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Article *in* Zootaxa · November 2018

DOI: 10.11646/zootaxa.4521.4.6

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Zootaxa 4521 (4): 573–583
http://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4521.4.6
http://zoobank.org/urn:lsid:zoobank.org:pub:3AD5E6D5-F35B-43DB-8D56-586E15DF9B21

Lethrus (*Lethrus*) *thracicus* (Coleoptera: Geotrupidae), a new species from the European part of Turkey

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Abstract

Lethrus (*Lethrus*) *thracicus* Král & Hillert, new species, from Thrace, north-western Turkey is described. The new species is compared with the morphologically similar species *L*. (*L*.) *apterus* (Laxmann, 1770), *L*. (*L*.) *ares* Král, Rejsek & Schneider, 2001 and *L*. (*L*.) *schneideri* Král & Hillert, 2013. Relevant diagnostic male characters (shape of mandibles, ventral mandible processes, pronotum and parameres) are illustrated. The name *Lethrus subaeneus* Fairmaire, 1866 is considered a *nomen nudum*.

Key words: Coleoptera, Scarabaeoidea, Geotrupidae, Lethrinae, *Lethrus*, taxonomy, new species, *nomen nudum*, Balkan Peninsula, Palaearctic region

Introduction

The genus *Lethrus* Scopoli, 1777 is represented by 12 described species in central, south-eastern and eastern Europe. All of them belong to the nominotypical subgenus *Lethrus* (Král *et al.* 2001, Nikolajev 2003, Pittino 2011, Král & Hillert 2013, Král *et al*. 2013, Bagaturov & Nikolajev 2015, Nikolajev *et al*. 2016). All representatives of this genus are flightless and their way of life limits their ability of colonization. Quaternary geographical changes in the south-eastern European region provided conditions for beetle speciation in the past and created numerous suitable habits (isolated mountain valleys) in the present (see *e.g*., Král & Hillert 2013, Král *et al.* 2013). Despite the fact that six species from south-eastern Europe have already been described in recent years (*e.g*., Nikolajev *et al*. 2016), new species are still being found. Samples of material of *Lethrus* from the Balkan Peninsula were studied in parallel also by standard molecular analysis methods and the results obtained indicate significant differences between populations, meriting them the species status (Drožová *et al*. unpublished data). The recently collected *Lethrus* material in the European part of Turkey revealed another new species, whose formal description is presented below.

Material and methods

Material was examined with Olympus SZ61 stereomicroscope. The habitus photographs were taken using a Canon MP-E 65mm/2.8 Macro lens with 5:1 optical magnification on bellows attached to a Canon EOS 550D. Partially focused images of the specimen were combined using Zerene Stacker software.

The following abbreviations identify the collections housing the material examined (curators are given in parentheses).

CUPC—Department of Zoology, Charles University, Prague, Czech Republic (Petr Šípek);
DKCP—David Král collection, deposited in NMPC;

Accepted by A. Bezděk: 2 Oct. 2018; published: 16 Nov. 2018

OHCB—Oliver Hillert collection, Schöneiche bei Berlin, Germany;
NMPC—National Museum, Praha, Czech Republic (Jiří Hájek).

Specimens of the newly described species are provided with one red printed label "Lethrus (Lethrus) thracicus sp. nov., HOLOTYPUS ♂, ALLOTYPUS ♀ [or] PARATYPUS ♂ [or] ♀, David Král & Oliver Hillert det. 2018". Exact label data are cited for the type material, individual lines of every label by a vertical bar ("|"). Information in quotation marks (" ") indicates the original spelling. Our remarks and additional comments are found in brackets.

We decided to include in the type series only material from the type locality and its closest vicinity to minimize the possibility of icluding multiple taxa in the type material (possible presence of morphologically very similar, allopatrically distributed species of the genus). Morphological terminology used in the description mainly follows Král & Hillert (2013).

Taxonomy

Lethrus (*Lethrus*) *thracicus* Král & Hillert, new species

(Figs. 1a–e; 2d, h; 3d, h; 4d, h; 5d; 6; 7)

Type locality. European Turkey, Edirne prov., 18 km E of Edirne, Habiller env., 41°40'27.96"N 26°47'12.35"E, ca 121 m a. s. l.

Type material. **European Turkey, Edirne Prov.:** Holotype, ♂ (DKCP), "European Turkey, 26.iv.2011| Habiller env. | ca 121 m, 41°40'27.96"N 26°47'12.35"E | P. Janšta, D. Drožová & P. Šípek lgt. [printed]". Paratypes: allotype, ♀ and 1 ♂ (DKCP), 2 ♂♂ and 1 ♀ (OHCB) and 2 ♂♂ (CUPC), same data as holotype; 3 ♂♂ (DKCP), "TR [= Turcia]—ca 15 Km | e.[east of] Edirne [ca 41°40'N 26°40'E] | 27.3.[19]88 [Walter] Heinz [legit] [handwritten, black ink]".

