

THREE NEW CAVE-DWELLING LEIODID BEETLES (COLEOPTERA: LEIODIDAE: CHOLEVINAE: LEPTODIRINI) FROM BOSNIA AND HERZEGOVINA

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Abstract – Three new troglobitic leiodid beetle species have been described from several underground habitats in Central Bosnia and Herzegovina: *Leonhardia jajcensis* sp. n., from the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina, *Katobatzon apfelbecki* sp. n., from the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, and *Protobracharthron dusinae* sp. n., from the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica. The three leiodid species are easily distinguished from related taxa. All important morphological characteristics of the species have been listed, along with the diagnoses and images of the taxa. The new species are relicts and endemics of Central Bosnia and Herzegovina and probably belong to old phyletic lineages of Tertiary or even pre-Tertiary origin.

Key words: Leiodidae, Cholevinae, Leptodirini, *Leonhardia*, *Katobatzon*, *Protobracharthron*, new species, cave-dwelling fauna, Central Bosnia and Herzegovina

INTRODUCTION

Altogether four species and five subspecies of the genus *Leonhardia* Reitter, 1901, are presently known. They inhabit Bosnia and Herzegovina and are spread from Mts. Gola Planina and Vlašić in the north to Mts. Pakline, Vran, and Plasa in the south (Perreau, 2000, 2004; Nonveiller et al., 2002). The species are *Leonhardia droveniki* Perreau, 1999 (from a cave on Mt. Kruščica, near Ilidža), *L. hilfi* Reitter, 1901 (from caves and soil on Mts. Vran and Plasa), *L. reitteri* Breit, 1902 (from a few caves on Mts. Vlašić and Gola Planina), and *L. delminiumica* Nonveiller, Pavićević, Rađa & Vujčić-Karlo, 2002 (from the Jama na Paklinama Pit, near Tomislavgrad, Mt. Pa-

kline) (Perreau, 1999, 2000; Nonveiller et al., 2002). *Leonhardia hilfi* comprises a total of two subspecies: *L. hilfi hilfi* Reitter, 1901 (from caves on Mt. Vran) and *L. hilfi robusta* Knirsch, 1928 (endogean from the Strmenica site, Mt. Plasa) (Perreau, 2000). *Leonhardia reitteri* comprises the following three subspecies: *L. reitteri reitteri* Breit, 1902 (from the Ledenića Cave, near the Harambašina Voda Spring, Mt. Vlašić), *L. reitteri mersa* Knirsch, 1928 (from caves near the village of Korićani, Mt. Vlašić), and *L. reitteri zariquieyi* Müller, 1937 (from the Ćorića Pećina Cave, near Jajce, Mt. Gola Planina) (Perreau, 2000).

The genera *Katobatzon* Knirsch, 1928, and *Protobracharthron* Reitter, 1889, are monotypic and

restricted to Central Bosnia and Herzegovina. The former comprises the species *Katobatzon antennarium* Knirsch, 1928 (from the Pećinica Cave, Mt. Vlašić) (Knirsch, 1928; Perreau, 2000). The latter genus contains the species *Protobracharthron reitteri* (Apfelbeck, 1889) (from a cave near Kreševo, Fojnica district) (Jeannel, 1924; Perreau, 2000). Perreau (2000) erroneously reported the species from Dalmatia (Croatia) instead of Bosnia and Herzegovina.

Certain regions of Bosnia and Herzegovina (especially karstic areas in Herzegovina) remain unexplored, and new leptodirine leiodid taxa can be expected to be found in future.

Several field trips in central Bosnia and Herzegovina organized by the Špiljar Speleological Society (Split, Croatia) and the Speleological Association of Bosnia and Herzegovina (Sarajevo, Bosnia and Herzegovina) in 2012 and 2013 resulted in the discovery of three new leptodirine leiodid species. Both descriptions and diagnoses of the new leiodid taxa are given in the current study. The diagnosis of *Leonhardia jajcensis* sp. n. is based on a thorough analysis of the type series of 22 males and 44 females collected in the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina; the diagnosis of *Katobatzon apfelbecki* sp. n. is based on a thorough analysis of the type series of five males and three females collected in the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, and the diagnosis of *Protobracharthron dusinae* sp. n. is based on a thorough analysis of the type series of one male and one female collected in the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica.

MATERIALS AND METHODS

The leiodid beetle specimens were analyzed in the laboratories of the Institute of Zoology, University of Belgrade – Faculty of Biology, Belgrade, Serbia. The genitalia were removed from the bodies and fixed on microscope slides in a medium composed of Canada balsam and xylol. Afterwards the leiodids were glued

on paper labels and then analyzed as dry specimens. All taxonomically important morphological characters were studied for comparison. A Carl Zeiss Stemi 2000 binocular stereomicroscope and Carl Zeiss Axioskop 40 microscope with a Canon PowerShot A80 digital camera attached were used in this study. Additionally, Canon PowerShot SX 130 IS and Canon EOS 400D digital cameras were used for photographing whole specimens.

RESULTS AND DISCUSSION

FAMILY LEIODIDAE FLEMING, 1821

SUBFAMILY CHOLEVINAE KIRBY, 1837

TRIBE LEPTODIRINI LACORDAIRE, 1854

GENUS *LEONHARDIA* REITTER, 1901

LEONHARDIA JAJCENSIS S. ĆURČIĆ & RAĐA, SP. N. (Figs. 1-9)

Etymology – After the city of Jajce (Central Bosnia and Herzegovina), situated near the type habitat of the new species – the Kapnica Cave.

