, in certain species, such *V. frater* (Holzschuh, 1981) and *V. soror soror* (Holzschuh, 1981), the elytra are reddish brown. However, the most principal difference is in aedeagi, where the shape is considerably different in the new species *V. samosensis* sp. nov. compared to other species. The endemic species is very different from other species in the aedeagus shape. All the compared taxa from Greece as well as Turkey, such as *V. bisignata bisignata* (Brullé, 1832), *V. bisignata laurae* (Peasarini & Sabbadini, 2007), *V. dojranensis* dojranensis (Holzschuh, 1984), *V. dojranensis mahri* (Holzschuh, 1986), *V. soror* soror (Holzschuh, 1981), *V. soror tauricola* (Holzschuh, 1993), *V. frater* (Holzschuh, 1981), have aedeagi strongly extended toward apex; it is narrower, long, ending with very narrow apex. This is just the most important feature differentiating the new species *Vadonia samosensis* sp. nov., from other taxa of the genus *Vadonia*.

Etymology: The new species, *Vadonia samosensis* sp. nov., is described from Greece and its name is derived based on the location of its occurrence, the island Samos (Greece). It is an endemic species for the time being.

Distribution of particular *Vadonia* species in Greece and Turkey.
Vadonia samosensis sp. nov. - Greece, Samos-island, Kampos Marathokampou.
Vadonia bisignata bisignata (Brullé, 1832) - Greece, Peloponnese, Taygetos, Tripoli.
Vadonia bisignata laurae (Pesarini & Sabbadini, 2007) - Greece, Thessaly, Epirus.
Vadonia dojranensis mahri (Holzschuh, 1986) - Greece, Thraki, Drama, Serres, Xanthi.
Vadonia dojranensis dojranensis (Holzschuh, 1984) - Greece, Gevgelija, Notia.
Vadonia soror soror (Holzschuh, 1981) - Turkey, Denizli, Burdur.
Vadonia soror tauricola (Holzschuh, 1993) - Turkey, Mersin, Erdemli.
Vadonia frater (Holzschuh, 1981) - Turkey, Adana, Nurdagi.

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a b c d

Figure 1. *Vadonia samosensis* sp. nov., **a**) male, **b**) female, **c,d**) Aedeagus.

A COMPARATIVE LIST OF THE LEAF BEETLES OF THE PROVINCES IN MARMARA REGION OF TURKEY, EXCLUDING BRUCHINAE (COLEOPTERA: CHRYSOMELIDAE)

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[**Özdikmen, H.** 2016. A comparative list of the leaf beetles of the provinces in Marmara Region of Turkey, excluding Bruchinae (Coleoptera: Chrysomelidae). Munis Entomology & Zoology, 11 (2): 682-690]

ABSTRACT: This work is presented a comparative list of the leaf beetles of the provinces in Marmara Region of Turkey, excluding Bruchinae. All known taxa from the provinces in Marmara Region of Turkey and thereby European Turkey are given in the present text.

KEY WORDS: Coleoptera, Cerambycidae, European Turkey, Marmara Region, Turkey

Any direct research on leaf beetles in Marmara Region of Turkey is not present. Therefore fauna of leaf beetles in Marmara Region of Turkey is not sufficiently known. Chiefly, a complete faunistic information about all the leaf beetle taxa established in European Turkey in Marmara Region of Turkey was firstly published by Löbl & Smetana (2010) in their Palaearctic catalogue of Chrysomeloidea.

Then, an important study titled "Checklist of leaf beetles (Coleoptera: Chrysomelidae) of Turkey, excluding Bruchinae" was published by Ekiz et al. (2013). Later works were published by Özdikmen (2014a,b,c), Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014), Özdikmen & Kavak (2014) and Özdikmen & Topcu (2014). Although the mentioned studies helped to determine the list of leaf beetles from the provinces in Marmara Region of Turkey, the list needs further corrections to be fully and correctly realized.

Consequently a comparative list of the leaf beetles of the provinces in Marmara Region of Turkey, excluding Bruchinae, is provided with this work.

MATERIAL AND METHOD

The material is the published works of Löbl & Smetana (2010), Ekiz et al. (2013), Özdikmen (2014a,b,c), Özdikmen & Kaya (2014), Özdikmen & Mercan (2014), Özdikmen & Cihan (2014), Özdikmen & Özbek (2014), Özdikmen & Kavak (2014) and Özdikmen & Topcu (2014).

During this study, no collected specimens from any locations has been used. Firstly, I examined the mentioned literatures and I determined leaf beetles living in the provinces in Marmara Region of Turkey. After this I prepared a comparative list according to obtained information.

COVERED GEOLOGICAL AREA OF THE PRESENT WORK

The research area of the present work covers the Marmara Region. As seen below, the Marmara Region of Turkey includes 2 main divisions and 5 parts: 1. European Turkey (=East Thrace) includes 4 parts as Ergene, Istranca, Çatalca and

South Marmara bordered by territory of Greece, Bulgaria (partly) and the Aegean Sea in the West, Asian Turkey (= North-West Anatolia) in the East, Bulgaria and Black Sea in the North and Marmara Sea and remaining parts of Asian Turkey (= North-West Anatolia) in the South. 2. Asian Turkey (= North-West Anatolia) includes 2 parts as Kocaeli and South Marmara bordered by European Turkey, Marmara Sea and Aegean Sea in the West, Western Black Sea Region in the East, Black Sea and European Turkey in the North and Aegean Region in the South.

Turkey is divided into 7 regional parts commonly. The Marmara Region includes several parts as follows:

Marmara Region (North-West Turkey)

A. European Turkey (= East Thrace)
1. Ergene Part (including Edirne and Tekirdağ provinces)
2. Istranca Part (including Kırklareli province)
3. Çatalca Part (including İstanbul province)
4. South Marmara Part (Çanakkale province: Gelibolu Peninsula)

B. Asian Turkey (=North-West Anatolia)
1. Kocaeli Part (including Kocaeli and Sakarya provinces)
2. South Marmara Part (including Bilecik, Yalova, Bursa, Balıkesir and Çanakkale provinces)

RESULTS AND DISCUSSIONS

LIST OF THE TAXA ESTABLISHED IN THE PROVINCES IN MARMARA REGION OF TURKEY:

(**Abbreviations**: **ATR** – Asian Turkey, **ETR** – European Turkey, **BAL** – Balıkesir province, **BIL** – Bilecik province, **BUR** – Bursa province, **CAN** – Çanakkale province, **EDI** – Edirne province, **IST** – İstanbul province, **KRK** – Kırklareli province, **KOC** – Kocaeli province, **SAK** – Sakarya province, **TEK** – Tekirdağ province, **YAL** – Yalova province).

Names of taxa	**BAL**	**BIL**	**BUR**	**CAN**	**EDI**	**IST**	**KRK**	**KOC**	**SAK**	**TEK**	**YAL**	**ETR**	**ATR**
MEGALOPODIDAE Latreille													
ZEUGOPHORINAE Böv. & Craighead													
Zeugophora subspinosa (Fabricius)						+						+	
ORSODACNIDAE Thomson													
ORSODACNINAE Thomson													
Orsodacne humeralis Latreille												+	
CHRYSOMELIDAE Latreille													
DONACIINAE Kirby													
Donacia clavipes Fabricius												+	
Donacia marginata Hoppe						+						+	+
Donacia simplex Fabricius						+						+	+
Donacia thalassina Germar												+	
Plateumaris sericea (Linnaeus)						+						+	+
CRIOCERINAE Latreille													
Crioceris duodecimpunctata (Linnaeus)												+	
Crioceris paracenthesis (Linnaeus)						+						+	

Names of taxa	BAL	BIL	BUR	CAN	EDI	IST	KRK	KOC	SAK	TEK	YAL	ETR	ATR
Lilioceris faldermanni (Guérin-Méneville)												+	
Oulema melanopus (Linnaeus)				+	+		+			+		+	+
CLYTRINAE Kirby													
Clytra atraphaxidis atraphaxidis (Pallas)					+							+	
Clytra bodemeyeri bodemeyeri Weise		+											+
Clytra laeviuscula Ratzeburg									+				+
Clytra nigrocincta nigrocincta (Lacordaire)						+							+
Clytra novempunctata Olivier												+	
Clytra valeriana valeriana (Ménétriés)												+	
Coptocephala destinoi Fairmaire	+			+	+							+	+
Coptocephala gebleri (Gebler)				+									+
Coptocephala unifasciata unifasciata (Scopoli)	+			+								+	+
Labidostomis asiatica Faldermann	+	+											+
Labidostomis axillaris Lacordaire					+	+						+	
Labidostomis karamanica Weise		+											+
Labidostomis longimana (Linnaeus)	+	+			+		+			+		+	+
Labidostomis mesopotamica Heyden		+	+					+					+
Labidostomis oertzeni Weise						+	+					+	+
Labidostomis pallidipennis (Gebler)						+						+	+
Labidostomis propinqua Faldermann						+		+	+			+	+
Labidostomis rufa (Waltl)		+	+			+	+					+	+
Labidostomis sulcicollis Lacordaire						+						+	+
Lachnaia sexpunctata (Scopoli)		+	+						+			+	+
Macrolenes dentipes (Olivier)	+		+	+									+
Smaragdina aurita aurita (Linnaeus)						+						+	+
Smaragdina hypocrita (Lacordaire)			+			+						+	+
Smaragdina limbata (Steven)	+	+	+	+		+	+		+	+		+	+
Smaragdina salicina (Scopoli)						+						+	+
Smaragdina tibialis (Brullé)			+		+	+	+		+			+	+
Smaragdina xanthaspis (Germar)	+	+	+		+				+			+	+
Tituboea macropus (Illiger)				+	+	+						+	+
CRYPTOCEPHALINAE Gyllenhal													
Cryptocephalus anticus Suffrian		+	+	+			+	+	+	+		+	+
Cryptocephalus apicalis Gebler												+	
Cryptocephalus bameuli Duhaldeborde												+	
Cryptocephalus biledjekensis Pic		+											+
Cryptocephalus bipunctatus bipunctatus (Linnaeus)	+		+	+	+		+					+	+
Cryptocephalus connexus Olivier	+	+	+						+	+		+	+
Cryptocephalus cribratus Suffrian		+				+							+
Cryptocephalus chrysopus Gmelin												+	
Cryptocephalus duplicatus Suffrian		+	+			+	+	+	+	+		+	+
Cryptocephalus elegantulus Gravenhorst												+	
Cryptocephalus exiguus amiculus Baly			+										+
Cryptocephalus exiguus variceps Weise						+			+			+	+
Cryptocephalus flavipes Fabricius			+	+	+	+				+		+	+
Cryptocephalus fulvus fulvus Goeze				+	+		+					+	+
Cryptocephalus ilicis Olivier	+		+			+	+					+	+
Cryptocephalus janthinus Germar				+			+					+	+
Cryptocephalus labiatus (Linnaeus)												+	
Cryptocephalus macellus Suffrian	+	+		+		+			+			+	+
Cryptocephalus moraei (Linnaeus)		+	+	+			+		+	+		+	+

