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## *Lethrus (Lethrus) baiocchii* nov.sp. (Coleoptera: Geotrupidae) from Iran

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**Abstract:** *Lethrus (Lethrus) baiocchii* nov.sp. from the Māzandarān (مازندران), Semnān (سمنان) and Tehran (تهران) provinces of Iran is described. The new species is similar and closely related to *L. (L.) acutangulus* BALLION, 1870. Diagnostic characters of the Iranian and west Turkmenian species of the nominotypical subgenus *Lethrus* SCOPOLI, 1777 are given for both males and females. Additionally the characteristics of the head, male mandible processes, pronotum and aedeagus are illustrated for all species.

**Key words:** Taxonomy, new species, differentiating characters, Coleoptera, Scarabaeoidea, Geotrupidae, *Lethrus*, Palearctic region.

### Introduction

Two species of the subgenus *Lethrus* SCOPOLI, 1777 of the genus *Lethrus* are currently known from the southern and southeastern region of the Caspian Sea in Iran and west Turkmenistan: *Lethrus acutangulus* BALLION, 1870 and *L. sieversi* KOZHANTSCHIKOV, 1894 (NIKOLAJEV 2003; KRÁL & NIKOLAJEV 2006). For *L. acutangulus*, the material examined in the present paper came from the north Iranian provinces of Māzandarān (مازندران), Golestan (گلستان) and N Semnān (سمنان). *L. sieversi* is so far known only from the western slopes of the Kopet Dagh mountain range (کپهداغ) in Turkmenistan (NIKOLAJEV 2003; SEMENOV-TYAN-SHANSKIJ & MEDVEDEV 1936). Three other species of *Lethrus*, of the subgenus *Scelolethrus* SEMENOV, 1892 are known from Iran; *L. (Scelolethrus) chorassanicus* SEMENOV & MEDVEDEV, 1935, *L. (Scelolethrus) mithras* REITTER, 1904 and *L. (Scelolethrus) percutens* GUSAKOV & KLIMENKO, 2011. Further species of *Lethrus* are present in the nearby Kopet Dagh mountain range in West Turkmenistan: *L. (Heteroplistodus) cicatricosus* REITTER, 1889, *L. (Scelolethrus) crypticus* KRÁL & OLEXA, 1996, *L. (Scelolethrus) rosmarus* BALLION, 1871, *L. (Scelolethrus) spinnimanus* JAKOVLEV, 1892, *L. (Scelolethrus) substriatus* KRAATZ, 1883, *L. (Scelolethrus) sulcatus* KRAATZ, 1883 and *L. (Scelolethrus) tekkensis* KRÁL & OLEXA, 1996.

Fifteen other species of the subgenus *Lethrus* are known from Europe and the Mediterranean region (KRÁL et al. 2001; KRÁL & NIKOLAJEV 2006; PITTINO 2011; KRÁL & HILLERT 2013; KRÁL et al. 2013).

In this paper we described *Lethrus baiocchi* a new species from the Māzandarān, Semnān and Tehrān (تهران) provinces of Iran.

The three species differ clearly in the shape and position of the ventral mandible processes, the dimension and shape of the mandibles, the anterior angles of the pronotum and the anterior margin of the male metafemur. A matrix defining the most important diagnostic characters of the three species is established. The external structures of the males genitalia shows homogenous morphologies, these characters are known from several related species distributed in Middle Asia and Western Palearctic (KRÁL & HILLERT 2013; KRÁL et al. 2013).

### Material and Methods

The following abbreviations identify the collections housing the material examined (curators in brackets):

- ALCR: private collection of Andrea Liberto, Rome, Italy;
- DBCR: private collection of Daniele Baiocchi, Rome, Italy;
- DEIC: Germany, Müncheberg, Deutsches Entomologisches Institut (Lutz Behne);
- DKCP: collection of David Král, Praha, (deposited in NMPC);
- DSCC: private collection of Daniele Sechi, Cagliari, Italy;
- FICO: private collection of Francesco Izzillo, Orta di Atella, Italy;
- GCCR: private collection of Gianpaolo Carissimi, Rome, Italy;
- GNCR: private collection of Giorgio Narducci, Rome, Italy;
- IRSNB: Institut Royale des Sciences Naturelles de Belgique, Brussels (Alain Drumont);
- JSCP: private collection of Jan Schneider, Czech Republic, Praha;
- MNHN: Museum national d'Histoire Naturelle, Paris (Antoine Mantilleri);
- MZUR: Museo del Dipartimento di Zoologia dell'Università di Roma "La Sapienza", Rome, Italy;
- NMPC: National Museum (Natural History), Prague, Czech Republic (Jiří Hájek);
- NME: Naturkundemuseum Erfurt (Matthias Hartmann);
- OHCB: private collection of Oliver Hillert, Schöneiche bei Berlin, Germany;
- SMNS: Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang Schawaller);
- SZCM: private collection Stefano Ziani, Meldola, Italy.

Specimens of the newly described species are provided with one red printed label "HOLOTYPE, ALLOTYPUS or PARATYPUS name of taxon nov. spec. Oliver Hillert & Daniele Sechi, det. 2014". Remarks of the author and comments are indicated in brackets. Through the text the following abbreviations are used (m) male, (f) female, x / y = number of males / number of females.

