

# THE FIRST FINDING OF A LIVE STYGOBIONT BIVALVE *CONGERIA* IN THE LIKA REGION, CROATIA

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By the side of the three already known separate populations of relic stygobiont bivalves of the genus *Congeria* in the Dinaric karst (Bela Krajina /Slovenia/, western Bosnia /Bosnia and Herzegovina/ and Dalmatia-Herzegovina /Croatia – Bosnia and Herzegovina/) a new population has been found in the underground area of North Velebit, in the drain part of the Lika River, Croatia. After the discovery of part of a shell on the bottom of Lukina Jama pit (–1392 m deep), thousands of specimens of *Congeria* have been found in Markov Ponor, all the way through more than 1700 m of underground tunnels. As well as a list of associated fauna, a description is provided of some of the ecological factors of the biotope whose temperature reaches a maximum of +6 °C, the lowest temperature in the habitats known.

**Key words:** stygobiont bivalve, Dreissenidae, *Congeria*, new locality, Lika River, Croatia

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Uz već poznate tri odijeljene populacije stigobiontnog reliktnog školjkaša roda *Congeria* u Dinarskom kršu (Bela Krajina /Slovenija/, zapadna Bosna /Bosna i Hercegovina/ i Dalmacija-Hercegovina /Hrvatska – Bosna i Hercegovina/) nađena je nova populacija u podzemlju sjevernog Velebita, u ponderskom dijelu rijeke Like, Hrvatska. Nakon otkrića dijela ljušture na dnu Lukine jame (–1392 m duboko) nađeno je više tisuća jedinki kongerije u Markovom ponoru duž dosad preko 1700 m poznatih podzemnih hodnika. Uz popis popratne faune navode se neke ekološke značajke staništa kojih temperatura vode iznosi maksimalno +6 °C, što je dosad najniža vrijednost svih dosad poznatih nalazišta.

**Ključne riječi:** stigobiontni školjkaš, Dreissenidae, *Congeria*, novo nalazište, rijeka Lika, Hrvatska

## INTRODUCTION

The largest finds of the relic stygobiont mollusc *Congeria kusceri* Bole, 1962 are recorded in the area of Popovo polje (left tributaries of the Neretva River), Herze-

govina (BOLE, 1962; MORTON *et al.*, 1998). This relic species has also been known from W-Bosnia in the area near Lušci Palanka and Sanski Most (SKET, 1970), and in Slovenia at the source of the Krupa River (Bela krajna) only the shells of *Congeria* have been found (BOLE, 1992), very likely deriving from a live population of some so far unknown subterranean habitat. Bio-speleological research carried out during 1996–1998 in the Neretva valley resulted in new finds of both live populations and also of shells at springs and in ponors (swallow holes) mostly in the Dalmatian (Croatian) part of the Neretva drainage area (JALŽIĆ, 1998). The last find of shells of *Congeria* was at the source of the Ombla River near Dubrovnik (SCHÜTT, 2000). So far, this species has been recorded in Croatia at a total of nine localities



**Fig. 1.** Finding localities of genus *Congeria* in the area of Dinarid karst. Localities in Croatia are black and are marked with numbers. A – Herzegovina/S-Dalmatia population (1–8 – JALŽIĆ, 1998, 9 – SCHÜTT, 2000); B – W Bosnia population (SKET, 1970); C – N-Velebit population (10 – Lukina jama pit, 11 – Markov Ponor); D – Krupa population (BOLE, 1992)

only in the area that makes up an integrated unit together with the known range in Herzegovina (Fig. 1; population A). The disjunctive distribution of the sites known so far and the meagre research carried out into the fauna of subterranean waters in Croatia mean that finds of unknown colonies are still possible (JALŽIĆ, 1998).