Type locality – Kapnica Cave, village of Božikovac, near Jajce, 1 235 m a.s.l., Mt. Dnolučka Planina, Central Bosnia and Herzegovina, 05 May 2013, holotype male, 21 paratype males and 39 paratype females collected from pitfall traps with rotten meat as bait, leg. T. Rađa; *idem*, 18 November 2012, five paratype females collected by hand, leg. T. Rađa. The type specimens are deposited in the collection of the Institute of Zoology, University of Belgrade - Faculty of Biology, Belgrade, Serbia (IZFB-14/01-66).

Diagnosis – *Leonhardia jajcensis* sp. n. clearly differs from its closest relatives from caves, pits and deep soil in Bosnia and Herzegovina. These are *Leonhardia droveniki*, *L. hilfi*, *L. reitteri* and *L. delminiumica*., Numerous distinctions exist between the new species and the other four species, and these are given below. *Leonhardia jajcensis* sp. n. is easily distinguished



Fig. 1. *Leonhardia jajcensis* sp. n. from the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. Holotype male, habitus (dorsal view). Scale = 1.00 mm.

from *L. droveniki* by its bigger size (3.57–4.00 mm vs. 2.80–3.00 mm), shape of the mesosternal carina (high, almost right-angled, with a rounded anterior margin vs. low, obtuse-angled, with a straight anterior margin), maximum width of the pronotum (somewhat before its mid-length level vs. at its anterior third), shape of the lateral pronotal margins (sub-parallel basally vs. mostly narrowing basally), and shape (inversely ovate vs. oval) and maximum width of the elytra (slightly in front of the mid level vs. at the mid level) (Perreau, 1999; Nonveiller et al., 2002; present study).

Leonhardia jajcensis sp. n. is easily distinguished from *L. hilfi* by the length of the antennae (slightly exceeding the middle of the elytra in males or ending before the middle of the elytra in females vs. reaching the middle of the body), length/width ratio

of the antennomeres VIII (1.79 vs. 2.00) and X (2.00 vs. > 2.50), form (sub-bell-shaped, with the lateral margins rounded anteriorly vs. subquadrate, with the lateral margins obtuse anteriorly) and length/width ratio of the pronotum (slightly wider than long vs. as long as wide), shape of the mesosternal carina (almost right-angled, anterior margin less convex, ventral margin concave vs. obtuse-angled, anterior margin more convex, ventral margin somewhat elevated) and elytra (inversely ovate vs. widely oval), size of the scutellum (huge vs. small), form of the median lobe apex in dorsal view (more elongate, rounded vs. less elongate, somewhat flattened at the top), length of the median lobe (much longer than parameres vs. less longer than parameres), form of the median lobe in lateral view (medially dorsally more convex, sub-basally ventrally convex vs. medially dorsally less convex, sub-basally ventrally almost straight), and position of the inner parameral seta (slightly below the level of the pre-apical parameral seta vs. much below the level of the pre-apical parameral seta) (Reitter, 1901; Jeanne, 1924; Knirsch, 1928; Perreau, 1999; Nonveiller et al., 2002; present study).

Leonhardia jajcensis sp. n. is easily distinguished from *L. reitteri* by its bigger size (3.79 mm vs. 3.20–3.70 mm), depth of the longitudinal impression on the frons (deep vs. shallow), length of the antennae (slightly exceeding the middle of the elytra in males or ending before the middle of the elytra in females vs. barely reaching the middle of the body) and antennomere II (slightly shorter than the following two antennomeres combined vs. as long as the following two antennomeres combined), length/width ratio of the antennomeres VIII (1.79 vs. 1.50) and X (2.00 vs. >2.00), shape of the posterior pronotal angles (almost right-angled, apically obtuse vs. right-angled, apically sharp or weakly acute-angled), mesosternal carina (anterior margin rounded, ventral margin regularly concave vs. anterior margin obtuse, ventral margin deeply incised) and elytra (inversely ovate vs. oval), form of the median lobe in dorsal view (less elongate, almost sub-parallel, with somewhat dragged apex vs. more elongate, somewhat narrowed distally, with a rounded apex),

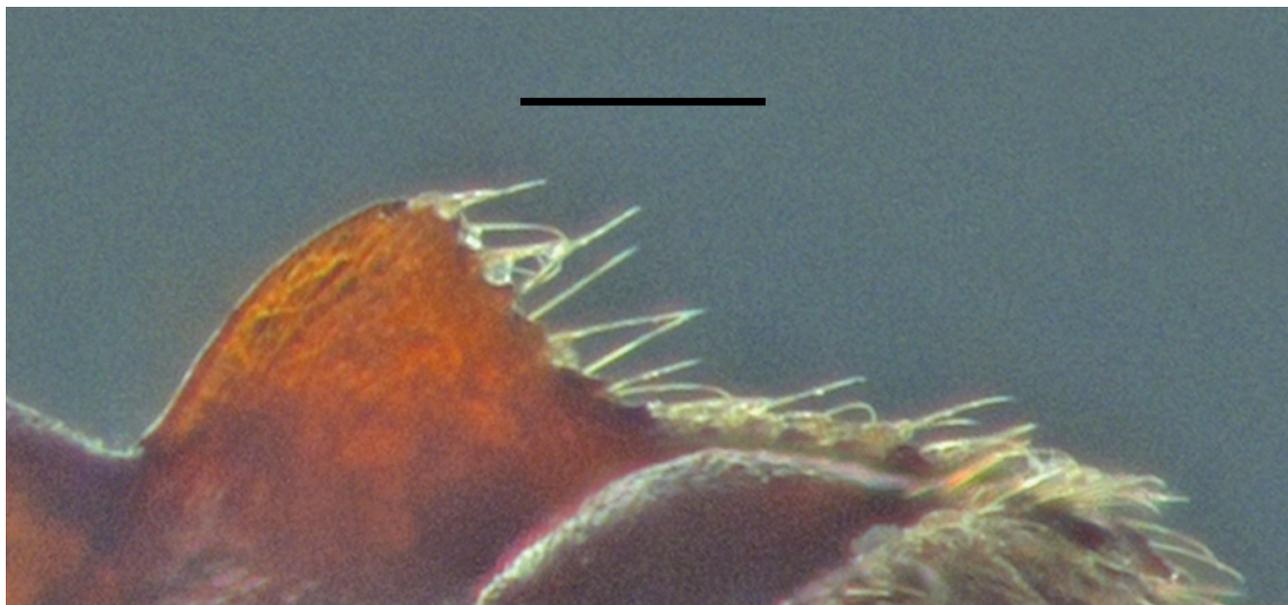


Fig. 2. *Leonhardia jajcensis* sp. n. from the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. Holotype male, mesosternal carina (lateral view). Scale = 0.10 mm.

