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A NEW TROGLOBITIC SPECIES OF THE GENUS *PORRHOMMA* FROM MACEDONIA (ARANEAE: LINYPHIIDAE)

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The new troglobitic species *Porrhomma matevskii n. sp.* is described from the Srt pit in Matka Gorge, Macedonia, based on specimens of both sexes. To date, no troglobitic species have been recorded from Macedonia. *Porrhomma matevskii n. sp.* is the first eyeless species to be described in the genus across the entire Balkan Peninsula. The primary troglomorphic traits include the complete absence of eyes, pronounced leg elongation, and near-total depigmentation, which position it as one of the most troglomorphic species within the genus and a clear ancient relict. The phylogenetic relationship between this new species and other members of the genus *Porrhomma* is discussed. The need for its conservation and protection is also highlighted.

Keywords: Balkan Peninsula; cave spiders; subterranean; eyeless; taxonomy

INTRODUCTION

Within the family Linyphiidae, the genus *Porrhomma* Simon, 1884, is one of the few genera that includes subterranean species. Of the 25 validly described species to date, only six are considered troglobitic: *Porrhomma cavernicola* (Keyserling, 1886), *P. frassianum* Weiss & Sarbu, 2021, *P. ohkawai* Saito, 1977, *P. profundum* M. Dahl, 1939, *P. rakanum* Yaginuma & Saito, 1981, and *P. rosenhaueri* (L. Koch, 1872). These subterranean species share common troglomorphic traits, including significant eye reduction (in both size and function) and depigmentation [6]. However, until recently, no completely eyeless *Porrhomma* species had been identified. The first entirely eyeless species, *P. frassianum*, was discovered in the Frasassi Caves in central Italy [8].

The aim of this paper is to describe a new troglobitic species of *Porrhomma* from Macedonia.

MATERIAL AND METHODS

Specimens were hand-collected and preserved in 70 % ethanol. The new species was ex-

amined, measured, and illustrated using a Stemi 508 stereomicroscope and a PrimoStar 3 microscope, both equipped with an Axiocam 208 camera, and operated using ZEN 3.0 (blue edition) software and CombineZP image stacking software. Photographs of live specimens were taken with a 5.1-megapixel HP Photosmart R817 digital camera. The left palp was illustrated, and descriptions of the male palp refer to the left one. To prevent damage to the only available paratype, the epigyne of the new species was not dissected. Leg segment lengths were measured along the lateral side. All measurements are given in millimeters. Taxonomic nomenclature follows [9]. The holotype is deposited in the Arachnoidea collection of the Natural History Museum of Vienna.

RESULTS

Taxonomy

Family Linyphiidae Blackwall, 1859
Genus *Porrhomma* Simon, 1884
Porrhomma matevskii n. sp. Figs 1–12
Porrhomma n. sp.: Kolčakovski et al. [2]: 20.

Type material. Holotype: ♂, Osoj Mt., Kaurski Zelenik, 960 m a.s.l., Srt pit, 12.09.2009, leg. M. Komnenov. Paratype: 1 ♀, same data as holotype.

Diagnosis: *Porrhomma matevskii n. sp.* is a troglobitic, depigmented species with very long legs. It can be easily distinguished from all other *Porrhomma* species (except *P. frassianum*) by the complete absence of eyes or any lens remnants (Fig. 2). The new species differs from the eyeless *P. frassianum* particularly in the shape of the prosoma. The frontal part of the prosoma is not flattened, but instead exhibits a bulge when viewed laterally (Fig. 4), with the head region raised in both sexes. Additionally, *P. matevskii n. sp.* differs from *P. frassianum* in chaetotaxy, possessing a prolateral spine on tibia I (absent in *P. frassianum*), as well as ventral spines on femora III and IV (also absent in *P. frassianum*). Genital differences include the male's anterior process (AP) of the embolic plate, which is thicker in *P. matevskii n. sp.* (slender in *P. frassianum*), and the embolus, which ends very close to the AP (distant in *P. frassianum*). In females, *P. matevskii n. sp.* has an ellipsoidal epigynal plate, whereas it is rectangular in *P. frassianum*.