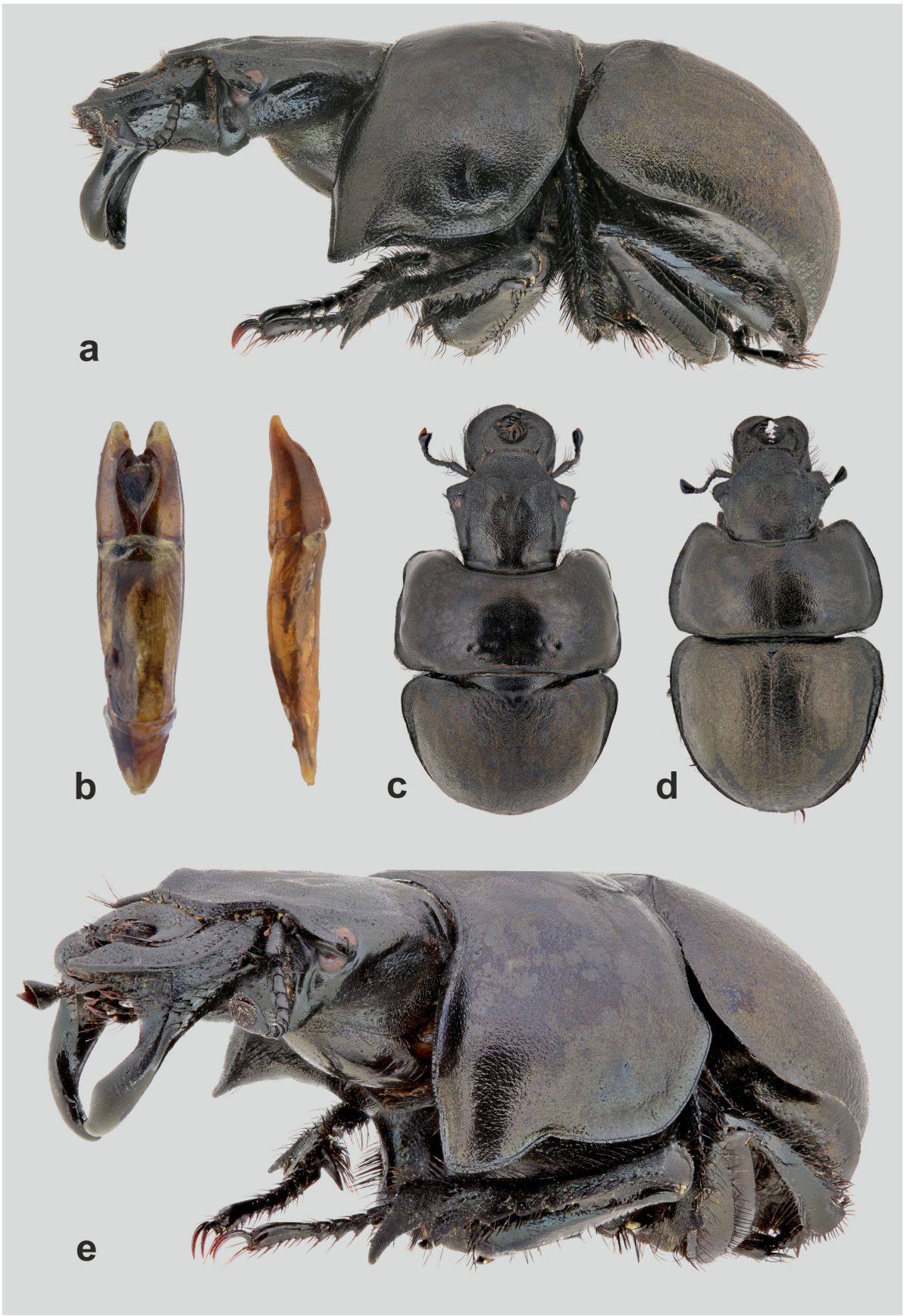
Additional material examined. European Turkey, Tekirdağ Prov.: 1 ♂, 1 ♀ (NMPC), Tekirdağ env. [ca 40°59'N 27°30'E], iv.1987.

Description of holotype (♂). Maximally developed (hyperthelic) male with well developed ventral mandible processes (Figs. 1a, c, e). Oblong, strongly convex; dorsal surface black, except moderately shiny pronotum almost alutaceous; ventral surface black with fine blue tinge, moderately shiny, claws black-brown; macrosetation black.

