

TAXONOMICAL AND ECOLOGICAL NOTES ON THE GENUS *SCOTOPLANETES* ABSOLON, WITH THE DESCRIPTION OF A NEW SPECIES FROM MONTENEGRO (COLEOPTERA: CARABIDAE: TRECHINI)

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Lakota, J., Lohaj, R. & Dunay, G.: Taxonomical and ecological notes on the genus *Scotoplanetes* Absolon, with the description of a new species from Montenegro (Coleoptera: Carabidae: Trechini). *Nat. Croat.*, Vol. 19, No. 1, 99–110, 2010, Zagreb.

Scotoplanetes aquacultor n. sp. from the »Vodna jama« pit (Dragaljsko polje near Grahovo, south-west Montenegro), second known species of the genus is described, illustrated and compared with the congeneric species *Scotoplanetes arenstorffianus* Absolon, 1913. Based on the examination of the holotype, *Scotoplanetes arenstorffianus weiratherianus* Noesske, 1928 is reconsidered in synonymy to *Scotoplanetes arenstorffianus*. Data about the taxonomy of this remarkable genus, complemented with the description of habitat and the bionomy are given.

Key words: *Scotoplanetes aquacultor* sp. nov., new species, Coleoptera, Carabidae, Trechinae, taxonomy, bionomy, subterranean environment, hygropetric, Montenegro

Lakota, J., Lohaj, R. & Dunay, G.: Taksonomske i ekološke bilješke o rodu *Scotoplanetes* Absolon, s opisom nove vrste iz Crne Gore (Coleoptera: Carabidae: Trechini). *Nat. Croat.*, Vol. 19, No. 1, 99–110, 2010, Zagreb.

U radu se opisuje i ilustrira *Scotoplanetes aquacultor* n. sp. iz »Vodne jame« (Dragaljsko polje kod Grahova, jugozapadna Crna Gora), druga poznata vrsta tog roda te se uspoređuje s vrstom iz istog roda *Scotoplanetes arenstorffianus* Absolon, 1913. Na temelju holotipa se *Scotoplanetes arenstorffianus weiratherianus* Noesske, 1928 razmatra kao sinonim *Scotoplanetes arenstorffianus*. Daju se podaci o taksonomiji ovog izuzetnog roda, kao i opis staništa i bionomija.

Ključne riječi: *Scotoplanetes aquacultor* sp. nov., nova vrsta, Coleoptera, Carabidae, Trechinae, taksonomija, bionomija, podzemlje, higropetrik, Crna Gora

INTRODUCTION

Aphaenopsoid cave dwelling Trechine genus *Scotoplanetes* Absolon, 1913 has remained monogeneric for more than 90 years. From the single species *Scotoplanetes arenstorffianus* Absolon, 1913, two subspecies were known from the southern Herzegovina: *Scotoplanetes arenstorffianus arenstorffianus* from the well-known Vjetrenica cave on the Popovo polje plateau, and *Scotoplanetes arenstorffianus weiratherianus* Noesske, 1928 described from the nearby Mrcine cave by the village Grebci, located between the Popovo polje plateau (Bosnia and Herzegovina) and the city of Dubrovnik (Croatia).

At the end of 1930's NOESSKE (1928: 5) described the new cave dwelling genus *Adriaphaenops* Noesske, 1928 with 'aphaenopsoid' characters (also as a subgenus of the genus *Trechus* Clairville) with the type species *A. antroherponomimus* from the cave Čatol jama (nomen fictum Weiratheri, identified as Sniježnica (snow cave) on Tišov Krš) on Bjelašnica Mts. near Gacko, Herzegovina. In the same year JEANNEL (1928: 793) placed genera *Scotoplanetes* and *Adriaphaenops* into the *Aphaenops* phyletic lineage and noted that both genera are undoubtedly only subgenera of the genus *Aphaenopsis* G. Müller, 1931. Later, SCHEIBEL (1935: 34) presented genera *Scotoplanetes* and *Adriaphaenops* only as subgenera of the genus *Aphaenops*. Genera *Aphaenopsis*, *Scotoplanetes* and *Adriaphaenops* were later unified by PRETNER (1959) into one heterogeneous genus *Aphaenopsis*. This concept has been also followed by CASALE & LANEYRIE (1982), but refused by SCIACKY & VIGNA TAGLIANTI (1980), MONGUZZI (1993) and CASALE & GUÉORGUIEV (1994) who recognized them as separate genera. This status has been also accepted by DROVENIK & PEKS (1994), MORAVEC *et al.* (2003) and QUÉINNEC (2008).

