



# History of the Taxonomic Studies of Marine Isopoda (Crustacea: Peracarida) from Argentina

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## Review Article

Volume 6 Issue 3

Received Date: June 14, 2023

Published Date: June 27, 2023

DOI: 10.23880/izab-16000477

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## Abstract

The order Isopoda is one of the most speciose and morphologically diverse order within the Crustacea worldwide, and the Southwest Atlantic is not the exception. The knowledge of the marine isopod fauna in the Argentine Continental Shelf and Slope spans almost two centuries. It began during the 19th century and the first half of the 20th century, when European and North American scientists directed their research to this part of world. Subsequently, some Argentine researchers continued the taxonomic studies on the Isopoda, focused mainly on intertidal and shallow waters species of the continental shelf. Currently, the taxonomic knowledge of Isopoda has significantly expanded due to the access to deep-sea environments. In the present contribution, the history of the taxonomic studies of Isopoda from Argentina is reviewed.

**Keywords:** Argentine Sea; Diversity; Isopoda; Review; Southwest Atlantic

## Order Isopoda

Isopoda with more than 10600 described species is the most diverse order within the Peracarida crustaceans [1]. The isopods are an ancient group; the most ancient fossil record belong to the Middle Pennsylvanian Period [2] and it is hypothesized that ancestral isopods living in the Devonian [3]. This long evolutionary history of the Isopoda might explain the great diversity of morphotypes observed among all the suborders. Moreover, isopods display a high variety of morphological adaptations that could be an important factor in their ability to colonize different environments. Of the total described species, more than 6200 inhabit marine or estuarine waters, and are distributed from the intertidal to the abyssal zone, all over the world [4]. Currently, within the order Isopoda 11 suborders are recognized, viz.: Asellota, Calabazoida, Cymothoidea, Limoniriidea, Microcerberidea,

Oniscidea, Phoratoidea, Phreatoidea, Sphaeromatidea, Tainisopidea and Valvifera [5].

## Taxonomic Studies

### The Beginning with International Researchers

The researches on the marine isopod fauna from the Argentine Sea spans nearly 200 years. The initial studies documenting species from the Argentine Continental Shelf were published in the 19th century. These early descriptions were conducted by two European carcinologists. In 1843, Adam White described a species of Sphaeromatidae based on several specimens housed in the British Museum, which were collected in the Malvinas Islands [6]. In the same year, Félix Guérin-Méneville [7] described two species (one Sphaeromatidae and one Valvifera), also collected in

the Malvinas Islands, using specimens provided by Baron Cuvier. Subsequently, the North American naturalist James Dana studied the isopods collected during the *United States Exploring Expedition* (1838–1842). Through this survey, Dana reported new findings and described many new species from Patagonia and Tierra del Fuego [8,9].

Following that, Danish zoology Christian Lütken, and British carcinologists Robert Cunningham and Edward Miers investigated the isopod fauna from the Magellan Strait and the surrounding area. In 1858, Lütken [10] described the serolid *Acanthoserolis schythei*; Cunningham [11] examined material collected by the *H.M.S. Nassau* during 1866–1869, while Miers [12] studied material collected by the *H.M.S. Alert* during 1878–1879. Their work resulted in the documentation of several species and new records in the area. In 1874, Swiss marine biologist Théophile Studer published his findings on the Isopoda collected by the German *S.M.S. Gazelle* during the expedition from 1874 to 1876. Studer's work included the description of the valviferan species *Pseudidothea miersii*, collected off the coast of Patagonia (ca. 47°S 63°W) [13]. In 1884 and 1886, British carcinologist Frank Beddard published two papers reporting isopods and tanaids collected during the *H.M.S. Challenger* Expedition from 1876 to 1878. As a result, Beddard described four species (two spp. in each suborder of Asellota and Valvifera, respectively) based on the specimens collected at stations 320 (ca. 37°S 53°W) and 313 (ca. 52°S 67°W) [14,15]. Some years later, Georg Pfeffer described a total of six species (three Asellota spp. and three Sphaeromatidea spp.) collected during the Deutschen Polarstation 1882–1883 Expedition to the South Georgia Islands [16].

In the early 20th century, Timothy Stebbing reported new records for nine species from the Malvinas Islands [17–19]. In 1901, Swedish zoologist Axel Ohlin described eight species belonging to the Valvifera suborder, collected during two surveys to Tierra del Fuego and Patagonia during 1892–1893 and 1895–1896 [20]. Among the North American researchers, it is worth to mention the carcinologist Harriet Richardson, who described two species (one sp. in the Asellota and Valvifera suborders each) based on specimens obtained from the *RV Albatross* during a survey in 1888 [21,22]. Finally, Åke Nordenstam in a monographic work recorded many isopods and described 12 species from the subantarctic waters around the Malvinas Islands, Beagle Channel, and South Georgia Islands based on materials collected during the Swedish Antarctic Expedition carried out between 1901 and 1903 [23]; while Edith Sheppard described four species of Serolidae, two species of Valvifera, and reported eight new records based on materials collected by the British *R.R.S. William Scoresby* during 1927–1931 [24,25].

