# A taxonomic revision of the squat lobsters (Anomura: Chirostyloidea and Galatheoidea) of South Africa

Thesis presented for the Degree of Doctor of Philosophy in the Department of Biological Sciences, University of Cape Town

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**“Journey before destination” – Brandon Sanderson, from the S*tormlight Archive*.**

**Title page:** *Trapezionida* cf. *barbeti* (Galil, 1999) from Aliwal Shoal, 30 m. Photograph: Valda and Mike Fraser.

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# Plagiarism Declaration

1. I know that plagiarism is wrong. Plagiarism is to use another’s work and pretend that it is one’s own.

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# Acknowledgements

While undertaking the monumental task of revising the squat lobsters of South Africa, I came across a quote that proved incredibly meaningful to me throughout the project. It was as simple as: “Journey before destination”. During the many failures and difficult days this often reminded me that the journey is as important, or even more important, than the destination and should not be feared but embraced. It is only through these failures and hardship that valuable skills are gained, and lessons are learnt.

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# Abstract

South African squat lobsters (Chirostyloidea and Galatheoidea) are a severely understudied group. They have never been the subject of a formal monographic study and the last additions to the fauna were made almost 20 years ago. Thus, a revision of these superfamilies is long overdue. This study relied on examination of historic material housed in the Natural History Collections of the Iziko South African Museum, as well as ad-hoc sampling to carry out morphological analyses and molecular barcoding where possible. These methods were used to add to, revise and update the regional fauna. The thesis is presented in the form of six chapters, four of which each revise one of the families of squat lobsters present in South Africa and provide an illustrated key to the known regional species in that family. These chapters are supported by an introduction and synthesis chapter and a reference list. The first revisory chapter covers the Chirostyloidea (Chapter 2), and includes redescriptions of four species, reports on one species (and genus) from South Africa for the first time and expands the distribution and depth range for *Uroptychus simiae*. The third chapter describes two new species of Galatheidae, adds three species (and a genus) to the regional fauna list and resolves several dubious records. *Galathea labidolepta* Stimpson, 1858 is also redescribed and a neotype assigned, as the holotype was lost in the 1871 Chicago fire. The Munididae are revised in the fourth chapter, wherein two new species are described, seven species (four of which are new generic records for South Africa) are added as new distribution records, while five species are redescribed, two of which were previously only known from brief descriptions. The fifth chapter revises the deep-dwelling Munidopsidae and redescribes two species. This study marks the largest ever contribution to the South African squat lobster fauna with 15 species being added, comprising four new species and 11 new distribution records, while two species are removed due to synonymy. This increases the number of South African squat lobster species from 32 to 45. In the process, six genera are also reported on for the first time. Illustrated redescriptions are given for 12 species that were known from outdated or inadequate descriptions. Where possible, DNA sequences were produced as part of an integrative approach to delineate species, and this is the first study to provide such genetic data on South African squat lobsters, with 28 barcodes provided for eight species. Though this study adds valuable knowledge to this important group, it also highlights the need for more rigorous sampling, as more than half of the species are known from just a single sampling event and almost certainly more species remain to be discovered from the region.

# Chapter 1: Introduction

The name squat lobster is commonly given to animals of two divergent, distantly-related clades, the superfamilies Chirostyloidea Ortmann, 1892 and Galatheoidea Samouelle, 1819, with both groups having a similar bilaterally-symmetrical body plan (Baba et al., 2011; Schnabel et al., 2011a; Schnabel, 2020). They are dorso-ventrally flattened, with their pleon held beneath the thorax, resembling a squatting posture, hence the common name (Baba et al., 2009, 2011). Like other crustaceans in the infraorder Anomura, they have the characteristic presence of five pairs of pereopods, the first pair modified as generally elongate and slender pincers, the second to fourth pairs being simple walking legs, while the last pair is much shorter, folded and usually hidden under the carapace (Baba et al., 2008). The two superfamilies differ in that the Chirostyloidea have a dentate mandible (a character only shared with Lomisoidea Bouvier, 1894 and Aegloidea Dana, 1852), while the Galatheoidea have a smooth or unidentate mandibular cutting edge, a plesiomorphic character in the Anomura (Ahyong et al., 2010; Schnabel & Ahyong, 2010; Schnabel et al., 2011a). Moreover, the Chirostyloidea have no sternal plate between the legs on the last thoracic sternite and have a third maxilliped with no epipod, while the Galatheoidea has a well-developed sternal plate and have an epipod present or absent on Mxp3 (Macpherson & Baba, 2011). The larvae between these two families also differ, as the chirostyloid zoea 1 larvae lack posterolateral spines along the carapace, while such spines are present in the zoea 1 larvae of galatheoids (except for the Munidopsidae Whiteaves, 1874). Interestingly, the Chirostyloidea are more closely related to hermit crabs than to the Galatheoidea (Schnabel & Ahyong, 2010).

The Chirostyloidea and Galatheoidea each consist of four families, with the former comprising more than 383 species, while the latter has around 1300 species worldwide (WoRMS Editorial Board, 2024). The Chirostyloidea comprises the families Chirostylidae Ortmann, 1892, Eumunididae A. Milne-Edwards & Bouvier, 1900, Kiwaidae Macpherson, Jones & Segonzac, 2005 and the Sternostylidae Baba, Ahyong & Schnabel, 2018. The Galatheoidea consist of the families Galatheidae Samouelle, 1819, Munididae Ahyong, Baba, Macpherson & Poore, 2010, the deep-dwelling Munidopsidae, Ortmann, 1898 and the porcelain crabs (not covered in this study) Porcellanidae Haworth, 1825.

The global squat lobster fauna has been researched extensively, with several recent publications adding large numbers of species, notably Macpherson & Robainas-Barcia (2015) and Baba (2018) which added 92 galatheid and 106 chirostylid species respectively. Moreover, there have been several important revisions, with several new families and numerous new genera added in the past 15 years (Ahyong et al., 2010; Baba, 2018; Baba et al., 2018; Machordom et al., 2022). However, it is estimated that around 60% and 80% of the true diversity for chirostyloids and galatheoids respectively, still remain unknown (Macpherson & Schnabel in Appeltans et al., 2012; De Grave et al., 2023).

Squat lobsters are a diverse, cosmopolitan group that are mostly benthic, though some exhibit pelagic phases during juvenile stages of their life, before settling on the benthos, while a few remain in the water column their entire life (Matthews, 1932; Williams, 1980; Lovrich & Thiel, 2011; Schnabel et al., 2011b; Dong et al., 2021). They inhabit nearly all marine ecosystems from the subarctic to the Antarctic, including unique habitats such as hydrothermal vents, cold seeps and anchialine caves (Khodkina, 1975; Baba, 2005; Garcia-Guerrero et al., 2006; Schnabel, 2020). They have been observed at depths ranging from littoral to over 5300 m deep (Macpherson & Segonzac, 2005; Schnabel et al., 2011b), but the majority live in deep-sea habitats beyond the shelf break (Baba, 2005). They are most commonly found in tropical and temperate waters (this pattern being consistent across most depth strata), concentrating in the western Pacific, with fewer species present at high latitudes (Baba, et al., 2008; Schnabel et al., 2011b).

Squat lobsters play important roles in benthic ecology and are often associated with a broad range of symbionts (Lovrich & Thiel, 2011). Chirostyloids are commonly associated with alcyonaceans, antipatharians and pennatulaceans, rarely also occurring with sponges, crinoids, echinoids and starfish (Rice & Miller, 1991; Baeza, 2011; Guilloux et al., 2010; Hendrickx et al., 2013; Wicksten, 2020; Baba, 2018; Schnabel, 2020; Arnés-Urgellésm et al., 2020). They either perch on the surface of commensal hosts (e.g. *Chirostylus* Ortmann, 1892 and *Gastroptychus* Caullery, 1896), or cling onto the axes of host corals (e.g. *Heteroptychus* Baba, 2018 and *Uroptychus* Henderson, 1888), and occasionally have modified dactyli that form a prehensile structure, likely an adaptation to cling onto branching corals (Baba et al., 2011). Galatheoids also occur on a variety of host organisms, including hard corals, alcyonaceans, sponges and crinoids (Baba, 1971; Baba & Oh, 1990; Rice & Miller, 1991; Osawa & Okuno, 2004; Baba & Fujita, 2008). Most of these are shallow-water associations (though this is likely an artifact of greater access to shallower water), and these squat lobster species often mimic the colours of their hosts (Fujita & Baba, 1999; Cabezas et al., 2011).

Squat lobsters are frequently found living in vulnerable marine ecosystems (VMEs), such as hydrothermal vents, cold seeps, seamounts and coral reefs (Macpherson & Segonzac, 2005). Hydrothermal vents are often referred to as ‘underwater volcanoes’ as they emit geothermally heated water through fissures in the seafloor (Van Dover, 2000; Van Dover et al., 2002). These unique habitats, normally found along mid-ocean ridges and back-arc basins (Rogers et al., 2012), have been found to host a number of squat lobster species, often at incredible abundances (de Saint Laurent & Macpherson, 1997; Baba, 2005; Macpherson & Segonzac, 2005; Macpherson et al., 2005). Squat lobsters are also regularly associated with VME taxa such as sponges, alcyonacean corals and occasionally antipatharians, and pennatulaceans (Khodkina, 1975; Baba and Williams, 1998; Baba, 2005; Rowden et al., 2010; Baeza, 2011; Schnabel et al., 2011b; Schnabel, 2020). Several studies have highlighted the susceptibility of these habitats and their inhabitants to anthropogenic activities (especially bottom trawling and ocean acidification) and have called for their increased protection (FAO, 2009). Squat lobsters have been shown to provide useful insight as VME indicator taxa, allowing for more effective marine spatial planning, to protect VMEs (Yan et al., 2020). Thus, having accurate taxonomic knowledge will not only be useful for taxonomists in the field, but will also provide valuable data required for marine spatial planning impact assessments, sustainable resource management and protection targets, especially given the ecological importance of the group. Improving the taxonomic resolution of South Africa’s squat lobsters is important considering the region’s known high biodiversity and paucity of data from beyond 200 m depth.

## The South African marine habitat and fauna

South Africa lies at the junction of the Atlantic, Indian and Southern Oceans and as a result has a remarkably diverse marine environment. The biogeographic zonation pattern around the coast is driven by two contrasting major ocean currents, with the cold Benguela Current flowing south to north along the western region, while the warm Agulhas Current transports tropical water from the Indian Ocean southwards along the eastern region (Gründlingh, 1983; Nelson & Hutchings, 1983; Shannon & Nelson, 1996; Branch & Branch, 2018). The South African bathymetry is quite varied, as the eastern region has a very narrow, steep continental shelf (Dingle, 1986), and as a result does not support many commercial fisheries (Fennessey, 1994). Conversely, towards the southern region the continental shelf broadens considerably, especially towards the Agulhas Bank (Figure 1.1), which extends nearly 185 km south of the coastline (Sink et al., 2019). The western region is also characterized by a wide continental shelf, often terraced and supports the majority of South Africa's commercial fishing industries (Griffiths et al., 2010). The biogeography of the region was first classified by Stephenson (1939, 1944, 1948), who designated three marine provinces; the cool-temperate Southern Benguela, the warm-temperate Agulhas and the sub-tropical Natal-Delagoa provinces. Since Stephenson's seminal work this classification has been refined, owing largely to the National Biodiversity Assessment (NBA) (Lombard et al., 2004; Sink et al., 2012, 2019), compiled every five to seven years by the South African National Biodiversity Institute (SANBI). The most recent NBA iteration (Sink et al., 2019) updated the six ecoregions proposed in Sink et al. (2012) into four shelf regions (Agulhas, Delagoa, Natal and Southern Benguela) and two deep regions (Southeast Atlantic Deep Ocean and Southwest Indian Deep Ocean), as depicted in Figure 1.1. For simplicity and because the samples examined here span both the shelf and deep regions recognized by the NBA classification, this study refers to three broad regions; the west coast, which is a combination of the Southern Benguela Shelf and Southeast Atlantic Deep Ocean ecoregions; the south coast, which is the Agulhas Shelf Ecoregion and the southern portion of the Southwest Indian Deep Ocean Ecoregion; and the east coast which is a combination of the Delagoa and Natal Shelf Ecoregion, as well as the northern portion of the Southwest Indian Deep Ocean Ecoregion (Figure 1.1).

The known marine fauna of South Africa comprises around 13 000 described species (Griffiths et al., 2010) including invertebrates, vertebrates, flora, protozoans and prokaryotes. Patterns of biodiversity differ between groups, with species richness generally being lower on the west coast and increasing eastwards, although in some temperate groups the highest species numbers occur in the southwest (Awad et al., 2002; Griffiths et al., 2010; Teske et al., 2011). Endemicity rates are also unusually high and vary greatly between groups, but a mean of 33% of all species are endemic to the region. However, these patterns are based largely on coastal communities, which have been relatively well-sampled, with over 99% of existing samples from depths shallower than 1000 m, and some 83% from less than 100 m (Griffiths et al., 2010). However, since 2010, more samples have been taken from greater depths, especially between 100 – 1000 m, so these numbers have likely changed in recent years, though the bathyal and abyssal zones > 1000 m remains almost completely unexplored.

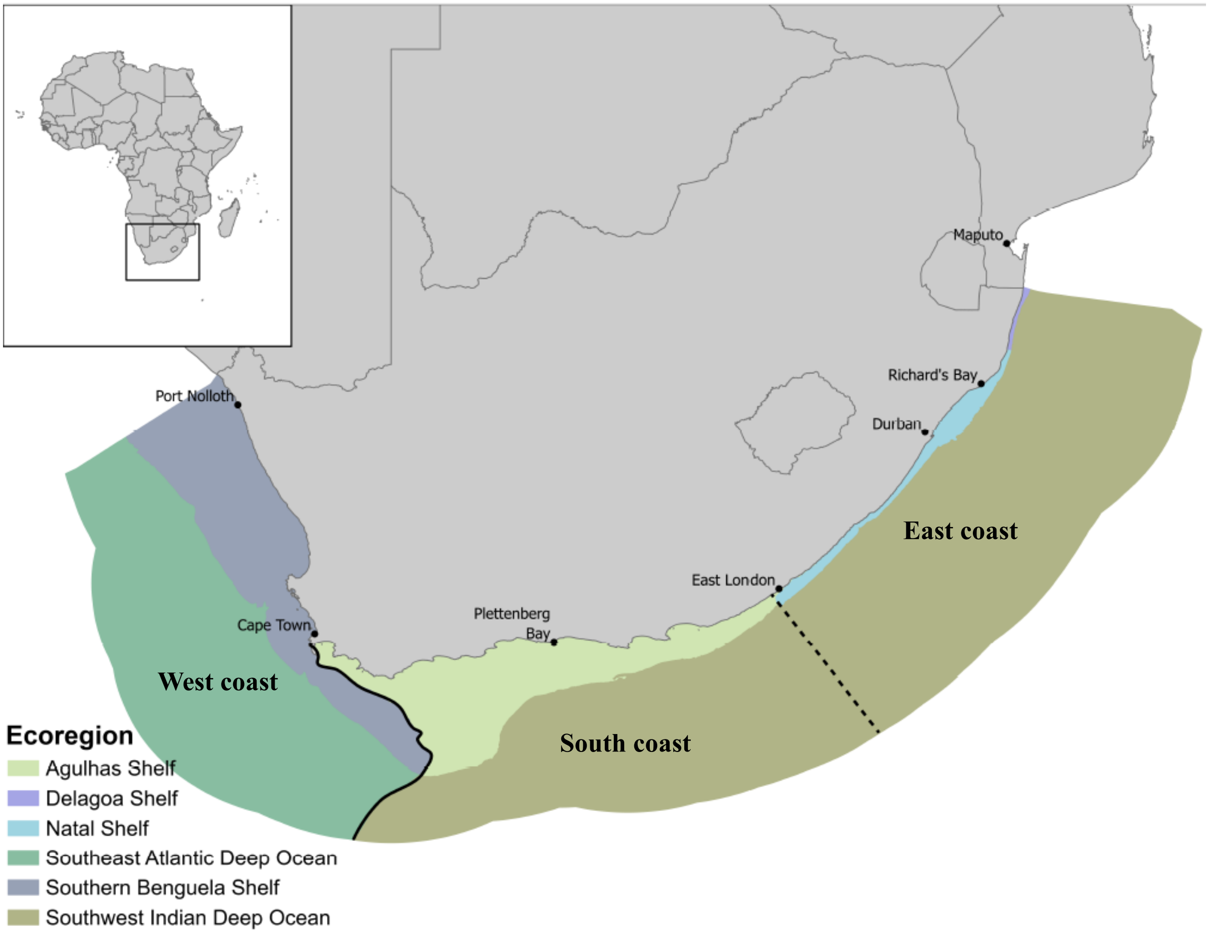

**Figure 1.1:** Map of South Africa, showing the three marine regions used in this study. For the purposes of this study, lines are added to depict the break between the different coasts, though the break between the south and east coast is not defined by specific oceanographic features and is indicated by a dashed line. Ecoregions from Sink et al. (2019).

### History of squat lobster research in South Africa and aims of this study

South African squat lobsters first appeared in the literature in 1858 when Stimpson described the endemic *Galathea labidolepta* Stimpson, 1858. These early descriptions were all done on an ad-hoc basis as taxonomists and material were quite rare. Thomas Stebbing did some research on the group in the early 1900's adding previously known species to the South African squat lobster fauna (Stebbing 1908, 1917) and described the enigmatic *Hapaloptyx difficilis* Stebbing, 1920 from the east coast. A 100 years later this species remains the only one in the genus and some questions have been raised regarding the validity of the species (Baba, 1988; Baba, 2008; Schnabel & Ahyong, 2010). During the Stebbing era Doflein & Balss (1913) added

*Galathea nexa* to the growing list of South African squat lobsters. It was only in 1925 when Keppel H. Barnard added *Munida incerta* Henderson, 1888 (now *Agononida africerta*) to the local fauna that a South African researcher started working on South African squat lobsters. He was a pillar in South African crustacean taxonomy for many years and in his 1950 monograph he added six new squat lobster records (Barnard, 1950). Following in the footsteps of his mentor (K.H. Barnard) was another key South African crustacean taxonomist, Brian F. Kensley. Between 1968 and 1981 he described three species and added another four to the South African squat lobster fauna (Kensley, 1968, 1977, 1981). During this time until 1993 two researchers from Pakistan Nasima M. Tirmizi and Waquar Javed (who was working on galatheoids of the wider region), added three new species and a new record for South Africa (Tirmizi & Javed, 1976, 1980, 1992, 1993), while Tirmizi along with Keiji Baba (one of the most influential researchers on the group) added a new species, *Uroptychus remotispinatus* Baba & Tirmizi, 1979. Baba went on to publish a monograph with a species list of deep-sea Indo-Pacific chirostylids and galatheids in 2005 where he added two new species known from South Africa as well as two new records (Baba, 2005). Enrique Macpherson and Michel Segonzac (2005) added two new records for South Africa and described a new endemic species, *Munidopsis laurentae* Macpherson & Segonzac, 2005. *Munidopsis gladiola* was the last species added to the South African fauna by Macpherson (2007), while the most recent work pertaining to squat lobsters is Emmerson's (2016) multi-volume guide on South African Decapoda, though this list contains numerous inaccuracies and has various other presentation problems (as outlined in Griffiths, 2017) and should simply be used as a starting point to quantify the decapod fauna present in South Africa.

Evidently, the squat lobsters of South Africa have never been the subject of a monographic study, and as suggested have only part of larger works on the overall South African Crustacean fauna, larger works on squat lobsters of broader regions, or ad-hoc species descriptions. Thus, at the start of this study, the number of squat lobster species known to be present in South Africa was 32, comprising seven chirostyloids and 25 galatheoids. However, the last regional study was published almost 20 years ago and since that time much unidentified material has accumulated in the Natural History Collections of the Iziko South African Museum (SAMC), and considerable changes have occurred in the taxonomy of the group. A revision of the South African squat lobster fauna is thus long overdue.

The main aim of this study was to revise the squat lobster fauna of South Africa providing descriptive accounts where necessary and an updated species list. The specific objectives were thus as follows:

- Examine existing identified and unidentified material accumulated in the Natural History Collections of the Iziko South African Museum and update all identifications and report on new distribution records.
- Sample squat lobsters in South African waters, by participating in benthic research cruises, adding as many new records as possible.
- Generate genetic barcodes for as many species as possible.
- If found, describe species new to science.
- Redescribe poorly known species and update descriptions to modern standards.
- Create illustrated keys for each family to enable identification for experts and non-experts.

The thesis is presented in the form of six chapters, four of which each revise one of the squat lobster families present in South Africa. These are written in the format of free-standing publications, which means that some repetition is inevitable, especially with regards to methodology. These chapters are supported by an introduction (Chapter 1) and synthesis chapter (Chapter 6) and a reference list. Chapter 2 (the first revisory chapter) provides a comprehensive overview of the Chirostyloidea (though only the family Chirostylidae is treated, as no other chirostyloid families are present in South Africa) and provides redescriptions for species with inadequate or outdated descriptions. Chapter 3 revises the shallow-water Galatheidae, updating the taxonomic determination of all species previously reported for the region using an integrative approach, while also providing a redescription for South Africa's first reported squat lobster and describing two new species. Chapter 4 provides a comprehensive review of all known species of Munididae in South Africa, including redescriptions for several species, while also addressing dubious records using a combination of morphological and genetic analyses. In this chapter numerous species and genera are reported from South Africa for the first time, while two new species are also described. Chapter 5 revises the Munidopsidae, and includes several species redescriptions and key information from rare species.

## Terminology

**Cervical groove** – curved transverse groove separating the anterior gastric region and posterior cardiac and branchial regions.

**Crista dentata** – denticulate mesial ridge on the ischium of the Mxp3.

**Gonopod 1 (G1) and Gonopod (G2)** – modified male pleopods used for copulation.

**Linea anomurica –** longitudinal groove separating the dorsal part of the carapace and the pterygostomian flap.

**Mxp1** – first maxilliped, the most anterior appendage of the mouthparts.

**Mxp3 –** third maxilliped, the most posterior appendage of the mouthparts.

**Pleon –** posterior part of the body, behind and articulating with the carapace, folded under the thorax, consisting of five pleonites and the telson.

**Pereopod 1 (P1)/Cheliped** – this appendage is chelate and consists of the dactylus/finger and propodus/palm (which form the chela), carpus, merus, ischiobasis and coxa.

**Pereopods 2 – 4 (P2 – 4)/walking legs** – these are symmetrical from left to right and consists of a dactylus, propodus, carpus, merus, ischiobasis and coxa.

**Pleonite** – segment of the pleon, also referred to as somite.

**Pleuron** – lateral extensions of the pleonites produced ventrally.

**Pterygostomian flap –** lateral part of the carapace covering the lateral side of buccal cavity and enclosing the branchial cavity and the gills laterally. Delineated from the dorsal part of the carapace by a longitudinal groove called the linea anomurica

**Tergite** – dorsal part of the pleonite.

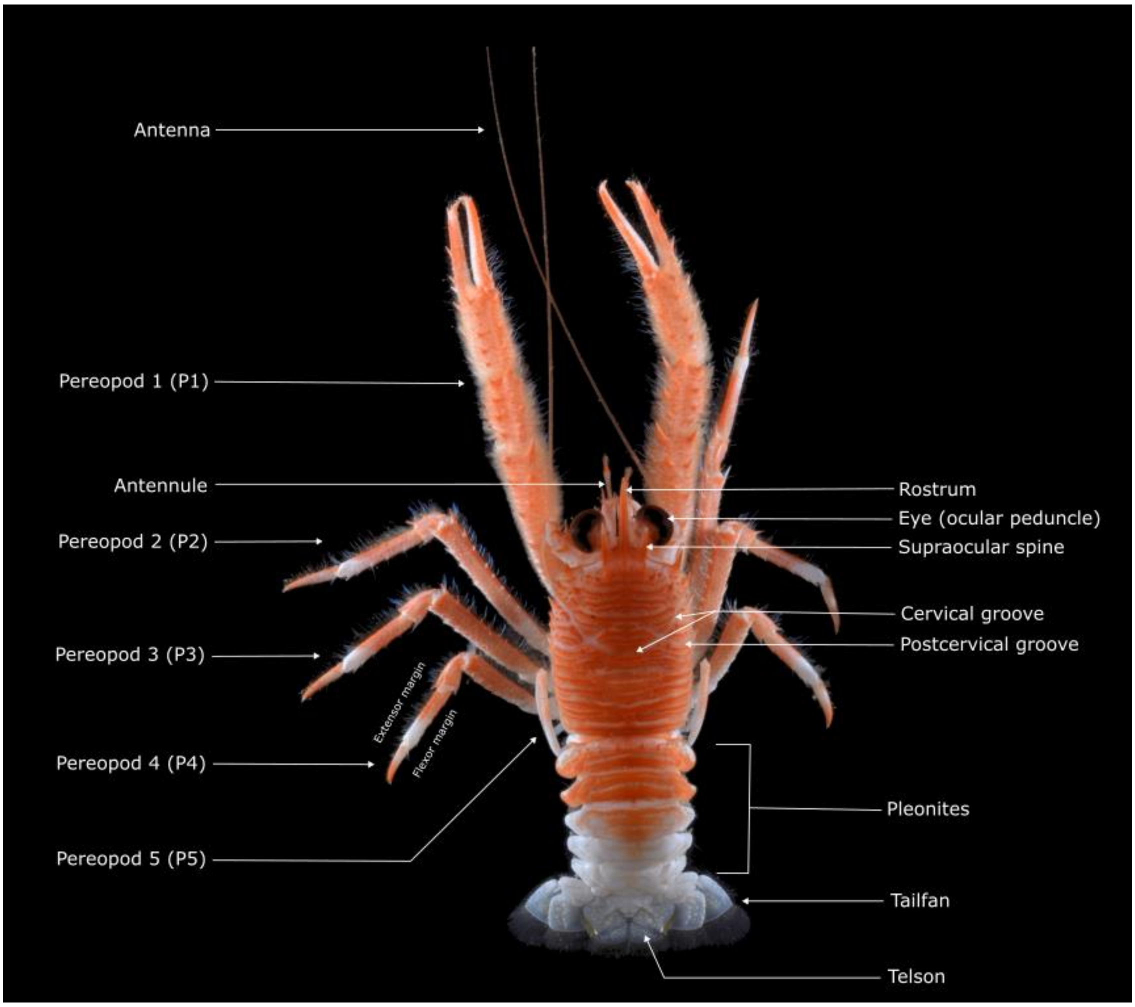

**Figure 1.2:** Descriptive terminology of body and appendages.

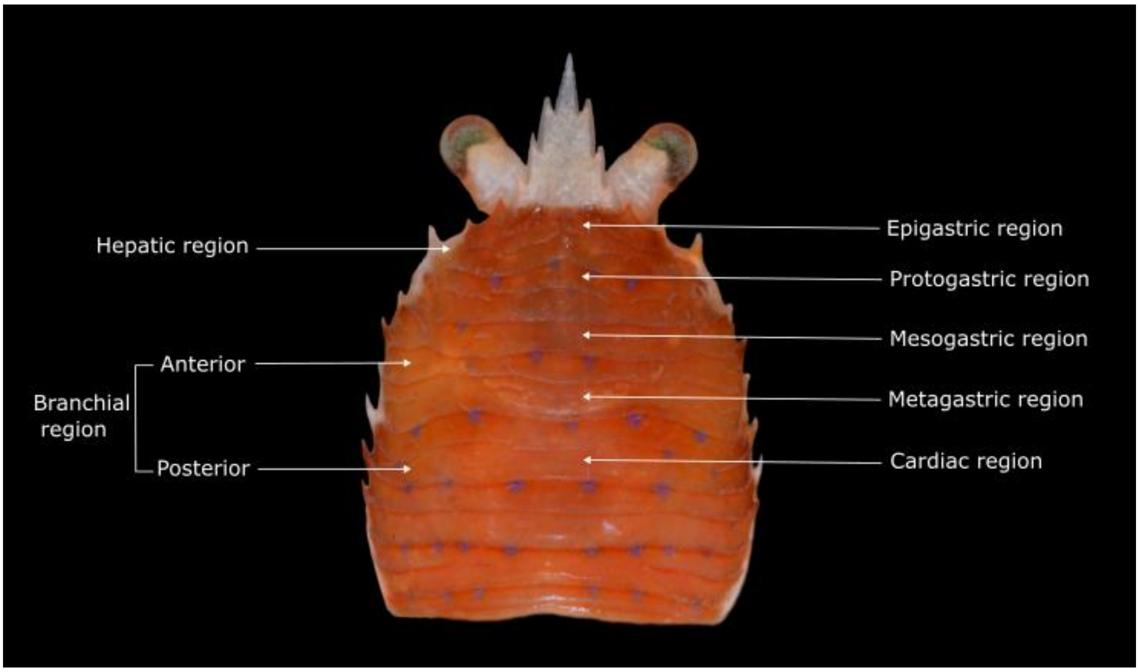

**Figure 1.3:** Descriptive terminology of dorsal carapace regions.

# Chapter 2: The Chirostyloidea (Anomura) of South Africa

## Introduction

The Chirostyloidea are a superfamily of squat lobsters whose members were previously included within the Galatheoidea (Baba et al., 2008), but was elevated by Schnabel et al. (2011a), based on a combination of morphological and molecular analyses. These analyses showed chirostyloids to be more closely related to Aegloidea, Lomisoidea and Paguroidea than to the remaining Galatheoidea (Schnabel et al., 2011a). Chirostyloids are predominantly found along steep continental margins, undersea ridges and seamounts, and are mostly associated with Vulnerable Marine Ecosystem (VME) species, such as alcyonacean corals and occasionally antipatharians, pennatulaceans and crinoids (Baba and Williams, 1998; Baba, 2005; Rowden et al., 2010; Baeza, 2011; Schnabel, 2020). These associations with VME species are what makes them good indicator taxa and a useful tool to inform management decisions on these VME taxa. Chirostyloids are much less diverse than galatheoids, with 383 described species as opposed to 1177 (according to WoRMS Editorial Board, 2024).

The Chirostyloidea comprise four families; Chirostylidae Ortmann, 1892, Eumunididae A. Milne-Edwards & Bouvier, 1900, Kiwaidae Macpherson, Jones & Segonzac, 2005 and Sternostylidae Baba, Ahyong & Schnabel, 2018. In South Africa, only Chirostylidae are present and hence this is the only family addressed herein. The family consists of six genera; *Chirostylus* Ortmann, 1892, *Gastroptychus* Caullery, 1896, *Hapaloptyx* Stebbing, 1920 (of dubious validity), *Heteroptychus* Baba, 2018, *Uroptychodes* Baba, 2004 and *Uroptychus* Henderson, 1888. *Uroptychus* is by far the largest genus containing 287 of the 329 accepted species in the family. Of the six genera, all but *Gastroptychus* and *Uroptychodes* are present in South Africa.

The first chirostylid recorded in South African waters was the enigmatic *Hapaloptyx difficilis* Stebbing, 1920, though there has been considerable debate concerning the validity of the monotypic genus. *Uroptychus nitidus* (A. Milne-Edwards, 1980) was reported by Barnard, 1950, while *U. foulisi*, *U. simiae* and *U. undecimspinosus* were described by Kensley (1977). Baba and Tirmizi (1979) described *U. remotispinatus* from Japan, South Africa and Mozambique, while Kensley (1981) described *U. edwardi* (now *Heteroptychus edwardi*), no further species have been added since.

This family has never been formally reviewed in South Africa, and there are very few publications covering South African chirostylids. While this study was being done, the Chirostyloidea of the western Indian Ocean was revised by Baba et al. (2024) and these two studies ran concurrently until the latter was published late 2024. Baba et al. (2024) did not have access to South African material, however data on different characters of South African species were provided to them from this study, which they used to compile diagnoses for the respective species. While there is some overlap between these two concurrent studies, they are complementary and are conducted with the same objective of enhancing our knowledge of this poorly known squat lobster fauna. The aim of the present study is to compile a thorough systematic account of the Chirostylidae currently known from South Africa, based on currently accepted nomenclature, and re-describing outdated species, as well as reporting on new distribution records. Given the extensive new literature arising since the last publication on South African chirostylids more than 40 years ago, a revision on the group is long overdue.

# Methods

This study is based on the examination of historical material from numerous expeditions, such as those conducted on the SS *Pieter Faure* and the RV *Meiring Naude* around the South African coast and subsequently housed in Natural History Collections of the Iziko South African Museum, spanning the period 1901 to 1990 and a depth range of 70 – 1200 m. Access to deeper waters is very limited in South Africa, no new specimens were collected from this family during the course of the study. Due to this and the fact that existing material was too old, no genetic analyses were conducted.

Drawings were made using a WILD stereomicroscope equipped with a camera lucida, and digitally traced in Inkscape 1.21 (www.inkscape.com) using a Wacom Intuos Pro Graphics Tablet. Photos were taken using a Nikon D3100 camera and edited with GIMP 2.10.30 software (www.gimp.com). Images credited to TPA Botha, unless stated otherwise. Maps were created using ESRI ArcGIS 3.3.0.

The terminology and measurements used largely follow Baba et al. (2011). Specimen sizes are indicated by the postorbital carapace length (pcl) measured in the midline from the base of the rostrum to the posterior margin of the carapace. The rostrum is measured from the base to the distal tip. Lengths of appendages are measured along the dorsal for pereopod 1 (P1) and lateral for pereopods 2 – 4 (P2 – 4) midlines; breadths are measured at the midlength of antennal article 1 and pereopod 1, at the maximum for the antennal scale and between the dorsal and ventral margins at midlength of P2 – 4 meri; heights are measured at the maximum for the antennular ultimate article. Lengths of sternite 4 anterolateral and posterolateral margins follow Baba (2018). Where applicable ranges of morphological and meristic variations are included in the description, holotype measurements given in parentheses. Abbreviations and symbols used are: ♀ = female; ♂ = male; Mxp3 = maxilliped 3; ovig. = ovigerous; P1= pereopod 1 (cheliped); P2 – 4 = pereopods 2 – 4.

## Systematic account

Superfamily **Chirostyloidea** Ortmann, 1892

Chirostylidae Ortmann, 1892: 244.

Chirostyloidea Schnabel & Ahyong, 2010: 57; Schnabel, Ahyong & Maas, 2011: 10; Macpherson & Baba, 2011: 42; Schnabel, 2020: 28; Poore & Ahyong, 2023: 265.

**Diagnosis:** After Schnabel et al. (2011a) and Poore & Ahyong (2023).

Symmetrical body, carapace with or without transverse striae; rostrum varied, usually prominent; supraocular spines present or absent. Sternal plastron comprised of sternites 3 – 7, thoracic sternite 8 absent. All pleonites sclerotized, articulating. Tailfan transversely divided by joint. Antennal article comprised of 5 articulating articles; acicle present or absent. Mandible cutting edge toothed. Maxilliped 1 with epipod present or absent. P1 symmetrical, elongate, always chelate. Maxilliped 3 and P2 – 4 without epipods. Pereopods 2 – 4 with claw-like dactyli. Ocular scales absent. Gills phyllobranchiate.

**Composition:** Chirostylidae Ortmann, 1892, Eumunididae A. Milne-Edwards & Bouvier, 1900, Kiwaidae Macpherson, Jones & Segonzac, 2005, Sternostylidae Baba, Ahyong & Schnabel, 2018.

**Remarks:** Of the four families, only the Chirostylidae are present in South Africa and is thus the only family addressed herein.

## Family **Chirostylidae** Ortmann, 1892

Chirostylidae Ortmann, 1892: 246; 1898: 1149; Alcock, 1901: 278; van Dam, 1933: 2; Barnard, 1950: 495 ; Balss, 1957: 1594; Davie, 2002: 29; Poore, 2004: 220; Baba et al., 2008: 13; Baba et al., 2009: 7; Schnabel & Ahyong, 2010: 58; Macpherson & Baba, 2011: 48; Baba et al., 2018: 78; Schnabel, 2020: 29; Poore & Ahyong, 2023: 266.

Diptycinés Milne-Edwards & Bouvier, 1894: 296, 312; 1897: 116.

Diptychinae Bouvier, 1896: 312; Milne-Edwards & Bouvier, 1897: 116.

Uroptychidae Alcock, 1901: 236, 278.

**Type genus:** *Chirostylus* Ortmann, 1892, by original designation.

**Diagnosis:** After Schnabel & Ahyong (2010) and Poore & Ahyong (2023).

Carapace with no transverse setiferous striae, surface smooth, tuberculate or spinose, posterior margin not greatly inflated or distinctly defined. Rostrum triangular, spiniform or strongly reduced, supraocular spines absent. Pleonite 2 without prominent anterolaterally directed spine on anterolateral margin. Thoracic sternite 3 not produced anteriorly, distinctly demarcated from preceding sternites 1 and 2 by step that forms well-defined anterior margin at articulation with maxillipeds 3, placing excavated sternum on more dorsal plane. Eyes well-developed. Basal antennular article bearing distolateral spines. Antennal peduncle consisting of 5 articles, with acicle present or absent. Mandible with calcified cutting edge, strongly serrated along its length. Maxilliped 1 with no epipod; exopod flagellum present or absent, not annulated. Mxp3 to P4 each with 2 arthrobranchs (vestigial or well-developed on Mxp3). P5 with only 1 arthrobranch. P2 – 4 with pleurobranch. Male pleopods 1 and 2 present, pleopods 3 – 5 vestigial or absent.

**Genera included:** *Chirostylus*; *Gastroptychus*; *Hapaloptyx*; *Heteroptcyhus*; *Uroptychodes*; *Uroptychus*.

**Remarks:** Four of the six genera, *Chirostylus, Hapaloptyx, Heteroptychus* and *Uroptychus* are recorded in South Africa, of which *Chirostylus* is reported for the first time here.