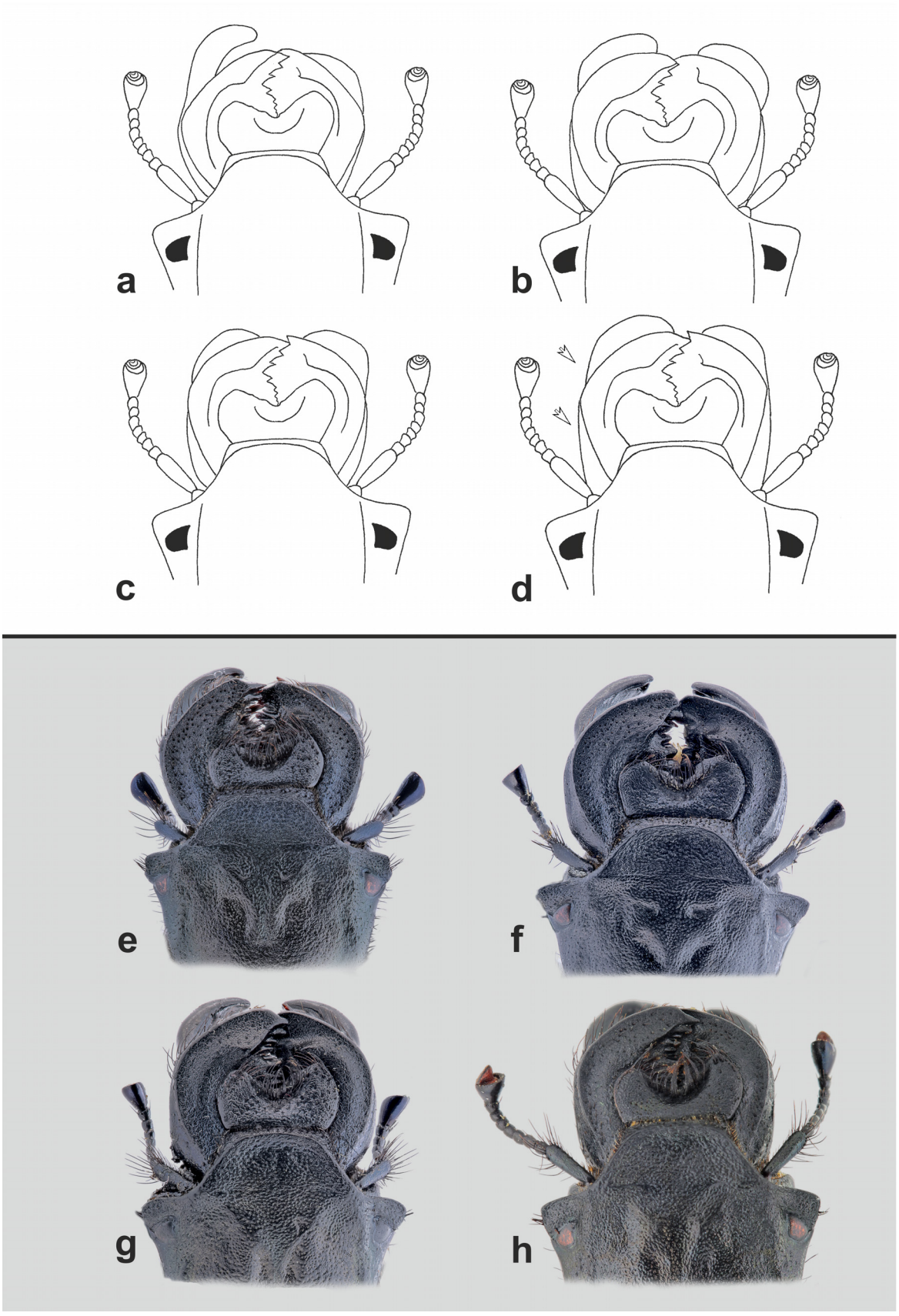
Head (Figs. 1a, c, e). Labrum bilobed, asymmetrical, right lobe remarkably more developed; surface rugosely and coarsely, shallowly and sparsely punctate, each puncture bearing short recumbent macroseta; anterior margin with dense row of long macrosetae. Clypeus transverse, trapezoidal with anterior angles rounded. Frontal impressions vague, frontal tubercles indistinct. Frontoclypeal suture present only laterally; keels separating eye canthus from frons only slightly developed but distinct, slightly divergent posteriad. Eye canthus exceeding eyes, projecting anterolaterad, almost rectangular, lateral margins divergent posteriad, anterolateral angle rounded, oblique keel above eyes absent. Pleurostomal process evenly arcuate, hardly exceeding ventrolateral mandible outline. Punctation of frons double, consisting of coarse, transversally rugose, regularly and densely distributed punctures, intermixed with fine, irregularly distributed ones; coarse punctures separated by approximately less than their diameter, punctation becoming distinctly sparser posteriad and on occiput; clypeus and eye canthus distinctly rugose.

Mandibles symmetrical, external outline almost semicircular, pointed subapically in dorsal aspect (Figs. 2a, e) with maximum width approximately at middle of mandibles length.