## Taxonomy

***Lethrus (Lethrus) acutangulus* BALLION 1870** (Figs. 1, 2, 3, 10, 11, 12, 16, 19, 21, 24, 26, 29, 30, 34, 36, 38, 39, 40, 41, 42, 43, 48, 49, 50, 56, 59)

*Lethrus persicus* REITTER 1890: 291 (synonymized by SEMENOW 1894)

Type locality: "östliches Ufer des Kaspischen Sees, unweit Astrabat [east bank of Caspian sea, Astrabat env.]".

Type material examined: *Lethrus persicus* labelled: Holotype (♀) (DEIC) (designated by NIKOLAJEV 1974), "*Lethrus spec.?*, persia, Staudinger// 302// *L. persicus* m// Lectotypus// H. Gaedike des. 1987// Holotypus *Lethrus, persicus* Rtt., 22.iii.1974 Nikolajev// *Lethrus, acutangulus* Ball., Nikolajev det."; Paralectotypus (♀) (DEIC) (designated by GAEDIKE 1987), "astrabad, Staudinger// *Lethrus, acutangulus* Ball., Nikolajev det.// Paralectotypus// H. Gaedike des. 1987".

Additional material examined (107 specimens).

G o l e s t a n : Iran, Golestan, östl. Elburs-Gebirge, 45km N Sharud / 10km S Shirin, Abad, 1900–2000m, 3.vi.2008, H. Mühle lgt., 0/2 in OHCB, Astrabad, Persia, 1/0 in OHCB; Persien, Astrabad, 2/0 in DKCP.

M ā z a n d a r ā n : Iran, Mazandaran, 1400m, 20km südlich Nowshahr Weysser, 9.-14.vi.1977, Holzschuh & Ressler lgt., 0/1 in OHCB; Iran, NE Mazandaran, Karim Ishán, 37. 26 N 55. 23 E, 70 km NE Gombad-é-kávús, 4-7.iv.1999, J. Kalab lgt., 1/1 in OHCB, 1/1 in JSCP, 1/0 in DKCP; N Iran, p. Mazandaran, Nahār Hōrān, 10 km S Gorgan, 3645N 5428E, 16.vi.1999, lgt. P. Kabátek, 1/0 in DKCP; Iran, Mazandaran, Kelardasht, m 1200, 22.v.2002, G. Magnani lgt., 2/6 in SZCM; N Iran, Mazandaran, 12 km E Kelardasht, m 1200, 19.vi.2003 G. Sama lgt., 4/2 in SZCM; N Iran, Mazandaran, 12 km E Kelardasht, m 1100, 20.vi.2003 D. Gianasso lgt., 1/2 in SZCM; Iran, Mazandaran, Kelardasht, m 1100, 20.vi.2003, P. Rappuzzi lgt., 1/1 in SZCM; N Iran, Mazandaran prov., Hasan Kif valley SW, 11.-16.vii.2003, 1800-3000m, ivo Jeniš leg., 1/0 in DKCP; Iran, Mazandaran prov., C. Elburs) Kandelous, 1800-2100m, 18.vi.2009, 1/2 in OHCB, 1/1 in DSCC, 1/1 in JSCP; N-Iran, Prov. Mazandaran, vic. Kolijak, 36°28'28"N 51°39'35"E, 1600-1850m, 4/5.v.2010, A. Skale lgt., 1/1 in OHCB; N-Iran, Prov. Mazandaran, Kodir, alpine meadow pasture, 1700m NN, 36°26'56"N 51°48'06"E, 5.V.2012, D. Frenzel lgt., 3/1 in NME; N-Iran, Prov. Mazandaran, vic. Kolijak, 36°28'18"N 51°40'14"E, Umgebung Kolijak, Berghang, 1840m, 5.v.2010, J. Weipert lgt., 9/3 in NME; Iran, Mazandaran prov., Kalarasht env., 1236m, 17.v.2010, 1/0 in OHCB; Ir., Mazandaran pr., Elburs Mts., Kandelous env., 36°23'N 51°31'E, alt. 1900m, Machálik lgt., 1/1 in OHCB; Iran, Mazandarān prov., Sari-Shahmirzād, 4 km SE Kiyāsar 1500 m, 36°13'43.3"N-53°33'51.2"E 18.-24.v.2010 D. Baiocchi lgt., 3/5 in DSCC, 7/9 in DBCR; Iran, Mazandarān prov., Lasak env., 950 m, Marzanābād) Kojur rd., 36°25'80"N-51°28'14"E 22.v.2012 D. Baiocchi lgt., 2/4 in DSCC, 5/0 in DBCR.

S e m n ā n Iran, Semnan, östl. Elburs Gebirge, 40 km N Sharud, Abr 1800-1900m, 2.vi.2008, Mühle lgt., 1/1 in OHCB; Iran, Semnān prov., Šāh Kūh range, NW of Abr 1865 m, 36°43'01.5"N-55°03'08"E 19-22.v.2010 D. Baiocchi leg., 2/0 in DSCC, 1/2 in FICO; Iran, Semnan, 4/9 km NE Abr, m 1600/1800, 19-23.v.2010, G. Sama lgt., 1/2 in SZCM; Pers, Kopet-Dagh, Siaret 1160m, v.99, coll. Hauser, 1/0 in OHCB, 1/0 in JSCP, 1/1 in DKCP.