## Key to species of the family Chirostylidae in South Africa

**1.** Carapace posterolateral margin deeply excavated. Basal region of eyestalk visible in dorsal view by short rostral base. Mxp1 flagellum absent..……..……..… **2 (fig. 2.1A)**

Carapace posterolateral margin weakly or marginally excavated. Basal region of eyestalk not visible in dorsal view, concealed by well-developed rostrum. Mxp1 flagellum present…………………………….……..…………….... **3 (fig. 2.1B)**

**2.** Mandible with incisor margin serrated. P1 elongated, more than 8.0 times carapace length………………..……………..… ***Chirostylus* cf. *dolichopus* (p. 17; fig. 2.1A, E)**

Mandible with incisor margin not dentate. P1 short, slender less than 2.0 times carapace length……………….……..… ***Hapaloptyx difficilis* (p. 24, dubious record; fig. 2.1C)**

**3.** Posterior half of pterygostomian flap very low (posterior height $\leq 0.3$ x anterior height). Sternal plastron ♀ deeply excavated on posterior margin; posterior sternites medially discontinuous due to absence of median calcified part ………………..………………

……………………...……………….……***Heteroptychus edwardi* (p. 26; fig. 2.1F)**

Posterior half of pterygostomian flap rarely low, mostly proportionately high from anterior to posterior. Sternal plastron ♀ not deeply excavated on posterior margin; posterior sternites entirely calcified..……..…………………….….……... **4 (fig. 2.1G)**

**4.** P2 – 4 dactyli penultimate spine prominent, much broader (>1.5 x) than antepenultimate spine……………………….……..… ***Uroptychus undecimspinosus* (p. 47; fig. 2.1H)**

P2 – 4 dactyli penultimate spine not prominent, at most slightly broader than antepenultimate spine..………...…………………….……...…………… **5 (fig. 2.1I)**

**5.** Thoracic sternite 3 anterior margin without pair of submedian spines…………………

…………………….……...…………….…… ***Uroptychus foulisi* (p. 35; fig. 2.1G)**

Thoracic sternite 3 anterior margin with pair of submedian spines..……... **6 (fig. 2.1J)**

**6.** Rostrum short, not reaching base of cornea....….. ***Uroptychus simiae* (p. 42; fig. 2.1D)**

Rostrum well-developed, overreaching cornea ……………………………………..

…………………………….…………..**7 (fig. 2.1B, shown using different species)**

**7.** Thoracic sternite 4 anterolateral margin as long as posterolateral margin…...…..…..

……..… ***Uroptychus remotispinatus* (p. 41; fig. 2.1G, shown using different species)**

Thoracic sternite 4 anterolateral margin distinctly longer than posterolateral margin.….

……….….... ***Uroptychus boucheti* (p. 33; fig. 2.1J, shown using different species)**

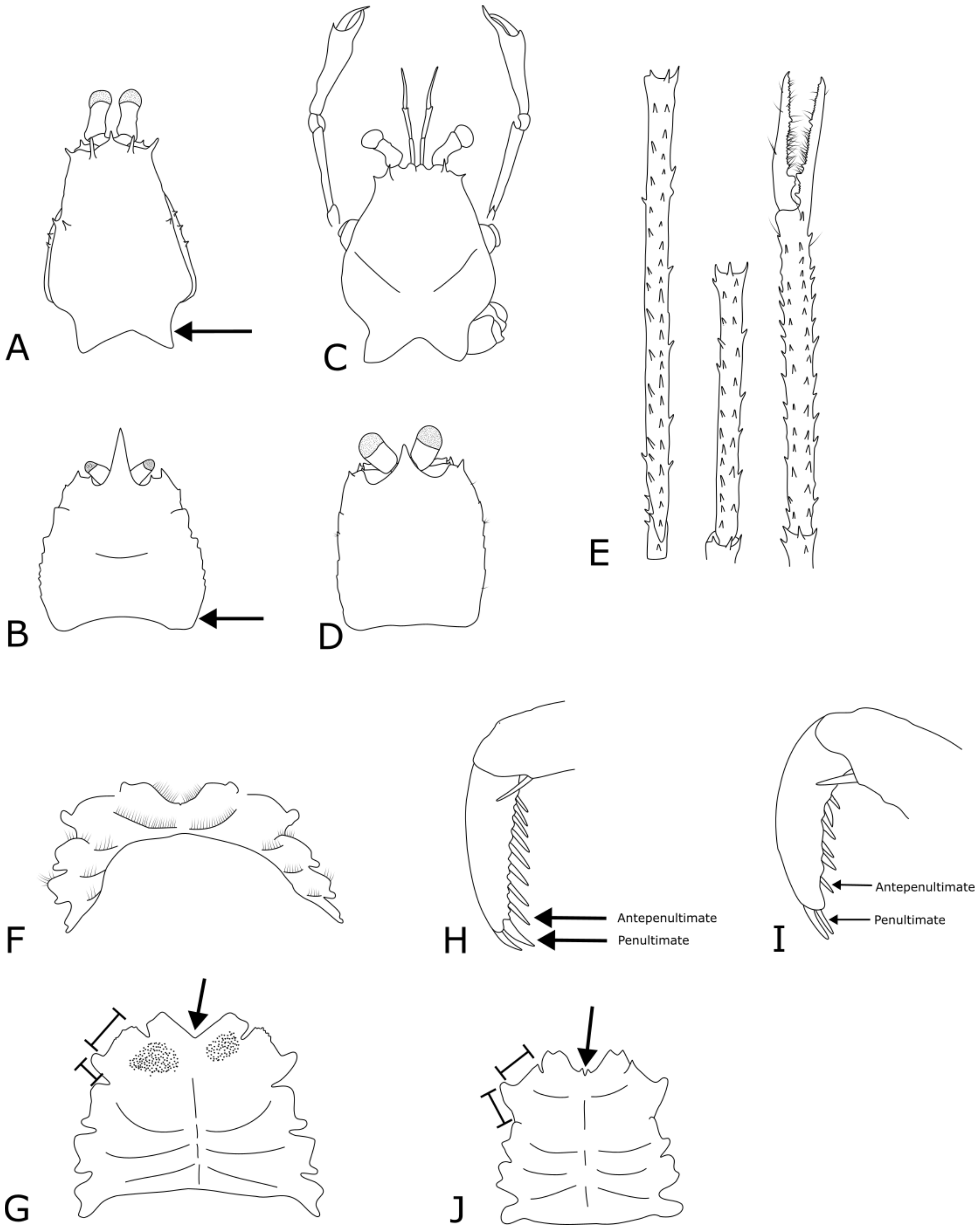
A
C
E
B
D
F
H
Antepenultimate
Penultimate
I
Antepenultimate
Penultimate
G
J

**Figure 2.1:** **A** – *Chirostylus* cf. *dolichopus* carapace, dorsal view, arrow showing deeply excavated posterolateral margin; **B** – *Uroptychus foulisi* carapace, arrow showing a weakly excavated posterolateral margin; **C** – *Hapaloptyx difficilis* adapted after Stebbing (1920), with carapace and P1's; **D** – *Uroptychus simiae* carapace, dorsal view; **E** – *Chirostylus* cf. *dolichopus* Right P1 merus, carpus, palm and fingers, dorsal view (same scale as A); **F** – Sternal plastron of *Heteroptychus edwardi*, ventral view; **G** – Sternal plastron of *Uroptychus foulisi*, ventral view, arrow showing lack of submedian spines; **H** – *Uroptychus undecimspinosus* Left P3 dactylus, lateral view; **I** – *Uroptychus simiae* Left P3 dactylus, ventral view; **J** – Sternal plastron of *Uroptychus simiae,* ventral view, arrow showing pair of submedian spines.

### Genus ***Chirostylus*** Ortmann, 1892 – **NEW RECORD**

*Chirostylus* Ortmann, 1892: 246; Miyake & Baba, 1968; Zariquiey Álvarez, 1968: 261; Osawa and Nishikiori, 1998: 386; Baba, 2005: 15; Baba et al., 2008: 14 (list and synonymies); Baba et al., 2009: 8; Macpherson & Baba, 2011: 48; Schnabel, 2020: 29; Poore & Ahyong, 2023: 268.

**Type species:** *Chirostylus dolichopus* Ortmann, 1892, by monotypy.

**Diagnosis:** After Schnabel (2020) and Poore & Ahyong (2023).

Carapace dorsal surface usually smooth, posterolateral margin strongly excavated. Rostrum (if present), small, spiniform, remote from paired epigastric spines. Thoracic sternite 3 anterior margin concave (rarely), straight or transverse, with row of spines. Pleon without transverse ridges, pleonite 2 with no anterolateral pleural spine. Ocular peduncle elongate, basal article visible in dorsal view. Antennal scale absent; antenna with short flagellum. Maxilliped 1 with no flagellum. P1 – 4 slender, subcylindrical and spinose. P2 – 4 propodi much longer relative to dactyli. G1 and G2 present.

**Remarks:** This genus is reported from South Africa for the first time here, after material in the Natural History Collections of the Iziko South African Museum was examined and ROV footage taken from the iSimangaliso Wetland Park was provided. Currently only one species is present in South Africa.

***Chirostylus* cf. *dolichopus*** Ortmann, 1892 – **NEW RECORD**

**Figures 2.2 – 2.5, 2.18A**

*Chirostylus dolichopus* Ortmann, 1892: 246, plate 11, figures 2, 2b, 2c, 2e, 2i, 20, 12z (Kadsiyama, Sagami Bay (type locality), shallow water); Miyake & Baba, 1968: 381, figures 1b, 2 (Sagami Bay, 63 – 70m) ; Tirmizi & Khan, 1979: 86, figure 6 (Somali Republic & Mozambique Channel, 88 – 140 m); Baba, 1988: 5 (Sulu Archipelago, 35 – 42 m); Ahyong & Baba, 2004: 57 (Timor Sea, Northern Territory, 124 m); Baba, 2005: 16, figures 2, 3a (Mauritius, 73 – 238 m; Baba et al., 2008: 14 (compilation, in part, not figure 1A); Schnabel & Ahyong, 2010: 60, figures 2C, 2I (no record); Okuno & Osawa, 2016: 2, figures 1, 2 (Japan, 30 m); Baba et al., 2018: 80, figure 1A (no record); Schnabel, 2020: 32, figure 8 (Kermadec Islands, 20 – 30 m); Poupin et al., 2022a: 145, figures 8A, C, E (Mayotte, 70 – 80 m); 14B; 2022b: 275, figure 4D (La Réunion, 85 – 97 m); Baba et al., 2024: 19, figures 1A, B, 2A (Glorieuses Islands, Madagascar, Mozambique Channel, 80 – 193 m).

**Material examined:** South Africa, 27°03'36’S; 32°54'30’E, 70 m, 06/06/1990, SAMC-A094557, 1 ♂ 4.0 mm; South Africa, 31°06'24’S; 30°18'00’E, 125 m, 08/07/1985, SAMC-A094558, 1 ♂ 7.9 mm.

**Figure 2.2:** *Chirostylus* cf. *dolichopus* Ortmann, 1892 on an unidentified octocoral, south of Richard’s Bay, South Africa, 98 – 104 m. Photograph by: SeaEye Falcon 12177 during ACEP: Imida Frontiers in 2017.

**Description (of South African specimens):**

*Carapace:* Carapace 1.3 times longer than broad, greatest breadth measured at posterior one-third, 1.8 times distance between anterolateral spines. Dorsal surface smooth, weakly convex from anterior to posterior margin, with weak depression between gastric and cardiac regions; gastric and cardiac region unarmed; anterior extremity of posterior branchial margin armed with 1 spine each side. Rostrum anteriorly rounded, produced to median spine, flanked by well-developed spine each side behind ocular peduncles. Lateral margins divergent posteriorly; anterolateral angle of carapace with well-developed spine, with smaller spine on lateral limit of orbit. Pterygostomian flap anteriorly rounded, surface with row of minute spines on anterior and posterior margin.

*Sternum:* Excavated sternum with 2 subequal spines in midline between Mxp1 bases, 1.2 times longer than wide; surface with longitudinal ridge in midline on posterior sternites; lateral extremities divergent posteriorly. Thoracic sternite 3 surface concave; anterior margin transverse, armed with 7 – 8 spines. Sternite 4 armed with small spine on posterior part of anterolateral margin.

*Pleon:* Pleonites surface smooth. Pleonite 1 narrower laterally, anterior margin rounded medially. Pleonite 2 tergite somewhat rectangular, 2.0 times broader than long, pleuron laterally rounded. Pleura of pleonites 3 and 4 posterolaterally rounded.

*Eye:* Ocular peduncle elongated with somewhat inflated cornea; 1.5 times longer than broad. Cornea slightly more than one-third length of remaining eyestalk.

*Antennule and antenna:* Basal antennular article with well-developed distolateral spine, bearing 2 ventral spines, distomesial margin with broad spine. Antennal basal article short, article 2 with well-developed anterolateral spine; article 5, 3.3 times longer than article 4, barely falling short of distal end of cornea, with well-developed distomesial spine.

*Mxp:* Mxp3 basis with well-developed distomesial spine. Ischium with 19 denticles on crista dentata, flexor margin distally rounded. Merus as long as ischium; flexor margin unarmed, with small distal lobe; extensor margin with distal spine, occasionally with more proximal spine. Carpus with distal spine on extensor margin.

*P1:* Sparsely setose, except fingers with numerous setae on opposable margins; length 10.0 – 10.3 carapace length. Ischium with distodorsal and distoventral spine, with more proximal spine on ventral margin, with single lateral and mesial spine. Merus 3.5 – 3.7 times carapace length with rows of spines along entire dorsal, ventral and mesial margins. Carpus 0.6 – 0.7 times merus length, subcylindrical with row of spines on dorsal, ventral and mesial margins. Palm 12.5 times longer than broad, 1.0 – 1.3 times length of carpus. Fingers gaping in distal two-thirds, distally ending in somewhat incurved spine; movable finger 0.4 times length of palm, opposable margin with blunt proximal process; opposable margin of fixed finger with 3 somewhat sharp proximal processes.

*P2 – 4:* Elongated, slender, with sparse long setae, more setose on dactyli and distal margin of propodi. Meri successively shorter posteriorly (P3 merus 0.9 times P2 merus length, P4 merus 0.9 times P3 merus length); extensor margin with row of sharp spines, flexor margin with row of numerous spines on P2, fewer on P3 – 4; P2 merus 2.7 – 2.9 times carapace length, 1.1 – 1.4 times P2 propodus length; P3 merus 1.3 – 1.4 times P3 propodus length; P4 merus 1.4 times P4 propodus length. Carpi as long as or slightly successively shorter posteriorly (P3 carpus 0.9 – 1.0 times P2 carpus length, P4 carpus as long as P3 carpus); carpus-propodus length ratio 0.6 – 0.7 on P2 – P3, 0.7 – 0.8 on P4; P2 – 4 flexor margin with 3 – 4 spines, extensor margin with row of numerous spines. Propodi shorter successively (P3 propodus 0.8 times P2 propodus length, P4 propodus 0.9 times P3 merus length); P2 propodus 16.9 – 19.1 times longer than proximal height, 19.3 – 21.0 on P3, 17.3 – 20.4 on P4; flexor margin mostly straight with 18 – 19 long, slender, movable spines on P2, 14 – 15 spines on P3 – 4, distal spines closely arranged. Dactyli extensor margin moderately curved; flexor margin nearly straight with 6 – 8 corneous spines gradually decreasing in size towards base of article, P2 penultimate spine subequal breadth to ultimate spine, distinctly broader than ultimate spine on P3 – 4.

**Variation:** Ranges noted in description.

**Coloration (in life, Figure 2.2):** Base colour of carapace and pereopods orange–red; carapace dorsal surface with 3 whitish lines, outermost transverse anteriorly, laterally paralleling lateral margin, second outermost inverse triangle from protogastric region, posteriorly divergent, innermost line inverse triangle originating from cardiac region, posteriorly divergent, preceded by median line running to anterior of second outermost line. Pleon slightly paler. P1 with median white line running along entire length. P2 – 4 meri with median white line, distally with white spot centered on reddish marking.

**Global distribution:** Japan (Type locality), 22 – 70 m. Reported from several coral symbionts such as ‘octocorals’ and colonies of ‘fan-like gorgonians’ (Okuno & Osawa, 2016).

Records from Somali Republic, Mozambique Channel, Mauritius, west and north Australia, Sulu Archipelago (Philippines), Kermadec Islands and now South Africa require confirmation, 35 – 238 m.

**South African distribution:** South of Richard's Bay to off Boteler Point, KwaZulu-Natal, South Africa, 70 – 125 m (Figure 2.16).

**Remarks:** *Chirostylus dolichopus* was reported to have a cosmopolitan distribution in the Indo-West Pacific (Baba et al., 2008), but Okuno & Osawa (2016) suggested that this distribution was likely inaccurate and that re-examination of material outside Japan was required. They argued that *C. dolichopus sensu stricto* is likely restricted to Japan and surrounding areas. Baba et al. (2024) show that there are likely three different species in the Western Indian Ocean (WIO) presenting an unresolved species complex, which the South African material forms part of. The South African specimens (and other WIO material from Poupin, 2022a, b; Baba et al., 2024) differ from material from the type locality, most notably in presence of a rostral spine, absent in the western Pacific material. It is believed that the WIO material differs to the topotypic material (Baba et al., 2024). They and the South African specimens likely represent an undescribed species. To better understand the relationships within this species complex, fresh material is required to enable genetic analyses to aid in resolving this complex and a study is in progress by Baba et al. (in prep). In the interim the name is retained, but given an cf. notation pending resolution.

In South Africa, this species is unmistakable as it has exceptionally long pereopods (cheliped more than eight times carapace length and the second pereopod almost seven times the carapace length), long eyestalks that are visible in dorsal view and a deeply excavated sternum.

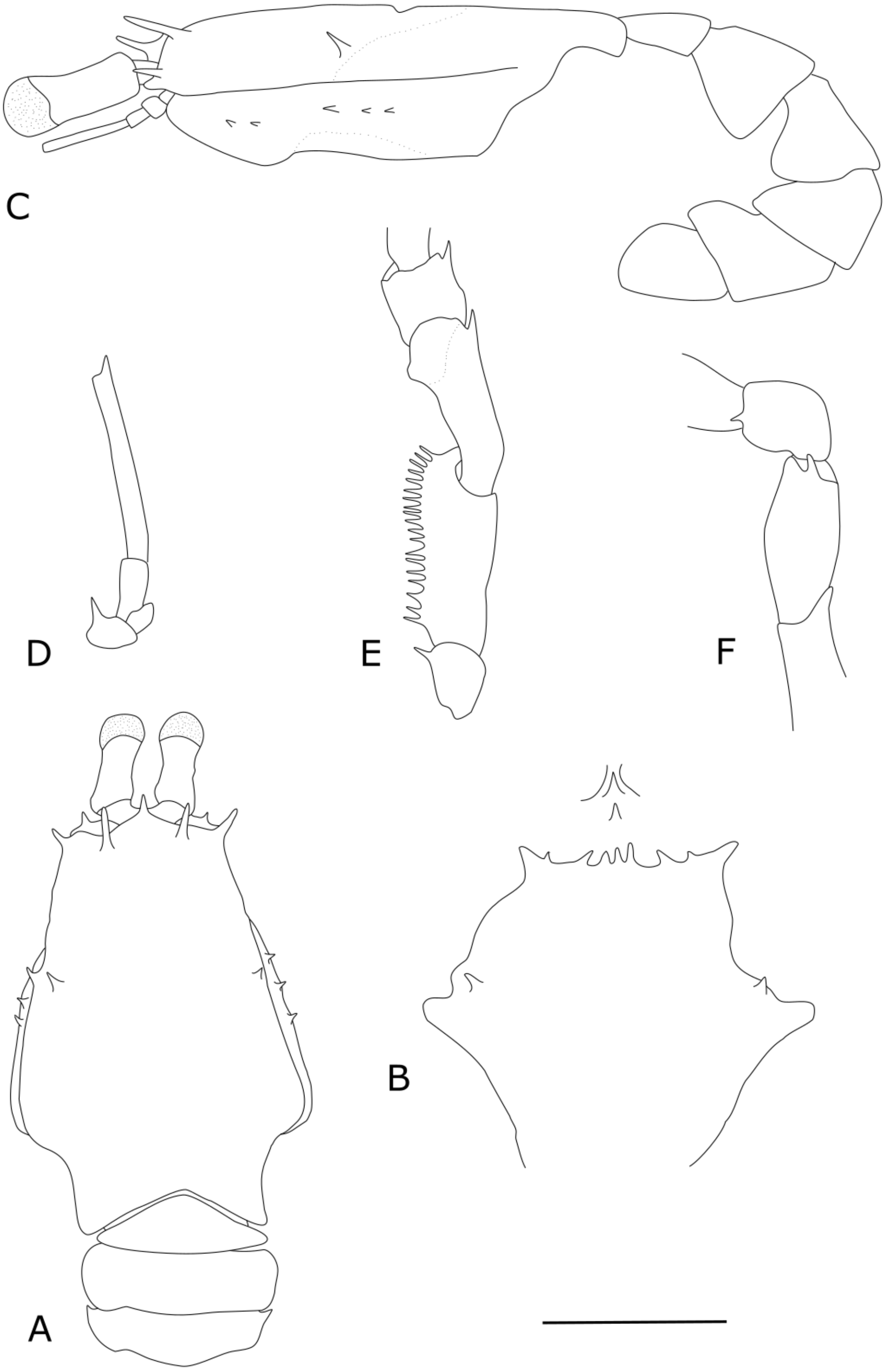

**Figure 2.3:** *Chirostylus* cf. *dolichopus* Ortmann, 1892, ♂, 7.9 mm (SAMC-A094558), off Boteler Point, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Anterior part of sternal plastron, with excavated sternum and basal parts of Mxp1; **C** – Carapace and pleonites, lateral view; **D** – Right antenna, ventral view; **E** – Left Mxp3 (setae omitted), ventral view; **F** – Left Mxp3 (setae omitted), lateral view. Scale bar: A = 4.0 mm; B = 2.0 mm; C = 3.0 mm; D – F = 1.5 mm.

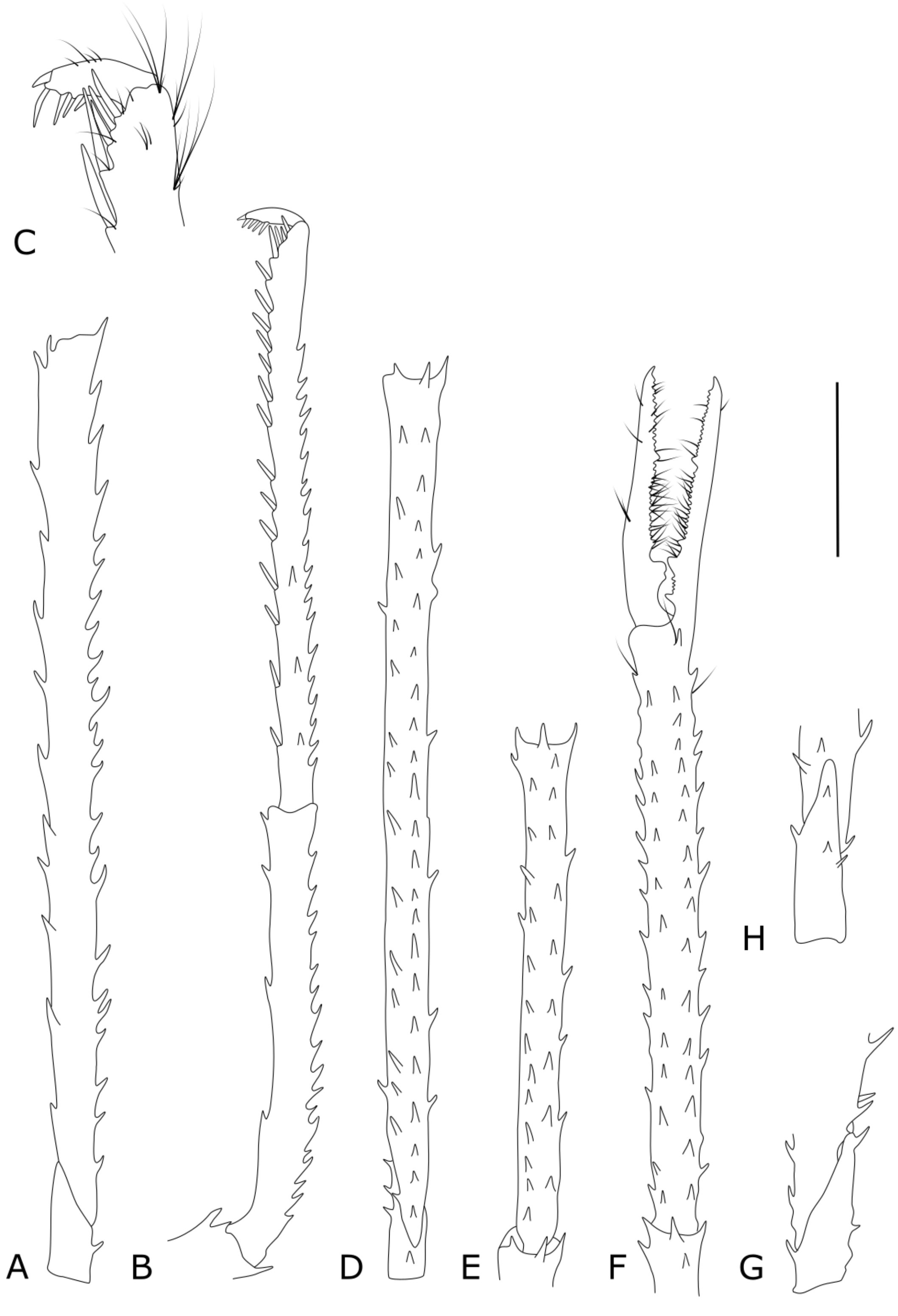

**Figure 2.4:** *Chirostylus* cf. *dolichopus* Ortmann, 1892, ♂, 7.9 mm (SAMC-A094558), off Boteler Point, South Africa. **A** – Left P2 merus, lateral view; **B** – Left P2 carpus, propodus, dactylus, lateral view; **C** – Left P2 dactylus and distal part of propodus, lateral view; **D** – Right P1 merus, dorsal view; **E** – Right P1 carpus, dorsal view; **F** – Right P1 palm and fingers, dorsal view; **G** – Right P1 ischium, lateral view; **H** – Right P1 ischium, ventral view. Scale bar: A, B, G, H = 4.0 mm; C = 2.0 mm; D – F = 6.0 mm.

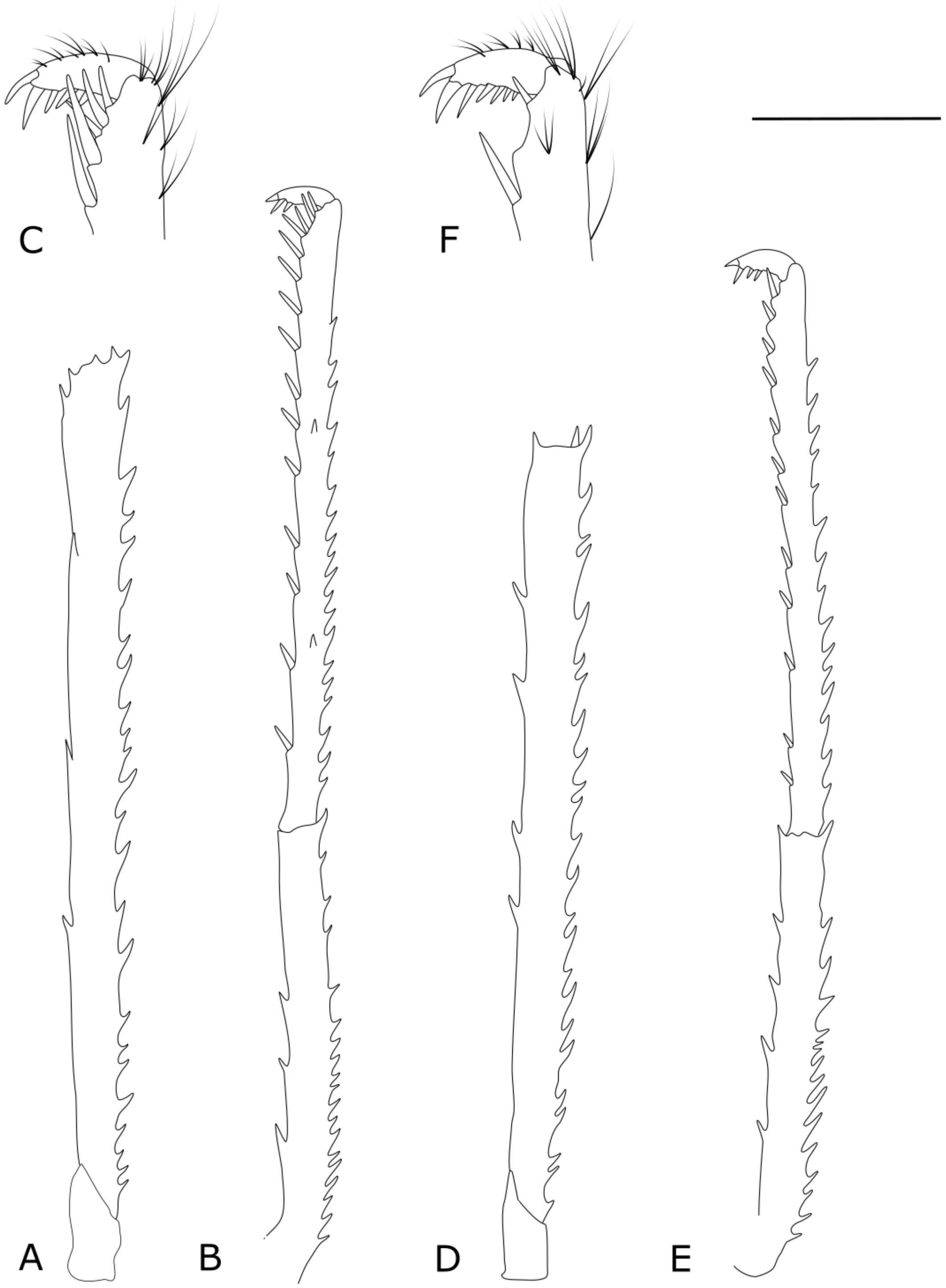

**Figure 2.5:** *Chirostylus* cf. *dolichopus* Ortmann, 1892, ♂, 7.9 mm (SAMC-A094558), off Boteler Point, South Africa. **A** – Left P3 merus, lateral view; **B** – Left P3 carpus, propodus, dactylus, lateral view; **C** – Left P3 dactylus and distal part of propodus, lateral view; **D** – Left P4 merus, lateral view; **E** – Left P4 carpus, propodus, dactylus, lateral view; **F** – Left P4 dactylus and distal part of propodus, lateral view. Scale bar: A, B, D, E = 4.0 mm; C, F = 2.0 mm.

### Genus ***Hapaloptyx*** Stebbing, 1920

*Hapaloptyx* Stebbing, 1920: 263; Barnard, 1950: 496; Baba et al., 2008: 13 (compilation); Macpherson & Baba, 2011: 7; Poore & Ahyong, 2023: 268.

**Type species:** *Hapaloptyx difficilis* Stebbing, 1920, by monotypy. Gender: masculine.

**Diagnosis:** After Poore & Ahyong (2023).

Rostrum consists of a small spine. Carapace dorsal surface smooth; posterolateral margin deeply excavated. Mandibular incisor margin smooth. Mxp1 with no flagellum.

**Remarks:** An endemic genus only known from the original description of one species from South Africa. Although included here, the validity of the description remains questionable, hence the brevity of the diagnosis.

***Hapaloptyx difficilis*** Stebbing, 1920

*Hapaloptyx difficilis* Stebbing, 1920: 263, Crustacea pl. 105 (off Natal, South Africa (type locality, 168 m); Van Dam, 1933: 44 (discussion); Barnard, 1950: 496; Kensley, 1981: 35 (list); Baba, 1988: 4 (discussion); Baba et al., 2008: 13 (list and synonymies).

**Material examined:** None available.

**Holotype** – South Africa, 30°12’33.12’S; 30°52'41.88’E, 168 m, SAMC-A094557, 1 ovig. ♀ 7.0 mm, material lost.

**Description:** See Stebbing (1920).

**General distribution:** South Africa (endemic).

**South African distribution:** Off Scottburgh, South Africa (endemic), 168 m (Figure 2.16).

**Remarks:** Barnard (1950) mentioned that neither the type, nor any of its body parts that were mounted on a slide were still in the Natural History Collections of the Iziko South African Museum. Kensley (1974) mentioned that the type specimen was dried and three slides were made from some of the body parts, but did not confirm whether the material still existed. Upon visiting the Natural History Collections of the Iziko South African Museum and spending several years working there on the marine crustacean collection I can confirm that the type material is not present and should be considered lost. New material is thus required to confirm the validity of the species.

It is plausible that this species is in fact of the genus *Chirostylus* (as suggested by Schnabel & Ahyong, 2010), as the carapace resembles that of members of the genus (especially *Chirostylus* cf. *dolichopus*). Moreover, the rostral, anterolateral and gastric spines depicted are all comparable to that of *C.* cf. *dolichopus*. The walking legs of these two species are also extremely similar in size, shape and spinature. One of the biggest contributing factors to the confusion of this species, is the small, unusual chelipeds depicted with it. Schnabel & Ahyong (2010) pointed these out and stated: "the chelipeds more closely resemble those of some majoid crabs than chirostylids, and we suspect that either the type account is inaccurate or that more than one species may comprise the type material". Attempts were made to retrieve the catch log from the same station to see whether a majoid crab perhaps was present, though unfortunately these attempts were unsuccessful. When one considers the original description Stebbing (1920) does not sound completely confident that the type material comprises only a single species, as he says: "If the detached limbs are correctly allocated (as suggested by the bases of four pairs, these bases being still in attachment to the body) the chelipeds are rather short and slender….". However, in consultation with several experts it is agreed that the species is maintained for now and more specimens are required to resolve the status of *H. difficilis*, though this account may provide some insight into this 100-year-old quandary.

### Genus ***Heteroptychus*** Baba, 2018

*Heteroptychus* Baba, 2018: 570; Schnabel, 2020: 39; Poore & Ahyong, 2023: 268.

**Type species:** *Heteroptychus scambus* Benedict, 1902.

**Diagnosis:** After Baba (2018).

Carapace dorsal surface smooth, glabrous, much broader than long, lateral margin with only anterolateral spine, rarely with 1 or 2 processes on branchial region. Rostrum broadly or narrowly triangular. Eyestalk basal article visible in dorsal view. Pterygostomian flap posterior half height 0.1 – 0.3 times that of anterior half. Sternal plastron different between sexes, posterior margin strongly excavated in females, median parts of sternite 5 – 7 absorbed into sternite 4 (left and right parts of sternites 5 – 7 discontinuous, interrupted by loss of median parts). Antennal scale articulated or fused with article 2, not reaching article 4 distal end, articles 4 and 5 unarmed. P1 ischium with lobe-like or spiniform anterior dorsal process, posterior process usually lobe-like (rarely obsolescent). P4 short, especially carpus, 0.3 – 0.5 times length of P3 carpus. Distal two articles of P2 – 4 with long prehensile margins thickly fringed with setae, dactyli flexor margin with perpendicular slender spines. G1 and G2 present.

**Remarks:** A recently erected genus established by Baba (2018) based on females with a strongly excavated posterior margin of the sternal plastron with sternites 5 – 7 medially discontinuous; the pterygostomian flap with very low posterior half (posterior height at most 0.3 times anterior height, but usually lower); short P4 carpus, at most half as long as the P3 carpus (subequal or slightly shorter in *Uroptychus* specimens). Of the 11 species known, only one is found in South Africa.

***Heteroptychus edwardi*** (Kensley, 1981)

**Figures 2.6 – 2.8, 2.18B**

*Uroptychus edwardi* Kensley, 1981: 69, figures 6, 7 (east of Port Edward, South Africa (type locality), 900 m).

*Uroptychus scambus* – Baba, 1988: 43 (synonymy).

*Heteroptychus edwardi* – Baba, 2018: 71 (key); Baba, et al., 2024: 39, figure 15 (key, diagnosis).

**Material examined:**

**Holotype** – South Africa, 31°0'S; 30°27.2'E, 900 m, 12/05/1977, SAMC-A016033, 1 ovig. ♀ 5.0 mm.

**Description:**

*Carapace:* Carapace 0.7 as long as broad, greatest breadth measured at posterior third, 3.4 times distance between anterolateral spines. Dorsal surface smooth, slightly convex from anterior to posterior, smooth along entire margin. Lateral margin strongly convex posteriorly, smooth along entire length, anterolateral spine prominent, directed forward, slightly upcurved, overreaching midlength of rostrum. Rostrum distally narrow, triangular, 1.2 times as long as broad, 0.3 times that of remaining carapace length, barely overreaching cornea, strongly upcurved; dorsal surface rounded. Lateral limit of orbit rounded, unarmed. Pterygostomian flap low on posterior half (posterior height half that of anterior height), anteriorly produced to well-developed spine; anterior surface somewhat inflated (convex from dorsal to ventral).

*Sternum:* Excavated sternum bluntly produced anteriorly, anterior half surface with sharp ridge in midline between Mxp1 bases. Sternal plastron about half as long as broad, lateral extremities convexly divergent posteriorly; sternite 3 anterior margin deeply excavated in semicircular shape, with small median notch; broadest at sternite 6.

*Pleon:* Surface smooth and polished. Dorsal surface of pleonite 1 convex from anterior to posterior. Pleonite 2 tergite 2.8 times broader than long; pleuron lateral margin slightly concave, strongly divergent posteriorly, terminating in blunt tip. Pleura of pleonites 3 – 4 narrowed laterally, ending in blunt tip. Telson 0.4 as long as broad, posterior margin of posterior plate straight, length 1.3 times anterior plate length.

*Eye:* Ocular peduncle as long as broad, subovate. Corneas short, 0.3 times that of remaining eyestalk.

*Antennule and antenna:* Ultimate antennular article 3.2 times longer than high. Antennal article 2 fused with antennal scale. Antennal scale triangular, narrow, barely reaching midlength of article 4, unarmed. Articles 3 – 5 unarmed; article 5, 1.3 times longer than article 4, breadth half height of ultimate antennular article. Flagellum of 10 – 11 segments.

*Mxp:* Mxp1 with bases broadly separated. Mxp3 basis ridged on mesial margin, unarmed. Ischium short, 0.5 times merus length, crista dentata without denticles, flexor margin not rounded distally. Merus unarmed, distomesially slightly rounded. Carpus unarmed.

*P1:* Smooth and glabrous, with sparse, fine setae, fingers more setose than remaining articles; length 7.6 times carapace length. Ischium with blunt distodorsal process and lobe-like proximal process, otherwise unarmed, ventrally elongated, narrowed. Merus 1.6 times carapace length, with broad distodorsal spine. Carpus with 2 broad distodorsal spines, with mesial process at midlength and another distally, 1.5 times merus length. Palm 5.2 times longer than broad, 0.8 times length of carpus, mesial margin weakly ridged, proximally narrowed. Fingers directed anterolaterally, proximal half gaping, distal half closed, relatively slender, spooned distally; movable finger 0.5 times length of palm; opposable margin with blunt process at midlength of gape, distal to opposite truncate process on fixed finger.