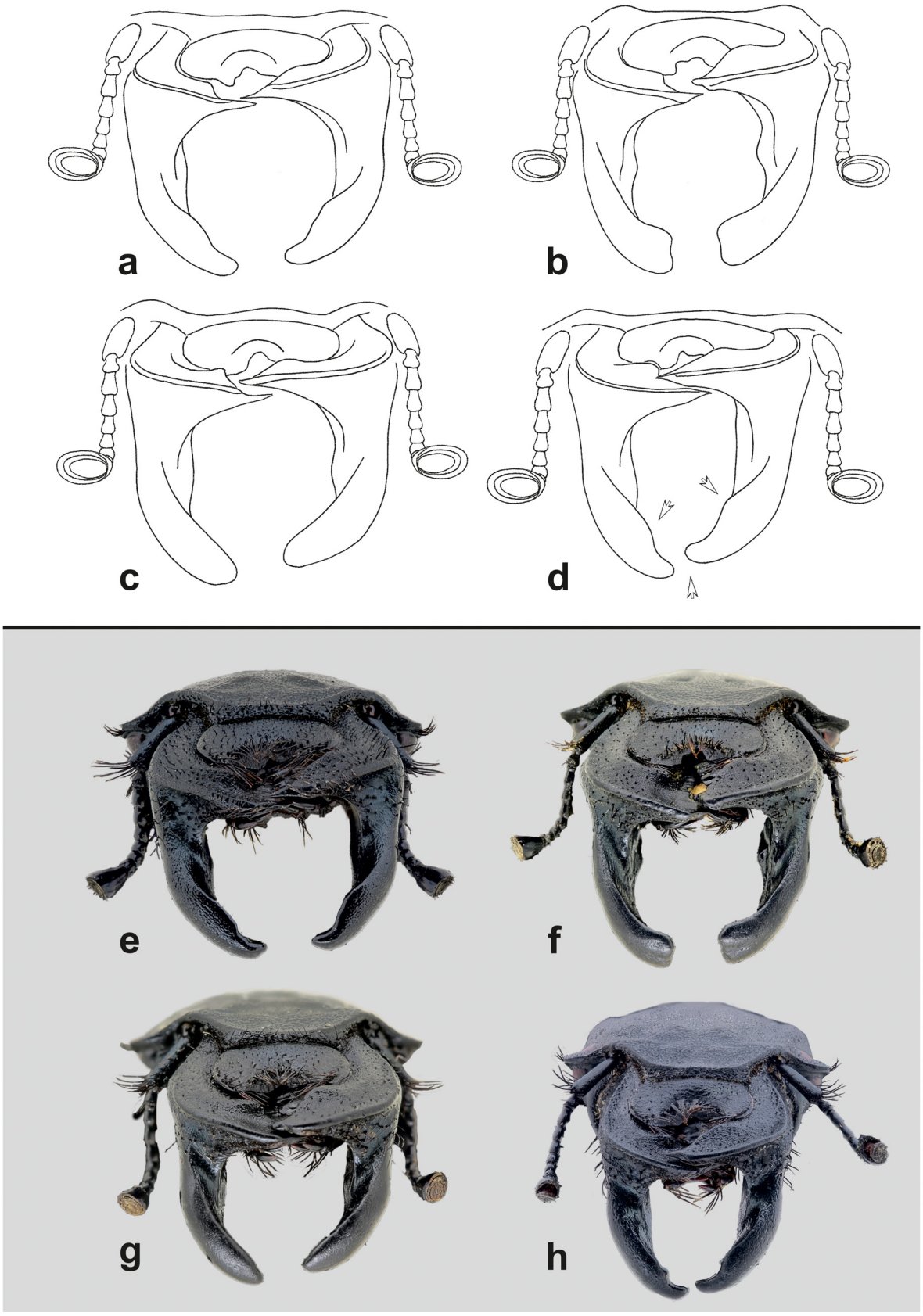
Ventral mandible processes (Figs. 2d, h; 3d, 5; 4d, h) weakly asymmetrical, right process slightly more developed than left one and with different angle in lateral aspect. Both processes distinctly longer than length of mandible; base thickened, not exceeding lateral mandibular outline in dorsal aspect, with slightly concave external outline in basal half in frontal aspect; longitudinal keel on base laterally present, straight and approximately parallel to lateral mandibular outline in dorsal aspect, distinctly broader as maximum width of mandibles outline basally; in lateral aspect weakly arcuate, approximately subparallel to lateral mandibular outline, slightly divergent gradually basad approximately from middle of its length. Inferiobasal tooth absent; both processes bent inward aproximately in middle of mandibles length in frontal view; anterior subapical tooth absent; apical emargination absent; apical tooth round.



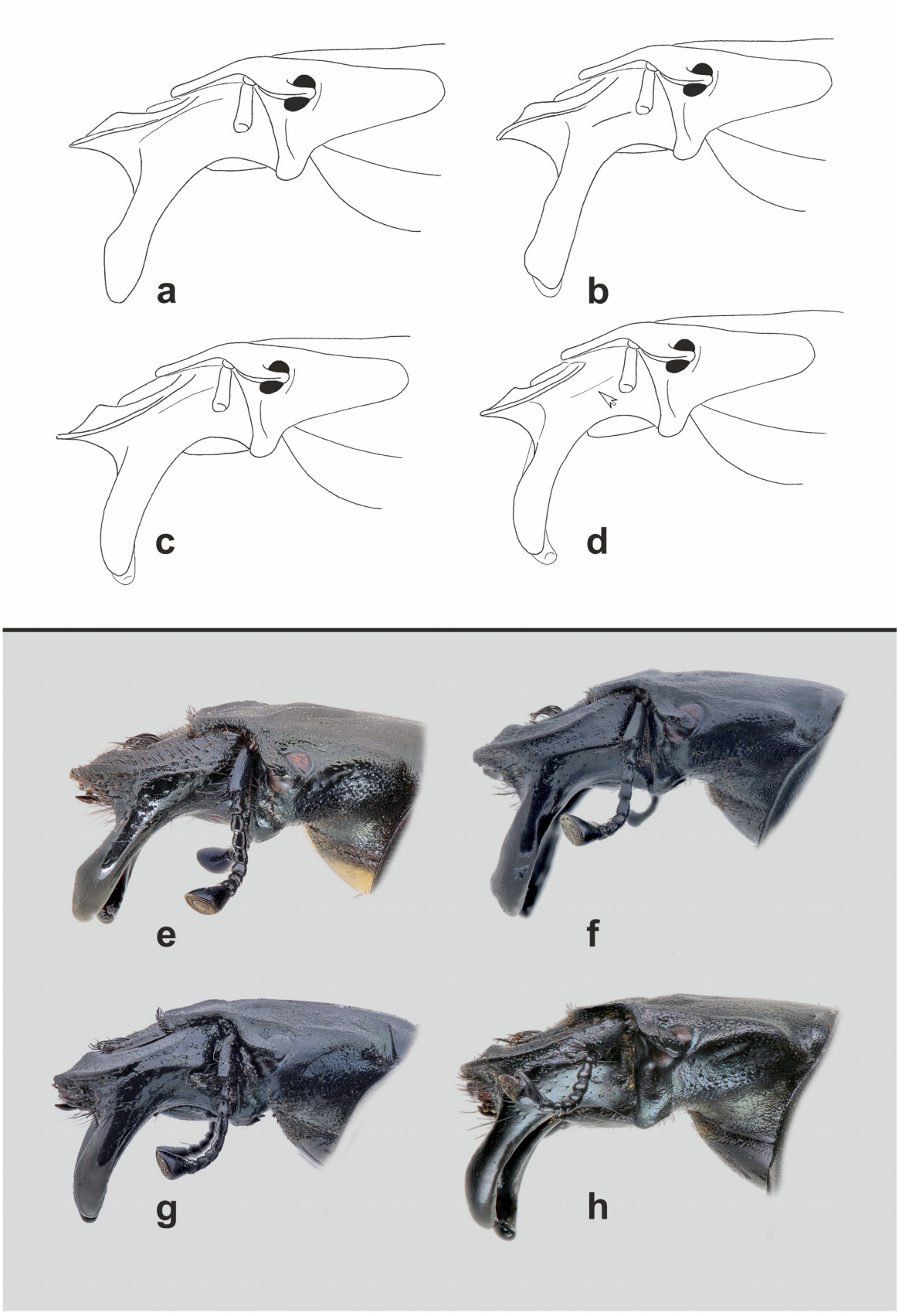
FIGURES 1a–e. *Lethrus* (*Lethrus*) *thracicus* Král & Hillert, new species (European Turkey, Edirne prov., Habiller env., holotype (male), excepting allotype (female)—d). a—habitus, left lateral aspect; b—aedeagus, dorsal and left lateral view; c, d—habitus dorsal view; e—habitus, left oblique antero-lateral view. Not to scale.