length of the median lobe (much longer than parameres *vs.* less longer than parameres), length and shape of the basal bulb (shorter, less rounded *vs.* longer, more rounded), form of the median lobe in lateral view (curved in its median part, dorsally less convex, distally dorsally less concave, sub-basally ventrally more convex, apex thinner, more elongate *vs.* curved after the middle, dorsally more convex, distally dorsally more concave, sub-basally ventrally less convex, apex thicker, less elongate), structure of the inner sac (with a “Y”-formed basal piece and other sclerifications *vs.* membranous, only with a “Y”-formed basal piece), and position of the inner parameral seta (slightly below the level of the pre-apical parameral seta *vs.* almost at the level of the pre-apical parameral seta) (Breit, 1902; Jeannel, 1924; Knirsch, 1928; Müller, 1937; Perreau, 1999; Nonveiller et al., 2002; present study).

Leonhardia jajcensis sp. n. is easily distinguished from *L. delminiumica* by its bigger size (3.57–4.00 mm *vs.* 3.10–3.40 mm), length/width ratio of the antennomeres VIII (1.79 *vs.* hardly longer than wider) and XI (< 3.00 *vs.* 3.00), shape of the mesosternal carina (anterior margin rounded, ventral margin

regularly concave *vs.* anterior margin convex, ventral margin somewhat elevated), form of the median lobe (somewhat sub-basally thickened, apically rounded *vs.* sub-parallel, apically pointed) and parameres in dorsal view (somewhat curved before the middle *vs.* sub-parallel), length of the median lobe (much longer than parameres *vs.* less longer than parameres), shape of the basal bulb (less rounded *vs.* more rounded), form of the median lobe in lateral view (curved in its median part, distally dorsally less concave, sub-basally ventrally more convex, distally ventrally straight, apex longer *vs.* curved after the middle, distally dorsally more concave, sub-basally ventrally less convex, distally ventrally not straight, apex shorter), structure of the inner sac (with a “Y”-formed basal piece, two lateral basal sclerifications, a median teeth-like structure, and two distal bands *vs.* membranous, only with a “Y”-formed basal piece and two distal bands), and position of the inner parameral seta (slightly below the level of the pre-apical parameral seta *vs.* much below the level of the pre-apical parameral seta) (Nonveiller et al., 2002; present study).

Description – Medium-sized. Total body length: ♂♂

3.69 mm, ♀♀ 3.92 mm. Pholeuonoid, highly specialized leptodirine beetle (Fig. 1). Color from yellowish-brown to reddish-brown, integument shiny, pubescent, finely microsculptured (Fig. 1).

Head elongate, anophthalmous, without occipital carina, gradually narrowing basally (Fig. 1). Head narrower and shorter than pronotum, slightly longer than wide. Length/width ratio 1.08. Head pubescent, covered with fine puncturation and microsculpture. Mouthparts pubescent, specialized for filtering water and organic matter (Moldovan et al., 2004). Genae somewhat concave. Vertex with a deep longitudinal impression. Antennae elongate, slender, somewhat widened distally, pubescent, more elongate in males, slightly exceeding the middle of the elytra in males or ending before the middle of the elytra in females. Antennae inserted at around the mid-head level. Antennomere I somewhat widened, two times shorter than antennomere II. Antennomere II moderately wide, somewhat widened distally, slightly shorter than the following two antennomeres combined. Antennomeres III-VI similar in shape, narrow, somewhat widened distally, among which antennomeres V and VI slightly longer than antennomeres III and IV. Antennomeres VII and IX-XI much widened, huge, among which X is the shortest and XI the longest. Antennomere VIII small, gradually widened distally, 1.79 times as long as broad. Antennomere X twice as long as broad, widened distally. Antennomere XI apically pointed, somewhat less than three times as long as broad.

