



<http://dx.doi.org/10.11646/zootaxa.4012.1.4>

<http://zoobank.org/urn:lsid:zoobank.org:pub:C3B3A06D-C18C-4B66-83E9-51B605E11862>

Taxonomic review of *Drilus* Olivier, 1790 (Elateridae: Agrypninae: Drilini) from Asia Minor, with descriptions of seven new species and comments on the female antennal morphology in Drilini

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Abstract

The neotenic elaterid genus *Drilus* Olivier, 1790 in Asia Minor is reviewed. Twelve species are recognized, of which seven are described as new: *Drilus badius* sp. nov., *D. huijbregtsi* sp. nov., *D. mertliki* sp. nov., *D. robustus* sp. nov., *D. sanliurfensis* sp. nov., *D. teunissenii* sp. nov., and *D. turcicus* sp. nov. All known species are listed with diagnoses, data on variability and distribution. A key to the males of *Drilus* species in Asia Minor is provided and information on prey of known larvae is summarized. Antennal morphology of Drilini females is briefly discussed.

Key words: antenna, Turkey, Elateroidea, larva, neoteny, taxonomy, snails

Introduction

The genus *Drilus* Olivier, 1790 belongs to the soft-bodied elaterid tribe Drilini (Kundrata & Bocak 2011, Kundrata *et al.* 2014a). Fully winged males are characterized by the serrate to pectinate antennae, convex lateral pronotal margins, almost complete sharp edges at lateral prothoracic margins, and the deeply emarginate or v-shaped frontal margin of mesoventrite (Kundrata & Bocak 2007, Kundrata *et al.* 2014b). The neotenic females undergo incomplete metamorphosis and remain larviform and wingless as mature adults (Bocak *et al.* 2010). Most of the 35 *Drilus* species occur in the Mediterranean (Wittmer 1944, Bocak 2007), but information on real diversity, intraspecific variability and species distributional ranges is very limited. The alpha-taxonomy of this genus was studied for the Iberian Peninsula and Balearic Islands (Bahillo de la Puebla & López Colón 2005), mainland Levant (Kundrata *et al.* 2014b) and Crete (Kundrata *et al.* 2015). These studies showed that *Drilus* is more speciose than previously believed and thus, many new species are expected to be found in underinvestigated regions such as Asia Minor. Only five species of *Drilus* are known from that region, all of them described between the years 1867 and 1902 (Wittmer 1944). Since then, nobody has paid attention to the *Drilus* fauna of that area. Therefore, herein we provide a taxonomic review of this genus in Asia Minor.

Material and methods

This study is based primarily on the examination of adult male morphology but where possible, we also studied female and larval characters. Genitalia were dissected after a short treatment in hot 10% aqueous solution of potassium hydroxide. The membranous parts of the female genitalia were dyed with chlorazol black. Important diagnostic characters were photographed using a digital camera attached to a stereoscopic microscope. The line illustration of the female genitalia was derived from the photograph. The following measurements were taken with an ocular scale bar on a microscope: BL—body length, measured from the fore margin of head to the apex of elytra (in males) or body (females, larvae); BW—body width, measured at the widest part of the body; EL—elytral length;

WHe—width of head including eyes; WHum—width at humeri; PL—pronotal length at midline; PW—pronotal width at the widest part; Edist—minimum interocular distance at the frontal part of cranium; Ediam—maximum eye diameter in the lateral view. Exact label data are cited for the examined material. The morphological terminology follows Bocak *et al.* (2010).

Depositories

HNHM	Hungarian Natural History Museum, Budapest, Hungary
LMBC	Department of Zoology, Palacky University, Olomouc, Czech Republic
MHNP	Muséum national d'histoire naturelle, Paris, France
NMPC	Národní muzeum, Prague, Czech Republic
PCAT	collection of A. P. J. A. (Dré) Teunissen, Eindhoven, Netherlands
PCJB	collection of J. Bednář, Kralupy nad Vltavou, Czech Republic
PCJJ	collection of J. Januš, Kladno, Czech Republic
PCJR	collection of J. Brádka, Kralupy nad Vltavou, Czech Republic
PCJV	collection of J. Vávra, Ostrava, Czech Republic
PCRS	collection of R. Schuh, Wiener Neustadt, Austria
PCRK	collection of R. Kunderata, Olomouc, Czech Republic
RMNH	Naturalis Biodiversity Center, Leiden, Netherlands

Taxonomy

Drilus Olivier, 1790

Drilus Olivier, 1790: 1.

Type species. *Drilus flavescens* Olivier, 1790: 1.

= *Cochleoctonus* Mielzinsky, 1824: 74.

Type species. *Cochleoctonus vorax* Mielzinsky, 1824: 74.

Drilus akbesianus (Fairmaire, 1895)

(Fig. 1)

Malacogaster akbesiana Fairmaire, 1895: cx.

Malacogaster akbesianus: Olivier 1910: 4, Wittmer 1944: 204, Bocak 2007: 210.

Drilus akbesianus (Fairmaire, 1895): Kunderata, Kobielszova & Bocak 2014: 461.

Type material. Holotype, male, "Syrie, Akbes, C.D. 1891, Bul. 95 cx" (MNHP).

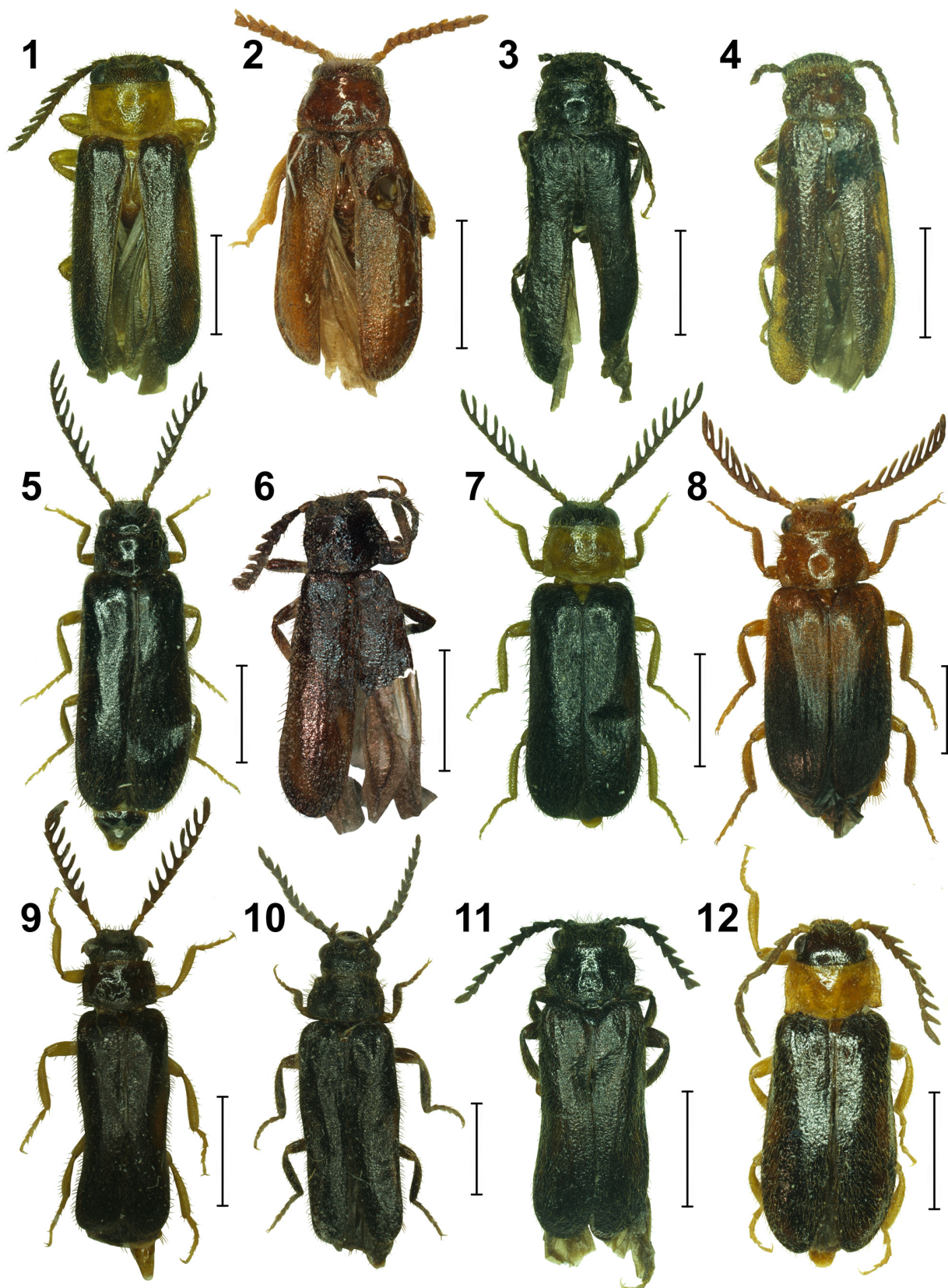
Type locality. Turkey, "Akbes" [= Hatay].