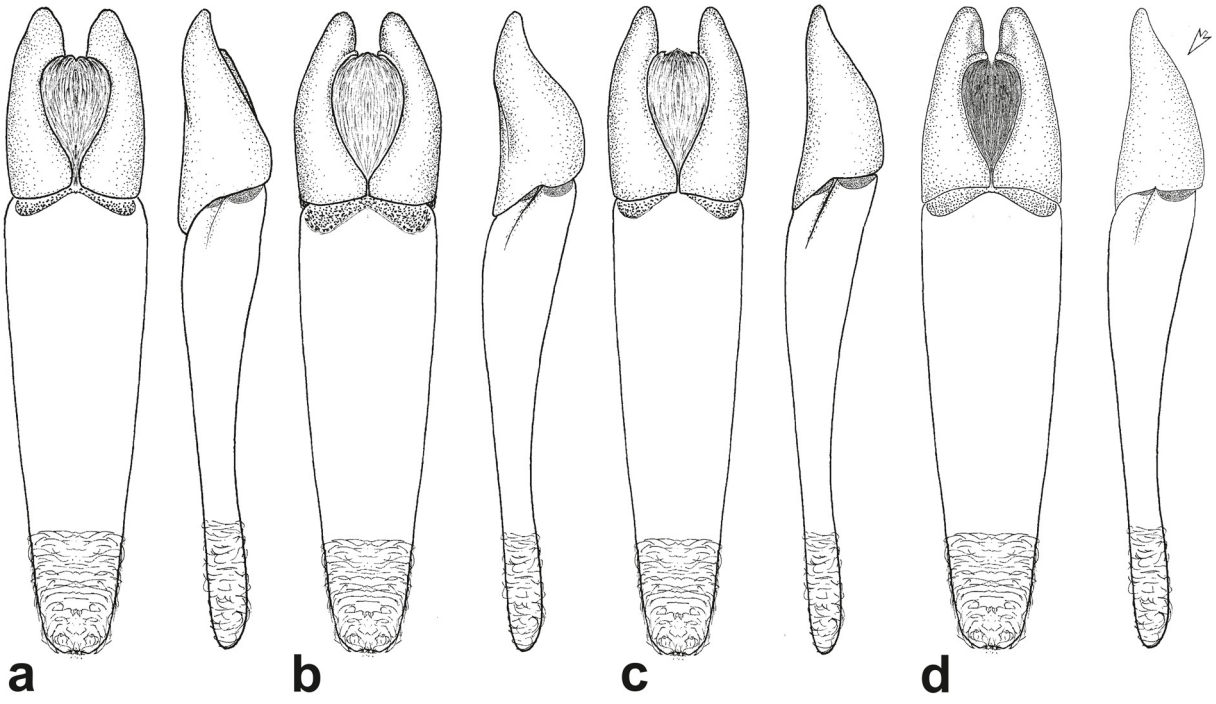
FIGURES 2a–h. Male head in dorsal view. a, e—*Lethrus* (*L.*) *apterus* (Slovakia, Kamenica nad Hronom, DKCP), b, f—*L.* (*L.*) *ares* (Greece, Evros dist., Polía, holotype, NMPC); c, g—*L.* (*L.*) *schneideri* (Greece: Thrace distr., Karydia, holotype, NMPC); d, h—*L.* (*L.*) *thracicus* Král & Hillert, new species (European Turkey, Edirne prov., Habiller env., holotype). Differential characters shown by arrow. Not to scale.



