

THE GENUS *ADORETUS* DEJEAN, 1833 IN ISRAEL WITH DESCRIPTION OF *ADORETUS (ADORETUS) LUDMILAE* SP. NOV. AND NOTES ON RELATED WESTERN PALEARCTIC SPECIES (SCARABAEIDAE: RUTELINAE)

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ABSTRACT: The genus *Adoretus* Dejean, 1833 in Israel is revised, distribution and phenology are provided. *Adoretus ludmilae* previously confused with *Adoretus irakanus* Ohaus, 1928 is described from Israel and the latter is removed from the Israel Fauna. Related western palearctic *Adoretus* are discussed and paramera are illustrated.

KEY WORDS: Western Palearctic, Israel, *Adoretus*, systematics, taxonomy, morphology

According to Bodenheimer (1937) two species of the genus *Adoretus* Dejean, 1833 (for authorship see Krell, 2007 and Bousquet & Bouchard, 2013) were occurring in Israel: *Adoretus granulifrons* Fairmaire, 1882 and *Adoretus sterbae* Reitter, 1909. Chikatunov and Pavlicek in their checklist (1997) added *Adoretus irakanus* Ohaus, 1928 and they were followed by Král & Smetana (2006).

We could study 213 specimens of *Adoretus* collected in Israel, preserved in the SMTAU in other public or private collections. Three species were identified: *Adoretus sterbae* Reitter, 1909 and *Adoretus granulifrons* Fairmaire, 1882, the *Adoretus* specimens collected in Israel and identified as *irakanus* are in reality a new species here described as *Adoretus ludmilae* sp. nov.. *A. irakanus* is presently known now only from Iraq (Král & Smetana, 2006). The distribution and phenology of the *Adoretus* occurring in Israel is presented. Doing the comparative morphological analysis of the new species with the western Palearctic species of *Adoretus*, we realized that several drawing of paramera in the original descriptions are quite poor and in some cases mistakenly interpreted. Therefore in this paper we are providing photos in dorsal and lateral projection of the different species examined, excluding the species from Iraq and Iran that will be treated in another paper.

Some of the palearctic species included in the genus *Adoretus* have been grouped by Reitter (1903) and Ohaus (1934) in taxa of subgeneric rank: *Adoretus* s. str., *Lepadoretus* Reitter, 1903, *Chaetadoretus* Ohaus, 1914 and *Gemadoretus* Reitter, 1903. *Lepadoretus* is characterized only by the clothing consisting of scales instead of hairs or setae and *Chaetadoretus* by the occurrence of a few longer erect hairs placed singly amongst those on the elytra. The difference between hairs and scales in several species is quite indefinite, and the scattered erect setae make their appearance by such imperceptible degrees that they seem to us equally unsuited to provide a line of demarcation. For the present we leave the systematic situation as described but we think that at least *Adoretus* s. str. and *Lepadoretus* might be synonyms.

MATERIAL AND METHODS

This study was based on specimens preserved in SMTAU and in other public and private collections. Fresh material was also collected and examined by the authors, mainly in Tel-Aviv area (hand collecting from roses) and 'Arava Valley (using mercury and UV light traps).

External structures were observed under a Wild M5 stereoscopic microscope. Images of anatomical details/genitalia were taken with a Canon G12 digital camera and processed using licensed Adobe Photoshop CS6 software 13.0.1 x64. All measurements are in mm.

Abbreviations

CDKC = Collection Denis Keith, Chartres, France.

CGML = Collection Geoffrey Miessen, Liège, Belgium.

CGSP = Collection Guido Sabatinelli, Prévessin, France.

CORR = Collection Oz Rittner, Rishon LeZziyon, Israel.

MSNG = Museum d'Histoire Naturelle de Genève, Switzerland.

SMTAU = The Steinhardt museum of natural history, Zoological department, Tel-Aviv University, Israel.