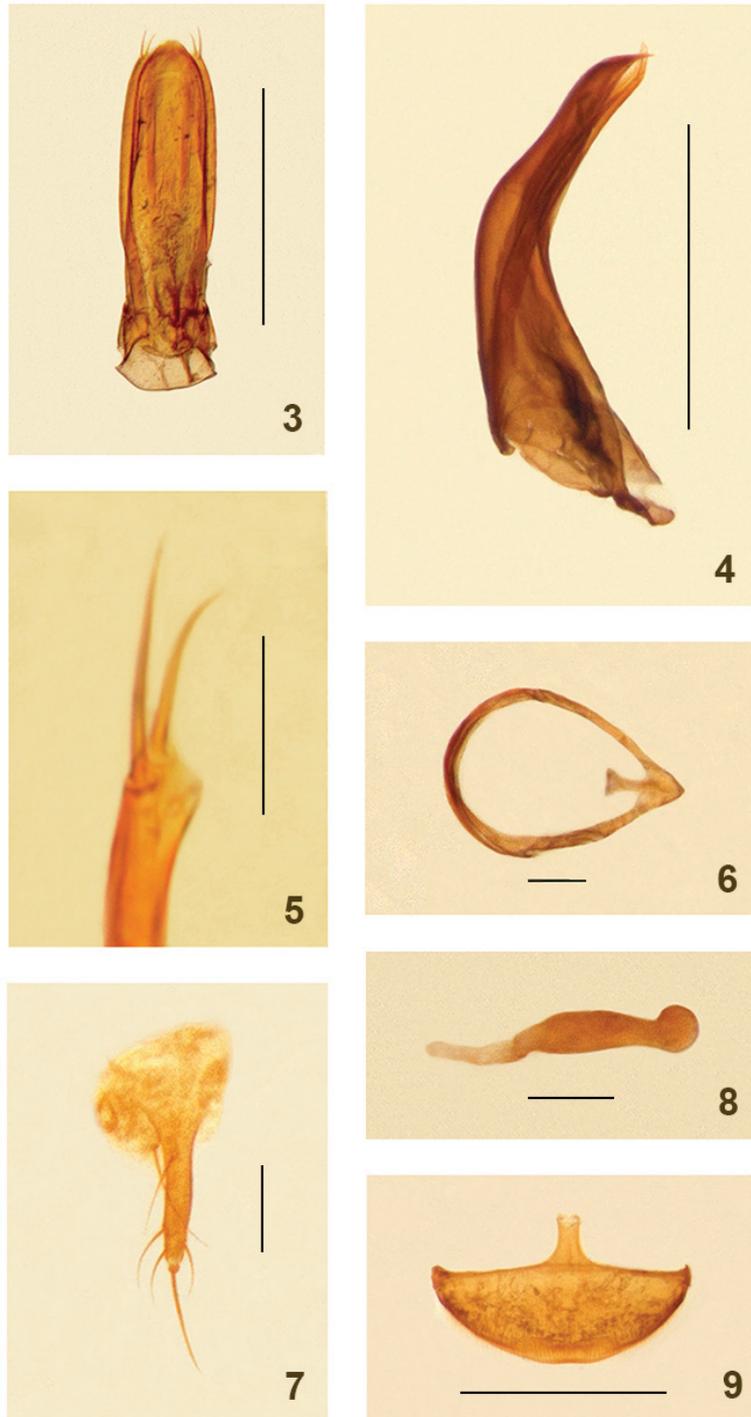
Pronotum sub-bell-shaped, wider than long (pronotum width/length ratio 1.18), with the maximum width somewhat before its mid-length level, then constricted towards the base (Fig. 1). Pronotum wider than head. Lateral pronotal margins rounded anteriorly, while moderately sinuate basally. Anterior pronotal angles small, protruding forwards, while posterior pronotal angles almost right-angled, apically obtuse, slightly protruding downwards. Pronotal base straight, longer than anterior pronotal margin, which is slightly convex medially. Pronotal disc weakly convex, covered with dense short laid hairs, densely distributed deep punctures and microsculp-

ture. Mesosteral carina well developed, high, almost right-angled, with a rounded anterior margin and a few small teeth carrying setae on its ventral concave margin (Fig. 2).

Elytra elongate, inversely ovate, somewhat broader in females (1.47 times as long as wide in males, 1.42 times as long as wide in females), with the maximum width slightly in front of the mid level (Fig. 1). Shoulders somewhat expressed. Lateral elytral margins visible while analyzing from above, especially in the anterior part of the elytra. Elytral disc convex, in lateral view steeply declining posteriorly, while gently declining to pronotum. Elytral disc with dense laid hairs, numerous deep punctures, and microsculpture. Sutural striae present. Scutellum subtriangular, huge. Pygidium not covered by elytra.

Legs long and slender, with femora broadened basally and slightly constricted sub-apically (Fig. 1). Protibiae thickened in the posterior halves, curved inwards, with an exterior distal brush-like structure each. Mesotibiae inconspicuously curved exteriorwards, almost straight, while metatibiae inconspicuously curved inwards, almost straight. Each tibia with an apical comb, covered with thorns. Tarsal claws long, pointed apically. Male protarsi 5-segmented, barely dilated, narrower than the apex of the protibia. Female protarsi 4-segmented and narrow.

Aedeagus elongated, stout (Figs. 3 and 4). Basal bulb of moderate size, rounded. Median lobe in dorsal view somewhat sub-basally thickened, then sub-parallel, and apically abruptly narrowed and rounded (Fig. 3). Copulatory piece consists of a central "Y"-formed and two additional lateral basal sclerifications, similar to that in *Leonhardia hilfi* (Jeanne, 1924). In front of them a teeth-like structure occurs. Paired lateral bands present in the apical half of the median lobe (Fig. 3). Median lobe in lateral view curved, straight in the apical half, concave dorsally sub-apically, convex ventrally in the basal part, with the acute apex curved downwards (Fig. 4). Parameres elongate, thin, slightly shorter than median lobe, regularly curved, slightly widened sub-basally,



Figs. 3-9. *Leonhardia jajcensis* sp. n. from the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. 3 – holotype male, aedeagus (dorsal view); 4 – holotype male, aedeagus (lateral view); 5 – holotype male, left parameral apex (dorsal view); 6 – holotype male, abdominal sternite IX (urite); 7 – paratype female, left gonostylus (dorsal view); 8 – paratype female, spermatheca (lateral view); 9 – paratype female, abdominal sternite VIII. Scales = 0.50 mm (Figs. 3, 4, and 9), 0.10 mm (Figs. 6-8), and 0.05 mm (Fig. 5).

then gradually narrowing distally in lateral view (Fig. 4), with similar shape in dorsal view, somewhat curved before the middle, then sub-parallel (Fig. 3). Each paramere with three acuminate setae (one strong long, somewhat curved, in apical position; one inner thin short, straight, in pre-apical position; and one outer strong long, somewhat curved, in pre-apical position) (Figs. 3-5). The inner parameral seta positioned slightly below the level of the pre-apical parameral seta (Fig. 5).