FIGURES 3a–h. Male head in frontal view. a, e—*Lethrus* (*L.*) *apterus* (Slovakia, Kamenica nad Hronom, DKCP), b, f—*L.* (*L.*) *ares* (Greece, Evros dist., Polía, holotype, NMPC); c, g—*L.* (*L.*) *schneideri* (Greece: Thrace distr., Karydia, holotype, NMPC); d, h—*L.* (*L.*) *thracicus* Král & Hillert, new species (European Turkey, Edirne prov., Habiller env., holotype). Differential characters shown by arrow. Not to scale.



FIGURES 4a–h. Male head in left lateral view. a, e—*Lethrus* (*L.*) *apterus* (Slovakia, Kamenica nad Hronom, DKCP), b, f—*L.* (*L.*) *ares* (Greece, Evros dist., Polía, holotype, NMPC); c, g—*L.* (*L.*) *schneideri* (Greece: Thrace distr., Karydia, holotype, NMPC); d, h—*L.* (*L.*) *thracicus* Král & Hillert, new species (European Turkey, Edirne prov., Habiller env., holotype). Differential characters shown by arrow. Not to scale.



FIGURES 5a–d. Aedeagi in dorsal and lateral aspect. a—*Lethrus* (*L.*) *apterus* (Slovakia, Kamenica nad Hronom, DKCP), b—*L.* (*L.*) *ares* (Greece, Evros dist., Polía, holotype, NMPC); c—*L.* (*L.*) *schneideri* (Greece: Thrace distr., Karydia, holotype, NMPC); d—*L.* (*L.*) *thracicus* Král & Hillert, new species (European Turkey, Edirne prov., Habiller env., holotype). Differential characters shown by arrow. Not to scale.

Pronotum (Figs. 1a, c, e) transverse, distinctly broader than base of elytra, broadest just behind middle; margin entirely bordered, slightly crenulate in anterior parts. Anterior corners weakly but distinctly projecting anterolaterad, with angulate outline; lateral margin approximately weakly emarginate anteriorly, than straight to rounded posterior angle; basal margin straight. Punctation of dorsal surface simple, consisting of deep, sparsely and irregularly distributed punctures; punctures separated by approximately two to four their diameters discally, surface near lateral margins considerably shagreened and alutaceous.

Scutellar plate widely triangular, finely shagreened.

Elytra almost semicircular, apices not prominent, each apex forming independent arc. Epipleuron strongly narrowed apicad, epipleural keel not reaching elytral apex. Whole surface alutaceous, finely transversally rugose; striae not indicated, entirely vanishing in rugosities.

Legs. Profemur not armed, protibia with row of eight gradually proximad diminishing external denticles, and with row of tubercles on ventromedial edge.

Male genitalia. Aedeagus with parameres shallowly sinuate distally in lateral aspect (Figs. 1b, 5d)

Measurements. Total body length 18–24 mm, holotype—23 mm, allotype—24 mm (Figs. 1a, c, d, e).

Variability in males. Mandible processes in medium developed and underdeveloped (hypothelic) males short, more or less straight with simply rounded to almost acute apically.

Sexual dimorphism. Female (Fig. 1d) differ from males as follows: external outline of mandibles almost straight, in apical quarter rounded in dorsal aspect; ventral mandibular process absent; pronotum anterior corners more angulate, pronotum lateral margins broadly rounded, protibia broader, row of tubercles on ventromedial edge less pronounced.

Differential diagnosis. Among the species distributed in the Balkan Peninsula, the new species is most similar and probably closely related to *Lethrus* (*L.*) *ares* Král, Rejsek & Schneider, 2001, *L.* (*L.*) *apterus* (Laxmann, 1770)

and *L*. (*L*.) *schneideri* Král & Hillert, 2013. Distinguishing features in males are as follow: absence of anterior subbasal tooth of ventral mandibular processes (*L*. (*L*.) *schaumii* Reitter, 1890 and *L*. (*L*.) *elephas* Reitter, 1890 have distinct anterior subbasal tooth); absence of anterior subapical tooth of ventral mandibular processes (*L*. (*L*.) *halkidikiensis* Hillert & Král, 2013, *L*. (*L*.) *perun* Hillert & Král, 2013, *L*. (*L*.) *raymondi* Reitter, 1890 and *L*. (*L*.) *strymonensis* Hillert & Král, 2013 have distinct anterior subapical tooth); presence of approximately symmetrical ventral mandibular processes and regularly rounded or obtuse-angular anterior pronotal angles (*L*. (*L*.) *fallax* Nikolajev, 1975 and *L*. (*L*.) *liviae* Pittino, 2011 have remarkably asymmetrical ventral mandibular processes and strongly produced acute-angular anterior pronotal angle). For characters to separate *L*. (*L*.) *apterus*, *L*. (*L*.) *ares*, *L*. (*L*.) s*chneideri* and *L*. (*L*.) *thracicus* Král & Hillert, new species, see the character matrix (Table 1). Additionally, these four species exhibit probably a strictly allopatric distribution. *Lethrus* (*L*.) *thracicus* Král & Hillert, new species is restricted to the European part of Turkey (it means the lowland east of the Maritza river); *L*. (*L*.) s*chneideri* is an endemic species of the southernmost slopes of the Rhodope Mountains approximately between the towns of Xánthi and Komotiní (Greece); *L*. (*L*.) *ares* is known so far only from four spots all situated in the Eridropótamos river basin (Greece and Bulgaria) and *L*. (*L*.) *apterus* is a widely distributed Pannonian species known from Burgenland (Austria), Moravia (Czech Republic) and Serbia in the west to the Don river basin in the east (see e.g., Král *et al*. 2013, Nikolajev 2003, Bagaturov & Nikolajev 2015 and Chehlarov *et al.* 2016).