THE *ADORETUS* SPECIES IN ISRAEL

***Adoretus (Adoretus) granulifrons* Fairmaire, 1882: 68**
graniceps Reitter, 1889: 268

Material Examined. Dead Sea Area: Ne`ot haKikkar, 15.v.1999, Yarom, I. & Kravchenko V., 1 specimen. **Central Negev:** Nahal Peres, 1.vi.1998, Freidberg, A., 6 exx. **'Arava Valley:** 'En Zin, 30°53.60N 35°09.17E, 9.ix.1990 6 specimens, 25.x.1998 1 specimen, 20.vi.1999 1 specimen, 11.vi.1999 2 specimens, 9.vii. 1999 6 specimens, 11.viii. 1999 2 specimens, 9.ix. 1999 6 specimens, 25.x.1999 2 specimens, 5.vi.2000 4 specimens, all collected by Yarom, I. & Kravchenko, V.; Nahal Gidron, 16.xi.1997, Maklakov, A., 1 specimen; Shezaf Nat. Res., 30°43N 35°16E, 18.v.1999 1 specimen, 10.x.1999 1 specimen, 2.vi.2000 2 specimens, all collected by Kravchenko, & V. Yarom, I.; 'Iddan, 4.vi.2000, Kravchenko, & V. Yarom, I., 4 specimens; Hazeva Field School, 30°46.70N 35°15.25E, 13.v.1999, Yarom, I. & Kravchenko, V. 1 specimen; Nahal Neqarot, 30°39.00N 35°10.45E, 15.viii.1999 2 specimens, 14.x.1999 1 specimen, all collected by Yarom, I. & Kravchenko, V.; Zuqim Reservoir, 30°39.20N 35°11.20E, 22.vi.1999, Yarom, I. & Kravchenko, V., 2 specimens; Gerofit, 5.ix.2002 41 specimens, 12.vi.2002 27 specimens, 15.xi.2002 6 specimens, all collected by Kravchenko, V. & Chikatunov, V.; Yotvata, 16.viii.1999, Yarom, I. & Kravchenko, V. 5 specimens. All specimens preserved in SMTAU.

Distribution. Described from Sudan (Loc. Typ. of *granulifrons*) and Egypt (Assuan, Loc. Typ. of *graniceps* Reitter). Indicated by Král & Smetana, 2006 from Israel, Jordan.

In Israel is present in the southern tip of the Dead Sea, Eastern part of the Central Negev area and along the 'Arava valley (red dots in fig. 41).

Phenology. Adults are active from May to October.

The paramera of this species are here illustrated for the first time with a photograph (fig. 26, length 1.43 mm) from a specimen from 'Arava Valley, 'En Zin.

***Adoretus (Adoretus) sterbae* Reitter, 1909: 82**

Material Examined. Upper Galilee: Huliot [Sede Neḥamyā], 8.viii.1943, leg. Bytinski-Salz, 1 specimen. **Jordan Valley:** Bet Alfa, 3.v.1946, leg. Bytinski-Salz, 3 specimens. **Judean Hills:** Yerushalayim, 20.i.1958, 1 specimen. All specimens preserved in SMTAU.

Distribution. Described from Turkey (Adana) and indicated by Král and Smetana (2006) also from Israel. In Israel we documented its presence in Upper Galilee, Jordan Valley and the Judean Hills (blue dots in fig. 41).

Phenology. The collecting data from the three specimens from Israel shows three very different periods of activity: January, May and August. It is possible that some records are not correct. In Turkey it was collected at in the 3rd decade of April.

The paramera of this species were illustrated for the first time in a drawing by Sabatinelli (1983) then by Baraud (1992), here reproduced (fig. 12) with an original photograph (fig. 11, length 1.7 mm) from a specimen from Jordan Valley, Bet Alfa.

***Adoretus (Adoretus) ludmilae* sp. nov. (Figs. 1-6)**

Typical Series. Holotype male: Israel, Tel Aviv, Park HaYarqon, 32°06'N 34°48'E, 5.VII.2010, leg. G. Sabatinelli, on roses at 21:00, deposited in SMTAU. **Allotype** female: same data as the holotype, deposited in SMTAU. **Paratypes:** **Israel, Mt. Hermon:** Har Ḥermon, 1800m., 12.vi.2003, Freidberg, A. 1 female in SMTAU. **Israel Upper Galilee:** Panyas [Banias], 30.vii.2002, Kravchenko, V. & Chikatunov, V. 1 female in SMTAU; Tel Dan, 15.vii.2002, Kravchenko, V. & Chikatunov, V. 1 female in SMTAU; Tel Dan, 20.viii.2002, Kravchenko, V. & Chikatunov, V., 1 male and 2 females in SMTAU. **Israel, Central Coastal Plain:** Herzliyya, 27.vi.2006, Freidberg, A., 17 males and 2 females in SMTAU; Herzliyya, 7.vii.2005, Freidberg, A., 1 male and 2 females in SMTAU; Tel Aviv, 6.vii.2005, Shlagman, A., 1 male in SMTAU; Tel Aviv, Park HaYarqon, 27.vi.2003, Shlagman, A., 30 males and 6 females in SMTAU; Tel Aviv, Park HaYarqon, 8.vii.2009, Rittner, O., 23 males and 17 female in SMTAU; Tel Aviv, 2.x.2002, light trap, Kravchenko, V. & Chikatunov, V., 2 males and 1 female in SMTAU; Tel Aviv, 24.vi.2003, light trap, Chikatunov, V. & Kravchenko, V., 2 males in SMTAU; Tel Aviv, Park, HaYarqon, 32°06'N 34°48'E, 5.VII.2010, leg. Sabatinelli, G. on roses at 21:00, 30 males and 30 females in CGSP, 1 male and 1 female deposited in MHNG, 10 males and 10 females in CORR. **Israel, Jordan Valley:** Hammat Gader, 15.vi.2002, light trap, Kravchenko, V., 1 male in SMTAU; Hammat Gader, 22.vii.2002, light trap, Kravchenko, V. & Chikatunov, V., 2 males in SMTAU; Hammat Gader, 23.viii.2002, Kravchenko, V. & Chikatunov, V., 1 female in SMTAU. **Jordan,** Al Jabiha, 7.v.92 [in Arabic], 1 male in CGSP.