In the latter half of the 20th century, international expeditions focused on the deep waters off the coast of

Argentina. These surveys significantly contributed to the understanding of isopod fauna in the Argentine Continental Slope and Argentine Basin. Notable researchers, such as Robert Menzies, reported three new records and described eleven species collected during the *RV Vema* expeditions [26]. Additionally, Russian scientist Oleg Kussakin described several isopod species collected during Cruise III of the Soviet Antarctic Expedition aboard the *RV Ob* [27] and *RV Akademik Kurchatov* [28–31]. Since then, numerous species of isopods have been described. For a comprehensive compilation of the deep-sea isopod fauna off Argentina, see Doti, et al. [32].

### The Advent of Argentine Researchers

Taxonomic studies focusing on marine Isopoda in the Argentine Sea, conducted by Argentine researchers, are scattered across numerous publications. The first researcher to study this fauna was Deidamia Giambiagi, whose initial work in 1922 described three isopod species found in the collection of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” [33]. In 1925, Giambiagi described two species and reported 14 new findings based on material collected in the intertidal zone of Tierra del Fuego during the first national expedition in 1921 [34].

In later years, taxonomic studies on marine isopods focused primarily on Valvifera and Serolidae from the intertidal and shallow waters of Buenos Aires Province. Bastida and Torti [35,36] and Torti and Bastida [37] described three valviferan species of the family Chaetiliidae. Additionally, Bastida and Torti [38–40] studied the Serolidae, describing two new species and providing an identification key. In 1970, Bastida and Torti [41] conducted a monographic work on Serolidae collected by the *RV Calypso* along the Atlantic coast of South America. Towards the end of the 20th century, Roux and Bastida [42] reported the presence of the exotic species *Sphaeroma serratum* in the Mar del Plata harbor for the first time. More recently, Rumboldt, et al. [43] and Meloni, et al. [44] recorded two additional non-native species *Dynamene edwardsi* and *Paracerceis sculpta*, respectively, from the Mar del Plata harbor (Buenos Aires Province).

In the early 21st century, Argentine researchers focused mainly on the taxonomy and biogeography of Asellota isopods. The examination of just a few benthic samples collected in the Beagle Channel allowed to Doti, et al. [45] to present several new records of asellote species. This work highlighted that the asellote fauna from the Argentine Sea was poorly studied, probably as a consequence of their small size. This preliminary result encouraged the study of the Asellota along the shallow waters of the Argentine Continental Shelf, spanning from Buenos Aires to the Beagle Channel. As a result, new species of paramunnids were described by Doti

and Roccatagliata [46-49]; Doti et al. [50] presented new records and biogeographical analyses for asellote isopods.

Furthermore, several studies examined the biology of parasitic isopods in the families Cryptoniscidae and Bopyridae. Lovrich, et al. [51] and Peresan and Roccatagliata [52] provided information on hyperparasitism by the cryptoniscid *Liriopsis pygmaea*. Roccatagliata and Lovrich [53] and Miranda-Vargas and Roccatagliata [54] studied the infestation of *Pseudione tuberculata* (now *Eremitione tuberculata*) on two lithodid species in the Beagle Channel. Roccatagliata and Torr s-Jord  [55], Torres-Jord  and Roccatagliata [56], and Diaz and Roccatagliata [57] investigated the infestation of *Leidyia distorta* and *Anathelges* cf. *hyptius* on different host species. More recently, Pereira et al. [58] described a new bopyrid species, *Pseudione chiesai*, infesting the squat lobster *Munida spinosa* (now *Curtonida spinosa*) in the Mar del Plata submarine canyon.

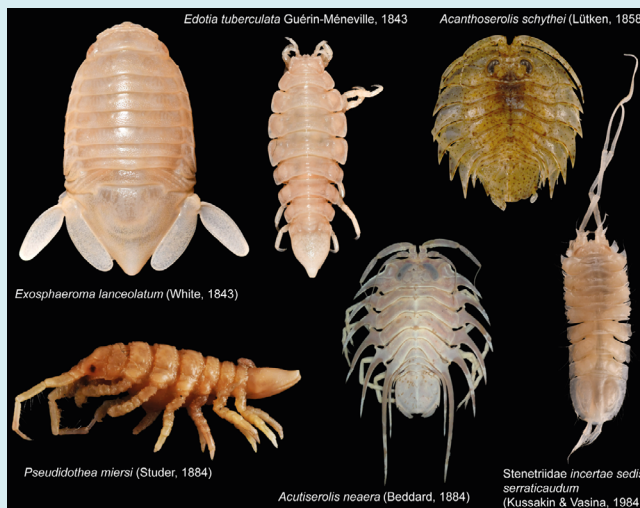
With regards to the suborder Valvifera, Doti et al. [59] reported new records for *Pseudidothea miersii* and described its commensal relationship with the sea urchin *Austrocidaris canaliculata*. One year later, Poore et al. [60] described the species *Macrochiridothea estuariae* from the R o de la Plata and redefined the genus *Chiriscus*.

