

The Newsletter of the IUCN/SSC Mollusc Specialist Group
Species Survival Commission • International Union for Conservation of Nature

TENTACLE



UNITAS MALACOLOGICA

Editor – Robert H. Cowie



From the Editor

The two articles in this supplement were intended for *Tentacle* 30. By an inexcusable oversight I failed to include them. I also accidentally deleted a group of names from the list of Mollusc Specialist Group members. This supplement to *Tentacle* 30 therefore includes the two articles and a corrected list of members. I offer my most humble apologies to the authors, members of the MSG and the readership of *Tentacle*.

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CHRONICLE OF AN ANNOUNCED EXTINCTION: *MICROCONDYLAEA BONELLII*, THE SPECIES NOT WORTH SAVING?

By Nicoletta Riccardi, Tiziano Bo, Arthur E. Bogan, Karel Douda, Elsa Froufe, Duarte V. Gonçalves, Jasna Lajtner, Vanessa Modesto, Giuseppe A. Moro, Vincent Prié, Ronaldo Sousa, Spase Shumka, Amílcar Teixeira, Maria Urbańska, Simone Varandas & Manuel Lopes-Lima

Microcondylaea bonellii (Fig. 1) was recently used to exemplify the pathway that brings neglected species to extinction (Riccardi *et al.*, 2021). It is a freshwater mussel that belongs to one of the least studied Unionidae subfamilies, the Gonideinae (Lopes-Lima *et al.*, 2017). Species in this subfamily have suffered major declines, and almost half of the assessed Gonideinae species are currently listed as Near Threatened or Threatened (IUCN, 2021). This subfamily includes only three European species, *Potomida acarnanica*, *P. littoralis* and *M. bonellii*, all restricted to southern Europe and all poorly studied. Once populations extended from

Switzerland to Greece with numerous populations, but currently *M. bonellii* is undergoing a serious and rapid decline all over its range. Declines or even disappearance of its populations caused the erosion of genetic diversity making it one of the European freshwater mussel species with the lowest genetic diversity (Froufe *et al.*, 2017). The few remaining populations are so isolated that, in the event of local extirpation, recolonisation is unlikely. Successful recolonisation requires a source population connected to the area to be recolonised and that there is a host fish suitable for (obligatory) glochidia metamorphosis and development to the juvenile stage. Unfortunately, we do not even know what is the host fish range used by *M. bonellii*.

Knowledge of the biology and ecology of this species is extremely poor and outdated. It preferentially inhabits flowing waters on fine to coarse-grained sand lying in stable banks and eventually overgrown by submerged plants (Nagel *et al.*, 2007). Individuals are commonly so deeply buried in the sediment that only the holes created by the two apertures



Fig. 1. An individual of *Microcondylaea bonellii* with the foot protruding to anchor itself to the substrate (left) and the inhalant and exhalant apertures of a deeply buried individual visible on the sediment surface (right).

(inhalant and exhalant) are visible at the surface of the substrate (Fig. 1). The very flat shell and the force exerted by the large foot allow it to sink and anchor stably in the sediments even in stretches with a rather strong current. These are important adaptations to rivers with a very variable flow regime but, on the other hand, they limit their movements. In fact, *M. bonellii* probably exhibits very limited or no horizontal movement, contrasting with other freshwater mussel species.

The species is a rapid breeder capable of consecutive brooding events that are apparently produced in the absence of males. Whether the animals can store sperm or whether they are cryptic hermaphrodites is not known. Eggs and larvae are brooded in all four gills and glochidial release occurs after a few weeks in the form of cylindrical masses (conglutinates) that apparently mimic the prey of the host fish (Nagel *et al.*, 2007).