Description.

Male. Holotype: length 12.4 mm; breadth: 5.5 mm. Habitus as in fig. 1.

Uniform red-brown-chocolate with the pronotum and head a little bit darker, evenly and closely clothed with minute decumbent grey setae. Elongate-oval and not very convex, finely punctured and not shining.

Clypeus semielliptical, transverse large 2.7 mm and width 1.2; covered with closely irregular punctures, points are mostly mixed together sometimes creating smooth horizontally layers. Each puncture bears a single short and adpressed bristle; anterior margin of reflexed; clypeal frontal suture well visible and bearing bristles.

Frons covered with closely irregular punctuation, each puncture bears a single short and adpressed bristle. The occipital area is smooth. Front of clypeus evenly broadly rounded.

Antennae lamellate. Funiculus comprises 6 segments and antennal club with 3 segments. Length of funiculus is equal to length of the club. Scape bears few erect long setae.

Canthus reach about one third of the eye and bears erect long setae.

Labrum T shaped with median process reaching between the mandibles, truncate at the end and finely serrated at the sides (fig. 6); dark colored and covered with fine punctures.

Pronotum transverse: breadth 4.6 mm, length 2.4 mm; pronotal angles visible the basal obtuse and anterior acute; with "m" shaped punctures, each one bearing a single short and adpressed bristles; pronotal margin with horizontally adpressed short bristles at its base.

Scutellum triangularly shaped with the same punctuation and bristles as the pronotum; dark colored with the center a bit brighter.

Elytra elongate, very convex and sub-parallel with the maximal breadth (5.5 mm) towards the distal part; covered with short adpressed bristles, irregular punctures and with three visible striae, each one defined by two rows of punctures.

The pygidium is clothed with erect hairs, which are short at the base and become gradually longer towards the most prominent part.

The front tibia is armed with three external teeth, with the basal teeth separated from both apical tooth and located in center of the tibia; terminal spur at the inner margin located almost in opposite to the outer median tooth; base of the tarsi located on the ventral side of the tibia, opposite to the outer median tooth. Outer edges of tibia dark colored and flattened. Tibia covered with small and shallow punctures and short bristles. The claws are very unequal, the inner front and outer middle and hind ones very long, and the first and second cleft at the tip (figs. 4 and 5).

Paramera (fig. 2, length 1.86 mm) close to those of *A. pullus* Baudi, 1870 and *A. sterbae* 1909 with who it was confused until today.

Paratypes: same characters as the holotype, length: 11-12.3 mm, max breadth: 5.5-6 mm.

Sexual dimorphism is mainly visible in the abdomen which is more is convex in the female, and straight or slightly concave in the male; the last ventral segment is large and more or less triangular in the former, and short and transverse in the latter; and the pygidium is short and oblique in the female, and larger and much more convex in the male; the club of the antenna is a little bit longer in males; the longer front and middle claws are cleft in both sexes but the two divisions are approximately equal in the female (fig. 3) and very unequal in the male (fig. 5), the cleft being at a distance from the end and sometimes almost obliterated (fig. 4).

In the male the cleft is very minute, at a little distance from the apex, and sometimes not very easily seen.

Derivatio Nominis. The species is dedicated to Ludmila Leibiusky-Rittner who kindly accompanied us several times to collect insects.

Distribution. In Israel: Mt. Hermon, North East part of Upper Galilee, Northern tip of Jordan valley and Central Coastal Plain; and Amman (Jordan) (yellow spot in fig. 41). These collection sites are very diverse in terms of climate, vegetation and height. Furthermore there is a large empty gap between these areas and it is more than possible that *A. ludmilae* will be found in the future elsewhere in Israel and its neighboring countries.

Phenology. Adults are active from mid-June to October with the peak in June-July. In Tel-Aviv adults were seen in vast numbers in a small rose garden (figs. 42-43). Activity starts in July at about 20:30, only when total darkness arrives. Outside the rose garden adults are hardly seen coming to light. In the Zoological garden of Tel-Aviv University only 2 specimens were collected near lights during a period of three years, a distance of only 1 km. from the rose garden.

NOTES ON WESTERN PALEARCTIC *ADORETUS* DEJEAN, 1833

Before deciding that *Adoretus ludmilae* was a new species we had to exclude conspecificity with all western palearctic species. In doing this exercise we realized that the aedeagus and in particular the paramera (parameral lamina) was not yet figured in any publication and in some case the original drawing in the description differed from the shape resulting from a photograph of the typus or conspecific specimens. We thought that this paper was a good opportunity to provide our observation on the matter. However the *Adoretus* of Persia-Iran will be discussed subsequently in a specific paper.