Names of taxa	BAL	BIL	BUR	CAN	EDI	IST	KRK	KOC	SAK	TEK	YAL	ETR	ATR
Cryptocephalus ocellatus ocellatus Drapiez	+	+	+	+		+						+	+
Cryptocephalus octomaculatus Rossi												+	
Cryptocephalus octopunctatus octopunctatus (Scopoli)									+			+	+
Cryptocephalus paphlagonius Sassi & Kısmalı		+											+
Cryptocephalus parvulus Müller			+										+
Cryptocephalus praticola Weise							+					+	
Cryptocephalus prusias Suffrian	+	+	+			+	+					+	+
Cryptocephalus pusillus Fabricius												+	
Cryptocephalus pygmaeus vittula Suffrian			+					+				+	+
Cryptocephalus rufipes (Goeze)						+						+	
Cryptocephalus rugicollis Olivier			+									+	+
Cryptocephalus schaefferi moehringi Weise		+	+		+		+			+		+	+
Cryptocephalus sericeus (Linnaeus)	+		+				+					+	+
Cryptocephalus signatifrons Suffrian								+				+	+
Cryptocephalus transcaucasicus Jakobson		+					+					+	+
Cryptocephalus trimaculatus Rossi		+	+										+
Cryptocephalus turcicus Suffrian	+	+	+	+		+					+	+	+
Cryptocephalus virens Suffrian			+	+									+
Pachybrachis bodemeyeri (Weise)			+										+
Pachybrachis fimbriolatus (Suffrian)		+				+						+	+
Pachybrachis hieroglyphicus (Laicharting)		+										+	+
Pachybrachis humeralis Burlini												+	
Pachybrachis instabilis Weise	+		+				+		+			+	+
Pachybrachis limbatus (Ménétriés)	+	+	+	+		+					+	+	+
Pachybrachis mendax mendax Suffrian				+									+
Pachybrachis sinuatus (Mulsant & Rey)												+	
Pachybrachis tesselatus tauricus Suffrian			+										+
Stylosomus flavus flavus Marseul												+	
Stylosomus tamaricis (Herrich-Schäffer)												+	
EUMOLPINAE Hope													
Bromius obscurus (Linnaeus)												+	
Colaspinella grandis (Frivaldszky)			+			+						+	+
Floricola ulema (Germar)												+	
Macrocoma doboszi Borowiec							+					+	
Macrocoma rubripes rubripes (Schaufuss)												+	
Pachnephorus canus Weise						+						+	+
Pachnephorus pilosus (Rossi)												+	
Pachnephorus tessellatus (Duftschmid)												+	
Pachnephorus villosus (Duftschmid)	+		+	+					+			+	+
CHRYSOMELINAE Latreille													
Chrysolina cerealis cerealis (Linnaeus)												+	
Chrysolina chalcites (Germar)			+			+			+			+	+
Chrysolina coerulans coerulans (Scriba)												+	
Chrysolina didymata didymata (Scriba)		+											+
Chrysolina fastuosa fastuosa (Scopoli)												+	
Chrysolina gypsophilae (Küster)		+	+									+	+
Chrysolina haemoptera byzantia Jolivet						+	+					+	
Chrysolina herbacea herbacea (Duftschmid)		+	+		+	+	+	+				+	+
Chrysolina hyperici hyperici (Forster)			+			+						+	+
Chrysolina limbata volodi Bienkowski & O.-Bienk.			+										+

Names of taxa	**BAL**	**BIL**	**BUR**	**CAN**	**EDI**	**IST**	**KRK**	**KOC**	**SAK**	**TEK**	**YAL**	**ETR**	**ATR**
Chrysolina olivieri olivieri Bedel												+	
Chrysolina oricalcia (Müller)												+	
Chrysolina orientalis orientalis (Olivier)		+	+			+						+	+
Chrysolina polita polita (Linnaeus)							+					+	
Chrysolina reitteri (Weise)		+											+
Chrysolina salviae salviae (Germar)		+										+	+
Chrysolina sanguinolenta (Linnaeus)						+						+	+
Chrysolina songarica Gebler						+	+					+	+
Chrysolina sturmi Westhoff												+	
Chrysolina turca (Fairmaire)			+			+						+	+
Chrysolina vernalis ottomana (Weise)				+		+				+		+	+
Chrysomela populi Linnaeus		+				+		+				+	+
Chrysomela tremula tremula Fabricius			+	+	+	+		+				+	+
Chrysomela vigintipunctata vigintipunctata (Scopoli)		+	+	+		+		+				+	+
Colaphellus sophiae transsylvanicus Machatschke				+	+	+						+	+
Entomoscelis adonidis (Pallas)												+	
Gastrophysa polygoni polygoni (Linnaeus)					+	+						+	+
Gonioctena decemnotata Marsham	+					+						+	+
Gonioctena linnaeana linnaeana (Schrank)												+	
Gonioctena viminalis viminalis (Linnaeus)												+	
Gonioctena fornicata (Brüggemann)		+										+	+
Leptinotarsa decemlineata (Say)				+	+					+		+	+
Neophaedon pyritosus (Rossi)						+						+	+
Phaedon cochleariae cochleariae (Fabricius)							+					+	
Phratora vulgatissima (Linnaeus)												+	
Phratora vitellinae (Linnaeus)		+	+		+	+		+	+			+	+
Plagiodera versicolora (Laicharting)			+		+	+	+	+	+		+	+	+
Plagiosterna aenea aenea (Linnaeus)	+			+		+						+	+
Prasocuris flavocincta (Brullé)						+						+	+
Prasocuris phellandri (Linnaeus)						+	+					+	+
Timarcha olivieri olivieri (Fairmaire)						+						+	+
Timarcha pratensis Duftschmid						+						+	+
Timarcha rugulosa rugulosa Herrich-Schäffer												+	
Timarcha tenebricosa (Fabricius)												+	
GALERUCINAE Latreille													
Agelastica alni alni (Linnaeus)	+		+			+	+	+	+			+	+
Diorhabda elongata (Brullé)					+							+	
Galeruca circassica Reitter				+									+
Galeruca melanocephala (Ponza)												+	
Galeruca pomonae pomonae (Scopoli)				+									+
Galerucella calmariensis (Linnaeus)						+						+	+
Galerucella lineola lineola (Fabricius)						+		+				+	+
Galerucella pusilla Duftschmid		+		+				+					+
Lochmaea caprea (Linnaeus)				+		+						+	+
Luperus graecus Weise												+	
Phyllobrotica adusta adusta (Creutzer)					+		+			+		+	
Phyllobrotica elegans Kraatz			+			+						+	+
Phyllobrotica frontalis Weise		+				+							+
Xanthogaleruca luteola (Müller)	+	+								+		+	

Names of taxa	BAL	BIL	BUR	CAN	EDI	IST	KRK	KOC	SAK	TEK	YAL	ETR	ATR
ALTICINAE Newman													
Aeschrocnemis byzantica Nadein						+							+
Aeschrocnemis serbica (Kutschera)			+			+						+	+
Altica bicarinata Kutschera		+											+
Altica brevicollis brevicollis Foudras						+						+	+
Altica cornivorax Král						+						+	+
Altica deserticola (Weise)									+				+
Altica globicollis Weise						+							+
Altica impressicollis Reiche		+				+		+	+			+	+
Altica oleracea oleracea (Linnaeus)					+							+	
Altica palustris (Weise)											+		+
Altica quercetorum quercetorum Foudras						+						+	+
Altica tamaricis tamaricis Schrank					+	+						+	+
Aphthona bergeali Fritzlar						+							+
Aphthona bonvouloiri Allard		+				+						+	+
Aphthona euphorbiae Schrank					+	+						+	+
Aphthona flava Guillebeau												+	
Aphthona flaviceps Allard						+						+	+
Aphthona lacertosa Rosenhauer					+							+	
Aphthona lutescens Gyllenhal						+						+	+
Aphthona nigriceps Redtenbacher					+							+	
Aphthona nonstriata Goeze						+	+					+	+
Aphthona ovata Foudras						+						+	+
Aphthona pygmaea (Kutschera)					+				+			+	+
Aphthona semicyanea Allard			+										+
Aphthona venustula (Kutschera)					+							+	
Aphthona violacea (Koch)											+		+
Batophila fallax Weise						+			+			+	+
Chaetocnema arenacea (Allard)					+							+	
Chaetocnema aridula (Gyllenhal)					+	+	+					+	+
Chaetocnema breviuscula (Faldermann)						+			+			+	+
Chaetocnema chlorophana (Duftschmid)						+	+			+		+	+
Chaetocnema concinna (Marsham)					+			+				+	+
Chaetocnema conducta (Motschulsky)					+	+	+					+	+
Chaetocnema confusa (Boheman)						+							+
Chaetocnema coyei (Allard)						+	+					+	+
Chaetocnema hortensis (Geoffroy)					+	+						+	+
Chaetocnema major (Jacquelin du Val)				+	+							+	+
Chaetocnema mannerheimii (Gyllenhal)					+							+	
Chaetocnema obesa (Boieldieu)					+		+					+	
Chaetocnema orientalis (Bauduer)				+		+	+					+	+
Chaetocnema procerula (Rosenhauer)	+			+		+	+					+	+
Chaetocnema sahlbergii (Gyllenhal)						+							+
Chaetocnema scheffleri (Kutschera)						+							+
Chaetocnema semicoerulea semicoerulea (Koch)				+					+				+
Chaetocnema subcoerulea (Kutschera)						+							+
Chaetocnema tibialis (Illiger)	+			+				+				+	+
Crepidodera aurata (Marsham)	+	+			+			+				+	+
Crepidodera aurea (Geoffroy)						+						+	+
Crepidodera lamina (Bedel)												+	
Dibolia phoenicia Allard	+												+

Names of taxa	BAL	BIL	BUR	CAN	EDI	IST	KRK	KOC	SAK	TEK	YAL	ETR	ATR
Epitrix pubescens (Koch)	+	+				+	+					+	+
Hippuriphila modeeri (Linnaeus)						+		+					+
Longitarsus anatolicus Weise								+					+
Longitarsus anchusae (Paykull)					+							+	
Longitarsus fallax Weise						+						+	+
Longitarsus jailensis Heikertinger						+						+	+
Longitarsus linnaei (Duftschmid)						+						+	+
Longitarsus luridus luridus (Scopoli)						+						+	+
Longitarsus lycopi (Foudras)	+		+				+					+	+
Longitarsus melanocephalus (DeGeer)						+						+	+
Longitarsus niger (Koch)						+							+
Longitarsus nigrofasciatus nigrofasciatus (Goeze)			+		+							+	+
Longitarsus obliteratus (Rosenhauer)					+	+						+	+
Longitarsus pinguis Weise						+							+
Longitarsus pratensis (Panzer)						+	+					+	+
Longitarsus quadriguttatus (Pontoppidan)	+												+
Longitarsus rectilineatus (Foudras)						+							+
Longitarsus reichei (Allard)												+	
Longitarsus succineus (Foudras)						+							+
Longitarsus tabidus tabidus (Fabricius)			+		+							+	+
Mantura rustica (Linnaeus)						+	+					+	+
Neocrepidodera ferruginea (Scopoli)						+			+			+	+
Neocrepidodera nigritula (Gyllenhal)						+						+	+
Neocrepidodera transversa (Marsham)					+							+	
Ochrosis ventralis (Illiger)						+	+	+				+	+
Orestia olympica Frivaldszky			+										+
Phyllotreta atra (Fabricius)					+			+				+	+
Phyllotreta balcanica Heikertinger			+					+					+
Phyllotreta cruciferae (Goeze)		+	+		+							+	+
Phyllotreta diademata Foudras					+			+				+	+
Phyllotreta erysimi erysimi Weise												+	
Phyllotreta nemorum (Linnaeus)		+			+	+						+	+
Phyllotreta nigripes nigripes (Fabricius)		+			+							+	+
Phyllotreta ochripes (Curtis)						+						+	+
Phyllotreta praticola Weise						+							+
Phyllotreta punctulata (Marsham)			+			+	+					+	+
Phyllotreta striolata (Illiger)					+							+	
Phyllotreta undulata (Kutschera)		+				+						+	+
Phyllotreta variipennis variipennis (Boieldieu)						+						+	+
Phyllotreta vilis Weise						+							+
Phyllotreta vittula (Redtenbacher)					+							+	
Podagrica fuscicornis (Linnaeus)						+						+	+
Podagrica malvae malvae (Illiger)			+			+	+					+	+
Podagrica menetriesii (Faldermann)	+		+		+							+	+
Psylliodes chalcomera (Illiger)					+	+						+	+
Psylliodes chrysocephala chrysocephala (Linnaeus)	+	+				+		+				+	+
Psylliodes cuprea (Koch)			+			+						+	+
Psylliodes kiesenwetteri Kutschera												+	
Psylliodes luteola (Müller)		+											+
Psylliodes napi (Fabricius)												+	

