

**SERBOLEONHARDELLA GEN. N., BASED ON PROLEONHARDELLA REMYI
JEANNEL (LEPTODIRINI, LEIODIDAE, COLEOPTERA),
FROM A CAVE IN SOUTHWESTERN SERBIA**

**Srećko B. Ćurčić¹, Heinrich Schönmann², Miloje M. Brajković¹,
and Božidar P. M. Ćurčić¹**

¹*Institute of Zoology, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia*

²*Natural History Museum of Vienna, A-1014 Vienna, Austria*

Abstract — A new genus of cavernicolous leptodirine leiodids (*Serboleonhardella* gen. n.) from the Dvostruka (= Bjeloševačka) Pećina Cave, village of Jabuka, near Prijepolje in Southwest Serbia is diagnosed and described. This new genus differs clearly from all other closely related genera in the following correlative traits: body size and form; morphometric ratios of certain antennomeres; length of the antennae; form of the pronotum; shape of the pronotal lateral margins; pronotum/elytra width and length ratios; shape of the mesosternal carina; shape of the elytra; elytral punctuation; presence/absence of elytral sutural striae; form of the aedeagus and its basal bulb; median lobe/paramere length ratio; shape of some parameral setae; shape of the parameres; form of the copulatory piece; and form of abdominal sternite IX (urite).

Serboleonhardella gen. n. belongs to a separate phyletic lineage which includes two other genera, *Proleonhardella* Jeannel and *Pholeuonillus* Breit. The new genus is present in Southwest Serbia only, while *Proleonhardella* species inhabit Serbia and Bosnia-Herzegovina. *Pholeuonillus* is given full generic status in the present paper; its members are known from Bosnia-Herzegovina only.

The *Serboleonhardella-Proleonhardella-Pholeuonillus* complex is probably of Mesogeid age and origin; its species originated during the Alpine Orogeny, which affected vast areas of the Balkan Peninsula, including the Dinarids, their terra typica.

Key words: Leiodidae, *Serboleonhardella*, new genus, cave fauna, Serbia

INTRODUCTION

The subterranean invertebrate fauna of Serbia has been the object of extensive and intensive investigations in the recent past (B. Ćurčić, 2002) and is well-known for its high specific diversity and the exceptional specialization of many of the taxa. Many troglotic invertebrates have been discovered and described only in recent years,

which suggests that our knowledge of the subterranean fauna of the Dinaric karst is still far from being complete.

The leiodid fauna in Serbia is insufficiently known. A great number of endogean and cave genera and species from the subfamily Cholevinae were described in the first half of the 20th century (Müller, 1904; Jeannel, 1924, 1931, 1934; Perreau, 2004). A few additional cave-dwellers and endogean species were found recently – *Pholeuonopsis cvijici* S. Ćurčić & Brajković; *P. zlatiborensis* S. Ćurčić, Brajković, B. Ćurčić & N. Ćurčić; *Magdelainella bozidarcurcici* S. Ćurčić & Brajković; *M. zivojindjordjevici* S. Ćurčić, Brajković, B. Ćurčić & Schönmann; *M. mucanjensis* S. Ćurčić, Brajković, B. Ćurčić, & Schönmann; *M. nikolateslai* S. Ćurčić, Brajković, B. Ćurčić & Schönmann; *M. milojebrajkovici* S. Ćurčić & B. Ćurčić; *Kosaniniella javorensis* S. Ćurčić, Brajković & B. Ćurčić; *Bathyscidius comottiorum* Giachino, *Remyella raskae* S. Ćurčić & B. Ćurčić; and *R. javorensis* S. Ćurčić & B. Ćurčić (S. Ćurčić and Brajković, 2002, 2002 a; S. Ćurčić et al., 2004, 2004 a, 2005, 2006, 2008; Giachino, 2006). Only one genus is solely restricted to Serbia – *Kosaniniella* S. Ćurčić, Brajković & B. Ćurčić (from Southwest Serbia) (S. Ćurčić, 2005; S. Ćurčić et al., 2004 a, 2008).