Adoretus (Adoretus) aegrotus Burmeister, 1844: 470 *millingeni* Pic, 1905: 153 (Loc. Typ.: Arabia)

Described from Nubia (Egypt-North Sudan) and reported from Algeria by Pic (as *millingeni*) and by Baraud (1885). Indicated also by Král & Smetana (2006) from Sinai ("Arabien"). We know this species, or a very closely related one, also from Arabian Peninsula.

The paramera were presented for the first time in a drawing by Baraud (1985) and here reproduced (fig. 39).

Adoretus (Adoretus) afghanus Machatschke, 1958: 178

This species was described from Afghanistan, Kabul. Machatschke compared Kabul populations of *simplex*-group with the other species from the Indian subcontinent. While at the time of the description the differences between *afghanus* and other *simplex* species-group were quite striking, the intense sampling of North Pakistan conducted by one of the authors (GS) in the recent year are weakening those differences.

The shape of paramera provided in a drawing by Machatschke and here reproduced (fig. 38) differs from those (fig. 37, length 1.86 mm) of a series of specimens from Afghanistan, North Kabul, Djebel os-Siradj (ex coll. Petrovitz,

MHNG). The value of this species needs to be reconsidered using the typical series.

***Adoretus (Adoretus) discolor* (Falderman, 1835: 276 – *Trigonostoma*)**

Described from “Persico-Armeniaca” and reported by Král & Smetana (2006) from Azerbaijan, Armenia, Georgia, and South West Russia.

The paramera of this species were presented for the first time in a drawing by Baraud (1992), here reproduced (fig. 8) and with an original photograph (fig. 7, length 2.3 mm) from a specimen from Iran, West Azerbaijan, Maku (CGSP).

***Adoretus (Adoretus) gandolphei* Guérin-Ménéville, 1859: 185**

fuscitarsis Reitter, 1903: 32 (Loc. Typ.: Algeria, Oued Deur Leur)

infissidens Pic, 1922: 17

Described from North Algeria (Chlef, formerly Orleansville) and indicated by Baraud (1885) from Morocco, Algeria and Tunisia.

The paramera of this species were presented for the first time in a drawing by Baraud (1985) here reproduced (fig. 30) and with an original photograph (fig. 29, length 1.9 mm) from a specimen from Morocco, Moyen Atlas, Qued Sebou (CGSP).

***Adoretus (Adoretus) garamas* Peyerimhoff, 1921: 235**

Described from South Algeria (Hoggar), reported by Baraud (1985) from Libya, Sahrawi, Chad and Mauritania and by Král & Smetana (2006) from Egypt.

The paramera of this species are known only from the drawing of Baraud (1985) here reproduced (fig. 33).

***Adoretus (Adoretus) geyri* Ohaus, 1917: 5**

surcoufi Peyerimhoff, 1921: 234 (Loc. Typ.: Algeria, Ghardaïa Province. El Ménia District, El Golea oasis).

Described from South East Algeria (Tig'amaiin en tisita and Tihiaout) and reported by Baraud (1985) from Morocco, Sahrawi, Algeria, by Král & Smetana (2006).

The paramera of this species were presented for the first time in a drawing by Baraud (1985) here reproduced (fig. 25) with an original photograph (fig. 24) from a specimen from Morocco, Zaoula-el-Barhnia (in CGML). The close similitude with the paramera of *A. granulifrons* Fairmaire, 1882 is striking and need to be further investigated.

***Adoretus (Adoretus) hybogeneius* Ohaus, 1930: 153**

Described from Sudan (Loc. Typ.: Shendi 150 km northeast of Khartoum on the Nile) and reported by Baraud (1985) from Morocco, Algeria and Mauritania.

The paramera of this species were figured in the original description and here reproduced (fig. 35), then by Baraud (1985) here reproduced (fig. 36) with an original photograph (fig. 34, length 2.3 mm) from a specimen from Oman Muscat (CGSP). All these images reproduce a very particular shape of paramera in the genus *Adoretus*, longitudinally fissured at the apex and densely coated with short hairs in the basal lower surface. We found that this morphology is common

to a group of *Adoretus* described with different names: *punjabensis* Arrow, 1917, *machatschkei* Petrovitz, 1965, *imitator* Benderitter, 1927, *vastus* Petrovitz, 1958, and that could represent a unique species largely distributed across Africa to India through Arabian Peninsula.

***Adoretus (Adoretus) irakanus* Ohaus, 1928: 401**

Described from Iraq (Rustam). It was reported by Chikatunov and Pavlicek (1997), followed by Král & Smetana (2006), from Israel but all the specimens from Israel previously identified as *A. irakanus* are now referred to *A. ludmilae* n.sp. and *A. irakanus* is presently known from Iraq and Iran (CGML).

