museu de ciències naturals de Barcelona

Animal Biodiversity and Conservation 46.2 (2023)
DOI: 10.32800/abc.2023.46.0173

Brief communication

Nomenclatural problems caused by type species designation in Gammaridae (Amphipoda)

N. Rosas-Ramos[1], P. Jurado-Angulo[2], P. C. Rodríguez-Flores[3], M. García-París[2]

Author affiliations:
[1] Universidad de Salamanca, Spain
[2] Museo Nacional de Ciencias Naturales-CSIC, Spain
[3] Museum of Comparative Zoology, Harvard University, USA

Corresponding author:
Paula C Rodríguez-Flores; paularodriguezflores@g.harvard.edu

Handling Editor:
Pere Abelló

Received: 01/02/2023
Cond. acceptance: 07/06/2023
Final acceptance: 15/09/2023
Published: 02/10/2023

Cite:
Rosas-Ramos N, Jurado-Angulo P, Rodríguez-Flores PC, García-París M, 2023. Nomenclatural problems caused by type species designation in Gammaridae (Amphipoda). *Animal Biodiversity and Conservation* 46.2, 173-176. DOI: http://doi.org/10.32800/abc.2023.46.0173

ISSN: 1578-665 X
eISSN: 2014-928 X

Abstract

Nomenclatural problems caused by type species designation in Gammaridae (Amphipoda). Recent phylogenetic studies of Gammaridae made evident some nomenclatural issues that should be addressed. We discuss the nomenclatural problems caused by the use of the unavailable name *Neogammarus* Ruffo, 1937 and the designation of type species for *Rhipidogammarus* Stock, 1971 and *Neogammarus* Karaman, 1969. Since the type species of these two last names is the same, *Gammarus rhipidiophorus* Catta, 1878, the ICZN requires that a new objective synonymy be established: *Neogammarus* Karaman, 1969 = *Rhipidogammarus* Stock, 1971, syn. nov. This synonymy changes the current general use of these two names, generating a new nomenclatural combination, *Neogammarus karamani* (Stock, 1971) n. comb. We provide a synonymic list of *Neogammarus* to facilitate its general application.

Key words: *Rhipidogammarus*, *Neogammarus*, New synonymy, Amphipoda, Nomenclature, Taxonomy

Resumen

Problemas nomenclaturales causados por la designación de las especies tipo en Gammaridae (Amphipoda). En recientes estudios filogenéticos de la familia Gammaridae se ha puesto de manifiesto la existencia de determinados aspectos nomenclaturales que han de ser abordados. En el presente artículo se examinan los problemas nomenclaturales causados por el uso de *Neogammarus* Ruffo, 1937, un nombre no disponible, y la designación de la especie tipo de *Rhipidogammarus* Stock, 1971 y *Neogammarus* Karaman, 1969. Debido a que la especie tipo designada para estos dos últimos nombres es la misma, *Gammarus rhipidiophorus* Catta, 1878, el ICZN requiere que se establezca una nueva sinonimia: *Neogammarus* Karaman, 1969 = *Rhipidogammarus* Stock, 1971, syn. nov. Esta sinonimia cambia el uso general que actualmente se hace de estos dos nombres, lo que da lugar a una nueva combinación nomenclatural: *Neogammarus karamani* (Stock, 1971) n. comb. Proporcionamos una lista de los sinónimos de *Neogammarus* para facilitar su aplicación.

Palabras clave: *Rhipidogammarus*, *Neogammarus*, Nueva sinonimia, Amphipoda, Nomenclatura, Taxonomía

Introduction

The recent phylogenetic synthesis of the family Gammaridae (Hou and Sket 2016, Sket and Hou 2018) provided a solid basis for the phylogenetic structure of the family, with definition of well-supported clades such as *Echinogammarus* Stebbing, 1899, *Parhomoeogammarus* Schellenberg, 1943, *Relictogammarus* Hou and Sket, 2016, and *Marinogammarus* Schellenberg, 1937. However, Hou and Sket's (2016) hypothesis put forward some nomenclatural problems, mostly related to the use of non-available generic names. Some of these problems were discussed in García-París et al (2023), but an additional overlooked nomenclatural problem implying type species designation requires further attention.