On the basis of a thorough study of a small sample of leptodirine beetles from Southwest Serbia (borrowed from the Natural History Museum of Vienna and labelled as “*Proleonhardella remyi* n. sp.; det. R. Jeannel”), we identified and established a new genus: *Serboleonhardella* gen. n. The description of the new genus is based on study of the holotype male. The type specimen is deposited in the collection of the Natural History Museum of Vienna, Austria.

MATERIALS AND METHODS

The leiodid specimen from the Natural History Museum of Vienna was fixed to a paper label and then analyzed as a dry example. Genital structures were removed from the insect and fixed on microscope slides in a medium composed of Canada balsam and xylol.

The obtained specimen was analyzed in detail in laboratories of the Institute of Zoology, Faculty of Biology, University of Belgrade. Carl Zeiss - Stemi 2000 and Carl Zeiss - Ergaval binocular stereomicroscopes were used in this study, together with a special monitor and accessories for drawing.

RESULTS AND DISCUSSION

LEIODIDAE FLEMING, 1821

SERBOLEONHARDELLA S. ĆURČIĆ & SCHÖNMANN, GEN. N.

Type species. – *Proleonhardella remyi* Jeannel, 1934.

Other species. – None.

Etymology. – After Serbia, its *terra typica* + the late Otto Leonhard, an eminent Austrian speleologist and naturalist. The name of the new genus is of female gender.

Diagnosis. – The new genus differs clearly from two other related genera of Leiodidae (*Proleonhardella* Jeannel and *Pholeuonillus* Breit) in body size (3.00–3.50 mm vs. 1.30–2.20 mm vs. 3.00 mm); body form (ovoid vs. oval vs. elliptic); form of certain antennomeres (antennomere VIII oval, elongated; antennomere VII moderately thickened; antennomeres IX and X relatively long vs. antennomere VIII small, spherical; antennomere VII considerably wider; antennomeres IX and X not elongated vs. antennomere VIII small, quadrate; antennomeres IX and X not elongated); length of the antennae (ending well before the mid-elytral level vs. extending as far as the mid-elytral level vs. ending somewhat before the mid-elytral level); form of the pronotum (anterior angles rounded, pronotum slightly constricted basally vs. anterior angles somewhat rounded, pronotum constricted basally vs. anterior angles considerably rounded, pronotum considerably constricted basally); shape of the pronotal lateral margins (anteriorly depressed, moderately curved vs. arcuated, sub-basally rounded vs. arcuated, anteriorly rounded); the pronotum/elytra width and length ratios (pronotum narrower than elytra throughout its whole length, much shorter than elytra vs. pronotum narrower than elytra, pronotal base wider than elytral base, pronotum less shorter than elytra vs. pronotum as wide as elytra, less shorter than elytra); shape of the mesosternal carina (elevated, rounded vs. elevated, angulose vs. not elevated, considerably lower); shape of the elytra (ovoid vs. oval vs. elliptic); elytral punctuation (dense and fine punctures vs. fine punctures vs. large and deep punctures); presence/absence of elytral sutural striae (present vs. absent vs. absent); form of the aedeagus and basal bulbus (aedeagus wide and rounded apically, having two subapical lobes; basal bulbus elongated vs. aedeagus attenuated apically, ending as a triangular tip; basal bulbus oval vs. unknown); the median lobe/paramere length ratio (median lobe slightly longer than parameres vs. median lobe considerably longer than parameres vs. unknown); shape of lower inner parameral setae (strongly angulosely curved vs. straight or regularly curved vs. unknown); shape of the parameres (almost of same width vs. widening apically vs. unknown); form of the copulatory piece (having a unique basal stylet, a chitinized angulose structure, and two anterior weakly chitinized bands vs. having a bifid basal stylet and two strong lamellose parts vs. unknown); and form of abdominal sternite IX (urite) (sub-circular vs. sub-trapezoid vs. unknown) (Figs. 1–5) (Jeannel, 1910, 1911, 1924, 1934; Reitter, 1911; Breit, 1913).