During the Czech biospeleological expedition of Roman Mlejnek and Petr Zajíček to Montenegro, another species belonging to the genus *Scotoplanetes* by its typical morphological characters (size and shape of body, elytral and pronotal chaetotaxy, complete frontal furrows and right mandible with distinct teeth) was discovered in Vodna jama pit on Dragaljsko polje plateau near the village of Umac. This species is described below.

MATERIAL AND METHODS

The morphological structures of the beetles were examined using the microscopes Olympus SZ 60 and LEICA S8 APO. Photos were taken using the microscope LEICA S8 APO with attached digital camera NIKON COOLPIX® E 4500. Male genitalia were dissected, cleansed and mounted in Euparal® on the transparent slides under the examined specimens. Photos of genitalia were taken using microscope Leitz Ergolux with attached digital camera NIKON COOLPIX® E 4500 and were completed using Helicon Focus software program.

Abbreviations used in the text are as follows:

TL: total body length (measured from the anterior margin of clypeus to the apex of elytra)
AL: antennal length (measured from the base of antennal scape to the apex of terminal antennal segment)

HL: head length (measured from the base of the neck to the front margin of the labrum)

HW: maximum width of head

PL: pronotum length (measured along median line)

PW: maximum width of pronotum

EL: elytral length (measured along sutura from the elytral base to the apex)

EW: maximum width of elytra

HT – holotype, PT, PTT – paratype(s).

Forward slash indicates separate labels.

Codens of the museums and private collections:

CNHM – collection of the Croatian Natural History Museum, Zagreb, Croatia (Branko Jalžić)

SMTD – collection of the Staatliches Museum für Tierkunde, Dresden (Klaus-Dieter Klass)

CJL – coll. Ján Lakota, Ružomberok, Slovakia

CRL – coll. Roman Lohaj, Košice, Slovakia

RESULTS

Genus *Scotoplanetes* Absolon, 1913

Scotoplanetes Absolon, 1913: 93, type species: *Scotoplanetes arenstorffianus* Absolon, 1913, by monotypy, type locality: Vjetrenica cave near Zavala, southern Herzegovina, BiH.

Scotoplanetes arenstorffianus Absolon (Figs. 1, 2, 8–15)

Trechus (*Scotoplanetes*) *arenstorffianus* Absolon, 1913: 93; J. MÜLLER, 1913: 97, 117.

Aphaenops (*Scotoplanetes*) *arenstorffianus* Absolon: SCHEIBEL, 1935: 34, 36.

Aphaenopsis (*Scotoplanetes*) *arenstorffianus* Absolon: PRETNER, 1959: 79, 90; CASALE & LANEYRIE, 1982: 159.

Scotoplanetes arenstorffianus Absolon: NOESSKE, 1914: 24; JEANNEL, 1928: 251; DROVENIK & PEKS, 1994: 43; MORAVEC, UÉNO & BELOUSOV, 2003: 320; QUÉINNEC, 2008: 167; LOHAJ & JALŽIĆ, 2009: 230

Scotoplanetes arenstorffianus weiratherianus Noesske, 1928: 12; Pretner, 1974: 8 (as a subsp. *weiratheri*); MORAVEC, UÉNO & BELOUSOV, 2003: 320 syn. nov.

Material examined (names of parts of the Vjetrenica cave after Lučić, 2003): two females, 6.9.2001, »Radovanovičev kanal«, lgt. B. Jalžić (CNHM, CRL), one male (Fig. 1), 18.8.2004, »Gornji Absolonov kanal«, lgt. J. Bedek (CNHM), one male, »Leopardov kanal«, 10.9.2007, leg. B. Jalžić (CNHM).