Names of taxa	BAL	BIL	BUR	CAN	EDI	IST	KRK	KOC	SAK	TEK	YAL	ETR	ATR
Psylliodes wachsmanni Csiki												+	
Sphaeroderma rubidum (Graells)						+						+	+
HISPINAE Gyllenhal													
Hispa atra Linnaeus	+		+	+		+		+	+		+	+	+
Dicladispa testacea Linnaeus			+			+			+			+	+
CASSIDINAE Gyllenhal													
Cassida atrata Fabricius			+		+							+	+
Cassida bella Faldermann									+				+
Cassida berolinensis Suffrian		+											+
Cassida brevis Weise												+	
Cassida fausti Spaeth & Reitter					+							+	
Cassida ferruginea Goeze									+				+
Cassida hablitziae Motschulsky						+							+
Cassida inquinata Brullé	+		+	+	+		+			+		+	+
Cassida murraea murraea Linnaeus					+				+	+		+	+
Cassida nebulosa Linnaeus	+		+	+					+			+	+
Cassida nobilis Linnaeus	+			+				+	+			+	+
Cassida palaestina Reiche			+										+
Cassida pannonica Suffrian	+	+	+										+
Cassida prasina Illiger	+	+					+		+			+	+
Cassida rubiginosa rubiginosa Müller	+		+		+		+		+	+		+	+
Cassida sanguinolenta Müller		+											+
Cassida saucia Weise	+												+
Cassida seraphina Ménétriés	+	+	+			+			+			+	+
Cassida stigmatica Suffrian				+									+
Cassida vibex Linnaeus												+	
Cassida viridis Linnaeus	+			+					+	+		+	+
Cassida vittata Villers	+												+
Hypocassida subferruginea (Schrank)	+	+	+	+	+	+		+	+	+		+	+

The number of the leaf bettle taxa established in **European Turkey (= East Thracia)** in Marmara Region of Turkey is 220. 59 of them were reported without exact locality or province.

The number of the leaf bettle taxa established in **Asian Turkey (North-West Anatolia)** in Marmara Region of Turkey is 210.

The number of the leaf bettle taxa established in whole territory of **Marmara Region** of Turkey is 281.

The number of the leaf bettle taxa established in each of the provinces in whole territory of Marmara Region of Turkey is as follows:

European Turkey (= East Thracia)

Çanakkale province (Gelibolu Peninsula) – 1, Edirne province – 57, İstanbul province – 51, Kırklareli province – 47, Tekirdağ province – 19, Without exact locality or province – 59.

Asian Turkey (North-West Anatolia)

Balıkesir province – 43, Bilecik province – 56, Bursa province – 67, Çanakkale province – 41, İstanbul province – 119, Kocaeli province – 29, Sakarya province – 38, Yalova province – 6.

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NEW SPECIFIC NAMES FOR MARINE CYTHEROIDEA (OSTRACODA, CRUSTACEA)

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[**Kempf, E. K.** 2016. New specific names for marine Cytheroidea (Ostracoda, Crustacea). Munis Entomology & Zoology, 11 (2): 691-694]

ABSTRACT: For junior primary homonyms of Cytheroidea species (Ostracoda) the following substitutional names are proposed: *Bythoceratina brunomilhaui* nom. nov. for *Bythoceratina robusta* Milhau, 1993; *Asciocythere raybatei* nom. nov. for *Asciocythere acuminata* Bate, 1964; *Cytheropteron morsii* nom. nov. for *Cytheropteron bicostatum* Morsi, Hewaidy & Samir, 2016; *Occultocythereis alsheikhlyi* nom. nov. for *Occultocythereis elongata* Al-Sheikhly, 1982; *Australimoosella tittertonae* nom. nov. for *Australimoosella polypleuron* Titterton & Whatley, 2009; and *Xestoleberis morsiana* nom. nov. for *Xestoleberis posterotruncata* Morsi, Hewaidy & Samir, 2016.

KEY WORDS: Ostracoda, nomenclatural changes, junior homonyms, replacement names

Class Ostracoda Latreille, 1802
Order Podocopida Sars, 1866
Suborder Cytherocopina Baird, 1850
Superfamily Cytheroidea Baird, 1850
Family Bythocytheridae Sars , 1926
Genus *Bythoceratina* Hornibrook, 1952

Bythoceratina brunomilhaui nom. nov.

Bythoceratina robusta Milhau, 1993. Geobios, 26 (2): 182, plate 4, figs. 4-7. Preoccupied by *Bythoceratina robusta* Zhao in Wang et al. 1988: Foraminifera and Ostracoda in bottom sediments of the East China Sea: 273, plate 56, figs. 6-10.

Remarks on nomenclatural change: With the publication of volumes 6 and 7 from my world database of marine Ostracoda (Kempf 1995a and 1995b) that case of homonymy became known. Until now I could not register any replacement name.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. The valves of *Bythoceratina robusta* Milhau are in length and height about 15 % shorter and show quite a different surface sculpture.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Bythoceratina robusta* Milhau, 1993 from the Lower Miocene (Otaian) of New Zealand represents a junior primary homonym of *Bythoceratina robusta* Zhao in Wang et al. 1988 from bottom sediments of the East China Sea, for which *Bythoceratina brunomilhaui* nom. nov. is herewith introduced as a necessary new name.

Etymology: The new name is honouring Dr. Bruno Milhau in recognition of his valuable contributions to ostracodology and biostratigraphy.

Family Schulerideidae Mandelstam, 1959
Genus *Asciocythere* Swain, 1952

Asciocythere raybatei nom. nov.

Asciocythere acuminata Bate, 1964. Bulletin of the British Museum (Natural History), Geology, 10 (1): 15, plate 2, figs. 10-12. Preoccupied by *Asciocythere acuminata* Swain, 1952. United States Geological Survey Professional Paper, 234 B: 77, plate 8, fig. 20.

Remarks on nomenclatural change: With the publication of volumes 1 and 2 from my world database of marine Ostracoda (Kempf 1986a and 1986b) that case of homonymy became known. Until now I could not register any replacement name.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. In lateral view the holotype of *Asciocythere acuminata* Bate, 1964 is about 15% shorter and differs considerably by a characteristic outline of the valves.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Asciocythere acuminata* Bate, 1964 from the Middle Jurassic of Yorkshire represents a junior primary homonym, for which *Asciocythere raybatei* nom. nov. is herewith introduced as a necessary new name.

Etymology: The new name is honouring Dr. Raymond Holmes Bate in recognition of his valuable contributions to ostracodology.

Family Cytheruridae G. W. Müller, 1894
Genus *Cytheropteron* Sars, 1866

Cytheropteron morsii nom. nov.

Cytheropteron bicostatum Morsi, Hewaidy & Samir, 2016. Journal of African Earth Sciences, 117: 154, plate 1, figs. 5-8. Preoccupied by *Cytheropteron bicostatum* Brand, 1990. Geologisches Jahrbuch, Reihe A, 121: 182, plate 8, figs. 15-19.

Remarks on nomenclatural change: Through the publication of volumes 6 and 7 from my world database of marine Ostracoda (Kempf 1995a and 1995b) and my actual work on this database that case of homonymy became known. The present state of accelerated research conditions by using information from the internet makes it necessary to substitute such homonyms as soon as possible.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. In *Cytheropteron bicostatum* Morsi, Hewaidy & Samir the carapax is somewhat larger and differs considerably in outline when seen laterally or dorsally. In addition, there is a great difference in geological age.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Cytheropteron bicostatum* Morsi, Hewaidy & Samir, 2016 from the Middle Eocene (Lutetian) of Egypt represents a junior primary homonym of *Cytheropteron bicostatum* Brand, 1990 from the Upper Bathonian of Germany, for which *Cytheropteron morsii* nom. nov. is herewith introduced as a necessary new name.

Etymology: The new name is honouring Dr. Abdel-Mohsen M. Morsi in recognition of his valuable contributions to ostracodology and biostratigraphy.

Family Trachyleberididae Sylvester-Bradley, 1948
Genus *Occultocythereis* Howe, 1951

Occultocythereis alsheikhlyi nom. nov.

Occultocythereis elongata Al-Sheikhly, 1982. Journal of the Geological Society of Iraq, 15 (1): 71, plate 1, figs. 2, 5, 10, 11. Preoccupied by *Occultocythereis elongatum* (recte: *elongata*) Bhalla, 1979. Bulletin of the Indian Geologists' Association, 12 (2): 146, fig. 1.

Remarks on nomenclatural change: With the publication of volumes 1 and 6 from my world database of marine Ostracoda (Kempf 1986a and 1995a) that case of homonymy became known. Until now I could not register any replacement name.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. The adult valves of both species are about the same size, but differ in outline and in surface sculpture.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Occultocythereis elongata* Al-Sheikhly, 1982 from Maastrichtian marls of western Iraq represents a junior primary homonym of *Occultocythereis elongata* Bhalla, 1979 from Lower Eocene inter-trappean limestones near Duddukuru in Andhra Pradesh, for which *Occultocythereis alsheikhlyi* nom. nov. is herewith introduced as a necessary new name.

In 2002 Khosla & Nagori transferred *Occultocythereis elongata* Bhalla to the genus *Falsocythere* which resulted in the new combination *Falsocythere elongata* (Bhalla, 1979). Nevertheless, as a junior primary homonym the specific name *Occultocythereis elongata* Al-Sheikhly, 1982 remains invalid and needs a new name.
Etymology: The new name is honouring Dr. Saad S. J. Al-Sheikhly in recognition of his valuable contributions to ostracodology.

Family Trachyleberididae Sylvester-Bradley, 1948
Genus *Australimoosella* Hartmann, 1978

Australimoosella tittertonae nom. nov.

Australimoosella polypleuron Titterton & Whatley, 2009. Revista Española de Micropaleontologia, 37 (2): 67, plate 5, figs. 27, 28, 31, 35. Preoccupied by *Australimoosella polypleuron* Coimbra et al., 2004. Journal of Micropalaeontology, 23 (2): 115, plate 2, figs. 13-17.