The instance discussed here deals with the problem of the current use of the unavailable name *Neogammarus* Ruffo, 1937, the proper use of the name *Neogammarus* Karaman, 1969, and its

consequences for *Rhipidogammarus* Stock, 1971 a clade related to *Sarothrogammarus* Martynov, 1935, including *R. rhipidiophorus* (Catta, 1878) and *R. karamani* Stock, 1971.

Results

The name *Neogammarus* Ruffo, 1937 is unavailable for nomenclatural purposes because it was described without fixation of type species (Stock 1971, García-París et al 2023). Dahl (1958) reserved *Neogammarus* for *Gammarus festai* Ruffo, 1937, but as expressed in article 67.5 of the International Code of Zoological Nomenclature (ICZN 1999, García-París et al 2023), this action does not constitute a designation of type species, and *Neogammarus* Dahl, 1958 is thus not an available name. *Neogammarus* was subsequently made available by Karaman (1969: p. 57; 1971: p. 206) who designated *Gammarus rhipidiophorus* Catta, 1878 as its type species.

A couple of years later, Stock (1971) erected the genus *Rhipidogammarus* Stock, 1971 designating *G. rhipidiophorus* Catta, 1878 as its type species (by original designation). Therefore, the designation of *G. rhipidiophorus* Catta, 1878 as type species of *Rhipidogammarus*, creates a problematic situation because *Rhipidogammarus* Stock, 1971 shares type species with *Neogammarus* Karaman, 1969.

Since type species fixation by Karaman (1969) is in accordance with the International Code of Zoological Nomenclature (ICZN 1999), *Neogammarus* Karaman, 1969 and *Rhipidogammarus* Stock, 1971 became objective synonyms by being defined by the same type species. *Neogammarus* Karaman, 1969 has nomenclatural precedence over *Rhipidogammarus* Stock, 1971, and consequently we are forced to propose the new synonymy: *Neogammarus* Karaman, 1969 = *Rhipidogammarus* Stock, 1971. Therefore, the species included to date within *Rhipidogammarus* Stock, 1971 should be transferred to *Neogammarus* Karaman, 1969. Based on this information, the synonymic list of *Neogammarus* Karaman, 1969 (including unavailable names) remains as:

Neogammarus Karaman, 1969
Neogammarus Ruffo, 1937: p. 442 (described as subgenus of *Gammarus*) (unavailable name)

Type species: none designated originally. *Gammarus festai* Ruffo, 1937 and *G. rhipidiophorus* Catta, 1878 were included originally in *Neogammarus*, but none of them was designated as type species (Ruffo, 1937).

Neogammarus G. S. Karaman, 1969: p. 50 (stat. nov.)

Type species: *G. rhipidiophorus* Catta, 1878 by original designation.

Rhipidogammarus Stock, 1971: p. 114 (new synonymy)

Type species: *G. rhipidiophorus* Catta, 1878 by original designation.

Species included in *Neogammarus* Karaman, 1969, based on Stock's (1971) proposal are: *Neogammarus rhipidiophorus* (Catta, 1878) and *Neogammarus karamani* (Stock, 1971) new combination.

Discussion

The unfortunate unintended misapplication of the International Code of Zoological Nomenclature (ICZN 1999) by not designating type species for the new genera described after 1930 (e.g., Ruffo 1937, Schellenberg 1937) and the coincidental designation of the same type species for two different generic conceptions (Karaman 1969, Stock 1971) is having a direct impact in the taxonomy of Gammaridae. This situation implies that some of the established generic conceptions needed to be reconsidered: see for example the problem of *Homoegammarus* Schellenberg, 1937 (García-París et al 2023) or *Neogammarus* Ruffo, 1937.

In some cases, the redefinition of genera is relatively simple when the type species of each new generic conception is included in a well-supported molecular phylogeny (Hou and Sket 2016), but it is still a problem when type species are not studied at molecular level and their phylogenetic placement is therefore unknown. Fortunately, the two species originally included by Ruffo (1937) in the original description of *Neogammarus* Ruffo, 1937, along with the type species selected by Karaman (1969) for *Neogammarus* Karaman, 1969, are included in sound molecular phylogenetic hypotheses (Hou and Sket 2016, Sket and Hou 2018).