Description. – A leptodirine genus of medium dimensions. Body bathyscioid, ovoid, and convex (Fig. 1). Tegument uniformly pubescent. Head retractile, with complete occipital carina. Antennae short, protruding over the pronotum base, ending well before the mid-elytral level. Antennomere II elongated, slightly shorter than ultimate antennomere. Antennomere III short, about twice as short as antennal article II. Antennomeres IV–VI similar to antennomere III, moderately widening distally. Antennomere VII moderately thickened (with length/width ratio of 2.26). Antennal article VIII the smallest, oval, and elongated, almost twice as short as antennomere VII. Antennomeres IX and X wide, longer than broad. Antennal segment XI long, its length/width ratio being 1.64, shorter than antennomerae IX + X together (Fig. 1). Eyes absent.

Pronotum transverse (Fig. 1), with width/length ratio of 1.71. Its base slightly narrower than elytral base. Pronotal lateral margins not regularly arcuated, moderately curved, slightly concave anteriorly, and inconspicuously constricted posteriorly. Anterior pronotal angles rounded. Posterior pronotal angles acute, covering elytral base. Pronotum narrower than elytra throughout its whole length, considerably shorter than elytra, the elytra/pronotum length ratio being 2.44.

Mesosternal carina high, apically rounded (Fig. 2), not reaching the metasternal level. Anterior margin of mesosternal carina distinctly convex, the posterior one depressed.

Elytra ovoid, rounded apically, longer than wide (with length/width ratio of 1.30), widest sub-basally, at the level of their foremost sixth (Fig. 1). Elytral disc convex, covered with long laid setae, bearing densely distributed fine punctures. Sutural striae present, parallel to suture. Elytral lateral margins regularly arcuated. Scutellum small and triangular (Fig. 1).

Legs elongated and slender (Fig. 1). Anterior tarsi tetramerous in male. First protarsomeres somewhat wider than other protarsal articles. Protibiae each with an apical outer and an apical inner spine. Mesotibiae barely convex; metatibiae almost straight. Both meso- and metatibiae each with some apical spines, but without exterior ones.

Aedeagus (Fig. 3) small, stout, with rounded apex. Median lobe somewhat longer than paramerae, having two sub-basal lobes (Fig. 3). Both sides of median lobe arcuated, narrowing apically. Paramerae curved, thin, each carrying three distal setae (two apical setae and one sub-apical inner seta). Paramere apices narrow and rounded (Fig. 4). The inner seta borne somewhat below the other two setae. Two apical setae long and straight; the subapical inner seta shorter, angulosely curved. Basal armature of the copulatory piece consisting of a complex multi-dentate chitinized structure (Fig. 3). Median portion of copulatory piece represented by a weakly chitinized inverted U-formed sclerification. Distal part of copulatory piece in the form of two elongated sygmoid bands. Armature of the inner sac (Fig. 3) also includes a long chitinized basal fiber. Basal bulbus of median lobe rounded, with an elongated triangular process.

Female genitalia unknown.

Distribution. – The genus *Serboleonhardella* gen. n. is monotypic and comprises a single species, *S. remyi* (Jeannel, 1934), inhabiting a cave locality in Southwest Serbia.

Remarks. – *Serboleonhardella* gen. n. belongs to a separate phyletic lineage which includes two other genera, *Proleonhardella* and *Pholeuonillus*. The new genus is present in Southwest Serbia only, while *Proleonhardella* species inhabit Serbia and Bosnia-Herzegovina. *Pholeuonillus* is given full generic status in the present paper; its members are known from Bosnia-Herzegovina only.