The paramera of this species were figured in the original description and here reproduced (fig. 19) with an original photograph (fig. 18, length 2.52 mm) from a specimens from Irak, Al Hadr , Rawah (CDKC).

***Adoretus (Adoretus) nigrifrons* (Steven, 1809: 41 – *Melolontha pallidulus* Motschulsky, 1860: 522**

Described from Caucasus-South Russia and reported by Král & Smetana (2006) from Azerbaijan, Georgia, SW Russia, Afghanistan, Iran, Kirghizstan, Kazakhstan, Tajikistan, Uzbekistan, Xizang.

This species is the type species of the genus *Adoretus*, it is widely distributed and quite stable in its interpretation by the different authors.

The paramera of this species were presented for the first time in a drawing by Petrovitz (1958) here reproduced (fig. 23), then by Baraud (1992) and by Kalashyan (2002). Here we present an original photograph (fig. 22, length 1.85 mm) from a specimen from Afghanistan, Herat (CGSP).

***Adoretus (Adoretus) persicus* Reitter, 1889: 268**

This species was described from “Nordpersien” and it is one of the oldest species of the genus. However the interpretation of this taxon is not stable. We are reproducing here the drawing of the paramera provided by Baraud (fig. 21) in its description of *A. petrovitzi* (1975) and those (fig. 20, length 2.57 mm) from a series of specimens from Iran identified by Petrovitz (MHNG). Their shape appear quite different: while *A. persicus* sensu Petrovitz is close to *A. irakanus* Ohaus, 1928, *A. persicus* sensu Baraud is close to *A. iranicus* Petrovitz 1958. We believe that the interpretation of Petrovitz is more close to the reality but the study of the typical series is necessary to solve this ambiguity.

***Adoretus (Adoretus) peyerimhoffi* Baraud, 1979: 222**

Described from Morocco (Erfoud, Oued Khrouf) and reported (Baraud, 1985) also from Sahrawi.

The shape of paramera of this species is known only from the drawing provided by Baraud here reproduced (fig. 28). The species is very close to *A. gandolphei* Guérin-Ménéville from which can be distinguished from different shape of apical part of the labrum and from the punctuation of the clypeus and pronotum. The dorsal basal margin of paramera seems also different but we could not confirm it.

***Adoretus (Adoretus) pruinus* Ballion, 1870: 345**

Described from Uzbekistan (Chodshent, Samarkand district) and reported by Král & Smetana (2006) also from Afghanistan, Kirghizstan, Kazakhstan, Tajikistan, and Turkmenistan.

The paramera of this species were presented for the first time in a drawing by Ohaus (1930), here reproduced (fig. 14) with an original photograph (fig. 13) from a specimen from Afghanistan (MHNG).

***Adoretus (Adoretus) pullus* Baudi, 1870: 76**

Described from Cyprus and known only from there.

Paramera were illustrated first time in a drawing by Sabatinelli (1983) then by Baraud (1992) here reproduced (fig. 10) with an original photograph (fig. 9, length 1.85 mm) from a specimen from Ypsonas, Lemesos (CGML).

***Adoretus (Adoretus) quadridens* Marseul, 1878: 71**

Described from Egypt and known only from there. Baraud indicated (1985) that the type of this species disappeared and we could not trace any specimen with this particular shape of clypeus that could be attributed to this species. Although from Egypt, from the original description we believe that this species is not related to *A. ludmilae* n. sp.

***Adoretus (Adoretus) rufifrons* Reitter, 1903**

Described from China, Western Xinjiang (Maralbaschi, Kaschgar-Darja).

We could study only a single male specimen (Xinjiang, Dsungarei, Karlyk-Tag, ex coll. Petrovitz, MHNG) of this species for which we are providing for the first time the photograph of the paramera (fig. 15, length 1.34 mm). The shape of paramera is close to *A. pruinus* Ballion, 1870 but the size of the body is much smaller and integuments light coloured.

***Adoretus (Adoretus) rubenyani* Kalashyan, 2002: 76**

Described from Armenia (Etshmiadzin env., Arax vill.) and known only from there.

The paramera were figured in a drawing in the original description, here reproduced (fig. 17) with the original photograph (fig. 16). The species seems close to *A. irakanus* and *nigrifrons* with who was compared in the description.

***Adoretus (Adoretus) senescens* Walker, 1871: 12**

Described from High Egypt, known only from there and unknown by Baraud (1985). We could not trace any specimen that could be attributed to this species. Although from Egypt, from the original description we believe that this species is not related to *A. ludmilae* n. sp.

***Adoretus (Gemadoretus) clypeatus* Burmeister, 1844: 471
signatus Reitter, 1889: 268 (Loc. Typ.: Egypt, Aswan)**

Described from Kordofan (Sudan) and from Egypt (Baraud, 1985).

The paramera of this species are here figured for the first time (fig. 27, length 1.5 mm) from an historical specimen "Aegypt" (CGSP).