Microcondylaea bonellii has a restricted distribution in the northern and eastern tributaries of the Adriatic Sea, from the Po Basin in the south to northern Greece. After a dramatic decline during the 1970s, a few extant populations were found in the 1980s in northern Italy, Slovenia, Croatia, Albania and Montenegro (Bodon *et al.*, 2005; Mrkvicka, 2018). Nonetheless, it was listed as Vulnerable (VU–A2c) in the last IUCN assessment (Albrecht *et al.*, 2011) based on a documented 35% decline in populations over its range. Surprisingly, this assessment reported 160 populations in northern Italy, and the populations were not even declared as fragmented. As a result of this assessment, which was based only on outdated references and museum collections, and lacked a real census, the level of risk for the species has been greatly underestimated. Instead, the very narrow range, the declining trends in abundance and distribution, and the growing fragmentation of the small extant populations should have already placed the species at the highest level of extinction risk (i.e. Critically Endangered).

To counter this lack of data we decided to carry out the necessary surveys to update the IUCN extinction risk assessment. The surveys (2013–2020) showed a decline of 75–80% in the number of populations, and the geographic range declined more than 90%. In Italy, viable populations persist in scattered locations of the northwestern (Po River basin) and northeastern regions (Brenta and Isonzo River basins). In the Balkans, populations were found in Mirna River (Croatia; Mrkvicka, 2018), Vipacco River (Slovenia; Govedic & Bizjak Govedic, 2019) and in a canal near Lezha in the Skadar Lake basin (Sousa *et al.*, 2020).

Although the first wave of extinction probably occurred before the 1970s, coinciding with industrial development and intensification of agro-industrialisation, a second wave, at least as strong as the first, is still underway. The few extant *M. bonellii* populations are likely to decline rapidly because of the loss, fragmentation and degradation of habitat, pollution and introduction of invasive species. Periodic monitoring shows that the Italian populations are declining in size because of riverbed channelling and prolonged droughts. For instance,

modifications of the riverbed were responsible for the near-disappearance of the Torrente Versa population, the density of which dropped from 16–20 individuals m⁻² in 1993–2003 to 42 individuals found in marginal sub-optimal habitats over 6,000 m⁻² monitored in 2020. Pollution from intensive agriculture, enhanced by river impoundments and droughts, are the most likely causes of the over 90% density reduction of the Italian populations of the Po tributaries.

Based on this updated information, we submitted a re-assessment to list the species as Critically Endangered (CR–A2ac) (Riccardi & Lopes-Lima, 2021, submitted).

Any conservation action is currently hampered by a lack of crucial information. The identification of the host fish is essential to assess whether residual populations may spontaneously reproduce in situ, as well as to initiate attempts at artificial reproduction. Also, the genetic diversity of known populations must be assessed because it will give clues for future interventions, including possible translocations.

The species is now in such rapid decline that any action, even with low success probability, is worth trying. With three of the five viable populations in Italy decreasing by 99% from 2014 to 2019, and no data for the other two, there is only time for an “in extremis” rescue attempt. A “Noah’s Ark” project based on taking animals from nature to attempt artificial reproduction has been ongoing since 2019 thanks to a grant from the Mohamed bin Zayed Conservation Fund (project N. 192522810). After two failed attempts to induce the production of glochidia in animals kept in captivity, we decided to try collecting animals from wild populations during the next reproductive season, i.e. April to July 2022. Unfortunately, the lack of crucial information prevents us from estimating the probability of success and the time required to obtain individuals to re-introduce to the wild. The numerous attempts to obtain the necessary funding for a study that allows conservation actions to be launched have not been successful. Although the species is in rapid decline and there are no ecological equivalents that can replace its ecosystem role, we failed even to obtain the support of institutions in charge of biodiversity conservation. Both Italian regional authorities (the Piedmont Region and the Friuli Venezia Giulia Region) and neighbouring Slovenia that still host populations, have declared that the species is not “a priority at European level being in the list in Annex V, and not IV”, so it is not entitled to dedicated time and human resources. The same reason, “not a priority”, was recently used to justify the rejection of a project for a bilateral collaboration between the Italian Consiglio Nazionale delle Ricerche and the Albanian Ministry of Education and Sport to try to save one of the existing populations.