T a x o n o m i c r e m a r k s : In his study of the genus *Lethrus*, "Analytische Uebersicht der bekannten *Lethrus*-Arten", REITTER's description (1890: 291) of *Lethrus persicus* from "Nordpersien [N Persia], (Astrabad)" was based on only three females. Comparing it with *L. (L.) cephalotes* v. *podolicus* FISCHER VON WALDHEIM, 1822 [= *L. apterus* LAXMANN, 1770], he notes the difference in sculpture of the elytra, the presence of a medial furrow on the pronotum and of a well developed tubercle on the head. *L. persicus* was synonymised with *L. acutangulus* by SEMENOW (1894: 486). The distinct character of Reitter's description "well developed tubercle of the head" is also a character of the female of *L. acutangulus* (Figs 34, 35), furthermore all differentiating characters we have found assume that the types of *L. persicus* are females of *L. acutangulus*.

***Lethrus (Lethrus) baiocchi nov.sp.*** (Figs 4, 5, 6, 13, 14, 15, 17, 20, 22, 25, 27, 31, 32, 33, 35, 37, 39, 44, 45, 46, 47, 51, 52, 53, 57, 59, 60, 61)

Type locality: Iran, Māzandarān [مازندران], Sari-Shahmirzād, 4 km SE Kiyāsar, 1500 m, 36°13'43,3"N-53°33'51,2"E.

Holotypus (male), labelled: "Iran, Mazandarān prov., Sari-Shahmirzād, 4 km SE Kiyāsar 1500 m, 36°13'43,3"N-53°33'51,2"E 18-24.v.2010 D. Baiocchi lgt.", in SMNS.

Allotypus (female), labelled: "Iran, Mazandarān prov., Sari-Shahmirzād, 4 km SE Kiyāsar 1500 m, 36°13'43,3"N-53°33'51,2"E 18-24.v.2010 D. Baiocchi lgt.", in SMNS.

Paratypes (179 specimens).

Māzandarān: N Iran, Semnān 32 km NE Shahmirzād, m 2330 18.v.2010 D. Gianasso leg. 0/2 in DSCC; N. Iran, sö. Sari-Kiasar 1300 m, 02.vi.[19]77, K. Bernhauer lgt., 1/0 in DBCR; Iran, Mazandarān prov., Sari-Shahmirzād, 4 km SE Kiyāsar 1500 m, 36°13'43,3, N-53°33'51,2, E 18-24.v.2010 D. Baiocchi lgt., 4/7 in ALCR, 15/66 in DBCR, 4/10 in DSCC, 2/2 in GNCR, 1/1 in IRSNB, 1/1 in MNHN, 3/3 in MZUR, 1/1 in NMPC, 1/1 in GCCR, 6/12 in OHCB; idem 18-24.v.2010 D. Gianasso lgt., 2/3 in DSCC; Iran, Mazandarān, Sari Kiyasar, m 1500, 1/24.v.2010, G. Sama lgt., 0/1 in SZCM; Iran, Mazandarān, 20.iv.2010, E of VENA JAM, 36°21'23"N 53°24'20"E, ca 1000 m, Tursonov lgt., 3/11 in DKCP.

Semnān: Iran, Semnān prov., Šāh Kūh range, NW of Abr 1865 m, 36°43'01.5"N-55°03'08"E 18-22.v.2010, D. Baiocchi leg., 1/2 in DSCC, 2/3 in FICO, 0/1 in OHCB.

Tehrān: Iran, Elborz 40 km E Tehran, m 1700 14.iv.2001, J. Klir lgt., 2/4 in SZCM.

**Etymology:** Patronymic; dedicated to Daniele Baiocchi (Rome, Italy) an excellent specialist of the genus *Anthaxia* (Coleoptera, Buprestidae) and collector of the majority of the specimens of the new species.

**Description of holotype (male)** (Figs 31-32): well developed male with well developed ventral mandible processes (Figs 4, 5, 6, 13, 14, 15, 22). Total body length 25 mm. Oblong, strongly convex; dorsal surface black, moderately shiny; ventral surface black; claws black; setation black.

**Head** (Figs 17, 20, 25): labrum bilobed, asymmetrical, right lobe more developed; surface rugosely, shallowly and sparsely punctuated, punctures separated by one time their diameter; anterior margin with a row of long dense macrosetae. Clypeus transverse, trapezoidal, with anterior angles round. Frontal impressions vague, frontal tubercles indistinct. Frontoclypeal suture present only laterally; keels separating eye canthus from frons distinctly developed. Eye canthus exceeding eyes, projecting anterolaterally, almost acute-angled, anterolateral angle round, oblique keels above eyes absent. Pleurostomal process evenly arcuate, weakly exceeding ventrolateral mandibular outline. Punctuation of frons double, consisting of coarse, regularly and densely distributed punctures, intermixed with fine, irregularly distributed ones; coarse punctures separated by approximately one time their diameter, punctuation becoming distinctly sparser posteriorly and on occiput; clypeus and eye canthus with rugose microsculpture

**Mandible** (Figs 4, 5, 6, 13, 14, 15, 17, 20, 22, 25): strongly asymmetrical; left mandible: external dorsolateral outline evenly round in anterior quarter, strong concavity in the middle with distinct angles on its posterior part, external outline interrupted in subarea of concavity, maximal width of left mandible in posterior third, ventrolateral mandibular outline keel-like; right mandible: distinctly more developed than the left, dorsolateral mandibular outline evenly round in anterior third, short concavity in the middle, maximal width in the front part of mandible, ventrolateral outline keel-like with weak ventral tooth near the base of ventral process.