*P2 – 4:* Setose on flexor margins of propodi and dactyli, with some sparse setae on other articles. Meri successively shorter posteriorly (P3 merus 0.9 times length of P2 merus, P4 merus 0.5 times length of P3 merus); length:breadth ratio 6.0 on P2, 5.8 on P3, 3.4 on P4; P2 merus as long as carapace, 1.2 times longer than P2 propodus, P3 merus 1.1 times longer than P3 propodus, P4 merus 0.8 times longer than P4 propodus; unarmed. Carpi successively shorter posteriorly (P3 carpus 0.9 times P2 carpus length, P4 carpus 0.5 times P3 carpus); carpus:dactylus length ratio 1.3 on P2 – 3, 0.6 on P4; unarmed. Propodi subequal on P2 and P3, P4 propodi 0.7 times P3 propodus length; propodus:dactylus length ratio 1.4 – 1.5 on P2 and P3, subequal on P4; flexor margin concave, curving in lateral view; unarmed. Dactyli subequal on P2 and P3, P4 dactylus 0.9 times P3 dactylus length; dactylus:carpus ratio 0.7 on P2 and P3, 1.8 on P4; flexor margin with row of 11 – 14 small, sharp subequal spines (some broken), perpendicular to margin; ultimate larger than penultimate.

*Eggs:* Number of eggs, 31, size, each 1.3 x 1.6 mm.

**Variation:** N/A.

**Coloration:** Live coloration unknown.

**Global distribution:** South Africa (endemic).

**South African distribution:** East of Port Edward, 900 m (Figure 2.16).

**Remarks:** Kensley (1981) described this species withing the genus *Uroptychus*, based on the spiciform rostrum, which he believed to be diagnostic. A few years later, Baba (1988) synonymised the species with *U. scambus* (Benedict, 1902), as he believed the rostrum was a subject of variation observed in his material and that the description is not justified. However, some 30 years later Baba (2018) resurrected *edwardi* and moved it to the genus *Heteroptychus*. This validation of the species was made on the basis of the spiciform rostrum overreaching the eyes, the anterolateral spine reaching the tip of the eye and the frontal margin that is somewhat sinuous between the rostrum and anterolateral spine. Baba (1988, 2018) highlighted the brevity of the original description of *H. edwardi* and suggested that a redescription was required, which is provided herein. Characters provided that were not shown in the original description includes the upcurved anterolateral carapace spine, the rounded orbital angle and the tooth-like projection on the excavated sternum anterior margin.

In South Africa, this species can easily be distinguished from other chirostyloids by the posterior half of pterygostomian flap that is very low (posterior height ≤ 0.3 x anterior height), the smooth dorsal carapace surface and the sexually dimorphic sternal plastron that is deeply excavated on posterior margin in females.

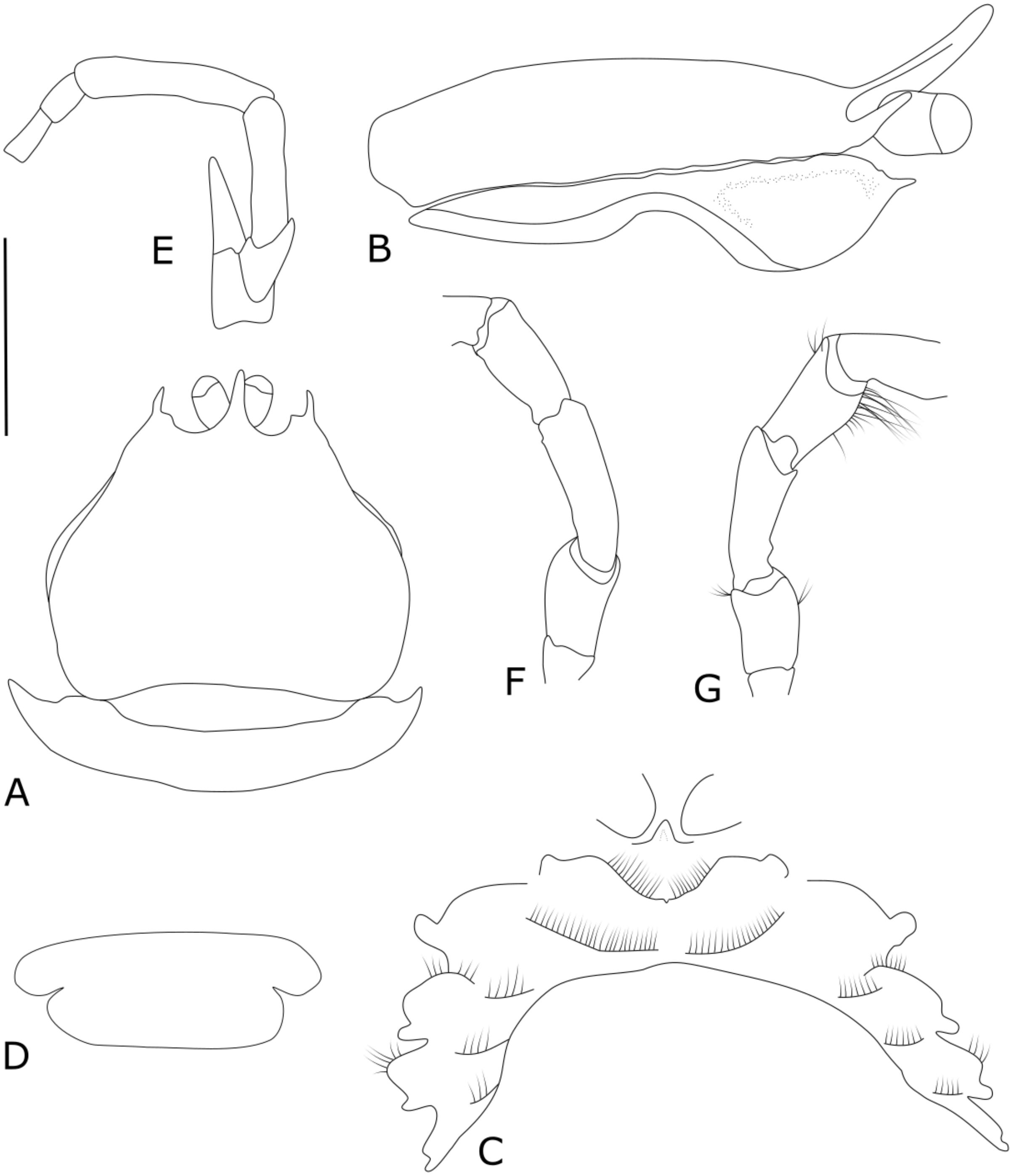

**Figure 2.6:** *Heteroptychus edwardi* (Kensley, 1981), holotype, ♀, 5.0 mm (SAMC-A016033), East of Port Edward, South Africa. **A** – Carapace and anterior part of pleon, dorsal view; **B** – Carapace, lateral view; **C** – Sternum, ventral view; **D** – Telson; **E** – Antenna, ventral view; **F** – Mxp3 (setae omitted), lateral view; **G** – Mxp3, ventral view. Scale bar: A = 4.0 mm; B – D, F, G = 2.0 mm; E = 1.0 mm.

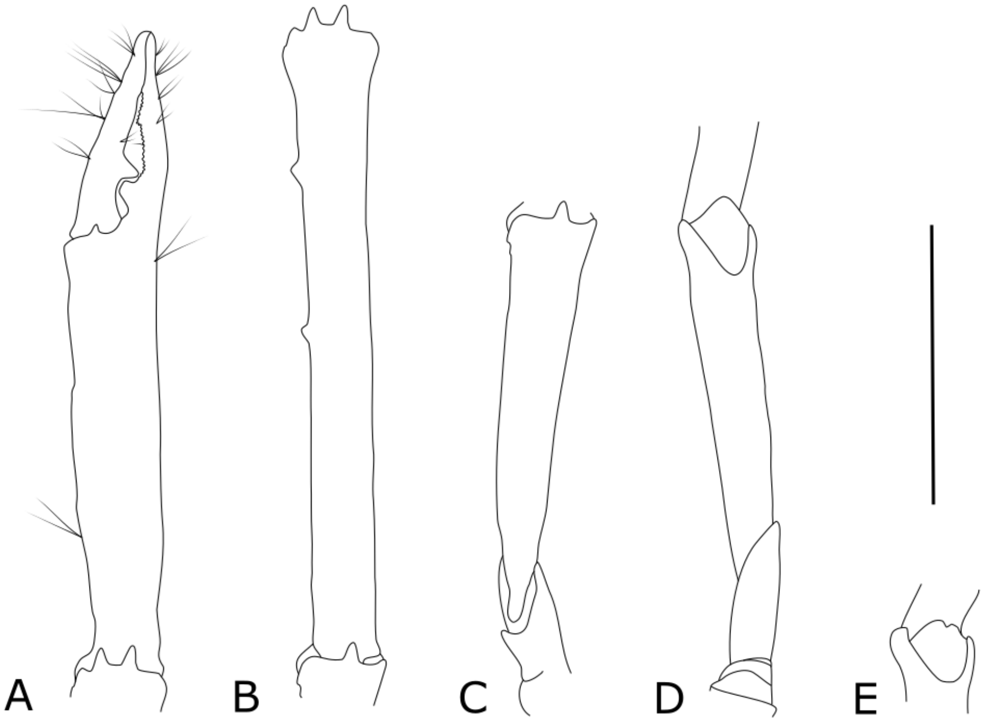

**Figure 2.7:** *Heteroptychus edwardi* (Kensley, 1981), holotype, ♀, 5.0 mm (SAMC-A016033), East of Port Edward, South Africa. **A** – Right P1 palm and fingers, dorsal view; **B** – Right P1 carpus, dorsal view; **C** – Right P1 ischium and merus, dorsal view; **D** – Right P1 ischium and merus, ventral view; **E** – Distal portion of right P1 carpus, ventral view. Scale bar: A – E = 5.0 mm.

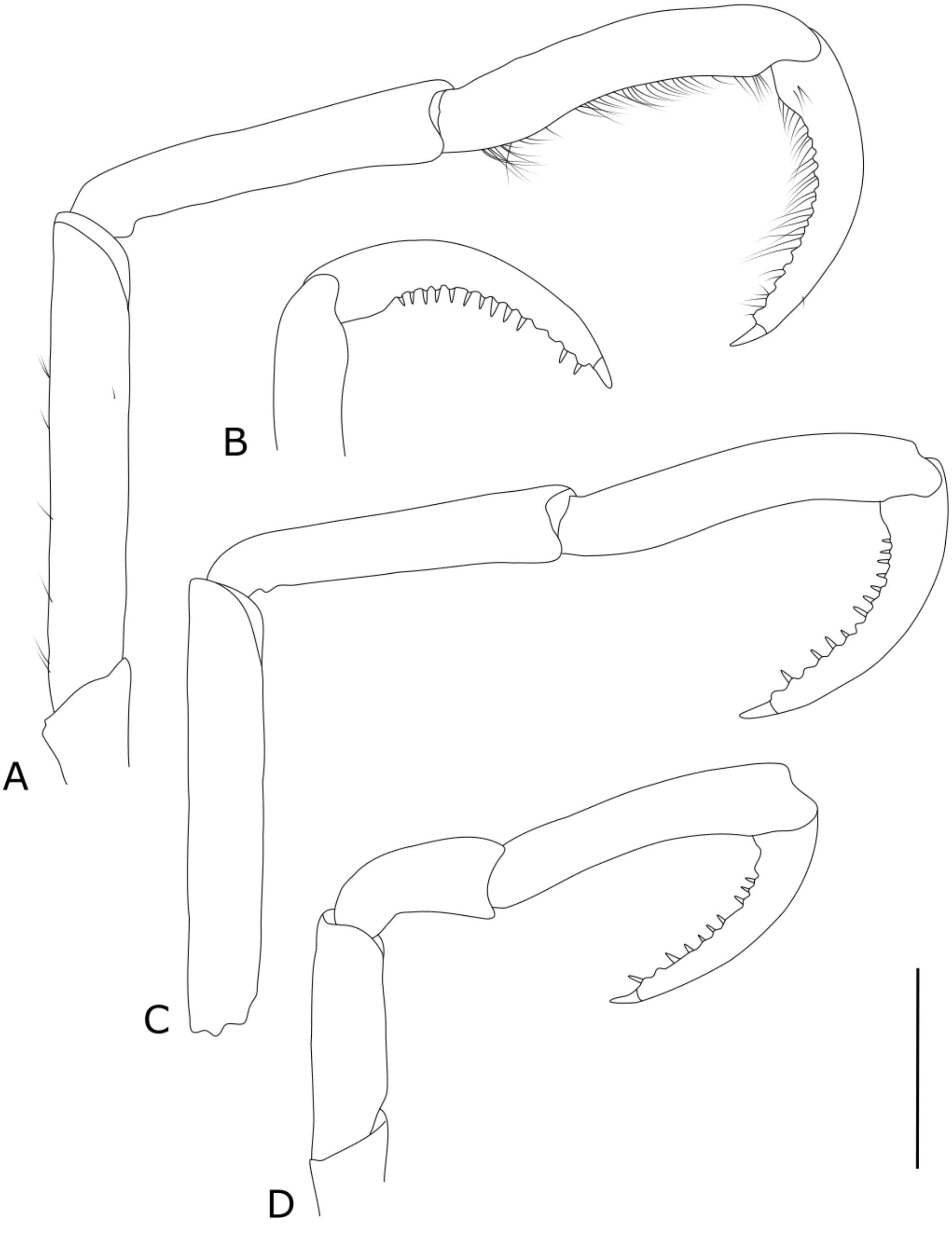

**Figure 2.8:** *Heteroptychus edwardi* (Kensley, 1981), holotype, ♀, 5.0 mm (SAMC-A016033), East of Port Edward, South Africa. **A** – Right P2, lateral view; **B** – Right P2 dactylus (setae omitted), lateral view; **C** – Right P3 (setae omitted), lateral view; **D** – Right P4 (setae omitted), lateral view. Scale bar: A – D = 2.0 mm.

### Genus ***Uroptychus*** Henderson, 1888

*Diptychus* A. Milne-Edwards, 1880: 61 (junior homonym of *Diptychus* Steindachner, 1866; Pisces); A. Milne-Edwards & Bouvier, 1897: 123.

*Uroptychus* Henderson 1888: 173 (gender: masculine), replacement name for *Diptychus* A. Milne- Edwards, 1880; Alcock, 1901: 281; Stebbing, 1910: 365; van Dam, 1933: 18; Chace, 1942: 9; Barnard, 1950: 495; Zariquiey Álvarez, 1968: 262; Baba, 1988: 17; Ahyong & Poore, 2004: 12; Poore, 2004: 220; Baba, 2005: 27; Baba et al., 2008: 27 (compilation); Baba et al., 2009: 32; Macpherson & Baba, 2011: 49; Baba, 2018: 19; Schnabel, 2020: 54; Poore & Ahyong, 2023: 268.

**Type species:** *Diptychus nitidus* A. Milne-Edwards, 1880.

**Diagnosis:** After Baba (2018).

Carapace dorsal surface smooth, granulose, with scale-like ridges or spines, lateral margin smooth or spinose with distinct anterolateral spine, rarely obsolete. Rostrum broadly or narrowly triangular, flattish, laterally unarmed or with small spines. Lateral limit of orbit acuminate, rounded or bearing small spine. Pterygostomian flap proportionately high from anterior half to posterior, rarely very low on posterior half. Sternal plastron anterior margin distinctly concave, unarmed or with submedian spines and median notch or sinus. Excavated sternum terminating anteriorly between Mxp1 bases, with or without median spine or ridge. Antennal scale articulated with, or fused with, article 2, flagellum medium length, anteriorly directed, never reaching end of P1. Left and right Mxp3 bases broadly separated, distal parts fitting into excavated sternum when folded. P1 unarmed or spinose, ischium with distodorsal spine. P2 – 4 spines on dactyli flexor margin of various sizes and arrangements, P4 carpus subequal to or fairly shorter than or rarely longer than P4 carpus.

**Remarks:** This is by far the largest genus within the Chirostylidae with 287 species globally, of which over 100 are described in Baba (2018) alone. In South Africa only five species are recorded.

***Uroptychus boucheti*** Baba, Corbari & Macpherson, 2024

**Figure 2.18C**

*Uroptychus gracilimanus* – Doflein & Balss, 1913: 135 (part, 1 ovigerous female 8.0 mm, MZS 349 from Valdivia Stn 250 (= *Uroptychus boucheti*, not *U. gracilimanus* (Henderson, 1885)).

*Uroptychus gracilimanus* – Baba, 1990: 941, figure 8b (not *U. gracilimanus* (Henderson, 1885)).

*Uroptychus australis indicus* – Tirmizi, 1964: 394 (not *U. indicus* Alcock, 1901).

*Uroptychus nitidus* – Barnard, 1950: 495, figure 92g – i (Durban, East London, 146 – 805 m); Kensley, 1977: 167, figure 4 (northeast South Africa, 560 – 1200 m); Kensley, 1981: 60 (south of Durban, 625 – 900 m).

*Uroptychus boucheti* Baba et al., 2024: 72, figures 30B, 36, 37 (eastern South Africa (off Durban), southern Mozambique (type locality), southern and western Madagascar, Comoro Islands, Zanzibar and southern Somali Republic, 464 – 1668 m).

**Material examined:** South Africa, 28°21.0'S; 32°34.0'E, 775 – 825 m, 28/05/1975, SAMC-A015303, 23 ♂ 4.9 – 7.9 mm, 12 ovig. ♀ 5.7 – 10.0 mm, 22 ♀ 6.1 – 7.1 mm; South Africa, 30°15'32.0'S; 30°57'34.9'E, 805 m, 04/04/1901, SAMC-A0908, 2 ♂ 7.4 – 10.7 mm, 5 ovig. ♀ 8.1 – 10.0 mm, 3 ♀ 7.9 – 9.5 mm; South Africa, 28°21.0'S; 32°34.0'E, 722 – 768 m, 29/05/1975, SAMC-A015308, 2 ♀ 5.7 – 6.0 mm; South Africa, 30°32'12.0'S; 30°52'48.0'E, 625 – 900 m, 10/05/1977, SAMC-A094530, 1 ♀ 9.2 mm.

**Description:** See Baba et al. (2024).

**Variation:** Some females with unequal P1's (left P1 longer and much broader than right P1). Anterolateral spines directed slightly inward, not straight forward. Sternite 3 anterior margin notch occasionally wider than depicted in description. Sternite 4 occasionally with spine proximal to anterolaterally produced spine. Pleonite 2 tergite 2.2 times broader than long, slightly less than described 2.3 – 2.5. P1 length to carapace ratio 5.1 – 5.6 for males and 4.1 – 5.1 for females, unlike the described 4.8 – 5.2 for males and 4.7 – 5.1 for females.

**Coloration:** After Baba et al. (2024).

Mostly pale orange-red, paler on posterior half of carapace, pleonites and distal portions of P1 – 4 meri, carpi and propodi.

**Global distribution:** Comoro Islands, Madagascar, Mozambique (type locality), South Africa, Zanzibar and Somali Republic, 464 – 1668 m.

**South African distribution:** East London to Boteler Point, 625 – 900 m (Figure 2.17).

**Remarks:** It is herein confirmed that the South African material reported under *U. nitidus* collected by the Meiring Naude cruise represent the species *U. boucheti* as described by Baba et al. (2024). This is the most common chirostylid found around the South African coast, often collected in great abundances, exceeding 90 specimens in a single sampling event. Despite its abundance, it has been misidentified for over 70 years as *U. nitidus,* as *U. nitidus* exclusively occurs in the western Atlantic. This new species is clearly distinct from *U. nitidus* as the terminal spine of P2 – 4 propodi is single and not paired, as is typical of *U. nitidus*. This species is closely related to *Uroptychus proto* Baba, Corbari & Macpherson, 2024*,* another recently-described species, though can be differentiated based on P2 – 4 breadth, (more slender in *Uroptychus boucheti*); a pterygostomian flap anteriorly that is acuminate or rarely with a small spine, not produced to distinct spine; an antepenultimate spine of P3 and P4 dactyli that is equidistant from the penultimate and preantepenultimate instead of more remote from the penultimate spine. In South Africa *Uroptychus boucheti* is superficially similar to *U. remotispinatus*, however the distalmost of flexor marginal spines of P2 – 4 propodi adjacent to the juncture with the dactylus and not considerably remote from it as in *U. remotispinatus.* Lastly, the fourth thoracic sternite anterolateral margin is distinctly longer than the posterolateral margin.

This species was collected on some *Thouarella* spp. and other primnoids, a common host for species of the genus, as well as with other crustaceans *U. foulisi* and *Lithodes murrayi* Henderson, 1888.

***Uroptychus foulisi*** Kensley, 1977

**Figures 2.9 – 2.11, 2.18D**

*Uroptychus foulisi* Kensley, 1977: 168, figure 5 (off Richard's Bay, South Africa (type locality), 1000 – 1200 m); Baba, 2005: 226 (key and synonymies); Baba et al., 2008: 32 (list and synonymies); Baba, 2018: 32 (key); Baba et al., 2024: 105, figure 55 (key, diagnosis).

**Material examined:**

**Holotype** – South Africa, 28°37.8'S; 32°38.4'E, 1000 – 1200 m, 25/05/1976, SAMC-A015336, 1 ♂ 5.5 mm.

**Paratype** – South Africa, 28°37.8'S; 32°38.4'E, 1000 – 1200 m, 25/05/1976, SAMC-A095303, 1 ovig. ♀ 5.8 mm.

**Description:**

*Carapace:* Covered in long, fine setae; (1.2) – 1.3 times wider than long; greatest width 1.9 x distance between anterolateral spines. Dorsal surface smooth, unarmed; lateral margin strongly convex, anterolateral spine well-developed, directed forward, at same level as orbital spine, but overreaching; well-developed ridge-like tubercles originating at anterior quarter, followed by several diminishing tubercles. Rostrum somewhat narrowly triangular, length 1.5 times width, 0.4 times that of remaining carapace, width less than half distance between anterolateral spines, 0.2 times carapace breadth measured at posterior carapace margin; dorsal surface flattish. Pterygostomian flap anterior margin roundish, ending in small spine; anterior height same as posterior height.

*Sternum:* Excavated sternum with blunt ridge between Mxp1 bases. Sternal plastron 1.4 times wider than long, lateral extremities weakly divergent posteriorly. Sternite 3 bluntly produced anterolaterally, anterior margin strongly V-shaped, no median notch present. Sternite 4 anterolaterally blunt, ridged, posterolateral margin slightly more than half length of anterolateral margin. Sternite 5 anterolateral margin slightly longer than sternite 4 posterolateral margin.

*Pleon:* Surface smooth, glabrous. Pleonite 2, 3.3 times wider than long; lateral margins concave, weakly divergent posteriorly. Pleura of pleonites 3 – 5 tapering laterally to blunt tip. Telson 2.8 times wider than long; posterior plate with posterior margin slightly emarginate, as long as anterior plate.

*Eye:* Somewhat short, stout (1.2) – 1.4 times longer than broad, reaching just over half length of rostrum, distinctly broader proximally than distally, greatest breadth 1.7 times that of cornea, lateral margin weakly convex. Cornea slightly shorter than half length of remaining eyestalk.

*Antennule and antenna:* Ultimate antennular article 3.2 – (3.4) times longer than high. Antennal peduncle overreaching cornea. Article 2 unarmed, rounded anterolaterally. Article 3 produced anteromesially. Article 4 with 2 minute spines distomesially. Article 5, 1.8 times longer than article 4, breadth 0.8 times height of ultimate antennular article, unarmed. Antennal scale overreaching article 4, slightly broader than article 5 with thick plumose setae.

*Mxp:* Mxp1 with bases separated. Mxp3 basis with 2 – (3) denticles on mesial margin. Ischium with (29) – 35 denticles on crista dentata; flexor margin unarmed. Merus 1.6 times longer than ischium, flattish, with 1 – 2 small spines on flexor margin. Carpus – dactylus unarmed.

*P1:* Elongate, 5.0 times longer than carapace (female 4.3 times longer than carapace) with long, finely plumose setae. Ischium with strong distal spines on dorsal and ventral margins. Merus granulate dorsally with several striae dorsally and some eminences on lateral and mesial margins each with well-developed distal spine; length 1.0 – (1.2) times that of carapace. Carpus also granulate, 1.0 – (1.1) times longer than merus, with several minute spines distally; some eminences on lateral and mesial margin. Palm somewhat elongate, 3.1 – (3.4) times longer than broad, lateral and mesial margins subparallel, dorsal surface smooth, weak eminences on mesial margin, length subequal to that of carpus, slightly longer in females. Fingers slightly curving ventrally, distally curving inwards, crossing when closed; movable finger with proximal process barely fitting into narrow longitudinal groove on opposite finger when closed, length (0.4) – 0.5 that of palm.

*P2 – 4:* Slender, subcylindrical on merus, carpus – dactylus mesio-laterally compressed, with long, fine plumose setae, surfaces somewhat granulate. Meri shorter successively (P3 merus 0.9 times length of P2 merus, P4 merus 0.8 times length of P3 merus); P2 – 4 meri equally broad; length:breadth ratio 5.9 – (6.2) on P2, 5.3 on P3, 4.3 on P4; P2 merus as long as carapace, 1.2 times longer than P2 propodus; P3 merus (1.1) – 1.3 times longer than P3 propodus, P4 merus (0.9) – 1.0 times length of P4 propodus; flexor margin with small distal spine, extensor margin with several eminences. Carpi subequal in length on P2 and P3 or successively shorter marginally shorter (P3 carpus (0.9) – 1.0 times length of P2 carpus, P4 carpus 0.8 times length of P3 carpus); carpus:propodus length ratio 0.6 – (0.7) on P2, 0.6 – (0.7) on P3, 0.5 – (0.6) on P4; unarmed, several eminences on extensor margin. Propodi subequal or successively slightly shorter; flexor margin straight, subparallel to extensor margin, with 5 – 7 spines, terminal spine paired. Dactyli distinctly shorter than carpi (dactylus:carpus ratio 0.7 on P2, 0.7 – (0.8) on P3, (0.7) – 0.9 on P4; dactylus-propodus ratio 0.4 – (0.5) on P2, P3, 0.4 on P4; flexor margin curved ending in strong spine, preceded by 6 – 7 elongate spines diminishing towards base of article, perpendicular to margin, ultimate and penultimate spine equal distance apart as penultimate and antepenultimate, ultimate spine longer than penultimate.

*Eggs:* Number of eggs carried, about 50; size, 1.0 mm x 1.3 mm.

**Variation:** Ranges noted in description.

**Coloration:** Unknown.

**Global distribution:** South Africa (endemic).

**South African distribution:** Northeast of Richards Bay, KwaZulu-Natal, 1000 – 1200 m (Figure 2.17).

**Remarks:** This species is only known from the original description, with no new specimens collected in the last 50 years. The original description is quite brief and several important characters were not reported on, such as the spination of the P2 – 4 propodi. As shown in Figure 2.11D, the terminal spine on the propodi flexor margin is paired. This redescription is also augmented with size ranges and relative sizes of segments, which was not reported in the original description. There are a number of similarities between this species and *U. insignis*, such as a ridged lateral margin, a V-shaped notch medially on the third sternite anterior margin, paired terminal spines on P2 – 4 propodi flexor margin and oblique and well-developed, evenly-spaced spines on P2 – 4 dactyli flexor margin. These species can, however, be differentiated as *U. foulisi* carapace dorsal surface is unarmed, instead of a row of epigastric spines; it also has a pterygostomian flap with smooth surface and not granulose or bearing small spines; it also has eyes overreaching the rostrum midlength and does not terminate in the proximal one-third of the rostrum; the antennal scale is quite short and does not reach the midlength of the fifth antennal article (instead of reaching or overreaching the distal end of the fifth antennal article); the chelipeds are long and elongated, 5.0 times the carapace length (4.3 times in females), instead of 3.0 – 4.1 in males and 3.0 – 3.8 in females (Ahyong et al., 2015).

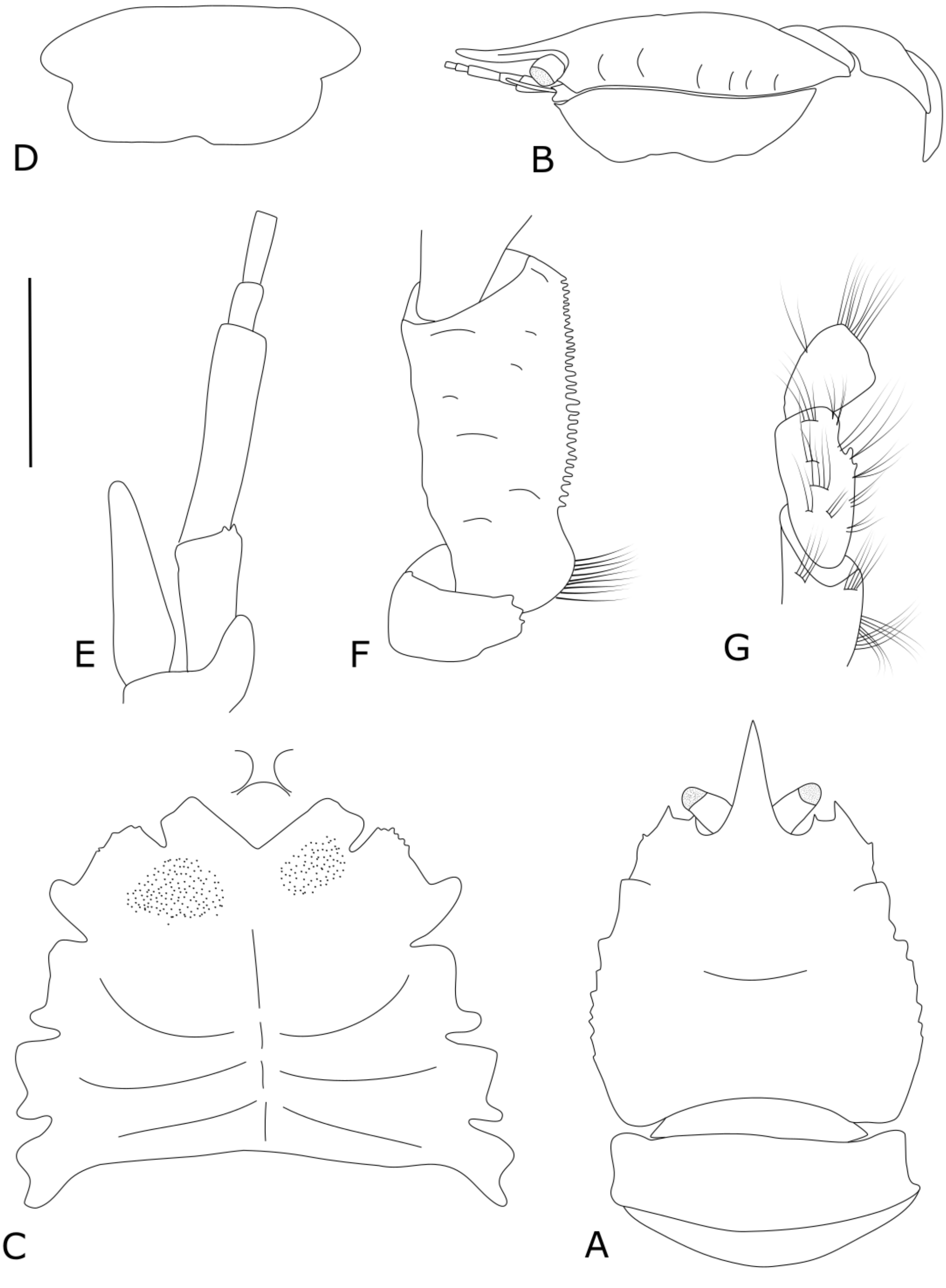

**Figure 2.9:** *Uroptychus foulisi* Kensley, 1977, holotype, ♂, 5.5 mm (SAMC-A015336), northeast of Richard's Bay, South Africa. **A** – Carapace and anterior pleonites (setae omitted), dorsal view; **B** – Carapace and anterior pleonites (setae omitted), lateral view; **C** – Sternal plastron, ventral view; **D** – Telson; **E** – Right antenna (setae omitted), ventral view; **F** – Right Mxp3 ischium, ventral view; **G** – Right Mxp3 ischium, merus and carpus, lateral view. Scale bar: A, B = 4 mm, C, D, G = 2 mm, E, F = 1 mm.

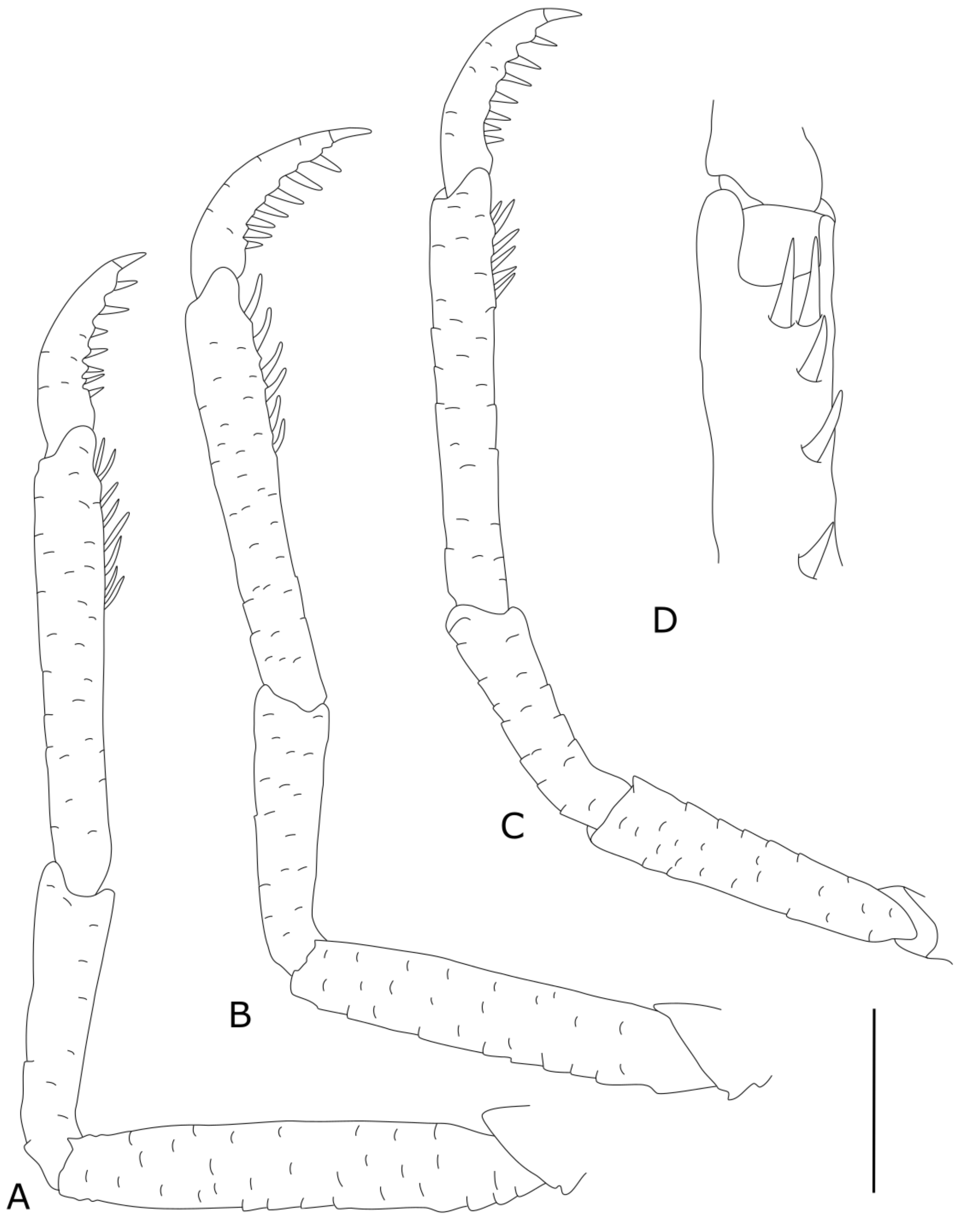

**Figure 2.10:** *Uroptychus foulisi* Kensley, 1977, holotype, ♂, 5.5 mm (SAMC-A015336), northeast of Richard's Bay, South Africa. **A** – Left P1 ischium and merus (setae omitted), ventral view; **B** – Left P1 ischium (setae omitted), lateral view; **C** – Left P1 merus and carpus (setae omitted), dorsal view; **D** – Left P1 palm and fingers (setae omitted), dorsal view. Scale bar: A, B = 2.0 mm, C, D = 3.0 mm.