Etymology: The species is named in honor of my dear friend and colleague, Academician Vlado Matevski, in recognition of his taxonomic work on the Macedonian Academy of Sciences and

Arts' publication *The Flora of the Republic of Macedonia*. The name is in the genitive case.

Description:

Male Holotype: Total length 1.88 mm; prosoma length 0.92 mm, width 0.64 mm; chelicerae length 0.48 mm. The clypeus is hairy, and the prosoma exhibits a bulge in lateral view (more pronounced in the female). The head region is raised (higher than in the female) and hairy only in the middle (resembling a Mohawk hairstyle) (Figs 2–3).

Coloration: The chelicerae and prosoma are light yellow, while the legs and opisthosoma are grey-white. For the coloration of live specimens, refer to Figs 9–10.

Legs: The legs are very long (see Tab. 1) and thin, with long hairs on the ventral side. Femur I has a dorsal spine at 0.56, femur II has a dorsal spine at 0.47, and femora III and IV each have a ventral spine. Patellae I–IV each have a long spine. All tibiae have two dorsal spines; tibia I has one prolateral and one retrolateral spine, while tibia II has one retrolateral spine. The metatarsi have no spines, and the dorsal trichobothria are not visible.

Pedipalp: As shown in Figs 5–6. The embolus is long and curved, wrapped by the embolic membrane, and ends very close to the anterior process of the embolic plate. The anterior process is more than twice as long as it is wide, directed toward the tip of the embolus. The tip of the distal suprategular apophysis is clearly visible in both retrolateral and prolateral views.

Table 1. Leg measurements male holotype (mm)

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	1.24	0.26	1.12	1.00	0.68	4.30
II	1.02	0.24	0.98	0.82	0.52	3.58
III	0.88	0.20	0.68	0.66	0.46	2.88
IV	1.16	0.22	1.10	0.94	0.56	3.98

Female Paratype: Total length 1.98 mm; prosoma length 0.86 mm, width 0.58 mm; chelicerae length 0.46 mm. The clypeus exhibits a prominent bulge in lateral view (Fig. 4). The legs are very long (see Tab. 2) and thin. Femur I has a dorsal spine at 0.50, femur II has a dorsal spine at 0.35, and femora III and IV each have a ventral

spine. Patellae I–IV each bear a long spine. All tibiae have two dorsal spines; tibia I has one prolateral and one retrolateral spine, while tibia II has one retrolateral spine. The metatarsi are devoid of spines, with $Tm\ Mt\ I = 0.70$.

The epigyne features an ellipsoidal plate. Coloration is as in the male.

Table 2. Leg measurements female paratype (mm)

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	1.16	0.26	1.02	0.92	0.62	3.98
II	1.06	0.22	0.88	0.84	0.58	3.58
III	0.92	0.20	0.78	0.68	0.48	3.06
IV	1.18	0.22	1.08	0.90	0.42	3.80

Ecology: Little is known about the ecology of *Porrhomma matevskii* n. sp. Prior to collection, a female specimen was observed consuming a small animal, possibly a fly or collembolan. It was collected from the bottom of the pit, at a depth of approximately 30 meters. Despite extensive searches of nearby caves and pits, no additional *Porrhomma* specimens were found (Kolčakovski et al., 2009).

Distribution: The species is known only from the type locality (Figs 11–12).

Endemism: A local endemic to Macedonia (Fig. 1).

Conservation: Due to its extremely low population and highly restricted range, which appears to be confined to a single cave, *P. matevskii* n. sp. is not currently under direct threat. However, it should be considered potentially vulnerable in the event of persistent and frequent human disturbance. As such, this newly discovered species warrants consideration for conservation and should be included in the list of nationally protected species.