***Clypadoretus epistomalis* (Chobaut, 1899: 38 – *Adoretus*)**

Described from Algeria, Touggourt and know also from Algeria, Ahenet and Hoggar and Morocco in the Sahara reaching in the North Tafilalet, Erfoud (Baraud, 19885).

The paramera were figured for the first time in a drawing by Baraud and here reproduced (fig. 40).

***Pseudadoretus koechlini* (Marseul, 1867: 1xxx – *Adoretus*)
evanescens (Marseul, 1878: 72 – *Adoretus*)**

The type female described from Algeria, Biskra and the male redescribed as *evanescens* by the same Author from Algeria, Laghouat.

The species is known from several localities of Algeria but also from Morocco, Sahara reaching in the North Tafilalet and Mauritania (Baraud, 1985).

The paramera of this species were illustrated first time in a drawing by Baraud (1985) here reproduced in (fig. 32) with an original photograph (fig. 31) from a specimen from Morocco, Errachida (CGSP). It is evident that the drawing provided by Baraud is quite different from the specimen from Errachida here shown and the matter need further investigation.

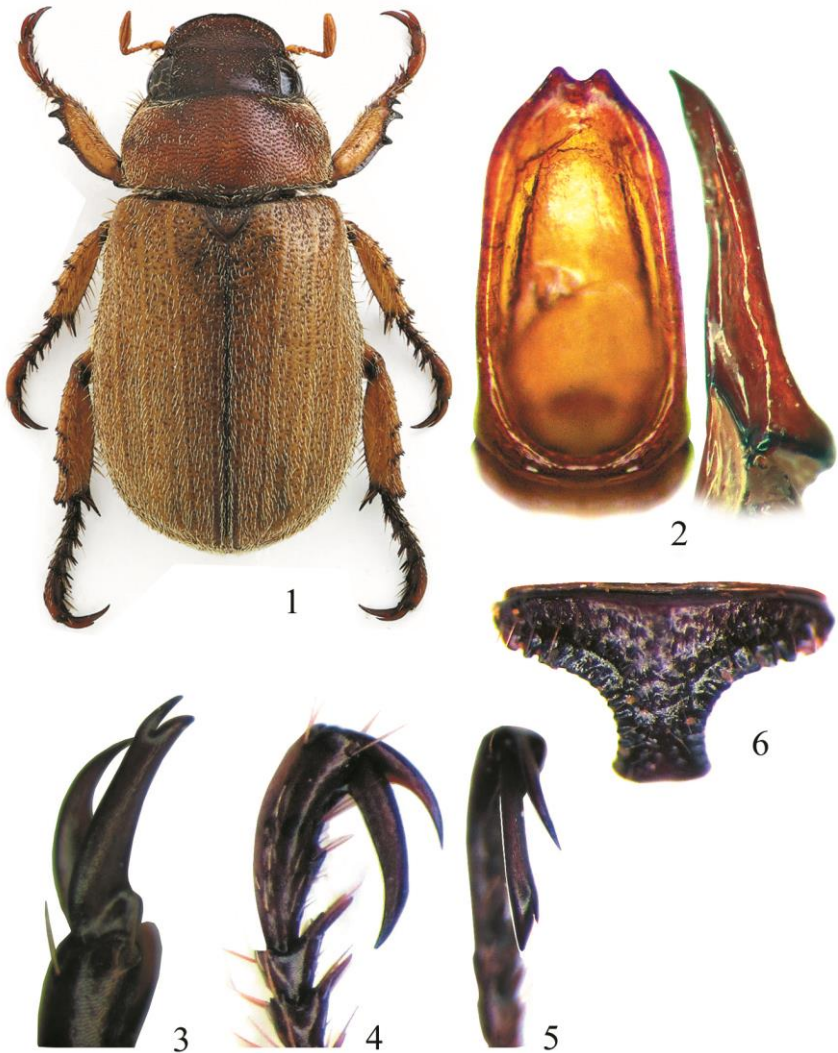
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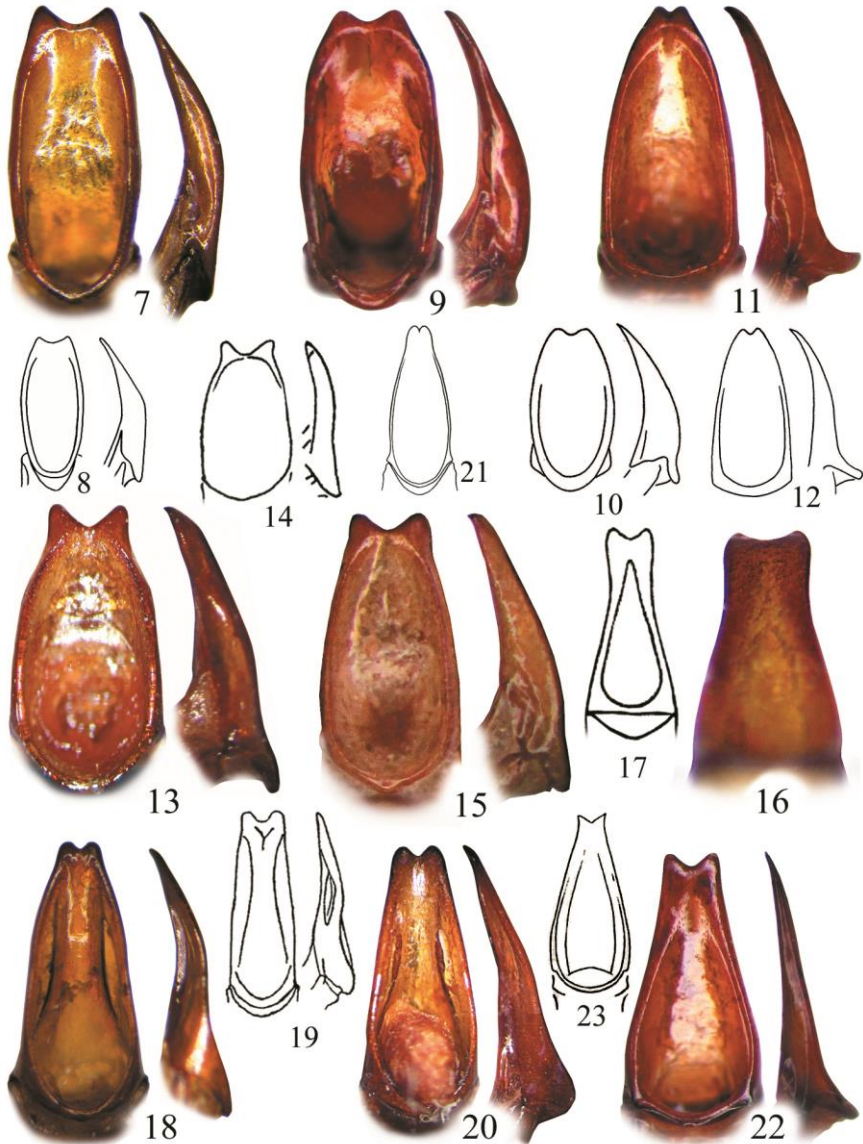
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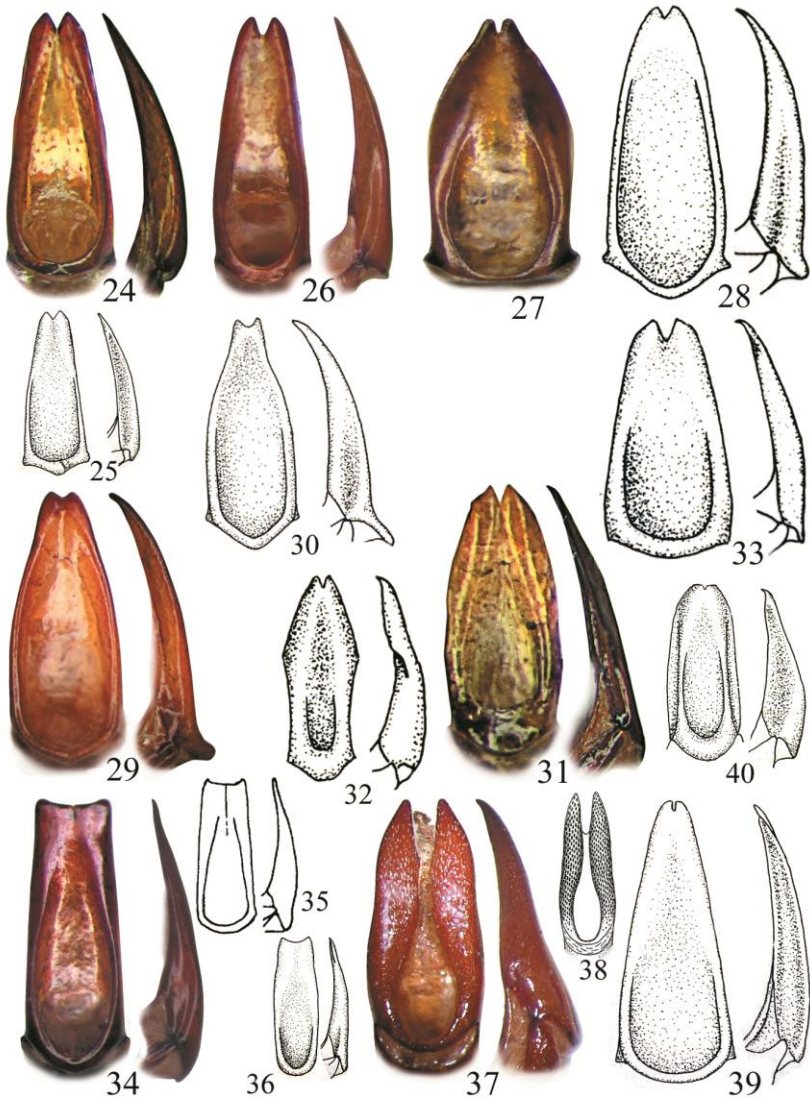
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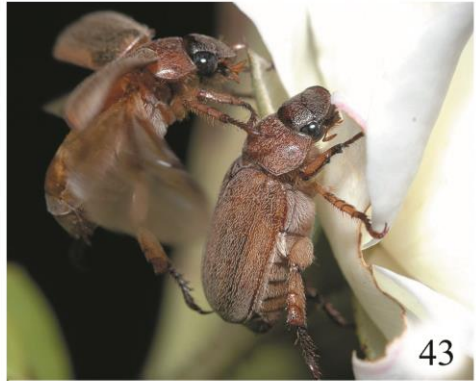
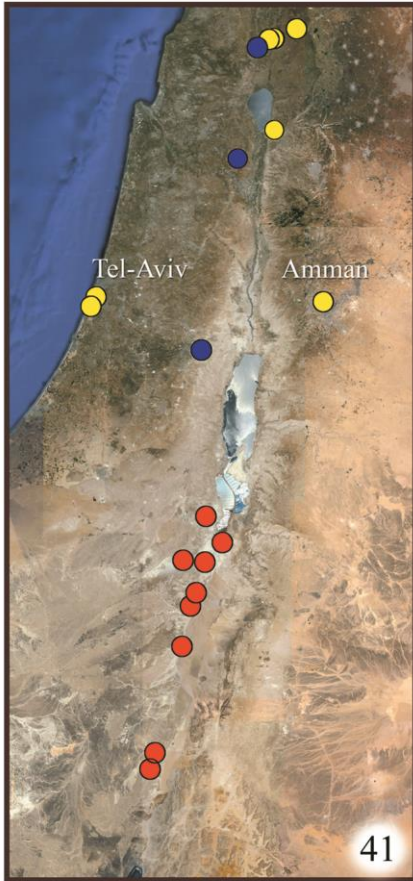
Figures 1- 5. *Adoretus (Adoretus) ludmilae* n. sp. 1: holotype male; 2: paramera in dorsal and lateral view; 3: front claws in female lateral view; 4: front claws in male lateral view; 5: front claws in male frontal view; 6: labrum.