The *Serboleonhardella-Proleonhardella-Pholeuonillus* complex is of Mesogeid age and origin (Guéorguiev, 1977). The endemic differentiation of *Serboleonhardella* gen.

n. and its related genera in the central part of the Balkan Peninsula was facilitated by the great Alpine Orogeny, paleoclimatic events, and subsequent evolution of the underground karstic relief, followed by the differentiation of many niches underground. It is evident that *Serboleonhardella* gen. n. represents a relict form endemic to both Serbia and the Balkan Peninsula.

SERBOLEONHARDELLA REMYI (JEANNEL, 1934), COMB. N.

(Figs. 1-5)

Old combinations. – *Proleonhardella* (s. str.) *remyi*: Jeannel, *Rev. Fr. Ent.*, 1934, **1**, 98.

Proleonhardella (s. str.) *remyi*: Pretner, *Acad. Sci. Art. Slov.*, 1968, **3**, 14.

Proleonhardella (s. str.) *remyi*: Perreau, *Mém. Soc. Ent. Fr.*, 2000, **4**, 189.

Material examined. – “Type” male from the Dvostruka (= Bjeloševačka) Pećina Cave, village of Jabuka, near Prijepolje, Pešter, collected by P. Rémy (no other collecting data).

Diagnosis. – The species is presently the only one of the genus (see the “Diagnosis” of *Serboleonhardella* gen. n.).

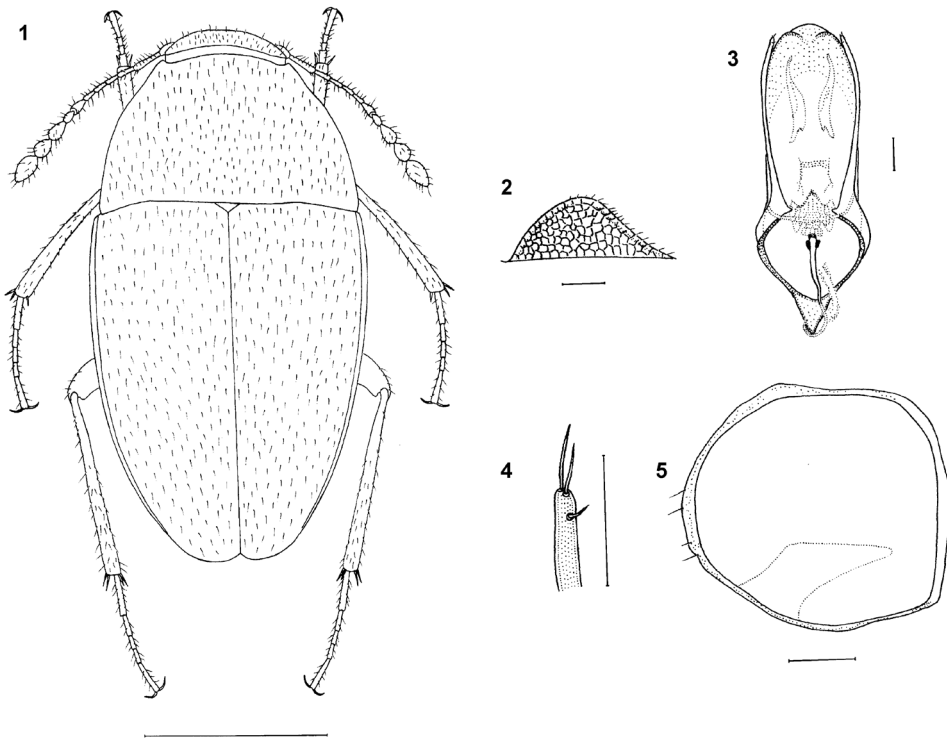
Supplementary description. – Medium-sized. Body length: 3.00-3.50 mm. Body bathyscioid, elytra convex and ovoid (Fig. 1). Body color pale brown. Tegument shiny.