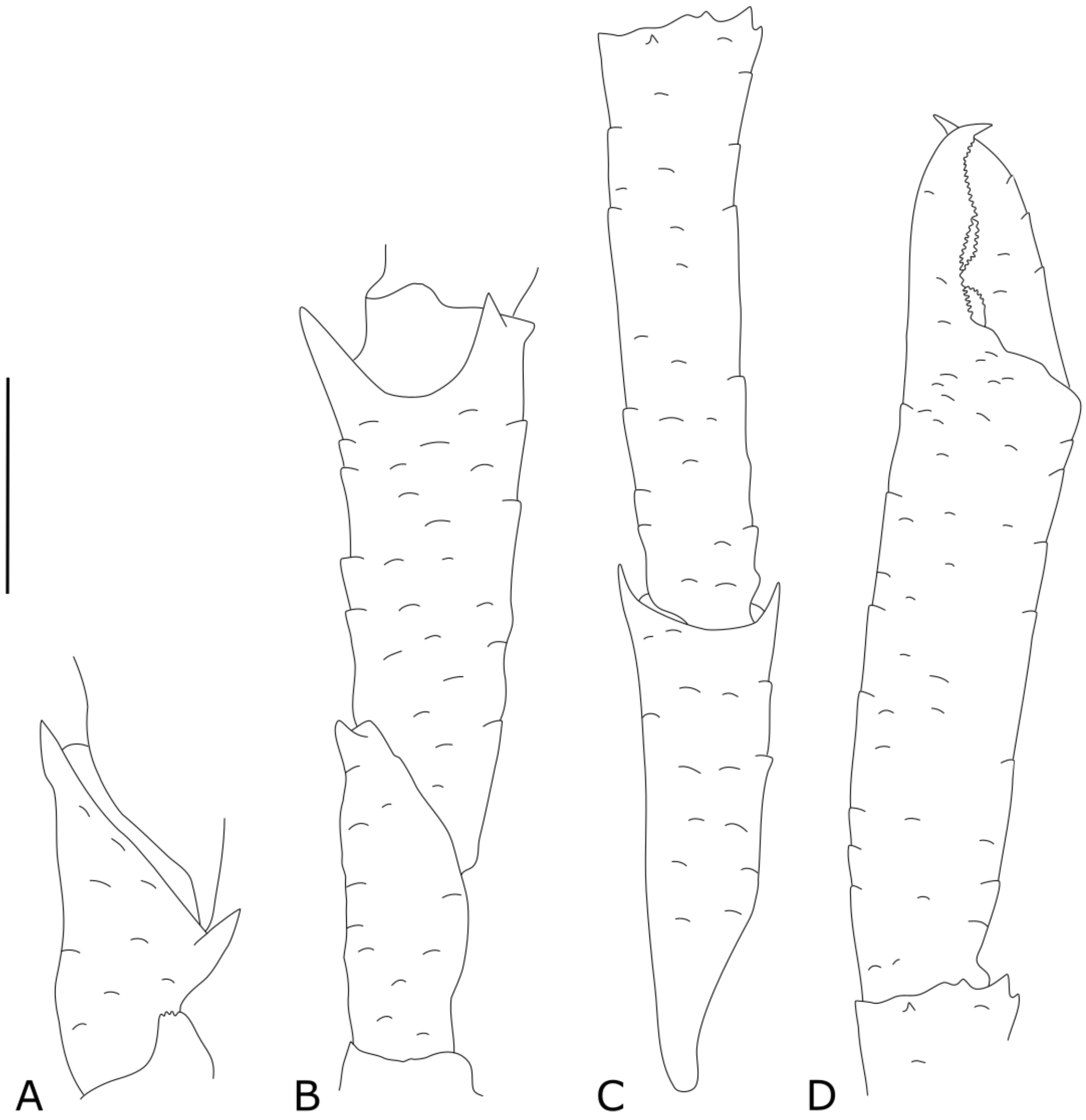

**Figure 2.11:** *Uroptychus foulisi* Kensley, 1977, holotype, ♂, 5.5 mm (SAMC-A015336), northeast of Richard's Bay, South Africa. **A** – Right P2 (setae omitted), lateral view; **B** – Right P3 (setae omitted), lateral view; **C** – Right P4 (setae omitted), lateral view; **D** – Right P2 propodus distal end (setae omitted), ventral view. Scale bar: A – C = 2.0 mm, D = 900 µm.

In South Africa, *U. foulisi* is most similar to *U. simiae*, though can be distinguished as it has a longer rostrum (1.5 times width, whereas it is 0.8 – 1.0 times width in *U. simiae*), is unarmed on the anterior margin of the third sternite and is unarmed on the lateral margins of the pterygostomian flap.

***Uroptychus remotispinatus*** Baba & Tirmizi, 1979

*Uroptychus remotispinatus* Baba & Tirmizi, 1979: 52, figures 1, 2 (Japan (type locality), off Durban and off Mozambique, 1320 – 1600 m); Baba 2005: 55, 230 (synonymies and key); Baba et al., 2008: 41 (list and synonymies); Baba et al., 2009: 57, figures 47, 48 (Taiwan, 1629 – 1649); Poore et al., 2011: 329, plate 7H (no record); Baba, 2018: 444, figure 222 (New Caledonia, 1070 – 2250 m); Schnabel, 2020: 222, figures 150, 151 (Colville Ridge, Bay of Plenty, 1073 – 1800 m); Baba et al., 2024: 185 (Mozambique Channel, 1408 – 1600 m).

**Material examined:** None available. Type material – Southeast of Mizunoko, Shima Light, Bungo Suido, 32°32'N, 132°25'E, 1,320 m, USNM-150318 (not examined).

**Description:** See Baba et al. (2009) and Baba (2018).

**Variation:** N/A.

**Coloration:** After Baba et al. (2009).

Carapace and pleon pale salmon-pink, reddish on anterior part of carapace and rostrum, as well as Mxp3, P1 fingers and P2 – 4 propodi and dactyli. Corneas pale yellowish. Tailfan translucent.

**Global distribution:** Indo-West Pacific, Mozambique, Madagascar Strait, Taiwan, Japan, New Caledonia, Norfolk Ridge, Wallis and Futuna Islands (SW Pacific), Colville Ridge, Bay of Plenty and South Africa; 850 – 2250 m.

**South African distribution:** East of Durban, KwaZulu-Natal, 1360 m (Figure 2.17).

**Remarks:** Unfortunately, examination of the South African material was not possible as the material is likely still held at the University of Karachi, Pakistan and efforts to contact the institution remain unsuccessful. This is the deepest dwelling chirostyloid in South Africa. This species is most similar to *U. boucheti* in South Africa (see differences under that species remarks).

***Uroptychus simiae*** Kensley, 1977

**Figures 2.12, 2.13, 2.19A**

*Uroptychus simiae* Kensley, 1977: 170, figures 6, 7 (northeast South Africa (type locality), 400 – 550 m); Kensley, 1981: 34 (list); Baba, 2005: 59, 231 (off Durban, 412 – 445 m); Baba et al., 2008: 42 (list and synonymies); Baba, 2018: 21 (key); Baba et al., 2024: 192, figure 109 (key, diagnosis).

**Material examined:**

**Holotype** – South Africa, 27°44.4'S; 32°42.8'E, 400 – 450 m, 26/05/1975, SAMC-A015341, 1 ♂ 4.8 mm.

**Paratypes** – South Africa, 27°44.4'S; 32°42.8'E, 400 – 450 m, 26/05/1975, SAMC-A015342, 2 ♂ 3.9 – 4.0 mm, 2 ♀ 3.9 – 4.9 mm, 1 ovig. ♀ 3.8 mm.

**Allotype** – South Africa, 27°59.5'S; 32°40.8'E, 550 m, 22/05/1976, SAMC-A015343, 1 ovig. ♀ 4.2 mm.

**Other material:** South Africa, 31°56.1'S; 29°26.5'E, 410 – 430 m, 20/07/1982, SAMC-A094559, 1 ♀ 6.6 mm. South Africa, 32°27.4'S; 28°56.4'E, 270 – 300 m, 13/07/1984, SAMC-A094560, 1 ♀ 4.2 mm. South Africa, 33°14.0'1.3'S; 28°2.0’57.8'E, 146 – 238 m, 30/07/1901, SAMC-A0939, 12 ♂ 3.5 – 6.1 mm, 10 ovig. ♀ 4.8 – 5.9 mm, 7 ♀ 3.0 – 5.0 mm.

**Description:**

*Carapace:* As long as broad; greatest breadth 1.2 times distance between anterolateral angles. Dorsal surface weakly convex from anterior to posterior, with slight depression between gastric and cardiac regions; devoid of setae. Lateral margins mostly straight, weakly convex posteriorly, bearing row of 1 – 3 minute spines with some eminences; anterolateral angle with well-developed spine overreaching lateral limit of orbit. Rostrum short, broadly triangular, dorso-ventrally flattish; length 0.2 times that of remaining carapace, barely reaching or falling slightly short of distal end of ocular peduncle, length 0.8 – 1.0 times breadth; breadth 0.6 times distance between bases of anterolateral spines. Pterygostomian flap somewhat anteriorly angular ending in spine, surface with row of 5 – 6 spines directly below linea anomurica.

*Sternum:* Excavated sternum anteriorly broad, triangular, surface with small spine in midline between Mxp1 bases. Sternal plastron as long as broad, lateral extremities somewhat divergent posteriorly. Sternite 3 slightly depressed, anterior margin concave, narrow V-shaped median sinus flanked by small spine, lateral margin with weak, blunt spine. Sternite 4 anterolateral margin acute, produced to small spine; posterolateral margin as long as anterolateral margin. Sternite 6 slightly broader than sternite 5 and 7. Sternite 5 anterolateral margin rounded.

*Pleon:* Tergites smooth, sparse, fine setae. Pleonite 1 dorsal surface convex from anterior to posterior. Pleonite 2 tergite 2.8 times broader than long; pleuron lateral margin moderately concavely divergent, posterolaterally blunt. Pleura of pleonites 3 – 5 laterally somewhat blunt. Telson half as long as broad, posterior plate with small, median concave notch, length 1.6 times that of anterior plate.

*Eye:* 1.2 times longer than broad, slightly overreaching rostrum, with fine, sparse setae proximal to cornea on dorsal surface. Cornea slightly dilated, more than half length of remaining eyestalk.

*Antennule and antenna:* Ultimate antennular article 3.0 times longer than wide. Antennal peduncle barely reaching end of cornea. Article 2 unarmed. Article 3 strongly produced anteromesially. Article 5, 1.8 times longer than article 4, breadth 0.7 times height of ultimate antennular article. Flagellum consists of 12 segments, barely reaching distal end of P1 merus. Antennal scale 1.2 times broader than article 5, almost reaching midlength of article 5.

*Mxp:* Mxp1 with bases close to each other. Mxp3 basis with (1) – 2 spines on mesial ridge. Ischium 0.6 times merus length, flexor margin not rounded distally, crista dentata with 20 – (23) denticles. Merus unarmed, flexor margin rounded distally. Carpus unarmed.

*P1:* Elongated, 5.3 (5.5) – 5.7 times longer than carapace, barely setose except for fingers. Ischium dorsally with well-developed distal spine, ventrally with row of small spines ending with well-developed spine. Merus (1.1) – 1.3 times carapace length, ventrally with row of spines proximally, bearing distolateral spine, distomesial spine occasionally present (both only visible ventrally). Carpus 1.2 – (1.4) times longer than merus, unarmed. Palm (3.1) – 3.5 times longer than broad, as long as carpus or slightly shorter. Fingers distally incurved slightly, not crossing when closed, slightly gaping in males, not gaping in females; opposable margin of movable finger with small proximal process and large process at midlength (females with low process proximally); fixed finger margin straight in females, mostly straight in males, narrower distally; fixed finger (0.4) – 0.5 as long as palm.

*P2 – 4:* Sparse setae on merus, carpus, distal 2 articles more setose with long, fine setae. Meri unarmed; somewhat compressed mesio-laterally, successively shorter posteriorly (P3 merus

0.8 – 0.9 times length of P2 merus, P4 merus 0.8 times length of P3 merus), subequal breadth on P2 – 4; length:breadth ratio (5.9) – 6.8 on P2, (5.3) – 6.5 on P3, (4.3) – 4.9 on P4; P2 merus (0.9) – 1.0 times length of carapace, 1.4 – (1.6) times length of P2 propodus; P3 merus 1.3 (1.4) – 1.5 times length of P3 propodus; P4 merus 1.0 (1.1) – 1.2 times length of P4 propodus. Carpi unarmed; subequal or shorter successively (P3 carpus 0.9 times P2 carpus length, P4 carpus as long as P3 carpus), carpus:propodus length ratio, 0.7 on P2, (0.6) – 0.7 on P3, 0.6 – (0.7) on P4. Propodi subequal on P2 – 4, or slightly longer on P2 than P3 and P4; flexor margin straight, with (7) – 8 proximally diminishing spines, terminating in a pair of distal spines. Dactyli slender relative to propodi, about half length of propodi; dactylus:carpus length ratio, 0.6 – (0.7) on P2, (0.7) – 0.8 on P3, 0.7 – (0.8) on P4; flexor margin with 8 – 9 obliquely directed spines, obscured by setae, penultimate spine closer, nearly contiguous to ultimate spine than antepenultimate.

*Eggs:* Number of eggs carried 2 – 4; each 1.1 mm x 1.2 mm.

**Variation:** Ranges noted in description. Some specimens with 10 spines on P2 – 4 dactyli flexor margin, instead of 8 – 9. Males occasionally with longer left P1 (5.7 times carapace length, right P1 4.9 times), left palm 1.3 times right palm length.

**Coloration:** Unknown.

**Global distribution:** South Africa (endemic).

**South African distribution:** East London to northeast of St Lucia, 270 – 550 m (Figure 2.17).

**Remarks:** Relatively abundant between the South African-Mozambican border and now for the first time as far south as East London, often with over 20 specimens collected in a single sampling event. Several characters are depicted here that did not appear in the original description. This redescription is also augmented with size ranges and relative sizes of segments, which was not reported in the original description. This study also expands the depth range for this species from 400 – 550 m to 136 – 550 m. Collected along with other crustaceans such as *Samadinia natalensis* Kensley, 1977.

This species is most similar to *U. foulisi* in South Africa (see differences under *U. foulisi* remarks).

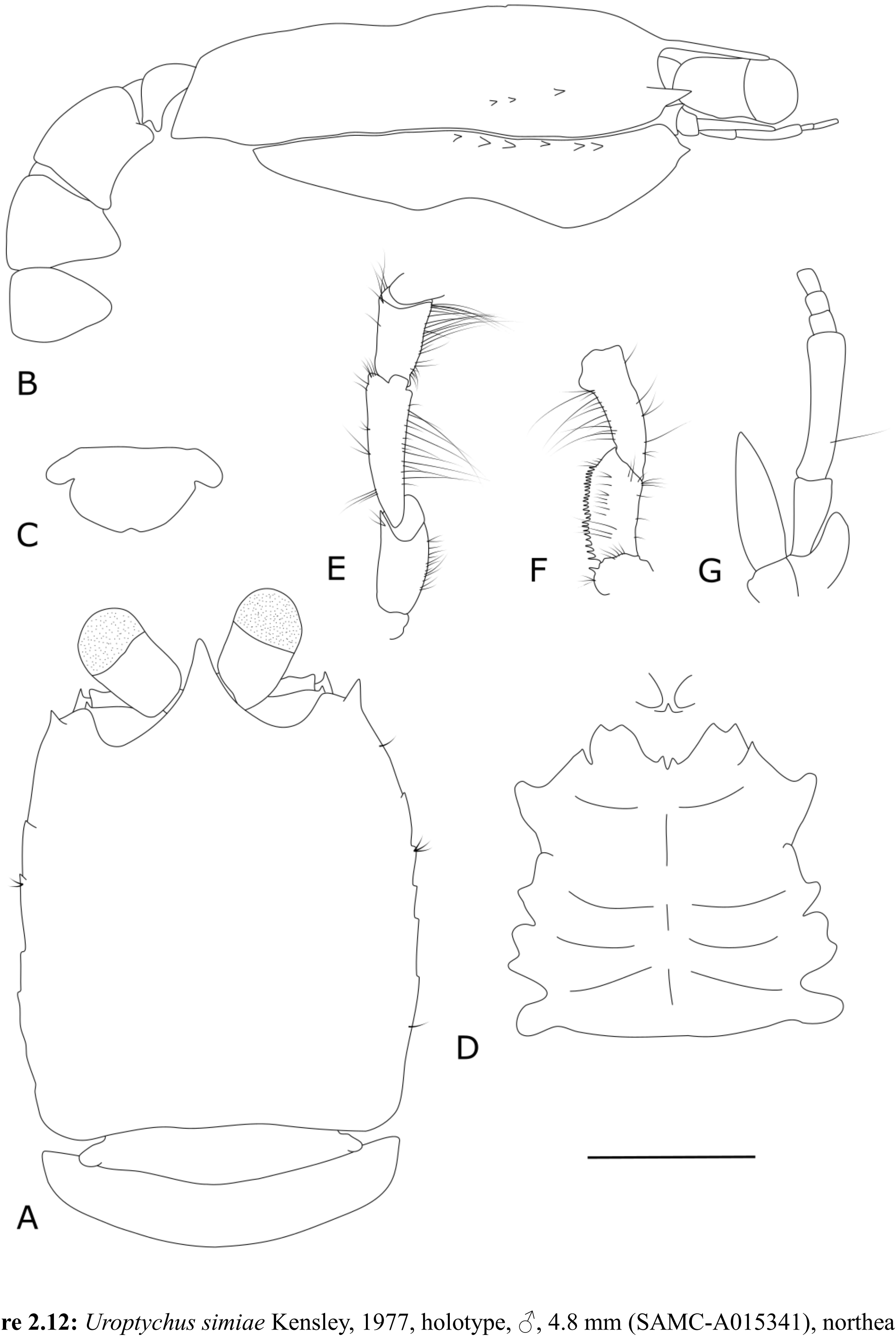

**Figure 2.12:** *Uroptychus simiae* Kensley, 1977, holotype, ♂, 4.8 mm (SAMC-A015341), northeast of St. Lucia, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Carapace and pleonites, lateral view; **C** – Telson; **D** – Sternal plastron, ventral view; **E** – Left Mxp3, lateral view; **F** – Left Mxp3, ventral view; **G** – Right antenna, ventral view. Scale bar: A, B, D = 4.0 mm; G = 2.0 mm; C, E, F = 1.0 mm.

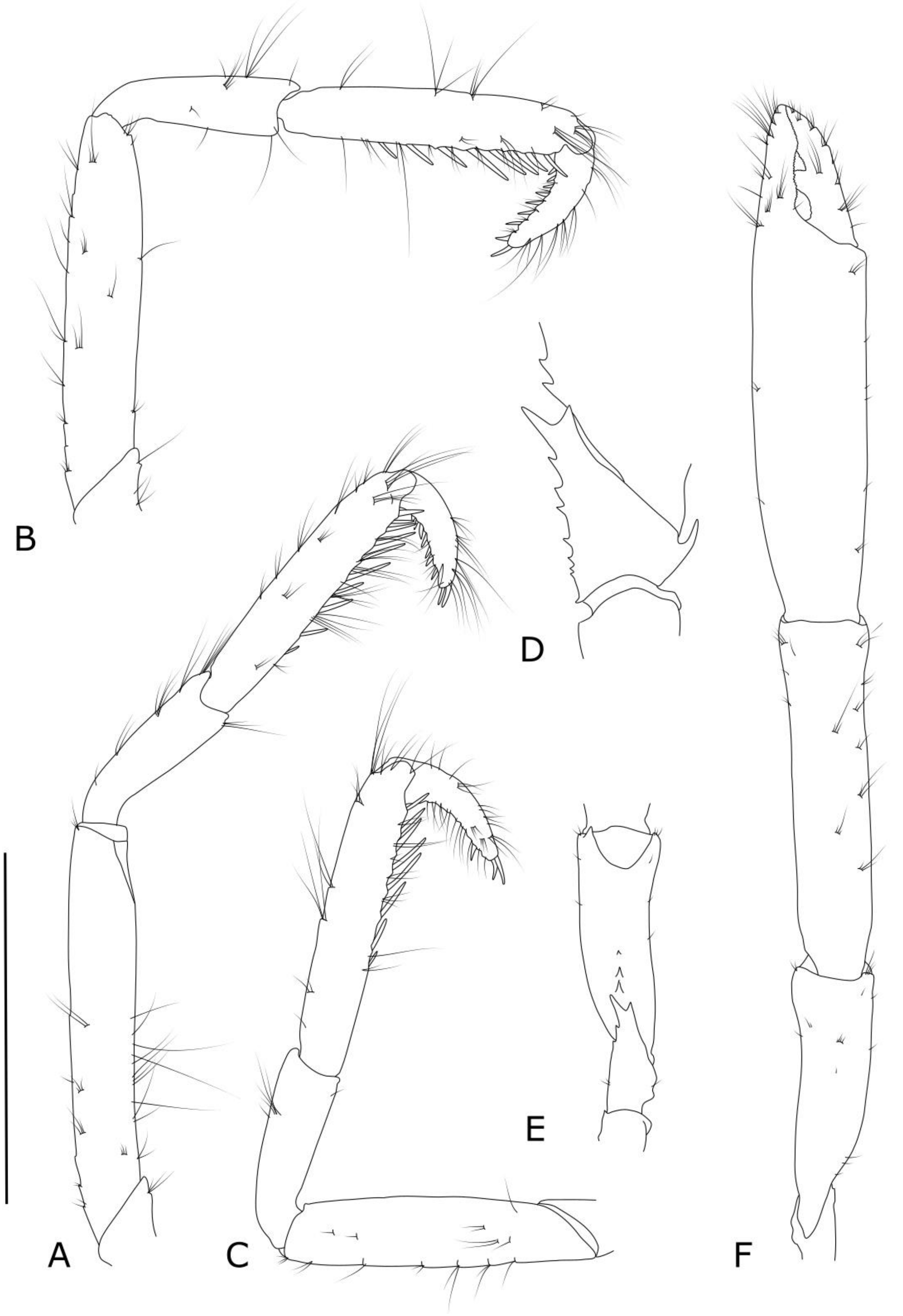

**Figure 2.13:** *Uroptychus simiae* Kensley, 1977, holotype, ♂, 4.8 mm (SAMC-A015341), northeast of St. Lucia, South Africa. **A** – Right P2, lateral view; **B** – Right P3, lateral view; **C** – Right P4, lateral view; **D** – Right P1 ischium, lateral view; **E** – Right P1 ischium and merus, ventral view; **F** – Right P1, dorsal view. Scale bar: A – D = 2.0 mm; E – F = 4.0 mm.

***Uroptychus undecimspinosus*** Kensley, 1977

**Figures 2.14, 2.15, 2.19B**

*Uroptychus undecimspinosus* Kensley, 1977: 173, figures 8, 9 (off Richard's Bay, South Africa (type locality), 360 – 420 m); Baba, 2005: 59, 232 (synonymies, key); Baba et al., 2008: 45 (list and synonymies); Baba, 2018: 28 (key); Baba et al., 2024: 205, figure 118 (key, diagnosis).

**Material examined:**

**Holotype** – South Africa, 28°45.5'S; 32°24.5'E, 360 – 420 m, 29/05/1975, SAMC-A015315, 1 ♂ 3.7 mm.

**Paratypes –** South Africa, 28°45.5'S; 32°24.5'E, 360 – 420 m, 29/05/1975, SAMC-A015315, 1 ♂ 1.3 mm, 2 ♀ 2.0 – 2.2 mm.

**Allotype** – South Africa, 28°45.5'S; 32°24.5'E, 360 – 420 m, 29/05/1975, SAMC-A015315, 1 ovig. ♀ 3.7 mm.

**Description:**

*Carapace:* Slightly broader than long or as long as broad; greatest breadth 1.5 times distance between anterolateral spines. Dorsal surface smooth, epigastric region with 4 pairs of spines and well-developed median spine; dorsally somewhat convex from anterior to posterior with small depression at midpoint. Lateral margins with 9 spines; first anterolateral slightly reaching or overreaching small orbital spine; second and third small (both often obsolete and slightly ventral to level of other spines); fourth spine well-developed, fifth also small and similar level to second and third spine; sixth to eighth well-developed on branchial margin, acute, followed by smaller spine. Rostrum narrowly triangular, dorsal surface concave; lateral margin with 3 – 4 spines, occasionally with distal spinule; length 0.6 times that of remaining carapace, breadth 0.3 times carapace width at posterior margin. Pterygostomian flap anteriorly angular, produced to sharp spine, surface smooth, unarmed.

*Sternum:* Excavated sternum rounded between bases of Mxp1, unarmed, surface ridged in midline. Sternal plastron as long as broad or slightly broader than long, lateral extremities between sternites 4 and 6 straight, sternite 7 somewhat divergent posteriorly. Sternite 3 shallowly depressed, anterior margin with V-shaped sinus flanked by incurved spine each side. Sternite 4 with 1 – 2 spines anterolaterally, reaching at most bases of submedian spines on sternite 3, anterolateral margin long, straight; posterolateral margin short, slightly more than half length of anterolateral margin. Sternite 5 anterolateral margin with 2 small spines, as long as posterolateral margin of sternite 4.

*Pleon:* Smooth and glabrous. Pleonite 1 with weak transverse ridge. Pleonite 2 tergite 2.8 times broader than long; pleuron anterolaterally and posterolaterally blunt angular, posterolaterally slightly more rounded; lateral margin strongly concave. Pleonite 3 pleuron laterally slightly angular. Telson slightly more than half as long as broad; posterior plate moderately emarginate on posterior margin, length 1.2 times that of anterior plate.

*Eye:* (1.3) – 1.5 times longer than broad, overreaching rostrum midlength; slightly broader proximally. Cornea 0.4 times length of remaining eyestalk.

*Antennule and antenna:* Ultimate article of antennular peduncle 3.3 – 3.8 times longer than high. Antennal article 2 with distolateral spine. Article 4 and 5 each with strong distomesial spine; article 5, 1.8 times longer than article 4. Flagellum consisting of 11 – 12 segments, slightly shorter than or barely reaching distal end of P1 merus. Antennal scale 1.5 times broader than article 5, tapering, slightly overreaching article 5, not reaching rostral tip.

*Mxp:* Mxp1 with bases broadly separated. Mxp3 lateral margins sparsely setose, distal 3 articles more setose on flexor margins. Basis unarmed, mesial margin smooth. Ischium with 36 – 38 denticles on crista dentata; flexor margin rounded distally. Merus (1.4) – 1.6 times longer than ischium, bearing 1 – 2 well-developed distolateral spines on cristate flexor margin with smaller spine more proximal. Carpus with 3 spines on extensor margin, distal spine most prominent.

*P1:* Relatively slender, subcylindrical covered in long plumose setae, palm somewhat enlarged; length 5.0 (5.1) – 5.2 times carapace length (females with unequal P1's 4.2 – 5.0 carapace length; smaller P1 palm not enlarged). Ischium dorsally bearing slender distal spine, ventromesially well-developed spine, occasionally with subterminal spine on proximal portion. Merus 1.2 times carapace length, bearing well-developed distolateral and distomesial spines, followed by several spines on mesial margin; ventrally with row of well-developed spines. Carpus (1.2) – 1.3 times merus length, with several small distal spines and rows of small spines on dorsal and mesial margin. Palm (2.8) – 3.4 times longer than broad, 0.9 – (1.0) times carpus length. Fingers somewhat incurved distally, slightly gaping in males, not gaping in females; opposable margin of fixed finger with small proximal process, movable finger with blunt process proximally; movable finger 0.4 – (0.5) times length of palm.

*P2 – 4:* Moderately compressed mesio-laterally, covered in setae, more setose on extensor margin. Meri successively shorter posteriorly (P3 merus 0.9 times length of P2 merus; P4 merus 0.8 – 0.9 times length of P3 merus), equally broad on P2 – 4; length:breadth ratio (4.0) – 4.3 on P2, 3.6 (3.7) – 3.9 on P3, 3.4 – (3.6) 3.7 on P4; P2 merus (0.8) – 0.9 times carapace length, 1.1 – 1.2 times length of propodus; P3 merus times propodus length; P4 merus (0.9) – 1.0 times propodus length; P2 – 3 meri with distal spines on flexor and extensor margins, with row of small spines on extensor margin, P4 unarmed, with some eminences on extensor margin. Carpi slightly shorter successively or as long posteriorly (P3 merus 0.9 – 1.0 times P2 merus length, P4 merus 0.9 – 1.0 times P3 merus length), slightly shorter than dactyli; length 0.5 times propodus length on P2 – 3, 0.4 – (0.5) on P4; P2 with row of spines on extensor margin, P3 with only distal spine; P4 unarmed. Propodi subequal on P2 – 4; flexor margin straight, with 3 proximally diminishing spines on distal two-thirds on P2 – 4. Dactyli straight, ending in slender spine, preceded by 8 – 10 well-developed, somewhat oblique spines, ultimate spine more slender and shorter than antepenultimate, penultimate broader than antepenultimate; dactylus:propodus length ratio, (0.6) – 0.7 on P2, 0.6 on P3, (0.6) – 0.7 on P4.

**Variation:** Ranges noted in description.

**Coloration:** Unknown.

**Global distribution:** South Africa (endemic).

**South African distribution:** Off Richard’s Bay, KwaZulu-Natal, 360 – 420 m (Figure 2.17).

**Remarks:** Rare species, only known from a single sampling event from which the species was described. Baba et al. (2024) suggest *U. undecimspinosus* closely related to a newly described species, *Uroptychus galene* Baba, Corbari & Macpherson, 2024. However, the two species differ in armature on the carapace dorsal surface, as *U. undecimspinosus* bears spines on the epigastric and hepatic regions while the latter is unarmed; the rostrum of *U. undecimspinosus* bears three to four lateral spines and not just a single subterminal spine in *U. undecimspinosus*; the cheliped carpus has two rows of spines on the mesial and mesiodorsal margins in *U. undecimspinosus* and not only two distoventral spines; P2 – P3 has a row of small, but distinct spines (Figure 2.15A, B), with some ridges only on P4, similar to *Uroptychus galene*. This collection event included other crustacean species also described in Kensley (1977), the majoid crab *Samadinia* (previously *Rochinia*) *natalensis* and *Exodromidia* (previously *Pseudodromia*) *spinosissima.*

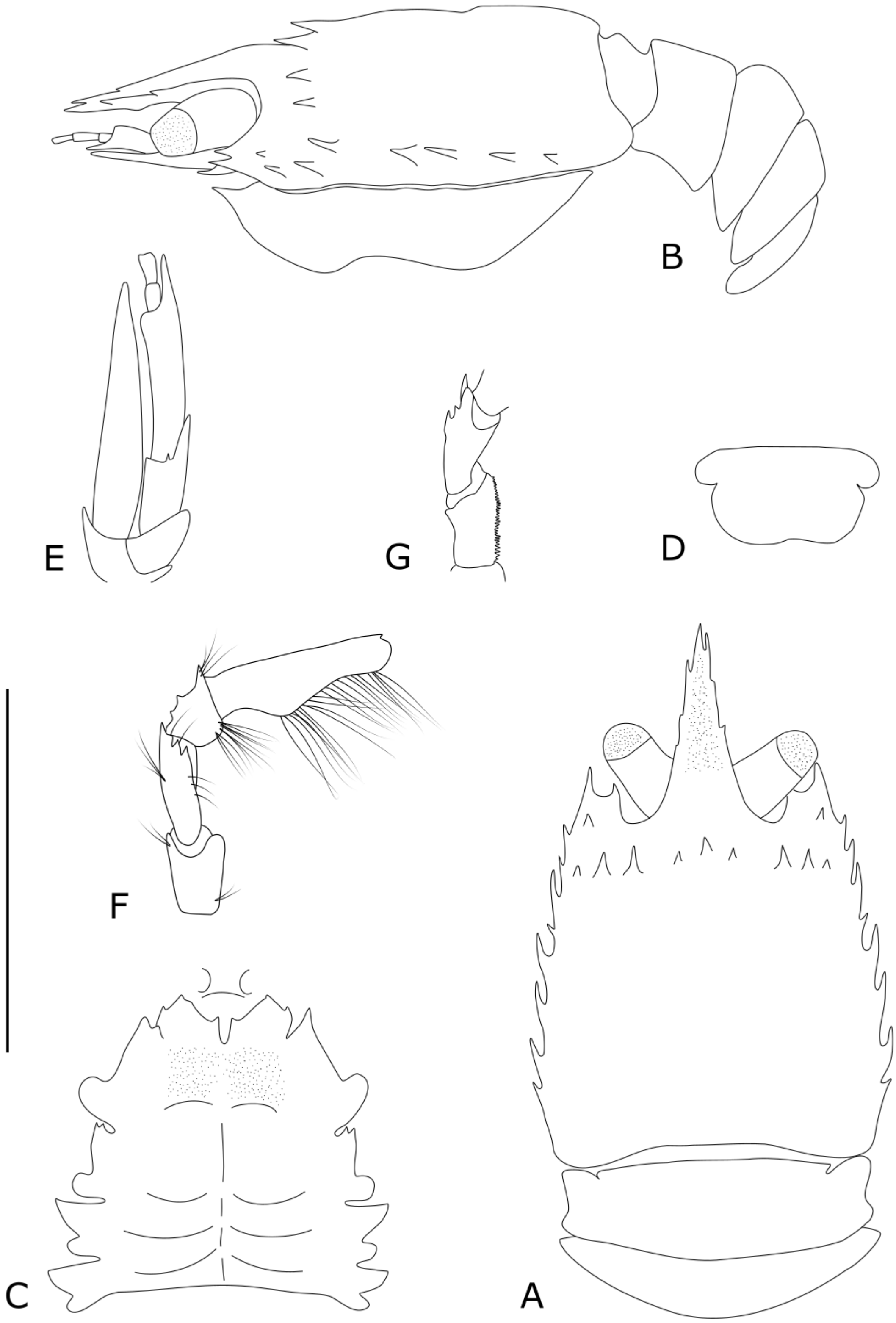

**Figure 2.14:** *Uroptychus undecimspinosus* Kensley, 1977, ♂, 3.7 mm (SAMC-A015315), east of Richard's Bay, South Africa. **A** – Carapace and anterior pleonites (setae omitted), dorsal view; **B** – Carapace and anterior pleonites (setae omitted), lateral view; **C** – Sternal plastron, ventral view; **D** – Telson; E – Right antenna, ventral view; **F** – Right Mxp3, lateral view; **G** – Right Mxp3 (setae omitted), ventral view. Scale bar: A – D, F, G = 2.0 mm; E = 1.0 mm.

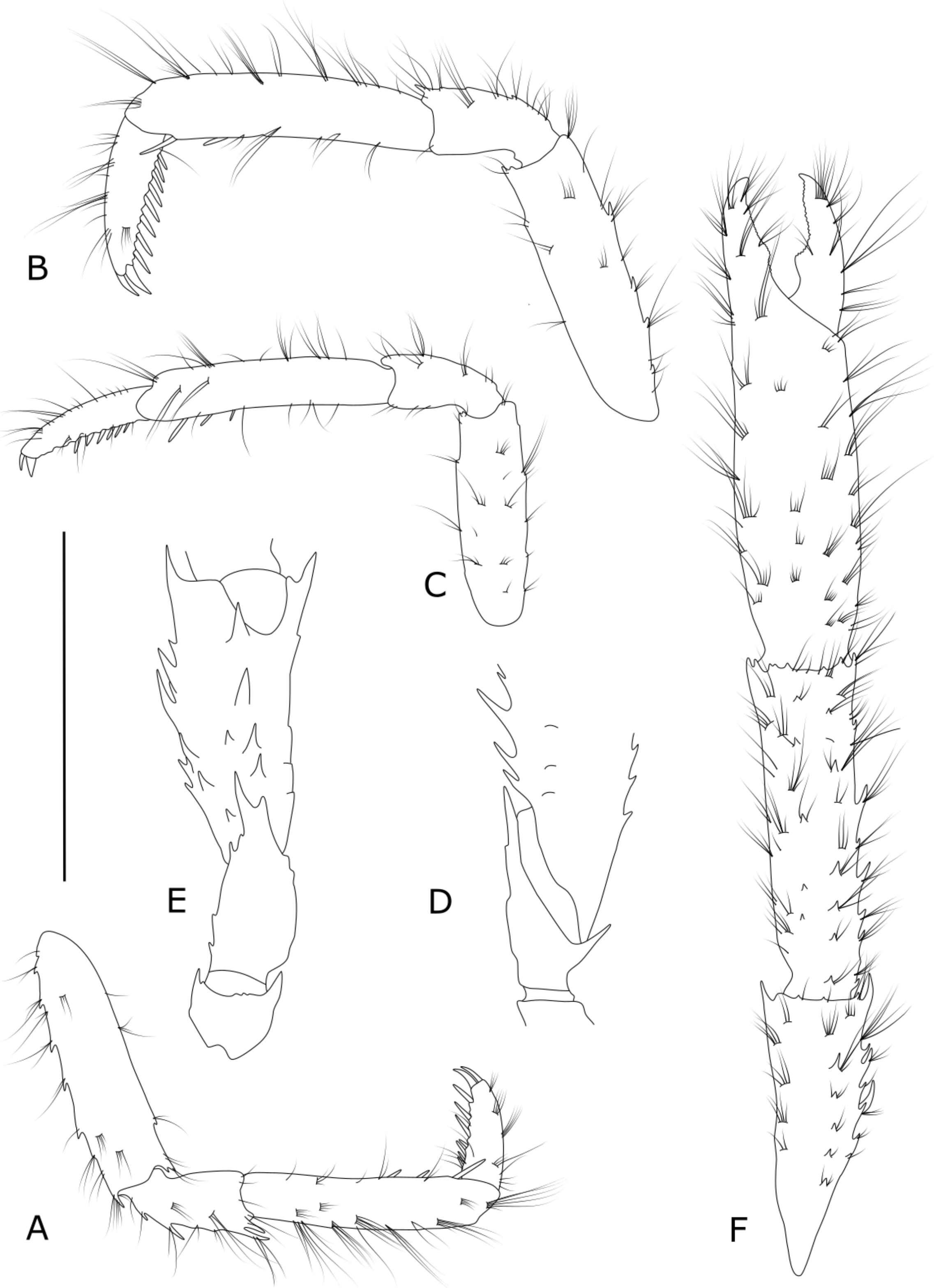

**Figure 2.15:** *Uroptychus undecimspinosus* Kensley, 1977, ♂, 3.7 mm (SAMC-A015315), east of Richard's Bay, South Africa. **A** – Left P2, lateral view; **B** – Left P3, lateral view; **C** – Left P4, lateral view; **D** – Left P1 ischium (setae omitted), lateral view; **E** – Left P1 ischium and merus (setae omitted), ventral view; **F** – Left P1, dorsal view. Scale bar: A – E = 2.0 mm; F = 3.0 mm.

In South Africa, *U. undecimspinosus* is easily recognizable due to the spinose nature of the carapace (four pairs of epigastric spines and nine spines on lateral margins), as well as the second to fourth pereopod dactyli that bears a prominent penultimate spine, that is much broader (>1.5 x) than antepenultimate spine.