Another known material: Holotype, female (Absolon, 1943: 208), date unknown, »Cvijićeva dvorana« cavern (ABSOLON, 1916a), lgt. Kurt von Arenstorff (ABSOLON, 1913); one male, 27.7.1914, »Bijeli saljev« chamber (ABSOLON, 1916b), lgt. K. Absolon (current location of holotype and Absolon's male specimen is unknown to authors and might be lost); one male, 21.8.1931, »Donja Vjetrenica« gallery, lgt. Slovenian cave research team (PRETNER, 1959: 81); one male, 28.5.1940, 250 m from the entrance in the main gallery (if distance was measured correctly, it can be only in »Prvi pjati« pools or maybe »Žuti saljev« drapery region), lgt. A. Winneguth (PRET-

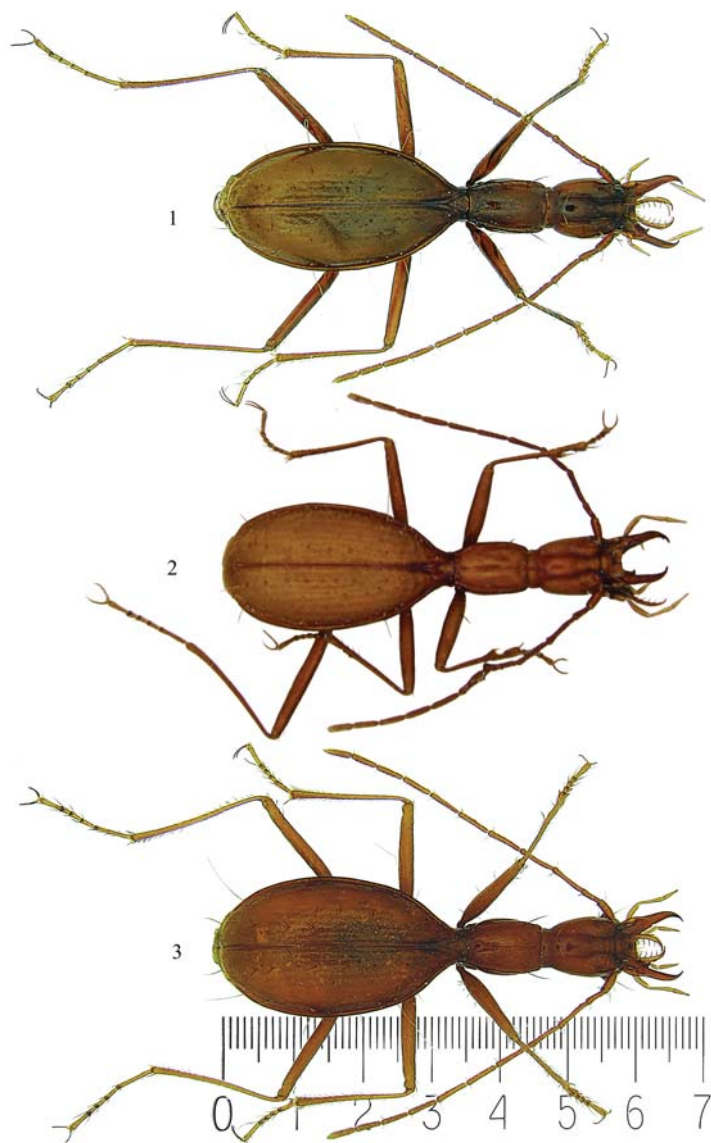
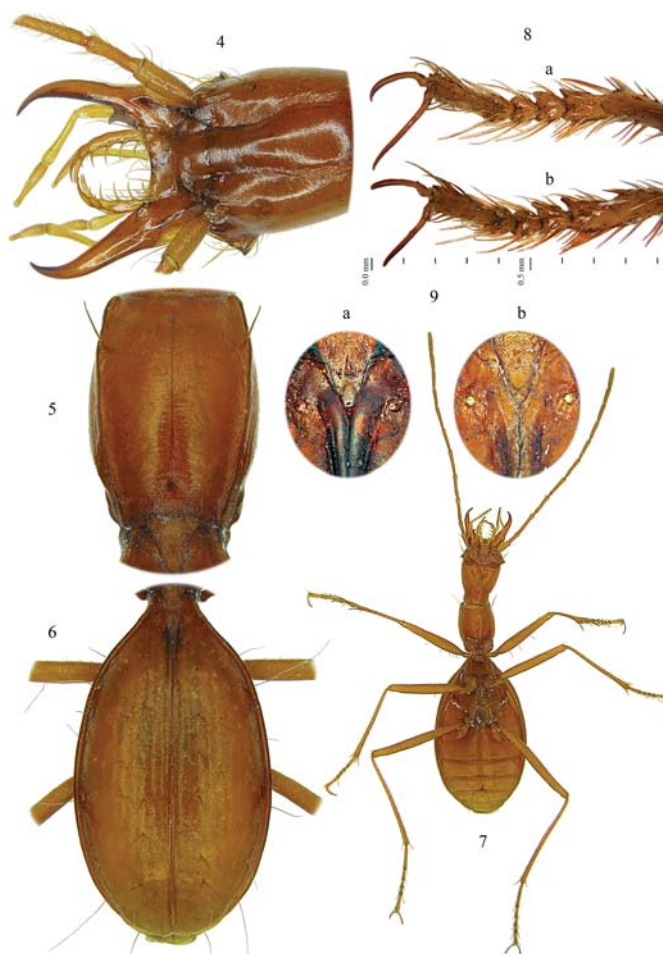


