

Contribution to the knowledge of the group *europaeus* of *Centromerus* Dahl (Linyphiidae, Araneae) in the Balkan Peninsula

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Contribution to the knowledge of the group *europaeus* of *Centromerus* Dahl (Linyphiidae, Araneae) in the Balkan Peninsula. - The study of a large sample of the blind representative of *Centromerus* Dahl (Linyphiidae, Araneae), including both sexes, has revealed that this taxon, otherwise inhabiting the Zlotska Pećina Cave, East Serbia, ex-Yugoslavia, is close to *C. dacicus* Dumitrescu and Georgescu, from Romania; therefore, it is not conspecific neither with *Centromerus europaeus* (Simon), nor with *C. subcaecus* Kulczynski, as claimed by some early araneologists. In addition, both taxonomic and biogeographical interrelationships of some representatives of the *C. europaeus* species group in the Balkan Peninsula have been discussed in view of the genesis and evolution of their underground habitats.

Key-words: taxonomy - biogeography - evolution - cave fauna - Araneae - *Centromerus*.

INTRODUCTION

Records of cave-dwelling spiders in Serbia (ex-Yugoslavia) are rare and consist of brief reports by STOJICEVIĆ (1929), ČURČIĆ (1969) and DEELEMEN-REINHOLD (1985), who cite altogether 22 species, classified into 15 genera and 11 families; representatives of these species are mostly either regular troglloxenes, troglphilic or epigean forms. The only troglobitic spider from the area belongs to the genus *Centromerus* Dahl; its representatives were found in the Zlotska Pećina Cave and in the Vernjikica Pećina Cave, East Serbia, ex-Yugoslavia (FAGE 1931; KRATOCHVIL & MILLER 1938; THALER 1987). Subsequently, a long-lasting confusion concerning the taxonomic status of this taxon was due mainly to the fact that all further revisions of the blind *Centromerus* species from Serbia were based only on females.

We propose to analyse the diagnostic characters of this troglobitic species and to offer some evidence on its taxonomic and evolutionary interrelationships with other spiders of the *C. europaeus* species group in the Balkan Peninsula.

MATERIAL AND METHODS

30 ♀, 4 ♂ and 30 juveniles of the blind *Centromerus* are analysed from the Zlotska Pećina Cave (or Lazareva Pećina Cave), village of Zlot, near Bor, East Serbia, ex-Yugoslavia, 21–23 November 1995, collected by R.N. Dimitrijević, S.E. Makarov, and L.R. Lučić. In the same cave, a male and a female of the troglophilic linyphiid species *Lepthyphantes trnovensis* (Drensky) were also discovered.

Used abbreviations: E – embolus; m – membrane; LR – lamellar part of radix; R – radix; O – genital openings; P – paracymbium; S – genital socket; T – terminal apophysis.

All specimens are preserved in 75% ethyl-alcohol with 5% glycerol. One male and three females are deposited in the collection of the Muséum d'histoire naturelle in Geneva, Switzerland; all other specimens are deposited in the collection of the Institute of Zoology, Faculty of Biology, University of Belgrade, Belgrade, Yugoslavia.

RESULTS AND DISCUSSION

The taxonomic identity of the blind *Centromerus* female from the Zlotska Pećina cave had attracted the attention of numerous araneologists (DRENSKY 1931; KRATOCHVIL 1934, 1936; KRATOCHVIL & MILLER 1938; THALER & HÖFER 1988); the uncertain status of this species is due to two facts: (a) only females were accessible for comparison and (b) the distinctions between females of the species of the *C. europaeus* group are not reliable.

Following FAGE (1931), KRATOCHVIL (1934) attributed the *Centromerus* specimens from the Zlot cave system to *Centromerus europaeus* (Simon), which otherwise inhabits the Maritime Alps and the Pyrenees (SIMON 1911, 1929); the findings of the latter form in Algeria are doubtful, since BOSMANS (1986) claimed that the exact identity of *C. europaeus* (and especially of the specimens from Algeria) was uncertain. Furthermore, he also considered the possibility of erroneous attribution of other Algerian species to *C. europaeus*, and especially of those with either reduced eyes or with no eyes at all (BOSMANS 1986). Additionally, early araneologists simply attributed numerous anophthalmous specimens of *Centromerus* to *C. europaeus*, without considering the distinctions in the structure of the male pedipalp and epigyne, which otherwise exist between different populations and species.

Subsequently, KRATOCHVIL (1936) and KRATOCHVIL & MILLER (1938) reconsidered the status of some *Centromerus* representatives from different caves of the Balkan Peninsula.