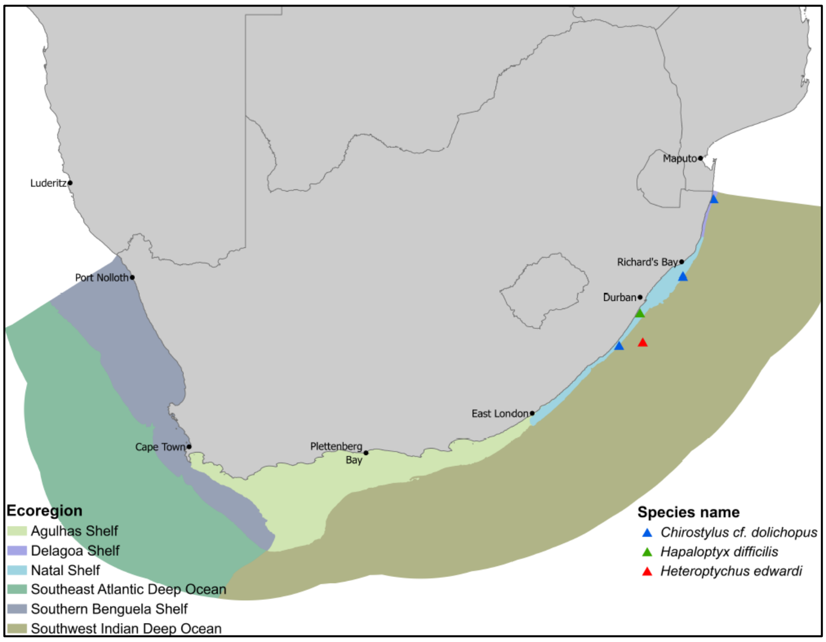

**Figure 2.16:** Distribution map of species in the genera *Chirostylus, Hapaloptyx* and *Heteroptychus* found in South Africa.

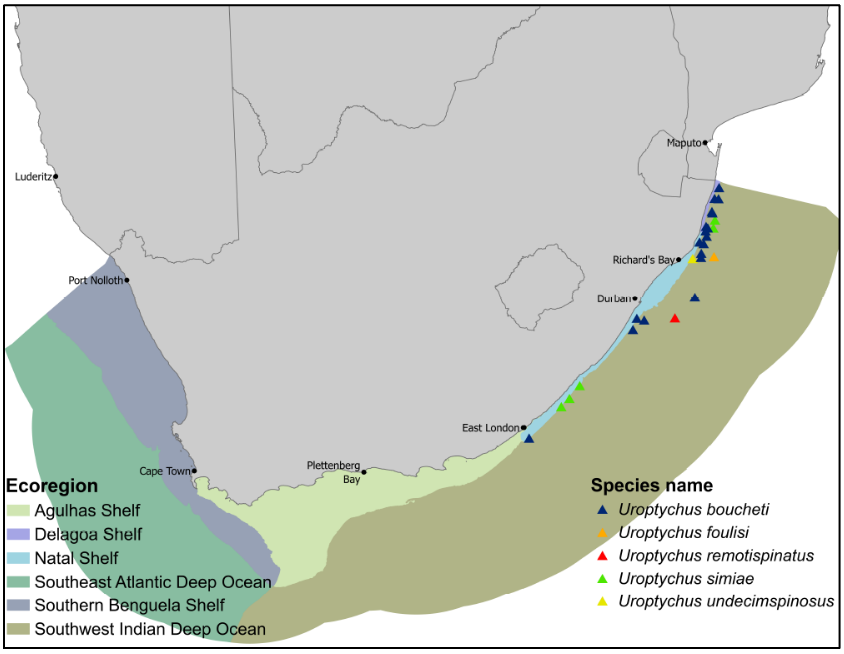

**Figure 2.17:** Distribution map of species in the genus *Uroptychus* found in South Africa.

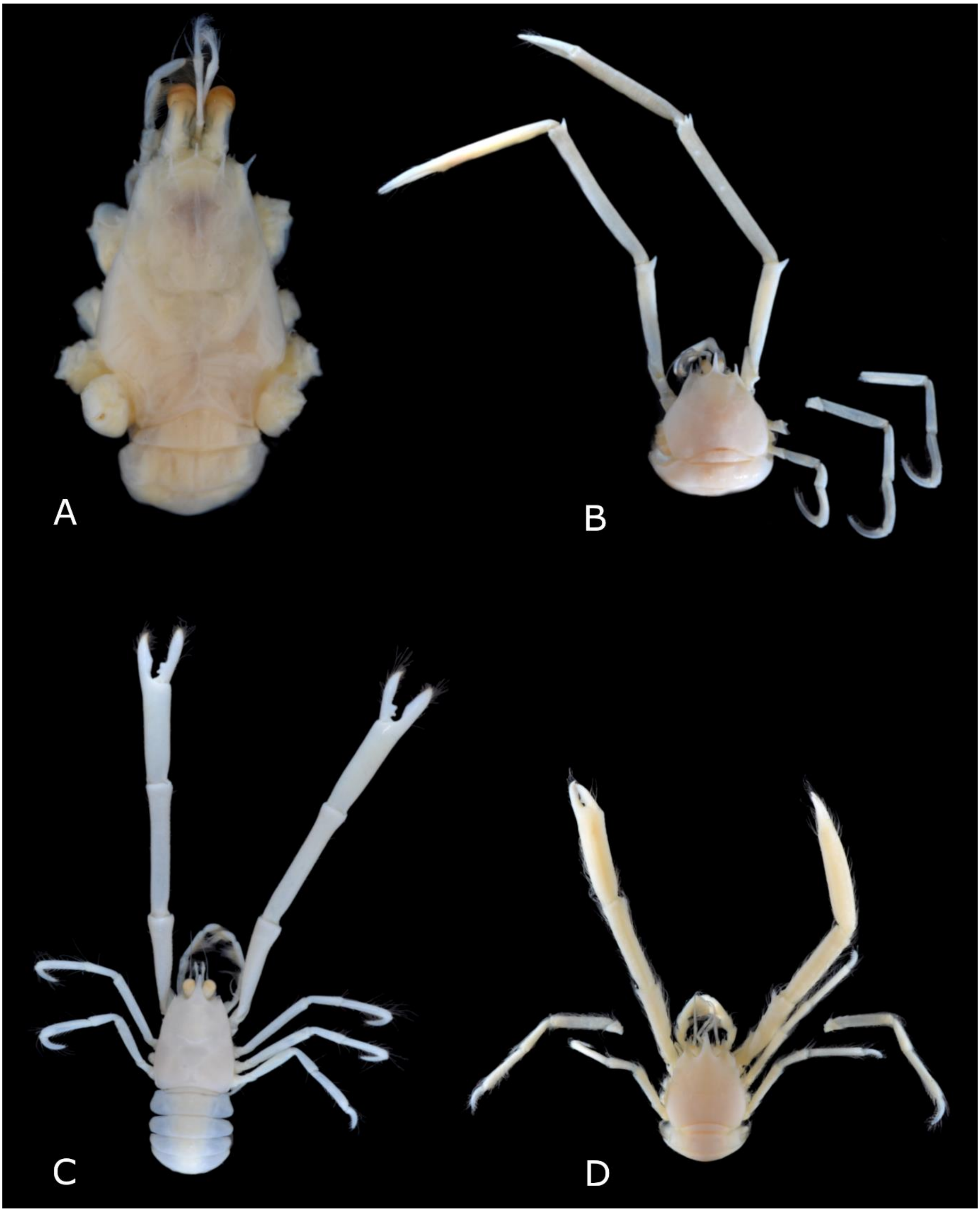

**Figure 2.18:** Dorsal view of preserved specimens. **A** – *Chirostylus* cf. *dolichopus* Ortmann, 1892, off Boteler Point, South Africa, ♂, 7.9 mm (SAMC-A094558); **B** – *Heteroptychus edwardi* (Kensley, 1981), east of Port Edward, South Africa, holotype, ♀, 5.0 mm (SAMC-A016033); **C** – *Uroptychus boucheti* Baba, Corbari & Macpherson, 2024, southeast off Scottburgh, South Africa, ♀, 9.2 mm (SAMC-A094530); **D** – *Uroptychus foulisi* Kensley, 1977, northeast of Richard's Bay, South Africa, holotype, ♂, 5.5 mm (SAMC-A015336).

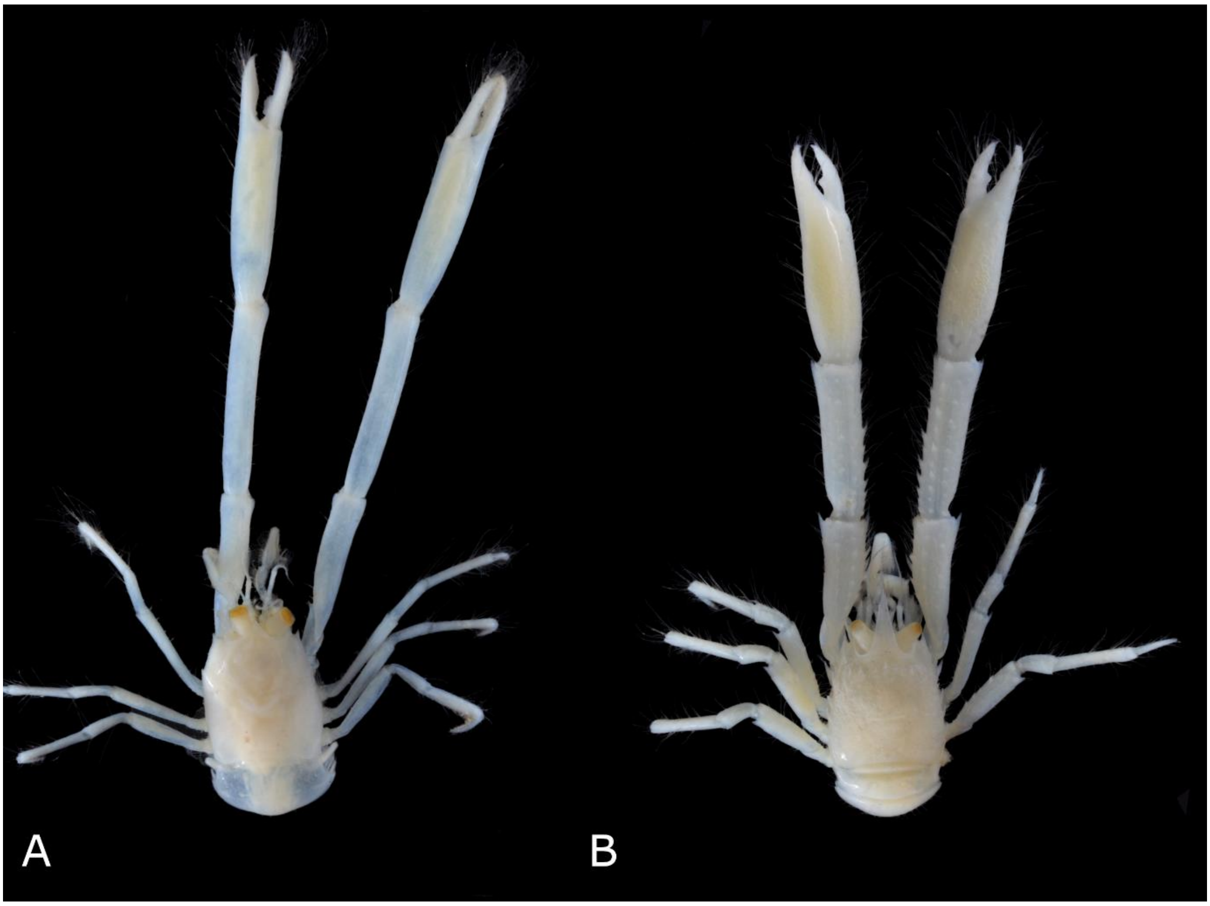

**Figure 2.19:** Dorsal view of preserved specimens. **A** – *Uroptychus simiae* Kensley, 1977, northeast of St. Lucia, South Africa, holotype, ♂, 4.8 mm (SAMC-A015341); **B** – *Uroptychus undecimspinosus* Kensley, 1977, east of Richard's Bay, South Africa, holotype, ♂, 3.7 mm (SAMC-A015315).

# Discussion

Following this study, South Africa now has eight chirostylids present from four different genera (one genus and species dubious). One new genus and species distribution record, that of *Chirostylus* cf. *dolichopus* is added here. Four of the previously known species are also redescribed herein, as their original descriptions by Kensley (1977, 1981) were brief and several important characters were left out.

Five of the eight species (62.5%) are endemic to South Africa, a far greater proportion than the 33% reported for the South African marine invertebrate fauna as a whole (Griffiths et al., 2010). Chirostylids have been reported to have high endemicity rates, often exceeding 40% (Schnabel et al., 2011b; Schnabel, 2020). Baba et al. (2024) also state that a high number of chirostylids are endemic to the WIO region. This number in South Africa is likely inflated, as four of the eight species are only known from single sampling events, and as sampling effort in the area and adjacent areas is increased, it is likely that several of these species will be reported from other localities and/or outside South African waters. This was also the case for Schnabel (2020), who found that more than 50% of the New Zealand chirostyloid fauna were collected from single sampling events.

The chirostylid fauna of South Africa is clearly concentrated along the northeast coast of South Africa, as all species can be found between Durban and the Mozambican border. Only two species are found as far south as East London, with no species reported along the southern and western coast of South Africa. This absence is most likely not due to a lack of sampling effort, as the southern and western coast of South Africa has been sampled more extensively than the east (Griffiths et al., 2010). Indeed, no species have yet been reported from the entire west coast of Africa, with only *Gastroptychus formosus* (Filhol, 1884), *Uroptychus bouvieri* Caullery, 1896, *Uroptychus concolor* (A. Milne Edwards & Bouvier, 1894) and *Uroptychus maroccanus* Türkay, 1976 found on the northwest coast of Morocco. This shows that the South African chirostylids have a distinct Indian Ocean affinity, though more sampling along the west coast of Africa is required.

The South African chirostylid diversity is quite similar to that of Mozambique, from which nine species and two genera are known, with only three species shared between them. Madagascar has a far greater diversity with 24 species from five genera. This is probably because there has been more extensive sampling in Madagascan waters, coupled with the fact that a dedicated study on their taxonomy has been published (Baba, 1990). Baba et al. (2024) suggest that the WIO region fauna is likely underestimated as it has far fewer species (25%) than reported for the western Pacific.

It is extremely likely that the South African chirostylid diversity remains severely underestimated. From the first collection in South Africa in 1901, only 40 sampling events have collected chirostylids, the last of which was over 30 years ago. Almost certainly increased sampling effort around the South African coast, especially in the east and in deeper waters, will add more species to the fauna list, not only as new distribution records, but also as species new to science.

# Chapter 3: Taxonomic revision of the family Galatheidae (Anomura: Galatheoidea) in South Africa, with descriptions of two new species

## Introduction

The anomuran family Galatheidae Samouelle, 1819 comprise small (< 15 mm), mostly shallow-water squat lobsters, though some are known from continental shelf and slope sites at depths > 1000 m, although there is an erroneous record from 2400 m (Tirmizi & Javed, 1993; Ahyong et al., 2010; Macpherson & Robainas-Barcia, 2015). Galatheids typically have a triangular rostrum, carapace with transverse striae or tubercles, a well-developed tailfan, and are often brightly-coloured, with several species exhibiting crypsis (Ahyong et al., 2010; Rodríguez-Flores et al., 2018; Poore & Ahyong, 2023). Galatheidae form part of the superfamily Galatheoidea, along with families Munididae Ahyong, Baba, Macpherson & Poore, 2010, Munidopsidae Ortmann, 1898 and the porcelain crabs of the family Porcellanidae Haworth, 1825. Interestingly, phylogenetic analyses showed that the Galatheidae are most closely related to the Porcellanidae, with which they form a sister clade and share several morphological characteristics (Scholtz & Richter, 1995; Ahyong et al., 2009; Bracken et al., 2009; Schnabel et al., 2011a). There are currently 11 extant and six fossil genera in the Galatheidae, as *Janetogalathea* Baba & Wicksten, 1997 was recently moved to the Munidopsidae Ortmann, 1898 (Rodríguez-Flores et al., 2023). Thus, there are about 260 species in the family, with *Galathea* Fabricius, 1793 being by far the most speciose genus with over 175 described species (WoRMS Editorial Board, 2024).

During the last 170 years galatheids have been limited to local records added to South African fauna mostly through opportunistic sampling. The endemic *Galathea labidolepta* Stimpson, 1858 was the first to be described. Later expeditions conducted and led by John D. Gilchrist aboard the SS Pieter Faure in the late 19th to early 20th century reported, *G. dispersa* Spence Bate, 1858 and *G. intermedia* Liljeborg, 1851. Doflein and Balss (1913) reported on *G. nexa* Embleton, 1836 from St. Francis Bay, while Barnard's famous 'Descriptive catalogue on the Decapod Crustacea of South Africa' (1950) included two additional species from the Pieter Faure collections (and synonymised *G. labidolepta* with *G. intermedia*). Another important series of ecological surveys were carried out by the University of Cape Town in the 1940's to 1960's and these collections (like the Pieter Faure collections) were later deposited in the

Natural History Collections of the Iziko South African Museum. However, most of the specimens forming part of these collections were never studied or identified and have remained in those collections for up to 77 years before finally being identified in this study. In the interim, international taxonomists Tirmizi & Javed (1980, 1993) added two species to the South African squat lobster fauna, *Phylladiorhynchus serrirostris* (Melin, 1939) (later changed to *P. integrirostris* (Dana, 1852)) and *Galathea pubescens* Stimpson, 1858, while more recently Baba (2005) added *G. lumaria*, all three these species were collected along the east coast. The most recent publication pertaining to South African squat lobsters was by Emmerson (2016), who only listed five species from South Africa, although most of these were incorrect, outdated and did not consider the important publication by Macpherson & Robainas-Barcia (2015) on *Galathea* species from the wider Western Indian Ocean region.

Prior to this study, seven galatheid species from three genera were known from South Africa, which is relatively low, considering South Africa's high marine invertebrate fauna biodiversity consisting of some 13 000 species (Griffiths et al., 2010). Moreover, regional biodiversity also suggests the number of South African galatheids are underestimated as Mozambique and Madagascar have 10 and 21 galatheid species respectively (Macpherson et al., 2023). The status of most of the South African records are either dubious or outdated and there has been no formal revision on the group that incorporates recent literature and specimens accumulated in the Natural History Collections of the Iziko South African Museum since Barnard (1950). A revision of this family is thus long overdue. The aim of this study is to compile a thorough systematic account of the Galatheidae of South Africa, incorporating all known species in a single account based on currently-accepted nomenclature, describing any new species and reporting on new distribution records, as well as re-describing poorly described species using modern integrative techniques.

## Methods

This study is based mainly on the examination of historic material from numerous expeditions around the South African coast and housed in the Natural History Collections of the Iziko South African Museum, Cape Town, spanning the period 1898 to 2023. Several collections of new material were also conducted during the study, mostly during the annual demersal survey conducted by the Department of Forestry, Fisheries and Environment aboard the FRS *Africana* and the chartered commercial vessel *Compass Challenger*. These samples were collected using a German otter trawl design with several configurations and a 75 mm mesh cod-end fitted with

35 mm mesh liner. Trawls had a 30-minute bottom time duration over appropriate habitats spanning the depth range of 53 – 127 m along the South African west and south coasts (see Atkinson et al., 2011 for detailed methods). Additional collections examined formed part of the Natal Museum dredging program on the RV *Phakisa*, the Agulhas Bank Connections cruise aboard the RV *Observer* and on SEAmester V and VI cruises aboard the RV *SA Agulhas II*. All specimens collected were placed in 96% EtOH, which was replaced daily for three days so specimens could be used for genetic analyses. Once analyses were completed, specimens were transferred to 70% EtOH and deposited in the Natural History Collections of the Iziko South African Museum, Cape Town for long-term preservation.

Drawings were made using a WILD stereomicroscope and a Nikon SMZ1270, both equipped with a camera lucida, and digitally traced in Inkscape 1.21 (www.inkscape.com) using a Wacom Intuos Pro Graphics Tablet. Photos were taken using a Nikon D3100 camera and edited with GIMP 2.10.30 software (www.gimp.com). Images credited to TPA Botha, unless stated otherwise. Maps were created using ESRI ArcGIS 3.3.0.

The terminology and measurements used in this study follow Baba et al. (2009, 2011) and Macpherson & Robainas-Barcia (2015). Specimen sizes are indicated by the postorbital carapace length (pcl), measured from the base of the rostrum along the midline to the posterior margin of the carapace. Rostrum length is measured from between lateral basal incisions to the distal tip, while breadth is between the left and right lateral basal incisions. Appendages are measured in dorsal (pereopod 1) and lateral (pereopods 2 – 4) midlines (excluding distal spines). Where applicable, ranges of morphological and meristic variations are included in the descriptions, holotype measurements given in parentheses. Abbreviations and symbols used are: Mxp3 = maxilliped 3; ovig. = ovigerous; P1= pereopod 1; P2 – 4 = pereopods 2 – 4; G1 = male gonopod 1; G2 = male gonopod 2; m = metres, mm = millimetres; ♀ = female; ♂ = male.

Total genomic DNA was isolated from muscle and egg tissue using a Zymo DNA extraction kit, following supplier recommendations. Two mitochondrial markers, 16S rRNA and COI (Cytochrome oxidase subunit I) were amplified through polymerase chain reaction (PCR) using primers 16Sar-L and 16Sbr-L (Palumbi, 1996) and LCO1490 and HCO2198 (Folmer et al., 1994). Amplification reactions were performed in a final volume of 20 µL, which included 2 – 4 µL DNA template, 0.2 mM of each primer, 10 µL DreamTaq (Thermo Scientific$^{TM}$) and 4 – 2 µL nuclease free water to make up 20 µL. Initial denaturation step for thermal cycling consisted of 95° C for 3 minutes followed by 35 cycles at 95° C for 30 seconds, an annealing temperature of 50° C for 30 seconds and 72° C for 1 minute, and a final extension of 72° C for 10 minutes. PCR cleanup was conducted at a volume of 12 µL, consisting of 10 µL of PCR product and 0.7 µL of Exonuclease I (Thermo Scientific$^{TM}$) and 1.3 µL of FastAP Thermosensitive Alkaline Phosphatase (Thermo Scientific$^{TM}$). The cleanup was conducted at 37° C for 15 minutes, followed by 85° C for 15 minutes. Samples were sequenced at the Central Analytics Facility (CAF) in Stellenbosch, South Africa. Sequences were edited using Geneious Prime 2022.1.1 and manually aligned. Most alignments did not require further editing. Sequences of known species in the region were downloaded from GenBank and a progressive pairwise alignment was performed in Geneious. Subsequently, Neighbour-Joining trees were conducted in Geneious. Lastly, a pairwise distance matrix was created in MEGA 11 with sequences trimmed to 569 base pairs. All sequences were uploaded onto the Barcode of Life Data System (BOLD) database.

# Systematic account

## Family **Galatheidae** Samouelle, 1819

Galatheadae Samouelle, 1819: 92.

Galatheinae – A. Milne Edwards & Bouvier, 1894: 244; A. Milne Edwards & Bouvier, 1897: 3; A. Milne Edwards & Bouvier, 1899: 71; Ortmann, 1898: 1150; Baba, 1988: 53; Baba, 2005: 67.

Galatheidae – Bouvier, 1896: 311; Alcock, 1901: 236; Schmitt, 1921: 162; Barnard, 1950: 481; Balss, 1957: 1595; Zariquiey Álvarez, 1968: 268; Squires, 1970: 407; Williams, 1965: 105; Williams, 1984: 231; Davie, 2002: 58; Poore, 2004: 228; Ahyong et al., 2010: 59; Macpherson & Baba, 2011: 51; Poore & Ahyong, 2023: 273.

**Type genus:** *Galathea* Fabricius, 1793

**Diagnosis:** After Ahyong et al. (2010).

Rostrum well-developed, broad, flattened, usually subtriangular; supraocular spines present or absent. Carapace as long as or longer than wide (excluding rostrum); dorsally with transverse striae. Tailfan well-developed, not folded against preceding tergite.

**Genera included:** *Alainius*; *Allogalathea*; *Allomunida*; *Coralliogalathea*; *Fennerogalathea*; *Galathea*; *Lauriea*; *Macrothea*; *Nanogalathea*; *Phylladiorhynchus*; *Tridonthea*.
**Remarks:** Globally, there are 11 known genera, four of which are present in South Africa.

## Key to species of the family Galatheidae in South Africa

1. Lateral margin of rostrum nearly unarmed, with rudimentary or finely serrate teeth at most…………………… ***Phylladiorhynchus* cf. *janiqueae* (p. 90; fig. 3.1A)**

   Lateral margin of rostrum with distinct teeth…………………………. **2 (fig. 3.1B)**

2. Uropodal endopod extremely broad. P2 – 4 dactyli curved, strongly biunguiculate.. …………………………………… ***Lauriea gardineri* (p. 88; fig. 3.1C)**

   Uropodal endopod about as long as broad. P2 – 4 dactyli straight, with seta-like movable spines…………………………………………. **3 (fig. 3.1D)**

3. Rostrum exceptionally elongate, ventrally carinate, with 5 – 9 small lateral teeth… …………………………………… ***Allogalathea elegans* (p. 63; fig. 3.1E)**

   Rostrum moderately long, mostly flattish, with 2 – 5 lateral teeth………… **4 (fig. 3.1B)**

4. Pterygostomian flap with row of spines on upper margin near linea anomurica……… …………………………………… ***Galathea labidolepta* (p. 68; fig. 3.1H)**

   Pterygostomian flap unarmed, at most with row of denticles……………… **5 (fig. 3.1I)**

5. Rostrum with 2 pairs of lateral teeth……………… ***Galathea lumaria* (p. 74; fig. 3.1F)**

   Rostrum with 3 or more pairs of lateral teeth………………………………. **6 (fig. 3.1B)**

6. Antennular article 1 with 2 well-developed terminal spines, distomesial obsolescent or minute …………………………………… ***Galathea* cf. *pubescens* (p. 75; fig. 3.1J)**

   Antennular article 1 with 3 well-developed terminal spines, distomesial distinct, occasionally clearly smaller than others………………………………... **7 (fig. 3.1I)**

7. Carapace with 2 epigastric spines………… ***Galathea tanegashimae* (p. 77; fig. 3.1L)**

   Carapace with 4 or more epigastric spines…………………………………. **8 (fig. 3.1B)**

8. Dorsal branchial spine absent and only 3 spines on posterior branchial margin. Only proximal spines present on P1 movable finger…… ***Galathea hydrae* (p. 67; fig. 3.1N)**

   Dorsal branchial spine always present, 4 spines on posterior branchial margin. Spines reaching at least midway along margin of P1 movable finger……………. **9 (fig. 3.1M)**

9. Row of spines on P1 movable finger reaching at least 2/3 length of margin. Numerous ridges on gastric and posterior branchial region…… ***Galathea* n. sp. A (p. 78; fig. 3.1G)**
   Row of spines on P1 movable finger reaching midlength of margin. Few ridges on gastric and posterior branchial region……..……… ***Galathea* n. sp. B (p. 84; fig. 3.1K)**

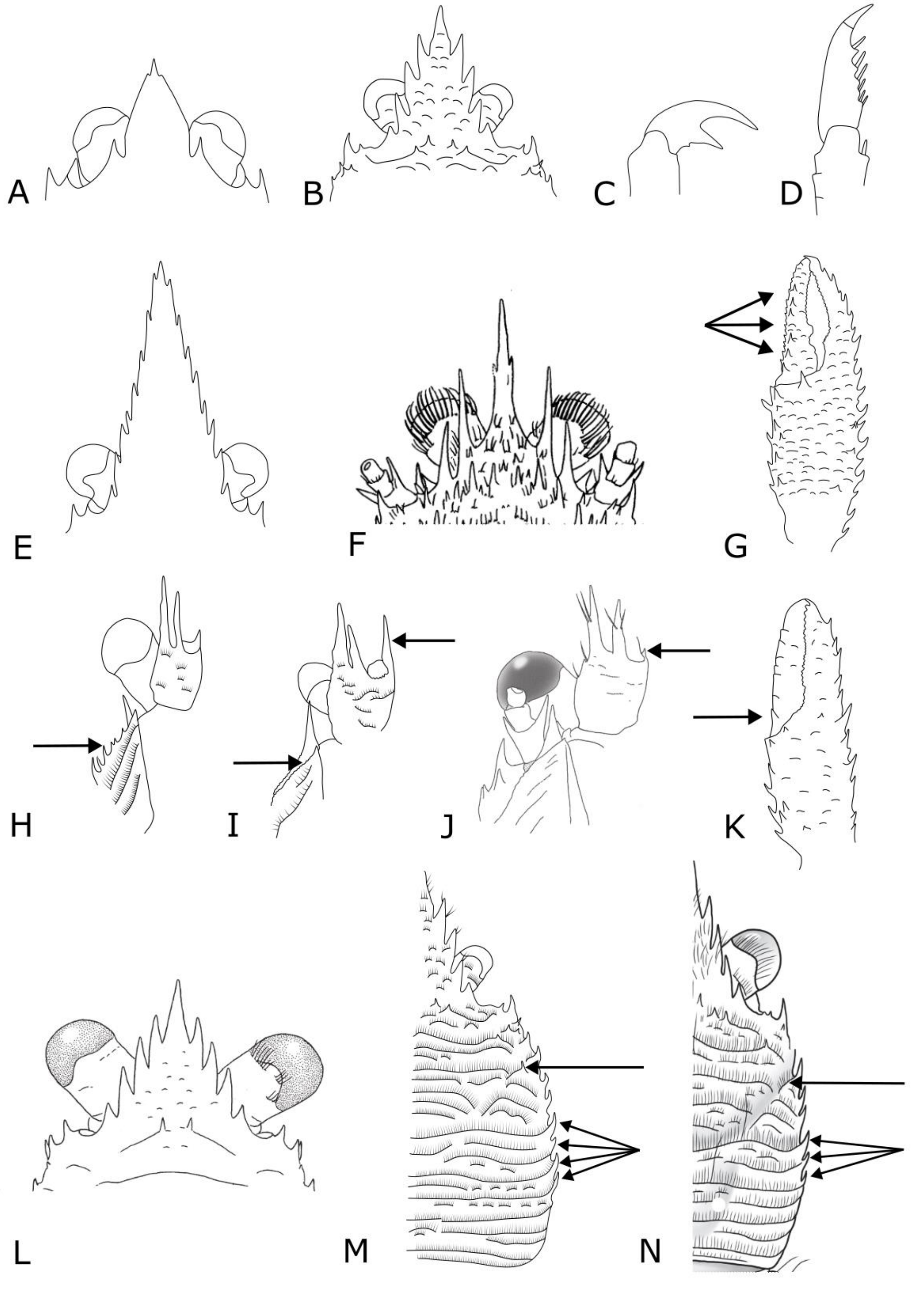

**Figure 3.1:** **A** – *Phylladiorhynchus* cf. *janiqueae* rostrum, dorsal view; **B** – *Galathea* n. sp. A rostrum, dorsal view; **C** – *Lauriea gardineri* Right P2, lateral view; **D** – *Galathea labidolepta* Right P2, lateral view; **E** – *Allogalathea elegans* rostrum, dorsal view; **F** – *Galathea lumaria* (from Baba, 2005) rostrum, dorsal view; **G** – *Galathea* n. sp. A Right P1, dorsal view; **H** – *Galathea labidolepta* cephalic region showing antennule and pterygostomian flap, ventral view; **I** – *Galathea* n. sp. A cephalic region showing antennule and pterygostomian flap, ventral view; **J** – *Galathea* cf. *pubescens* (from Baba et al., 2009) cephalic region showing antennule and pterygostomian flap, ventral view; **K** – *Galathea* n. sp. B Right P1, dorsal view; **L** – *Galathea tanegashimae* (from Baba et al., 2009) rostrum, dorsal view; **M** – *Galathea* n. sp. A lateral margin, dorsal view; **N** – *Galathea hydrae* (from Macpherson & Robainas-Barcia, 2015) lateral margin, dorsal view.

### Genus ***Allogalathea*** Baba, 1969

*Allogalathea* Baba, 1969: 5; Poore, 2004: 231; Baba et al., 2009: 87; Cabezas et al., 2011: 249; Macpherson & Baba, 2011: 12; Poore & Ahyong, 2023: 275.

**Type species:** *Galathea elegans* Adams, 1847.

**Diagnosis:** After Cabezas et al. (2011).

Carapace dorsal surface unarmed, with distinctive transverse striae bearing fine but coarse setae, lateral margins convex medially bearing a row of spines. Rostrum dorsally flattish, horizontal or marginally deflected, carinated ventrally, long with 5 – 9 small lateral teeth and no supraocular spines. Pleonites unarmed. Telson relatively short, incomplete subdivision. Short ocular peduncles with well pigmented cornea. Orbit strongly delimited, lateral limit rounded or bluntly produced. Basal antennular article with three terminal spines. Mxp3 ischium subtriangular in cross section, merus flexor margin with spines. P1 spinose with setiferous squamae. P2 – 4 moderately short, carpi and meri with row of spines on dorsal crests; dactyli flexor margin with row of teeth each bearing corneous seta. Males with two pairs of gonopods. Usually associated with crinoids.

**Remarks:** Globally there are only four species in the genus, with only one known in South African waters.

***Allogalathea elegans*** (Adams, 1847)

**Figures 3.2A, B, 3.9A**

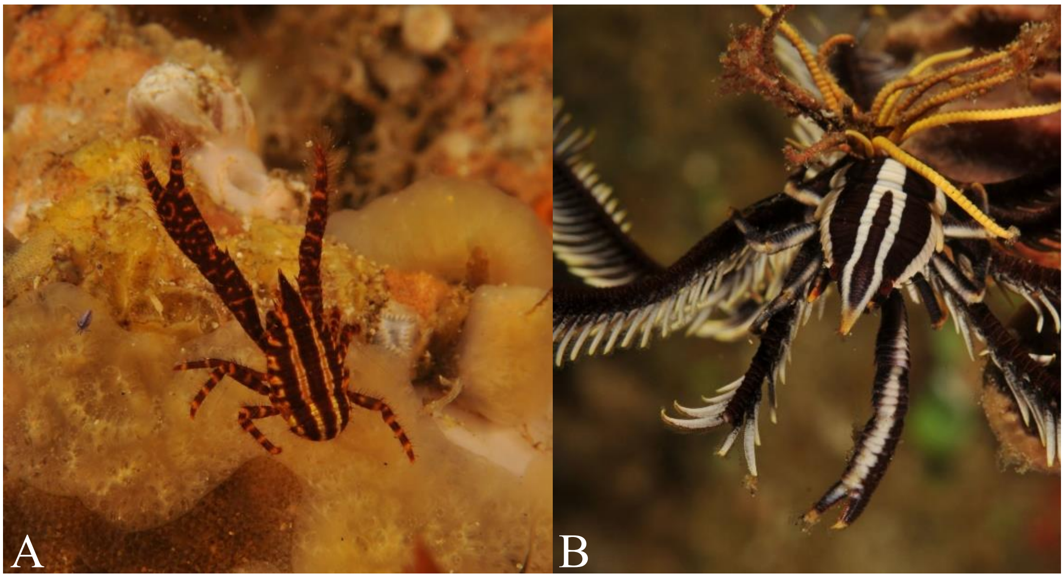

**Figure 3.2: A** – *Allogalathea elegans* (Adams, 1847), colour pattern three, Roonies, Sodwana Bay, KwaZulu-Natal, 32m; **B** – *A. elegans* on *Cenometra bella* (Hartlaub, 1890), colour pattern four, Aliwal Shoal, KwaZulu-Natal, 30m. Photographs: Mike and Valda Fraser.

*Galathea elegans* Adams, 1847: 8: plate 12, figure 7 (Corregidor, Philippines (type locality); Haswell, 1882b: 163 (Holborn Island (Queensland), 36 m); Miers, 1884: 278 (Albany Island, and Port Molle, 5 – 26 m); De Man, 1888: 455 (Ambon); Henderson, 1888: 117 (Celebes Sea, 18 – 37 m); Henderson, 1893: 431 (Tuticorin [(Gulf of Mannar] and Martaban [Gulf of Martaban, Burma]); Ortmann, 1894: 23 (Amboina); Borradaile, 1900: 421 (New Britain); de Man, 1902: 709 (Ternate); Grant & McCulloch, 1906: 50, plate 4, figures 6, 6a (Port Curtis, Queensland); Southwell, 1906: 220 (Chilaw Paar, Sri Lanka, 16 – 20 m); Balss, 1913: 4, figures 2 – 3 (Sagami Bay, 120 m); Potts, 1915: 83, figure 4, plate 1, figure 5 (Torres Strait); Balss, 1921: 22 (Cape Jaubert, North Western Australia, 10 m); Laurie, 1926: 133 (Seychelles and Cargados Carajos, 62 m); Gordon, 1935: 7 (Sorong Doom); Miyake, 1938: 37, figure 1, plate 2, figures A – E (Oshima, Kii Peninsula, possibly subtidal); Miyake in Miyake & Nakazawa, 1947: 733, figure 2118; Melin, 1939: 77, figures 48 – 53 (Bonin Islands, 73 – 146 m); Barnard, 1950: 487, figures 91, i – k (Durban and Delagoa Bay); Holthuis, 1953: 49 (Marshall Islands, 4 – 7 m, on *Comanthus bennetti*); Utinomi, 1956: 63, plate 32, figure 4 (no record); Tirmizi, 1966: 189, figure 11 (Red Sea, 55 m); Miyake, 1965: 635, figure 1045 (no record); Miyake & Baba, 1967: 228, figure 3 (East China Sea, 103 m); McNeill, 1968: 33 (Great Barrier Reef, Lizard Island, 35 m); Lewinsohn, 1969: 123, figure 24 (Red Sea, 1 – 25 m); Healy & Yaldwyn, 1970: 67, plate 31 (no record); Johnson, 1970: 3 (off Ajax Shoal and east of Sultan Shoal (Singapore), Singapore Straits south of Bedok, 16 – 44 m); Kensley, 1981: 34 (list).

*Galathea longirostris* Dana, 1852: 482 (type lost; type locality: Fiji Islands, 18 m); Dana, 1855: plate 30, figure 11; Southwell, 1906: 220 (Sri Lanka N of Cheval and Gulf of Manaar, 13 – 16 m); Yokoya, 1936: 138, figure 6 (type data: female, lost; type locality: Misaki, Sagami Bay, Japan).

*Galathea deflexifrons* Haswell, 1882a: 761 (type locality: Albany Passage, Queensland); Haswell, 1882b: 163.

*Galathea grandirostris* Stimpson, 1858: 90 (type lost; type locality: Kagoshima Bay, Japan, 9 m); Stimpson, 1907: 234 (Kagoshima Bay, Japan, 9 m); Henderson, 1888: 119, plate 12, figure 3 (Off Cebu, Philippines, 174 – 183 m); Borradaile, 1900: 421 (New Britain).

*Galathea* (?) *grandirostris* - Southwell, 1906: 221 (Dutch Modragam Paar, Sri Lanka, 22 – 66 m).