Fig. 1. *Scotoplanetes arenstorffianus* male, Vjetrenica cave, **Fig. 2.** *Scotoplanetes arenstorffianus weiratherianus*, holotype female, Mrcine cave (= *S. arenstorffianus* syn. nov.), **Fig. 3.** *Scotoplanetes aquacultor* sp. nov., holotype, Vodena jama pit

NER, 1959: 81); one male, 26.6.2001, »Saljev visećih jezera« chamber; one male, 1.7.2002, »Bijeli saljev« chamber, lgt. R. Mlejnek (R. Mlejnek, pers. comm).

Scotoplanetes arenstorffianus weiratherianus Noesske:

Material examined: Holotype female (Fig. 2), labelled as follows: »Mrzine-Höhle bei Grebci, Herzegow., 22. XII. 1913 +10 (white label, handwritten) / Weirather le-



Scotoplanetes aquacultor sp. nov.: Fig. 4. head, Fig. 5. pronotum, Fig. 6. elytrae, Fig. 7. habitus, ventral view, Fig. 8. left male protarsus, Fig. 9. scutellar region (a = *S. arenstorffianus*, b = *S. aquacultor*)

git! Das zweite bekannte exemplar! (white label, handwritten) / TYPE (red label, handwritten) / Mrzine bei Grebci Weirather 22./12.13 10 + (white label, handwritten) / s. Weiratherianus Noesske. Type! Col. Centrabl III, 1928 p. 12 (white label, handwritten) / coll. Prof. Dr. Noesske Ankauf 947 (white label, printed)» (SMTD).

Original description: »Bei meinem *Scotoplanetes* ist der 1. Punkt der S[eries] umbil. [icata] deutlich, wenn schon nur wenig eingerückt, die Streifung zwar flach, aber bis zum Rande der Flügeldecken erhalten, der hintere Halsschildrand schwach nach vorn ausgebogen; auf diese und andere abweichenden Merkmale ausführlicher einzugehen, behalte ich mir vor. Anscheinend handelt es sich um eine Rasse des *Scot. arenstorffianus* Abs. (? ssp. *Weiratherianus* m.), zumal da das Tier von einem andere Fundorte (bei Grebci) stammt.« [Noesske 1928: 12, in note 2 under line].

Note: The author did not make a complete description of this subspecies (see above), he just gave few features when describing *Adriaphaenops antroherponomimus*. PRETNER (1959:81) considered specimen from Noesske's collection to be conspecific with *S. arenstorffianus*, without any comment. In the last catalogue of the palearctic Carabidae (MORAVEC *et al.*, 2003) the subspecies was kept as valid. Examination of holotype specimen shows that it is identical with the typical *Scotoplanetes arenstorffianus* and that there are no significant morphological characters which would support the validity of this subspecies. From the above mentioned reasons we consider *Scotoplanetes arenstorffianus weiratherianus* Noesske, 1928 as a synonym of *Scotoplanetes arenstorffianus* Absolon, 1913.

Scotoplanetes aquacultor sp. nov.

(Figs. 3, 4–15)

Medium size, apterous trechine with aphaenopsoid characters: elongated head and pronotum with ovoid, on base strongly narrowed elytra, obviously wider than head and pronotum, body depigmented, strongly flattened (Fig. 3, 7).