Remarks on nomenclatural change: Apart from the original publication, *Australimoosella polypleuron* Coimbra et al., 2004 became known through the publication of volumes 11 and 12 from my world database of marine Ostracoda (Kempf 2008a and 2008b). Through my actual work on this database that case of homonymy became evident. The present state of accelerated research conditions by using information from the internet makes it necessary to substitute such homonyms as soon as possible.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. The adult valves of *Australimoosella polypleuron* Titterton & Whatley are about 20% smaller in length and height and show clear differences in surface sculpture.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Australimoosella polypleuron* Titterton & Whatley, 2009 from Recent fine sand near Guadalcanal Island represents a junior primary homonym of *Australimoosella polypleuron* Coimbra et al., 2004 from Recent sediments of the Brazilian continental shelf southwest of the mouth of Amazon River, for which *Australimoosella tittertonae* nom. nov. is herewith introduced as a necessary new name.
Etymology: The new name is honouring Dr. Rosemary Titterton in recognition of her valuable contributions to ostracodology.

Family Xestoleberididae Sars, 1928
Genus *Xestoleberis* Sars, 1866

Xestoleberis morsiana nom. nov.

Xestoleberis posterotruncata Morsi, Hewaidy & Samir, 2016. Journal of African Earth Sciences, 117: 158, plate 2, figs. 18-19. Preoccupied by *Xestoleberis posterotruncata* Titterton & Whatley, 2005. Revista Española de Micropaleontologia, 37 (2): 307, plate 4, figs. 1-5.

Remarks on nomenclatural change: Apart from the original publication, *Xestoleberis posterotruncata* Titterton & Whatley, 2005 became known through the publication of volumes 11 and 12 from my world database of marine Ostracoda (Kempf 2008a and 2008b). Through my actual work on this database that case of homonymy became evident. The present state of accelerated research conditions by using information from the internet makes it necessary to substitute such homonyms as soon as possible.

Comparison of the published descriptions and figures of the two species reveals that they are not synonymous. The carapax of *Xestoleberis posterotruncata* Morsi, Hewaidy & Samir is only a little bit smaller, but differs considerably in outline by a sharply truncated posterior margin when seen laterally. In addition, there is a great difference in geological age.

Consequently, according to the International Code of Zoological Nomenclature (1999), *Xestoleberis posterotruncata* Morsi, Hewaidy & Samir, 2016 from the Middle Eocene (Lutetian) of Egypt represents a junior primary homonym of *Xestoleberis posterotruncata*

Titterton & Whatley, 2005 from Recent coral sand near Guadalcanal Island, for which *Xestoleberis morsiana* nom. nov. is herewith introduced as a necessary new name.
Etymology: The new name is honouring Dr. Abdel-Mohsen M. Morsi in recognition of his valuable contributions to ostracodology and biostratigraphy.

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GENETIC AND MORPHOLOGICAL VARIATIONS AMONG GEOGRAPHICAL POPULATIONS OF *RHOPALOSIPHUM PADI* (L.) (HEMIPTERA: APHIDIDAE) IN EGYPT, USING RAPD AND ISSR MARKERS.

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ABSTRACT: Morphological and genetic variation of sixteen geagraphical populations of *Rhopalosiphum padi* (L.) collected from different locality of Egypt, were studed by investgating eighteen morphometric or numeric morphological characters, applying two molecular techniques; Random Amplified Polymorphic DNA (RAPD) and Inter Simple Sequence Repeats (ISSRs) with whole genomic DNA of aphid. Moreover, phylogenetic relationships among those populations were also concerned on base of morphological or genetic variation. Most tested morphological characters were nearly constant among investigated populations except five characters. Population of El-Fayoum Governorate was nearly different morphologically than others. The tested primers gave 47.27% polymorphism among *R. padi* geographical populations. Arbitrary primer C11 generated two unique bands with molecular weights 1400 and 1570 bp characterized Aswan and Menia populations, respectively. In addition, arbitrary primer (OPA-09) showed highest level of polymorphism at all (73.77%). Proximity matrix analysis, based on combined effect of RAPD- PCR and ISSRs, showed highest similarity value (85%) between geographical populations of Aswan and Sohag Governorates, while the lowest was with Qena and El-Sharqya populations. Moreover, the tested populations could be divided successfully into two main clusters, the first cluster include populations of Upper and Middle Egypt Governorates, while the second cluster includes populations of Lower Egypt Governorates.

KEY WORDS: *Rhopalosiphum padi,* genetic, ISSR, RAPD-PCR, geotypes, wheat, phylogeny, Egypt

Aphid is a serious pest with wide range of agricultural crops in the temperate world; it can cause severe damage directly by depriving the plant of its essential nutrients or indirectly by transmitting viruses (Blackman, 1974; Minks & Harrewijn, 1987; Blackman & Eastop, 1994 & 2000). Bird cherry-oat aphid *Rhopalosiphum padi* (Linnaeus, 1758), is considered as one of dominant aphid species attack wheat and other plants of the families Gramineae. It was recorded for first time in Egypt by (Habib & El- Kady, 1961) on wheat. Confiding this species on cereal plants will be obvious and effective with higher generations' numbers under future climatic conditions in most regions of Egypt (Tabikha, 2016).

Molecular markers are rapid identification for large numbers of individuals collected at immature stages (Carew et al., 2003 & 2005). These techniques have been successfully applied to identify organisms in cryptic groups of invertebrates and also to identify species from eggs and immature stages (Clark et al., 2001; Carew et al., 2003 & 2005; Hebert et al., 2004; Choe et al., 2006). Early genetic studies depend on using PCR-random amplified polymorphic DNA technique to differentiate and study phylogenetic among aphid species in Egypt (Shahadi-

Fatima et al., 2007; Tabikha, 2008 and Amin et al., 2013), moreover detecting large amounts of genetic variation among and within biotypes of species (Black et al., 1992; Cenis et al., 1993). PCR-RFLP technique has been used not only to differentiate between aphid biotypes (Sunnucks et al., 1997; Shufran, 2003) but also to characterize genetic relationship of geographic population of aphid species in different countries. Mitochondrial DNA have been extensively used for studying population structure, phylogeography and phylogenetic relationship at various taxonomic levels (Xu et al., 2009).

Mitochondrial DNA methodology found to be a very promising tool for analyzing aphid population structure such as *Rhopalosiphum padi* from different localities in Spain (Martinez et al., 1992). Spatial and seasonal patterns of mitochondrial DNA diversity for *R. padi* populations were also examined in France (Martinez-Torres et al., 1997). Same technique has been also used to demonstrate the presence of two predominant lineages of *R. padi* in New Zealand (Bulman et al., 2005).

In addition, PCR techniques were used with other aphid species, that RAPD-PCR was used to estimate nucleotide diversity and genetic structure of *Rhopalosiphum padi, Aphis gossypii* and *Myzus persicae*, collected from two geographic distributions (Martinez et al., 1997), to detect the differentiation of *Myzus persicae* on tobacco from different regions (Yang-Xiao et al., 1999) and *Aphis gossypii* in China (Zou-Chen et al., 2000 & 2001). 588 bp region of (mtDNA-COI) were sequenced and analysed among different geographic population of *Sitobion avenae* in China (Zhao-huan et al., 2011).

Although Simple Sequence Repeats ISSRs (microsatellites) considered as punctual and sensitive genetic techniques which has been used by plant biologists (Wolfe & Liston, 1998) it was rarely used in zoological studies (Kostia et al., 2000; Reddy et al., 1999). This technique was used for population-level studies in two species of cyclically parthenogenetic aphids, *Acyrthosiphon pisum* and *Pemphigus obesinymphae* (Abbot, 2001), and to differentiate among eleven cereal aphid species found in Egypt (Helmi et al., 2011). Moreover it was also used to characterize microsatellite loci in *Aphis gossypii,* which collected from different host plants and different locations (Vanlerberghe et al., 1999) and to identify different biotypes of greenbug, *Schizaphis graminum* (Weng et al., 2007).

So, current study aimed to use RAPD-PCR and ISSRs for studying genetic variation and phylogeographic relationship among *Rhopalosiphum padi* geographical populations collected from 16 locations along latitudes of Egypt.

MATERIALS AND METHODS

1. Samples Collection and Preservation:

Specimen (apterous viviparous) of *Rhopalosiphum padi* (L.) collected from leaves, leaves' sheaths and spinks of wheat, *Triticum aestivum* from sixteen different administrative regions in Egypt (between latitudes of 22° and 32°N and longitudes 25°E and 35°E) during March, 2015. Data about latitudes and longitudes of region and date of collection and amount of each specimen were recorded and presented in Table (1) then preserved in Eppendorf tubes with ethyl alcohol 70% till further specimen mounting and morphological studies. Ten adult females were caged separately on wheat leaves by using leaf cages under field conditions of each region. After three days, offspring of next generation for each stem mother were collected by hair brush and preserved in Eppendorf tubes with ethyl alcohol 70% and transferred to laboratory under cooling and then preserved under -20^{o} C till further use in molecular genetics studies.

2. Mounting Samples and Morphological Studies:

Slides of preserved adults apterae specimens were prepared and mounted, after maceration procedure according to Blackman and Eastop (2000) and a permanent euparal mounting technique was chosen following Martin's (1983) method of dehydrating the macerated specimens. The species was identified and confirmed by using taxonomic keys of Blackman and Eastop, (1984) & (2000) and Fathi and El-Fatih (2009). Eighteen morphometric or numeric morphological characters were investigated in specimens of each region as follow:-

1. Ratio between each antennal segment (I, II, III, IV, V, Basal part of VI and Unguis of VI) to total length of antenna.
2. Ratio between width of first Antennal seg. to width of second antennal seg.
3. Ratio between width to length of Apical rostal segment.
4. Ratio between width to length of Sphiniculi.
5. Ratio between width to length of Cauda.
6. Ratio between length of first to second tarsal segment.
7. Number of sensorial seta on antennal segment (I, II, III, IV, V and Basal part of VI).

Obtained data subjected to ANOVA test Analysis by using COSTAT (2008) statistical software computer program, then hierarchical clusters analysis based average linkage method for tested morphological characters of each aphid geographical population and their Euclidean distance, was performed by SYSTAT 13 Computer program.