No door has been opened to save *M. bonellii*. It is destined for extinction but, for this very reason, consigned to future memory as a testimonial of the many “non-priority” species.

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FRESHWATER SPECIES AT RISK

By Monika Böhm

In 2020, the IUCN Species Survival Commission (SSC) Freshwater Conservation Committee (FCC), in collaboration with [Shoal](#) and the [Global Center for Species Survival](#), put out a call to freshwater-relevant SSC Specialist Groups to nominate species from their taxonomic remit to feature in an upcoming publication about freshwater species at risk. This report will highlight the need for freshwater conservation using the cases of 50 freshwater species from across the globe and representing different taxon groups; it aims to attract funders to freshwater species conservation while also inspiring a more general audience to be captivated and amazed by – and ultimately care for – freshwater biodiversity. At the same time, the report pulls together freshwater expertise from across the SSC and helps to engage Specialist Groups with the broader work of the FCC. The report is scheduled to be published in spring 2022, and will hopefully make a splash in time for the International Day for Biodiversity on 22 May.

Five species of freshwater molluscs will be represented in the report; the remainder of the 50 species will be made up of five representatives each for the other major taxonomic groups: mammals, birds, amphibians, reptiles, fish, crustaceans, insects, plants and fungi. On receiving the call for nominations, the Specialist Group members responded in droves. Nomination guidelines specified that nominated species should meet all or at least some of these criteria: 1) assessed (or likely to be assessed) as Critically Endangered (CR) or Endangered (EN); 2) have a high-quality photograph, ideally of a live individual and in natural habitat; 3) be underfunded and in need of immediate conservation action; 4) be an umbrella or flagship species for other species; and 5) be a good case study for freshwater threat or conservation opportunities.

Altogether, the number of nominations far exceeded the stipulated ten species for the broader shortlist. The final five

species have now been selected. This has been a tough decision for the FCC, which had to ensure not only good geographical and taxonomic representation across all species groups included in the report, but also a good representation of different habitats and threats, and availability of images.

Three gastropods and two bivalves have made the final cut and will be highlighted in the publication (drum roll, please): the wicker ancyliid *Rhodacmea filosa*, the Naegele spring snail *Pyrgulopsis metcalfi*, a species of *Tylomelania* (best option still to be decided based on available imagery), *Microcondylaea bonellii* and *Acostaea rivolii*. The publication will probably highlight other species of concern, which will include the wider shortlists from across the taxon groups, so nominating numerous species has definitely not been in vain.

Furthermore, we are hoping to start some regular communications about freshwater molluscs. While these

considerations are in the early stages, we have several channels at our disposal – not only via the Mollusc Specialist Group’s own newsletter (*Tentacle*) and social media (@SSC_Mollusc_sg) but also via our partners at the [Global Center for Species Survival](#) (@ProtectSpecies). The information collated during this nomination process will put us in good stead to highlight some wonderful and captivating species over the next year – and thanks to the Mollusc Specialist Group members, we also know where to get new inspiration for further freshwater communications in future.

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IUCN SSC MOLLUSC SPECIALIST GROUP

This membership list now includes taxonomic and conservation expertises, to the extent they are known. In order to keep your details up to date, please inform the chair of the IUCN SSC Mollusc Specialist Group, Mary Seddon, and the editor of *Tentacle*, Robert Cowie, of any changes or corrections, especially regarding expertises. If there is any information you do not want to be public, please also inform us.

The list is in two parts: Official Members and Other Contributors. The former are currently listed on the IUCN official register of members of the IUCN SSC Mollusc Specialist Group. The latter are people who may have served on the Mollusc Specialist Group in the past or have provided assistance on enquiries, all of whom we acknowledge for their continued support of the work of the Group, although they are not currently listed on the IUCN official register of members.