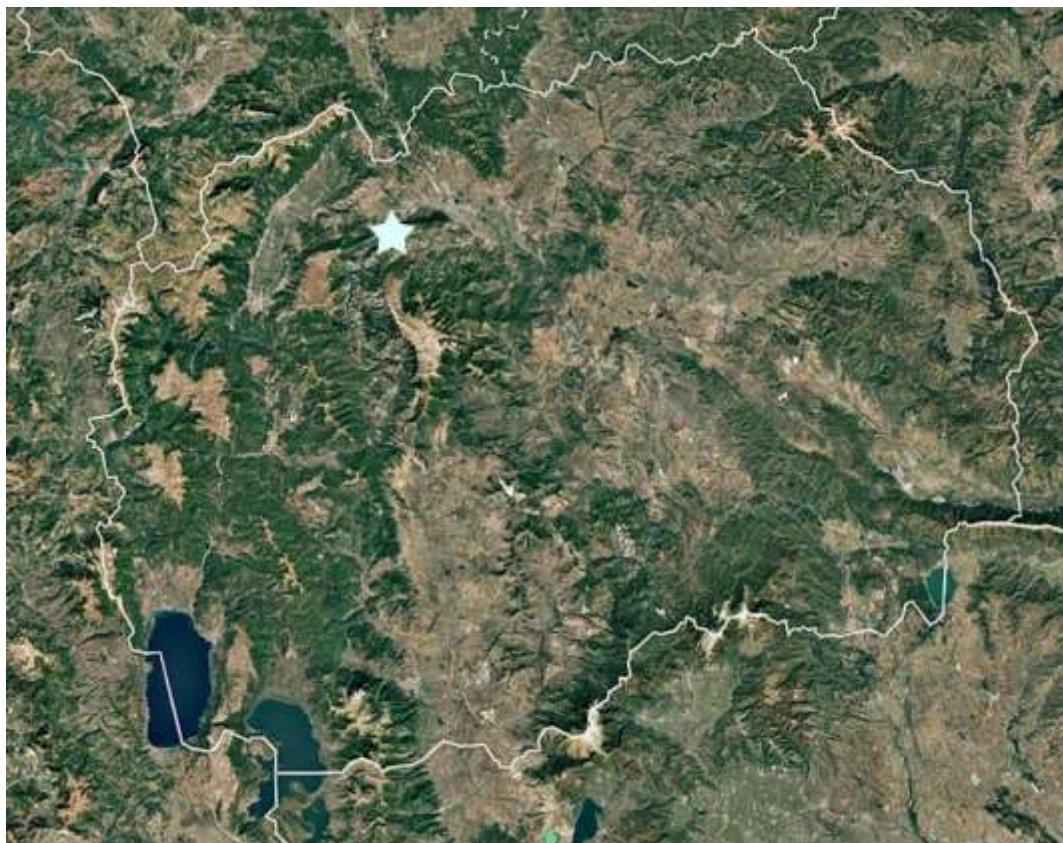