Other material examined. Male, "Akbes, Museum Paris, Collection Léon Fairmaire, 1906, *Malacogast. akbesianus* Fairm." (MHNP); male, "Syrie, Akbes, C.D. 1895, Museum Paris, Coll. L. Bedel 1922, *Drilus akbesianus* Fairm. (*Malacog.*)" (MHNP).

Diagnosis. *Drilus akbesianus* shares the yellowish to reddish brown pronotum and dark elytra, head and antennae with *D. rectus* Schaufuss, 1867 (Turkey, Levant), *D. nemethi* Kunderata, Kobielszova & Bocak, 2014b (Syria) and *D. iranicus* Wittmer, 1967 (Iran) (Figs 1, 7, 12). *Drilus akbesianus* differs from *D. rectus* in the relatively larger eyes, from *D. nemethi* in the robust antennae, more transverse pronotum, and relatively longer paramera, and from *D. iranicus* in yellowish to reddish brown abdomen and shallower transverse groove near frontal prosternal margin.

Remarks. This species was recently redescribed and figured by Kunderata *et al.* (2014b), so we are not repeating the description here. Female and immature stages are unknown.

Distribution. Southern Turkey (Hatay Province; Fig. 55).



FIGURES 1–12. Habitus images of *Drilus* species. 1, *Drilus akbesianus* (Fairmaire, 1895); 2, *D. badius* **sp. nov.**; 3, *D. huijbregtsi* **sp. nov.**; 4, *D. latithorax* Pic, 1902; 5, *D. mertliki* **sp. nov.**; 6, *D. obscuricornis* Pic, 1899; 7, *D. rectus* Schauffuss, 1867; 8, *D. robustus* **sp. nov.**; 9, *D. sanliurfensis* **sp. nov.**; 10, *D. teunissen* **sp. nov.**; 11, *D. turcicus* **sp. nov.**; 12, *D. iranicus* Wittmer, 1967. Scale bars = 2.0 mm.



FIGURES 13–21. Pronota of *Drilus* species. 13, *Drilus badius* sp. nov.; 14, *D. huijbregtsi* sp. nov.; 15, *D. latithorax* Pic, 1902; 16, *D. mertliki* sp. nov.; 17, *D. obscuricornis* Pic, 1899; 18, *D. robustus* sp. nov.; 19, *D. sanliurfensis* sp. nov.; 20, *D. teunisseni* sp. nov.; 21, *D. turcicus* sp. nov. Scale bars = 0.5 mm.

***Drilus badius* sp. nov.**

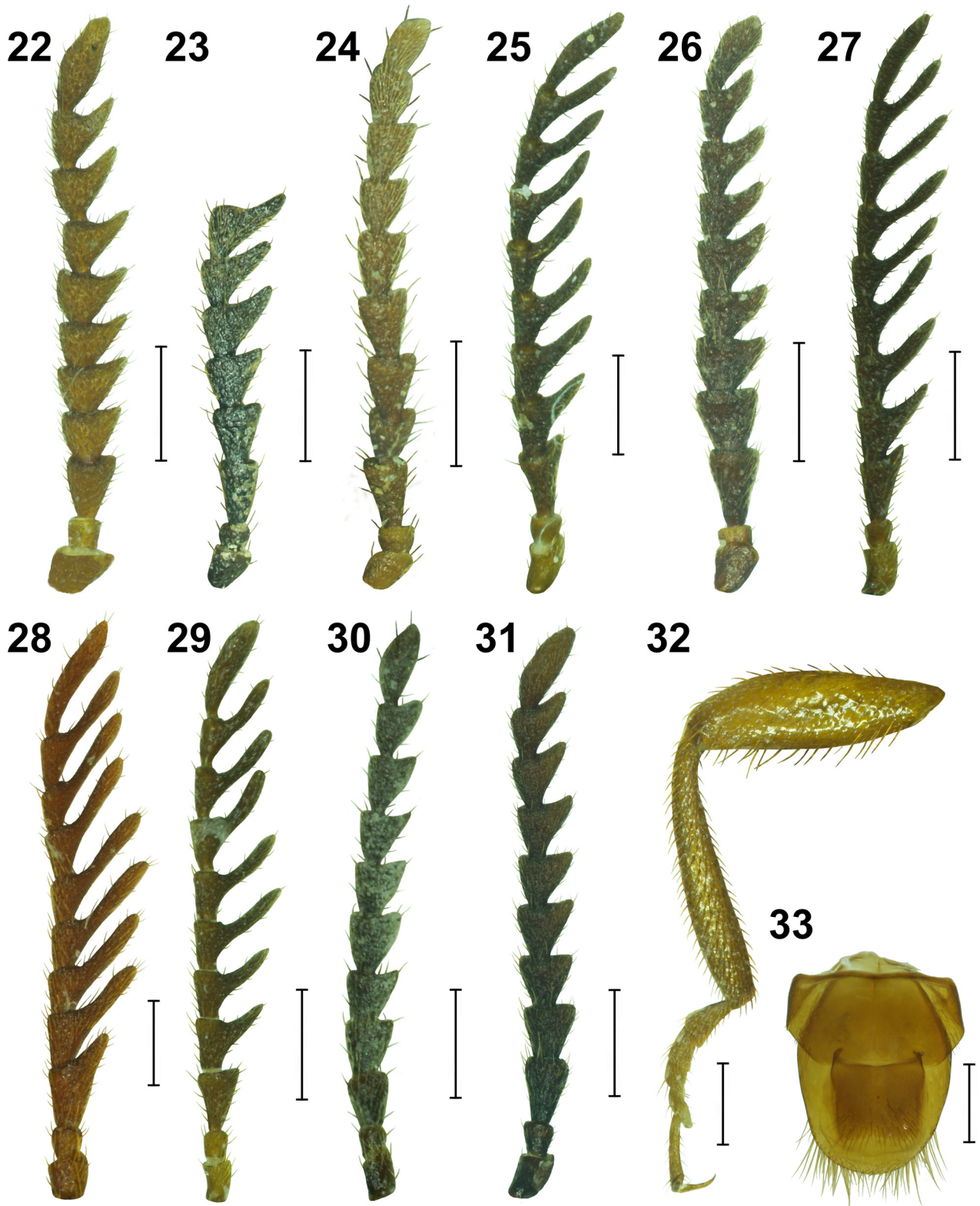
(Figs 2, 13, 22, 34)

Type material. Holotype, male, "Turcia, coll. E. Friv., Friv., 3945, *Drylus fulvicollis* Kiesw., coll. E. Frivaldszky" (HNHM).

Type locality. Turkey (with no additional data).

Diagnosis. *Drilus badius* sp. nov. is similar to *D. obscuricornis* Pic, 1899, but differs in the lighter body coloration and larger, more distinct pronotal punctation (Figs 2, 6).

Description. Male (holotype). Body 3.0 times longer than width at humeri, reddish brown, scape, pedicel, tibiae and tarsi yellowish, antennomeres 3–11 light brown; body covered with yellowish pubescence (Fig. 2). Head including eyes about as wide as anterior margin of pronotum (Fig. 13), dorsally with small shallow depression, rather smooth, sparsely and finely punctured, with sparse semierect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 2.0 times eye diameter. Mandibles curved, incisor margin with short



FIGURES 22–33. Antennae of *Drilus* species. 22, *Drilus badius* sp. nov.; 23, *D. huijbregtsi* sp. nov.; 24, *D. latithorax* Pic, 1902; 25, *D. mertliki* sp. nov.; 26, *D. obscuricornis* Pic, 1899; 27, *D. rectus* Schaufuss, 1867; 28, *D. robustus* sp. nov.; 29, *D. saniurfensis* sp. nov.; 30, *D. teunissenii* sp. nov.; 31, *D. turcicus* sp. nov. *Drilus robustus* sp. nov., male. 32, leg; 33, last abdominal segments. Scale bars = 0.5 mm.

conspicuous tooth in middle part. Labrum transverse; maxillary palpi slender, apical palpomere obliquely cut. Antennae pectinate, reaching one third of elytral length; antennomere 3 long, serrate, antennomeres 4–10 pectinate, apical antennomere simple, longest (Fig. 22). Pronotum slightly convex, transverse, widest at middle, 1.7 times wider than length at midline. Anterior margin widely emarginated medially, lateral margins convex, widened; posterior margin convex, bisinuate. Anterior angles inconspicuous, posterior angles distinct, obtuse (Fig. 13); surface of disc rather smooth, sparsely covered with fine punctures, with sparse pubescence, mainly at angles. Scutellum gradually narrowed, rather smooth; apex rounded. Prosternum transverse, with transverse widely v-shaped wrinkles, with distinct transverse groove near frontal margin; frontal margin almost straight; posterior margin widely convex, steeply declivitous, prosternal process inconspicuous. Mesoventrite v-shaped, depressed anteromedially. Elytra subparallel-sided, covered with semierect pubescence, sparser basally, denser apically. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, longer than combined lengths of tarsomeres 3 and 4. Aedeagus with stout, considerably curved phallus; paramera long, slightly membranous apically; phallobase u-shaped (Fig. 34). Female and immature stages unknown.