Male abdominal sternite IX (urite) well developed, sub-triangular, with an inner projection (Fig. 6).

Female gonostyli elongate, thin, gradually narrowing apically and pointed, slightly curved (Fig. 7). Each stylus with a single apical seta, three inner setae, and one outer seta (Fig. 7). Spermatheca sclerotized, elongated, straight, sub-apically constricted, with a rounded top (Fig. 8).

Female abdominal sternite VIII large, transverse, with a wide anterior process, setose (Fig. 9).

Bionomy and distribution – The new species was found in pitfall traps baited with rotten meat and under rocks on the floor in the medium part of the Kapnica Cave, village of Božikovac, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. For the time being, the species is known only from the type locality.

GENUS *KATOBATIZON* KNIRSCH, 1928

KATOBATIZON APFELBECKI S. ĆURČIĆ & RAĐA, SP. N. (Figs. 10-18)

Etymology – After Viktor Apfelbeck (1859-1934), the renowned Austrian entomologist and first curator of the entomological collection at the National Museum of Bosnia and Herzegovina in Sarajevo, who published around 100 scientific papers and described over 620 new taxa from the Balkan Peninsula, mainly cave-dwelling and endogean Coleoptera (Nonveiller, 1999).



Fig. 10. *Katobatizon apfelbecki* sp. n. from the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. Holotype male, habitus (dorsal view). Scale = 1.00 mm.

Type locality – Jama Ispod Puta Pit, village of Božikovac, near Jajce, 1 210 m a.s.l., Mt. Dnolučka Planina, Central Bosnia and Herzegovina, 05 May 2013, holotype male, four paratype males and two paratype females collected from pitfall traps with rotten meat as the bait, leg. T. Rađa; Snježara Pit, village of Brvanci, near Jajce, 1 191 m a.s.l., Mt. Dnolučka Planina, Central Bosnia and Herzegovina, 18 November 2012, one paratype female collected by hand, leg. T. Rađa. The type specimens are deposited in the collection of the Institute of Zoology, University of Belgrade - Faculty of Biology, Belgrade, Serbia (IZFB-14/67-74).

Diagnosis – *Katobatizon apfelbecki* sp. n. clearly differs from a single existing congener from a cave on

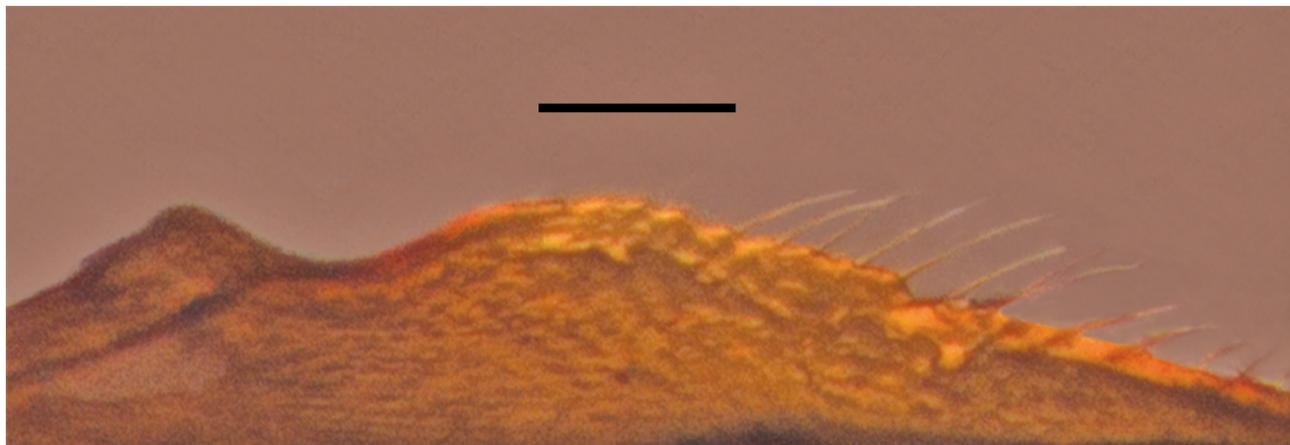


Fig. 11. *Katobatzon apfelbecki* sp. n. from the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. Holotype male, mesosternal carina (lateral view). Scale = 0.10 mm.

Mt. Vlašić, Central Bosnia and Herzegovina – *K. antennarium*. There are numerous distinctions between the species, and these are presented below. *Katobatzon apfelbecki* sp. n. is easily distinguished from *K. antennarium* by its shorter body length (3.56 mm *vs.* 3.70 mm), length/width ratio of head (slightly longer than wide *vs.* almost as long as wide) and certain antennomeres (antennomere I shorter by a quarter than antennomere II, antennomere III slightly shorter than antennomere II, antennomere IV shorter than antennomere I, antennomere V as long as antennomere I, antennomere VI longer than antennomere I, antennomere VII slightly more than half longer than antennomere VI, more than 4 times as long as wide, antennomere VIII less than two times shorter than preceding antennomere, antennomeres IX and X each more than twice as long as antennomere VI *vs.* antennomere I shorter by a fifth than antennomere II, antennomeres II and III of almost equal length, antennomeres IV-VI each as long as antennomere I, antennomere VII almost twice as long as antennomere VI, 3.5 times as long as wide, antennomere VIII more than two times shorter than preceding antennomere, antennomeres IX and X each twice as long as antennomere VI), maximum width of the pronotum (somewhat in front of the middle *vs.* at the base), shape of the anterior (rounded *vs.* pointed) and posterior pronotal angles (more protruding downwards *vs.* less protruding downwards), form of the elytra (inversely ovate *vs.* obtusely ovate),

maximum width of the elytra (somewhat in front of the middle *vs.* around the middle), elytra/pronotum length/width ratios (elytra more than three times as long as pronotum, while more than 1.5 times as wide as pronotum *vs.* elytra three times as long as pronotum, while almost twice as wide as pronotum), shape of the elytral shoulders (more pronounced *vs.* rounded), and form of the meso- (curved exteriorwards *vs.* straight) and metatibiae (curved inwards *vs.* straight) (Knirsch, 1928; Guéorguiev, 1976; present study).