Type series: Holotype male, labelled as follows: »MONTENEGRO, Dvorsno (Dragaljsko) polje, Umac env, Vodna jama (pit), -95 m, 13.8.2005, R. Mlejnek lgt.« (white label, printed) / HOLOTYPUS *Scotoplanetes aquacultor* sp. nov., J. Lakota, R. Lohaj & G. Dunay det. 2010 (red label, printed), (CJL). Paratypes, one male and one female, labelled: »MONTENEGRO, Dvorsno (Dragaljsko) polje, Umac env, Vodna jama (pit), -95 m, 10.6.2004, R. Mlejnek, P. Zajiček lgt.« (white label, printed) / PARATYPUS *Scotoplanetes aquacultor* sp. nov., J. Lakota, R. Lohaj & G. Dunay det. 2010 (red label, printed), (CJL, CRL).

Description.

Total body length 5.50–6.25 mm (male PT and HT), female PT 5.95 mm. Colour yellowish to reddish-brown, mouthparts, antennae and tarsi slightly paler, mandibles dark brown, head with distinct isodiametric microsculpture, microsculpture of pronotum and elytra with isodiametric and transverse meshes.

Head (Fig. 4) conspicuously large, elongated oval, slightly wider than pronotum, widest in the middle, index HL/HW 1.50–1.58, neck well defined, with two pairs of supraorbital setae, anterior pair before middle, posterior pair at hind part of head near neck. Frontal furrows complete, deep, regularly arcuated, more superficial in posterior part, reaching posterior supraorbital setae. Tempora regularly convex, eyes totally absent. Labrum transverse, bearing 6 setae, apical margin slightly concave, with small, round, well-defined, yellowish-brown spot in the middle of posterior part of labrum. Mandibles elongate and slender, moderately curved apically, acutely pointed. Left mandible bigger and more robust, right mandible slender, with stronger basal tooth on inner margin, bidentally formed, posterior tooth small, rounded, anterior one big, strong and pointed. Length of mandibles: in male 0.80–0.82 mm, in female 0.88 mm. Maxilla slender, well-developed, lacinia gently curved, provided with a row of recurved spines and short prickly hairs on inner margin under 45° angle. Maxillary and labial palpi slender, apical segments cylindrical, slightly narrowed apically. Antennae (Fig. 15) relatively long and slender, AL 4.45–4.88 mm, with pale pubescence; length of antennomeres (from scape to terminal segment) in

males: 0.35–0.36; 0.26–0.30; 0.47–0.52; 0.47–0.52; 0.47–0.52; 0.47–0.50; 0.45–0.50; 0.40–0.45; 0.37–0.40; 0.36–0.39; 0.38–0.42 mm, in female: 0.37; 0.27; 0.50; 0.50; 0.50; 0.50; 0.45; 0.42; 0.40; 0.37; 0.37 mm.

Pronotum (Fig. 5) narrow and elongate, index PL/PW = 1.48–1.64, with maximum width in anterior fourth of total length, slightly narrower than head, propleura visible from dorsal view. PL in males = 1.00–1.06 mm, in female = 0.96 mm, PW in males = 0.67–0.69 mm, in female = 0.60 mm. Anterior angles gently rounded, not prominent, posterior angles obtuse. Lateral groove shallow, narrowed in middle, wider in angles, with single pair of anterior setae situated in the anterior fifth of pronotal length, posterior pair of setae absent. Base of pronotum with shallow elongated median impression, median furrow inconspicuous.

Elytra (Fig. 6) subovate elongate, with maximum width in third fifth of total length, index EL/EW 1.70–1.71, strongly flattened, in posterior part more convex. EL in males = 3.37–3.63 mm, in female = 3.13 mm, EW in males = 1.98–2.13 mm, in female = 1.83 mm. Elytral striae 1–4 superficially indicated, shallow, finely punctated, further striae vanished. Scutellar striae missing, scutellar setiferous puncture present, distinct. Elytral intervals from slightly convex to flat. Elytral chaetotaxy irregular, stria 3 in HT with eight setiferous pores on each elytron, PT male with nine pores on left and seven on right elytron, PT female with seven pores on left and eight on right elytron, first pore is situated at level of first pore of series umbilicata. Stria 5 with three discal setiferous pores on each elytron in HT and female PT, and with four in male PT, all pores are irregularly situated from anterior quarter to posterior third of total elytral length, with relatively long and thin setae. Umbilicate series aggregated, consisting of 8 setiferous pores (in female left elytron is with 9 setae; irregular one is situated between pores 3 and 4); setae 2, 6 and 8 very long, setae 1, 3 and 5 shorter. Umbilicate pores asymmetrically situated, distances vary between left and right elytron. Apical stria short but well defined, with small setiferous pore with very thin seta, situated before apical stria in posterior part of elytrae. Elytral suture elevated in scutellar region, forming slightly concave platform (Fig. 9). Scutellum well-defined, subtriangular, moderately vaulted. Abdominal sternites glabrous, with two short setae on each side, last abdominal segment in males and females with only one pair of longer setae.