Measurements. BL 5.2 mm, EL 4.0 mm, WHe 1.2 mm, WHum 1.9 mm, PL 0.9 mm, PW 1.6 mm, Edist 0.8 mm, Ediam 0.4 mm.

Distribution. Turkey (no additional data known).

Etymology. The specific epithet *badius* is the Latin adjective referring to the general body coloration.

***Drilus frontalis* Schaufuss, 1867**

Drilus frontalis Schaufuss, 1867: 84.

Type material. Not available.

Type locality. Turkey, Mersin.

Diagnosis and remarks. According to the original description (Schaufuss 1867), *Drilus frontalis* is very similar to *D. rectus*. Kundrata *et al.* (2014b) argued that the morphological characters used for separation of those species (e.g. body size, pronotum shape and emargination of the penultimate ventrite) are variable even within *D. rectus* populations. Both types are probably lost and we failed to find specimens of either species from Mersin (the type locality of *D. frontalis*), so we retain the species status of *D. frontalis* until more material is available. Female and immature stages are unknown.

Distribution. Southern Turkey (Mersin Province; Fig. 55).

***Drilus huijbregtsi* sp. nov.**

(Figs 3, 14, 23, 35)

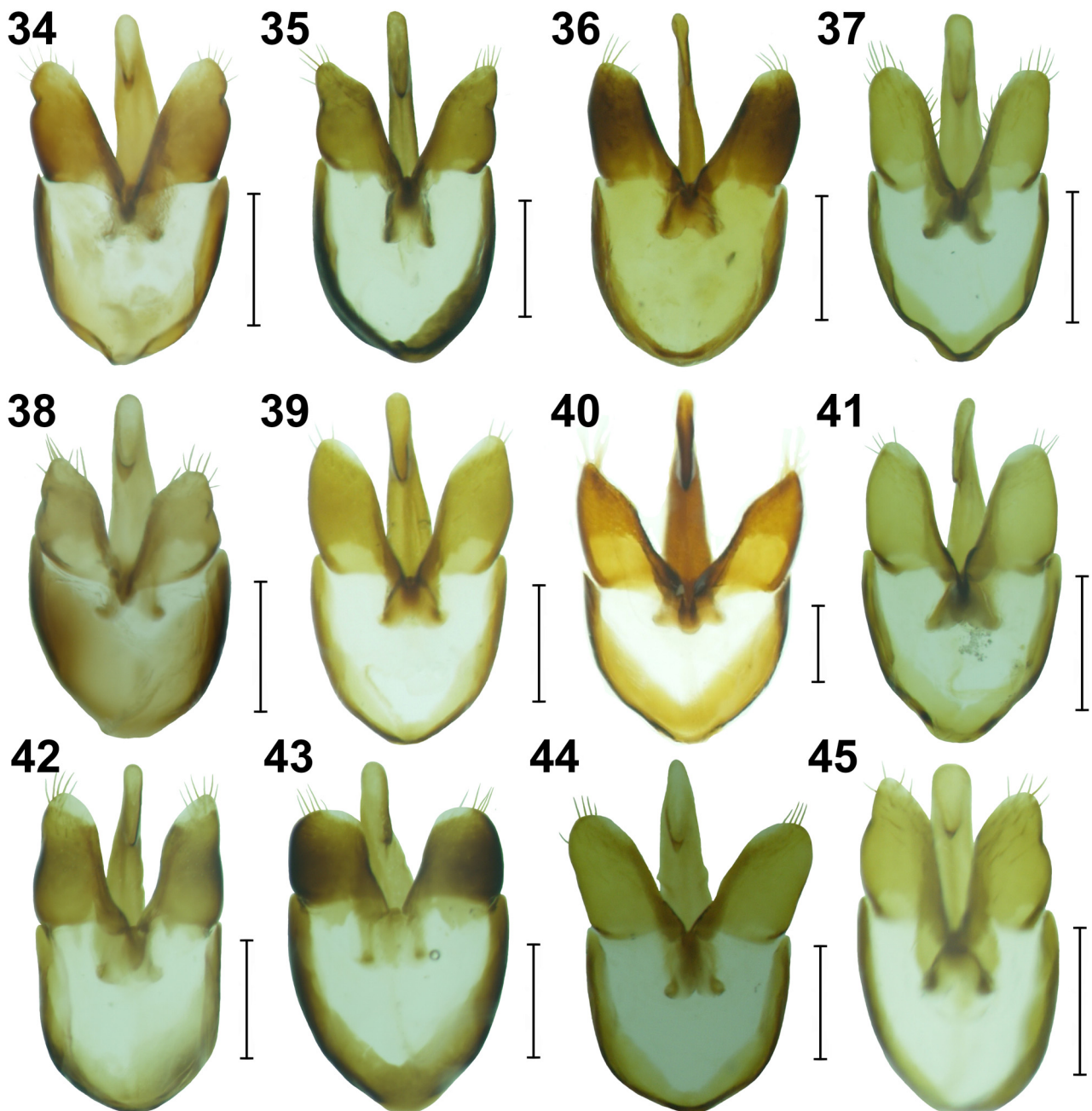
Type material. Holotype, male, "Amasia, Coll. D. A. Reclaire, *Drilus concolor* Ahr. E. le Moul't" (RMNH).

Type locality. Turkey, Amasya.

Diagnosis. *Drilus huijbregtsi* sp. nov. is similar in habitus and coloration to *D. turcicus* sp. nov. These species differ in the shapes of clypeus, antennae (Figs 23, 31) and male genitalia (Figs 35, 43).

Description. Male (holotype). Body 3.3 times longer than width at humeri, dark brown to black, trochanters and tarsi brown; body covered with light brown pubescence (Fig. 3). Head including eyes slightly wider than anterior margin of pronotum (Fig. 14), dorsally with wide shallow depression, covered with large shallow punctures, with sparse semierect to erect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 2.0 times eye diameter. Mandibles curved, incisor margin with short conspicuous tooth medially. Labrum transverse; maxillary palpi slender, apical palpomere obliquely cut. Antennae pectinate (only two and eight antennomeres present of left and right antenna, respectively); antennomere 3 long, serrate, antennomeres 4–8 pectinate (Fig. 23). Pronotum slightly convex, transverse, widest at middle, 1.6 times wider than length at midline. Anterior margin almost straight, lateral margins convex, widened; posterior margin bisinuate. Anterior angles inconspicuous, posterior angles rectangular (Fig. 14); surface of disc sparsely covered with fine shallow punctures,

with sparse semierect to erect pubescence, pubescence denser at angles. Scutellum flat, gradually narrowed, wrinkled; apex widely rounded. Prosternum transverse, slightly wrinkled, frontal margin almost straight, posterior margin widely convex, steeply declivitous, prosternal process inconspicuous. Mesoventrite widely v-shaped, with groove anteromedially. Elytra relatively long, subparallel-sided, slightly wrinkled, covered with semierect pubescence. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, longer than combined lengths of tarsomeres 3 and 4. Penultimate ventrite medially with deep rounded emargination. Aedeagus with robust, considerably curved phallus; paramera rather short, slightly membranous apically; phallobase long, u-shaped (Fig. 35). Female and immature stages are unknown.



FIGURES 34–45. Male genitalia of *Drilus* species. 34, *Drilus badius* sp. nov.; 35, *D. huijbregtsi* sp. nov.; 36, *D. latithorax* Pic, 1902; 37, *D. mertliki* sp. nov.; 38, *D. obscuricornis* Pic, 1899; 39, *D. rectus* Schaufuss, 1867 (Turkey, Adana Prov.); 40, *D. robustus* sp. nov.; 41, *D. sanliurfensis* sp. nov.; 42, *D. teunissenii* sp. nov.; 43, *D. turcicus* sp. nov.; 44, *D. iranicus* Wittmer, 1967; 45, *Drilus* sp. (Abkhazia). Scale bars = 0.25 mm.

Measurements. BL 6.4 mm, EL 4.4 mm, WHe 1.3 mm, WHum 1.9 mm, PL 1.0 mm, PW 1.6 mm, Edist 0.9 mm, Ediam 0.4 mm.

Distribution. Northern Turkey (Amasya Province; Fig. 55).

Etymology. This species is named after Dr. Hans Huijbregts (RMNH, Leiden, Netherlands).