One of these two species, *Gammarus festai* Ruffo, 1937, was placed in a diverse clade under the unavailable name *Homoeogammarus* Schellenberg, 1937 (Hou and Sket 2016, Sket and Hou 2018). *Gammarus festai* Ruffo, 1937 was subsequently transferred to *Pectenogammarus* Reid, 1940 by García-París et al (2023), because *Pectenogammarus* is the oldest available name for the '*Homoeogammarus*' clade proposed by Sket and Hou (2018). Most of the species formerly included under the unavailable name *Neogammarus* Ruffo, 1937 (not *Neogammarus* Karaman, 1969) are now part of the morphologically diverse clade *Pectenogammarus*. *Pectenogammarus festai* and *P. nudus* (Stock 1971), also formerly treated as part of *Neogammarus* Ruffo, 1937, are included in a relatively isolated clade of *Pectenogammarus* (Sket and Hou, 2018: supplementary material fig. 1, pag. 9) that, even if recognized as an independent genus or subgenus, cannot take the unavailable name *Neogammarus* Ruffo, 1937.

The second species included by Ruffo (1937) in his original description of *Neogammarus* was *Gammarus rhipidiophorus* Catta, 1878, which according to Stock (1971), and confirmed with molecular data (Hou and Sket, 2016: supplementary material fig. S1 and table S1) is, together with *N. karamani*, sister to a clade including *Sarothrogammarus* Martynov, 1935, *Barnardiorum* Iwan and Löbl, 2007 and *Comatogammarus* Stock, 1971, and not closely related to *Pectenogammarus* (*sensu* García-París et al, 2023). The well-supported clade including *N. rhipidiophorus* and *N. karamani* (Hou and Sket, 2016; Sket and Hou, 2018) must retain the name *Neogammarus* Karaman, 1969 and not *Rhipidogammarus* Stock, 1971 as discussed above.

Although all phylogenetic studies, including those based on molecular data, should be treated as work-

ing hypotheses (Fitzhugh 2006, Gonçalves et al 2007, Sánchez-Vialas et al 2020), there are associated taxonomic and nomenclatural issues that cannot be left unattended following their publication. It is true that some phylogenetic proposals might change in a short time, requiring a new taxonomic rearrangement, but in general many available genus level names remain stable over time, only changing their applicability to a certain clade or to another, depending on the phylogenetic placement of their type species. Throughout the entire zoological systematics there are many examples of old names recovered after phylogenetic proposals showed the para or polyphyly of certain taxa (Sánchez-Vialas et al 2021). We believe that in order to keep an active taxonomy that follows developments in the field of systematics, nomenclatural changes need to be adopted as rapidly as possible so that new generations of taxonomists will use the current proper name, even though it might be prone to change after a more complete analysis is performed, in exactly the same way as occurs with taxonomic changes based on hypotheses relying on morphological data (e.g., Myers and Lowry 2003, 2020, Marin and Palatov 2022).

However, there are other cases in which nomenclatural changes are not imposed by a change in the taxonomy of a group. These other cases are a simple consequence of the reluctance of some authors to follow the regulations provided by the International Code of Zoological Nomenclature (ICZN 1999). The nomenclatural problems in Gammaridae shown in this and previous notes (García-París et al 2023) are not a direct consequence of phylogenetic results but a consequence of the misapplication of unavailable names to well-defined clades. And this situation is independent from the taxonomic or phylogenetic framework. In our case, the name *Neogammarus* Ruffo, 1937 is unavailable according to the ICZN (ICZN 1999), and therefore it cannot be applied under any circumstances, while the name *Neogammarus* Karaman, 1969 is available and therefore should be applied to the clade in which its type species is included, unless an older available name exists for that clade. In order to revert the unavailability of *Neogammarus* Ruffo, 1937, a proposal needs to be sent to the International Commission of Zoological Nomenclature, but we do not consider this is necessary, because after a few publications that correctly use the name *Neogammarus* Karaman, 1969, not many researchers will remember the previous ascription of the species included under that name (as has been the case for extensive changes in vertebrate genera following molecular hypotheses: see for example Faivovich et al (2005), Glaw and Vences (2006), de Sá et al (2012), Rovito et al (2015).