3. Molecular Genetic Characterizations:

Sixteen specimens of geographical populations for Bird cherry-oat aphid, collected from wheat plants in different localities of Egypt, were subjected to Polymerase Chain Reaction with six arbitrary ten-mer primers (RAPD- PCR) and with four Inter Simple Sequence Repeat (ISSRs) primers.

a) DNA extraction

DNA from aphid was extracted using a Cetyl Trimethyl Ammonium Bromide (CTAB) protocol Weeks *et al.* (2000) with some modifications. Five individuals of apterus aphid adults were grinded in Eppendorf tubes under liquid nitrogen to a fine powder, powdered were transferred to 1.5 ml tubes and 750 µl of extracted buffer (2% PVP-40, pH 8.0 EDTA 20 mM, CTAB 5% (W/V) Tris-HCl pH 8.0 100 mM, NaCl 1.4 M, 2.0% mercapto ethanol) stored in 60˚C was added to each sample, mixed then kept in 60˚C hot water bath for 35 minutes. During incubation period, the contents of the tubes were shaken gently several times. Equivalent to the volume of the tube, the mixture of chloroform – isoamyl alcohol (1:24) was added to each tube containing the sample and was mixed gently for one minute. The mixture was centrifuged for 15 min at 13,000 rpm, and then supernatant was taken and poured into a new sterile tube, 1 ml of cold isopropanol solution was added to each tube and the solution in the tubes was gently mixed several times. Let the DNA precipitate in -20°C (freezer) for 30 min at least. The tubes containing DNA strands were centrifuged for 10 min at 13000 rpm on 4˚C and the supernatant was emptied gently so that the DNA remained intact inside the tube. Then 500 ml of ethanol 70% was added to the tubes containing DNA, and centrifuged at 13,000 rpm on 4˚C for 5 min. The upper phase was discarded and tubes were upside down in air and placed on absorbent paper so that the deposition dried and finally 50 µl of sterile double- distilled water was added to each tube. The samples were stored overnight in the refrigerator until the mass of DNA distilled in water. To detect the extracted DNA, 1.2% Agarose gel in TBE buffer was used then 5 µl of DNA with double amount of loading buffer was mixed and electrophorized under a constant voltage of 80 volts for 1.5 hours. Quantity and quality of extracted DNA was determined by spectrophotometry and agarose gel electrophoresis.

b) RAPD-PCR preparations and conditions:

Six random primers that consist of 10 bases were used to differentiate and fingerprint the tested Bird cherry-oat aphid geographical populations. The arbitrary primers sequences are presented in Table (2). For RAPD analysis, PCR amplification was carried out in total volume of 25µl containing 2.5µl 10 x buffer, 2.5µl 50 mM $MgCl_2$, 2.5µl 4 mM dNTPs, 7µl 50pmol primer,1µl 10 ng of isolate genomic DNA and 0.2µl (5 units/ µl) Taq DNA polymerase (Promega Germany).

Amplification was performed in a thermal cycler and The following PCR programme was applied: Initial Denaturation (Initial strands separation) on 95°C for 5 min; then 40 cycles were performed, each cycle contained Denaturation on 95°C for 1 min, Annealing on

30ºC for 1 min and Extension on 72ºC for 1 min; finally, an extra final extension step on 72ºC for 10 min Istock et al. (2001). Two µl of loading dye were added prior to loading of 10 µl per gel slot. Electrophoresis was performed at 100 volt with 0.5 x TBE as running buffer in 1.5% agarose/0.5x TBE gels and then gel was stained in 0.5 µg/cm^3 (w/v) ethidium bromide solution and distained in deionized water. Finally the gel was visualized and photographed using gel documentation system (Bio-Rad Gel Doc.2000).

c) ISSR preparations and conditions:

PCR amplification was performed using four Inter Simple Sequence Repeats (ISSRs) primers to differentiate and finger prints the geographical population of Bird cherry-oat aphid. The ISSR primers sequences of DNA are presented in Table (3). PCR amplification was conducted in total volume of 25 µL containing: 2µL DNA, 2µL of primer, 2.5µl 10 x buffer, 2.5µl 50mM MgCl2, 2.5µl 4mM dNTPs and 0.2 µl (5 units/ µl) Taq DNA polymerase (Promega Germany).

The DNA amplifications were performed in an automated thermal cycler with PCR conditions as follow: for one cycle on 94°C for 5 min, followed by 40 cycles [1 min on 94°C, 75 second on 44°C (for HB-09 and HB-14 primers) or 40°C (for HB-12 and HB-13 primers) and 2 min on 72°C] then Final extension for 10 min on 72°C. PCR products were separated by gel electrophoresis in 1% (w/v) agarose gel in TBE buffer at 120 V for 30 min then the bands were visualized by staining with Ethidium bromide, and photographed by using gel documentation system (Bio-Rad Gel Doc.2000).

4. Genetic Relatedness among Aphid Geographical Population:

To calculate pairwise difference matrix among the sixteen geographical populations of *R. padi*, Gene_Profiler_Eval computer program was used to record bands variations with each primer of RAPD and ISSRs markers, then resulting polymorphic bands from each geographical population were scored as 1 for presence of band and 0 for its absence. It was assumed that the bands with the same size were identical. Genetic comparisons based on RAPD or/and ISSRs fingerprints among geographical population were calculated using Jaccard's similarity coefficient embedded in Multi Variate Statisical Pakage (MVSP) Version 3.1. computer program. Cluster analysis of the data matrix was performed by the Unweighted Pair Group Method with Arithmetic Means (UPGMA) with Jaccard's similarity coefficient Sneath and Sokal (1973).

RESULTS

Morphological and genetic variation of sixteen geagraphical populations of *Rhopalosiphum padi* (L.) collected from different locality of Egypt, were studied by investgating eighteen morphometric or numeric morphological characters and using ten PAPD and ISSR primers in polymerase chain reaction (PCR) for extracted DNA of each population. Moreover, phylogenetic relationships among those populations were also concerned on base of morphological or genetic variation among the populations.

1. Morphological Variation and Relatedness Analysis.

Most of the tested morphometeric and numeric morphological characters were nearly constant among investigated geographical population of *R.padi* in Egypt except five characters, which were varied signficantly from geographical population to another. Those varied characters were ratio between second antennal segment length to total antenna length, first to second antennal segment width, length of first to second tarsal segment, and width to length of sphiniculi, in addition numbers of sensorial hairs on fourth antennal segments. Results of ANOVA test analysis confirmed presence significant geographical variation for those characters among populations as followed: (F= 2.146*, LSD 0.05= 2.9e-5), (F= 3.104**, LSD 0.05= 0.015), (F= 2.481*, LSD 0.05= 0.302), (F= 3.478**, LSD 0.05= 0.176) and (F= 2.461*, LSD 0.05= 0.998), respectively. So it will be recommended avoiding of use those characters in discriminate *R. padi* species. In contrary the rest constant tested characters can be used as taxonomic characters for *R. padi* species as possible or at least characterized *R. padi* population of Egypt, but it is unsuitable for discriminate geographical populations of *R. padi* inside Egypt.

Relatedness among sixteen geographical populations of *R. padi*, based on morphometric and numeric morphological characters as graphically illustrated in Figure (1) that reflected the sixteen geographical populations can be classifying into two main clusters. The first cluster separate El-Fayoum population from others which indicate that population is nearly different morphologically than others. The second cluster divided to two sub-clusters, the first sub-cluster includes Assiut and Menia population, while the second sub-cluster divided to two groups. First group separate the south populations (Swan, Qena and Sohag Governorates) from Lower Egypt population, which the last one include two sub-groups, the first sub-group include population in closed localities (El-Behera, Kafer El-Shikh, Dakahli, Domiata) in addition Beni-Suif Governorates. While the second sub-group include population in semi closed governorates (El-Monfia, El-Giza, El- Sharqya and El-Gharbia Governorates).

2. Molecular Genetic Variation and Characterization.

Genetic variation among the sixteen geographical population of *R. padi* were assessed by using six Random Amplified Polymorphic DNA (RAPD) primers and four Inter Simple Sequence Repeats (ISSRs) primers with whole genomic DNA of aphid. Analysis of obtained data revealed that the used primers showed different levels of polymorphism. These primers generated 880 fragments, 416 bands of them were considered as polymorphic markers (47.27%) for different geographical populations of *R. padi*, while 496 bands were considered as monomorphic bands (52.73%).

a. <u>RAPD-PCR analysis.</u>

The obtained bands pattern of applying RAPD-PCR technique are shown in Figure (2), which reflect that four arbitrary primers (C11, C14, OPA-03 and OPA-09) from the six tested primers gave successfully different levels of polymorphism among tested geotypes, while the other primers (OPA-11 and OPA-12) didn't show any polymorphism among geotypes. The four primers generated 481 different DNA fragment bands with wide molecular sizes (140-1570 bp). 273 polymorphic distinct fragment bands were recorded to achieve 56.76% polymorphism among tested geotypes. The highest number of DNA fragment bands (129) was observed with primer OPA-03, while the lowest number was 103 bands, generated by primer C11.

Primer C11 generated 103 bands with widest molecular weights at all ranged from 225 to 1570bp. 71 bands of them were considered as polymorphic markers for different geotypes (68.93%), while 2 bands of them were considered as unique bands that characterized population of Aswan and Menia with molecular weights 1400 and 1570 bp, respectively. In contrary, two common bands were detected among the sixteen geographical population of *R. padi* in molecular weights 325 and 986bp. This primer generated lowest numbers of bands (3 bands) with population of Beni-Suif Governorate, while highest numbers (9 bands) observed with population of El-Dakahlia Governorate.

The generated RAPD profile of DNA fragment bands with primer C14 gave highest number of bands (10 bands) with El-Qaloubia geographical population. In contrast, this primer gave lowest numbers of DNA fragments (6 bands) with the population collected from Menia Governorate. In addition, it generated 127 bands with molecular weights ranged from 150 to 1100bp. Sixty three bands of them were considered as polymorphic markers for different geotypes to achieve moderated polymorphism level at all (49.60%). Four common bands were detected among the sixteen geographical populations in molecular weights 263, 316, 350 and 618bp.

It was obvious from bands analysis for PCR products generated by OPA-03 primer that were 129 bands with closest molecular sizes at all, ranged from 160 to 781 bp and lowest level of polymorphism among the sixteen tested geotypes (37.98%), where 49 bands of them were polymorphic bands. This primer generated lowest numbers of bands (4 bands) with population of Qena, while highest numbers (9 bands) observed with populations of Aswan, Assiut, El-Fayoum, El-Monofia, Kafer El-Shikh and Domiata Governorates. Highest number of common bands (Five) was detected among the sixteen geographical populations in molecular weights 362, 387, 436, 470 and 504bp.

The last arbitrary primer (OPA-09) generated 122 bands with molecular weights ranged from 140 to 1000 bp. Number of generated bands in different geotypes ranged from 4 bands in El-Behera population to 10 bands in populations of Qena and Sohag. This primer showed highest level of polymorphism at all (73.77%) whereas two common bands were only detected among the sixteen geographical populations of *R. padi* with molecular weights 140 and 300bp. So it may be considered as best DNA marker primers to differentiate among *R. padi* geographical population in Egypt.

b. ISSR analysis.

Four ISSRs primers (HB-09, HB-12, HB-13 and HB-14) were tested with the sixteen geographical populations of *R. padi* to detect molecular markers for each geotypes as shown in Figure (3). All tested ISSRs primers gave successfully different levels of polymorphism among tested geotypes that generated 399 different DNA fragment bands with molecular sizes (182-1000 bp). Obvious 143 polymorphic fragment bands were noticed to achieve polymorphism percent 35.84% among tested geotypes. The highest number of DNA fragment bands (115) was observed with primer HB-13, while the lowest number was 87 bands, generated by primer HB-09. Highest level of polymorphism (46.67%) was observed with primer HB-12, among the tested geotypes.

The generated ISSRs profile of DNA fragment bands with the primer HB-09 gave 87 bands with molecular weights ranged from 182 to 700bp. highest number of bands (6 bands) observed with most geographical population (Aswan, Qena, Sohag, Assuit, El-Qaluobia, El-Monfia, El-Gharbia and Domiata Governorates), while lowest numbers of bands (4 bands) occurred with population of Menia Governorate. It generated 39 polymorphic bands to achieve polymorphism level (44.83%). In contrast, three common bands were detected among the sixteen geographical populations with molecular weights 182, 183 and 625bp.