Legs relatively long and slender, protibiae without visible longitudinal groove on exterior surface, thickly pubescent. First two tarsomeres of male protarsi distinctly dilated and protracted at their internal margins, furnished with ventral adhesive setae (Fig. 8). Tarsal claws very long and slender, gently arcuate.

Aedeagus (Figs. 10–14) 0.60–0.65 mm long, moderately sclerotized, asymmetrical, median lobe twisted counter clockwise, in lateral view relatively robust, curved, apical part gently arcuated dorsally. Diameter of median lobe remains in dorsal view approximately same over the half of length, then gradually narrowed up to apical plate. Parameres wide, length of parameres less than half of aedeagus length, apex with four long and strong apical setae, in HT with additional shorter seta on left paramere before apex.

Etymology.

The specific epithet *aquacultor* derives from the Latin nouns *aqua* (= water) and *cultor* (= inhabitant, farmer) and reflects the bionomy of the taxon.

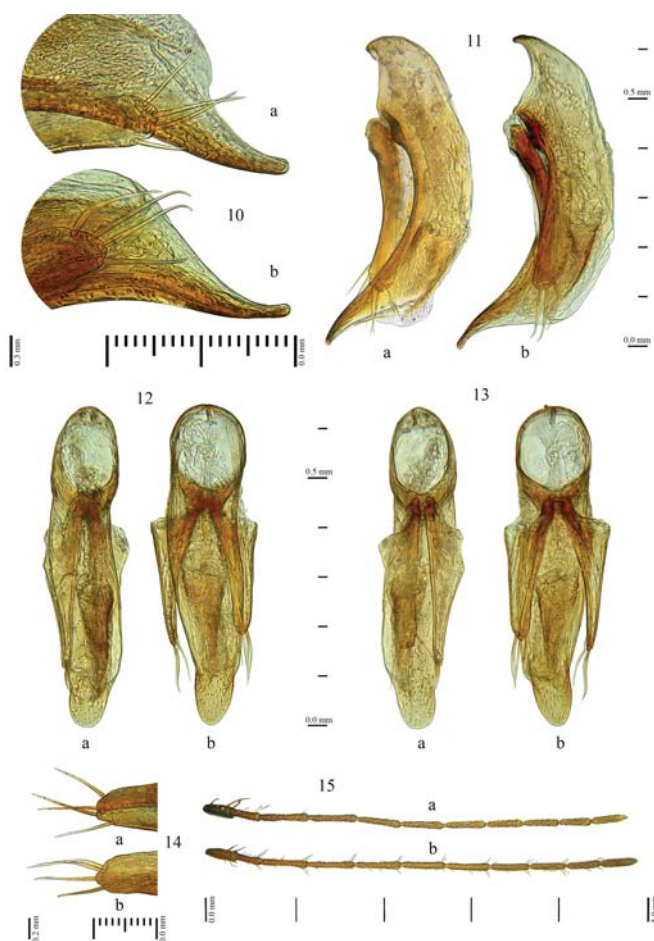


Fig. 10. apex of aedeagus, left lateral view, **Fig. 11.** aedeagus, left lateral view, **Fig. 12.** aedeagus, dorsal view, **Fig. 13.** aedeagus, ventral view, **Fig. 14.** apex of right paramere, **Fig. 15.** antenna (a = *S. arenstorffianus*, b = *S. aquacultor*)

Distribution.

So far known only from the type locality, Vodna jama pit on Dragaljsko polje near the village of Umac, Montenegro.

Habitat and ecology.