***Drilus latithorax* Pic, 1902**

(Figs 4, 15, 24, 36)

Drilus latithorax Pic, 1902: 24.

Type material. Holotype, male, "Asie - Min., Anatolie, C.D. 1888, Type [handwritten; circle label], Type [handwritten], Type [printed red label], *latithorax* Pic, Museum Paris, Prét n° 7697, 25.03.1992, 26.09.1992 [printed yellow label]" (MHNP).

Type locality. Turkey, "Anatolie: Smyrne" [= Izmir].

Diagnosis. *Drilus latithorax* is easily recognizable by the brown body coloration, prolonged clypeal part and serrate antennae (Figs 4, 24).

Description. Male (holotype). Body 3.4 times longer than width at humeri, reddish brown to dark brown, pronotum lighter, scape, pedicel and scutellum yellowish brown; body covered with yellow pubescence (Fig. 4). Head including eyes slightly wider than anterior margin of pronotum (Fig. 15), lateral margins above antennal sockets slightly elevated, elongated clypeus forming narrowed nasal part, with deep depression medially between antennal sockets; anterior clypeal edge notched, emarginated at middle; with large, shallow puncturation and sparse, semierect pubescence. Eyes medium-sized, their frontal distance 1.7 times eye diameter. Mandibles curved, incisor margin with conspicuous tooth in middle part. Labrum transverse, frontal margin slightly rounded; maxillary palpi slender, ultimate palpomere apically narrowed and flattened, obliquely cut. Antennae serrate (Fig. 24). Pronotum transverse, slightly convex, widest at middle, 1.5 times wider than length at midline. Anterior margin with small emargination medially, lateral margins convex, widened, slightly elevated posteriorly; posterior margin bisinuate, slightly emarginated at middle. Anterior angles inconspicuous; posterior angles obtuse (Fig. 15); surface of disc covered with large distinct punctures, with sparse semierect setae. Scutellum flat, elongate, gradually narrowed apically, sparsely punctured; apex rounded. Prosternum transverse, transversely wrinkled, frontal margin almost straight, prosternal process short, widely rounded, gradually declivitous. Mesoventrite v-shaped, medially grooved. Elytra relatively long, subparallel-sided, wrinkled, sparsely punctured, covered with sparse semierect pubescence, denser at outer margins and apical half. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, slightly longer than combined lengths of tarsomeres 3 and 4. Aedeagus with slender, considerably curved phallus; paramera long, with apical parts membranous; phallobase robust, u-shaped (Fig. 36). Female and immature stages are unknown.

Measurements. BL 6.2 mm, EL 4.9 mm, WHe 1.3 mm, WHum 1.8 mm, PL 1.0 mm, PW 1.5 mm, Edist 0.7 mm, Ediam 0.4 mm.

Distribution. Western Turkey (Izmir Province; Fig. 55).

***Drilus mertliki* sp. nov.**

(Figs 5, 16, 25, 37)

Type material. Holotype, male, "Turkey – vil. Rize, Ikizdere env., 24.6.2006, Josef Mertlik Lgt." (PCRK); Paratype, male, "TR – vil. Trabzon, 15 km W of Arakli, Konakönü env. 23.6.2006, Josef Mertlik Lgt." (PCRK).

Type locality. Turkey, Rize, Ikizdere env.

Diagnosis. *Drilus mertliki* sp. nov. is similar to *D. sanliurfensis* sp. nov., but differs from the latter by the pronotum with convex lateral margins and prominent hind angles (Figs 16, 19), and the narrower paramera (Figs 37, 41). The similarly-colored *Drilus* sp. from Caucasus differs from *D. mertliki* sp. nov. in the relatively shorter phallus and differently shaped paramera (Figs 37, 45).

Description. Male (holotype). Body 3.2 times longer than width at humeri, dark brown to black, antennae brown, scape, pedicel, legs and last abdominal ventrite yellowish brown; body covered with yellow pubescence (Fig. 5). Head including eyes about as wide as anterior margin of pronotum (Fig. 16), with shallow depression medially, lateral margins above antennal sockets slightly elevated, sparsely punctured, with sparse semierect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 1.8 times eye diameter. Mandibles curved, shiny, incisor margin with conspicuous tooth in middle part. Labrum transverse; maxillary palpi slender, ultimate palpomere apically slightly flattened, obliquely cut. Antennae pectinate, reaching one third of elytral length, antennomere 3 serrate, antennomeres 4–10 pectinate, apical antennomere simple, longest (Fig. 25). Pronotum slightly convex, transverse, widest at hind angles, 1.7 times wider posteriorly than length at midline. Anterior margin almost straight, lateral margins sinuate, posterior margin slightly convex. Anterior angles inconspicuous; posterior angles prominent, acute, slightly turned upward (Fig. 16); surface of disc sparsely covered with fine punctures, with sparse semierect setae. Scutellum flat, gradually narrowed, sparsely punctured; apex rounded. Prosternum transverse, slightly wrinkled, frontal margin almost straight, prosternal process minute, steeply declivitous. Mesoventrite widely v-shaped, anteromedially depressed. Elytra subparallel-sided, wrinkled, sparsely and finely punctured, covered with sparse semierect long pubescence, denser apically. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere slender, about as long as antennomere 1, slightly longer than combined lengths of tarsomeres 3 and 4. Aedeagus with robust, considerably curved phallus; paramera long, slender, covered with setae, mainly ventrally; phallobase long, v-shaped (Fig. 37). Female and immature stages are unknown.

Measurements. Holotype. BL 6.5 mm, EL 5.0 mm, WHe 1.3 mm, WHum 2.0 mm, PL 1.0 mm, PW 1.6 mm, Edist 0.8 mm, Ediam 0.4 mm. Paratype. BL 5.5 mm, EL 4.2 mm, WHe 1.1 mm, WHum 1.7 mm, PL 0.8 mm, PW 1.4 mm, Edist 0.7 mm, Ediam 0.4 mm.

Distribution. Northern Turkey (Rize and Trabzon Provinces; Fig. 55).

Etymology. The species name is a patronym in honor of Mr. Josef Mertlík (Opatovice nad Labem, Czech Republic).

Remarks. Paratype has slightly deformed left side of pronotum and is missing the left antenna (only scape and pedicel preserved) and right foreleg.

***Drilus obscuricornis* Pic, 1899**

(Figs 6, 17, 26, 38)

Drilus obscuricornis Pic, 1899: 205.

Type material. Holotype, male, "Asie Min., Brousse, Pic 1899 [printed label], Type [handwritten], Type [printed red label], *obscuricornis* Pic [handwritten]" (MHNP).

Type locality. Turkey, "Anatolie, Brusse" [= Bursa].

Diagnosis. *Drilus obscuricornis* shares more or less uniform body coloration and weakly pectinate antennae with *D. badius* **sp. nov.**, *D. huijbregtsi* **sp. nov.**, and *D. turcicus* **sp. nov.** However, *D. badius* **sp. nov.** is lightly colored and has finer, less distinct pronotal punctation (Figs 2, 6), *D. huijbregtsi* **sp. nov.** has finer, less distinct pronotal punctures and more slender male genitalia (Figs 14, 17, 35, 38), and *D. turcicus* **sp. nov.** has a wider clypeus and short rounded paramera (Figs 38, 43).

Description. Male (holotype). Body 3.0 times longer than width at humeri, dark brown to black, covered with yellow pubescence (Fig. 6). Head including eyes about as wide as anterior margin of pronotum (Fig. 17), dorsally with irregularly shaped depression, rugose, lateral margins above antennal sockets elevated, with large shallow punctures, with sparse semierect pubescence; clypeal margin narrowed, almost straight. Eyes medium-sized, their frontal distance 1.8 times eye diameter. Mandibles curved, incisor margin with short tooth medially. Labrum transverse, partly hidden by clypeus; maxillary palpi slender, apical palpomere obliquely cut. Antennae weakly pectinate, reaching one third of elytral length, antennomeres 3–4 serrate, antennomeres 5–10 slightly pectinate, apical antennomere simple, longest (Fig. 26). Pronotum slightly convex, transverse, widest at middle, 1.5 times wider posteriorly than length at midline. Anterior margin slightly concave, lateral margins convex, widened, slightly turned upward near posterior angles; posterior margin slightly emarginated at middle. Anterior angles

inconspicuous, posterior angles distinct, rectangular (Fig. 17); surface of disc sparsely covered with large shallow punctures, with sparse semierect setae, mainly at angles and lateral margins. Scutellum flat, gradually narrowed; apex rounded. Prosternum transverse, with deep transverse groove near frontal margin, frontal margin almost straight, prosternal process short, sharp, slightly elevated medially. Mesoventrite v-shaped, grooved medially. Elytra subparallel-sided, slightly rugose, shallowly punctured, covered with semierect pubescence. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, slightly longer than combined lengths of tarsomeres 3 and 4. Aedeagus compact, with considerably curved phallus; paramera robust; phallobase wide, u-shaped (Fig. 38). Female and immature stages are unknown.