Head sub-quadrate, narrowing anteriorly, retractile, with a complete and well-developed occipital carina, covered with long yellowish setae (Fig. 1). Antennae short, protruding over the pronotum base, ending well before the mid-elytral level. Antennomere II elongated, slightly shorter than ultimate antennomere. Antennomere III about twice as short as antennal article II. Antennomeres IV-VI similar to antennomere III, moderately widening distally. Antennomere VII moderately thickened, its length/width ratio being 2.26. Antennal article VIII the smallest, oval, and elongated, almost twice as short as antennomere VII. Antennomeres IX and X wide, longer than broad. Antennal segment XI long, its length/width ratio being 1.64, shorter than antennomerae IX + X together (Fig. 1). Eyes absent.

Pronotum transverse, much wider than long, widest basally (with width/length ratio of 1.71), somewhat narrower than elytra, with irregularly arcuated lateral margins and acute posterior angles covering elytral base. Pronotal disc moderately convex, with some long pubescence and fine punctures (Fig. 1). Anterior pronotal margin slightly protruding forward; posterior pronotal margin almost straight medially, but curved towards the posterior pronotal angles.

Mesosternal carina high, obtuse, apically rounded (Fig. 2), but not reaching the metasternal level. Anterior margin of mesosternal carina distinctly convex; the posterior one depressed, bearing 18 minute setae (Fig. 2).

Elytra ovoid, rounded apically, longer than wide (with length/width ratio of 1.30), widest sub-basally, at the level of their foremost sixth (Fig. 1). Elytral disc convex, covered with long laid setae, bearing densely distributed fine punctures.



Figs. 1-5. *Serboleonhardella remyi* (Jeannel), from the Dvostruka (= Bjeloševačka) Pećina Cave, village of Jabuka, near Prijepolje in Southwest Serbia. 1 – type male, habitus (dorsal view); 2 – type male, mesosternal carina (lateral view); 3 – type male, aedeagus with inner sac (dorsal view); 4 – type male, left parameral apex (dorsal view); 5 – type male, abdominal sternite IX (urite). Scale lines = 1.00 mm (Fig. 1) and 0.10 mm (Figs. 2-5).

Sutural striae present. Elytral lateral margins regularly arcuated. Scutellum small and triangular (Fig. 1).

Male protarsi tetramerous, not dilated, the proximal protarsomere being the largest (Fig. 1).

Aedeagus short and stout (Fig. 3). Apex of median lobe rounded. Sub-distal portion of median lobe with two rounded chitinized lobes. Median lobe somewhat longer than paramerae. Lateral margins of aedeagus arcuated, roundly constricted apically. Basal bulbous large, rounded, with an elongated triangular process. Paramerae regularly arcuated, slightly dilated sub-apically, then gradually narrowing apically. Paramere apices thin, each carrying three setae (two long straight apical setae and one short angulosely curved sub-apical inner seta) (Fig. 4). Saccus internus with basal armature (Fig. 3) carrying a multi-dentate structure, with a median weakly sclerotized inverted U-formed structure, and distal part consisting of two elongated sigmoid bands. Inner sac ending as a long chitinized basal fiber.

Female genitalia unknown.

Male abdominal sternite IX (urite) (Fig. 5) well-developed, sub-circular, with an internal process and a few exterior setae.

Bionomy and distribution. – This species was found under stones and rotten wood in Dvostruka (= Bjeloševačka) Pećina Cave, village of Jabuka, Bjeloševac, near Prijepolje in Southwest Serbia. The type habitat is a crossroad in the anterior part of the cave, where rocks and stones are distributed over the floor (Rémy, 1953; Pretner, 1968; Perreau, 2000). The analyzed species represents an endemic and relict form of Mesogeid origin and age.

GENUS *PHOLEUONILLUS* BREIT, STAT. N.

Synonyms. – *Bathyscia*: Reitter, *Wien. Entomol. Ztg.*, 1911, **30** (2-3), 50.

Proleonhardella (*Pholeuonillus*): Jeannel, *Arch. Zool. Exp. Gén.*, 1924, **63** (1), 246.