**Ventral mandibular processes** (Figs 4, 5, 6, 13, 14, 15, 22, 25): asymmetrical; right process: distinctly longer than horizontal length of mandible; base of

process weakly thickened, base located at the apex of mandibles, not exceeding lateral mandibular outline in dorsal aspect, inferobasal tooth present, apical tooth absent, apex bent inwardly and backwardly; left process: approximately as long as horizontal length of mandible, base weakly thickened, based in anterior quarter of mandible, not exceeding lateral mandibular outline in dorsal aspect, inferobasal tooth absent, process in similar shape as right one but shorter, less bent inwardly and backwardly on apex, inferomedial tooth weakly, evenly round.

**Pronotum** (Fig 27): transverse, distinctly broader than base of elytra, broadest just in basal third; margin entirely bordered, anterior angles distinct projecting anterolaterally; basal margin weakly s-shaped. Punctuation of dorsal surface simple; punctures separated by approximately four to five times their diameter, surface near lateral margin weakly shagreened especially on posterior angles.

**Scutellar shield**: widely triangular, finely shagreened.

**Elytra** (Fig 32): almost semicircular, apices not prominent, each apex forming independent arc. Epipleuron strongly narrowed apically, epipleural keel not reaching elytron apex. Whole surface finely transversally rugose; striae weakly indicated.

**Legs** (Figs 31, 32, 57): profemur not armed, protibia with eight gradually diminishing external denticles proximally, and with a row of tubercles on ventromedial edge; metafemur with distinct concavity on frontline at the inner half.

**Aedeagus**: as in Figs. 44, 45, 46, 47, 51, 52, 53.

**Variability in males**: Body length 28.0-24.0 mm. Mandible processes in maximum developed (hyperthelic) males longer but in similar shape undeveloped (hypothelic) males.

**Female**: Body length 25.0-13.0 mm, allotype 25 mm (Figs 33, 35, 37), differs from males as follows: ventral mandibular process absent, anterior angles not projecting anterolaterad.

**Differential diagnosis**: for differential diagnosis of males refer to the differentiating characters (Table 1). The concavity on anterior margin of metafemur of the three relevant species can be more or less variable, however, the basic form is illustrated in Figs 56-58; for differential diagnosis of females see the differentiating characters (Table 2).

**Distribution**: Iran, Māzandarān, Semnān and Tehrān provinces (59).

**Discussion**: So far the newly described species is known from two localities on the southern slopes of Elborz Mts. in the Iranian provinces of Māzandarān, Semnān and Tehrān. The compared species *L. acutangulus* is also known from the same locality: "Iran, Mazandarān prov., Sari-Shahmirzād, 4 km SE Kiyāsar 1500 m, 36°13'43,3"N-53°33'51,2"E" (59).

***Lethrus (Lethrus) sieversi* D. KOZHANTSCHIKOV 1894** (Figs 7, 8, 9, 18, 23, 28, 54, 55, 58, 59)

Type locality: "Turkmenia Tekke".

**Material examined** (14 specimens). W. Turkmenistan, Kara Kala distr., Sumbar riv. 20.v.1966, 1/1 in OHCB; Turkmeniya, 2. v. 1974, Syunt mt., S. Medvedev, 3/3 in DKCP; Turkmenistan, 3.v.1990, W Kopet Dagh, 1500 m, Sayran vill. env., coll. D. Král, 2/0 in DKCP; Turkmeniya, 3.v.1990, W-Kopet Dagh Mts., Bakharden county, env. Sayran vill., 1400-1600 m, B. Tuniyev lgt., 1/0 in DKCP; 22/93 Turkmenistan 1993, W. Kopeth Dagh Gebirge, Tutu Kala Pass, 1300m, 15 km

S. Seivan, 2.-3.v.93, leg P. Cate & A. Dostal, 1/0 in JSCP; Turkmeniya, 2.-3.v.1990, W Kopetdag Mts., Bakharden county, env. Sayvan vill., 1400-1600m, B.Tuniyev lgt., 1/0 in JSCP; Turkmenia, Vert g Sjunt, 3.v.74, G. Medvedev, 1/0 in JSCP.

**Tab. 1.** Differentiating characters of the species of the subgenus *Lethrus* from Iran and west Turkmenistan (male)

character / species	<i>Lethrus (L.) acutangulus</i>	<i>Lethrus (L.) baiocchii</i> nov.sp.	<i>Lethrus (L.) sieversi</i>
shape of anterior angles of pronotum	projecting anteroventrally (Figs 19, 26)	projecting anteroventrally (Figs 20, 27)	evenly round (28)
ventral mandibular process in lateral aspect (right)	base located at the middle of mandibles, directed forward and downward, straight, basal internal tooth absent (Figs 1, 10)	base at the apex of mandibles, directed downward, more or less straight, basal internal tooth absent (Figs 4, 13)	base at the front part of mandibles, directed downward, bent backward and inward, basal internal tooth present (7)
ventral mandibular process in lateral aspect (left)	base located at the middle of mandibles, directed anteroventrally, bent evenly downward (Figs 2, 11)	base in the anterior quarter of mandibles, directed downward, straight (Figs 5, 14)	base at the middle of mandibles, directed anteroventrally, bent evenly downward (8)
ventral mandibular process in frontal aspect	right process straight, downward, apex bent strongly inward; left process bent (45°) inward short after base (Figs 3, 12)	right process straight, downward, apical quarter evenly bent inward; left process straight, downward (Figs. 6, 15)	right process straight, bent inward (45°), apex bent hardly inward; left process straight (9)
shape of mandibles in dorsal aspect	more or less symmetrical, maximal width in middle (Figs 16, 19)	asymmetric, right mandible more developed (Figs 17, 20)	asymmetric, right process more developed (18)

