

ROZAJELLA JOVANVLADIMIRI GEN. N., SP. N. (LEPTODIRINI, LEIODIDAE, COLEOPTERA), FROM EAST MONTENEGRO, WITH NOTES ON ITS PHYLOGENY

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Abstract – A new genus and species of cave-dwelling leiodid beetles (*Rozajella jovanvladimiri* gen. n., sp. n.) has been diagnosed and described from the Pećina u Dubokom Potoku Cave, village of Donje Biševo, near Rožaje, Eastern Montenegro. This new genus clearly differs from all other close genera in the following correlative traits: body size; shape of head; presence of occipital carina, length of antennae; morphometric ratios and form of certain antennomeres; head/pronotum width ratio; pronotum length/width ratio; form of lateral pronotal margins; pronotal/elytral base length ratio; form of femora and protarsi; presence of apical rows of spines on tibiae; form of elytra; existence of elytral shoulders; length of elytral setae; form of median lobe and its apex; form of inner sac; length of basal bulb; form of parameres and their apices; distribution of parameral setae; and distribution in the Balkan Peninsula.

Rozajella gen. n. belongs to a separate phyletic lineage (série phylétique de “*Leptodirus*” - *sensu* Perreau 2000) which includes five other genera, *Leptostagus* Z. Karaman (from Macedonia), *Petkovskiella* Guéorguiev (from Macedonia), *Astagobius* Reitter (from Slovenia and Croatia), *Albanodirus* Giachino & Vailati (from Albania), and *Leptodirus* Schmidt (from Slovenia, Croatia, and Italy). The new genus is present in Eastern Montenegro only. The *Rozajella-Leptostagus-Petkovskiella-Astagobius-Albanodirus-Leptodirus* complex is probably of early Tertiary age, its species having originated during the Alpine Orogeny, which affected vast areas of the Balkan Peninsula, including the Dinarids, otherwise their terra typica.

Key words: *Rozajella*, Leptodirini, Leiodidae, phylogeny, biodiversity, evolution, Montenegro

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INTRODUCTION

The leptodirine fauna in Montenegro is not sufficiently known. The majority of endogean and troglobitic genera and species were described in the first half of the 20th century (Apfelbeck 1907; Jeannel 1924, 1930, 1934; Zariquiey 1927; Knirsch 1929; Müller 1934). Seven additional cave-dwellers were recently found – *Anthroherpon absoloni* (Guéorguiev), *Anthroherpon gueorguievi* Giachino & Vailati, *Anthroherpon hoermanni orlovacensis* (Guéorguiev), *Anthroherpon matzenaueri udrzali* Giachino & Vailati, *Anthroherpon taxi pretneri* Giachino & Vailati, *Tartariella durmitorensis durmitorensis* Nonveiller & Pavićević, and *Tartariella durmitorensis zephyrensensis* Nonveiller & Pavićević

(Guéorguiev 1990; Nonveiller and Pavićević 1999; Giachino and Vailati 2005). Two genera are also restricted to Montenegro: *Weiratheria* Zariquiey and *Tartariella* Nonveiller & Popović (Perreau 2000; Löbl and Smetana 2004; Giachino and Vailati 2005).

Thirty eight cavernicolous leptodirine species from 12 genera are presently known from Montenegro (Perreau 2000; Löbl and Smetana 2004). Thus, the evidence clearly demonstrates that our general knowledge of the leiodid fauna in Montenegro is far from being complete.

In the present paper, some leptodirine specimens collected in 2005 have been studied. After a thorough

analysis, a new genus and a new species – *Rozajella jovanvladimiri* gen. n., sp. n. – were established. The description of this new taxon is based on the study of six male and seven female specimens. The type series is deposited in the collection of the Institute of Zoology, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia (IZB 2000-13).

MATERIAL AND METHODS

Type specimens of analyzed leptodirine leiodids were caught under stones and from wet walls by hand in the posterior part of the Pećina u Dubokom Potoku Cave, village of Donje Biševo, near Rožaje, Eastern Montenegro.

The leiodid specimens were glued to separate paper labels and analyzed as dry samples. Both male and female genitalia were taken out from the insects and fixed on microscope slides in the medium consisted of canadabalsam and xylol.

All specimens were analyzed in laboratories of the Institute of Zoology, Faculty of Biology, University of Belgrade. During this study, binocular stereomicroscopes Carl Zeiss – Stemi 2000 and Carl Zeiss – Ergaval were used, altogether with special monitor and accessories for drawing.