Proleonhardella (*Pholeuonillus*): Pretner, *Catalogus faunae Jugoslaviae*, 1968, **3** (6), 13.

Proleonhardella (*Pholeuonillus*): Guéorguiev, *Razprave*, 1976, **19** (4), 99.

Proleonhardella (*Pholeuonillus*): Perreau, *Mém. Soc. ent. Fr.*, 2000, **4**, 188.

Type species. – *Pholeuonillus adolfi* (Reitter, 1911).

Other species. – None.

Type locality. – From an endogean habitat, Mt. Treskavica, Bosnia-Herzegovina.

Type series. – Holotype female, collected by Adolf Hoffmann (no other collecting data are given).

Diagnosis. – See “Diagnosis” of *Serboleonhardella* gen. n. (Breit, 1913; Jeannel, 1924; Guéorguiev, 1976).

Distribution. – The genus *Pholeuonillus* is presently known only from an endogean locality on Mt. Treskavica in the southern part of Bosnia-Herzegovina.

Remarks. – The genus *Pholeuonillus* probably belongs to a separate phyletic lineage which originated during the Paleogene. The endemic differentiation of *Pholeuonillus* and its related genera in the central part of the Balkan Peninsula was facilitated by the great Alpine Orogeny, paleoclimatic events, and subsequent evolution of the underground karstic relief which yielded many new epigeal and hypogean niches suitable for preserving this old and autochthonous fauna. Thus, the genus *Pholeuonillus* represents an endemic and relict taxon inhabiting Bosnia-Herzegovina on the Balkan Peninsula.

Acknowledgments — We would like to express our gratitude to both Ms. Nina Ćurčić and Dr. Vladimir Tomić for providing technical assistance. This study was financially supported by the Serbian Ministry of Science (Grant # ON 143053).

REFERENCES

- Breit, J. (1913). Wissenschaftliche Ergebnisse der Bearbeitung von O. Leonhard's Sammlungen. 5. Beiträge zur Blindkäferfauna von Bosnien und der Herzegowina. *Entomol. Mitt.* **2** (11), 351-358.