**Tab. 2.** Differentiating characters of the species of the subgenus *Lethrus* from Iran and west Turkmenistan (female)

character / species	<i>Lethrus (L.) acutangulus</i>	<i>Lethrus (L.) baiocchii</i> nov.sp.	<i>Lethrus (L.) sieversi</i>
anterior angles of pronotum	weakly acuminate, without transverse impression near angle (33, 36)	weakly acuminate, weakly transverse impression near angle (37)	evenly round
labrum in dorsal aspect	anterior depression evenly depressed (38)	anterior depression abruptly depressed (39)	anterior depression evenly depressed

character / species	<i>Lethrus (L.) acutangulus</i>	<i>Lethrus (L.) baiocchii</i> nov.sp.	<i>Lethrus (L.) sieversi</i>
surface of pronotum	more or less alutaceous, punctures distinct and separated by three times their diameter, becoming more shagreened near lateral margin	more or less shiny, very fine and disperse punctuation on dorsal surface, becoming weakly shagreened near lateral margin	more or less shiny, very fine and disperse punctuation, Punctuation on dorsal surface, becoming weakly shagreened near lateral margin
tubercle of head	distinct, well developed (Figs 34, 36)	distinct but hardly developed (Figs 35, 37)	indistinct, not well developed

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### Zusammenfassung

*Lethrus (Lethrus) baiocchii* nov.sp. aus den iranischen Provinzen Māzandarān (مازندران), Semnān (سمنان) und Teherān (تهران) wird in der vorliegenden Arbeit beschrieben. Eine Tabelle zur Unterscheidung der Arten der iranischen und westturkmenischen Arten der nominotypischen Untergattung *Lethrus* SCOPOLI, 1777 ist beigefügt. Die Unterschiede des Kopfes, der Mandibelanhänge der Männchen, das Halsschild und die männlichen Genitalien sind in Zeichnung und Bild dargestellt.

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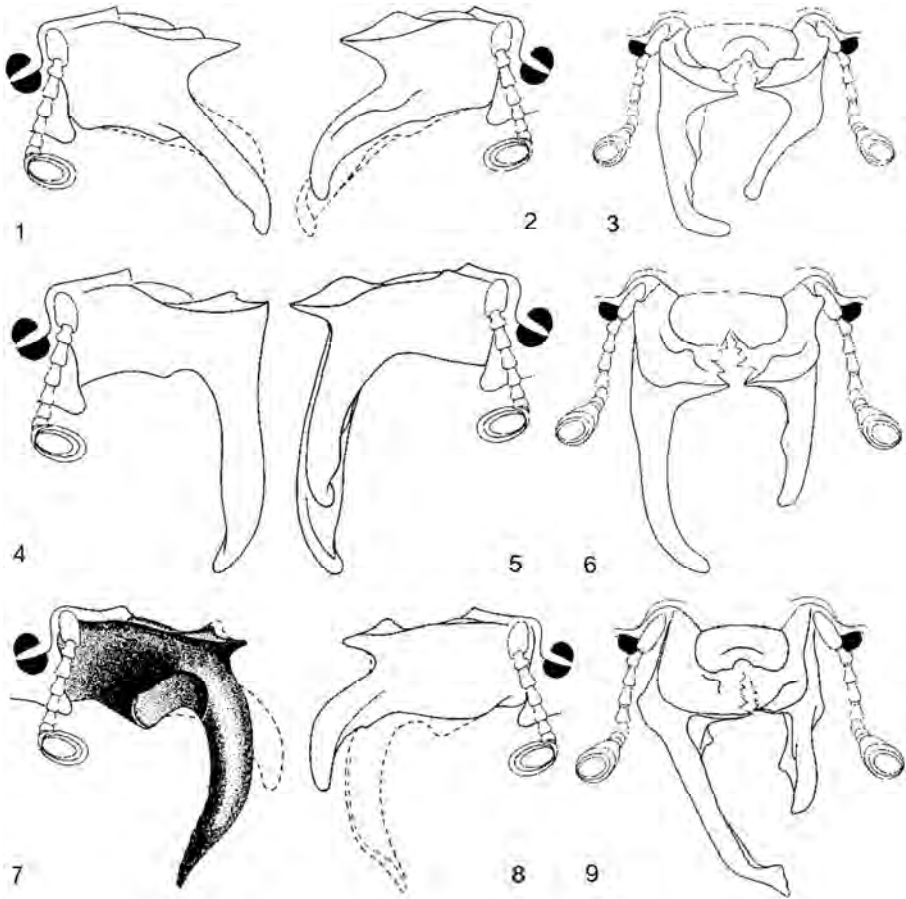
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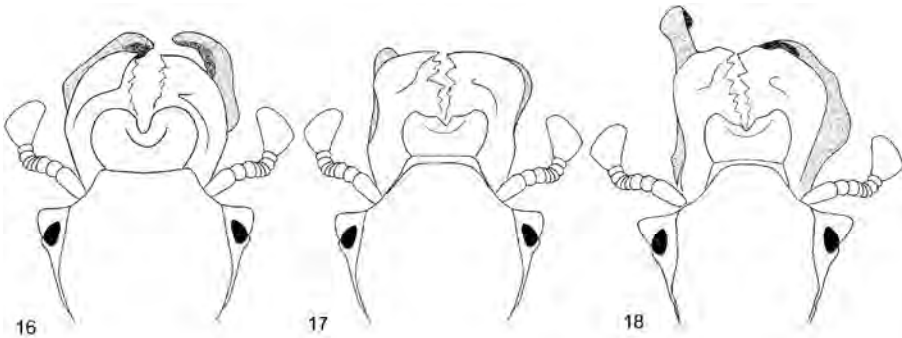