Description – Medium-sized. Total body length: ♂♂ 3.43 mm, ♀♀ 3.79 mm. Pholeuonoid, highly specialized leptodirine beetle (Fig. 10). Color yellow-brownish, integument shiny, pubescent, finely microsculptured (Fig. 10).

Head rounded, anophthalmous, without occipital carina, narrowing basally (Fig. 10). Head significantly narrower and somewhat shorter than pronotum, slightly longer than wide. Its length/width ratio 1.08. Head pubescent, covered with dense puncturation and microsculpture. Mouthparts pubescent, specialized for filtering water and organic matter (Moldovan et al., 2004). Genae somewhat concave. Antennae elongate, slender, pubescent, more elongate in males, slightly exceeding the body in males or well shorter than the body in females, where 2/3 of elytral length. Antennae inserted at around the mid-head level. Antennomere I wide, shorter by slightly



Figs. 12-18. *Katobatzon apfelbecki* sp. n. from the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. 12 – holotype male, aedeagus (dorsal view); 13 – holotype male, aedeagus (lateral view); 14 – holotype male, left parameral apex (dorsal view); 15 – holotype male, abdominal sternite IX (urite); 16 – paratype female, left gonostylus (dorsal view); 17 – paratype female, spermatheca (lateral view); 18 – paratype female, abdominal sternite VIII. Scales = 0.50 mm (Figs. 12, 13, and 18), 0.10 mm (Figs. 15-17), and 0.05 mm (Fig. 14).

more than a quarter than narrow antennomere II. The following four antennomeres narrower than antennomere II. Antennomere III slightly shorter than antennomere II. Antennomere IV shorter than antennomere I, antennomere V as long as antennomere I, while antennomere VI is longer than antennomere I. Antennomere VII slightly more than half longer than antennomere VI, more than four times as long as wide, widened apically. Antennomere VIII narrow, gradually widened apically, less than two times shorter than the preceding antennomere, three times as long as wide. Antennomeres IX and X long, widened apically, of almost equal length, more than twice as long as antennomere VI. Ultimate antennomere long, sub-apically widened, then apically narrowing, twice as long as antennomere III.

Pronotum sub-bell-shaped, slightly wider than long (pronotum width/length ratio 1.29), with the maximum width somewhat in front of its half length level, then constricted towards the base (Fig. 10). Pronotum wider than head, but narrower than elytral base. Lateral pronotal margins sigmoidly shaped, rounded anteriorly, while sinuate basally. Anterior pronotal angles small, rounded, somewhat protruding forwards, while posterior pronotal angles acute-angled, pointed, dragged both exteriorwards and downwards. Pronotal base slightly concave, longer than anterior pronotal margin, which is slightly convex medially. Pronotal disc weakly convex, covered with dense short laid hairs, densely distributed deep punctures and microsculpture. Mesosternal carina low, not reaching metasternum, the ventral margin with two convex elevations, with a few setae, the anterior margin convex, sloped (Fig. 11).

Elytra elongate, inversely ovate, around 1.5 times as long as wide, somewhat broader in females, with the maximum width somewhat in front of the mid level (Fig. 10). Elytra more than three times as long as pronotum, while more than 1.5 times as wide as pronotum. Shoulders weakly expressed, rounded. Lateral elytral margins visible while analyzing from above. Elytral disc convex, in lateral view steeply declining posteriorly, while gently declining to pronotum. Elytral disc with dense laid hairs, numerous

deep punctures, and microsculpture. Sutural striae present. Scutellum huge, sub-triangular, twice as broad as long. Pygidium totally covered by elytra.

Legs long and slender. Femora not constricted sub-apically (Fig. 10). Protibiae regularly curved inwards, thickened in the posterior halves, with two outer thorns apically each. Mesotibiae curved exteriorwards, while metatibiae curved inwards. Each tibia with an apical comb, covered with thorns. Tarsal claws long, pointed apically. Male protarsi 5-segmented, weakly dilated, narrower than the apex of the protibia. Male protarsomere I greater than other protarsomeres. Female protarsi 4-segmented and narrow.

Aedeagus elongated, stout (Figs. 12 and 13). Basal bulb of medium size, rounded. Median lobe in dorsal view sub-parallel, slightly thickened before the middle, apically rounded (Fig. 12). Inner sac mostly translucent, weakly sclerotized apart from a median teeth-like structure in the proximal part and two weakly expressed longitudinal bands in the distal part (Fig. 12). Median lobe in lateral view arcuate, thickened, regularly narrowing apically, widened basally, with a straight acute apex (Fig. 13). Parameres elongate, thin, slightly shorter than median lobe, almost straight and gradually narrowing distally in lateral view (Fig. 13), while sub-parallel, gradually narrowing distally, then somewhat widened sub-apically, constricted before the apex, with somewhat dilated apex each in dorsal view (Fig. 12). Each paramere with three acuminate setae (one strong long, somewhat curved, in apical position; one inner thin short, straight, in pre-apical position; and one outer strong long, curved, in pre-apical position) (Figs. 12-14). The inner parameral seta positioned around the level of the pre-apical parameral seta (Fig. 14).

Male abdominal sternite IX (urite) well developed, sub-oval, with an inner and an outer projection (Fig. 15).