Primer HB-12 generated 90 bands with molecular weights ranged from 280 to 1000bp. Moreover, 42 bands pattern of them were considered as polymorphic markers for different geotypes with percent of polymorphism (46.67%) (Highest level comparing with tested ISSRs primers). In contrary, three common bands were detected among the sixteen geographical populations in molecular weights 532, 665 and 740bp. This primer generated lowest numbers of bands (4 bands) with populations of El-Monfia Governorate, while highest numbers (7 bands) observed with populations of Aswan and El-Fayoum Governorates.

Primer HB-13 generated 115 bands with molecular weights ranged from 165 to 990bp. Numbers of generated bands in different geotypes ranged from 6 bands in populations of El- Monofia and El-Dakahlia to 8 bands in populations of Qena, Assiut, El-Qaloubia, Kafer El-Shikh and Domiata Governorates. This primer showed lowest level of polymorphism at all 16.52% whereas highest numbers of common bands (6 bands) were detected among the sixteen geographical populations with molecular weights 165, 256, 300, 333, 424 and 586bp. So it may be considered as less suitable ISSRs primer to differentiate geographical populations of *R. padi* in Egypt, while it may be DNA marker primers to characterized *R. padi* species of Egypt at all or species specific primers.

Primer HB-14 generated 107 bands with molecular weights ranged from 285 to 912 bp where 43 bands of them were polymorphic bands to give 40.19% polymorphism among the sixteen tested geotypes. This primer generated lowest numbers of bands (5 bands) with populations of El-Qaloubia and El-Behera Governorates, and generated 6 bands with population of Aswan, El-Fayoum and El- Gharbia Governorates. While highest numbers (8 bands) observed with *R. padi* populations of El-Fayoum, El-Dakahlia and Kafer El-Shikh Governorates. Common bands were detected among the sixteen geographical population species in molecular weights 285, 402, 420 and 738bp.

3. Genetic Relatedness among Geographical Populations of *R. padi* in Egypt.

Genetic similarities and phylogenetic relationships among the tested sixteen geographical population of *R. padi* were based on RAPD- PCR and ISSRs analysis, in addition the combined effect of those techniques. To calculate proximity matrix and design dendrograms, the obtained data were subjected to cluster analysis by using Unweighted Pair Group Method with Arithmetic Means (UPGMA) and Jaccard's similarity coefficient embedded in NTSYS-pc computer program.

The results of proximity matrix analysis for the tested sixteen geographical population of *R. padi*, based on RAPD- PCR, reflected that the highest similarity value 77.8% was recorded between geographical populations of El-Dakahlia and Kafer El-Shikh Governorates, while the lowest similarity value (48.6%) was recorded between geographical populations of Aswan and El-Giza Governorates. Moreover, dendrogram analysis based on RAPD-PCR polymorphism was graphically illustrated in Figure (4), which reflects that the sixteen geographical populations of *R. padi* could be classify into two main clusters with similarity percentage 61%, the first cluster divided to two sub-clusters, the first one includes only geographical population of El-Behera governorate; while the second include two groups with similarity percentages 68%, the first group divided to two sub-groups with similarity percentages 73%; the first includes El-sharqya, Kafer El-Shikh and El-Dakahlia populations, while the second includes Domiata and El-Qaloubia. The second sub-cluster includes El-Monfia and El-Giza population. The second cluster had populations of Upper Egypt governorates that divided to two sub-clusters with similarity percentage 68%, the first sub-cluster includes populations of Qena, Menia, Beni-Suif, El-Fayoum and El-Gharbia Governorates with similarity 69%; while the second sub-cluster includes populations of Assuit, Sohag and Aswan Governorates with similarity 73.3%.

Proximity matrix analysis for the tested sixteen geographical population of *R. padi*, based on ISSR-PCR, reflected that the highest similarity value 96.3% was recorded between geographical populations of Aswan and Sohag Governorates, while the lowest similarity value (61.3%) was recorded between geographical populations of Assiut and El-Sharqya Governorates. In addition, dendrogram analysis based on ISSRs polymorphism was graphically illustrated in Figure (5), which reflects that the sixteen geographical populations of *R. padi* separated to two main clusters with similarity percentage 77.5%, the first cluster divided to two sub-clusters, the first one includes only geographical population of El-Monofia Governorate; while the second sub-clusters includes two groups with similarity percentage 81%; the first group includes populations of El-Gharbia and El-Sharqya Governorates, while the second group divided to two sub-groups with similarity 81.3%; the first include Domiata and El-Behera, Kafer El-Shikh and El-Dakalia Governorates; while the second include the populations of El-Qaloubia, El-Giza, Beni-Suif and Menia Governorates. The second cluster had populations for south of Upper Egypt governorates (Aswan, Qena and Sohag, Assiut) in addition to El-Fayoum Governorate with similarity percentage 85%.

The results of proximity matrix analysis for the tested sixteen geographical population of *R. padi*, based on combined effect of RAPD- PCR and ISSRs, showed that the highest similarity value 85% was recorded between geographical populations of Aswan and Sohag Governorates, while the lowest similarity value (58.8%) was recorded between geographical populations of Qena and El-Sharqya Governorates. Moreover, dendrogram analysis based on combined effect of RAPD- PCR and ISSRs polymorphism is graphically illustrated in Figure (6), which reflects that the sixteen geographical populations of *R. padi* could be divided successfully into two main clusters with similarity percentage 68%, the first cluster include populations of Upper and Middle Egypt Governorates in addition population of El-Gharbia Governorate, while the second cluster includes populations of Lower Egypt Governorates. So the first cluster includes two sub-cluster with similarity 75%; the first sub-cluster includes populations of Aswan, Sohag, Assiut and Qena Governorates with similarity percentage 77%, while the second sub-cluster includes populations of Menia, Beni-Suif, El-Fayoum and El-Gharbia with similarity 76.5%. The second cluster of Lower Egypt could be also divided to two sub-cluster, the first sub-cluster includes populations of El-Monofia and El-Giza Governorates with similarity 79%, while the second sub-cluster could be divided to two groups; the first group includes populations of El-Qaloubia, El-sharqya, Kafer El-Shikh and El-Dakahlia Governorates with similarity percentage 75.5%, while the second group include populations in costal Governorates (El-Behera and Domiata) with similarity percentage 78%.

DISCUSSION

Classical morphological criteria for aphid species identification may be affected by environmental factors such as climatic conditions and physiological status of the host plant (Helmi et al., 2011). The RAPD-PCR analysis was suitable method to determine genetic distances among different taxa (families, subfamilies, genera, species and populations within species) of aphids, moreover to differentiate aphids especially for closely and related species (Black et al., 1992; Cenis et al., 1993; Lushai et al., 1997; Zhang et al., 2000 and Jain et al.; 2010). Using of different primers in the RAPD method permits the detection of different levels of DNA polymorphism for *Myzus persicae* population (Yang *et al.,* 1999), to detect a close relationship between the green spruce aphid, *Elatobium abietinum* in two localities (Sigurdsson et al., 1999), distinguish different geographical and/or host associated populations of some cryptic complex species (Zitoudi et al., 2001; Bulman et al., 2005; Helmi et al., 2011) and to distinguish among six biotypes of *Schizaphis graminium* (Black et al., 1992). Whereas *Diuraphis noxia* populations, collected from various host plants and regions, gave 69 polymorphic DNA bands amplified by 7 primers (Puterka et al., 1993). Random primer A11 gave a diagnostics constant loci to differentiate populations of *Aphis gossypii* collected on cucurbits, which was absent in those collected from other host plants (Vanlerberghe and Chavigny, 1998). In contract collected populations of *A. gossypii* from different localities can be differentiated (Zou-Chen et al., 2000). Each of geographical and seasonal distribution of *Sitobion avenae* populations had low effect on genetic variability (Figueroa et al., 2005).

In Egypt RAPD-PCR technique is successively used to fingerprint of some sap-sucking insect species belonging to the same taxonomic category such as fingerprinting of ten aphids species belonging to Genus *Aphis* (Shahadi-Fatima et al., 2007), eighteen aphid species belonging to Tribe Aphidini (Sub-tribe Rhapalosiphina) and Tribe Macrosiphini (Tabikha, 2008) and to differentiate eleven different cereal aphid species (Helmi et al., 2011).

Some taxonomic studies were based on ISSRs techniques and applied with aphids such as (Abbot et al., 2001) that studied population-level in two species of cyclically parthenogenetic aphids; *Acyrthosiphon pisum* and *Pemphigus obesinymphae*, and reported that ISSRs are suitable for invertebrate populations with small size bodies and low levels of within-population variation; (Weng et al., 2007) studied host-associated genetic differences and regional differences among the green bug, *Schizaphis graminum* biotypes and cited that the use of ISSRs would be useful for aphid genetic, ecological, and evolutionary studies.

In Egypt, (ISSRs) were used to find diagnostic markers for fingerprinting eleven cereal aphids collected from different cereal plants and from different localities in Egypt. Whereas HP-09 primer generated 23 bands with molecular weight ranged from 117 to 1109bp. and generated 5 bands with *R. padi* and showed 82.6% polymorphism; HP-11 primer generated 30 bands with molecular weights ranged from 124 to 1301bp. and showed 73.3 % polymorphism; HP-12 primer generated 22 bands with molecular weight ranged from 95 to 842bp. with 90.9% polymorphism, and detected one marker band for *R. padi* ; HP-13 primer: generated 25 bands with molecular weight ranged from 123 to 1016bp. with 88% polymorphism and detected also one marker band for *R. padi*; finally HP-14 primer generated 22 bands with molecular weights ranged from 32 to 963bp. with 81.8% and detect one marker band for *R. padi* (Helmi et al., 2011).

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Table 1. List of localities (Governorates) names and associated geographical information for collected specimens of *Rhopalosiphum padi* in Egypt.

Sample No.	Locality (Governorate)	GPS		Date of collection	Sample Size
		Latitudes	Longitudes		
1	Aswan	24° 25' 14.48" N	32° 56' 07.97" E	2/3/2015	20
2	Qena	25° 43' 20.31" N	32° 37' 43.31" E	1/3/2015	8
3	Sohag	26° 33' 50.43" N	31° 43' 42.67" E	3/3/2015	15
4	Assiut	27° 08' 50.26" N	31° 17' 34.61" E	3/3/2015	22
5	Menia	28° 06' 44.21" N	30° 44' 39.94" E	4/3/2015	17
6	Beni-Suif	29° 05' 15.55" N	31° 06' 37.54" E	4/3/2015	13
7	El-Fayoum	29° 26' 19.88" N	30° 46' 19.06" E	5/3/2015	11
8	El-Giza	30° 01' 03.64" N	31° 12' 17.60" E	18/3/2015	7
9	El-Qaloubia	30° 17' 11.36" N	31° 11' 59.49" E	21/3/2015	20
10	El-Sharqya	30° 35' 43.89" N	31° 27' 46.04" E	16/3/2015	8
11	El-Monofia	30° 36' 23.18" N	31° 00' 00.55" E	21/3/2015	18
12	El-Gharbia	30° 49' 15.06" N	30° 59' 33.52" E	16/3/2015	5
13	El-Dakahlia	31° 03' 55.40" N	31° 22' 15.66" E	24/3/2015	8
14	KaferEl-Shikh	31° 07' 27.38" N	30° 57' 12.12" E	10/3/2015	7
15	El-Behera	31 °19' 42.13" N	30° 24' 16.66" E	12/3/2015	17
16	Domiata	31° 24' 01.19" N	31° 41' 59.04" E	24/3/2015	5

Table 2. Arbitrary ten-mer primers employed in the RAPD-PCR analysis.