Etymology. Toponymic; the specific name *thracicus* reflects the Thracian lowlands region where the new species was collected.

Collecting events. All specimens originating from the type locality were collected from an uncultivated field margin and / or pasture with a disturbed surface mostly in places with very sparse herbaceous layer (Fig. 7). It was a sunny day and some specimens were observed to be active on the surface at 11–12 am.

Distribution. European Turkey (Fig. 6).

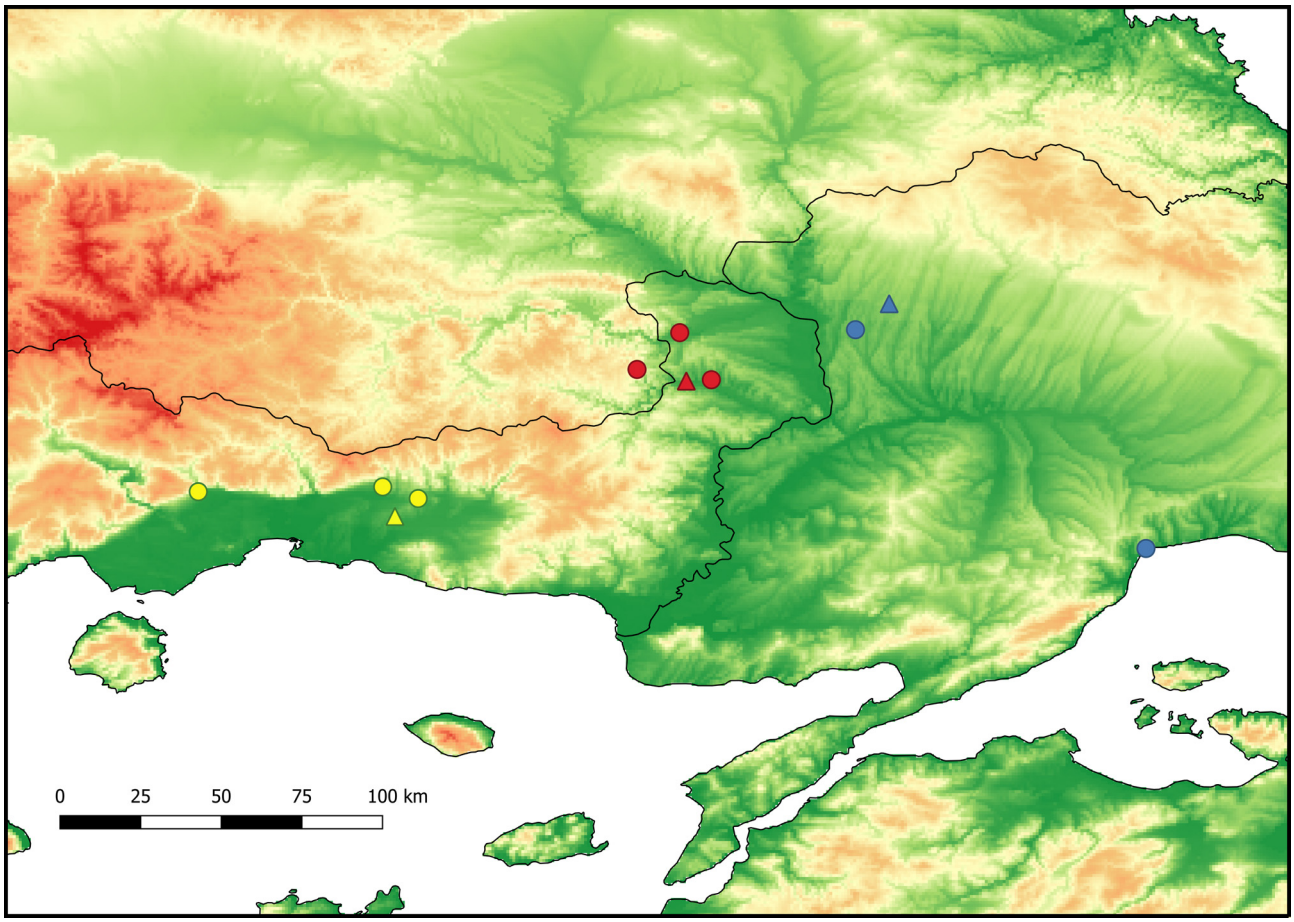


FIGURE 6. Sketch map of the Thracian lowlands (parts of Bulgaria, Greece and European Turkey) with marked distribution of *Lethrus* (*L*.) *ares*—red marks, *L*. (*L*.) *schneideri*—yellow marks, L. (*L*.) *thracicus* Král & Hillert, new species —blue marks; triangles represent the type localities. Compiled from Král *et al*. (2001, 2013) and Chehlarov *et al*. (2016).