*Allogalathea elegans* – Baba, 1969: 6, figure 1 (Kii Peninsula, and Amakusa in Kyushu, 30 m); Haig, 1973: 275 (off Double Island Point, Queensland, 60 m); Haig, 1974: 447 (Western Australia); Baba, 1977: 252 (Ambon and Sulu Islands, 27 m); Baba, 1979: 654, figure 3 (Marsegu Island, Misool Islands, Banda Island, Gorong Island, and north coast of Seram (Ceram), subtidal, on crinoids); Miyake, 1982: 149, plate 50, figure 5 (southern Kii Peninsula, 45 m); Takeda, 1982: 50, figure 150 (no record); Baba, 1982b: 61 (Palau Islands (Ngadarak Reef)); Baba, 1988: 54 (between Sulawesi and Butung, North Balabac Strait off northern Borneo, Sulu Archipelago, off southeastern Mindanao, between Samar and Leyte, Sibuyan Sea, Luzon Strait off Batan, shore to 81 m); Baba, 1990: 950 (Madagascar, 28 – 60 m); Steene, 1990: 158, 320 (Christmas Island, Indian Ocean, 10 m, on crinoid *Comanthus bennetti*); Tirmizi & Javed, 1993: 27, figures 12, 13 (western Indian Ocean off northern Mozambique, Bay of Bengal Andaman Islands, and Andaman Sea, 22 – 77 m); Gosliner et al., 1996: 226, figure 820 (Australia; Philippines; Indonesia; Enewetak); Wu et al., 1998: 84, figures 6, 12C (Taiwan); Komai, 2000: 351 (list); Minemizu, 2000: 168, with 3 figures (Ohse-zaki, Shizuoka Pref., Japan, 16 m); Davie, 2002: 60 (no record); Jones & Morgan, 2002: 133, colour figure (no record); Kawamoto & Okuno, 2003: 93, unnumbered figures (Kume-jima, Okinawa, 10 – 15 m, on crinoids); Poore, 2004: 231, figure 63e, plate 13f (compilation); Kawamoto & Okuno, 2006: 93, unnumbered figure (Kume-jima, Okinawa, 10 – 15 mm, on crinoids); Ahyong, 2007: 13 (Lord Howe Rise, 72 – 82 m); Macpherson, 2008: 289 (Dampier Archipelago, W Australia, 10.5 – 39 m); Poore et al., 2008: 18 (SW Australia, 100 – 102 m); Fujita, 2010: 38, figures 1 – 10, tables 1, 2 (Okinawa Island, Ryukyu Islands; larvae); Cabezas et al., 2011: 256, figures 2, 3 (Eastern Australia, Indonesia, Madagascar, Vauban, Vanuatu, 0 – 120 m); Limviriyakul et al., 2016: 3, figure 3a (Taiwan, 4 – 24 m); Lin & Osawa, 2016: 489, figure 1a (Singapore, 7.6 – 15.4 m); Lee et al., 2019: 726, figures 1, 2 (Jeju Island, 20 m).

**Material examined:** South Africa, 27°02'24.00'S; 32°54'54.00'E, 75 m, 06/06/1990, SAMC-A094531, 1 ♂ 5.9 mm. South Africa, 29°52'59.9'S; 31°0.0'0.0'E, 5 m, 01/01/1929, SAMC-A07834, material lost.

**Description:** See Cabezas et al. (2011).

**Variation:** Posterior transverse ridge occasionally uninterrupted instead of interrupted. P1:pcl ratio exceeds known range (2.2 – 3.0) at 3.4. P1 merus proportionally slightly longer than carpus at 1.7 times instead of the 1.3 – 1.4 times. P4 carpi have 1 or 2 distal spines on extensor margin (not unarmed).

**Coloration (in life; Figures 3.2A, B):** Of the four colour patterns observed by Baba (1979), it seems in South Africa colour patterns three and four are observed, which are dark carapace with two narrow light stripes (Figure 3.2A) and carapace with alternating longitudinal stripes of dark and light (Figure 3.2B).

**Global distribution:** Throughout Indo-Pacific from South Africa to New Caledonia and Japan, 0 – 120 m.

**South African distribution:** Durban Harbour to off Boteler Point, 75 m (Figure 3.7).

**Genetic data:** Not available.

**Remarks:** Cabezas et al. (2011) did not report *A. elegans* to occur in South Africa, however Barnard (1950) reported on a specimen collected from Durban Harbour. The range in South Africa is here confirmed to extend from Durban northwards to the Mozambican border. This species has a close association with crinoids and is often collected from these host organisms, mimicking their colours. In South Africa it is known to occur on *Tropiometra carinata* (Lamarck, 1816) and here reported on *Cenometra bella* (Hartlaub, 1890). The specimen first reported from South Africa in Barnard (1947, 1950) from Durban Harbour is considered lost, as confirmed by staff of the Natural History Collections of the Iziko South African Museum.

### Genus ***Galathea*** Fabricius, 1793

*Galathea* Fabricius, 1793: 47; Stimpson, 1858: 76; Haswell, 1882b: 161; Henderson, 1888: 117; A. Milne Edwards & Bouvier, 1894: 249; A. Milne Edwards & Bouvier, 1897: 13; Stebbing, 1910: 362; Doflein & Balss, 1913: 139; Schmitt, 1921: 163; Laurie, 1926: 123; Makarov, 1938: 79 (1962: 81); Barnard, 1950: 482; Zariquiey Álvarez, 1968: 271; Baba, 1969: 9; Tirmizi & Javed, 1993: 41; Ingle & Christiansen, 2004: 151; Poore, 2004: 231; Baba, 2005: 74; Baba et al., 2008: 64 (compilation); 2009: 105; Macpherson & Baba, 2011: 53; Macpherson & Robainas-Barcia, 2015: 13; Poore & Ahyong, 2023: 275.

**Type species:** *Cancer strigosus* Linnaeus, 1761.

**Diagnosis:** After Baba et al. (2009) and Macpherson & Baba (2011).

Carapace dorsal surface with setiferous transverse ridges (obsolescent in some species), laterally with row of spines. Poorly defined cardiac region. Triangular, dorsoventrally flattened rostrum with 4 (rarely 2 or 5) lateral teeth. Pleonites unarmed. Telson subdivision usually incomplete. Mostly short ocular peduncles with somewhat dilated and well-pigmented corneas. Orbit delimited ventrally by denticulate crest. Basal antennular article with 2 or 3 distal spines (distodorsal and distolateral usually present, distomesial often smaller or absent). Basal antennal article usually with well-developed distomesial spine; article 2 with distolateral and distomesial spines. Mxp3 ischium subtriangular in cross-section, merus with 1 – 3 spines on flexor margin. P1 spinose and setose. P2 – 4 extensor margin with row of spines on meri and carpi; flexor margin of dactyli with row of distinct teeth each with stiff corneous seta, ultimate tooth usually prominent. G1 rarely absent; G2 present.

**Remarks:** Globally, 194 species are known from the genus. Of these, three have been reported from South Africa. Two more are added here along with two undescribed species giving a total of seven now in South African waters.

***Galathea hydrae*** Macpherson & Robainas-Barcia, 2015 – **NEW RECORD**

**Figure 3.9B**

*Galathea hydrae* Macpherson & Robainas-Barcia, 2015: 140, fig. 48 (Mozambique (type locality), 148 – 152 m).

**Material examined:** South Africa, 29°50'3.98'S; 31°14'8.99'E, 135 m, 05/02/2021, SAMC-A094783, 1 ♀ 3.8 mm.

**Variation:** Two pairs of epigastric spines present instead of three previously reported. Rostrum 1.4 times longer than broad, not 1.6. Antennal article 1 reaching distal margin of article 3, not 2. P1 merus 2.8 times carpus length, not 3.5. P2 and P3 merus are the same length, not P3 0.9 length of P2.

**Description:** See Macpherson & Robainas-Barcia (2015).

**Coloration:** Unknown.

**Global distribution:** Mozambique, 101 – 152 m and now South Africa.

**South African distribution:** Off Umgeni River, KwaZulu-Natal, 135 m (Figure 3.8).

**Genetic data:** Not available.

**Remarks:** Macpherson and Robainas-Barcia (2015) thought that *G. dispersa* reported from South Africa and adjacent waters were likely in fact *G. hydrae* (but they did not have access to any of the material). However, upon examination of the material identified as *G. dispersa* in the Natural History Collections of the Iziko South African Museum, it can be confirmed that these specimens are neither *G. dispersa*, nor *G. hydrae*, but represent a closely-related new species, which is described below as *Galathea* n. sp. A (see under remarks of that species). However, the new record listed above does represent *G. hydrae* and signifies a small range extension into South Africa, as the species was previously known only from Mozambique.

In South African waters, this species is morphologically most similar to *Galathea* n. sp. A (see differences under respective new species remarks).

***Galathea labidolepta*** Stimpson, 1858

**Figures 3.3, 3.4, 3.9C, D**

*Galathea labidolepta* Stimpson, 1858: 89 (Simons Bay, Cape of Good Hope (type locality), 22 m); Stimpson, 1907: 231 (Simons Bay, Cape of Good Hope, 22 m); Doflein & Balss, 1913: 140, figure 6 (South Africa near East London, 80 – 102 m); Lenz & Strunk, 1914: 287, figure 1; Baba et al., 2008: 71 (compilation); Macpherson & Robainas-Barcia, 2015: 153, figure 53 (Port Elizabeth, 18 – 20 m and Agulhas Cape, 80 m); Macpherson et al., 2023: 382 (synonymies).

*Galathea intermedia* – Barnard, 1946: 378 (South African waters); Barnard, 1950: 283, figures 91, a – e (Simon's Bay, Agulhas Bank, Algoa Bay, and East London, 37 – 77); Tirmizi & Javed, 1993: 69, figure 30 (western Indian Ocean off South Africa, 68 – 70 m) (not *Galathea intermedia* Liljeborg, 1851).

**Figure 3.3**: *Galathea labidolepta* Stimpson, 1858 from the Knysna Estuary on an unknown Porifera and exhibiting the blue spots on the dorsal carapace. Photograph: Dr. Louw Claassens.

**Material examined:**

**Neotype –** South Africa, south of Still Bay (neotype locality), 34°33'45.36’S; 21°18'8.99’E, 62 m, 14/04/2021, SAMC-A094746, 1 ♀ 5.9 mm.

**Other material** – South Africa, 33°44'57.12’S; 26°41'52.08’E, 53 m, 23/09/2016, SAMC-A066507, 1 ovig. ♀ 4.9 mm; South Africa, 33°44'57.12’S; 26°41'52.08’E, 53 m, 23/09/2016, SAMC-A066508, 1 ovig. ♀ 6.0 mm; South Africa, 33°44'57.12’S; 26°41'52.08’E, 53 m, 23/09/2016, SAMC-A066509, 2 ♂ 2.5 – 5.7 mm, 2 ovig. ♀ 3.8 – 5.0 mm; South Africa, 33°44'57.12’S; 26°41'52.08’E, 53 m, 23/09/2016, SAMC-A094739, 2 ♂ 2.5 – 5.7 mm, 2 ♀ 3.8 – 5.0 mm; South Africa, 34°37'38.99’S; 21°53'56.76’E, 78 m, 15/04/2021, SAMC-A094747, 1 ♂ 3.3 mm, 1 ♀ 4.5 mm; South Africa, 33°51'22.68’S; 26°38'24.72’E, 97 m, 01/05/2021, SAMC-A094750, 1 ♂ 4.7 mm, 1 ovig. ♀ 5.6 mm; South Africa, 34°36'2.16’S; 21°7'0.48’E, 75 m, 14/05/2021, SAMC-A094751, 1 ♂ 3.0 mm; South Africa, 29°51'54.79’S; 31°9'11.30’E, 88 m, 05/02/2021, SAMC-A094761, 4 ♂ 1.4 – 1.8 mm, 3 ♀ 1.7 – 2.0 mm, 1 ovig. ♀ 2.4 mm; South Africa, 29°55'52.54’S; 31°3'45.86’E, 66 m, 26/10/2020, SAMC-A094769, 4 ♂ 3.2 – 3.7 mm, 2 ovig. ♀ 2.6 – 3.7 mm; South Africa, 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094785, 2 ♂ 1.8 – 1.9 mm, 1 ♀ 2.5 mm; South Africa, 29°49'14.41’S; 31°14'17.05’E, 99 m, 05/02/2021, SAMC-A094789, 7 ♂ 1.5 – 2.6 mm, 12 ♀ 1.4 – 2.4 mm; South Africa, 29°52' 42.31’S; 31°10'0.41’E, 110 m, 05/02/2021, SAMC-A094798, 31 ♂ 1.4 – 3.5 mm, 15 ♀ 1.6 – 2.5 mm, 3 ovig. ♀ 2.3 – 2.8 mm; South Africa, 34°3'18.18’S; 25°46'42.72’E, 75 m, 05/04/2022, SAMC-A094800, 5 ♂ 3.8 – 6.1 mm, 1 ovig. ♀ 4.3 mm; South Africa, 34°19'43.68’S; 22°11'44.23’E, 75.2 m, 20/05/2022, SAMC-A094811, 1 ovig. ♀ 4.5 mm; South Africa, 34°4'60.00’S; 25°58’60.00’ E, 84 m, 25/11/1960, SAMC-A094576, 1 ♂ 4.6 mm, 8 ♀ 1.7 – 3.6 mm, 3 ovig. ♀ 3.5 – 4.3 mm; South Africa, 34°4'60.00’S; 25°58'60.00’E, 84 m, 25/11/1960, SAMC-A094548, 1 ♂ 3.2 mm, 1 ovig. ♀ 3.4 mm; South Africa, 34°02'S; 23°27'E, 42 m, 11/02/1962, SAMC-A094574, 1 ♀ 2.8 mm; South Africa, 34°35'S; 21°56'E, 78 m, 28/08/1960, SAMC-A094573, 1 ♂ 4.5 mm; South Africa, 30°47.6'S; 30°29.6'E, 44 m, 17/05/1958, SAMC-A094577, 5 ♂ 2.0 – 3.7 mm, 1 ♀ 4.6 mm, 5 ovig. ♀ 2.5 – 3.2 mm; South Africa, 34°9'29.88’S; 18°27'0.36’E, 19 m, 28/04/1947, SAMC-A19512, 3 ♂ 3.9 – 5.2 mm, 1 ♀ 3.4 mm, 1 ovig. ♀ 5.5 mm; South Africa, 34°09'23.34’S; 22°47'44.94’E, 69 m, 28/06/2022, SAMC-A094812, 11 ♂ 2.8 – 5.9 mm, 6 ♀ 2.3 – 4.5 mm, 6 ovig. ♀ 4.4 – 5.0 mm; South Africa, 33°58'13.08’S; 26° 06'46.92’E, 84 m, 05/04/2022, SAMC-A094765, 1 ♂ 4.8 mm, 1 ♀ 4.4 mm, 1 ovig. ♀ 3.5 mm.

**Description:**

*Carapace:* Roughly as long as broad (rarely up to 1.2 times longer than broad); transverse ridges with short dense simple setae; distinct cervical groove, laterally bifurcated. Gastric area with 8 transverse ridges: 2 epigastric ridges, anterior ridge interrupted medially with 1 – 2 pairs of median spines, posterior ridge scale-like, not extending laterally; 2 protogastric ridges, anterior ridge slightly convex, uninterrupted, without parahepatic spines, posterior ridge scale-like; 1 uninterrupted mesogastric ridge, not extending laterally to anteriormost branchial marginal spines; 3 metagastric ridges, anterior ridge extending laterally to anterior branchial margin, uninterrupted, median ridge laterally interrupted, posterior ridge short, not extending past cervical groove. Hepatic region unarmed or with small hepatic spine occasionally present near anterolateral spine. Cervical groove shallow, followed by uninterrupted mid-transverse ridge and 6 other ridges, 4 ridges uninterrupted. Lateral margins convex, with 7 spines: first well-developed anterolateral spine, slightly posterior to lateral level of orbit; 3 spines on anterior branchial margin and 3 on posterior branchial margin, last spine small. Small spine on lateral limit of orbit, with 1 small frontal spine, infraorbital margin with 2 spines. Rostrum 1 – 1.6 times as long as broad, 0.4 – 0.5 times carapace length and breadth 0.3 – 0.4 that of carapace greatest width; some setose scales on dorsal margin, lateral margin with 4 sharp, deeply-incised teeth.

Pterygostomian flap rugose with 7 – 8 spines on upper margin near linea anomurica, decreasing in size posteriorly, some ridges with short setae, anterior margin blunt.

*Sternum:* As long as broad, lateral extremities somewhat divergent posteriorly.

*Pleon:* Pleonites 2 – 4 with 2 uninterrupted transverse ridges each; pleonite 5 with 2 medially interrupted ridges, anterior ridge short; pleonite 6 with 2 short, medially interrupted ridges. Males with G1 and G2.

*Eye:* Maximum corneal diameter 0.3 – 0.7 rostrum width, ocular peduncles length 0.8 times width.

*Antennule:* Article 1 with 2 well-developed distal spines, distodorsal larger, both with tuft of setae, distomesial spine minute. Ultimate article with some short, fine setae on distodorsal margin, not in tuft.

*Antenna:* Article 1 with well-developed ventral distomesial spine exceeding distal margin of article 2. Article 2 with 2 distal spines, distolateral slightly longer than distomesial, reaching mid-length of article 3. Articles 3 and 4 unarmed.

*Mxp3:* Ischium with 2 (rarely 1) small spines on distoflexor margin, 1 distal spine on extensor margin; crista dentata with 17 – 22 (rarely up to 24) denticles. Merus 1.3 – 2 times longer than ischium, flexor margin with 2 subequal spines on distal half, extensor margin with small spine and several eminences and long setae. Carpus, propodus, dactylus unarmed; propodus elongate.

*P1*: 2.9 times carapace length with scattered, finely setiferous scales, some long, non-iridescent simple setae. Merus 0.8 times carapace length, 1.7 times as long as carpus, spines roughly arranged in rows, dorsomesial and mesial spines stronger, distal spines well-developed. Carpus 0.8 times length of palm, 2.7 times longer than broad; dorsal and lateral surfaces with rows of spines; mesial margin 3 – 5 spines (distal second strongest). Palm 3.4 times longer than broad, spines arranged roughly in lateral, dorsolateral, mesial and dorsomesial rows; dorsolateral continuing along fixed finger. Fingers 1.2 times length of palm, movable fingers with small spines proximally and well-developed distal spine, fixed finger with row of spines.

*P2 – 4*: Moderately slender, with setose striae and scattered long, non-iridescent simple setae. P2 1.8 times carapace length. Meri shorter successively (P3 merus 0.9 length of P2 merus, P4 merus 0.8 length of P3 merus); P2 merus 0.6 times carapace length, 4.0 times as long as broad, 1.3 times longer than P2 propodus. Extensor margin with row of 10 – 12 proximally diminishing spines on P2 – 3, only distal spine on P4; flexor margins distally ending in strong spine (with small spine at base occasionally present) followed proximally by 0 – 1 spines and several eminences, lateral margins unarmed. Carpi with 6 – 7 spines on extensor margin of P2 – 3, P4 unarmed; lateral margin with 2 or 3 acute granules sub-parallel to extensor margin; flexor margin with some eminences on P2 – 3, distal margin acute. Propodi 4.5 – 4.6 times as long as broad; extensor margin with 1 – 2 proximal spines on P2 – 3, P4 unarmed; flexor margin with 6 slender movable spines on P2, P3 – 4 only 4 spines. Dactyli ending in well-curved strong spines, 0.5 – 0.6 times length of propodi; flexor margin with 5 or 6 proximally diminishing teeth, distal one prominent.

Epipods on P1.

**Variation:** Ranges noted in description. P1 fingers occasionally gaping distally in males.

**Coloration (in life; Figures 3.3, 3.9C, D):** Carapace light-orange to brick-red with blue or white spots (Figure 3.3, 3.9C, D), pleomere tergites 2 – 4 light-orange, often mottled (Figure 3.9D), posterior tergites and tailfan white. Rostrum and ocular peduncles white to light-orange. Eyes green or light-green. Chelipeds and walking legs orange with some orange/white mottling on meri.

**Global distribution:** South Africa (endemic).

**South African distribution:** False Bay to Durban Bay, 19 – 135 m (Figure 3.8). Neotype from Still Bay, 62 m.

**Genetic data:** 16S, COI; see Appendix Tables 3.1, 3.2.

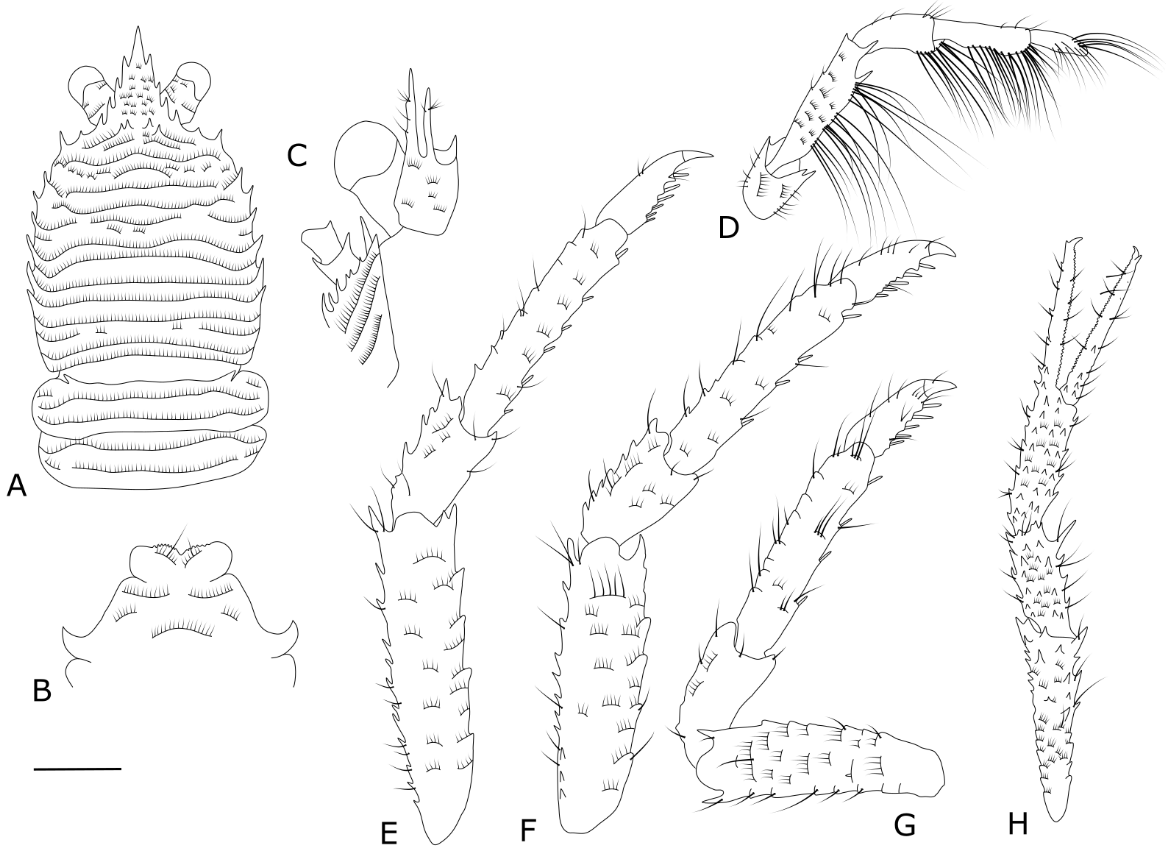

**Figure 3.4:** *Galathea labidolepta* Stimpson, 1858*,* neotype, ♀, 5.9 mm (SAMC-A094746), South of Still Bay, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region, showing antennular and antennal peduncles, ventral view; **D** – Right Mxp3, lateral view; **E** – Right P2, lateral view; **F** – Right P3, lateral view; **G** – Right P4, lateral view; **H** – Left P1, dorsal view. Scale bar: A, H = 2.0 mm; B – G = 1.0 mm.

**Remarks:** This was the first squat lobster described from South Africa in 1858 by William Stimpson. However, Barnard (1950) synonymised *G. labidolepta* with *G. intermedia* Liljeborg, 1851, although the synonymy was not incorporated in subsequent publications pertaining to the group and both species are currently valid. Macpherson & Robainas-Barcia (2015) made mention of the similarities between these two species (and others) and highlighted the need for a revision, not only of *G. labidolepta* but also *G. intermedia* (which is in progress, Macpherson, pers. comm.). After close examination of the morphology of South African material, it can be confirmed that *G. labidolepta* is a valid species, distinctly different from G. intermedia and other closely related species; *G. bolivari* Zariquiey Alvarez, 1950 and *G. cenarroi* Zariquiey Alvarez, 1968. The main differences between *G. labidolepta* and *G. intermedia* is with regards to ridges on the carapace and pleon, with the former having more ridges and the ridges bear plumose setae, whereas in the latter there are few ridges with simple setae. This was confirmed by genetic analyses which, showed *G. labidolepta* to have an 11.3 – 12.0% (COI) divergence to *G. bolivari* and 11.4 – 13.0% (COI) to *G. intermedia* (Appendix Figure 3.12).

A neotype for this species is assigned herein, as the holotype was lost during the Chicago fire of 1871, which destroyed the Chicago Academy of Sciences, where the Stimpson collection was held, and no neotype has since been assigned. Unfortunately, a neotype could not be collected from the type locality, though one is selected from nearby. The neotype does however match with the original description and hence is assigned as such. This species was frequently collected with other squat lobsters, such as *G. hydrae*, *Trapezionida antonbruuni* (Tirmizi & Javed, 1980), *T. janetae* (Tirmizi & Javed, 1992), *T. limula* (Macpherson & Baba, 1993), and the two undescribed species detailed below, *Galathea* n. sp. A and *Galathea* n. sp. B.

Some variation was observed in several characters. Some specimens do not exhibit the diagnostic character of having the Mxp3 merus twice the length of the ischium. Some males occasionally have an elongated P1 more than four times carapace length. Moreover, the P2 – 4 propodi with variable number of spines ranging from three to five. Macpherson and Robainas-Barcia (2015) also noted some differences in the specimens they examined; namely the hepatic region occasionally with small spine. Moreover, the rostrum length previously described as 1.9 times as long as broad, was only 1.0 – 1.6 in this study. Lastly, the P1 palm length was also reported to be greater than the fingers' length, however most specimens observed in this study had fingers slightly longer than palm.

The records herein greatly expand the distribution (and depth) of this species from the previously reported False Bay – East London (18 – 102 m) to False Bay – Durban Bay (18 – 135 m). Specimens from across the distribution range had an intraspecific variation (COI) of 0.5 – 1.2% confirming, along with morphological analyses, that all the material represents *G. labidolepta*.

This species is easily distinguishable from others in the genus as it has a row of spines on the upper margin of the pterygostomian flap (a rare, but unique character). Moreover, the third maxilliped merus is twice as long as the ischium (Figure 3.4D)

***Galathea lumaria*** Baba, 2005

*Galathea lumaria* Baba, 2005: 78, 244, figures 27, 29a (key, synonymies, off Durban (type locality), 412 m); Baba et al., 2008: 72 (compilation); Macpherson & Robainas-Barcia, 2015: 177 (key, synonymies); Macpherson et al., 2023: 380 (Mayotte Island, 455 – 505 m).

**Material examined:** None available. Type material – South Africa, 29°56’S; 31°19'30.0’E, 412 m, 26/08/1929, ZMUC CRU-11527, 3 ovig. ♀ 5.3 – 6.7 mm.

**Description:** <u>See Baba (2005).</u>

**Variation:** N/A.

**Coloration:** Unknown.

**Global distribution:** Madagascar, Mayotte Island, Mozambique, and South Africa, 206 – 505 m.

**South African distribution:** Off Durban, KwaZulu-Natal, 412 m (Figure 3.8).

**Genetic data:** Not available.

**Remarks:** This enigmatic species was described from three ovigerous females caught east of Durban in 1929. It was recently collected only for the second time by Macpherson et al. (2023) from Mayotte Island, so is no longer a South African endemic. It was collected along with two other squat lobster species; *Gonionida shaula* (Macpherson & de Saint Laurent, 2002) and *Uroptychus simiae* Kensley, 1977. In South African waters, this species can easily be distinguished based on the long, narrow rostrum with two slender, lateral spines.

***Galathea* cf. *pubescens*** Stimpson, 1858

**Figure 3.10A**

*Galathea pubescens* Stimpson, 1858: 90 (Hakodate and Amami-oshima Island, Japan (type locality), 46 – 60 m); Stimpson, 1907: 233 (East coast of Amami-oshima Island and Hakodate, Hokkaido, 46 – 60 m); Balss, 1913: 11, figures 11, 12 (Sagami Bay, 120 – 150 m); Yokoya, 1933: 57 (West of Muroto-zaki, Japan, 234 m); Makarov, 1938: 91, figures 32, 33 (no record); Miyake in Miyake & Nakazawa, 1947: 732, figure 2116 (no record); Miyake, 1965: 634, figure 1043 (no record); Tirmizi, 1966: 187 (Zanzibar, 421 – 457 m); Baba, 1969: 48, figure 5 (East China Sea, 120 m); Kim, 1973: 176, figure 6a, 6b, 20, plate 65, (Korea); Haig, 1974: 447 (Western Australia); Miyake, 1982: 145, plate 49, figure 3 (southern Kii Peninsula, 45 m); Baba, 1988: 76 (off North Mindanao, between Cebu and Bohol, between Cebu and Leyte, East coast of Mindoro and South China Sea off Southwest Luzon, 198 – 494 m); Baba, 1994a: 4 (off Central Queensland, 296 – 303 m); Wu et al., 1998: 97, figures 14, 21A (Taiwan); Komai, 2000: 353 (list); Davie, 2002: 62 (list); Baba, 2005: 83, figures 30, 245 (key, synonymies, Japan, Bali Sea, Kei Islands, Arafura Sea and New Caledonia, 137 – 450 m); Baba et al., 2008: 76 (compilation); Baba et al., 2009: 92, figures 105, 106 (Taiwan, 209 – 349 m); Dong & Li, 2010: 17 (East and South China seas, 110 – 494 m); Poore et al., 2011: 333, plate 11F (colour photo, Philippines); Macpherson & Robainas-Barcia, 2015: 256, figure 120A (colour photo, key, synonymies, Indonesia, Tonga & Vanuatu, 170 – 890 m).

Not *Galathea pubescens* – Baba, 1990: 956 (Madagascar, 150 – 350 m) (= *Galathea villosa*).

Dubious identification:

*Galathea pubescens* – Tirmizi & Javed, 1993: 72, figure 31 (Durban, South Africa, 138 m).

**Material examined:** None available. Type material – Material lost (Baba, 2005).

**Description:** See Baba (2005).

**Variation:** N/A.

**Coloration (in life; Figure 3.10A from Macpherson & Robainas-Barcia, 2015):** Carapace, P1 and meri of walking legs light orange. Posterior pleonites and dactyli of walking legs whitish.

**Global distribution:** Japan to New Caledonia, Philippines, Indonesia (Kei Islands), Tonga Vanuatu and off Central Queensland and South Africa (though record dubious), 45 – 890 m.

**South African distribution:** East of Durban, KwaZulu-Natal, 138 m (Figure 3.8).

**Genetic data:** Not available.

**Remarks:** The South African material collected on the IIOE I (International Indian Ocean Expedition) was identified as *G. pubescens* by Tirmizi & Javed, 1993. However, since the type material is known from Japan, there is some concern over the identity of these South African specimens. This was also highlighted by Macpherson & Robainas-Barcia (2015) who suggested that the status of the South African material is dubious, and more work is required to confirm its identity. Tirmizi and Javed (1993) indicated that the specimens collected during IIOE I would be deposited in the Smithsonian Institution. However, when contacted about the material they confirmed it is not in their possession and attempts to contact the University of Karachi, where Tirmizi and Javed were based, were unsuccessful. Interestingly, some specimens from Madagascar identified as *G. pubescens* by Baba (1990) were deemed to be a new species, *Galathea villosa,* by Macpherson and Robainas-Barcia (2015). It is likely that the South African material (and indeed all Western Indian Ocean material) could also represent this species, however, until more material is collected, the identity remains dubious and hence it is listed here as cf. Moreover, it is worth noting that the coordinates given in Tirmizi and Javed (1993) are wrong, and the latitude should read “29°35’S”, rather than “35’S”, based on the station information given for *Phylladiorhynchus serrirostris* (now *P. janiqueae*) in Tirmizi & Javed (1980).

In South African waters, *G.* cf. *pubescens* is most similar to *G. tanegashimae*, however can be distinguished based on the first antennular article bearing only two well-developed terminal spines, while the distomesial spine is obsolescent or minute unlike *G. tanegashimae* that has three well developed terminal spines. Moreover, the carapace bears a row of epigastric spines and not only two as in *G. tanegashimae*.

***Galathea tanegashimae*** **Baba, 1969 – NEW RECORD**

**Figure 3.10B**

*Galathea tanegashimae* Baba, 1969: 16, figure 4 (southern Kyushu, Japan (type locality), 15 – 30 m); Lewinsohn, 1981: 182 (Somalia); Tirmizi & Javed, 1993: 42, 65 – 66, figures 17, 28 (eastern Indian Ocean, 77 m); Ahyong, 2007: 14, figure 7 (Lord Howe Rise, 72 – 82 m); Baba et al., 2008: 80 (compilation); Baba et al., 2009: 127, figures 107 – 109 (Taiwan, 3 – 5 m); Macpherson & Cleva, 2010: 62, figures 3G, H (Mayotte, 3 – 30 m); Dong & Li, 2010: 20, figure 12 (South China Sea, 5 – 10 m); Poore et al., 2011: 334, plate 12A (Madagascar); Poupin et al., 2013a: 16, figure 7b, c (Mayotte, 3 – 30 m); Poupin et al., 2013b: 6 (Europa Island, Mozambique Channel); Macpherson & Robainas-Barcia, 2015: 303, figure 121D (Japan (Okinawa), Philippines, South China Sea (Macclesfield Bank), Vanuatu, Papua New Guinea, Australia (Queensland), New Caledonia, Maldives Islands, Seychelles Islands, Mayotte Island, Scattered Islands, Mozambique, Madagascar, 0 – 153 m); Macpherson et al., 2023: 383 (Glorieuses Islands, 97 – 124 m).

*Galathea spinosorostris* – Baba, 1990: 959 (Madagascar, 14 – 340 m).

**Material examined:** South Africa, 26°52'54.0’S; 32°55'18.0’E, 49 m, 03/06/1990, SAMC-A094567, 1 ovig. ♀ 3.9 mm; South Africa, 27°2'24.0’S; 32°54'54.0’E, 75 m, 06/06/1990, SAMC-A094568, 1 ♂ 3.7 mm.

**Description:** See Baba et al. (2009).

**Variation:** Distal spine on flexor margin of Mxp3 merus is not minute, as stated in the description, but well-developed. Distal spine of basal antennal article is well-developed, almost reaching the end of article 3 and not a short stout spine. Propodi of P2 – 4 occasionally have 4 spines on extensor margin and not 3.

**Coloration:** After Baba et al. (2009).

Carapace variable, brown, green or orange overall. Joint area between palm and fingers with white “X”-marking always present.

**Global distribution:** Japan, Taiwan, South China Sea, Vanuatu, Papua New Guinea, New Caledonia, Maldives Islands, eastern Indian Ocean, Seychelles Islands, Mayotte Island, Scattered Islands, Mozambique, Madagascar, 0 – 153 m and now South Africa.

**South African distribution:** Off Boteler Point, 49 – 75 m (Figure 3.8).

**Genetic data:** Not available.

**Remarks:** The South African specimens agree well with the original description and represents a small range extension (especially considering the wide scale of the known distribution), as this species is already known in the greater SWIO region. Often collected from sponges, corals (*Pocillopora* spp.), rocks and sand (Macpherson & Robainas-Barcia, 2015). This species has one of the most extensive distributions in all Galatheidae and exhibits no morphological or genetic differences between localities (Macpherson pers. comm.). Most similar to *G.* cf. *pubescens* in South African waters (see *G.* cf. *pubescens* remarks for differences).

### *Galathea* n. sp. A (to be named only when formally published)

**Figures 3.5, 3.10C, D**

*Galathea nexa* – Doflein & Balss, 2013: 139 (Francis Bay, near East London) (not *G. nexa* Embleton, 1836).

*Galathea dispersa* – Barnard 1950: 486, fig. 91f – h (no record); Kensley, 1981: 34 (list); Tirmizi & Javed, 1993: 67, fig. 29 (not *G. dispersa* Spence Bate, 1859).

**Material examined:**

**Holotype** – South Africa, south of Mossel Bay (type locality), 34°19'43.68'S; 22°11'44.23'E, 75 m, 20/05/2022, SAMC-A094807, 1 ♂ 8.3 mm.

**Paratypes** – South Africa, 34°19'43.68'S; 22°11'44.23'E, 75 m, 20/05/2022, SAMC-A094807, 3 ♂ 4.1 – 5.3 mm, 2 ovig. ♀ 6.1 mm.