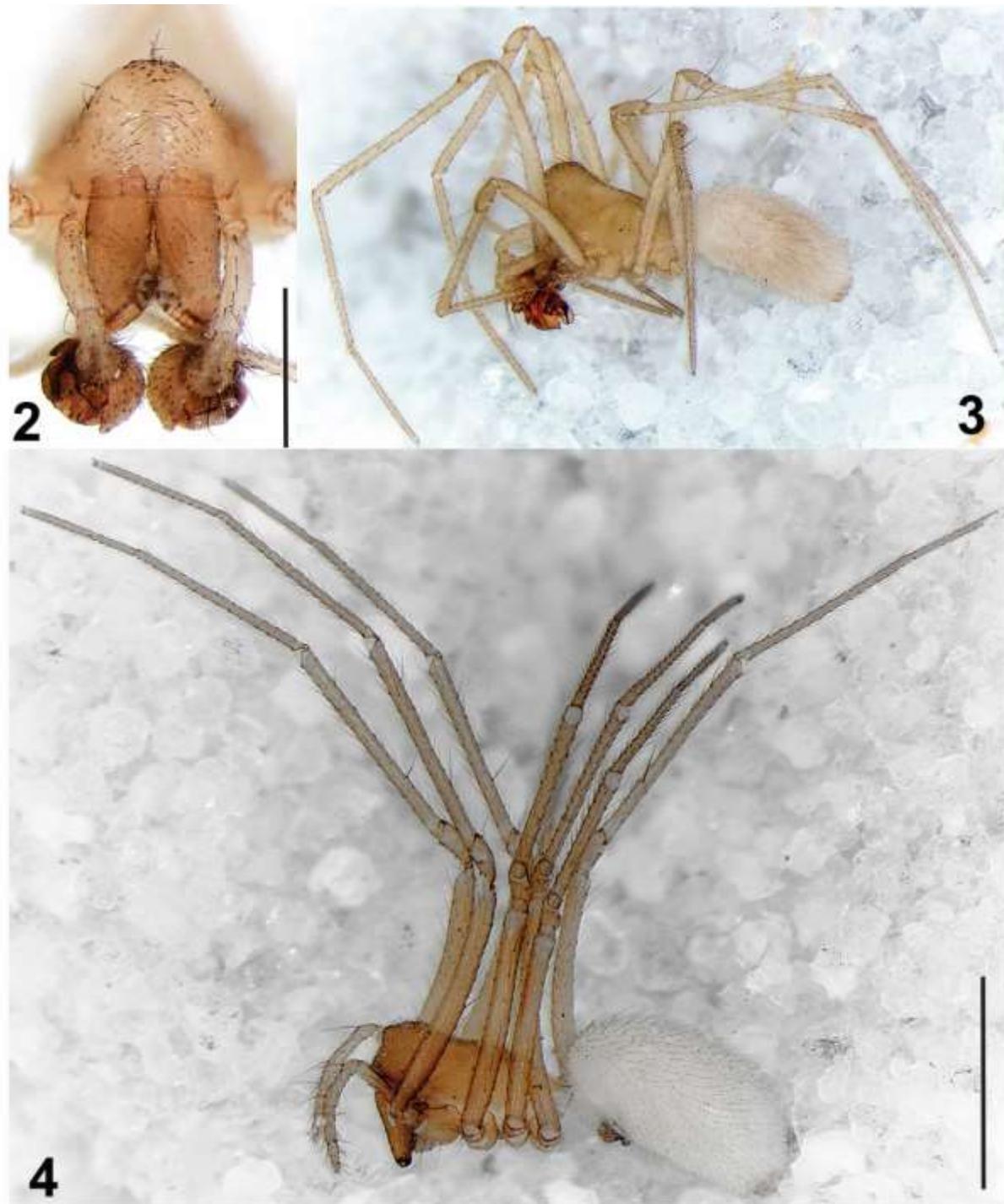