Measurements. BL 5.4 mm, EL 4.3 mm, WHe 1.1 mm, WHum 1.8 mm, PL 1.0 mm, PW 1.5 mm, Edist 0.7 mm, Ediam 0.4 mm.

Distribution. Western Turkey (Bursa Province; Fig. 55).

***Drilus rectus* Schaufuss, 1867**

(Figs 7, 27, 39)

Drilus rectus Schaufuss, 1867: 84.

Type material. Not available.

Type locality. Beirut (Lebanon) and Antiochia (southern Turkey).

Material studied. Male, "Turkey, 975 m, Toros Dağları, 9.6.1987, Lundberg lgt." (LMBC); male, "South Turkey, prov. Hatay, Harbyie env., 400m, 36°07'N 36°10'E, 31.3.2010, E. & P. Hajdaj lgt." (PCRK); 2 males, "Turkey, 13.–14.VI.2003, Adana vil. (ca 45 km N), Boztahta env., 37°23' N, 35°15' E, 460 m, Jiří Hájek & Josef Hotový leg." (NMPC); male, "Turkey, 5. 1990, Iskenderun, leg. Krajčík, coll. general, National Museum Prague, Czech Republic" (NMPC); male, "TR mer., province Hatay, Karaçay, Hatay env., valley of Asi Nehri river, 7.5.2005, J. Vávra leg." (PCJV).

Diagnosis. *Drilus rectus* is similarly colored as *D. akbesianus*, *D. nemethi* and *D. iranicus* (Figs 1, 7, 12). It differs from *D. akbesianus* and *D. nemethi* in relatively smaller eyes and from *D. iranicus* in the lightly colored abdomen and shallower transverse groove near the frontal prosternal margin.

Remarks. *Drilus rectus* occurs in Cyprus, southern Turkey and mainland Levant, which makes this species relatively widespread in comparison to the vast majority of its congeners. Similarly to other widely distributed *Drilus* species (*D. concolor* Ahrens, 1812 and *D. flavescens*; personal observation), the different populations and in some cases even the specimens within a single population vary in the body size, coloration, and several morphological characters including e.g. the head surface, shapes of frontal depression, pronotum and paramera (Schaufuss 1867, Kunderata *et al.* 2014b). The detailed DNA-based study together with knowledge of the biology and ecology is important for understanding the taxonomic status of the geographically distant *D. rectus* populations. This species was recently redescribed and figured by Kunderata *et al.* (2014b) so we are not repeating the description here. Female and immature stages are unknown. A female specimen from Cyprus collected by H. M. Morris and determined as *D. rectus* (Tab. 1) is deposited in the Natural History Museum in London, but without any further details this determination must be confirmed by future studies.

Distribution. Cyprus, Israel, Lebanon, Turkey (Adana, Hatay; Fig. 55). Given the current distribution of this species, its occurrence in Syria is highly probable.

***Drilus robustus* sp. nov.**

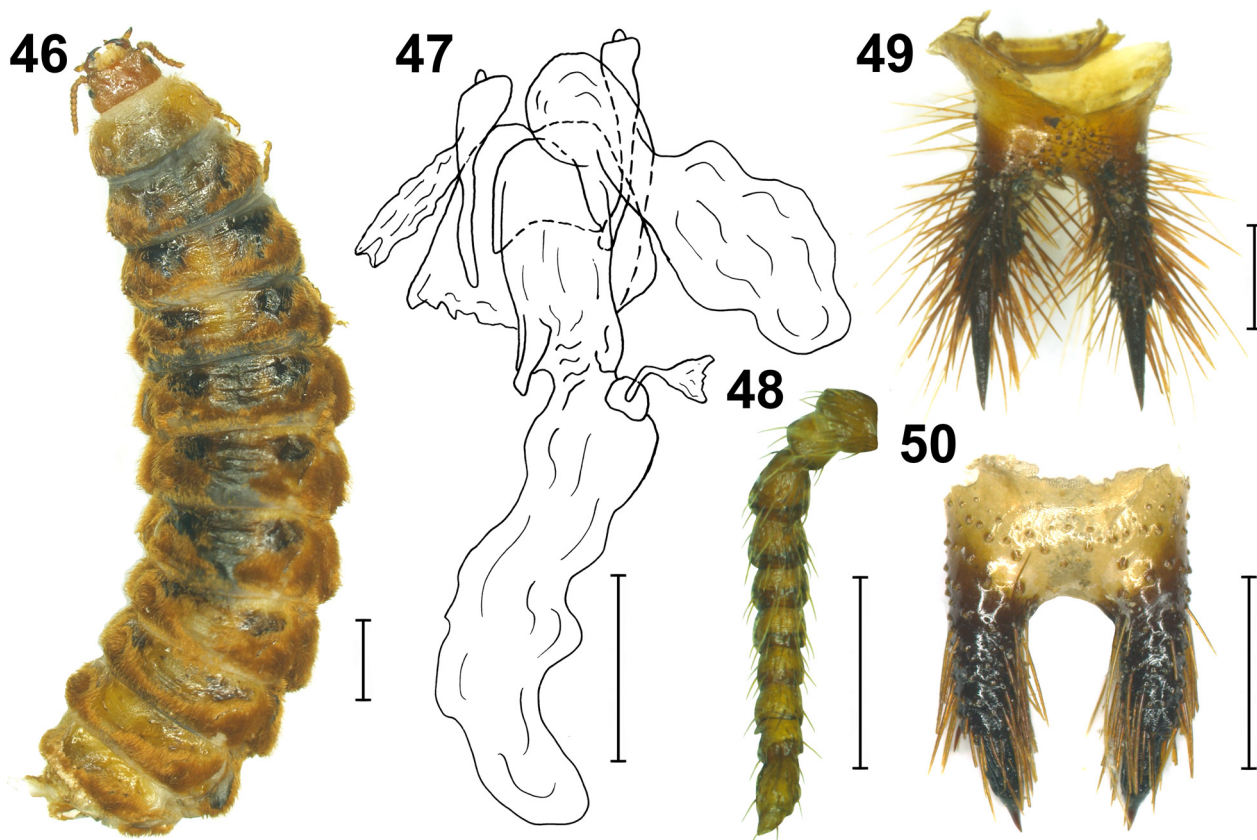
(Figs 8, 18, 28, 32–33, 40, 46–49, 51–52, 54)

Type locality. Turkey, Antalya province, Kemer env.

Type material. Holotype, male: "Turkey mer. occ., Kemer env., 1.–11.6.2011, J. Bednář lgt." (PCRK); 81 paratypes: 5 males, the same data as for the holotype (PCJB, PCRK); 4 males, "Turkey mer. occ., Kemer env., 1.–11.6.2011, J. Brádka lgt." (PCJR); 3 males, "Turkey mer. occ., Kemer env., 1.–11.6.2011, J. Januš lgt." (PCJJ); 62

males, 1 female, "Turkey, Antalya pr., Kemer env., 10m, 26.–28.5.2012, Krol, Fusek & Masek leg." (LMBC, PCRK); 5 males, "Turkey, Antalya pr., Kemer env., 10–50m, 26.–28.5.2012, Krol, Fusek & Masek leg." (PCRK); 1 male, "Turkey, Antalya pr., Kemer env., 50m, forest, in flight, 28.5.2012, Krol, Fusek & Masek leg." (PCRK).

Other material studied. 1 male, "Türkei, Catallar, 6.VI.1997, leg. H. Schmid" (PCRS); 1 larva, "Turkey, Antalya pr., Kemer env., 10m, 26.–28.5.2012, Krol, Fusek & Masek leg." (PCRK).



FIGURES 46–50. *Drilus robustus* sp. nov., female. 46, habitus; 47, genitalia; 48, antenna. Larval cerci. 49, *D. robustus* sp. nov.; 50, *Drilus* sp. (Turkey, Muğla Prov., Knidos). Scale bars = 2.0 mm (Fig. 46), 1.0 mm (Figs 47, 49–50), 0.5 mm (Fig. 48).

Diagnosis. The male of *Drilus robustus* sp. nov. can be easily distinguished from its congeners from Asia Minor by the following combination of characters: robust general habitus, reddish brown body coloration with bicolored elytra (Fig. 8), strongly pectinate antennae (Fig. 28), and pronotum widest slightly before middle, constricted anteriorly (Fig. 18). This species is very similar to *D. bleusei* (Olivier, 1913) from Rhodes, but they differ in e.g. the coloration of elytra (only apical 2/5 of elytra black in *D. bleusei*), the shape of pronotum (more constricted anteriorly in *D. bleusei*) and male genitalia (wider paramera and relatively shorter phallus in *D. bleusei*) (Trllova & Kundrata 2015).