**Figs. 1-9.** Male mandible and ventral mandible process (frontal and lateral aspects): (1-3) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; OHCB); (4-6) *Lethrus (Lethrus) baiocchii* nov.sp., Paratypus (Iran: Māzandarān; DSCC); (7-9) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



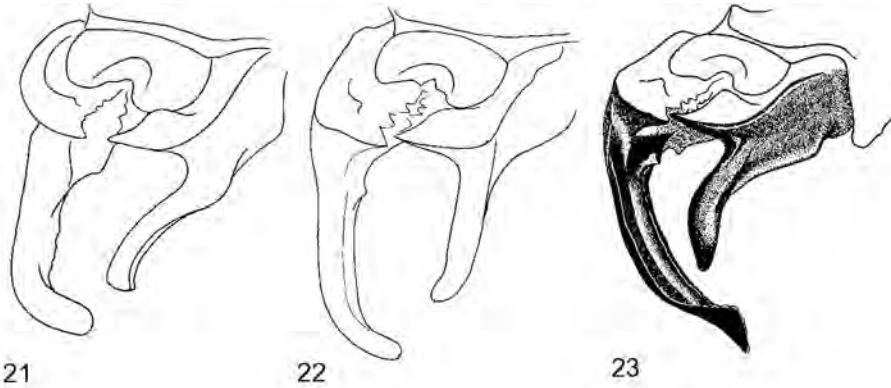
**Figs. 10-15.** Male mandible and ventral mandible process (frontal and lateral aspects): (10-12) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC); (13-15) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



**Figs. 16-18.** Head of male in dorsal aspect: (16) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; OHCB); (17) *Lethrus (Lethrus) baiocchii* nov.sp., Paratypus (Iran: Māzandarān; DSCC); (18) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



**Figs. 19-20.** Head of male in dorsal aspect: (19) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC); (20) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



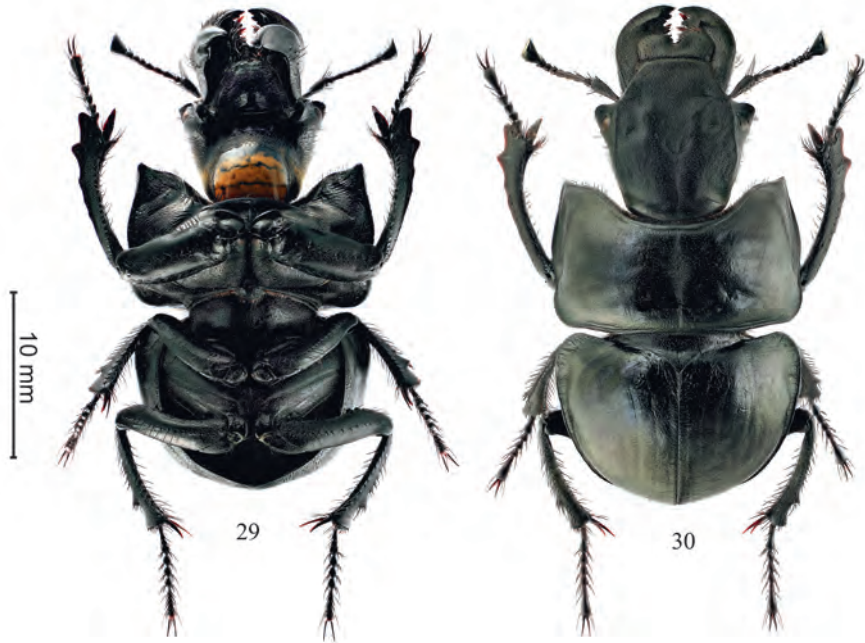
**Figs. 21-23.** Male mandible and ventral mandible process (frontolateral aspect): (21) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; OHCB); (22) *Lethrus (Lethrus) baiocchii* nov.sp., Paratypus (Iran: Māzandarān; DSCC); (23) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



**Figs. 24-25.** Male mandible and ventral mandible process (frontolateral aspect): (24) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC): (25) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



**Figs. 26-28.** Male pronotum (lateral aspect): (26) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC): (27) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS): (28) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



**Figs. 29-30.** Male habitus (dorsal and ventral aspects): (29) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC) male; (30) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC) female.



**Figs. 31-33.** Male habitus (dorsal and ventral aspect): (31-32) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS); (33) *Lethrus (Lethrus) baiocchii* nov.sp., Allotypus (Iran: Māzandarān; SMTS).