**Other material:** South Africa, 34°09'17.46'S; 22°48'37.32'E, 74 m, 01/05/2019, SAMC-A094743, 3 ♂ 4.1 – 9.1 mm; South Africa, 35°20'23.64'S; 21°38'12.12'E, 127 m, 15/05/2021, SAMC-A094753, 1 ♂ 7.1 mm; South Africa, 35°13'S; 21°19'18.00'E, 111 m, 22/03/1948, SAMC-A019511, 13 ♂ 4.2 – 8.5 mm; 6 ♀ 5.0 – 7.1 mm, 4 ovig. ♀ 5.1 – 5.9 mm; South Africa, 34°36'2.16'S; 21°07' 0.48'E, 75 m, 14/05/2021, SAMC-A094752, 1 ♀ 7.5 mm; South Africa, 34°01'53.64'S; 25°45'44.34'E, 49 m, 08/04/2022, SAMC-A094802, 2 ♂ 8.6 – 8.8 mm, 3 ovig. ♀ 7.2 – 8.1 mm; South Africa, 34°04'S; 25°59'E, 84 m, 25/11/1960, SAMC-A094547, 8 ♂ 1.9 – 7.1 mm, 9 ♀ 1.8 – 7.7 mm; South Africa, 34°15'S; 25°50'24.00'E, 108 m, 09/02/1962, SAMC-A094546, 1 ovig. ♀ 4.8 mm; South Africa, 29°46'S; 31°16'58.80’E, 130 m, 23/04/1958, SAMC-A094545, 1 ♂ 7.7 mm; South Africa, 29°53’S; 31°06’E, 183 m, 01/03/1963, SAMC-A012027, 9 ♂ 3.3 – 6.3 mm, 5 ♀ 3.8 – 5.6 mm; South Africa, 35°12'S; 22°11'E, 120 m, 24/05/1973, SAMC-A094539, 1 ♂ 3.0 mm, 1 ♀ 4.5 mm, 1 ovig. ♀ 5.7 mm; South Africa, 34°22'48.00’S; 23°21'E, 108 m, 20/09/1993, SAMC-A094562, 4 ♂ 4.0 – 7.4 mm, 1 ovig. ♀ 6.1 mm; South Africa, 33°29'58.20'S; 27°13'52.68'E, 40 m, 29/08/1901, SAMC-A0919, 5 ♂ 5.4 – 7.8 mm, 2 ♀ 4.6 – 8.1; South Africa, 33°49'59.88'S; 25°46'00.12'E, 37 m, 24/10/1898, SAMC-A0920, 1 ♂ 10.0 mm, 1 ovig. ♀ 5.2 mm (dry specimens); South Africa, 34°14'51.00'S; 18°30'01.80'E, 42 m, 08/06/1900, SAMC-A0922, 3 ♂ 5.9 – 9.7 mm, 1 ♀ 6.1 mm (dry specimens); South Africa, 33°25'39.72'S; 27°05'36.96'E, 40 m, 06/08/1901, SAMC-A0923, 4 ♀ 5.9 – 7.4 mm (dry specimens); South Africa, 30°47'13.92'S; 30°34'50.88’E, 91 m, 14/03/1901, SAMC-A0924, 2 ♀ 7.4 mm (dry specimens); South Africa, 29°21'02.88'S; 31°51'39.96'E, 113 m, 30/01/1901, SAMC-A0925, 1 ♂ 6.2 mm (dry specimens); South Africa, 34°04'00.12'S; 25°07'59.88'E, 42 – 64 m, 26-28/04/1906, SAMC-A0930, 2 ♂ 4.6 – 7.3 mm; South Africa, 34°04'59.88'S; 22°13'59.88'E, 38 m, 24/06/1898, SAMC-A0931, 1 ♀ 7.6 mm, 1 ovig. ♀ 7.2 mm (dry specimens); South Africa, 33°20'46.32'S; 27°23'01.32'E, 60 m, 27/08/1901, SAMC-A0932, 1 ♀ 6.3 mm; South Africa, 32°57'16.92'S; 28°05'13.92'E, 37 m, 11/07/1901, SAMC-A0933, 1 ♂ 7.3 mm, 1 ♀ 7.4 mm; South Africa, 33°13'59.88'S; 27°57'59.40'E, 90 m, 15/07/1901, SAMC-A0936, 1 ♂ 6.1 mm, 1 ovig. ♀ 3.7 mm; South Africa, 28°59'59.64'S; 31°46'26.40'E, 24 m, 08/02/1901, SAMC-A0937, 2 ♂ 5.4 – 5.7 mm, 2 ♀ 6.9 – 8.8 mm (dry specimens).

**Description:**

*Carapace:* Slightly longer than broad, with transverse ridges bearing short, dense plumose setae and few long setae. Cervical groove distinct, bifurcated laterally. Several transverse ridges; 2 epigastric ridges, anterior ridge interrupted medially by (2) – 3 pairs of epigastric spines, posterior ridge scale-like; 3 protogastric ridges, anterior ridge laterally interrupted, convex medially, with 1 parahepatic spine on each side, median ridge convex medially, with pair of long medial setae, interrupted laterally, posterior ridge short, scale-like; 2 mesogastric ridges, anterior ridge uninterrupted, does not extend to lateral margins, posterior ridge interrupted; 3 metagastric ridges, anterior and median ridge uninterrupted with scales between them, not extending laterally to anterior branchial region; posterior ridge short, uninterrupted, also not extending laterally; (2) – 4 small hepatic spines near anterolateral spine. Anterior branchial region with (4) – 5 distinct short ridges, 1 anterior branchial spine on each side. Mid-transverse ridge uninterrupted, concave medially, preceded by cervical groove. Posterior branchial region with 9 transverse ridges, 4 ridges uninterrupted, scales between some ridges. Lateral margins slightly convex, with 9 spines: 2 spines in front of and 7 behind anterior cervical groove; anterolateral first, well-developed, second small, at midlength between anterolateral and anteriormost spine of branchial margin, small spine between first and second; 3 spines on anterior branchial region, and 4 spines on posterior branchial region, posterior one small. Small spine on frontal margin between lateral limit of orbit and anterolateral spine; infraorbital margin with 2 spines, one well-developed, the other small. Rostrum 1.6 as long as broad, length 0.5 postorbital carapace length, breadth 0.3 that of carapace; dorsal surface slightly concave; distalmost lateral incisions 0.3 distance between proximal-most lateral incisions; rostrum with several scales and setae, pointing down proximally, lateral margin with 4 deeply incised sharp teeth, decreasing in size anteriorly.

Pterygostomian flap unarmed, rugose, ridges with short setae, anterior margin angular.

*Sternum:* As long as broad, lateral limits diverging posteriorly.

*Pleon:* Pleonites 2 and 3 with 3 transverse ridges on tergite, anterior and posterior ridge uninterrupted, medial ridge interrupted laterally; pleonite 4 with 1 uninterrupted ridge anteriorly and laterally interrupted ridge with scales in between; pleonite 5 with short mesial ridge anteriorly and 1 uninterrupted ridge posteriorly; pleonite 6 with 2 medially interrupted ridges. Males with G1 and G2.

*Eye:* Ocular peduncles 0.7 times as long as broad, maximum corneal diameter 0.5 rostrum width.

*Antennule:* Article 1 with 3 well-developed spines, distomesial and distodorsal spines subequal, large distolateral spine with long, fine setae. Ultimate article with tuft of fine setae on distodorsal margin.

*Antenna:* Article 1 with well-developed ventral distomesial spine exceeding distal margin of article 3. Article 2 with 2 well-developed distal spines, distomesial spine larger, pointing mesially, distolateral spine almost reaching distal margin of article 3. Article 3 with distomesial spine, article 4 unarmed.

*Mxp3:* Ischium with 2 well-developed distal spines on flexor margin, extensor margin with small distal spine; crista dentata with 24 – 25 denticles. Ischium 0.8 length of merus; merus flexor margin with 2 spines, proximal well-developed, distal one small, extensor margin with small distal spine. Carpus unarmed. All segments covered in long, fine setae.

*P1:* (2.4 –) 3.0 times carapace length, covered in short, dense plumose setae and fine setiferous scales. Merus 0.7 times carapace length, 1.7 times carpus length, with spines arranged in rows, dorsomesial and distal spines well-developed. Carpus 0.7 length of palm, 1.2 – (1.5) times longer than broad, dorsal and lateral margin with row of spines, mesial margin with several spines, second spine massive. Palm 1.8 times longer than wide, lateral and mesial margins convex, both margins with row of spines, dorsolateral row extending onto fixed finger. Fingers 0.6 – (0.7) times length of palm, curving outwards with gaping appearance, mesial margin of moveable finger with large tooth proximally and several spines reaching halfway along lateral margin.

*P2 – 4:* Moderately slender, with long plumose setae and several setiferous scales. P2 (1.6 –) 1.9 times carapace length, meri successively shorter posteriorly (P3 0.9 length of P2, P4 0.8 length of P3); P2 merus 0.6 times carapace length, 3.6 times longer than broad, 1.3 times longer than propodus; P3 merus 2.8 times longer than broad, 1.1 times longer than P3 propodus; P4 merus 2.5 times longer than broad, as long as P4 propodus. Extensor margin of P2 – 3 meri with row of 7 – 9 spines, distalmost spine largest, P4 with 1 distal spine; flexor margin with 2 distal spines, followed by several eminences; P4 lateral margin with 2 spines. P2 – 3 carpi with 3 – 4 spines on extensor margin, with 2 subequal distolateral spines, P4 with 2 subequal distal spines; P2 – 4 carpi with 1 distal spine on flexor margin. P2 – 4 propodi 4.5 – 5.3 times longer than broad; extensor margin unarmed; flexor margin with 5 – 6 movable spines. P2 – 4 dactyli 0.6 – 0.7 length of propodi, distally ending in large, curved spine, flexor margin with 5 slender movable spines.

Epipods on P1 – 3.

**Variation:** Some specimens with short, broad rostrum 1.1 – 1.3 times as long as broad. Rostrum occasionally bearing 5 lateral spines instead of 4. Several specimens with 2 parahepatic spines instead of 1. Mxp3 occasionally with 3 spines instead of 2. Rarely 2 protogastric ridges present and not 3. Occasionally fewer transverse ridges on posterior branchial margin. Some specimens have P1:carapace ratio as high as 3.4 and not 2.4 as reported from the holotype, with males and females often exhibiting dimorphic P1's.

**Coloration (in life; Figures 3.10C, D):** Ground colour of carapace and pleon orange with some scattered whitish spots, tips of lateral spines and rostrum brick-red (Figure 3.10C). Posterior pleomere tergites lighter orange, tailfan whitish and orange. P1 brick-red with plumose setae. P2 – 4 orange, dactyli lighter orange. Eyes often green. Occasionally, with a white, medial stripe on dorsal surface of carapace (Figure 3.10D).

**Global distribution:** South Africa (endemic).

**South African distribution:** From False Bay to Durban Bay, 24 – 183 m (Figure 3.8).

**Genetic data:** COI, 16S, see Appendix Tables 3.1, 3.2

**Remarks:** *Galathea* n. sp. A belongs to the group of species with gastric ridges that are not scale-like, carapace lateral margin with small, but distinct spine between anterolateral spine and anteriormost spine of branchial margin, antennular basal article with three well-developed terminal spines, distomesial spine always distinct, although sometimes clearly smaller than others, no cardiac spines on carapace, four or more epigastric spines and epipods on P1 – 3. This group includes, *G. hydrae, G. micra, G. pubipes* and *G. pascualae*. *Galathea* n. sp. A can easily be distinguished from *G. hydrae* as the new species has a dorsal branchial spine and four spines on posterior branchial margin instead of three (these characters were consistent in all specimens examined). Moreover, *Galathea* n. sp. A has a row of spines along 2/3 length of the movable finger of P1, instead of only proximal spines. It can also be distinguished from *G. micra*, *G. pubipes* and *G. pascualae* as these species either have no epipods, as in the case of the former, or epipods only present on P1, while *Galathea* n. sp. A has epipods on P1 – 3.

Although superficially similar to *G. nexa*, this species differs in the following aspects: Rostrum with several long and short setae scattered throughout, pleonite 2 with three uninterrupted transverse ridges and third pleonite with two uninterrupted transverse ridges, unlike *G. nexa* that bears almost no setae on the rostrum and only has one uninterrupted transverse ridge. Lastly, in terms of coloration, apart from the green eyes of *Galathea* n. sp. A it lacks the green coloration distinctive of *G. nexa* and is instead a red/orange colour (Figure 3.10C). *Galathea* n. sp. A showed a genetic divergence value of 2.7% (COI) with *G. nexa* (Appendix Figure 3.12). Therefore, it can be confirmed that *G. nexa* does not occur in South Africa and that the specimens identified as *G. nexa* by Doflein and Balss (1913) should be transferred to *Galathea* n. sp. A. Moreover, upon inspection of the *G. dispersa* specimens held in the Natural History Collections of the Iziko South African Museum, it can also be confirmed that all specimens previously identified as *G. dispersa* by Barnard (1950) and Kensley (1981) are in fact *Galathea* n. sp. A, as these specimens bear a parahepatic spine, as well as a dorsal branchial spine (absent in *G. dispersa*) and Mxp3 merus has two spines on flexor margin, not three – four. These specimens are also not *G. hydrae*, as suggested by Macpherson & Robainas-Barcia (2015) based on differences listed above between these two species. Thus, *G. dispersa* is a species occurring in the north-east Atlantic and Mediterranean Sea and is not present in South Africa.

Interestingly, this new species exhibits some sexual dimorphism, as males have large, broad chelipeds, whereas females have chelipeds that are shorter and more slender (Figure 3.10C, D). The white, median stripe on the dorsal surface of the carapace occurs in males and females and represents natural variation, as genetic analyses showed these individuals exhibit no differences to specimens without the white stripe.

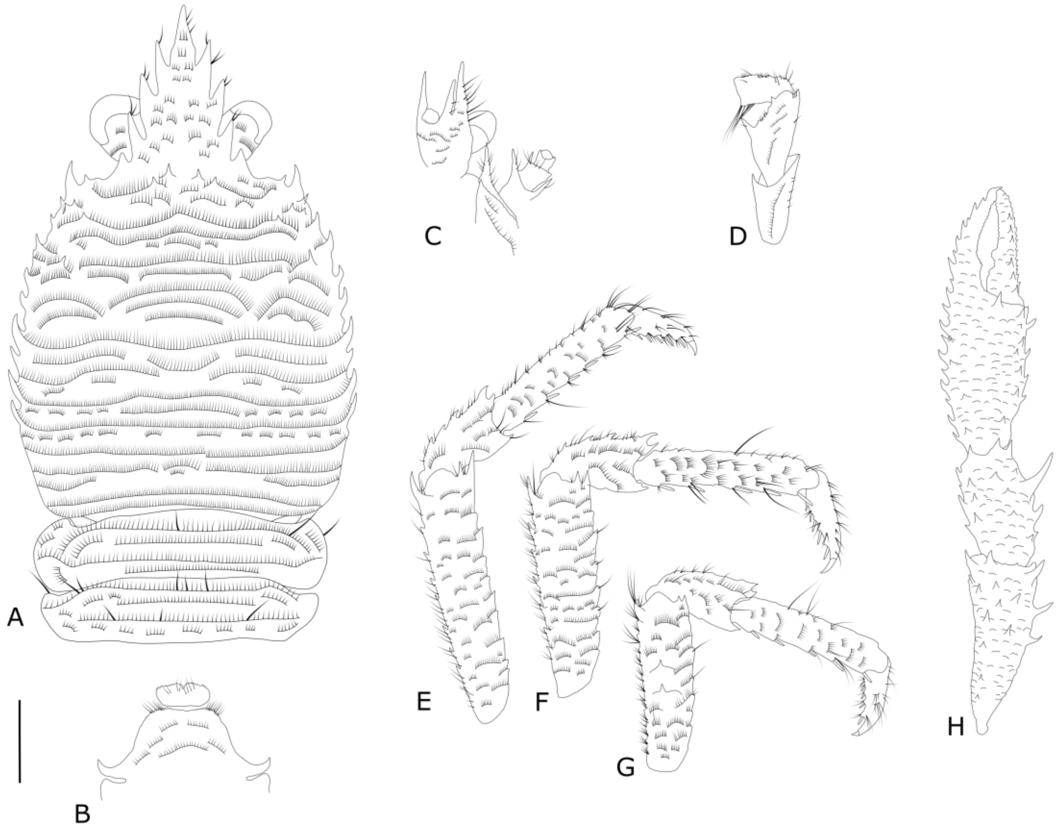

**Figure 3.5:** *Galathea* n. sp. A, holotype, ♂, 8.3 mm (SAMC-A094807), South of Mossel Bay, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region, showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view **E** – Right P2, lateral view; **F** – Right P3, lateral view; **G** – Right P4, lateral view; **H** – Left P1 (setae omitted), dorsal view. Scale bar: H = 4.0 mm; A – G = 2.0 mm.

### *Galathea* n. sp. B (to be named only when formally published)

**Figures 3.6, 3.11A**

**Material examined:**

**Holotype** – South Africa, east of Durban (type locality), 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094775, 1 ♀ 3.1 mm.

**Paratypes** – South Africa, 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094775, 2 ♀ 2.3 – 3.1 mm. South Africa, 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094786, 1 ♂ 2.5 mm.

**Other material:** South Africa, 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094776, 1 ♂ (carapace missing), 3 ♀ 1.4 – 2.4 mm. South Africa, 29°50'3.98’S; 31°14'8.99’E, 135 m, 05/02/2021, SAMC-A094781, 3 ♂ 2.5 – 4.5 mm.

**Description:**

*Carapace:* Carapace as long as broad, anterior cervical groove distinct. Ridges with long, thin plumose setae. Gastric region with some transverse ridges; 1 epigastric ridge medially interrupted with 1 or 2 pairs of epigastric spines; 2 protogastric ridges, anterior ridge uninterrupted with parahepatic spine each side, convex medially, posterior ridge interrupted, short; 1 mesogastric ridge, medially interrupted, not extending laterally to spines on branchial margins; 2 metagastric ridges, anterior ridge medially interrupted, not extending laterally, posterior ridge short, uninterrupted. Hepatic region with 1 or 2 spines. Anterior cervical groove with branchial dorsal spine on same level as mesogastric ridge. Mid-transverse ridge uninterrupted, followed by 6 ridges (4 uninterrupted). Lateral margins convex medially with 9 spines; 2 spines in front of anterior cervical groove, 1 anterolateral and a smaller spine posteriorly, 3 spines between anterior and posterior cervical groove and 4 spines behind posterior cervical groove. External limit of orbit unarmed, infraorbital margin with 3 or 4 minute spines and a large spine ventrally, unarmed between orbit and anterolateral spine. Rostrum triangular, broad, 1.2 – (1.4) times as long as broad, length 0.5 – 0.6 that of carapace length, breadth 0.4 that of carapace. Rostrum with 4 lateral teeth. Distance between distalmost lateral rostrum teeth 0.3 distance between proximal-most teeth, surface with sparse setae. Pterygostomian flap, 1 strong spine on upper margin near linea anomurica, anterior margin ending in 1 small spine.

*Sternum:* 0.8 – 0.9 times as long as broad, lateral extremities divergent posteriorly.

*Pleon:* Pleonites 2 – 4 each with 2 uninterrupted transverse ridges; pleonite 5 with short mesial ridge anteriorly and 1 uninterrupted ridge posteriorly. Pleonite 6 with short mesial ridge anteriorly and 1 medially interrupted ridge posteriorly. Male with G1 and G2.

*Eye:* Ocular peduncles as long as broad, maximum corneal diameter 0.7 rostrum width.

*Antennule:* Article 1 with 3 well-developed distal spines, distolateral and distomesial subequal; distodorsal largest. Ultimate article ends in a tuft.

*Antenna:* Article 1 with well-developed ventral distomesial spine exceeding distal margin of article 2. Article 2 with subequal distal spines reaching midlength of article 3. Article 3 with distomesial spine; article 4 unarmed.

*Mxp3:* Ischium with 2 distal spines on flexor margin, extensor margin with small spine, crista dentata with 24 denticles. Merus 1.4 times ischium length with well-developed spine at midlength of flexor margin not reaching distal margin of merus, with small distal spine; extensor margin with small distal spine. Carpus, propodus, dactylus all unarmed, with long dense setae.

*P1:* (2.5 –) 3.1 times carapace length, with slender, long plumose setae. Merus 0.8 times carapace length, (1.8 –) 2.1 times carpus length; several strong mesial spines from midlength distally and a strong spine distolaterally, with row of spines dorsally. Carpus 0.5 (– 0.7) times length of palm, 1.9 times longer than broad; strong spines on mesial margin starting at the midlength, with some dorsal spines. Palm 2.2 (– 2.5) times longer than broad, spines roughly in rows on mesial and lateral margins (some very small spines on dorsal surface). Lateral row of spines strong, continuing onto fixed finger. Fingers spooned, 0.9 length of palm; moveable finger with row of spines reaching approximately half length of finger with long setae and strong distal spine.

*P2 – 4:* Slender with some striae bearing plumose setae and sparse long setae. P2 (1.7 –) 2.0 times longer than carapace. Meri successively shorter (P3 merus 0.9 length of P2 merus; P4 merus 0.8 length of P3 merus). P2 merus 0.7 times length of carapace, (4.6 –) 4.8 times longer than broad, 1.5 times propodus length. P3 merus 3.7 – 4.4 times long as broad, 1.2 – 1.3 times propodus length. P4 merus 3.4 – 3.7 times as long as broad, 1.1 times length of propodus. Extensor margin of merus with 8 – 9 proximally diminishing spines on P2 – 3, P4 with 1 or 2 spines; lateral margins unarmed, with 1 spine on distoflexor margin. Carpi with 3 spines on P2

– 3 extensor margin, as well as 1 distolateral spine, P4 with 1 distal spine; P2 – 4 flexor margin with distal spine. P2 – 4 propodi 4.6 times longer than broad, P2 – 4 extensor margin unarmed, flexor margin with 4 – 6 movable spines. Dactyli 0.6 times length of propodi, flexor margin with 5 or 6 spines and ending in a strong terminal spine.

Epipods on P1 – 3.

**Variation:** Ranges noted in description.

**Coloration:** Unknown.

**Global distribution:** South Africa (endemic).

**South African distribution:** Off Umgeni River, KwaZulu-Natal, 75 m (Figure 3.8).

**Genetic data:** 16S (see Appendix Table 3.2).

**Remarks:** This species is morphologically similar to *G. hydrae* and *Galathea* n. sp. A but differs in the following regards: the P1 dorsal surface is much more spinose than in *G. hydrae* and has no frontal spine. *Galathea* n. sp. B differs to *Galathea* n. sp. A consistently with regards to the ridges on the pleon and dorsal surface of carapace: second and third pleonites of *Galathea* n. sp. B have two uninterrupted ridges instead of three, one interrupted epigastric ridge instead of two (anterior ridge uninterrupted, posterior ridge interrupted). Moreover, the mesogastric region has one uninterrupted ridge (occasionally mesially interrupted in *Galathea* n. sp. B), instead of two ridges (anterior ridge uninterrupted, posterior ridge interrupted in *Galathea* n. sp. A). The metagastric region of *Galathea* n. sp. B has two interrupted ridges, instead of three. The posterior branchial region has seven ridges (four of which are uninterrupted) whereas *Galathea* n. sp. A has nine ridges (five of these uninterrupted). The distoflexor margin of P2 – 4 meri has one distal spine, while *Galathea* n. sp. A has two. Lastly, the movable finger of P1 has spines reaching midlength instead of at least to 2/3 length as in *Galathea* n. sp. A. These two species are quite similar genetically (16S) with low divergence values, however as 16S is a conservative marker along with the morphological differences presented and the high support values recovered in the phylogenetic tree (Appendix Figure 3.13), this species is maintained as new.

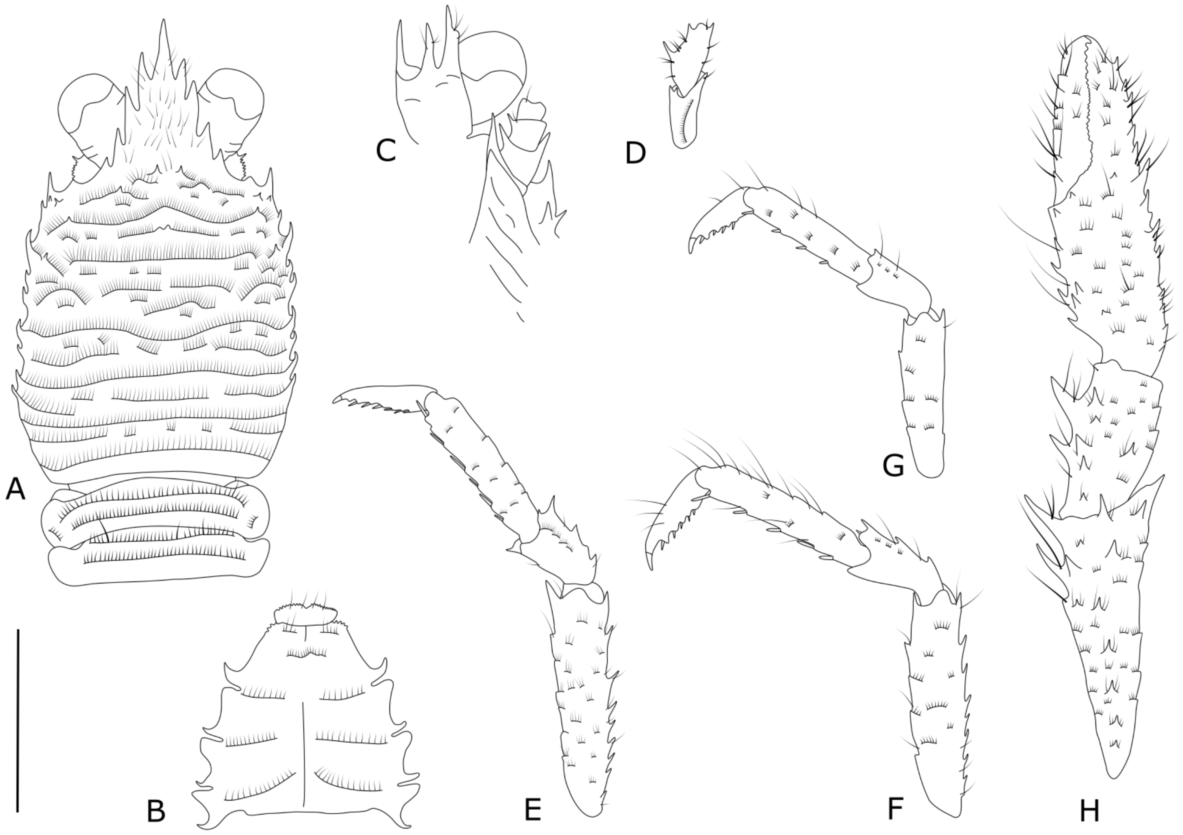

**Figure 3.6:** *Galathea* n. sp. B*,* holotype, ♀, 3.1 mm (SAMC-A094775), A – E, H; *Galathea* n. sp. B, paratype, ♂, 2.5 mm (SAMC-A094781), F, G, both off Umgeni River, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region, showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Left P2, lateral view; **F** – Left P3, lateral view; **G** – Left P4, lateral view; H – Right P1, dorsal view. Scale bar: A, E – H = 2.0 mm; B – D = 2.5 mm.

### Genus ***Lauriea*** Baba, 1971 – **NEW RECORD**

*Lauriea* Baba, 1971: 51; Baba, 2005: 67; Baba et al., 2008: 82 (compilation); Macpherson & Baba, 2011: 54; Macpherson & Robainas-Barcia, 2013: 139; Ahyong & Poore, 2023: 276.

**Type species:** *Galathea gardineri* Laurie, 1926, by monotypy.

**Diagnosis:** After Macpherson & Baba (2011).

Carapace transverse ridges weak and interrupted, usually with minute spines and uniramous setae, lateral margins with some acute spines. Rostrum triangular with 4 lateral teeth. Frontal margins strongly concave. Pleonites unarmed. Telson not completely divided, uropodal endopod much wider than long. Sternite 3 anterior margin produced forwards. Eyes elongated, corneas not dilated. Antennular article 1 with 3 distal spines, distomesial smaller than others. Antennal article 1 with short distomesial spine, article 2 usually with short distolateral and distomesial spines. Mxp3 merus flexor margin with 2 spines. P1 short, stout and setose. P2 – 4 short; dactyli curved and strongly biunguiculate. Males with G1 and G2 present.

**Remarks:** Species from the genus *Lauriea* are often associated with sponges (Palero et al., 2017). This is the first record of this genus from South Africa.

***Lauriea gardineri*** (Laurie, 1926) – **NEW RECORD**

**Figure 3.11B**

*Galathea gardineri* Laurie, 1926: 131, pl. 9, figures 1 – 5 (Mauritius (type locality), 106 m); Baba, 1990: 961 (Madagascar, 50 m).

*Lauriea gardineri* – Baba et al., 2008: 82 (compilation, in part); Macpherson & Robainas-Barcia, 2013: 144, figures 3, 8A, 9A (Madagascar, 56 – 355 m); Macpherson et al., 2023: 383 (Glorieuses Islands, 94 – 245 m).

*Lauriea* cf. *gardineri* – Poupin et al. (2022a): 148, figures 9A, 14C (Mayotte, 70 – 80 m).

Dubious records:

*Galathea gardineri* – Tirmizi, 1966: 277, figure 2 (Red Sea, 29 – 55m); Lewinsohn, 1969: 112 (no record).

*Lauriea gardineri* – Lewinsohn, 1982: 299, figure 1 (Gulf of Aqaba., 3 – 81 m); Tirmizi & Javed, 1993: 23, figures 10 – 11 (western Indian Ocean off Somali Republic & Andaman Islands, 66 – 177 m); Baba, 1994b: 43, figure 2 (Madagascar, New Caledonia, depth not given).

**Material examined:** South Africa, 27°0'24.00’S; 32°55'12.00’E, 66 m, 06/06/1990, SAMC-A094845, 1 ovig. ♀ 2.1 mm.

**Description:** See Macpherson & Robainas-Barcia (2013).

**Variation:** Carapace slightly wider than long. Antennal article 1 process clearly reaching end of article 2. P1 2.8 times carapace length, not 3.2; P1 merus also slightly shorter than carapace.

Several rows of strong spines on P1 carpus dorsal surface. P1 movable finger armed on mesial margin with row of spines extending half the length of finger. P3 carpus with 3 – 4 spines on extensor margin instead of 0 – 2. P2 – 4 propodi with strong spines on extensor margin and 3 slender movable spines instead of 5 – 6.

**Coloration:** After Macpherson and Robainas-Barcia (2013).

Carapace and pleon ground colour whitish, with several minute brown spots and setae brownish. P1 large brown and whitish bands and red spot on merus dorsal surface. P2 – 4 whitish with numerous small brown spots, setae whitish.

**Global distribution:** Madagascar, Mauritius and Seychelles Islands, 18 – 355 m, and now South Africa.

**South African distribution:** Boteler Point, KwaZulu-Natal, 66 m (Figure 3.7).

**Genetic data:** Not available.

**Remarks:** The specimen agrees well with the original description and Macpherson and Robainas-Barcia (2013) and represents a small range extension, as it is likely only known from the SWIO. Macpherson and Robainas-Barcia (2013) recommended additional work is required to confirm the status of material from the Red Sea and Somali Republic This represents not only a new species record, but also a new genus record for South Africa. This species is easily recognisable in South African waters as the carapace and walking legs are extremely setose and the second to fourth pereopod dactyli are curved and strongly biunguiculate.

### Genus ***Phylladiorhynchus*** Baba, 1969

*Phylladiorhynchus* Baba, 1969: 3; Baba, 2005: 200; Baba et al., 2008: 175 (compilation); Baba et al., 2009: 286; Macpherson & Baba, 2011: 55; Schnabel & Ahyong, 2019: 304; Rodriguez-Flores et al., 2021: 6; Poore & Ahyong, 2023: 276.

**Type species:** *Galathea pusilla* Henderson, 1885, by original designation.

**Diagnosis:** After Rodriguez-Flores et al. (2021).

Carapace dorsal surface with distinct transverse ridges, unarmed or with few epigastric spines, rarely with parahepatic spines; lateral margin spinose. Rostrum triangular, dagger-shaped, leaf-like or bottle-shaped, generally with well-developed supraocular basal and subapical spine on each side, margin usually minutely serrated. Lateral orbital spine present. Thoracic sternite 3 posterior margin widely or narrowly contiguous to sternite 4. Incomplete telson subdivision, comprised of ten plates. Eyes movable; cornea generally as wide as peduncle. Antennular article 1 with 3 – 5 distal spines (almost always with double distolateral spines). Antennal article 1 with strong distomesial process ventrally, usually overreaching antennal article 4. Mxp3 ischium with distal spines, crista dentata consisting of row of spines along entire margin; merus considerably shorter than ischium with well-developed spines on flexor and extensor distal margins. G1 absent; G2 present. P1 spinose, fingers with row of spines distally along curved margin, tip excavated, spooned.

**Remarks:** Recently Rodríguez-Flores et al. (2021) revised this genus, describing 41 species in the process to increase the total number to 55 species. Currently, only one species is known from South Africa.

***Phylladiorhynchus* cf. *janiqueae*** Rodríguez-Flores, Macpherson & Machordom, 2021

*Phylladiorhynchus integrirostris* – Tirmizi & Javed, 1993: 33, figure 15 (Mozambique Channel, West of Durban, off Somali Republic and Andaman Islands, 28 – 138 m).

*Phylladiorhynchus janiqueae* Rodríguez-Flores et al., 2021: 59, figures 21H, 22, 54E (SWIO, Madagascar (type locality), Reunion Island and Walter Shoals, 18 – 98 m); Macpherson et al., 2023: 383 (Walters Shoal, 26 – 40 m).

**Material examined:** Not available. Type material – Madagascar, 24°59'47.76'S; 47°5'42.00'E, 22 m, 30/04/2010, MNHN-IU-2014-13799, 1 ♂ 2.3 mm.

**Description:** See Rodríguez-Flores et al. (2021).

**Coloration:** Unknown.

**Global distribution:** SWIO, Madagascar, Reunion Island, Walter Shoals, 18 – 98 m, and now South Africa.

**South African distribution:** East of Ballito, KwaZulu-Natal, 138 m (Figure 3.7).

**Genetic data:** Not available.

**Remarks:** The South African material collected by the IIOE I was originally identified as *P. integrirostris* by Tirmizi and Javed (1980, 1993). According to Schnabel & Ahyong (2019), *P. integrirostris* senso stricto is now restricted to the Hawaiian Archipelago only, with other populations referred to other species. Subsequently, Rodriguez-Flores et al. (2021) described *P. janiqueae* from Madagascar, Reunion Island and Walters Shoal and they argued that the South African material is likely this new species, as the description from Tirmizi and Javed (1980, 1993) agrees well with their description. Unfortunately, neither Rodriguez-Flores et al. (2021), nor this study (for the same reason as for *G. pubescens*, the material is not in the Smithsonian, as indicated in the original publication), have had the opportunity to examine the South African material. The status thus remains dubious and hence given an cf. notation. This species was collected in the same sampling event as *G.* cf. *pubescens* and *Trapezionida* cf. *sphinx* (Macpherson & Baba, 1993).

This species is easily distinguished from other galatheids in South African waters as the rostrum bears no lateral spines, only with distinct supraocular tooth on either side, while the antennular basal article bears five terminal spines.

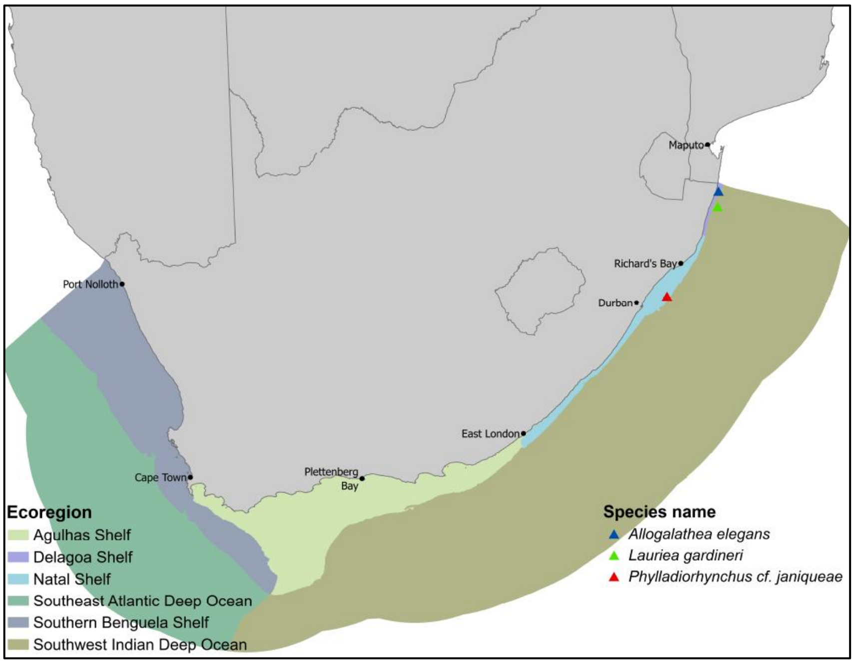

**Figure 3.7:** Distribution maps of species in genera *Allogalathea, Lauriea* and *Phylladiorhynchus* found in South African waters.