Female gonostyli elongate, gradually narrowing distally, almost straight, with a pointed apex each (Fig. 16). Each stylus with a single apical seta, three

inner setae, and one outer seta (Fig. 16). Spermatheca sclerotized, curved basally, constricted after the middle, with a rounded top (Fig. 17).

Female abdominal sternite VIII large, transverse, with a narrow anterior process, setose (Fig. 18).

Bionomy and distribution – The new species was found under rocks on the floor and from pitfall traps baited with rotten meat at the bottom of the Jama Ispod Puta, village of Božikovac, and the Snježara Pits, village of Brvanci, near Jajce, Mt. Dnolučka Planina, Central Bosnia and Herzegovina. For now, the species is known only from the type localities.

GENUS *PROTOBRACHARTHON* REITTER, 1889

PROTOBRACHARTHON DUSINAE

S. ĆURČIĆ, RAĐA & MULAOMEROVIĆ, SP. N.

(Figs. 19-27)

Etymology – After the Dusina Cave in the village of Dusina, its *terra typica*.

Type locality – Dusina Cave, village of Dusina, near Fojnica, 830 m a.s.l., Mt. Pogorelica, Central Bosnia and Herzegovina, 01 May 2013, holotype male and paratype female collected by hand, leg. S. Milanolo & J. Mulaomerović. The type specimens are deposited in the collection of the Institute of Zoology, University of Belgrade - Faculty of Biology, Belgrade, Serbia (IZFB-14/75-76).

Diagnosis – *Protobracharthron dusinae* sp. n. clearly differs from a single existing *Protobracharthron* species from a cave near Kreševo, Fojnica district, Central Bosnia and Herzegovina – *P. reitteri*. There are numerous distinctions between the species and these are given below. *Protobracharthron dusinae* sp. n. is easily distinguished from *P. reitteri* by its longer and narrower body (length 4.87-4.94 mm, width 1.85 mm vs. 4.50 mm, width 2.00 mm), length of the antennae in females (somewhat shorter than the body vs. slightly exceeding the body), antennomere I/II length ratio (antennomere I slightly more than two times shorter than antennomere II vs. antennomere



Fig. 19. *Protobracharthron dusinae* sp. n. from the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica, Central Bosnia and Herzegovina. Holotype male, habitus (dorsal view). Scale = 1.00 mm.

I three times shorter than antennomere II), length of certain antennomeres (antennomeres II-VII and IX, as well as antennomeres VIII, X, and XI not of equal length vs. antennomeres II-VII and IX, as well as antennomeres VIII, X, and XI of almost equal length), maximum width of the head (more anteriorly vs. immediately above the place where antennae are inserted), length/width ratio of the head (1.17-1.26 vs. 1.50) and pronotum (slightly longer than wide vs. much longer than wide), head/pronotum length ratio (head somewhat shorter than pronotum

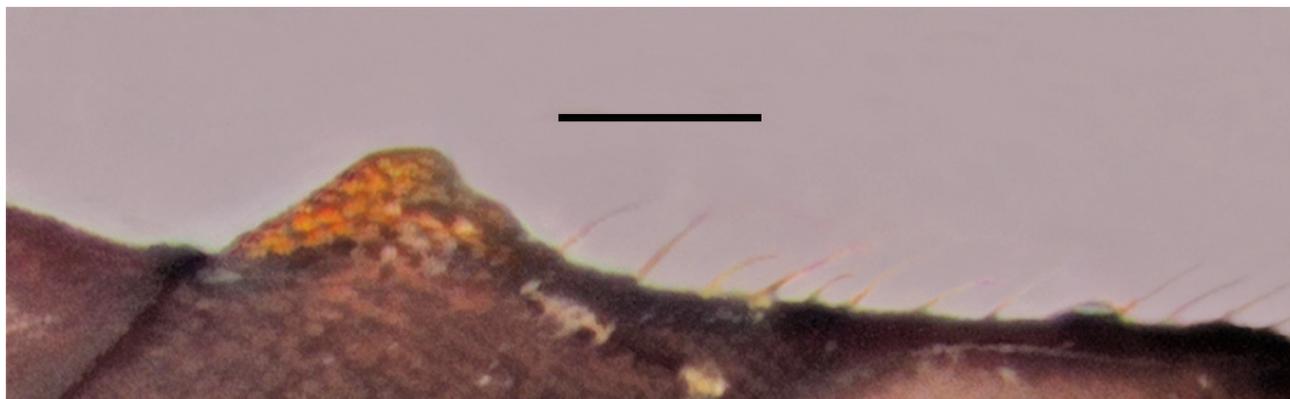


Fig. 20. *Protobracharthron dusinae* sp. n. from the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica, Central Bosnia and Herzegovina. Holotype male, mesosternal carina (lateral view). Scale = 0.10 mm.

vs. head at least as long as pronotum), maximum width of the pronotum (at its third length level vs. at its half), shape of both the anterior (prominent, protruding forwards vs. not prominent, rounded) and posterior (obtuse-angled and obtuse apically vs. acute-angled and pointed apically) pronotal angles, form of the pronotal base (convex vs. straight), shape and length/height ratio of the mesosternal carina (obtuse, longer than higher vs. dentiform, higher than longer), and length/width ratio (1.68 vs. 1.50) and maximum width of the elytra (slightly in front of the mid level vs. around the mid level) (Apfelbeck, 1889; Reitter, 1889; Jeannel, 1924; Guéorguiev, 1976; present study).

Description – Medium-sized. Total body length: holotype ♂ 4.87 mm, paratype ♀ 4.94 mm. Maximum body width: holotype ♂ 1.79 mm, paratype ♀ 1.91 mm. Leptodiroid, highly specialized leptodirine beetle (Fig. 19). Color red-brownish, integument shiny, pubescent, finely microsculptured (Fig. 19).