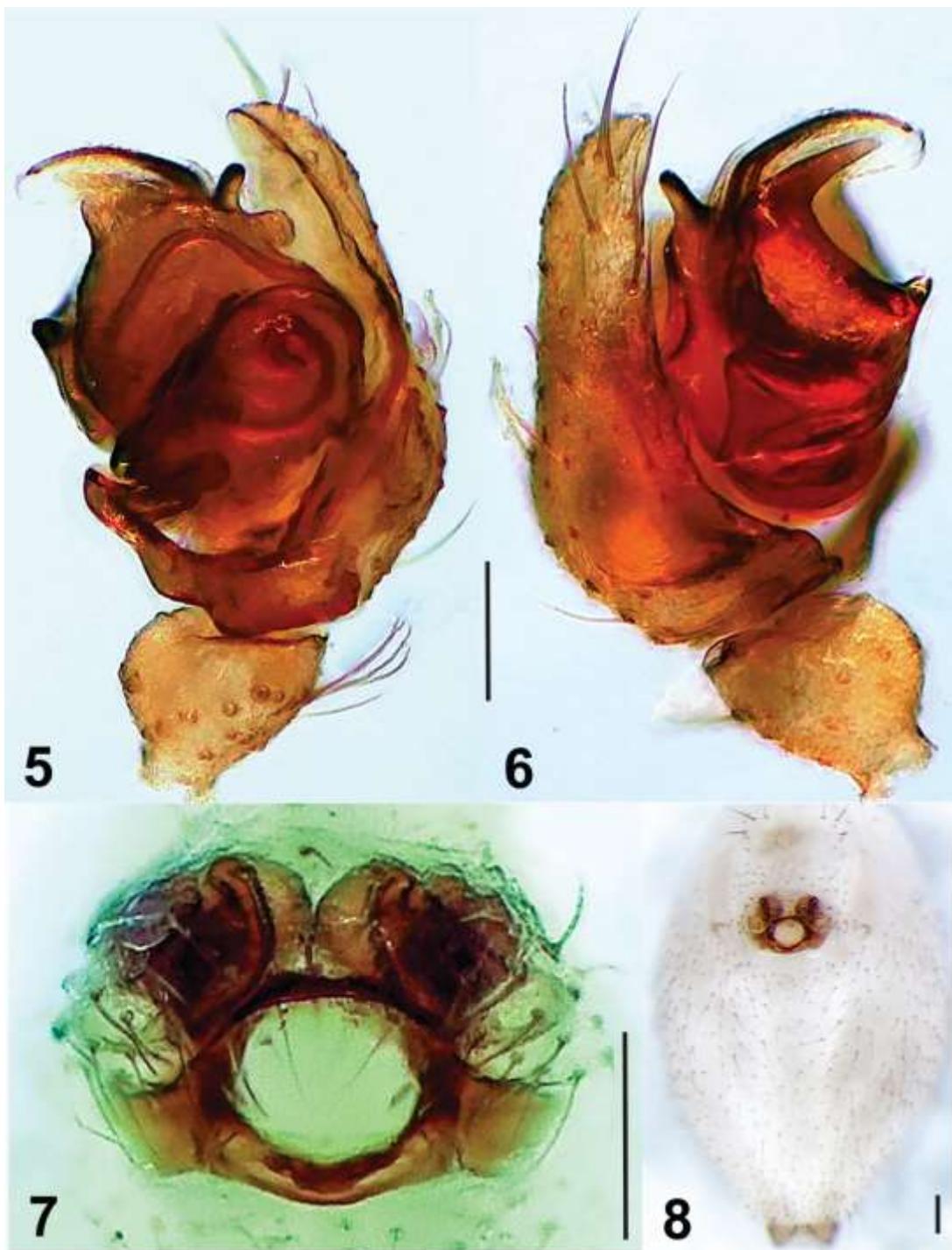