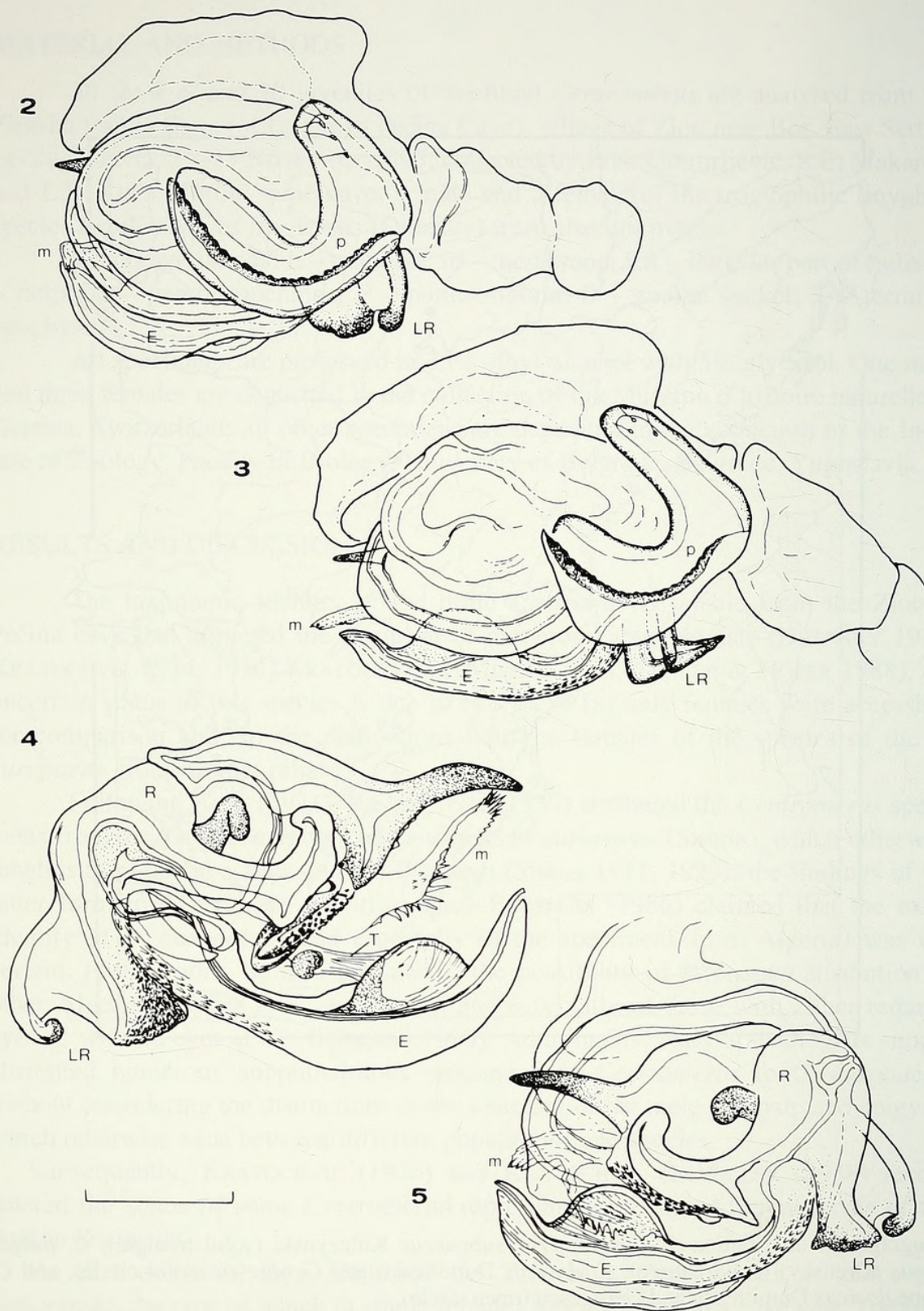
On that occasion, they identified the Zlot cave *Centromerus* as *subcaecus* Kulczynski, the type of which (a single female) was collected in a cave near Trebinje, Hercegovina (KULCZYNSKI 1914). KRATOCHVIL & MILLER (1938) re-studied this type specimen and some males and females of this species, collected from two caves situated at a distance of 10 and 35 km from the type-locality. Therefrom they described a male of *C. subcaecus* and mentioned the species from 8 caves in Hercegovina, Montenegro and Serbia (Zlotska Pećina Cave). This conclusion was further