Chair

Mary B. Seddon, Okehampton, UK. mary.molluscsg@gmail.com

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Official Members													
Christian Albrecht Justus Liebig University, Giessen	Germany		X		X	X				X			
David Aldridge University of Cambridge, Cambridge	UK		X			X				X		X	
Louise Allcock National University of Ireland, Galway	Ireland	X			X								
Maria Rosario Alonso Universidad de la Laguna, Tenerife	Spain			X	X								
Jose Arrebola Burgos Universidad de Sevilla, Sevilla	Spain			X	X				X				X
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Igor Balashov Schmalhausen Institute of Zoology, Kiev	Ukraine			X	X	X							
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Arthur Bogan North Carolina State Museum of Natural History, Raleigh	USA		X		X	X			X				
Monika Böhm Global Center for Species Survival, Indianapolis Zoo	USA	X	X		X		X						

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Olivier Gargominy Muséum national d'Histoire naturelle, Paris	France			X	X	X							
Daniel Geiger Santa Barbara Museum of Natural History, California	USA	X			X	X							
Jürgen Geist Technische Universität München, Freising	Germany		X		X	X			X				

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Official Members (continued)													
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Frank Köhler Australian Museum, Sydney	Australia		X	X	X	X							
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Charles Lange National Museums of Kenya, Nairobi	Kenya		X	X	X								
Dwayne Lepitzki Wildlife Systems Research, Banff	Canada		X		X	X		X					

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Igor Miyahira Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro	Brasil												
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Kathryn Perez University of Texas Rio Grande Valley, Edinburg, Texas	USA		X	X	X	X		X					

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Official members (continued)													
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Winston F. Ponder Australian Museum, Sydney	Australia												
Vincent Prié Muséum national d'Histoire naturelle, Paris	France		X		X	X		X		X	X		
Canella Radea National and Kapodistrian University of Athens	Greece		X		X	X							
Nicoletta Riccardi Institute of Ecosystem Study, Verbania Pallanza	Italy		X		X	X		X	X		X		
Ira Richling Staatliches Museum für Naturkunde Stuttgart	Germany		X	X	X	X				X			
Rodrigo Salvador Museum of New Zealand Te Papa Tongarewa, Wellington	New Zealand / Brasil		X	X	X	X			X				
Sonia B. dos Santos Universidade do Estado do Rio de Janeiro, Rio de Janeiro	Brasil		X			X							
Menno Schuilthuis Naturalis Biodiversity Center, Leiden	Netherlands			X		X				X			
Mary B. Seddon Okehampton	UK	X	X	X	X	X	X				X		
Julia Sigwart Senckenberg Research Institute and Natural History Museum, Frankfurt am Main	Germany	X			X	X					X		
Ioan Sirbu Lucian Blaga University of Sibiu	Romania		X		X	X		X				X	
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Rajko Slapnik Agencija Republike Slovenije Okolje, Ljubljana	Slovenia		X	X	X								
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Dinarte Teixeira Instituto das Florestas e Conservação da Natureza, Madeira	Portugal (Madeira)			X	X	X	X						
Elin Thomas Queen's University Belfast, Portaferry	UK	X			X	X					X		
Kostas Triantis National and Kapodistrian University of Athens	Greece			X	X	X							
Do Van Tu Institute of Ecology and Biological Resources, Hanoi	Viet Nam		X		X	X							