As in many other aspects of taxonomy, what appears to be as an encumberment today will become the habit of tomorrow, and therefore, in our opinion, it is wiser to correct nomenclatural errors immediately rather than to allow them to become a source of confusion for future generations.

References

Catta JD, 1878. Sur un Amphipode nouveau, le *Gammarus rhipidiophorus*. *Actes de la Société Helvetique des Sciences Naturelles Reunie a Bex les 20, 21 et 22 Aout 1877, 60e Session, Compte-Rendu 1876/1877*, 256-263.

Dahl E, 1958. Fresh and brackish water amphipods from the Azores and Madeira. *Boletim do Museu Municipal do Funchal* 11(27), 5-25.

de Sá RO, Streicher JW, Sekonyela R, Forlani MC, Loader SP, Greenbaum E, Richards S, Haddad CF, 2012. Molecular phylogeny of microhylid frogs (Anura: Microhylidae) with emphasis on relationships among New World genera. *BMC Evolutionary Biology* 12, 241. DOI: 10.1186/1471-2148-12-241

Faivovich J, Haddad CF, Garcia PC, Frost DR, Campbell JA, Wheeler WC, 2005. Systematic review of the frog family Hylidae, with special reference to Hylinae: phylogenetic analysis and taxonomic revision. *Bulletin of the American Museum of natural History* 2005(294), 1-240. DOI: 10.1206/0003-0090(2005)294[0001:SROTFF]2.0.CO;2

Fitzhugh K, 2006. The abduction of phylogenetic hypotheses. *Zootaxa* 1145(1), 1-110. DOI: 10.11646/ZOOTAXA.1145.1.1

García-París M, Jurado-Angulo P, Rodríguez-Flores PC, Rosas-Ramos N, 2023. Nomenclatural changes in a taxonomically complex group (Amphipoda: Gammaridae). *Zootaxa* 5230(5), 595-600. DOI: 10.11646/zootaxa.5230.5.7

Glaw F, Vences M, 2006. Phylogeny and genus-level classification of mantellid frogs (Amphibia, Anura). *Organisms Diversity and Evolution* 6(3), 236-253. DOI: 10.1016/j.ode.2005.12.001

Gonçalves H, Martínez-Solano I, Ferrand N, García-París M, 2007. Conflicting phylogenetic signal of nuclear vs mitochondrial DNA markers in midwife toads (Anura, Discoglossidae, *Alytes*): deep coalescence or ancestral hybridization? *Molecular Phylogenetics and Evolution* 44(1), 494-500. DOI: 10.1016/j.ympev.2007.03.001

Hou Z, Sket B, 2016. A review of Gammaridae (Crustacea: Amphipoda): the family extent, its evolutionary history, and taxonomic redefinition of genera. *Zoological Journal of the Linnean Society* 176(2), 323-348. DOI: 10.1111/zoj.12318

ICZN, 1999. *International Code of Zoological Nomenclature (ICZN)*. International Commission on Zoological Nomenclature, London.

Iwan D, Löbl I, 2007. Nomenclatural notes on tenebrionid beetles of the Palaearctic region (Insecta: Coleoptera). *Annales Zoologici, Warszawa* 57, 733-739. DOI: 10.3161/000345407783742033

Karaman GS, 1969. XXVI. Beitrag zur Kenntnis der Amphipoden. Taxonomie und Verbreitung der Art *Neogammarus rhipidiophorus* (Catta) in Mittelmeerbassin. *Glasnik Republickog Zavoda Za Zastitu Prirode I Prirodnjacke Zbirke u Titograd*, 2: 47-58.

Marin IN, Palatov DM, 2022. *Dursogammarus dromaderus* gen. et sp. nov., a new Ponto-Caspian gammarid (Amphipoda: Gammaridae) from the coastal pebble habitats of the foothills of the Caucasus. *Zoology in the Middle East* 68(3), 237-246. DOI: 10.1080/09397140.2022.2116171

Martynov AV, 1935. Amphipoda Gammaridea of the running waters of Turkestan. *Travaux de l'Institut Zoologique de 1'Academie des Science de l'URSS* 2, 411-508.