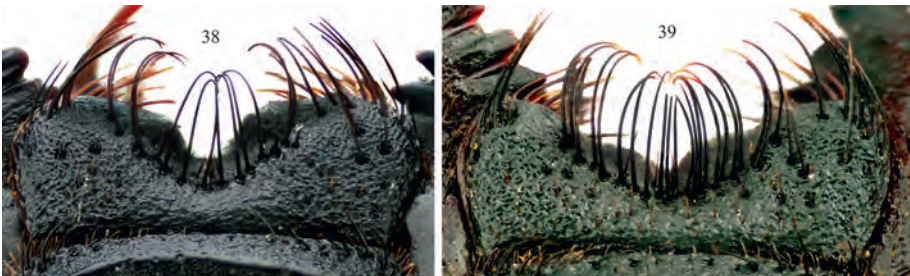




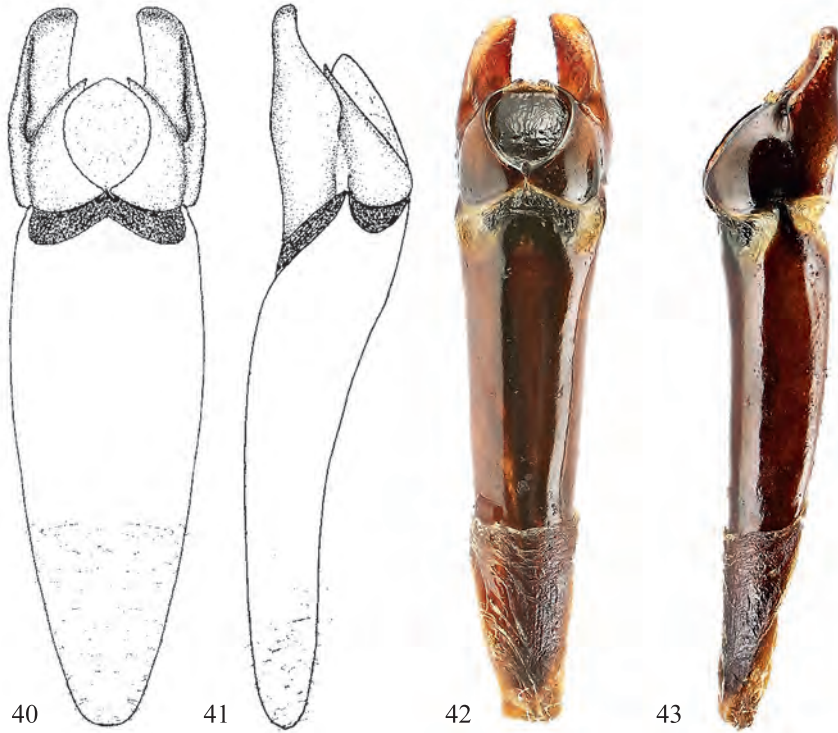
**Figs. 34-35.** Female head (frontolateral aspect): (34) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC); (35) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



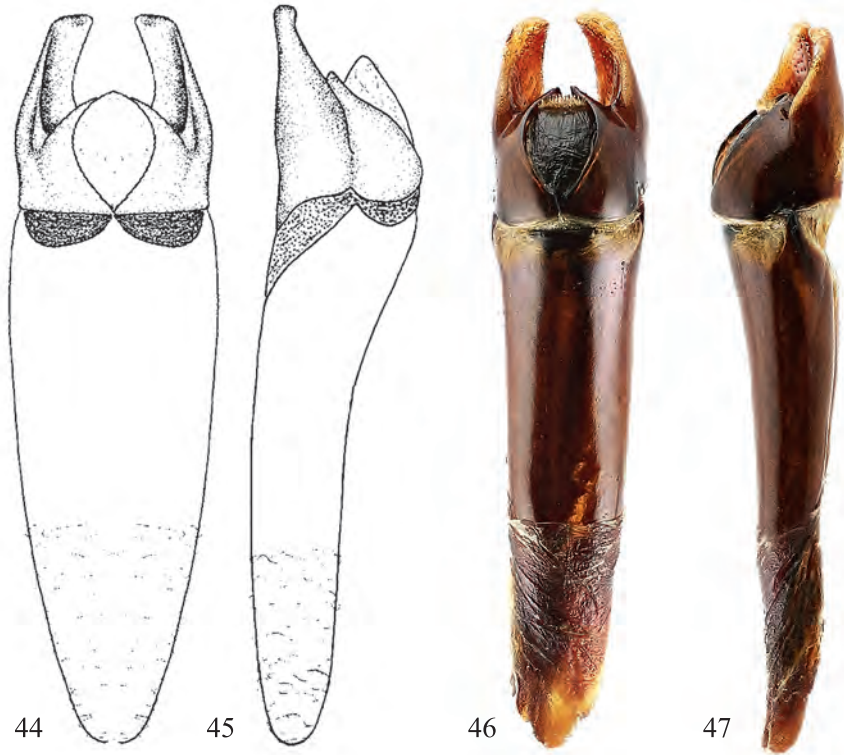
**Figs. 36-37.** Female frontal margin of pronotum: (36) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC); (37) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



**Figs. 38-39.** Female labrum: (38) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; OHCB); (39) *Lethrus (Lethrus) baiocchii* nov.sp., Allotypus (Iran: Māzandarān; SMTS).



**Figs. 40-43.** Aedeagus (frontal and lateral aspects): **(40-41)** *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; OHCB); **(42-43)** *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC).



**Figs. 44-47.** Aedeagus (frontal and lateral aspects): (44-45) *Lethrus (Lethrus) baiocchii* nov.sp., Paratypus (Iran: Māzandarān; DSCC); (46-47) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).