Description. Male (holotype). Body 2.6 times longer than width at humeri, yellowish brown to reddish brown, antennae slightly darker, elytra with black coloration beginning in humeral part and continuing obliquely to the inner elytral margins; body covered with yellowish pubescence (Fig. 8). Head including eyes about as wide as anterior margin of pronotum (Fig. 18), dorsally with shallow depression, sparsely covered with fine punctures, with sparse erect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 2.3 times eye diameter. Mandibles robust, long, curved, shiny, incisor margin with stout tooth medially. Labrum covered with sparse long setae; maxillary palpi with ultimate palpomere obliquely cut, flattened apically. Antennae pectinate, reaching one third of elytral length, antennomeres 3–10 pectinate, apical antennomere simple, longest, more than 2 times longer than stem of penultimate antennomere (Fig. 28). Pronotum slightly convex, transverse, widest slightly before middle, 1.5 times wider posteriorly than length at midline. Anterior margin straight, lateral margins deeply emarginate at basal third, widened at apical two thirds, posterior margin slightly convex, bisinuate. Anterior angles inconspicuous, posterior angles rectangular, slightly turned upward (Fig. 18); surface of disc sparsely covered with

fine punctures, with sparse erected setae, pubescence denser at angles and lateral margins. Scutellum flat, triangle-shaped, apical part rounded. Prosternum transverse, with long transverse groove near frontal margin, frontal margin almost straight, prosternal process short, elevated, gradually declivitous. Mesoventrite widely v-shaped. Elytra subparallel-sided, with longitudinal keel running from humeri toward apex, finely punctured, covered with semierect pubescence, sparser basally, denser at lateral margins and apically. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere apparently longest, almost as long as combined lengths of tarsomeres 2–4 (Fig. 32). Last abdominal segments as in Fig. 33. Aedeagus with phallus considerably curved, longer than paramera; paramera long, with basal inner parts strengthened; phallobase robust, widely v-shaped (Fig. 40).



FIGURES 51–54. *Drilus robustus* sp. nov. 51, larva; 52, mating couple; 53, the type locality (Turkey, Kemer env.); 54, larval skins inside the shells of *Rumina decollata* (Linnaeus, 1758).

Female. Larviform, body elongate. All body parts yellowish to light brown, head orange, dorsal surface of thoracic and abdominal segments with dark brown to black markings; body covered with short yellowish pubescence, sparse medially, dense at margins (Fig. 46). Head prognathous, well sclerotized, small, narrower than pronotal anterior margin. Eyes small, their frontal distance more than 5 times eye diameter. Antennae 11-segmented, filiform, covered with sparse semierect setae; apical antennomere minute, narrowed (Fig. 48, Table 1). Mandibles robust, shiny, considerably curved, incisor margin medially with small tooth. Pronotum widest at

posterior two thirds; thoracic and abdominal tergites wrinkled, mainly medially. Abdomen with nine visible segments, apical segment much narrower and smaller. Ovipositor with fused valviferes and coxites. Vagina simple, slender, short, sac-like (Fig. 47).

Larva. Body elongate, slightly widened towards apex. Body yellowish, head, dorsal surface of thoracic and abdominal segments, lateral pleural processes and legs brown; each tergite with a pair of black spots; body covered with long yellowish or brown pubescence (Fig. 51). Head prognathous, well sclerotized, small, narrower than frontal pronotal margin. Mandibles sclerotized, narrow and falcate. Abdomen with sclerotized and pigmented tergites, with long setae, especially dorsally (Fig. 49, 51, 54). Lateral pleural and tergal processes well developed. Last segment small, slender. Cerci slightly bent upward, densely covered with long pubescence, cerci apically acuminate; with long apical part (Fig. 49).

Measurements. Holotype. BL 7.1 mm, EL 5.2 mm, WHe 1.8 mm, WHum 2.7 mm, PL 1.4 mm, PW 2.2 mm, Edist 1.3 mm, Ediam 0.6 mm. Paratypes, males. BL 6.2–9.5 mm, EL 4.5–6.6 mm, WHe 1.6–2.3 mm, WHum 2.4–3.6 mm, PL 1.3–1.8 mm, PW 2.0–2.8 mm, Edist 1.1–1.6 mm, Ediam 0.5–0.7 mm. Paratype, female. BL 20.5 mm, BW 4.7 mm. Larva. BL 18.0 mm, BW 3.5 mm.

Distribution. Turkey (Antalya Province; Fig. 55).

Etymology. The specific epithet refers to the robust habitus of this species.

Biology and ecology. *Drilus robustus* **sp. nov.** occurs in a lowland forest; most specimens were collected at a forest edge (Fig. 53). Larvae prey on the snail *Rumina decollata* (Linnaeus, 1758) (Achatinoidea: Subulinidae; Fig. 54). Adults can be found from late May to early June. After pupation, males sit on grass and tree branches waiting for the females which they mate almost immediately after their emergence (L. Fusek, J. Bednář, pers. communication; Fig. 52).



FIGURE 55. The distribution of *Drilus* species in Asia Minor.

Table 1. Numbers of antennomeres in females of different *Drilini* species. ¹ xx+1 – the apical antennomere is minute; ? – one of the antennomeres might in fact consist of two fused antennomeres; pers. com. – personal communication; det. – determined.

Genus/Species	Geographic origin	Number of antennomeres ^{1,2}	Reference	Remarks
<i>Drilus</i> Olivier				
<i>D. concolor</i> Ahrens	Central Europe	11	Geisthardt 1979	apex of ultimate antennomere misinterpreted; as figured
	Netherlands	11	Burakowski 2003	apex of ultimate antennomere misinterpreted; figured as 11+1
	Netherlands	12 (11+1)	this study	natural habitat; E. Baalbergen; Leiden, Netherlands (pers. com.)
	Netherlands	12 (11+1)	this study	reared at home by O. Vorst; Leiden, Netherlands (pers. com.)
	Netherlands	13 (12+1)	this study	reared at home by O. Vorst (pers. com.)
<i>D. flavescens</i> Olivier	Central Europe	11 (10+1)	Geisthardt 1979	as figured
	France	10 (9+1)	Burakowski 2003	as figured
	France, Germany	10 (9+1)	Bocak et al. 2010	as figured
	Netherlands	10 (9+1)	this study	E. Baalbergen (pers. com.); natural habitat
	Netherlands	11? (10?+1)	this study	E. Baalbergen (pers. com.); natural habitat
	Netherlands	9 (8+1)	this study	E. Baalbergen (pers. com.); reared in the laboratory
	Netherlands	10 (9+1)	this study	E. Baalbergen (pers. com.); reared in the laboratory
	Netherlands	12? (11?+1)	this study	E. Baalbergen (pers. com.); reared in the laboratory
<i>D. horasjakionus</i> Kundrata et al.	Greece: Crete	10?, 11	Kundrata et al. 2014b	apex of ultimate antennomere misinterpreted; as figured
	Greece: Crete	11? (10?+1)	this study	re-examined
	Greece: Crete	12 (11+1)	this study	re-examined
<i>D. mauritanicus</i> Lucas	Morocco	11?	Faucheux & Agnas 2011	apex of ultimate antennomere misinterpreted; as figured
	Morocco	12 (11+1)	Faucheux & Kundrata 2014	re-examined, as figured
	Spain	12 (11+1)	this study	natural habitat
<i>D. robustus</i> sp. nov.	Turkey	11 (10+1)	this study	as figured (Fig. 48); natural habitat
<i>Drilus</i> sp.	Romania, France	12 (11+1)	this study	
<i>Drilus</i> sp.	Cyprus	11? (10?+1)	this study	reared by Ch. Makris; Limassol, Cyprus (pers. com.)
<i>Drilus rectus</i> Schaufuss?	Cyprus	11 (10+1)	this study	deposited in the Natural History Museum, London; det. as <i>D. rectus</i>
<i>Malacogaster</i> Bassi				
<i>M. passerinii</i> Bassi	Morocco	8 (7+1)	Faucheux & Agnas 2011	as figured
<i>M. passerinii</i> Bassi	Morocco	8 (7+1)	Faucheux & Kundrata 2014	as figured
<i>Malacogaster</i> sp.	Algeria	8 (7+1)	this study	
<i>Malacogaster</i> sp.	Morocco	8 (7+1)	this study	
<i>Malacogaster</i> sp.	Tunisia	8 (7+1)	this study	
<i>Malacogaster</i> sp.	Spain: Mallorca	8 (7+1)	this study	
<i>Selasia</i> Laporte				
<i>Selasia</i> sp.	Kenya: Mombasa	8 (7+1)	Williams 1951	

***Drilus sanliurfensis* sp. nov.**

(Figs 9, 19, 29, 41)

Type material. Holotype, male, "Turkey, Prov. Urfa, Halfeti, valley of Euphrat, 500 m, 37°52.5'E, 37°14.5'N, 28.IV–1.V.1989, leg. Fabián, Ronkay & Ronkay" (HNHM); 3 paratypes, males, the same data as for the holotype (HNHM).