RESULTS AND DISCUSSION

LEIODIDAE FLEMING

ROZAJELLA S. B. ĆURČIĆ, M. M. BRAJKOVIĆ
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Type species. – *Rozajella jovanvladimiri* sp. n.

Other species. – None.

Etymology. – After the town of Rožaje, which is situated near the type habitat of the new taxon – Pećina u Dubokom Potoku Cave.

Diagnosis. – The new genus clearly differs from phenetically close genus *Leptostagus* Z. Karaman (otherwise both genera belong to the phyletic series of “*Leptodirus*”) in body size (3.18-3.70 mm vs. 3.70-3.90 mm); shape of head (basally less narrowed vs. basally more narrowed); presence of occipital carina (present, inconspicuous vs. absent); length of antennae (markedly shorter than the

body vs. long as the body itself); antennomere I/II length ratio (antennomere I less than 1/3 shorter than the second one vs. antennomere I 1/3 shorter than the second one); length and width ratios of antennomeres II-IV (of these, antennomere II is the longest and widest, antennomere IV is the shortest vs. antennomeres II-IV almost of same width and length); antennomere VIII/II length ratio (antennomere VIII 1/3 shorter than antennomere II vs. antennomere VIII long as antennomere II); form of ultimate antennomere (elongate and apically pointed vs. elongately oval); form of antennomeres VII, IX, and X (conus-formed and markedly widened distally vs. gradually widened distally); head/pronotum width ratio (head somewhat narrower than pronotum vs. head scarcely broader than pronotum); pronotum length/width ratio (barely longer than it is broad vs. 1.5 times longer than it is broad); form of lateral pronotal margins (somewhat concave posteriorly vs. markedly concave posteriorly); pronotal/elytral base length ratio (pronotal base shorter than elytral base vs. pronotal base long as elytral base); width of femora (narrowing distally vs. thickened distally); form of hind femora (almost straight vs. bent); form of protarsi in males (two basal male protarsomeres dilated vs. male fore tarsi not broadened); presence of apical rows of spines on tibiae (present on tibiae I-III vs. present on tibiae I and II); form of elytra in dorsal view (inversely-ovoid, slightly concave subdistally vs. ovoid); form of elytra in lateral view (puffed up and convex in less extent vs. strongly puffed up and convex); existence of elytral shoulders (present vs. absent); length of elytral setae (long vs. short); form of median lobe in dorsal view (gradually attenuated apically, without pulled up top vs. markedly attenuated apically, with pulled up top); form of median lobe in lateral view (markedly arcuated vs. slightly curved ventrally); form of apex of median lobe in lateral view (slightly curved ventrally vs. straight); form of inner sac (weakly sclerotized, with two median bands vs. unarmed); length of basal bulb (long vs. short); width of parameres in lateral view (gradually attenuated apically vs. of same width during whole their length); form of parameral apex in dorsal view (dilated, slightly curved inwards vs. narrow, curved exteriorwards); distribution of parameral setae (two apical setae closely distributed vs. all setae equidistant); and distribution in the Balkan Peninsula (Eastern Montenegro vs. Central Macedonia) (Figs. 1-8) (K a r a m a n 1954; G u é o r g u i e v 1976).

Description. – A leptodirine genus of medium dimensions, eyeless, pubescent (most evidently in elytra), with

leptodiroid body, large subrectangular pronotum, inversely-ovate elytra, and antennae significantly shorter than the body length.