## MATERIAL AND METHODS

An expedition of speleologists from the Netherlands to Lukina Jama on Mt Velebit in 1998 enabled me to gather sediments from the bottom (1392 metres down). During analysis of specimens, among the many shells of subterranean *Hauffenia* sp. and *Lanzaia* sp. snails, half a *Congerina* shell was found. This surprising find spurred further biospeleological investigation for living specimens. Knowing the manner in which *Congerina* lives, I came upon the idea that it could live in the ponors of the Lika River, the waters of which flow underground below the massif of Mt. Velebit and appear on the Adriatic coast in many springs and submarine springs (BOŽIČEVIĆ, 1967). From hydrogeological maps it can be seen that some of the water of the Lika River drains under the ground below the part of Velebit where Lukina Jama is located. It can be hypothesised that the submerged parts of Lukina Jama are hydrologically connected with Markov Ponor in Lipovo Polje near Kosinj.

Markov Ponor lies at the bottom of Lipovo Polje, and the entrance coordinates are  $x = 4957, 900$ ;  $y = 5514, 375$ ;  $z = 481$  m. The first speleological research of this ponor was carried out by members of the Speleological Association of Croatia, very likely in 1960. At that time, a topographical sketch was made, according to which we planned and undertook our first descent into the ponor on 31 January 1999. Because of the ice that covered part of the hole, we did not manage to get down a small vertical and arrive at the first siphon. On the second attempt, on 29 May 1999, we did manage to get to the first siphon lake («The breath diving siphon»; Fig. 2) but we did not find any *Congerina* on the rocks above the level of the water as it was then, nor were there any visible in the water, as far as we could see from the sides. Nevertheless, this did show that the previous speleological investigation had not been carried out to the end, and that there was thus some possibility of finding unknown parts of the ponor. For this reason there followed many other exploratory descents organised by the Velebit Speleological Association, in which, thanks to really major efforts and the use of mountain climbing techniques the verticals were conquered, and new parts of the swallow hole were found. In one siphon the geologist D. Lacković found and gathered up *Congerina* shells («The dead *Congerina* siphon»). This find gave an additional spur to the undertaking of an inspection of the first siphon by divers. This was done on 26 June 1999, and at last, live *Congerina* were found in «Breath diving siphon». During this and later investigations (1999–2001) the Velebit Association members did a topographical survey of the maze of underground channels of the Markov Ponor, to a total length of 1725 m (BAKŠIĆ *et al.*, unpublished). The depth of the ponor comes to 69 m. A particular feature of this ponor is the morphology of the first net part of the channels. It is characterised by vertical sections (Fig. 2) that were a serious obstacle to research, and were only

