



## Cave shrimps *Troglocaris* s. str. (Dormitzer, 1853), taxonomic revision and description of new taxa after phylogenetic and morphometric studies

JURE JUGOVIC<sup>1,2\*</sup>, BRANKO JALŽIĆ<sup>3</sup>, SIMONA PREVORČNIK<sup>4</sup> & BORIS SKET<sup>5</sup>

<sup>1,4,5</sup> Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za biologijo, Večna pot 111, 1000 Ljubljana, Slovenia.

<sup>2</sup> Univerza na Primorskem, Znanstveno raziskovalno središče, Garibaldijeva 1, 6000 Koper, Slovenia & Univerza na Primorskem, Fakulteta za matematiko, naravoslovje in informacijske tehnologije, Glagoljaška 8, 6000 Koper

<sup>3</sup> Hrvatski prirodoslovni muzej, Demetrova 1, 10000 Zagreb, Croatia.

E-mail addresses: <sup>1</sup> jure.jugovic@bf.uni-lj.si; jure.jugovic@zrs.upr.si; <sup>3</sup> branko.jalzic@hpm.hr; <sup>4</sup> simona.prevorcnik@bf.uni-lj.si; <sup>5</sup> boris.sket@bf.uni-lj.si

\* Corresponding author

### Abstract

Within the Dinaric genus *Troglocaris* cave shrimps from the subgenus *Troglocaris* s. str. (Dormitzer, 1853) (Crustacea: Decapoda: Atyidae), have the widest distribution area. The recent molecular analyses have revealed significant, cryptic diversity in the subgenus. The aim of the subsequent detailed morphometric analyses was the provision of the appropriate diagnosable characters for the discovered lineages, i.e. taking care of their taxonomical visibility. We herein designate a neotype and provide a detailed description for the polytypic type species of the genus *T. (T.) anophthalmus* (Kollar, 1848), to enable its morphological distinction from the erroneously described *T. (T.) planinensis* Birštejn, 1948. Considering a combination of morphological, geographical and molecular data, we describe four new subspecies: *T. (T.) a. ocellata* ssp. nov., *T. (T.) a. periadriatica* ssp. nov., *T. (T.) a. legovici* ssp. nov. and *T. (T.) a. sontica* ssp. nov., apart from the extant *T. (T.) a. intermedia* Babić, 1922. Due to a considerable morphological variability and no easily observable diagnostic morphological characters, the GenBank accession numbers for the COI gene are added in all mentioned taxa.

**Key words:** Atyidae, phylogeny, subterranean, morphology, taxonomy

### Introduction

Although only an integration of all biological disciplines can promote biological research at the tempo set by biodiversity crisis (Whitfield 2007), the morphology-based alpha taxonomy (MOBAT) remains the most important discipline, providing the accessible data-set for assigning taxonomically valid names on the basis of name-bearing specimens. Many “cryptic” species or species with an “overlooked diversity” remain taxonomically invisible, as badly under-resourced MOBAT cannot keep pace with their discovery. The MOBAT is essential and should be promoted if the promise of the profound implications for the evolutionary theory, biogeography and conservation planning is to be realised (Schlick-Steiner *et al.* 2007).

The freshwater cave dwelling shrimp *Troglocaris anophthalmus* (Kollar 1848) is among Dinaric largest and most distinctive cave invertebrates. Despite of intensive research of its taxonomy (e.g. Kollar 1848; Dormitzer 1853; Babić 1922; Holthuis 1956), reproduction, ontogeny (Matjašič 1958, Juberthie Jupeau 1974, 1975), as well as ecology (Gottstein-Matočec 2003), the taxonomy of the genus has remained unresolved for a century or longer.

An initial molecular analysis of numerous European cave shrimp populations to solve a biogeographical enigma of *Troglocaris*, was conducted by Zakšek *et al.* (2007). In 54 specimens from three known disjunct centres of the genus distribution, three genetic markers were used for a reconstruction of its phylogeny: mitochondrial cytochrome oxidase subunit I mtDNA (COI, 610 base pairs), 16S rDNA (472 bp) and nuclear ITS2 rDNA (836 bp). The genus was found to be polyphyletic. The results promoted an *a posteriori* redefinition of taxa at different levels (Sket & Zakšek 2009). The novel genus *Gallocaris* Sket *et* Zakšek, 2009, was erected for the French taxon *Troglocaris schmidtii inermis* Fage, 1937, related to the genus *Dugastella* Bouvier. Additionally, four new Dinaric