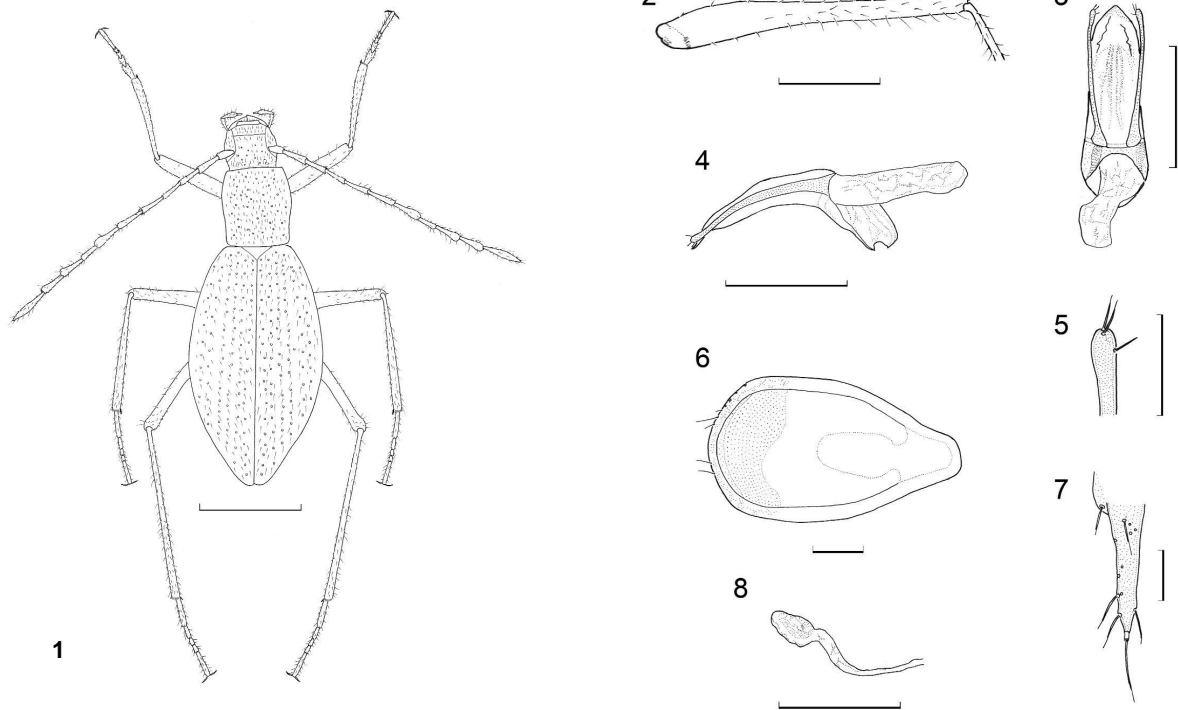
Head elongate, not retractile, with inconspicuous occipital carina; somewhat narrower than pronotum, basally slightly narrowing; mouth parts with dense, long pubescence. Penultimate labial palpomere long and widening distally; apical palpomere short. Temples somewhat concave; vertex almost flat. Temples bordered with a suture leading towards the anterior part of the head. Antennae inserted on the mid third of head, long, similar in both sexes, and protruding over mid-elytra (not reaching the elytron apex). Antennomere I wider and less than 1/3 shorter than antennomere II. Antennomere II moderately wide, longer than antennomere III, which is longer than antennomere IV. Antennomere V slightly shorter than antennomere VI; the both articles narrow. Antennomeres VII, IX, and X conus-like, widened distally; of these, antennomere VII is the longest, and antennomere X is the shortest. Antennomere VIII small, moderately widened

distally, 1/3 shorter than antennomere II. Ultimate antennomere the longest, apically pointed.

Pronotum large, slightly longer than it is wide, with its maximum width slightly anterior to mid-pronotum level, subrectangular in shape; lateral sides rounded anteriorly, sinuate basally, with hind angles obtuse but evident; basal margin shorter than the base of elytra. Pterothorax not pedunculate. Mesosternal carina weakly expressed; metasternum not predominant.

Elytra inversely-ovate, moderately puffed up and convex laterally, distally attenuate, slightly concave subdistally, similar in both sexes. Elytral shoulders somewhat expressed. Elytral apex bilobed. Disc with long erect pubescence; sutural striae absent.

Legs long and slender, with femora thickened basally. Hind femora almost straight. Male protarsi 5-segmented, with two dilated basal tarsomeres. Protibiae widened towards apex, with a semicircular apical comb, and a 7-fid inner apical spur each; meso- and metatibiae each



Figs. 1-8. *Rozajella giovanvladimiri* gen. n., sp. n., from the Pećina u Dubokom Potoku Cave, village of Donje Biševo, near Rožaje, Eastern Montenegro. 1 – holotype male, habitus (dorsal view); 2 – paratype female, right metafemur (lateral view); 3 – holotype male, aedeagus with inner sac (dorsal view); 4 – paratype male, aedeagus (lateral view); 5 – holotype male, left parameral apex (dorsal view); 6 – paratype male, abdominal sternite IX (urite); 7 – paratype female, left gonostylus (dorsal view); 8 – paratype female, spermatheca. Scale lines = 1.00 mm (Fig. 1), 0.50 mm (Figs. 2-4, 8), and 0.10 mm (Figs. 5-7).

with an apical row of short spines; mesotibiae bearing a 7-fid inner apical spur, and metatibiae carrying an unifid apical thorn. Tarsal claws long and pointed apically.