Figures 7-23. Paramera of *Adoretus* (*Adoretus*) *discolor* (Falderman, 1835), 7: specimen from Iran; 8: according to Baraud (1992). *A. pullus* Baudi 1870, 9: specimen from Cyprus, Ipsonas; 10: according to Baraud (1992). *A. sterbae* Reitter, 1909, 11: specimen from Jordan; 12: according to Baraud (1992). *A. pruinosis* Ballion, 1870, 13: specimen from Afghanistan; 14 according to Ohaus (1930). *A. rufifrons* Reitter, 1903, 15: specimen from Xinjiang. *A. rubenyani* Kalashyan, 2002, 16: paratype; 17: according to Kalashyan (2002). *A. irakanus* Ohaus, 1928, 18: specimen from Irak; 19: according to Ohaus (1928). *A. persicus* Reitter, 1889, 20; specimen from Iran; 21: according to Baraud (1975). *A. nigrifrons* (Steven, 1809), 22: specimen from Afghanistan; 23: according to Petrovitz (1958).



Figures 24-40. Paramera of *Adoretus* (*Adoretus*) *geyri* Ohaus, 1917, 24: specimen from Morocco; 25: according to Baraud (1985). *A. granulifrons* Fairmaire, 1882, 26: specimen from Israel, 'Arava Valley. *A. (Gemadoretus) clypeatus* Burmeister, 1844, 27: specimen from "Aegypt". *A. (Adoretus) peyerimhoffi* Baraud, 1979, 27: according to Baraud (1985). *A. gandolfei* Guérin-Ménéville, 1859, 29: specimen from Morocco, Qued Sebou; 30: according to Baraud (1985). *Pseudadoretus koechlini* (Marseuil, 1867), 31: specimen from Morocco, Errachida; 32: according to Baraud (1985). *A. (Adoretus) garamas* Peyerimhoff, 1921, 33: according to Baraud (1985). *A. hybogeneus* Ohaus, 1930, 34: specimen from Oman; 35: according to Ohaus (1930); 36: according to Baraud (1985). *A. afghanus* Machatschke, 1958, 37: specimen from North Kabul; 38: according to Machatschke (1958). *A. aegrotus* Burmeister, 1844, 39: according to Baraud (1985). *Clypadoretus epistomalis* (Chobaut, 1899), 40: according to Baraud (1985).



Figures 41-45. 41: red dots: *A. granulifrons*; yellow dots: *A. ludmilae*; blue dots: *A. sterbae*. 42-45: *Adoretus (Adoretus) ludmilae* n. sp. in nature (Tel Aviv, Park HaYarqon).