Name	Country	Taxonomic Expertise			Conservation Expertise								
		Marine molluscs	Freshwater molluscs	Land snails	Assessment	Survey & monitoring	Red List trainer	Habitat status & restoration	Conservation breeding	Conservation genetics	Environmental legislation	Invasive species	Wildlife trade
Dirk Van Damme Destelbergen	Belgium		X		X	X							
Jackie Van Goethem Royal Belgian Institute of Natural Sciences, Brussels	Belgium	X		X		X							
Ilya Vikhrev N. Laverov Federal Center for Integrated Arctic Research, Arkhangelsk	Russian Federation		X		X	X				X			
Maxim Vinarski Saint Petersburg State University	Russian Federation		X		X	X				X			
Ted von Proschwitz Göteborg Natural History Museum	Sweden		X	X	X	X							
Thomas von Rintelen Museum für Naturkunde, Berlin	Germany		X		X	X							
Norine Yeung Bishop Museum, Honolulu, Hawaii	USA			X	X	X		X	X				
Tadeusz Zajac Institute of Nature Conservation, Krakow	Poland		X		X	X			X				
Alexandra Zieritz University of Nottingham	UK		X		X	X			X				
Other contributors													
Jonathan Ablett, Natural History Museum, London	UK	X		X									
Takahiro Asami Shinshu University, Matsumoto	Japan			X									
Ruud Bank, University of Groningen	Netherlands		X	X									
Rudiger Bieler Field Museum, Chicago	USA	X											
Philippe Bouchet Muséum national d'Histoire naturelle	France	X	X	X									
Khadija Boulaassafer Cadi Ayyad University, Marrakech	Morocco												
Bram Breure Naturalis Biodiversity Center, Leiden	Netherlands			X									
Gilianne Brodie University of the South Pacific	Fiji			X	X								
David Clarke Zoological Society of London	UK			X					X				
Robert Cameron University of Sheffield	UK			X	X	X							
Jay Cordeiro Boston	USA		X		X								
Willy De Mattia Natural History Museum Vienna	Austria			X	X								
Mark Etherbirdge Environment and Natural Resources	Bermuda			X					X				

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Other contributors (continued)													
Hiroshi Fukuda Okayama University	Japan	X											
Terrence Gosliner California Academy of Sciences, San Francisco, California	USA	X											
Owen Griffiths BioCulture Mauritius	Mauritius			X	X								
Nova Hanson Memorial University of Newfoundland	Canada	X			X								
Joseph Heller Hebrew University, Jerusalem	Israel		X	X	X	X							
Jasna Lajtner University of Zagreb	Croatia		X		X	X							
Charles (Chuck) Lydeard Morehead State University, Morehead	USA		X	X									
Maria Cristina Dreher Mansur Museu de Ciências e Tecnolo, Porto Alegre	Brasil		X	X									
Ristiyanti M. Marwoto Research and Development Centre for Biology, Bogor	Indonesia		X	X									
Paula M. Mikkelsen Paleontological Research Institution, Ithaca	USA	X											
Hugh Morrison Australian Sea Shells P/L	Australia	X			X								X
Richard Neves Virginia Tech, Blacksburg, Virginia	USA		X						X				
Diarmaid Ó Foighil University of Michigan	USA		X	X	X					X			
Timothy A. Pearce Carnegie Museum, Pittsburg	USA		X	X									
Shane Penny Fisheries, Department of Industry, Tourism and Trade, Northern Territories	Australia	X	X										
Vladimir Pešić University of Montenegro	Montenegro		X	X	X								
Guido Poppe Conchology Inc, Cebu	Philippines	X			X								X
Barry Roth San Francisco, California	USA			X									
David Robinson USDA/APHIS/PPQ, Academy of Natural Sciences, Philadelphia	USA			X									
Rebecca J. Rundell State University of New York, Syracuse	USA			X									
John Stanisic Queensland Museum, South Brisbane	Australia			X									
Jaap J. Vermeulen National Botanic Garden, Singapore	Singapore			X									

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Other contributors (continued)													
Peter Ward University of Washington, Seattle	USA	X											
Anton (Ton) J. de Winter Nationaal Natuurhistorisch Museum, Leiden	Netherlands			X									
Min Wu Nanjing University	China			X									
Xiaoping Wu Nanchang University	China		X										
Nicolas Zuel, Ebony Forest Ltd	Mauritius			X	X	X		X					