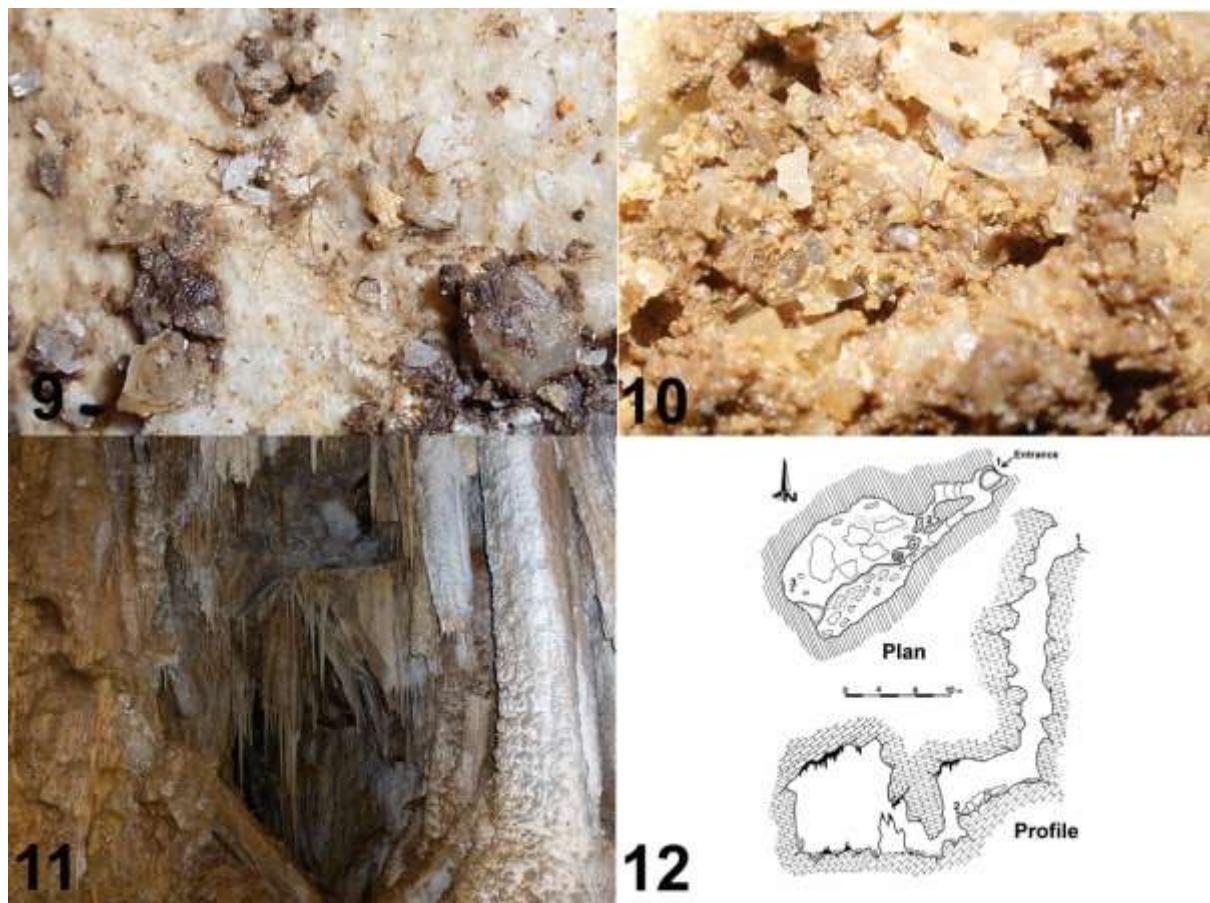
Figure 1. Location of the type locality of *Porrhomma matevskii* n. sp. in Macedonia