Vodna jama pit is situated on Dragaljsko (older name Dvrsno) Polje near the village of Umac (Fig. 16), between Grahovo and Risanj, southwest Montenegro, at the altitude of 615 m (see also TISSERANT & GODARD, 1970). The pit is formed by cascades, from depth of 80 m with waterfalls on the walls, down to the total depth of 135 m, where it ends in a small lake (Fig. 18). Type specimens were collected at the depth of ca 95 m on the vertical walls covered by a film of fluid water – the typical

cave hygropetric environment, defined by SKET (2004), together with one female of Leptodirine beetle *Hadesia weiratheri* Zariquiey, 1927 (Fig. 17). Other beetles found in the pit were *Anthroherpon apfelbecki metohijensis* Zariquiey, 1927 (Leiodidae: Leptodirini), *Neotrechus suturalis suturalis* (Schaufuss, 1864) and *Neotrechus hilfi* Reitter, 1903 (Carabidae: Trechini). Air temperature during the biospeleological research was 7°C. During other visits on 28th July 2004, 11th September 2004 and 7–8th May 2005 no other individual of *Scotoplanetes* was found.

DISCUSSION

Scotoplanetes aquacultor sp. nov. is strikingly similar to the type species of the genus, *Scotoplanetes arenstorffianus*, from which it differs by shorter frontal furrows,



Fig. 16. General view of the Dragaljsko (Dvrsno) polje, **Fig. 17.** the underground habitat of *Scotoplanetes aquacultor* sp. nov., **Fig. 18.** Vodna pit – topographical scheme of the cave

wider elytra with different number of setae, as well as by the shape of the scutellar region and aedeagus. These two species can be easily separated using the following key:

1 (2) Frontal furrows longer, reaching neck constriction; elytra narrower, index EL/EW 1.83–1.88, elytral stria 3 with 8–11 and stria 5 with 4–6 setiferous pores; elevated margins of elytral sutura near scutellum not fused together, divided by furrow (Fig. 9a); aedeagus with median lobe slender, apex wider. S Herzegovina, Vjetrenica and Mrcine caves *Scotoplanetes arenstorffianus*

2 (1) Frontal furrows shorter, not reaching neck constriction, ending at posterior supraorbital setae; elytra wider, index EL/EW 1.70–1.71, elytral stria 3 with 7–9 and stria 5 with 3–4 setiferous pores; elevated margins of elytral sutura near scutellum fused together (Fig. 9b); aedeagus with median lobe more robust and narrower apex. SW Montenegro, Dragaljsko polje, Vodna jama pit *Scotoplanetes aquacultor* sp. nov.

Representatives of the genus *Scotoplanetes*, as well as other Dinaric genera of aphaenopoid Trechine beetles, such as *Adriaphaenops* Noesske, 1928 *Minosaphaenops* Quéinnec, 2008, *Dalmataphaenops* Monguzzi, 1993, or *Derosiella* Quéinnec, 2008 were collected only individually and are known only from very small series. Despite of a long history and very intensive biospeleological research of Vjetrenica cave, representatives of *Scotoplanetes* were found only a few times since its discovery in 1913. Vodna jama pit was visited six times but *S. aquacultor* was collected only twice. All nine recently found specimens of both species were in, or very close to the typical hygropetric environment where also *Hadesia* was present (R. Mlejnek, J. Bedek and B. Jalžić, pers. comm.). One specimen of *S. aquacultor* was observed to be washed down the wall to the small lake and collected from its surface. Because only very few specimens were found until now, we assume that during the most part of the year they are in microcavities, inaccessible to humans and that only exceptionally, in suitable water conditions, they move to bigger spaces where they can be found.

The feeding strategy of *Scotoplanetes* is not known, as well as the reason why they are attracted to the hygropetric environment. Adaptation of mouthparts is not the same as in water filtering Leptodirini like *Hadesia* Müller, 1911, *Radziella* Casale & Jalžić, 1988, *Croatodirus* Casale, Giachino & Jalžić, 2000 or *Nauticiella* Moravec & Mlejnek, 2002 (MOLDOVAN *et al.*, 2004). Extremely thin and sharp spike-like mandibles with strong teeth look appropriate to fix slippery or soft food, showing that *Scotoplanetes* is a predator, which probably preys on eggs and larvae of *Hadesia* and other hygropetric invertebrates. Suitable prey is, however, much more common out of the hygropetric habitat, and can be present on wet walls, in mud or guano, etc. Further research can bring more light to this interesting problem.

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