Primer Code	Nucleotide Sequence 5\ -------------------- 3\
C_{11}	AAAGCTGCGG
C_{14}	TGCGTGCTTG
OPA-03	AGTCAGCCAC
OPA-09	CTCACCGTCC
OPA-11	CAATCGCCGT
OPA-12	CAATCGCCGT

Table 3. ISSR primers employed in the ISSR-PCR analysis.

Primer Code	Nucleotide Sequence 5\ -------------------- 3\
HB-09	GTGTGTGTGTGTGG
HB-12	CACCACCACGC
HB-13	GAGGAGGAGGC
HB-14	GTGTGTGTGTGTGC

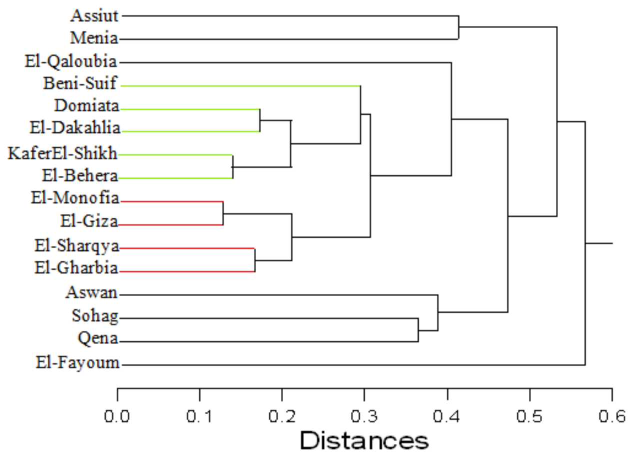

Figure 1. Hierarchical clusters show morphological relatedness among sixteen geographical populations of *R. padi*, based on morphometric and numeric Morphological characters.

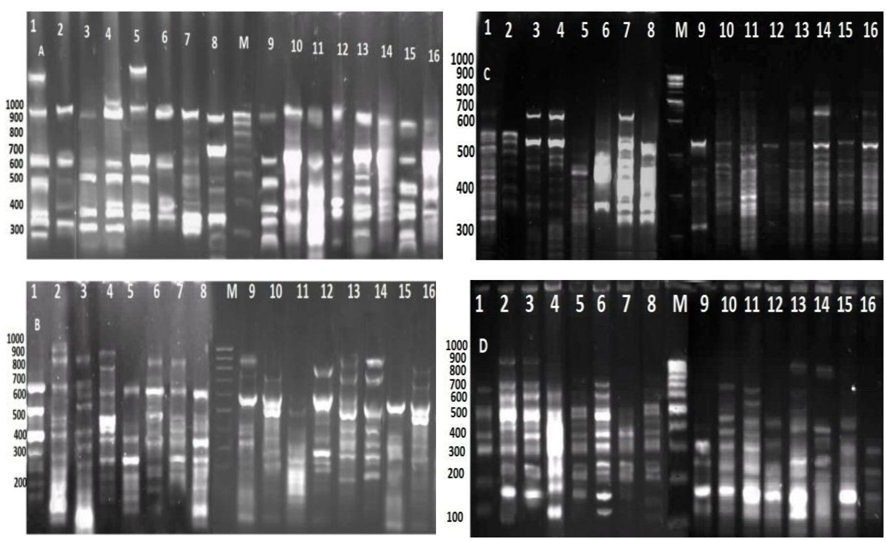

Figure 2. DNA fragment banding generated by four arbitrary primers [Primer C11(A), C14(B), OPA-03(C), and OPA-09(D)] for geographical population of *R. Padi* collected from sixteen localities [Aswan(L1), Qena(L2), Sohag(L3), Assiut(L4), Menia(L5), Beni-Suif (L6), El-Fayoum(L7), El-Giza(L8), El-Qaloubia(L9), El-Sharqya(L10), El-Monofia(L11), El-Gharbia(L12), El-Dakahlia(L13), Kafer El-Shikh(L14), El-Behera(L15) and Domiata(L16)], in addition DNA marker(M).

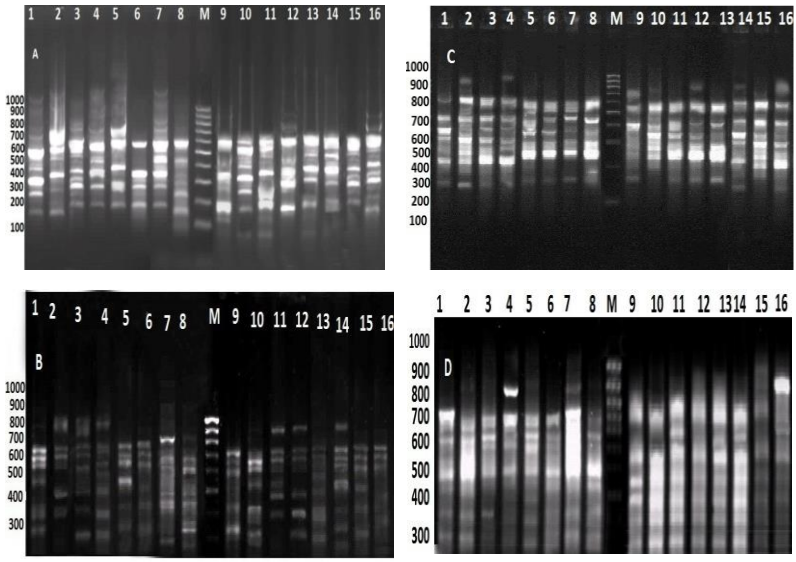

Figure 3. DNA fragment banding generated by four ISSRs primers [Primer HB-09 (A), HB-12(B), HB-13 (C), and HB-14 (D)] for geographical population of *R. Padi* collected from sixteen localities [Aswan(L1), Qena(L2), Sohag(L3), Assiut(L4), Menia(L5), Beni-Suif (L6), El-Fayoum(L7), El-Giza(L8), El-Qaloubia(L9), El-Sharqya(L10), El-Monofia(L11), El-Gharbia(L12), El-Dakahlia(L13), Kafer El-Shikh(L14), El-Behera(L15) and Domiata(L16)], in addition DNA marker(M).

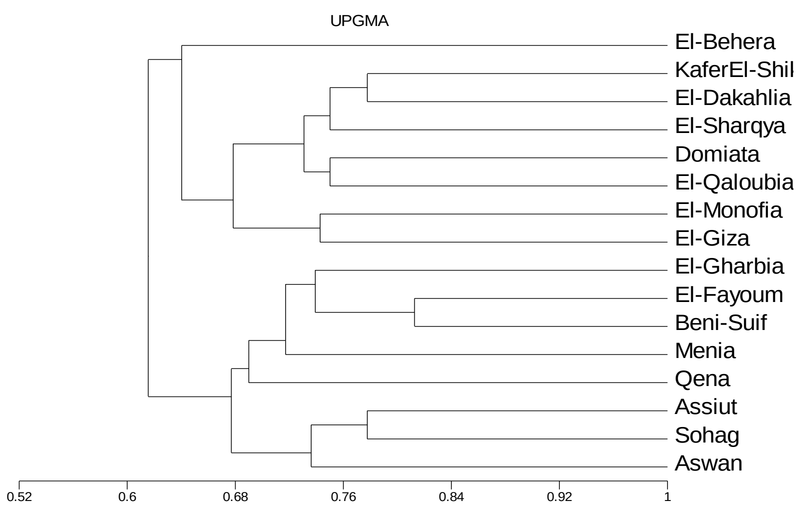

Figure 4. Dendrogram show phylogenetic relationship among the sixteen geographical population of *R. padi* based on RAPD-PCR analysis.

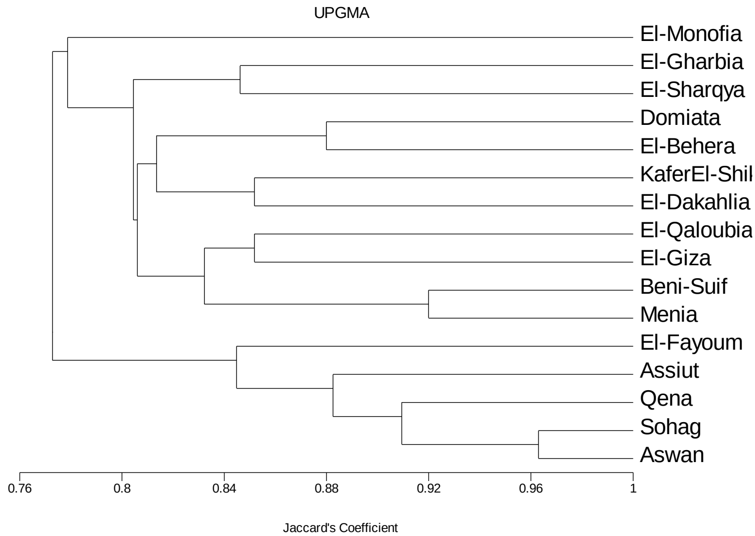

Figure 5. Dendrogram show phylogenetic relationship among the sixteen geographical population of *R. padi* based on ISSRs analysis.

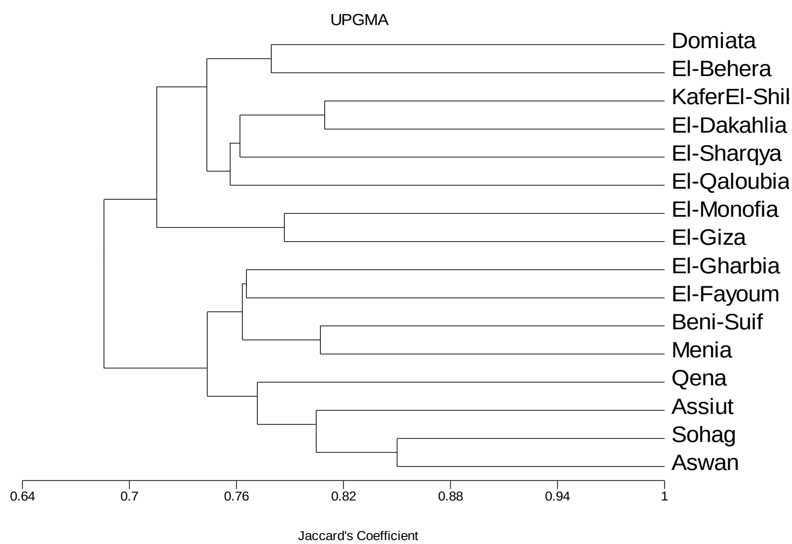

Figure 6. Dendrogram show phylogenetic relationship among the sixteen geographical population of *R. padi* based on combined effect of RAPD-PCR and ISSRs analysis.

A NEWLY RECORDED RAPHIGNATHOID MITE SPECIES FROM TURKEY: *BARBUTIA IRANENSIS* BAGHERI ET AL. (ACARI: RAPHIGNATHOIDEA)

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[**Dönel Akgül, G.** 2016. A newly recorded Raphignathoid mite species from Turkey: *Barbutia iranensis* Bagheri et al. (Acari: Raphignathoidea). Munis Entomology & Zoology, 11 (2): 709-711]

ABSTRACT: In this study, the genus *Barbutia* mite specimens in moss and soil samples taken from Reşadiye and Ahmediye, Turkey are examined. During the examination a total of three deutonimph females mite specimens of *Barbutia iranensis* Bagheri, Navaei and Ueckermann have been identified. The description and illustrations of the species are based on the collected specimens, and its distribution in the world is also given. This species is a new record for the Turkish fauna.