Figures 2–4. *Porrhomma matevskii* n. sp. male holotype (2–3) and female paratype (4). 2 prosoma, frontal view, 3–4 habitus, lateral view. Scale bars: 0.5 mm (2); 1 mm (3–4).



Figures 5–8. *Porrhomma matevskii* n. sp. male holotype (5–6) and female paratype (7–8). 5 left palp, retrolateral view; 6 same, prolateral view; 7 epigyne, ventral view; 8 abdomen, ventral view. Scale bars: 0.1 mm.



Figures 9–12. Habitus and type locality of *Porrhomma matevskii* n. sp. **9** habitus of male holotype; **10** habitus of female paratype; **11** the type locality; **12** plan and profile of the Srt pit (modified after [5]).

DISCUSSION

Although the Dinaric karst region of the Balkan Peninsula is home to the world's richest subterranean fauna [7], it is noteworthy from an ecological and phylogeographic perspective that no troglobitic *Porrhomma* species have been discovered in this area to date. In this context, the discovery of the eyeless species *Porrhomma matevskii* n. sp. in Macedonia, located relatively far from the Dinarides, is both remarkable and valuable.

It appears that *Porrhomma convexum* (Westring, 1851) is the only species recorded from caves in the Dinarides [1, 3]. In terms of epigean habitats, it is also significant to note that “no *Porrhomma* species have been recorded from epigean habitats in the Dinaric chain; extensive faunistic investigations of forest floors and Alpine regions in Slovenia by Polenec also failed to yield any *Porrhomma*” [1]. Several factors could explain the apparent “absence” of *Porrhomma* in the fauna of the Dinarides. The complex geomorphology and geological history of the region may play a role, as could the intricate taxonomy of the genus, which

has contributed to its relative neglect by arachnologists.

Of the 25 described species of the genus *Porrhomma*, most are distributed across Eurasia, with only a few species found in the Nearctic. The distribution of troglobitic species is uneven, with the majority found in Europe—*P. frasassianum*, *P. matevskii* n. sp., *P. profundum*, *P. rosenhaueri*—two species in Japan—*P. ohkawai*, *P. rakanum*—and only one species in North America—*P. cavernicola*. Apart from *P. frasassianum* and *P. matevskii* n. sp., which are eyeless, the other species exhibit significant eye reduction but retain remnants of their eyes.

Despite the recent revision of the genus, the closest relative of *Porrhomma matevskii* n. sp. cannot be determined with certainty, owing to inconsistencies in the representation of male palp morphology in this study. While the male palp is depicted in its entirety in various positions here, a previous study [6] only presents the embolic section dissected from the palpal bulb, omitting the remaining characters. Furthermore, due to the limited availability of only one paratype and to pre-

vent damage, the epigyne of *P. matevskii* n. sp. was not dissected.

Within the genus, *Porrhomma matevskii* n. sp. appears to be one of the most troglomorphic species and is likely an ancient relict, probably of a similar age to *P. frasassianum*. The type locality of *P. matevskii* n. sp., the Srt pit, is situated in a limestone area on the left side of the Treska River, on the southern slopes of Matka Gorge, with the entrance facing north. Its geological age is estimated to be Upper Pliocene [4].

Troglobitic species generally warrant special attention in conservation efforts. These single-site endemics are particularly vulnerable to anthropogenic disturbances and climate change, making them highly susceptible to extinction. *Porrhomma matevskii* n. sp. should be considered potentially vulnerable due to its extremely low population and highly restricted distribution, which appears to be confined to a single cave.

The discovery of a new eyeless *Porrhomma* species in Macedonia suggests that our understanding of the genus' diversity in Southern Europe, particularly in the Balkan Peninsula, is still far from complete. Additional fieldwork in the caves of the Balkan Peninsula is likely to uncover more new *Porrhomma* species, allowing for a more thorough and accurate understanding of its fauna.

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НОВ ТРОГЛОБИОНТЕН ВИД ОД РОДОТ *PORRHOMMA* ОД МАКЕДОНИЈА (ARANEAE: LINYPHIIDAE)

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Новиот троглобионтен вид *Porrhomma matevskii* n. sp. е описан од јамата Срт во клисурата Матка во Македонија, врз основа на примероци од двата пола. Досега, не беа познати троглобионтни видови пајаци од Македонија. *Porrhomma matevskii* n. sp. го претставува првиот вид без очи описан во родот за целиот Балкански Полуостров. Главните трогломорфни карактеристики се целосно отсуство на очи, забележливото издолжување на нозете и речиси целосна депигментација, што го прави еден од најтргломорфните видови на родот и несомнено антички реликт. Се дискутира за односот помеѓу новиот вид и другите членови од *Porrhomma*. Во текстот се нагласени потребите за негова заштита и зачувување.

Клучни зборови: Балкански Полуостров; пештерски пајаци; подземен; без очи; таксономија