Type locality. Turkey, Prov. Urfa, Halfeti, valley of Euphrat, 500 m, 37°14.5'N, 37°52.5'E.

Diagnosis. This species is similar in morphology and coloration to *D. mertliki* sp. nov., but differs from the latter by the shape of pronotum (Figs 16, 19) and male genitalia (Figs 37, 41).

Description. Male (holotype). Body 3.4 times longer than width at humeri. Head black, elytra and ventral parts dark brown, pronotum and scutellum lighter, antennomeres 3–11 brown, mouthparts, scape, pedicel, legs and last abdominal ventrite yellowish brown; body covered with yellowish to light brown pubescence (Fig. 9). Head including eyes about as wide as anterior margin of pronotum (Fig. 19), dorsally with wide shallow depression, lateral margins above antennal sockets elevated, covered with large shallow punctures, with sparse semierect or erect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 1.9 times eye diameter. Mandibles long, curved; incisor margin with short robust tooth in middle part. Labrum transverse; maxillary palpi slender, apical palpomere obliquely widely cut. Antennae pectinate, reaching one third of elytral length, antennomere 3 serrate, antennomeres 4–10 pectinate, apical antennomere simple, longest (Fig. 29). Pronotum slightly convex, transverse, widest at middle, 1.5 times wider posteriorly than length at midline. Anterior margin almost straight, lateral margins sinuate, posterior margin convex, bisinuate. Both anterior and posterior angles rectangular (Fig. 19); surface of disc sparsely punctured, with sparse erected setae, pubescence denser at angles. Prosternum transverse, slightly wrinkled, frontal margin almost straight, prosternal process minute, gradually declivitous. Mesoventrite v-shaped, anteromedially depressed. Elytra elongate, subparallel-sided, with longitudinal keel running from humeri toward apex, inconspicuous at apical 1/3 of elytra, slightly wrinkled, sparsely punctured, covered with semierect pubescence. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere long, slender, slightly longer than combined lengths of tarsomeres 3 and 4. Aedeagus with robust, considerably curved phallus; paramera long; phallobase v-shaped (Fig. 41). Female and immature stages are unknown.

Measurements. Holotype. BL 5.5 mm, EL 4.1 mm, WHe 1.2 mm, WHum 1.6 mm, PL 0.9 mm, PW 1.3 mm, Edist 0.7 mm, Ediam 0.4 mm. Paratypes. BL 4.5–6.4 mm, EL 3.5–4.8 mm, WHe 1.0–1.4 mm, WHum 1.3–2.0 mm, PL 0.7–1.0 mm, PW 1.1–1.6 mm, Edist 0.6–0.8 mm, Ediam 0.3–0.5 mm.

Distribution. Turkey (Şanlıurfa Province; Fig. 55).

Etymology. The specific epithet is derived from the name of the Turkish province in which this species occurs.

***Drilus teunissenii* sp. nov.**

(Figs 10, 20, 30, 42)

Type material. Holotype, male, "Turkiye, Anamur – Anamuryum, 9.–12.V.1991, A. Cox/H. Teunissen; *Drilus* cf. *funnebris*, det. A. Teunissen 1997" (PCAT); two paratypes, males, the same data as for the holotype (PCAT).

Type locality. Turkey, Anamur – Anamuryum.

Diagnosis. *Drilus teunissenii* sp. nov. shares serrate antennae with *D. latithorax*, but differs from the latter by the short clypeus, relatively shorter antennae and more transverse pronotum (Figs 4, 10, 15, 20).

Description. Male (holotype). Body 3.3 times longer than width at humeri, dark brown to black, mouthparts, scape, pedicel and scutellum slightly lighter, legs brown; body covered with yellow to light brown pubescence (Fig. 10). Head including eyes about as wide as anterior margin of pronotum (Fig. 20), dorsally with wide shallow depression, coarsely punctured, with sparse semierect to erect pubescence; clypeal margin widely concave. Eyes medium-sized, their frontal distance 1.9 times eye diameter. Mandibles robust, curved, incisor margin with stout tooth in middle part. Labrum transverse, shiny; maxillary palpi slender, apical palpomere obliquely cut. Antennae serrate, relatively short, robust, reaching humeri (Fig. 30). Pronotum convex, transverse, widest at middle, 1.6 times wider than length at midline. Anterior margin almost straight, lateral margins convex, widened, slightly turned upward posteriorly; posterior margin bisinuate. Anterior angles inconspicuous, posterior angles obtuse (Fig.

20); surface of disc covered with distinct deep punctures, with semierect pubescence, denser at angles. Scutellum flat, gradually narrowed, sparsely punctured; apex rounded. Prosternum transverse, wrinkled, frontal margin almost straight, prosternal process short, gradually declivitous. Mesoventrite v-shaped, anteromedially depressed. Elytra subparallel-sided, with longitudinal keel running from humeri toward apex, slightly wrinkled, finely punctured, sparsely covered with semierect pubescence. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, longer than combined lengths of tarsomeres 3 and 4. Aedeagus compact, with considerably curved phallus; paramera robust, slightly membranous apically; phallobase long, u-shaped (Fig. 42). Female and immature stages are unknown.

Variability. The pronotum of the holotype is more coarsely wrinkled and less distinctly punctured than in the paratypes.

Measurements. Holotype. BL 6.9 mm, EL 5.0 mm, WHe 1.4 mm, WHum 2.1 mm, PL 1.0 mm, PW 1.7 mm, Edist 0.9 mm, Ediam 0.5 mm. Paratypes. BL 6.5–7.0 mm, EL 4.8–5.2 mm, WHe 1.4–1.5 mm, WHum 2.1–2.2 mm, PL 1.1–1.2 mm, PW 1.7–1.8 mm, Edist 0.9 mm, Ediam 0.4–0.5 mm.

Distribution. Southern Turkey (Mersin prov.; Fig. 55).

Etymology. The species name is a patronym proposed in honor of Mr. A. P. J. A. (Dré) Teunissen (Eindhoven, Netherlands).

***Drilus turcicus* sp. nov.**

(Figs 11, 21, 31, 43)

Type material. Holotype, male, "Turcia, *Drilus longulus* det. J. Frivaldszky, 661 216" (HNHM); paratype, male, same data as for the holotype (HNHM).

Type locality. Turkey (with no additional data).

Diagnosis. *Drilus turcicus* sp. nov. is similar to *D. huijbregtsi* sp. nov., but differs from the latter by the less pectinate antennae (Figs 23, 31), wider clypeus, and shorter paramera (Figs 35, 43).

Description. Male (holotype). Body 3.0 times longer than width at humeri, dark brown to black, antennomeres, apical parts of tibiae and tarsi gradually lighter, light brown; body covered with yellowish pubescence (Fig. 11). Head including eyes slightly narrower than anterior margin of pronotum (Fig. 21), dorsally with wide shallow depression, lateral margins above antennal sockets elevated, distinctly punctured, with sparse semierect to erect pubescence; clypeal margin almost straight. Eyes medium-sized, their frontal distance 2.3 times eye diameter. Mandibles curved, incisor margin with robust tooth in middle part. Labrum transverse; maxillary palpi slender, apical palpomere obliquely cut. Antennae weakly pectinate, reaching one third of elytral length, antennomeres 3–5 serrate, antennomeres 6–10 weakly pectinate, apical antennomere simple, longest (Fig. 31). Pronotum slightly convex, transverse, widest at middle, 1.7 times wider than length at midline. Anterior margin medially with small emargination; lateral margins convex, widened, slightly elevated posteriorly; posterior margin bisinuate. Anterior angles inconspicuous, posterior angles obtuse (Fig. 21); surface of disc sparsely covered with sparse distinct punctures, with sparse semierect setae, pubescence denser at angles and lateral margins. Scutellum flat, longer than wide, gradually narrowed towards apex, distinctly punctured; apical part rounded. Prosternum transverse, wrinkled, with deep transverse groove near frontal margin; frontal margin almost straight, prosternal process short, steeply declivitous. Mesoventrite v-shaped, with oval cavity medially. Elytra relatively long, subparallel-sided, with longitudinal keel running from humeri toward apex, wrinkled (mainly basally), covered with semierect pubescence. Legs slender, slightly compressed, with sparse, long, semierect setae, tarsomeres 1–4 gradually shortened, tarsomere 4 shortest, apical tarsomere longest, slender, slightly longer than combined lengths of tarsomeres 3 and 4. Aedeagus with short, robust, considerably curved phallus; paramera short, rounded; phallobase long (Fig. 43). Female and immature stages are unknown.

Variability. The paratype is generally slightly lighter than the holotype, especially the elytra and apical antennomeres.