Male abdominal sternite IX (urite) well-developed and subtriangular. Aedeagus small-sized, stout, and arcuate (in lateral view); median lobe with a triangularly pointed apex which is slightly curved ventrally in lateral view; basal bulbous large and rounded; parameres slightly shorter than the median lobe, dilated at apex, gradually attenuated apically in lateral view, slightly curved inwards in dorsal view, each furnished with three setae (two close-set apical and one pre-apical, respectively). Inner sac weakly sclerotized.

Female gonostyli elongated, narrowing apically, pointed, and straight. Spermatheca membranous, sac-like, slightly sclerotized dorsally.

Distribution. – The genus *Rozajella* gen. n. is monotypic and comprises a single species: *R. jovanvladimiri* sp. n., inhabiting a cave locality in Eastern Montenegro.

Remarks. – *Rozajella* gen. n. belongs to a separate phyletic lineage (série phylétique de “*Leptodirus*” - *sensu* Perreau 2000) which includes five other genera, *Leptostagus* Z. Karaman (from Macedonia), *Petkovskiella* Guéorguiev (from Macedonia), *Astagobius* Reitter (from Slovenia and Croatia), *Albanodirus* Giachino & Vailati (from Albania), and *Leptodirus* Schmidt (from Slovenia, Croatia, and Italy). The new genus is present in Eastern Montenegro only.

The *Rozajella-Leptostagus-Petkovskiella-Astagobius-Albanodirus-Leptodirus* complex is probably of early Tertiary age, its species having originated during the Alpine Orogeny, which affected vast areas of the Balkan Peninsula, including the Dinarids, otherwise their terra typica. *Rozajella* gen. n. represents a relict form endemic to both Montenegro and the Balkan Peninsula.

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(Figs. 1-8)

Etymology. – After the Serbian Prince Vladimir (X-XI century), otherwise canonized as St. Jovan (= John) Vladimir.

Material examined. – Holotype male from the Pećina u Dubokom Potoku Cave, village of Donje Biševo, near Rožaje, Eastern Montenegro, August, 21, 2005, collected by S. B. Ćurčić; five paratype males and seven paratype

females, same locality and date, collected by S. B. Ćurčić, B. P. M. Ćurčić, and N. B. Ćurčić.

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

Description. – Medium-sized (total length: **GG** 3.18-3.45 mm; **EE** 3.45-3.70 mm), leptodiroid, highly specialized leptodirine beetle (Fig. 1). Colour brown-reddish, integument shiny, pubescent, finely microsculptured.

Head elongate, not retractile, anophthalmous, with inconspicuous occipital carina, basally slightly narrowing (Fig. 1). Mouth parts pubescent, specialized for filtering water and organic matter (Moldovan et al. 2004). Temples somewhat concave; vertex almost flat. Antennae medium-sized, slender, protruding over mid-elytra, pubescent, more elongate in males (antennae/body length ratio: **GG** 0.74; **EE** 0.61). Antennae inserted about at the mid-head level. Antennomere I wider and less than 1/3 shorter than antennomere II. Antennomere II moderately wide, longer than antennomere III, which is longer than antennomere IV. Antennomere V slightly shorter than antennomere VI; the both articles narrow. Antennomeres VII, IX, and X conus-like, widened distally; within these, antennomere VII is the longest, and antennomere X is the shortest. Antennomere VIII small, moderately widened distally, 1/3 shorter than antennomere II. Ultimate antennomere the longest, apically pointed. Head pubescent, covered with fine punctures.

Pronotum large in size (Fig. 1), moderately elongate, slightly longer than it is wide (pronotum width/length ratio: 0.94), with its maximum width slightly anterior to mid-pronotum level, slightly constricted to the base; lateral sides rounded anteriorly, sinuate basally. Basal margin shorter than the base of elytra. Both anterior (more intense) and basal margin (slightly) convex. Disc convex, covered by dense, short, erect pubescence, and by densely distributed deep punctures. Pterothorax not pedunculate. Mesosternal carina weakly expressed; metasternum not predominant.

Elytra inversely-ovate, distally attenuate, somewhat concave subdistally, slightly stouter in females (elytra width/length ratio: **GG** 0.59; **EE** 0.60), with maximum width slightly anterior to mid level (Fig. 1). Elytral shoulders somewhat expressed. Elytral apex bilobed. Disc convex, with long erect pubescence, covered with densely distributed deep punctures; sutural striae absent. Scutellum large and subtriangular.