TABLE 1. Character matrix for separation of males of *Lethrus* (*L.*) *apterus*, *L.* (*L.*) *ares*, *L.* (*L.*) *schneideri* and *L.* (*L.*) *thracicus* Král & Hillert, new species

species character	*Lethrus* (*L.*) *apterus*	*Lethrus* (*L.*) *ares*	*Lethrus* (*L.*) *schneideri*	*Lethrus* (*L.*) *thracicus*
shape of mandibles in dorsal view	lateral outline angulate at middle (Figs. 2a, e)	lateral outline semicircular (Figs. 2b, f)	lateral outline semicircular (Figs. 2c, g)	lateral outline angulate at middle (Figs. 2d, h)
lateral longitudinal keel on base of ventral mandible process in dorsal aspect	straight and approximately parallel to lateral mandibular outline, distinctly broader as maximum width of mandibles outline basally (Figs. 2a, e)	straight and distinctly subparallel to lateral mandibular outline, approximately so broad as maximum width of mandibles outline basally (Figs.2 b, f)	straight and distinctly subparallel to lateral mandibular outline, approximately so broad as maximum width of mandibles outline basally (Figs. 2 c, g)	straight and distinctly subparallel to lateral mandibular outline, approximately so broad as maximum width of mandibles outline basally (Figs. 2d, h)
mandibular processes	weakly asymmetrical, right process slightly more developed than left one and with different angle in lateral and frontal aspect (Figs. 3a, e; 4a, e)	both processes almost symmetrical (Figs. 3b, f; 4b, f)	both processes almost symmetrical (Figs. 3c, g; 4c, g)	weakly asymmetrical, right process slightly more developed than left one and with different angle in lateral aspect (Figs. 3d, h; 4d, h)
lateral longitudinal keel on base of ventral mandible process in lateral aspect	weakly arcuate, approximately parallel to lateral mandibular outline, divergent gradually basad approximately from middle of its length (Figs. 4a, e)	almost straight, distinctly subparallel to lateral mandibular outline, distinctly divergent gradually basad approximately from middle of its length (Figs. 4b, f)	weakly arcuate, approximately subparallel to lateral mandibular outline, slightly divergent gradually basad approximately from middle of its length (Figs. 4c, g)	almost straight, approximately parallel to lateral mandibular outline, slightly divergent gradually basad approximately from middle of its length (Figs. 4d, h)
shape of ventral mandible processes in frontal aspect	external outline concave basally, inferiobasal tooth present, rounded; subapical tooth distinct (more developed on right appendix), apical emargination present, remarkably deep on right, shallow on left one (Fig. 3a, e)	external outline strongly concave basally, inferiobasal tooth present, rounded; subapical tooth distinct, apical emargination present, shallow (Fig. 3b, f)	external outline concave basally, inferiobasal tooth absent; subapical tooth absent, apical emargination absent (Fig. 3c, g)	external outline concave basally, inferiobasal tooth shallowly, rounded; subapical tooth distinct, apical emargination present, shallow (Fig. 3d, h)
shape of left ventral mandible process in lateral aspect	anterior subapical tooth present, rounded; apical tooth not projected apically (Figs. 4a, e)	anterior subapical tooth present, broadened distad, angulate; apical tooth projected apically (Figs. 4b, f)	anterior subapical tooth absent, apical tooth not projected apically (Figs. 4c, g)	anterior subapical tooth present, rounded; apical tooth not projected apically (Figs. 4d, h)
shape of anterior pronotal angle	projected anterolaterad, angulate (see Král *et al*. 2013: fig. 2D)	not projected anterolaterad, broadly round (see Král *et al*. 2013: fig. 2E)	projected anterolaterad, angulate (see Král *et al*. 2013: fig. 2F)	projected anterolaterad, angulate (Figs 1a, c, e)
shape of parameres in lateral aspect	shallowly sinuate distally (Fig. 5a)	distinctly sinuate distally (Fig. 5b)	shallowly sinuate distally (Fig. 5c)	shallowly sinuate distally (Fig. 5d)
distribution	widely distributed from Austria (Burgenland), Czech Republic (Moravia) and Serbia to approximately Kursk, Rostov, Volgograd and Voronezh regions in Russia, southernmost to the northern foothills of the Stara planina Mts. in Bulgaria (see Král *et al*. 2013: fig. 6; Bagaturov & Nikolajev 2015)	restricted only to south-easternmost foothills of the Rhodope Mts. (river Eridropótamos basin region in Greece and Bulgaria) (Fig. 6)	restricted only to southernmost foothills of the Rhodope Mts. (Komotiní and Xánthi regions in Greece) (Fig. 6)	restricted to the European part of Turkey (lowland east of the Maritza river) (Fig. 6)

Remarks. Fairmaire (1866: 257) dealt in his work with the fauna of beetles of Turkey in a broader sense, *i.e*. of the territory from which the new species above is described. He introduced also the name *Lethrus subaeneus* from "Asia Mineure". However, this name was published without any mention of description or reference to it. Thus, according to ICZN (1999; cf. Article 12), we consider the name *Lethrus subaeneus* Fairmaire, 1866 to be a *nomen nudum.*

FIGURE 7. Type locality of *Lethrus* (*L.*) *thracicus* Král & Hillert, new species. European Turkey, Edirne prov., 18 km E of Edirne, Habiller env., 26.iv.2011 (photo by Petr Šípek).

Acknowledgements

Thanks are due to Petr Janšta (Charles University, Prague) who was an excellent companion during our "*Lethrus*" collecting trip, during which the material of the new species was gathered, to Lucie Nováková (Charles University, Prague) for executing the map, and to Mikhail F. Bagaturov (Sankt-Peterburg) and Jan Schneider (Prague) for critical reviewing of the text. The work of DD was supported by the Institutional Research Support grant of the Charles University, Prague (No. SVV 260434/2018). DK and PŠ were supported by the institutional resources of Faculty of Science, Charles University.

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