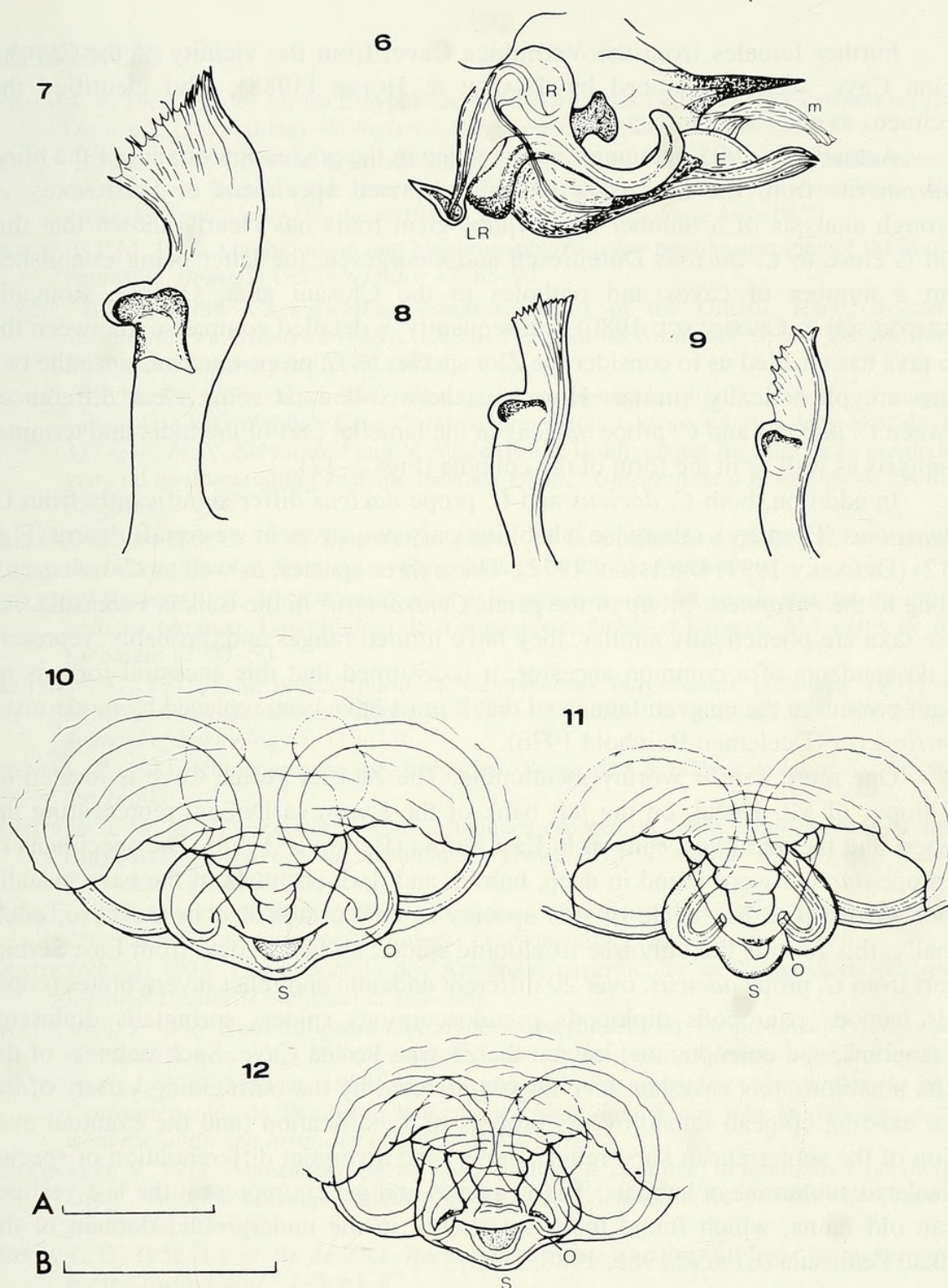
FIG. 1

Geographical distribution of *Centromerus subcaecus* Kulczynski (solid triangle), *C. bulgarianus* (Drensky) (solid square), *C. dacicus* Dumitrescu and Georgescu (solid circle), and *C. prope dacicus* Dumitrescu and Georgescu (open circle).

supported by L. Fage who personally had re-studied the specimens of *C. subcaecus*, upon the demand of Kratochvil; therefore, the former author also considered the Zlot *Centromerus* as conspecific with Kulczynski's species (KRATOCHVIL & MILLER 1938). However, all these comparisons were based on females only.