Measurements. Holotype. BL 5.6 mm, EL 4.3 mm, WHe 1.3 mm, WHum 1.9 mm, PL 1.0 mm, PW 1.7 mm, Edist 1.0 mm, Ediam 0.4 mm. Paratype. BL 5.9 mm, EL 4.5 mm, WHe 1.3 mm, WHum 1.8 mm, PL 1.0 mm, PW 1.7 mm, Edist 0.9 mm, Ediam 0.4 mm.

Distribution. Turkey (no additional data known).

Etymology. The species name is derived from the country of origin.

Drilus sp.

(Fig. 50)

Material. 2 larvae (only parts of exuviae, cerci and head present), "SW Turkey, Knidos, 31/05/2012" (PCRK).

Description. Larva. Head and tergites brown, with dark brown markings laterally. Head well sclerotized; mandibles narrow and falcate. Tergites pigmented, with long setae; last segment small, slender. Cerci slightly bent upward, densely covered with long pubescence (partly removed), cerci apically cuspidate, apex short (Fig. 50).

Remarks. Only the exuviae, last abdominal segments with cerci and one head were found in the shells of *Eobania vermiculata* (Müller, 1774) (Helicidae) collected in the ruins of Knidos (Datça district, Muğla Province). This species differs from *D. robustus* sp. nov. by much shorter cuspidate apex of cerci (Figs 49–50). Without the knowledge of immature stages for the vast majority of *Drilus* species in Turkey, we are not able to identify these larvae to the species level. Given the distribution of *Drilus* species in Asia Minor (Fig. 55), this larva might represent a yet undescribed species.

Identification key for the males of *Drilus* species in Asia Minor*

1. Pronotum yellowish to light reddish brown, apparently lighter than most of or whole elytra 2
- Pronotum dark reddish brown to black, about the same coloration as elytra 4
2. Elytra unicolored; whole elytra, head and antennomeres 3–11 dark brown to black 3
- Elytra bicolored; basal part of elytra, head and antennae light reddish brown (Fig. 8) *Drilus robustus* sp. nov.
3. Eyes relatively smaller, Edist/Ediam ratio 2.0–2.4; paramera mostly parallel-sided *Drilus rectus* Schaufuss
- Eyes relatively larger, Edist/Ediam ratio 1.8; paramera rounded *Drilus akbesianus* (Fairmaire)
4. Antennae serrate 5
- Antennae weakly or strongly pectinate 6
5. Clypeus elongated, forming narrowed nasal part; aedeagus as in Fig. 36 *Drilus latithorax* Pic
- Clypeus not elongated; aedeagus as in Fig. 42 *Drilus teunissenii* sp. nov.
6. Antennae strongly pectinate (Figs 25, 29) 7
- Antennae weakly pectinate (Figs 22–23, 26, 31) 8
7. Hind pronotal angles prominent (Fig. 16), aedeagus as in Fig. 37 *Drilus mertliki* sp. nov.
- Hind pronotal angles not prominent, rectangular (Fig. 19), aedeagus as in Fig. 41 *Drilus sanliurfensis* sp. nov.
8. Body lighter, reddish brown (Fig. 2); aedeagus as in Fig. 34 *Drilus badius* sp. nov.
- Body darker, dark brown to black 9
9. Eyes relatively larger, Edist/Ediam ratio 1.8; aedeagus as in Fig. 38 *Drilus obscuricornis* Pic
- Eyes relatively smaller, Edist/Ediam ratio 2.0–2.3 10
10. Clypeal margin narrowed, almost straight, with sharp anterior edge; paramera relatively longer, narrow (Fig. 35)
..... *Drilus huijbregtsi* sp. nov.
- Clypeal margin wide, concave, without sharp anterior edge; paramera relatively shorter, rounded (Fig. 43)
..... *Drilus turcicus* sp. nov.

* *Drilus frontalis* is not included in the key as we have not been able to locate the type specimen nor specimens which would fit the original description (Schaufuss 1867).

Discussion

The taxonomy of *Drilus* is complicated by the lack of information on species limits and distributions. Most species are known only from old insufficient descriptions with no differential diagnoses, some species were described under different genera (see Kundrata *et al.* 2014b, Trilova & Kundrata 2015), and many specimens in the museum collections are misidentified or undetermined, especially from the poorly studied regions. The current study revealed that the *Drilus* species diversity in Asia Minor was highly underinvestigated and we more than doubled the number of species known from that area. Considering the rarity of *Drilus* specimens in the collections, presumed limited distributional ranges caused by low dispersal capacities of wingless females and hitherto unexplored areas in Asia Minor (especially in Central and Eastern Anatolia; Fig. 55), we can expect many more species will be discovered in Turkey in the near future.

Despite some recent studies (e.g. Baalbergen *et al.* 2014), the biology and ecology of most *Drilus* species including those from Asia Minor are unknown. Larvae prey on various land snail taxa. In western Turkey, remains of *Drilus* larvae were found in the shells of *Albinaria* spp., *Bulgarica denticulata* (Olivier, 1801) (Clausiliidae; Örstan 1999), and *Eobania vermiculata* (Helicidae). Clausiliid and helioid snails are common prey of *Drilus* larvae in the Mediterranean (e.g. Faucheux & Agnas 2011, Baalbergen *et al.* 2014). In southern Turkey, larvae of *D. robustus* **sp. nov.** were found in the shells of *Rumina decollata* (Subulinidae; Fig. 54) similarly to some larger *Drilus* species from Spain and the Peloponnese (Bahillo de la Puebla & López Colón 2005, Baalbergen *et al.* 2014, Kundera *et al.* 2015).

Females of *Drilus* are also very poorly studied and their detailed morphology is known only for a few species (Bocak *et al.* 2010, Faucheux & Agnas 2011, Kundera *et al.* 2015). Particularly interesting is the morphology of female antennae. While males have serrate to flabellate antennae with the apical antennomere long and fully developed, female antennae are filiform, with the ultimate antennomere small, narrow, often inconspicuously separated from the penultimate one, and probably of a larval type (Cros 1930, Bocak *et al.* 2010, Faucheux & Kundera 2014). Although eight antennomeres are reported for two other known genera of Drilini, *Selasia* Laporte, 1836 and *Malacogaster* Bassi, 1834 (Williams 1951, Faucheux & Kundera 2014, respectively), the number of antennomeres in *Drilus* is variable and in natural conditions range from 10 to 12 (Table 1). The species identification of *Drilus* females is complicated by their uniform larviform morphology and peculiar antennal morphology, in which the number of antennomeres probably varies even within a single species (Kundera *et al.* 2015) and the morphology of the apical antennomere is often misinterpreted (Geisthardt 1979, Faucheux & Agnas 2011, Kundera *et al.* 2015; see Table 1). The only *Drilus* species in Asia Minor for which we know the female is *D. robustus* **sp. nov.** from Antalya province. This species shares 11 antennomeres with *Drilus* spp. from Cyprus and some *D. horasfakionus* Kundera, Baalbergen, Bocak & Schilthuisen, 2015 from Crete. The same number of antennomeres was probably erroneously reported also for the Central European species *D. flavescens* and *D. concolor* (Geisthardt 1979 for both species, Burakowski 2003 for the latter), however these species have in natural conditions 10 and 12 antennomeres, respectively (although they vary in numbers of antennomeres when reared under home or laboratory conditions; Table 1). More material from all around the *Drilus* distributional range is needed for the detailed study of female antennal morphology.

Acknowledgements

We are very obliged to colleagues and institutions for providing us with the material studied herein, namely J. Bednář (Kralupy nad Vltavou, Czech Republic), L. Bocak (Olomouc, Czech Republic), J. Hájek (NMPC, Prague, Czech Republic), H. Huijbregts (RMNH, Leiden, Netherlands), A. Mantilleri (MHNP, Paris, France), O. Merkl, T. Németh (HNHM, Budapest, Hungary), R. Schuh (Wiener Neustadt, Austria), A. P. J. A. (Dré) Teunissen (Eindhoven, Netherlands), and J. Vávra (Ostrava, Czech Republic). J. Bednář kindly shared with us the information on the collecting circumstances of *Drilus robustus* **sp. nov.** and L. Fusek (Olomouc, Czech Republic) provided the photographs of the larva and mating adults. We thank E. Baalbergen, O. Vorst (Leiden, Netherlands) and Ch. Makris (Limassol, Cyprus) for the information on the *Drilus* females in their care, O. Rittner and H. K. Mienis (Tel Aviv, Israel) for the snail species identifications, K. Szawaryn (Warsaw, Poland) for his help in finding some literature, and W. D. Shepard (Pinole, CA, USA) for the proof reading. This study was supported by grant no. CZ.1.07/2.3.00/30.0004 from the European Social Fund and the EU-SYNTHESYS grant FR-TAF 4665. This support is gratefully acknowledged.

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