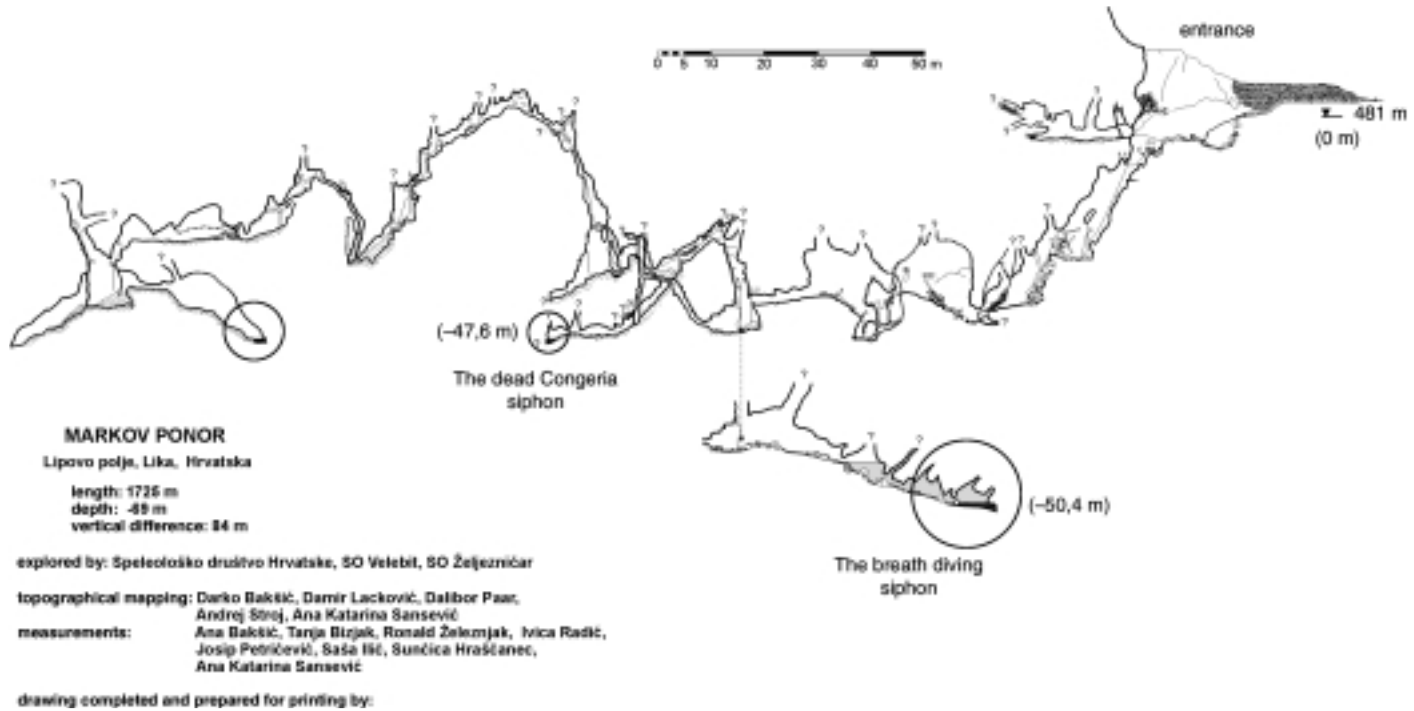


Fig. 2. First part of the profile of Markov Ponor, a newly discovered locality of the genus *Congeria* in Croatia (siphons are marked with circles).

mastered by using rock-climbing techniques. The ponor was created within the formation of Jurassic limestones, faulted in the NW-SE, NE-SW direction. During high water time, the Lika River flows in at the entrance, and at that time most of the swallow hole is flooded.

During investigations we gathered hundreds of shells, which are now part of Croatian Biospeleological Association collection at the Croatian Natural History Museum. Some of the shells are on the taxonomic review by F. Velkovrh in Lenart v Slov. Gorica (Slovenia). The rest of the fauna gathered is held in the collections of Croatian Natural History Museum.

## RESULTS AND DISCUSSION

On the rocks of the first siphon of Markov Ponor («The breath diving siphon»; Fig. 2) several living *Congerina* were found attached (Fig. 3) at various depths, but obviously only at places not exposed to the occasional powerful currents of water that pass through the siphon. The temperature of the water in the siphon comes to only +6 °C. We also found in Markov ponor, as well as *Congerina*, the following species of underground fauna:

Polychaeta:

*Marifugia cavatica* Absolon & Hrabe, 1930

Amphipoda:

*Niphargus arbiter* G. Karaman, 1985

Isopoda:

*Titanethes dahli* Verhoeff, 1926

Aranea:

*Troglohyphantes roberti* C. Deeleman, 1978

Pseudoscorpiones:

*Neobisium stygium* Beier, 1931

Diplura:

*Plusiocampa (Stygiocampa) nivea* (Joseph, 1882)

Coleoptera:

*Typhlotrechus bilimeki kiesenwetteri* (Schaum, 1862)

*Leptodirus hochenwarti* Schmidt, 1832 ssp.

Unfortunately, freshwater Gastropoda were not collected; only shells of different, not underground, species are seen in the drift.

The first identification of *Congerina* specimens did not show differences from the species *C. kusceri* Bole, 1962, but any expert investigation of the taxonomic status still remains to be done. The live specimens from the first siphon were of considerably smaller dimensions than the shells of the dead *Congerina* in the same locality.