FIGS 2-5. - 2, *Centromerus prope dacicus* Dumitrescu & Georgescu, male palp, external view (Zlotska Pečina Cave, Serbia); 3, *C. bulgarianus* (Drensky), male palp, external view (Suhata Pester Cave, Bulgaria); 4, *C. dacicus* Dumitrescu & Georgescu, suprategulum and embolic division, dorsal view (Closani Cave, Romania) (DUMITRESCU & GEORGESCU 1980); 5, *C. prope dacicus* DUMITRESCU & GEORGESCU, suprategulum and embolic division, dorsal view (Zlotska Pečina Cave, Serbia). Scale line 0.10 mm, (2, 3, 5). Fig. 4 is taken from Dumitrescu & Georgescu 1980 (no scale line).



FIGS 6–12. - 6, *Centromerus bulgarianus* (Drensky), suprategulum and embolic division (Suhata Pester Cave, Bulgaria); 7, *C. dacicus* Dumitrescu & Georgescu, terminal apophysis (Closani Cave, Romania) (DUMITRESCU & GEORGESCU 1980); 8, *C. prope dacicus* Dumitrescu & Georgescu, terminal apophysis (Zlotska Pečina Cave, Serbia); 9, *C. bulgarianus* (Drensky), terminal apophysis (Suchata peatera Cave, Bulgaria); 10, *C. prope dacicus* Dumitrescu & Georgescu, vulva and epigyne (Zlotska Pečina Cave, Serbia); 11, *C. dacicus* Dumitrescu & Georgescu, vulva and epigyne (Closani Cave, Romania) (DUMITRESCU & GEORGESCU 1980); 12, *C. bulgarianus* (Drensky), vulva and epigyne (Suchata Pester Cave, Bulgaria). Scale line 0.10 mm (6, 8, 9, 10, 12). Figs 7, 11 is taken from DUMITRESCU & GEORGESCU 1980 (no scale line).

Further females from the Vernjikica Cave, from the vicinity of the Zlotska Pećina Cave, were announced by THALER & HÖFER (1988), who identified the specimens as close to *C. subcaecus*.

Actually, in 1995, the junior author came in the possession of a lot of the blind *Centromerus* from the Zlot cave which comprised specimens of both sexes. A thorough analysis of a number of morphological traits has clearly shown that this form is close to *C. dacicus* Dumitrescu and Georgescu, the latter being established from a number of caves and potholes in the Closani area, Oltenia, Romania (DUMITRESCU & GEORGESCU 1980). Subsequently, a detailed comparison between the two taxa has enabled us to consider the Zlot species as *C. prope dacicus*, since the two forms are phenetically similar. However, there still exist some clear differences between *C. dacicus* and *C. prope dacicus* in the lamellar part of the radix and terminal apophysis as well as in the form of the epigyne (Figs 2–12).

In addition, both *C. dacicus* and *C. prope dacicus* differ significantly from *C. bulgarianus* (Drensky), otherwise inhabiting only two caves in western Bulgaria (Figs 1–12) (DRENSKY 1931; DELTSHEV 1972). These three species, as well as *C. subcaecus*, belong to the *europaeus*-group of the genus *Centromerus* in the Balkan Peninsula. All these taxa are phenetically similar, they have limited ranges and, probably, represent the descendants of a common ancestor; it is assumed that this ancestral form is no longer present in the epigean fauna and that it must have been replaced by modernised *Centromerus* (Deeleman-Reinhold 1976).

One more item is worthy mentioning. The Zlotska Pećina Cave is located on the slopes of Mt. Kučaj, on the left bank of the Lazareva Dolina, representing the deepest and the narrowest canyon in East Serbia (PETROVIĆ 1958). The specimens of *C. prope dacicus* were found in deep, humid, and dark channels of the cave, usually under stones. The life cycle of this species is well established in the cave; additionally, this form is the only true troglobitic spider, known to date from East Serbia. Apart from *C. prope dacicus*, over 20 different endemic and relict invertebrates (copepods, isopods, pauropods, diplopods, pseudoscorpions, spiders, springtails, diplurans, thysanurans, and coleopterans) inhabit the Zlotska Pećina Cave. Such richness of the fauna inhabiting this cave has been largely affected by the outstanding variety of the once existing epigean fauna, by the process of karstification (and the eventual evolution of the subterranean karst relief), and by the divergent differentiation of species in isolated subterranean habitats. These species and genera represent the last vestiges of an old fauna, which found their last shelter in the underground domain of the Balkan Peninsula (ČURČIĆ 1986, 1988, 1995).

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