Head elongate, anophthalmous, without occipital carina, narrowing basally (Fig. 19). Head somewhat narrower and shorter than pronotum. Its length/width ratio: holotype ♂ 1.26, paratype ♀ 1.17. Head pubescent, covered with fine punctation and microsculpture. Mouthparts pubescent, specialized for filtering water and organic matter (Moldovan et al., 2004). Genae somewhat concave. Vertex slightly impressed. Antennae elon-

gate, slender, pubescent, more elongate in males, slightly exceeding the body (in holotype male) or somewhat shorter than the body (in paratype female). Antennae inserted at around the mid-head level. Antennomere I wider and slightly more than two times shorter than antennomere II. Antennomere II moderately wide, somewhat widened distally. Antennomeres III-V narrow, among which III is the shortest and IV the longest. Antennomere VI slightly shorter than antennomere V. Antennomeres VII, IX and X significantly widened distally. Of these, VII is the longest and X the shortest. Antennomere VIII narrow, moderately widened distally, shorter than antennomere II. Ultimate antennomere slightly shorter than the penultimate one, apically pointed.

Pronotum massive, slightly longer than wide (pronotum width/length ratio in holotype male 0.93, while 0.89 in paratype female), with the maximum width at its third length level, then constricted towards the base (Fig. 19). Pronotum somewhat wider than head. Lateral pronotal margins rounded anteriorly, while sinuate basally. Anterior pronotal angles prominent, protruding forwards, while posterior pronotal angles obtuse-angled and obtuse apically. Pronotal base convex, longer than anterior pronotal margin, which is slightly convex medially. Pronotal disc convex, covered with sparse, short erect hairs directed posteriad, densely distributed deep punctures and microsculpture. Mesosternal carina low, obtuse,



Figs. 21-27. *Protobracharthron dusinae* sp. n. from the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica, Central Bosnia and Herzegovina. 21 – holotype male, aedeagus (dorsal view); 22 – holotype male, aedeagus (lateral view); 23 – holotype male, left parameral apex (dorsal view); 24 – holotype male, abdominal sternite IX (urite); 25 – paratype female, left gonostylus (dorsal view); 26 – paratype female, spermatheca (lateral view); 27 – paratype female, abdominal sternite VIII. Scales = 0.50 mm (Figs. 21, 22, and 27), 0.10 mm (Figs. 24-26), and 0.05 mm (Fig. 23).

longer than higher, with a few setae on its ventral margin (Fig. 20).

Elytra elongate, ovate, well broader in females (1.80 times as long as wide in holotype male, 1.56 times as long as wide in paratype female), with the maximum width slightly in front of the mid level (Fig. 19). Shoulders somewhat expressed. Lateral elytral margins barely visible only in the humeral region while analyzing from above. Elytral disc convex, in lateral view steeply declining to pronotum, while gently declining posteriorly. Elytral disc with dense erect hairs directed posteriad, numerous deep punctures, and microsculpture. Sutural striae present. Scutellum sub-triangular. Pygidium totally covered by elytra.

Legs long and slender, with femora broadened basally and constricted sub-apically (Fig. 19). Protibiae thickened in the posterior halves. Each tibia with an apical comb, covered with thorns. Tarsal claws long, pointed apically. Male protarsi 5-segmented, barely dilated, narrower than the apex of the protibia. Female protarsi 4-segmented and narrow.

Aedeagus elongated, stout (Figs. 21 and 22). Basal bulb large, rounded. Median lobe in dorsal view moderately narrowing distally and apically rounded (Fig. 21). Inner sac mostly translucent, weakly sclerotized apart from two median teeth, basal filamentous structure and two weakly expressed anterior longitudinal bands (Fig. 21). Median lobe in lateral view regularly arcuate, gradually narrowing distally, sub-basally convex, with an acuminate apex curved downwards (Fig. 22). Parameres elongate, thin, slightly shorter than median lobe. Parameres gradually narrowing distally, then somewhat dilated apically, slightly curved in lateral view (Fig. 22), sub-parallel in dorsal view (Fig. 21). Each paramere with three acuminate setae (one strong of medium length, slightly curved, in apical position; one inner thin short, straight, in pre-apical position; and one outer strong of medium length, slightly curved, in pre-apical position) (Figs. 21-23). The inner parameral seta positioned somewhat below the level of another two parameral setae (Fig. 23).

Male abdominal sternite IX (urite) well developed, sub-triangular, with an inner projection (Fig. 24).

Female gonostyli elongate, somewhat widened basally and sub-apically, then narrowing apically and pointed, almost straight (Fig. 25). Each stylus with a single apical seta, three inner setae, and one outer seta (Fig. 25). Spermatheca sclerotized, almost straight, medially constricted, with a spherical top (Fig. 26).

Female abdominal sternite VIII large, transverse, with a narrow anterior process, setose (Fig. 27).

Bionomy and distribution – The new species was found on wet walls in the hind part of the Dusina Cave, village of Dusina, near Fojnica, Mt. Pogorelica, Central Bosnia and Herzegovina. For now, the species is known only from the type locality.

CONCLUSIONS

The new leptodirine leiodid taxa probably belong to old phyletic lineages of Tertiary or even pre-Tertiary origin (Guéorguiev, 1977; Čurčić et al., 2012). The taxa are both relicts and endemics of the Dinaric mountain chain in Central Bosnia and Herzegovina. The endemic differentiation of the new and related taxa on the Balkan Peninsula was facilitated by the great Alpine Orogeny, paleoclimatic events and subsequent evolution of the underground karstic relief, which yielded numerous new epigeal and hypogean niches suitable for the preservation of the old and autochthonous fauna.

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