Legs long and slender, with femora thickened basally (Figs. 1, 2). Hind femora and tibiae almost straight. Tibiae without exterior bristles. Protibiae widened towards apex, with a semicircular apical comb, and a 7-fid inner apical spur each; meso- and metatibiae each with an apical row of short spines; mesotibiae bearing a 7-fid inner apical spur, and metatibiae carrying an unifid apical thorn. Tarsal claws long and pointed apically. Male protarsi 5-segmented, with two basal tarsomeres dilated, from which the tarsomere I narrower than the apex of protibia; female protarsi 4-segmented and narrow.

Aedeagus (Figs. 3-5) small, stout; basal bulbous large and rounded. Median lobe in dorsal view (Fig. 3) moderately narrowing distally and apically triangularly pointed. Inner sac mostly colourless and unarmed, only two median bands present. Median lobe in lateral view distinctly arcuated (Fig. 4), with an median convexity dorsally, slightly elevated and acuminate at apex. Its apex slightly curved ventrally in lateral view. Parameres elongated, thin, slightly shorter than the median lobe, gradually attenuated apically in lateral view, slightly curved inwards in dorsal view, dilated at apex, each furnished with three straight acuminate setae (two close-set in apical position, one inner, in pre-apical position) (Figs. 3, 5), similar in size and length.

Male abdominal sternite IX (urite) (Fig. 6) well-developed, subtriangular, with an internal process and a few exterior setae.

Female gonostyli elongated, narrowing apically, pointed, and straight (Fig. 7). Each stylus with a single apical seta, three inner, and one outer seta. Spermatheca membranous, sac-like, slightly sclerotized dorsally (Fig. 8).

Bionomy and distribution. – This species was found under stones and on wet walls in the Pećina u Dubokom Potoku Cave, village of Donje Biševo, near Rožaje (Eastern Montenegro). The type habitat is in the posterior part of the cave, where stones are distributed over the floor. Apart from *Rozajella jovanvladimiri* gen. n., sp. n., Pećina u Dubokom Potoku Cave is also inhabited by some pselaphine rove beetles (*Bryaxis* sp.), pseudoscorpions (*Neobisium ninae* Ćurčić & Dimitrijević), diplurans, and collembolans, respectively (P r e t n e r 1977; Ć u r č i ć et al. 2007). The analyzed species represents an endemic and relict taxon of Tertiary origin and age.

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ROZAJELLA JOVANVLADIMIRI GEN. N., SP. N. (LEPTODIRINI, LEIODIDAE, COLEOPTERA), ИЗ ИСТОЧНЕ ЦРНЕ ГОРЕ, СА ПОДАЦИМА О ЊЕГОВОЈ ФИЛОГЕНИЈИ

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Нови род и врста пећинских лејодида (*Rozajella jovanvladimiri* gen. n., sp. n.) су дијагностификовани и описани из Пећине у Дубоком потоку, село Доње Бишево, близу Рожаја, источна Црна Гора. Нови род се јасно разликује од свих других сродних родова по следећим корелативним особинама: дужина тела, облик главе, присуство окципиталне карине, дужина антена, морфометријски односи и облици појединих антеномера, однос ширине главе и пронотума, однос дужине и ширине пронотума, облик бочних проноталних ивица, однос дужине основе пронотума и покрилаца, облик фемура и протарзуса, присуство апикалних низова трнова на тибјама, облик покрилаца, присуство елитралних рамена, дужина сета на покрицима, облик медијаног лобуса и његовог врха, облик унутрашње врећице, дужина базалног булбуса, облик

парамера и њихових врхова, распоред парамералних сета и распрострањење на Балканском полуострву.

Rozajella gen. n. припада посебној филетичкој линији (филетичка серија "*Leptodirus-a*" - sensu Pergea и 2000), која укључује и пет других родова: *Leptostagus* Z. Karapan (из Македоније), *Petkovskiella* Guéorguiev (из Македоније), *Astagobius* Reitter (из Словеније и Хрватске), *Albanodirus* Giachino & Vailati (из Албаније) и *Leptodirus* Schmidt (из Словеније, Хрватске и Италије). Новоописани род је присутан само у источној Црној Гори. Комплекс *Rozajella-Leptostagus-Petkovskiella-Astagobius-Albanodirus-Leptodirus* је вероватно ранотерцијарне старости. Врсте ових родова су настале током Алпске орогенезе, која је деловала на простране области Балканског полуострва, укључујући и Динариде.