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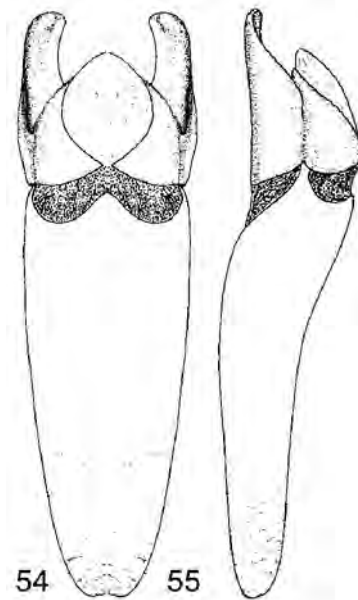


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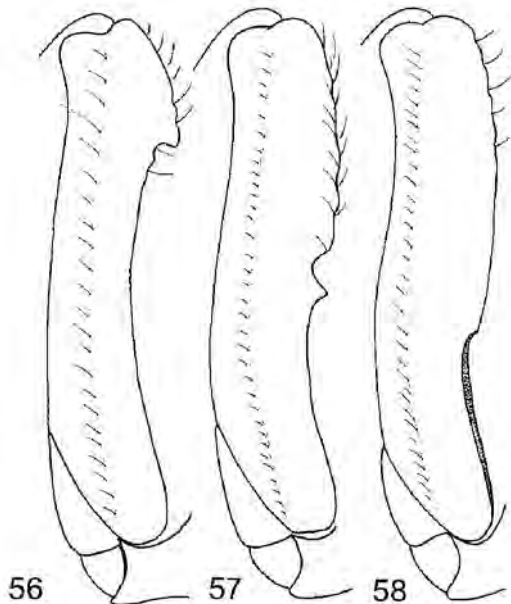


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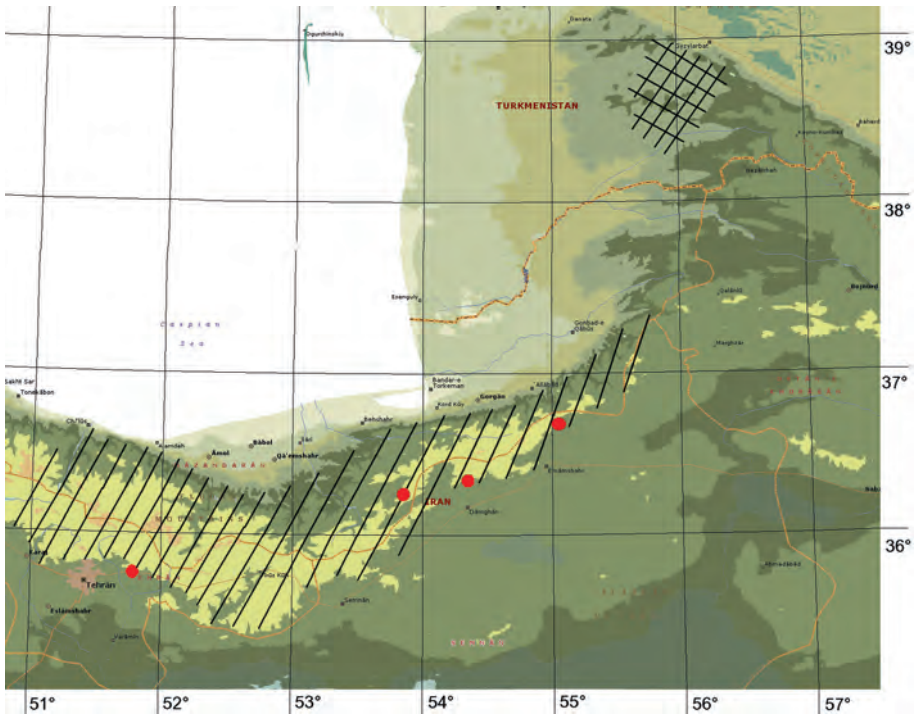
**Figs. 48-53.** Aedeagus with extended inverted internal copulatory organ (frontal, dorsal and lateral aspects): (48-50) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Māzandarān; DSCC); (51-53) *Lethrus (Lethrus) baiocchii* nov.sp., Holotypus (Iran: Māzandarān; SMTS).



**Figs. 54-55.** aedeagus (frontal and lateral aspects): *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



**Figs. 56-58.** Male metafemur: (56) *Lethrus (Lethrus) acutangulus* BALLION, 1870, (Iran: Mazandaran; OHCB); (57) *Lethrus (Lethrus) baiocchii* nov.sp., Paratypus (Iran: Mazandaran; DSCC); (58) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894, (Turkestan: Kara Kala; OHCB).



**Fig. 59.** Localities of the new species *Lethrus (Lethrus) baiocchii* and the distribution of the compared species of the subgenus *Lethrus* from Iran and Turkestan: slanted hatch ) *Lethrus (Lethrus) acutangulus* BALLION, 1870: red dots) *Lethrus (Lethrus) baiocchii* nov.sp.: crosshatch) *Lethrus (Lethrus) sieversi* KOZANTSCHIKOV, 1894.





**Fig. 60.** Habitat of the new species *Lethrus* (*Lethrus*) *baiocchii*, Sari-Shahmirzād, Iran.



**Fig. 61.** Breeding burrow in the habitat of the new species *Lethrus* (*Lethrus*) *baiocchii*, Sari-Shahmirzād, Iran.

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