Myers AA, Lowry JK, 2020. A phylogeny and classification of the Talitroidea (Amphipoda, Senticaudata) based on interpretation of morphological synapomorphies and homoplasies. *Zootaxa* 4778(2). DOI: 10.11646/zootaxa.4778.2.3

- 2003. A phylogeny and a new classification of the Corophiidea (Amphipoda). *Journal of Crustacean Biology* 23(2), 443-485. DOI: 10.1651/0278-0372(2003)023[0443:APAANC]2.0.CO;2

Reid D, 1940. On *Gamarus (Pectenogammarus) planicrurus* subg. et sp. n. (Crust. Amph.). *Annals and Magazine of Natural History, Series* 11(6), 287-292.

Rovito SM, Parra-Olea G, Recuero E, Wake DB, 2015. Diversification and biogeographical history of Neotropical plethodontid salamanders. *Zoological Journal of the Linnean Society* 175(1), 167-188. DOI: 10.1111/zoj.12271

Ruffo S, 1937. Una nuova specie di *Gammarus* del Mar Ligure. *Annali del Museo Civico di Storia Naturale Giacomo Doria* 59, 438-446.

Sánchez-Vialas A, García-París M, Ruiz JL, Recuero E, 2020. Patterns of morphological diversification in giant *Berberomeloe* blister beetles (Coleoptera: Meloidae) reveal an unexpected taxonomic diversity concordant with mtDNA phylogenetic structure. *Zoological Journal of the Linnean Society* 189(4), 1249-1312. DOI: 10.1093/zoolinnean/zlz164

Sánchez-Vialas A, Recuero E, Jiménez-Ruiz Y, Ruiz JL, Marí-Mena N, García-París M, 2021. Phylogeny of Meloini blister beetles (Coleoptera, Meloidae) and patterns of island colonization in the Western Palaearctic. *Zoologica Scripta* 50(3), 358-375. DOI: 10.1111/zsc.12474

Schellenberg A, 1937. Schlussel und Diagnosen der dem Susswasser-*Gammarus* nahestehenden Einheiten ausschlisslich der Arten des Baikalsees und Australiens. *Zoologischer Anzeiger* 117, 267-280.

Sket B, Hou Z, 2018. Family Gammaridae (Crustacea: Amphipoda), mainly its *Echinogammarus* clade in SW Europe. Further eluci-

dation of its phylogeny and taxonomy. *Acta Biologica Slovenic* 61, 93-102, http://bijh-s.zrc-sazu.si/ABS/SI/ABS/Cont/61_2/ABS_61_2018_2_splet-93-102.pdf

Stebbing TRR, 1899. Amphipoda from the Copenhagen Museum and other sources II. *Transactions of the Linnean Society of London, Zoology* 7(8), 395-432.

Stock JH, 1971. A revision of the *Sarathrogammarus* - Group (Crustacea, Amphipoda). *Bijdragen tot de Dierkunde* 41(2), 94-129.

Acknowledgements
We thank Miguel A. Alonso Zarazaga for support and critical review. We also thank the librarians of the Museo Nacional de Ciencias Naturales for their help

Author contributions
All authors contributed to the bibliographic search and writing of the manuscript

Conflicts of interest
No conflicts declared

Funding
This work has been possible thanks to the project grant PID2019-110243GB-100 /AEI/10.13039/501100011033 (Ministerio de Ciencia, Innovación y Universidades, Spain) (Principal investigator: M. García-París).
P. C. Rodríguez-Flores is supported by a biodiversity postdoctoral fellowship from the MCZ (Museum of Comparative Zoology) at Harvard University

Complete affiliations
Natalia Rosas-Ramos, Área de Zoología, Departamento de Biología Animal, Facultad de Biología, Edificio de Farmacia planta 5, Universidad de Salamanca, Campus Miguel de Unamuno s/n., 37007 Salamanca, Spain
Pilar Jurado-Angulo, Mario García-París, Departamento de Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales MNCN-CSIC, c/José Gutiérrez Abascal 2, 28006 Madrid, Spain
Paula C. Rodríguez-Flores, Department of Organismic and Evolutionary Biology, Museum of Comparative Zoology, Harvard University, 26 Oxford St., Cambridge MA 02138, USA