Since 2009, with the acquisition of the *RV Puerto Deseado* by the National Research Council (CONICET), several national expeditions have been conducted in the Argentine Continental Shelf, Mar del Plata submarine canyon, and Marine Protected Areas (MPAs) Namuncur /Banco Burdwood I and II. As a result of these expeditions many benthic samples collected along the Argentine coast, taken in depths ranging from 25 to 3300 meters are being studied by the laboratory of "Systematics and Biogeography of

Crustaceans Peracarida", headed by Dr. Daniel Roccatagliata (IBBEA, CONICET-UBA).

The collected material includes thousands of isopod specimens, with the suborders Asellota and Valvifera being the most diverse and abundant. Based on this material, Doti [61] described the asellotes *Pentaceration pleonarietis*, *Neasellus argentinensis* and *N. bicarinatus*. Whereas many other species of Asellota, most of them from the Mar del Plata submarine canyon, are still awaiting formal description (B. Doti, pers. comm.). Regarding the Valvifera, studies focused on the taxonomy of Ideoteidae and Antarcturidae from the Mar del Plata submarine canyon. Pereira and Doti [62] described *Edotia abyssalis*, the finding of this species at 3282 m represent the deepest record for the family Idoteidae. Later, Pereira et al. [63] erected the genus *Xiphoarcturus* with two new species, *X. kussakini* and *X. carinatus*, and performed the first phylogenetic analysis based on morphological characters for Antarcturidae. More recently, Pereira et al. [64] also described *Fissarcturus argentinensis* and the male of *Fissarcturus patagonicus*, providing additional morphological information since its original description by Ohlin [20]. Among the samples collected in the Mar del Plata submarine canyon, at least other nine new species of Valvifera were recorded (*E. pereira*, unpub. data).

Regarding the MPA Namuncur /Banco Burdwood I, Doti et al. [65] updated the list of isopods and cumaceans from this area. This work increased the number of recorded isopod species to a total of 56, including the records of seven new species of Asellota. More recently, Calder n L pez et al. [66] includes the fully description of two new species of the sphaeromatid genus *Moruloidea*, collected in the deep waters surrounding the Burdwood Bank.



**Figure 1:** Selected diversity of Isopoda, including some of the first described species from the Southwest Atlantic Ocean. The photographs are not at scale.

In Figure 1 are illustrated some of the first described species of isopod by international researchers. In Table 1 are listed all the species of isopods described by Argentine researchers, and their references.

<b>ASELLOTA</b>
Paramunnidae
<i>Abyssianira acutilobi</i> [47]
<i>Abyssianira lingula</i> [47]
<i>Advenogonium fuegiae</i> [46]
<i>Meridiosignum undulatum</i> [48]
<i>Meridiosignum disparitergum</i> [48]
<i>Munogonium quequensis</i> [49]
<i>Munogonium diplonychia</i> [49]
<i>Neasellus argentinensis</i> [61]
<i>Neasellus bicarinatus</i> [61]
<i>Pentaceration pleonarietis</i> [61]
<b>CYMOTHOIDA</b>
Bopyridae
<i>Pseudione chiesai</i> [58]
Cirolanidae
<i>Natatolana pastorei</i> [34]
<b>SPHAEROMATIDEA</b>
Serolidae
<i>Brazilserolis foresti</i> [41]
<i>Cristaserolis marplatensis</i> [41]
<i>Leptoserolis bonaerensis</i> [38]
<i>Leptoserolis sheppardae</i> [39]
Sphaeromatidae
<i>Pseudosphaeroma platense</i> [33]
<i>Tholozodium rhombofrontalis</i> [33]
<b>VALVIFERA</b>
Antarcturidae
<i>Fissarcturus argentinensis</i> [64]
<i>Xiphoarcturus carinatus</i> [63]
<i>Xiphoarcturus kussakini</i> [63]
Chaetiliidae
<i>Chaetilia argentina</i> [36]
<i>Chiriscus giambiagiae</i> [60]
<i>Macrochiridothea estuariae</i> [60]
<i>Macrochiridothea robusta</i> [35]
Idoteidae
<i>Edotia abyssalis</i> [62]
<i>Edotia doellojuradoi</i> [34]
<i>Synidotea marplatensis</i> [33]

**Table 1:** Isopod species from the Southwest Atlantic Ocean described by Argentine researchers.

## Conclusions

The investigation of marine isopods in the Argentine Continental Shelf and Slope has a lengthy background. Nonetheless, numerous areas, particularly in the Argentine Continental Slope, remain unexplored. Consequently, our knowledge of the taxonomy of marine Isopoda will continue to expand in the coming years.

## Conflicts of Interest

The author has no conflicts of interest to declare.

## Acknowledgements

I am very grateful to Brenda Doti (IBBEA) and an anonymous reviewer, for their valuable comments that improve the original version of this work.

## Funding

This research was funded by the CONICET (PIP 11220200102070CO).

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