- Ćurčić, B. (2002). The Cave Fauna of Serbia: from Origins to the Present and Perspectives. *J. Bulg. Acad. Sci.* **4**, 31-35.
- Ćurčić, S. B. (2005). *Uparedno-morfološka svojstva, razviće i filogenija nekih zemljišnih i pećinskih tvrdokrilaca (Carabidae i Cholevidae = Leiodidae, Coleoptera) iz Srbije*, 386 pp. PhD. Thesis. Faculty of Biology, University of Belgrade, Belgrade.
- Ćurčić, S. B., and M. M. Brajković (2002). *Pholeuonopsis cvijici*, a new troglobitic beetle from Western Serbia (Coleoptera, Cholevidae). *Arch. Biol. Sci. (Belgrade)* **54** (1-2), 43-48.
- Ćurčić, S. B., and M. M. Brajković (2002a). *Magdelainella bozidarcurcici* n. sp. (Coleoptera, Cholevidae), a new endemic beetle from Southwest Serbia. *Arch. Biol. Sci. (Belgrade)* **54** (3-4), 97-100.
- Ćurčić, S. B., Brajković, M. M., Ćurčić, B. P. M., and N. B. Ćurčić (2006). A new cave-dwelling and endemic species of the genus *Pholeuonopsis* (Coleoptera, Leiodidae) from Serbia. *Biologia (Bratislava)* **61** (5), 497-501.
- Ćurčić, S. B., Brajković, M. M., Ćurčić, B. P. M., and H. Schönmann (2004). On the diversity of *Magdelainella* Jeannel (Cholevidae, Coleoptera) in Serbia. *Arch. Biol. Sci. (Belgrade)* **56** (1-2), 65-73.
- Ćurčić, S. B., Brajković, M. M., Ćurčić, B. P. M., Schönmann, H., Makarov, S. E., Mitić, B. M., and V. T. Tomić (2004a). *Kosaniniella javorensis* n. gen., n. sp., from Southwest Serbia, with notes on the evolutionary status of *Knirrschiella* Guéorguiev (Cholevidae, Coleoptera). *Arch. Biol. Sci. (Belgrade)* **56** (3-4), 115-120.
- Ćurčić, S. B., Ćurčić, B. P. M., Makarov, S. E., Mitić, B. M., and B. Mihajlova (2005). On three new high-altitude endemic leiodids (Coleoptera: Leiodidae) from the Balkan Peninsula. *Entomol. Fennica* **16**, 309-316.
- Ćurčić, S., Waitzbauer, W., Zolda, P., Brajković, M. M., and B. P. M. Ćurčić (2008). New cave-dwelling species of the genus *Remyella* Jeannel (Leptodirini, Leiodidae, Coleoptera) from Serbia. *Arch. Biol. Sci. (Belgrade)* **60** (1), 109-115.
- Giachino, P. M. (2006). *Bathyscidius comottiorum* n. sp. del Kosovo (Coleoptera, Cholevidae, Leptodirinae). *Riv. Mus. Civ. Sci. Nat. Bergamo* **24**, 11-15.
- Guéorguiev, V. B. (1976). Recherches sur la taxonomie, la classification et la phylogénie des Bathysciinae (Coleoptera: Catopidae). *Dissertationes Acad. Sci. Art. Slovenicae, Ljubljana* **19**, 91-147.
- Guéorguiev, V. B. (1977). *La faune troglobie terrestre de la péninsule balkanique. Origine, formation et zoogéographie. Edition spéciales*. 182 pp. Academie bulgare des Sciences, Sofia.
- Jeannel, R. (1910). Essai d'une nouvelle classification des Silphides cavernicoles. *Arch. Zool. Exp. Gén.* **5** (5), 1-48.
- Jeannel, R. (1911). Revision des Bathysciinae (Coléoptères Silphides). Morphologie, distribution géographique, systématique. *Biospeologica. XIX. Arch. Zool. Exp. Gén.* **5** (7), 1-641.
- Jeannel, R. (1924). Monographie des Bathysciinae. *Biospeologica. L. Arch. Zool. Exp. Gén.* **63**, 1-436.
- Jeannel, R. (1931). Bathysciinae nouveaux recueillis par M. Rémy dans le grottes du Novi-Pazar. *Bull. Soc. Zool. France* **56**, 258-266.
- Jeannel, R. (1934). Bathysciinae recueillis par M. M. Rémy et R. Husson dans le Sandjak de Novi-Pazar et la Macédoine grecque. *Rev. Franç. Entomol.* **1**, 89-103.
- Müller, J. (1904). Zwei neue Höhlensilphiden von der Balkanhalbinsel. *Münchner Koleopterol. Z.* **2**, 38-42.
- Perreau, M. (2000). Catalogue des Coléoptères Leiodidae Cholevinae et Platypyllinae. *Mém. Soc. Entomol. France* **4**, 1-461.
- Perreau, M. (2004). Family Leiodidae Fleming, 1821: In: *Catalogue of Palaearctic Coleoptera, Volume 2. Hydrophiloidea - Histeroidea - Staphylinoidea* (Eds. I. Löbl and A. Smetana). 133-203. Apollo Books, Stenstrup.
- Pretner, E. (1968). *Catalogus faunae Jugoslaviae. III/6. Coleoptera. Fam. Catopidae. Subfam. Bathysciinae*, 59 pp. Academia Scientiarum et Artium Slovenica, Ljubljana.

Reitter, E. (1911). Paläarktische Coleopteren novitäten. *Wiener Entomol. Z.* **30** (2-3), 47-55.

Rémy, P. A. (1953). Description des grottes yougoslaves (Herzégovine, Dalmatie, Crna Gora et ancien Sandjak de Novi Pazar). *Bull. Mus. Hist. Nat. Belgrade* **B** (5-6), 175-233.