KEY WORDS: Acari, Barbutiidae, *Barbutia iranensis*, new record, Turkey

The poorly known family Barbutiidae is one of the most mysterious groups in the Prostigmata. Barbutiidae as one of the 11 families of Raphignathoidea (Fan & Zhang, 2005). Barbutiidae Robaux is containing only one genus *Barbutia* Oudemans and five rare species: *B. anguineus* (Berlese), *B. australia* Fan, Walter & Proctor, *B. longinqua* Fan, Walter & Proctor, *B. perretae* Robaux, and *B. iranensis* Bagheri et al. The systematic position of *Barbutia* has long been unclear. Fan et al. (2003) reviewed and discussed the systematic position of the family Barbutiidae and they hypothesized that it is a lineage that fits between Tetranychoidea and Raphignathoidea, and thought that it may require molecular data and/or a better understanding of ontogenetic characters to resolve this question. This family recorded the first time from Turkey by Doğan & Dönel (2009). *Barbutia iranensis* is the second species for Turkish fauna.

MATERIALS AND METHODS

Mites were extracted from samples of decomposing matter, soil and moss using compound Berlese funnels. After clearing in lactic acid, examples of each species were dissected for detailed examination of some structures and mounted in Hoyer's medium for identification. Drawings and examination were attained with drawing tube Nikon Y-IDT and Nikon E-600 type research microscopes. Measurements were made using a Leica DM 4000 B phasecontrast microscope. Dorsal setal and leg setal designations follow Kethley (1990) and Grandjean (1944), respectively. Setal counts of leg segments are given with solenidia in parenthesis. All measurements are given in micrometers (μm). The range of the dispersion of measurements has been given parenthetically; the average of the values is in front of parenthesis.

RESULTS AND DISCUSSION

Family: Barbutiidae Robaux, 1975
Type genus: *Barbutia* Oudemans, 1927.

Barbutia iranensis **Bagheri, Navaei & Ueckermann, 2010**
Deutonymph Female (n=3) (Figures 1-6)

Body elongate, 305 (297–320) long, 88 (75–90) wide.

Dorsum – Integument of dorsum faint striated except for punctuated along sejugal furrow. Shields not evident. Eyes and postocular bodies present, eyes 6 (4–8) and postocular bodies 7 (8–10) in diameters. Thirteen pairs of dorsal body setae smooth and slender. Setae *ve* about as long as *sce,* not reaching bases of c_1; *sci* about as long as e_1 and f_1;Dimension of setae as follows: *vi*: 12 (10–13); *ve*: 45 (43–48), *sci*: 8 (5–10); *sce*: 35 (30–43); c_1: 12 (10–13); c_2: 40 (38–45); d_1: 10 (8–13); d_2: 15 (13–18); e_1: 8 (5–10); e_2: 18 (13–23); f_1: 8 (5–10); h_1: 65 (60–70); h_2: 50 (43–63); *vi-vi*: 23 (20–25); *ve-ve*: 28 (25–30); *vi-ve*: 13 (10–15); *sce-sce*: 50 (47–55); c_1-c_1: 50 (47–55); c_1-c_2: 32 (30-35); d_2-d_2: 45 (43–50); c_1-d_1: 45 (40–53); c_1-d_2: 110 (108–115); d_1-d_1: 30 (27–35); d_1-d_2: 50 (43–53), e_2-e_2: 43 (40–45); d_2-e_2: 33 (30–35); d_1-e_1: 45 (43–48); d_1-e_2: 65 (63–68); e_1-e_1: 18 (15–20); e_2-e_1: 38 (35–43); f_1-f_1: 18 (15–20); e_1-f_1: 43 (40–45); e_2-f_1: 28 (25–30); h_1-h_1: 33 (30–35); h_2-h_2: 23 (20–28); h_1-h_2: 7 (5–8).

Venter – Ventral surface striated. Ventral shield absent. Ventral setae *1a* close to coxae I, *3a* situated in front of coxae III and *4a* situated on membrane between coxae IV. Measurements of the setae: *1a*: 23 (20-25), *3a*: 23 (20-25) and *4a*: 18 (15-20). Genital and anal openings separate, genital shields without setae, aggenital area with three pairs of setae, ag_1: 9 (8-10), ag_2: 20 (18-23) and ag_3: 10 (8-13). Pseudanal opening with three pairs of setae ($ps_{1\text{-}3}$).

Legs – Leg I: 90 (83–100); leg II: 57 (50–63); leg III: 55 (47–58); leg IV: 67 (60–73). Chaetotaxy of leg segments as follows (solenidia in parentheses): coxae 2–1–0–0, trochanters 1–1–1–1, femora 4–2–1–1, genua 6(κ)–0–0–0, tibiae 6(φ)–3(φ)–2–2, tarsi 12(2ω)–7(ω)–6(ω)–6(ω).

Gnathosoma – Palp 27 (23–33) long, palptibial claw with a ventral tooth. Chelicera (including moveable digit) 50 (47–58) long, cheliceral fixed digits reduced and movable digits small.

Adult stage. Unknown.

Distribution. Iran (Bagheri, Navaei and Ueckermann, 2010) and Turkey (this paper).

Materials examined. Two deutonymph females from moss, near the brook, 40° 27' 11 N, 37° 16' 39 E, 976 m, Reşadiye, 27. IV. 2011. One deutonymph female from moss and soil, 39° 52' 48N, 39° 20' 25 E, 1980 m, Ahmediye, Erzincan, 03. VI. 2011.

Remarks. *Barbutia iranensis* was originally collected from soil by Reza Navae Bonab and previously was known only in Iran. (Bagheri, Navaei and Ueckermann, 2010). The Turkish specimens are collected from moss, near the brook and soil. The general feature of the Turkish specimen is similar to the type specimen. But the body sizes of Turkish specimens are larger (305/88) than those of the type specimen (290/90); ratio of setae are given Table 1.

Table 1. The ratios of setae of *Barbutia iranensis*.

	Iranian specimens	Turkish specimens
vi:*sci*	1.0	1.5
ve:*sce*	1.0	1.2
c_1:c_2	0.5	0.3
c_1:d_1:e_1:f_1	2:1.2:1:1	1.5:1.2:1:1
vi:*vi–vi*	0.5	0.5
ve:*vi–ve*	3.4	3.5
c_1:c_1–c_1	0.5	0.3
c1–c1:*d1–d1*: *e1–e1*:*f1–f1*	2.6:1.6:1:1	2.7:1.6:1:1

These differences to be minor and therefore consider the Iranian and Turkish specimens conspecific. *Barbutia iranensis* is a newly recorded species for the Turkish fauna.

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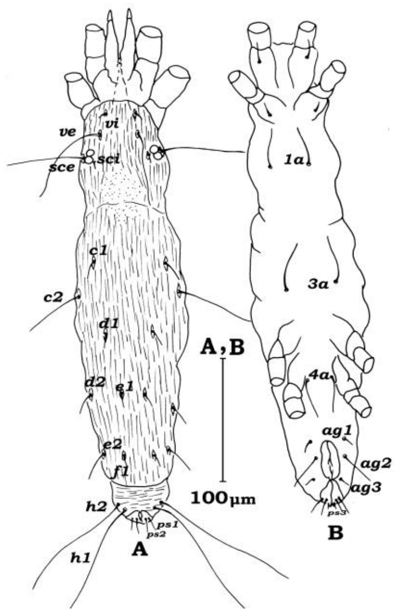
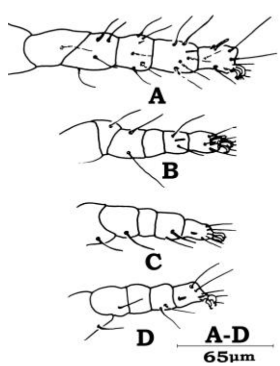


Figure 1. *Barbutia iranensis* (Deutonymph female): (A) Dorsal view, (B) Ventral view.



Figures 2. *Barbutia iranensis* (Deutonymph female): (A) Leg I, (B) leg II, (5C) leg III, (D) leg IV.

SCIENTIFIC NOTES

NEW RECORDS OF ACMAEODERINI FROM ELAZIĞ PROVINCE, TURKEY (BUPRESTIDAE: POLYCESTINAE)

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[Özgen, İ. & Volkovitsh, M. 2016. New records of Acmaeoderini from Elazığ province, Turkey (Buprestidae: Polycestinae). Munis Entomology & Zoology, 11 (2): 712-712**]**

Acmaeoderini Kerremans, 1892 is a tribe of beetles of the family Buprestidae belonging to the subfamily Polycestinae. So far, some faunistic records have been given by some authors from Turkey (Volkovitsh, 1986; Niehuis, 1989; Tezcan, 1995; Tozlu et al., 2000; Kısmalı et al., 1995; Korotyaev et al., 2016).

In this study, four species of Acmaeoderini (Coleoptera: Buprestidae: Polycestinae) from Harput (Elazığ province) in 2013-2014 were collected and identified. All species are firstly recorded for Elazığ fauna and widely distributed in E Mediterranean and SW Asia. The specimens were collected by sweeping net and kept on cotton layers. All specimens were identified by second author.

***Acmaeodera* (s.str.) *edmundi edmundi* Obenberger, 1935**

Distribution in Turkey: Adana, Bingöl, Isparta, Malatya, Mardin, Mersin, Tunceli (Volkovitsh, 1986; Niehuis, 1989). **Material examined:** Elazığ, Harput, Obuz, 13.VII.2013, leg. Özgen, 4 specimens.

***Acmaeodera* (s.str.) *brevipes brevipes* Kiesenwetter, 1858**

Distribution in Turkey: Adana, Adıyaman, Amasya, Antalya, Bingöl, Bursa, Gaziantep, Hatai, Manisa, Mersin, Muğla İzmir (Volkovitsh, 1986; Niehuis, 1989; Tezcan, 1995). **Material examined:** Elazığ, Harput, Obuz, 11.VIII.2014, leg. Özgen, 3 specimens.

***Acmaeoderella* (s.str.) *serricornis* (Abeille de Perrin, 1900)**

Distribution in Turkey: Ankara, Karaman, Malatya, Nevşehir, Şanlıurfa, Gaziantep (Volkovitsh, 1986; Niehuis, 1989; Tezcan, 1995; Korotyaev et al., 2016). **Material examined:** Elazığ, Harput, Obuz, 07.VII.2014, leg. Özgen, 2 specimens.

***Acmaeoderella (Liogastria) chrysanthemi* (Chevrolat, 1854)**

Distribution in Turkey: Adana, Ankara, Antalya, Denizli, Gaziantep, Hakkari, Hatay, Mersin İzmir, Kahramanmaraş, Konya, Kütahya, Muğla, Muş, Nevşehir, Şanlıurfa, Erzincan, Erzurum (Volkovitsh, 1986; Niehuis, 1989; Tezcan, 1995; Kısmalı et al., 1995; Tozlu, Özbek, 2000).**Material examined:** Elazığ, Harput, Obuz, 11.VII.2013, leg. Özgen, 2 specimens.

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