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Hadzinia ferrani, sp. n. (Opiliones: Nemastomatidae), a highly specialized troglobiotic harvestman from Slovenia

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Abstract

A highly specialized, endemic troglobiotic harvestman, *Hadzinia ferrani* sp. n., recently found in the Ferranova buža cave in the karst of Mt. Ulovka in central Slovenia is described. It is characterized by its small, 1.1–1.4 mm long body and very long, thin appendages, with leg II more than 20-times as long as the body. Although very similar to *Nemaspela* Šilhavý, 1966, the genus *Hadzinia* Šilhavý, 1966 can be clearly differentiated from *Nemaspela* by its truncated glans and short stylus, well delimited from the glans. According to these characteristics, *Hadzinia* is assumed most closely related to *Pyza* Staręga, 1976 and *Vestiferum* Martens, 2006 rather than to *Nemaspela* with the glans gradually tapering into a mostly long stylus. Genital morphology is the most appropriate and probably the only morphological approach for investigating relationships among the taxa under study.

Key words: Arachnids, Dinaric karst, *Hadzinia*, *Nemaspela*, *Pyza*, speleobiology, West Balkans

Introduction

In Europe, the nemastomatid genera *Hadzinia* Šilhavý, 1966, *Mitostoma* Roewer, 1951, *Nemaspela* Šilhavý, 1966 and *Paranemastoma* Redikorzev, 1936 include troglobiotic representatives (Roewer 1926; Kratochvíl 1958; Šilhavý 1966; Martens 1978; Gruber 2007; Chemeris 2009, 2013; Mitov 2011; Schönhofer & Martens 2012; Karaman 2013). In 2005, an eyeless, depigmented nemastomatid specimen was found in the Ferranova buža cave near Vrhnika in central Slovenia, a specimen which was later recognized as a representative of the genus *Hadzinia*. This is the first eyeless troglobiotic harvestman species in Slovenia that, according to present knowledge, is endemic to the country. In *Hadzinia*, until recently, only *H. karamani* (Hadži, 1940) had been described, having been recorded in Bosnia and Herzegovina and Croatia (Hadži 1940; Novak 2004, 2005b; Karaman 2013). Karaman (2013) announced several undescribed species, outlining *Hadzinia* as an independent lineage within the Nemastomatidae.

Material and methods

The habitat. The Ferranova buža cave is situated in the western Dinaric region in the vicinity of Vrhnika near Ljubljana. In this karstic region, the upper Triassic (Norian–Rhaetian) thick-bedded main dolomites are over-thrust on the Cretaceous and Jurassic limestones of the Logatec-Cerknica block (Buser 1965; Dozet & Buser 2009). The cave entrance is situated at an altitude of 660 m on the southern slope of Mt. Ulovka (801 m). The cave consists of narrow passages and large potholes, up to 80 m deep (Ferran 2003, 2006; Staut & Auersperger 2006). According to a recent report, the total depth of this cascade pothole is 360 m (Ferran, personal communication). Specimens were collected by hand on the flowstone and bare walls, mostly near trickling and seeping water.

Taxonomic investigations. Dissections were performed under a Nikon stereomicroscope. External

Nemastomatidae, characterized by distinctive male genital morphology. Ocular tubercle low or absent, eyes reduced. Male cheliceral apophysis and cheliceral gland openings absent. Pedipalps very long, 5.2–5.7-times as long as body, tarsus proximally conspicuously bent to ventral side. Truncus thin, base bifurcated. Glans truncated cone-like to elongate barrel-like shaped, slightly wider than truncus. Glans terminally truncated, with two lateral humps encompassing furrow and subapically emerged stylus on the ventral side in the middle of furrow, pointed in dorsal and ventral view. According to present knowledge, of scattered distribution in the central and western Dinaric region. Currently two described species (but compare Karaman 2013).

Karaman (2013) suggests that the unusual distribution of *Hadzinia* and *Nemaspela* could indicate their relict status as elements of the paleo-European mainland fauna. This is justified, but the distinctive genital morphologies indicate that these two lineages most probably evolved from various ancestors which independently colonized the subterranean environment. While *Nemaspela* seems to be a subterranean offshoot of the *Giljarovia* ancestor (Martens 2006), *Hadzinia* may have originated from the same ancestor as *Pyza* or *Vestiferum*.

It should be noted that *Nemaspela femorecurvata* Martens, 2006 and *N. ladae* Karaman, 2013 have been the only species in the genus missing the male cheliceral apophysis, which is also missing in *Hadzinia*. Dunlop & Mitov (2009) argue that the shape of the male cheliceral apophysis, viewed in isolation, is insufficient to identify the genus, since a few nemastomatid genera may evince a similar shape. Furthermore, its absence in highly adapted troglobionts is *per se* not a useful characteristic for identification, since it may be just one convergence in a series of several adaptations to subterranean habitats. Therefore, genital morphology is of greatest importance in considering relationships between the studied taxa, as has been established for other opilionid groups (Derkarabetian *et al.* 2010). In this way, the external similarities between particular *Hadzinia* and *Nemaspela* species imply either general adaptive convergence to the hypogean habitat, or convergence triggered either by living in similar habitats or by preying on comparable prey. All this additionally supports Karaman's opinion that in these genera we are investigating a special case of evolution within paleo-European mainland fauna with respect to Balkans-Caucasus opilionid congeners. Phylogenetic investigation could contribute much to clarifying the relationships among the alleged taxa.

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