**Fig. 3.** Photo of specimens of genus *Congeria* attached to the wall of the first siphon in Markov Ponor, along with the amphibious isopod crustacean *Tithanetes dahli*.  
Photo: B. Jalžić.

Clearly, what was involved here was a group of juvenile bivalves. Later, there was an investigation of new holes and siphons from the entrance part to the recent last point of the 1725 m long system in which thousands of live and bigger *Congeria* were found. Their shells have dimensions of up to 18 mm, smaller than those of the biggest specimens from populations in Hercegovina and Dalmatia (9–24 mm; MORTON *et al.*, 1989). In some places a drift of shells up to 50 cm thick was found (Fig. 4). These finds show that *Congeria* must have inhabited the underground spaces of Markov Ponor for a long time.

The investigation shows that *Congeria* is living even today in the underground areas below the northern Velebit through which the underground rivers of the Lika River flow, in an area that is at least 85 km distant from the source of the Krupa River near Črnomelj in Slovenia, and 125 km from the finds between Lušci Palanka and Sanski Most in W-Bosnia, and 255 km from the first finds in the Jezero Polje near Vrgorac in Croatia (Fig. 1). This gives the find particular importance, and underlines the possibility of new finds in the Dinaric karst; but it raises questions



Fig. 4. Photo of a detail of the up to 50 cm deep sediment (drift) from one of the channels of Markov Ponor: visible are shells of the bivalve *Congeria* in almost all layers.  
Photo: B. Jalžić.

about the degree of similarity of the populations of the distant parts of the range of the species *Congeria kusceri*. We know that as recently as the Miocene there was a whole series of *Congeria* species in the Dinaric area (KOCHANŠKY-DEVIDE & SLIŠKOVIĆ, 1980), and some of them could theoretically have survived changes in habitats only in today's subterranean refuges. At the same time this might be the last Pliocene species, which was perhaps more widely distributed, today some of the populations of it being found in hydrologically detached underground systems.

Since according to the data in the literature water temperature is an important ecological factor in the life of *Congeria* (MORTON *et al.*, 1998), the find of *Congeria* in Markov Ponor, where the temperature of the water is only +6 °C even in the warmest part of the year shows that this bivalve can live at quite low temperatures. The find of a part of shell in Lukina Jama points to *Congeria* being able to live at water temperatures of no more than +4 °C, but this still has to be proved. If it is indeed a matter of the same species, the temperature range of its aqueous habitat would come to 13 °C (6–19 °C).

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## SAŽETAK

### Prvi nalaz živih primjeraka stigobiontnog školjkaša *Congeria* u području Like, Hrvatska

B. Jalžić

Nakon nalaza dijela ljuštore podzemnog školjkaša roda *Congeria* u sedimentu vodotoka na dnu Lukine jame (N-Velebit, –1392 m), biospeleološkim istraživanjima u Markovu ponoru (Lipovo polje, Lika) kojim danas zbog hidroenergetskih zahvata samo povremeno otiče rijeka Lika ispod Velebita u Jadransko more, nađeno je novo nalazište živih jedinki ovog reliktnog roda. Uz opažanje brojne populacije od preko tisuće živih jedinki koje se nalaze duž glavnog kanala i u sifonima zasad poznatih 1725 m ponora, sakupljeno je još osam podzemnih vrsta (bez puževa!). Prva ekološka opažanja u periodu kada ponor nije poplavljen pokazuju da temperatura vode ne premašuje +6 °C, što je dosad najniža zabilježena temperatura za danas živuće *Congeria* populacije. Značaj ovog nalaza je u njegovoj izoliranosti, kako od dosad poznatih nalazišta u vodama Dunavskog sliva, tako i od najveće poznate populacije iz sliva rijeke Neretve, iz kojeg je i opisana vrsta *Congeria kusceri* Bole, 1962. Očekuje se utvrđivanje taksonomskog statusa, te genetičke srodnosti s ostalim izoliranim populacijama.