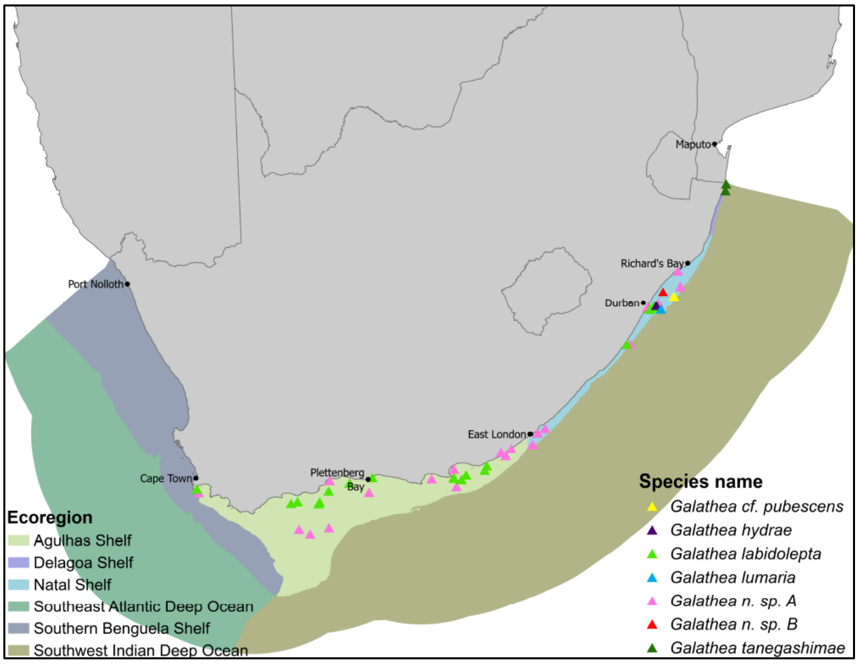

**Figure 3.8:** Distribution map of species in genus *Galathea* found in South African waters.

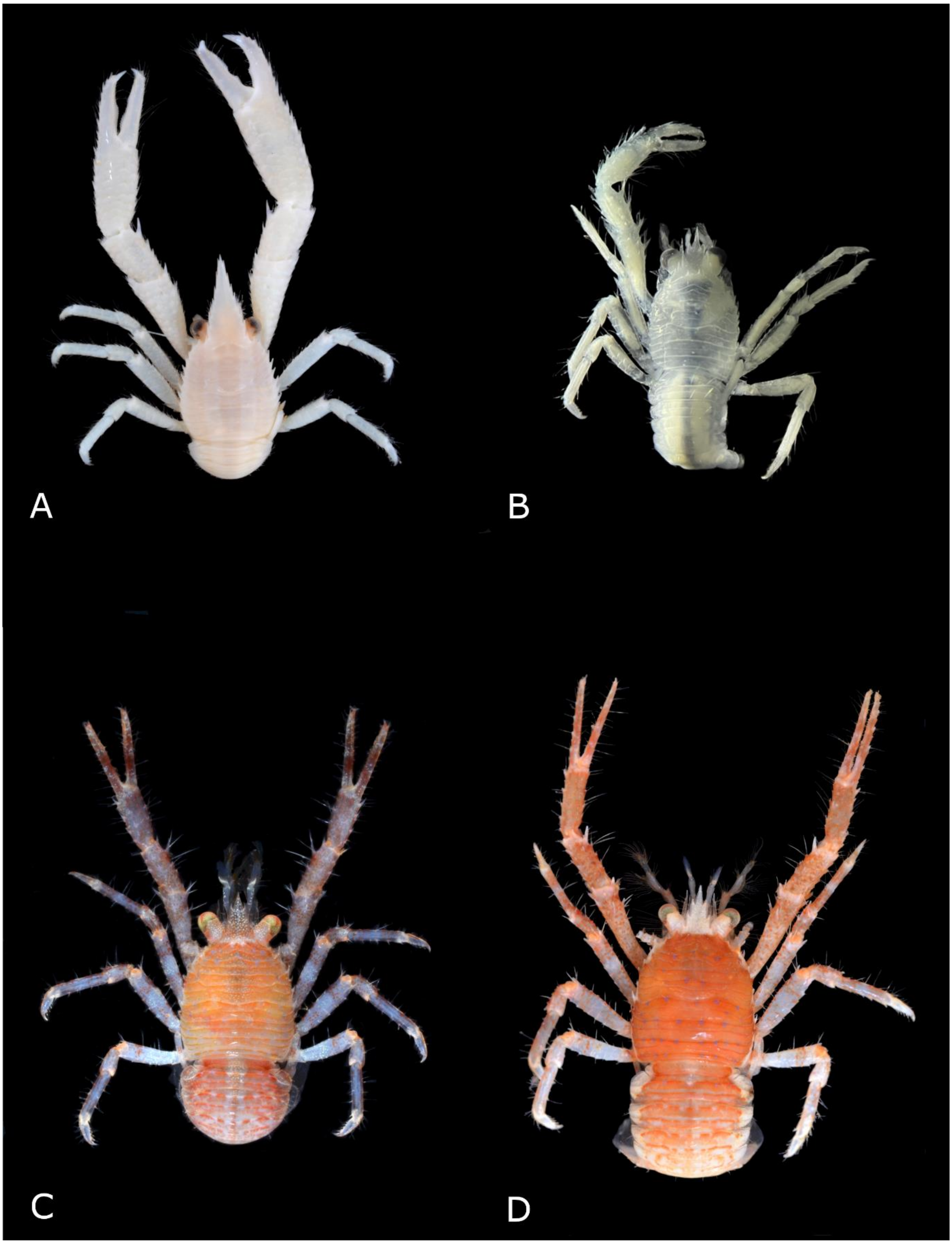

**Figure 3.9:** Dorsal view of live (C, D) and preserved (A, B) specimens. **A** – *Allogalathea elegans* (Adams, 1847), Boteler Point, South Africa, ♂, 5.9 mm (SAMC-A094531); **B** – *Galathea hydrae* Macpherson & Robainas-Barcia, 2015, Durban, South Africa, ♀, 3.8 mm (SAMC-A094783); **C** – *Galathea labidolepta* Stimpson, 1858, Kenton-on-sea, South Africa, ovig. ♀, 6.0 mm (SAMC-A066508); **D** – *Galathea labidolepta* Stimpson, 1858, Still Bay, South Africa, neotype, ♀, 5.9 mm (SAMC-A094746).

**Figure 3.10:** Dorsal view of live (A, C, D) and preserved (B) specimens. **A** – *Galathea pubescens* Stimpson, 1858, Vanuatu, ♂ 6.2 mm, MNHN-IU-2013-15948 (from Macpherson & Robainas-Barcia, 2015); **B** – *Galathea tanegashimae* Baba, 1969, Boteler Point, South Africa, ovig. ♀ 3.9 mm (SAMC-A094567); **C** – *Galathea* n. sp. A, Still Bay, South Africa, ♂ 7.1 mm (SAMC-A094753); **D** – *Galathea* n. sp. A, Still Bay, South Africa, ♀ 7.5 mm (SAMC-A094752).

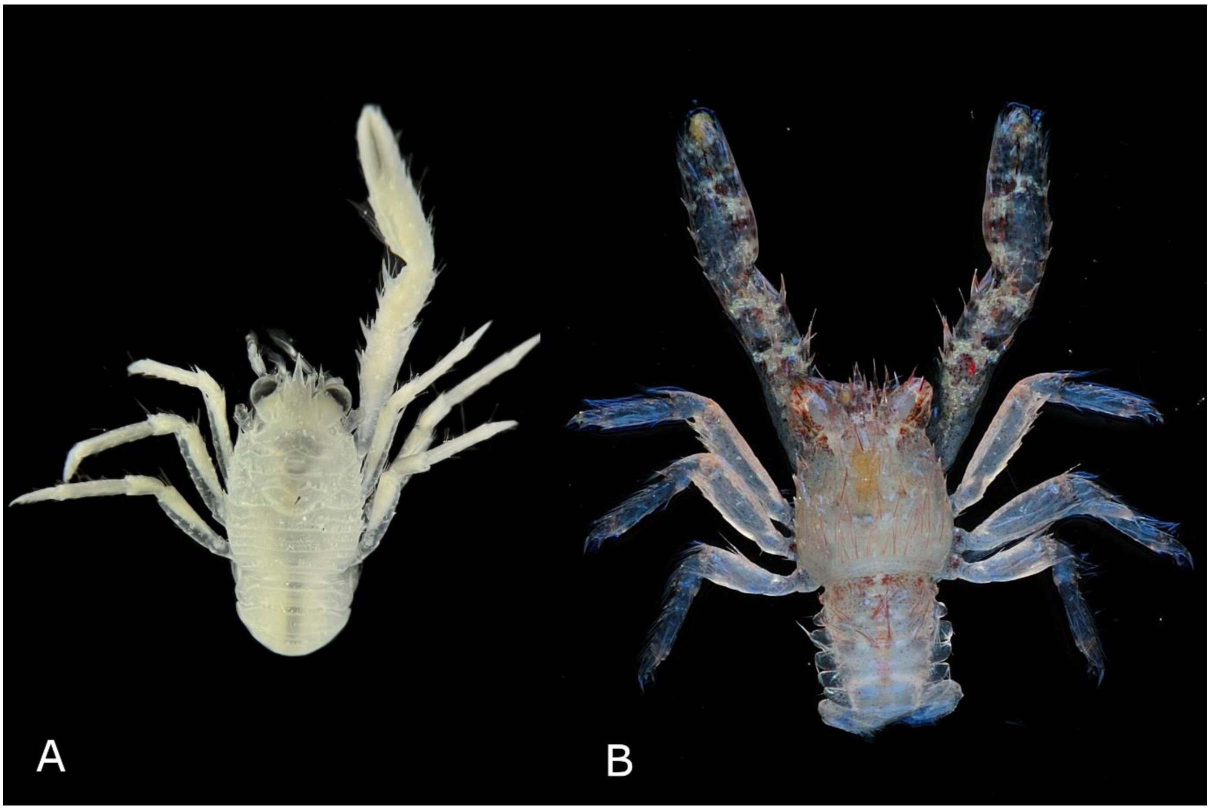

**Figure 3.11:** Dorsal view of live (B) and preserved (A) specimens. **A** – *Galathea* n. sp. B, Umgeni River, South Africa, holotype, ♀ 3.1 mm (SAMC-A094775); **B** – *Lauriea gardineri* Laurie, 1926, Madagascar, ♂ 1.8 mm (ATIMOVATAE, Stn TB02, from Macpherson & Robainas-Barcia, 2013).

## Discussion

This study increases the South African galatheid fauna as three new distribution records are added (*G. hydrae*, *G. tanegashimae* and a new genus record in *Lauriea*) and two new species are described. The status of three South African galatheids (*G. dispersa*, *G. intermedia* and *G. nexa*) were dubious at the start of this study, as these species originally known from the Mediterranean and adjacent waters were thought to occur in South Africa (Doflein & Balss, 1913; Barnard, 1946, 1950; Baba, 2005). In a more recent publication, Macpherson and Robainas-Barcia (2015) suggested that some of these identifications, such as *G. intermedia*, and *G. dispersa,* were incorrect and that these likely represent *G. labidolepta* and *G. hydrae* respectively, though not confirmed at that time. After morphological and genetic analyses, it is confirmed that South African '*G. intermedia*' specimens are indeed *G. labidolepta,* as suggested by Macpherson & Robainas-Barcia (2015). However, the '*G. dispersa*' and '*G. nexa'* material from South Africa are here referred to the undescribed species *Galathea* n. sp. A.

For the first time, genetic data for *Galathea labidolepta* is presented (see Appendix Figures 3.12, 3.13 and Tables 3.1, 3.2), confirming the suggestion of Macpherson and Robainas-Barcia (2015) that it is a closely related, but distinct species from *G. intermedia*. The status of the material and sequences listed for *G. intermedia* and its closely related species are currently being reviewed (Macpherson, pers. comm). Prior to this study *Galathea* n. sp. A has been erroneously identified as *G. dispersa* and *G. nexa*, however the genetic analyses now confirm that these are closely related but distinct species. These results indicate that they form a clade, though genetic data from more species in the genus are required to confirm.

Besides the two newly described species, *G. labidolepta* is the only endemic galatheid in South Africa, resulting in an endemicity rate of 30% for this small family. This is similar to the endemicity rate reported for all regional marine invertebrates, which is 33% (Griffiths et al., 2010). As is the case with most marine invertebrate groups in South Africa, the highest diversity of galatheid squat lobsters occurs on the east coast off KwaZulu-Natal, indeed all ten reported species occur here (Figure 3.7, 3.8), although *Galathea* n. sp. A and *G. labidolepta* showed their highest abundances on the southern Agulhas Shelf. Galatheids are often associated with corals and known to occur on rocky substrates, hence it is unsurprising the greatest diversity is found on the more tropical east coast. Only *Galathea* n. sp. A and *G. labidolepta* are found outside of KwaZulu-Natal, both extending as far west as False Bay off the southwestern tip of South Africa. These were also by far the most commonly reported species, as they were regularly caught as bycatch during demersal research hake trawl surveys. As expected, no galatheids were found in the cold waters on South Africa's west coast north of Cape Town, as the group is mostly reported in tropical or temperate seas (Ahyong et al., 2010). Moreover, few sampling events occur on the east coast of South Africa, as there is limited demersal commercial fishing in that region (besides a small prawn trawl fishing industry) and few research institutions conducting trawl, dredge or dive surveys in the area. Therefore, this is an area that should be further explored for galatheid diversity, not only because historically it has been poorly sampled, but also because of the great invertebrate diversity found here.

When considering the origin of *Galathea* species in South Africa, two groups of species appear to exist that share similarities with European galatheids. The first group include species that have spines on the pterygostomian flap (quite a rare, but diagnostic character in this genus) and all species in the group either have blue spots present or absent on the dorsal carapace, with no real differences genetically between individuals. This group includes *G. intermedia*, *G. bolivari* from the Mediterranean, and the eastern Atlantic and *G. labidolepta* from South Africa. The second group includes species that have epipods on P1 – 3 and highly setose chelae (appearing fur-like). This group includes *G. nexa* and *G. dispersa* (both previously thought to occur in SA) from the Mediterranean and eastern Atlantic and *G. hydrae*, *Galathea* n. sp. A and *Galathea* n. sp. B from South Africa. The species within these two groups are not only morphologically alike, but also have low molecular divergence values between species (Appendix Tables 3.1, 3.2), possibly a result of allopatric speciation. This is not as unexpected as it seems as some of these European galatheids such as *G. intermedia* extend as far south as Northern Angola. However, as mentioned earlier, the west coast of southern Africa is known for upwelling cells, such as the Lüderitz upwelling cell. This cell was reported to be a barrier to larval dispersion by Lett et al. (2007), as the cold upwelled water either kills the larvae or transports them offshore. However, these upwelling cells are only around 2 million years old, as proposed in Shannon (1985). This likely means that these South African *Galathea* species colonized before the upwelling cell originated, suggesting that they likely have a northeast Atlantic origin. Future studies could look into molecular clock or similar analyses to test the divergence dates of these species.

This study should be considered a first step in the process of documenting the galatheid fauna of South Africa and is mostly based on the examination of all locally, curated museum material (with some collections made throughout the duration of the study). The fact that several new records and new species were described from these relatively few samples, suggest that much remains to still be discovered. Future studies should focus on collecting more material from the east coast, where the greatest diversity is likely to be found, as well as conducting targeted collections which are likely to yield many more new records and new species.

# Chapter 4: Additions and revisions to the family Munididae (Anomura: Galatheoidea) of South Africa, with descriptions of two new species

## Introduction

Squat lobsters are an exceptionally diverse group of anomuran decapods found globally at all latitudes except the extreme polar regions (Baba et al., 2008; Schnabel et al., 2011b). They occur in a wide range of depths and environments; including the intertidal, shallow coral reefs, deep continental shelves, abyssal plains and chemosynthetic habitats (Baba et al., 2009; Lin et al., 2013; Machordom et al., 2022). Squat lobsters are considered important indicator species, as they often have host association with macroinvertebrates, such as corals, sponges and other vulnerable marine ecosystem (VME) species and with unique habitats such as seamounts, hydrothermal vents and cold-water seeps (Baba, 2005; Schnabel, 2020). Squat lobster taxonomy has undergone numerous changes and many species thus have a complex history of classification (Ahyong et al., 2010; Ahyong et al., 2011). This is mainly due to morphological conservatism displayed in many groups, the difficulty of finding diagnostic characters and true synapomorphies to define groups and the high level of convergence and homoplasy in their external morphology (Macpherson & Machordom, 2005; Cabezas et al., 2011; Rodriguez-Flores et al., 2019).

Squat lobsters are currently classified into two evolutionary independent superfamilies: the Chirostyloidea Ortmann, 1892 and the Galatheoidea Samouelle, 1819 (Ahyong et al., 2010; Schnabel et al., 2011a; Bracken-Grisom et al., 2013). The Chirostyloidea are made up of four families; the Chirostylidae Ortmann, 1892, Eumunididae A. Milne-Edwards & Bouvier, 1900, Kiwaidae Macpherson, Jones & Segonzac, 2005 and Sternostylidae Baba, Ahyong & Schnabel, 2018. The Galatheoidea also comprise four families; Galatheidae Samouelle, 1819, Munididae Ahyong, Baba, Macpherson & Poore, 2010 and Munidopsidae Ortmann, 1898 and the porcelain crab family Porcellanidae Haworth, 1825 (Ahyong et al., 2010). Globally, the Munididae are the most diverse group and include more than 450 species and 33 extant genera (Machordom et al., 2022).

Munidid squat lobsters typically have a spiniform rostrum with one, rarely two, supraocular spines on each side (Poore & Ahyong, 2023). Some of the more highly derived genera, such as *Neonida* and some *Bathymunida,* have the rostral and supraocular spines reduced to small tubercles (Ahyong et al., 2010; Baba & de Saint Laurent, 1996). The family ranges from intertidal to bathyal habitats, however, most species are found on continental shelf or slope areas (Ahyong et al., 2011). The Munididae recently underwent significant systematic changes when Machordom et al. (2022) split the genus *Agononida* Baba & de Saint Laurent, 1996 into three genera and the genus *Munida* Leach, 1820 into 11 genera and also resurrected the genus *Grimothea* Leach, 1820. These changes were made based on a combination of molecular analyses (using both mitochondrial and nuclear markers) and morphological characters.

In South Africa, the first munidid recorded was in Stebbing's (1910) "General Catalogue of South African Crustacea", where *Munida "sancti-pauli"* Henderson, 1885 was reported from Buffalo River near East London. Some 40 years later Keppel Barnard's famous 'Descriptive catalogue on the Decapod Crustacea of South Africa' (1950) included three munidid species; *Munida incerta, 'M. sancti-pauli'* and *M. semoni*. Subsequently, only few species records have been reported within larger works (Baba, 2005), or described from opportunistic sampling events (de Saint Laurent & Macpherson, 1988; Tirmizi & Javed, 1976, 1992, 1993). Emmerson's (2016) multi volume guide on the Decapoda of southern Africa listed nine munidids, though most names were outdated and one incorrect. Thus, at the start of this study only eight species from four different genera had been reported from the region. This is relatively few species, considering that South Africa is well-known for its diverse marine invertebrate fauna (Griffiths et al., 2010). Most of these species have undergone taxonomic changes since they were originally reported and many of the descriptions are outdated. Moreover, with the rise of new literature on the group, as well as specimen depositions accumulating in the Natural History Collections of the Iziko South African Museum, a revision on this important group is long overdue. Recently, a checklist to species of the Southwestern Indian Ocean (SWIO) was released by Macpherson et al. (2023), where 45 munidids from ten genera were listed. Some of these were reported from South Africa, though only seven of the 45 species are known from the region, which indicated that the South African fauna is likely underestimated. The aim of this study is to compile a thorough systematic account of the Munididae of South Africa, incorporating all known species in a single account based on currently accepted nomenclature, describing any new species and reporting on new distribution records, as well as re-describing poorly described species using modern integrative techniques.

# Methods

This study is mainly based on the examination of historic material from numerous research expeditions around the South African coast and accessioned in the Natural History Collections of the Iziko South African Museum, Cape Town spanning the period 1901 and 2023, while one specimen included is held at the Natural History Museum of Denmark, University of Copenhagen. Several collections of new material were also conducted during the study, mostly during the annual demersal research trawl surveys conducted by the Department of Forestry, Fisheries and Environment aboard the RV *Africana* and *Compass Challenger*. These samples were collected using a German otter trawl design with several configurations and a 75 mm mesh cod-end fitted with 35 mm mesh liner. Trawls had a 30-minute bottom time duration over appropriate habitats over the depth range 450 – 555 m on the South African west and south coasts (see Atkinson et al., 2011 for detailed methods). Additional collections examined formed part of the Natal Museum dredging program. After specimens were collected, they were placed in 96% EtOH, which was replaced daily for three days so specimens could be used for genetic analyses. Once analyses were completed, specimens were transferred to 70% EtOH deposited in the Natural History Collections of the Iziko South African Museum, Cape Town for long-term preservation.

Total genomic DNA was isolated from muscle and egg tissue using a Zymo DNA extraction kit following supplier recommendations. Two mitochondrial markers, 16S rRNA and COI (Cytochrome oxidase subunit I) were amplified through polymerase chain reaction (PCR) using primers 16Sar-L and 16Sbr-L (Palumbi, 1996) and LCO1490 and HCO2198 (Folmer et al., 1994). Amplification reactions were performed in a final volume of 20 µL which included 2 – 4 µL DNA template, 0.2 mM of each primer, 10 µL DreamTaq (Thermo Scientific$^{TM}$) and 4 – 2 µL nuclease free water to make up 20 µL. The initial denaturation step for thermal cycling consisted of 95° C for 3 minutes followed by 35 cycles at 95° C for 30 seconds, an annealing temperature of 50° C for 30 seconds and 72° C for 1 minute and a final extension of 72° C for 10 minutes. PCR cleanup was conducted at a volume of 12 µL, consisting of 10 µL of PCR product and 0.7 µL of Exonuclease I (Thermo Scientific$^{TM}$) and 1.3 µL of FastAP Thermosensitive Alkaline Phosphatase (Thermo Scientific$^{TM}$). The cleanup was conducted at 37° C for 15 minutes, followed by 85° C for 15 minutes. Samples were sequenced at the Central Analytics Facility (CAF) in Stellenbosch. Sequences were edited using Geneious Prime 2022.1.1 and manually aligned. Most alignments did not require further editing. Sequences of known species in the region were downloaded from GenBank and a progressive pairwise alignment was performed in Geneious. Subsequently, Neighbour-Joining trees were also produced using Geneious. Lastly, a pairwise distance matrix was created in MEGA 11 with sequences trimmed to 547 base pairs. All sequences were uploaded onto the Barcode of Life Data System (BOLD) database.

Specimens were examined and drawn produced using a WILD stereomicroscope and a Nikon SMZ1270 both equipped with a camera lucida, and digitally traced in Inkscape 1.21 (www.inkscape.com) using a Wacom Intuos Pro. Photos were taken using a Nikon D3100 camera and edited with GIMP 2.10.30 software (www.gimp.com). Images credited to TPA Botha, unless stated otherwise. Maps were created using ESRI ArcGIS 3.3.0.

The terminology and measurements used in this study follow Baba et al. (2009). Specimen sizes are indicated by the postorbital carapace length (pcl), measured from the base of the rostrum along the midline to the posterior margin of the carapace. The rostrum is measured from the base to the distal tip. Appendages are measured in dorsal (pereopod 1) and lateral (pereopods 2 – 4) midlines. Where applicable ranges of morphological and meristic variations are included in the description, holotype measurements are given in parentheses. Abbreviations and symbols used are: ♀ = female; ♂ = male; Mxp3 = maxilliped 3; ovig. = ovigerous; P1= pereopod 1 (cheliped); P2 – 4 = pereopods 2 – 4.

# Systematic account

## Family **Munididae** Ahyong, Baba, Macpherson & Poore, 2010

Munididae Ahyong, Baba, Macpherson & Poore, 2010: 59; Macpherson & Baba, 2011: 55; Machordom et al., 2022: 944; Poore & Ahyong, 2023: 277.

**Type genus:** *Munida* Leach, 1820.

**Diagnosis:** After Machordom et al. (2022).

Carapace (excluding rostrum) longer than wide, with transverse dorsal striae. Rostrum slender with dorsal ridges, usually spiniform; supraocular spines present. Telson distinctly or indistinctly subdivided into several plates. Endopod of uropod lacking long marginal spines. Corneas of eyes usually wider than ocular peduncles. Antennal peduncle pointing anteriorly or anterolaterally. Incisor edge of mandible entire. Mxp 1 exopod with well-developed flagellum. Mxp 3 pediform, epipod present; elongate ischium and merus, not expanded mesially; flexor margin of merus with spine(s), proximal always longest; carpus unarmed on flexor margin. P1 subcylindrical to ovate when in cross-section. P2 merus broader than those of P3 and P4.

**Genera included:** *Agononida*; *Anomoeomunida*; *Anoplonida*; *Antillimunida*; *Arabiconida*; *Babamunida*; *Bathymunida*; *Crosnierita*; *Curtonida*; *Dactylonida*; *Enriquea*; *Garymunida*; *Gonionida*; *Grimothea*; *Hendersonida*; *Heteronida*; *Hexamunida*; *Iridonida*; *Ischnonida*; *Leptonida*; *Munida*; *Neonida*; *Onconida*; *Paramunida*; *Plesionida*; *Raymunida*; *Sadayoshia*; *Scolonida*; *Setanida*; *Tasmanida*; *Torbenella*; *Trapezionida*; *Typhlonida*.

**Remarks:** In 2022, Machordom et al. made considerable changes to the systematics of the Munididae, as three new genera were erected for *Agononida*, 11 for *Munida* and the genus *Grimothea* Leach, 1820 was resurrected. Of the eight known South African munidids, one species remained as *Agononida*, two were transferred to *Gonionida* Macpherson & Baba in Machordom et al., 2022 and five to *Trapezionida* Macpherson & Baba in Machordom et al., 2022.

## Key to species of the family Munididae in South Africa

**1.** Epipods on P1 – 3. Mxp3 carpus with distal spine on flexor margin……………………………………….……………………………….…… ***Raymunida* cf. *vittata* (p. 127; fig. 4.1A)**

Epipods absent on P1 – 3. Mxp3 carpus unarmed on distal flexor margin…..... **2 (fig. 4.1B)**

**2.** Male G1 absent. Mxp3 merus flexor margin with single well-developed spine……….. ……………….……………...……….………… ***Agononida africerta* (p. 107; fig. 4.1B)**

Male G1 and G2 present. Mxp3 merus flexor margin with two or more spines, distal spine terminal, usually small…………………………………………………… **3 (fig. 4.1C)**

**3.** Bases between rostral and supraocular spines with deep groove. P1 fingers 2.5 x longer than palm….….….. ***Babamunida brucei* (p. 113; fig. 1D, shown using different species)**

Bases between rostral and supraocular spines with shallow groove. P1 fingers shorter than 2.5 x length of palm….. …………………………………………………..… **4 (fig. 4.1G)**

**4.** Eyes small, not wider than eyestalk, corneas usually not dilated. Antennular article 1 with small distomesial spine, at most half of length of distolateral spine. Antennal articles 1 and 2 with small distomesial spines at most reaching anterior margin of articles 2 and 3 respectively. Branchial lateral margin of carapace with 5 spines. Thoracic sternite 4 triangular, with narrow anterior margin……….… ***Typhlonida* n. sp. A (p. 157; fig. 4.1F)**

Eyes wider than eyestalk, corneas dilated. Antennular article 1 with well-developed distomesial spine, more than half the length of distolateral spine. Antennal articles 1 and 2 with well-developed distomesial spines usually exceeding tip of articles 2 and 3 respectively. Thoracic sternite 4 trapezoidal or triangular………….………. **5 (fig. 4.1E)**

**5.** Carapace branchial margin distinctly convex, first lateral spine mesial to anterolateral angle………………………………….…. ***Curtonida manqingae* (p. 116; fig. 4.1P)**

Carapace branchial margin straight or weakly convex, first lateral spine usually at anterolateral angle…………………………..……………..………….…. **6 (fig. 4.1M)**

**6.** Thoracic sternite 4 trapezoidal, anterior margin wide and contiguous or sub-parallel to posterior margin of sternite 3 at least ¾ of length. Posterior thoracic sternites sometimes with carinae on lateral parts. Antennal peduncle sometimes reduced. Branchial lateral margin of carapace with 3 – 5 spines………. ..……....…….. **7 (*Trapezionida*, fig. 4.1H)**

Thoracic sternite 4 triangular, anterior margin narrow, contiguous to posterior margin of sternite 3 at most along 1/3 of the length. Posterior thoracic sternites lacking carinae on lateral parts. Antennal peduncle never reduced. Branchial lateral margin of carapace with 5 spines….. …….…………………………….………..…….. **15 (*Gonionida*, fig. 4.1I)**

**7.** Four spines on lateral margins of carapace behind cervical groove……..…. **8 (fig. 4.1M)**

Five spines on lateral margins of carapace behind cervical groove…………. **9 (fig. 4.1N)**

**8.** Posterior thoracic sternites with granules on lateral parts…………..………….……
…..………. ***Trapezionida* cf. *barbeti* (p. 138; fig. 4.1H, shown using different species)**

Posterior thoracic sternites without granules on lateral parts……………………………..
………………... ***Trapezionida nesiotes* (p. 149; fig. 4.1I, shown using different species)**

**9.** Seventh thoracic sternite with small granules on lateral parts…………..….. **10 (fig. 4.1H)**

Seventh thoracic sternite without small granules on lateral parts……………. **11 (fig. 4.1I)**

**10.** P1 palm 5 times longer than broad; P1 weakly spinose. Second antennal article without mesial spine…………………..….……..….. ***Trapezionida* n. sp. A (p. 151; fig. 4.9A, C)**

P1 palm 3 times longer than broad; P1 strongly spinose. Second antennal article with mesial spine…………………………….…… ***Trapezionida limula* (p. 143; fig. 4.9B, D)**

**11.** Pleonites unarmed……………..……………..………..…………..…… **12 (fig. 4.1Q)**

Second pleonite with spines along anterior ridge of tergite……………….…**14 (fig. 4.1S)**

**12.** Antennular article 1 distal spines subequal……... ***Trapezionida janetae* (p. 139; fig. 4.1J)**

Antennular article 1 distal spines different sizes…………………...……. **13 (fig. 4.1K)**

**13.** Antennular article 1 distomesial spine longer than distolateral…………………..….
……….……………….……………………..…***Trapezionida mesembria* (p. 148; fig. 4.1L)**

Antennular article 1 distomesial spine shorter than distolateral…………………..……
……………………..…………….………..***Trapezionida antonbruuni* (p. 132; fig. 4.1K)**

**14.** Fourth pleonite with spines along anterior margin of tergite…***Trapezionida babai* (p. 137)**

Fourth pleonite unarmed…………….……………....... ***Trapezionida* cf. *sphinx* (p. 150)**

**15.** Second and third pleonites with spines on anterior margin……………………………..
……………………………..………...…………. ***Gonionida shaula* (p. 124; fig. 4.1R)**

Spines only on anterior margin of second pleonite…………….………….. **16 (fig. 4.1Q)**

**16.** Frontal margins oblique…………………........…. ***Gonionida hoda* (p. 123; fig. 4.1O)**

Frontal margins transverse…………………..…. ***Gonionida benguela* (p. 118; fig. 4.1N)**

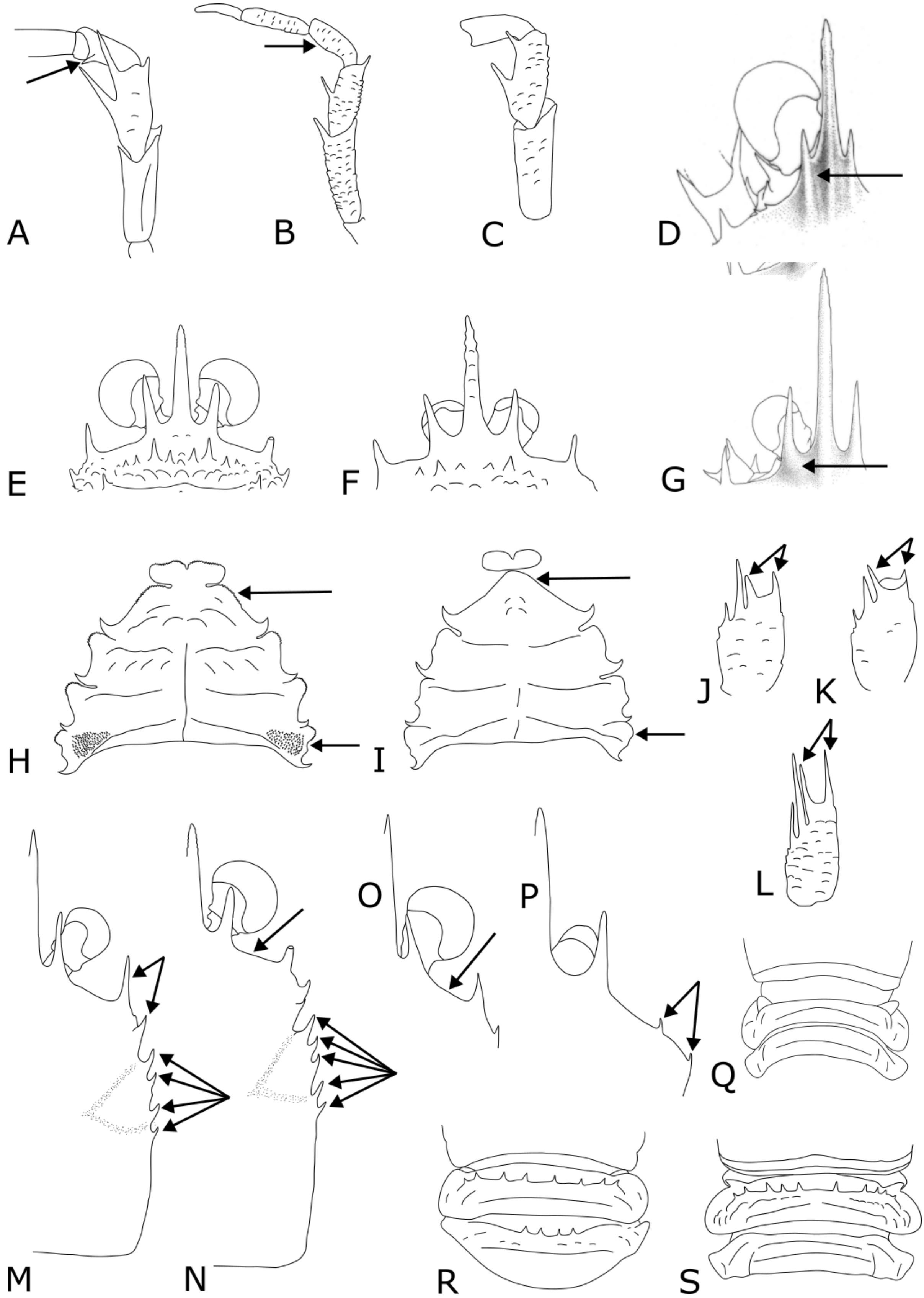
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**Figure 4.1:** **A** – *Raymunida* cf. *vittata* Mxp3, lateral view, arrow showing carpus distoflexor margin; **B** – *Agononida africerta* Mxp3, lateral view, arrow showing carpus distoflexor margin; **C** – *Gonionida benguela* Mxp3 ischium, merus, carpus, lateral view; **D** – *Babamunida hystrix* rostrum, supraocular spines and left orbital region, dorsal view (from Cabezas et al., 2008); **E** – *Gonionida benguela* rostrum, supraocular spines and eyes, dorsal view; **F** – *Typhlonida* n. sp. A rostrum, supraocular spines and eyes, dorsal view; **G** – *Munida rugosa* rostrum, supraocular spines and left orbital region, dorsal view (from Cabezas et al., 2008); **H** – *Trapezionida limula* sternal plastron, ventral view, arrow showing lateral parts of 7th thoracic sternite; **I** – *Gonionida benguela* sternal plastron, ventral view, arrow showing lateral parts of 7th thoracic sternite; **J** – *Trapezionida janetae* antennule, ventral view, arrows depicting distal spines; **K** – *Trapezionida antonbruuni* antennule, ventral view, arrows depicting distal spines; **L** – *Trapezionida mesembria* antennule, ventral view, arrows depicting distal spines; **M** – *Trapezionida nesiotes* right lateral margin of carapace, dorsal view, arrows showing spines behind cervical groove; **N** – *Gonionida benguela* lateral margin of carapace, dorsal view, arrows showing spines behind cervical groove and frontal margin; **O** – *Gonionida hoda* right frontal margin, dorsal view (adapted after Macpherson et al., 2017); **P** – *Curtonida manqingae* right frontal margin, dorsal view (adapted after Liu et al., 2013), arrows depicting anterolateral and first lateral spine; **Q** – *Trapezionida antonbruuni* second and third pleonites, dorsal view; **R** – *Gonionida shaula* second and third pleonites, dorsal view (adapted from Macpherson & de Saint Laurent, 2002); **S** – *Gonionida benguela* second and third pleonites, dorsal view.

### Genus ***Agononida*** Baba & de Saint Laurent, 1996

*Agononida* Baba & de Saint Laurent, 1996: 441; Poore, 2004: 229; Baba, 2005: 68; Baba et al., 2008: 46 (compilation); Baba et al., 2009: 71; Macpherson & Baba, 2011: 56; Machordom et al., 2022: 947; Poore & Ahyong, 2023: 280.

**Type species:** *Munida incerta* Henderson, 1888. Gender: feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace with distinct dorsal transverse striae; pair of epigastric spines; elevated transverse ridge on cardiac region, often armed with spine(s); branchial margin with 3 or 4 dorsal spines. Spiniform rostrum, flanked by supraocular spines. Orbital lateral limit rounded. Pleonites 2 – 4 each with pair of elevated transverse ridge, each anterior ridge with 4 spines; posterior ridge of pleonite 4 armed with median spine. Incomplete telson subdivision; moderately broad posterior plates, each plate length:breadth ratio 0.6 – 0.7. Sternum considerably broader than long, sternite 3, 4 – 5 times wider than long, sternite 4 broadly contiguous to sternite 3, widest at sternite 7, posterolateral region without granules and carinae. Corneas dilated. Antennal article 1 with strong distomesial spiniform process, exceeding antennal peduncle. Mxp3 ischium usually slender; merus flexor margin with strong submedian spine. P1 slender. P2 – 4 relatively slender, propodi length usually 15 times greater than height, dactyli laterally compressed, flexor margin with row of movable seta-like spines. P5 without plumose, toothbrush-like setae. G1 absent, G2 present.

**Remarks:** There are currently 21 known species globally, one of which is known to occur in South Africa (WoRMS Editorial Board, 2024).

***Agononida africerta*** Poore & Andreakis, 2012

**Figures 4.2, 4.16A**

*Munida incerta* – Kensley, 1977: 162 (Northeast South Africa, 280 – 454 m).

?*Munida incerta* – Baba, 1990: 963 (Madagascar, 394 – 700 m); Tirmizi, 1966: 205, figure 22 (Zanzibar, 421 – 658 m).

*Agononida africerta* Poore & Andreakis, 2012: 10, figures 2C, E, 3C, 8 (Mozambique (type locality) and Madagascar, 446 – 570 m); Poore & Andreakis, 2014: 205, figures 2a, 3 (Madagascar, 415 – 625 m); Macpherson et al., 2023: 384 (Glorieuses Islands, Mayotte Island, 460 – 833 m).

**Material examined:** South Africa, 35°09’47.88’S; 23°00’38.52’E, 450 m, 05/10/2016, SAMC-A094740, 2 ♂ 16.4 – 18.8 mm; South Africa, 35°11’54.61’S; 22°56’34.80’E, 512 m, 05/10/2016, SAMC-A094742, 1 ♂ 18.4 mm, 1 ♀ 17.0 mm; South Africa, 29°21’36.00’S; 31°58’12.00’E, 397 – 403 m, 01/02/2018, SAMC-A094759, 2 ovig. ♀ 19.0 – 22.0 mm; South Africa, 34°54’58.80’S; 24°08’10.20’E, 460 m, 27/04/2009, SAMC-A069738, 1 ♂ 15.1 mm; South Africa, 34°43’48.00’S; 24°33’E, 313 m, 29/04/2003, SAMC-A094566, 1 ♀ 18.6 mm.

**Description:** After Poore & Andreakis (2012).

*Carapace:* Carapace width slightly greater than length, with numerous short striae and interrupted transverse ridges with rows of short setae. Frontal margins transverse. Gastric region with pair of epigastric spines posterior to supraocular spines. Branchial region with 3 pairs of postcervical spines, distance between first pair less than last two pairs. Lateral margins convex, widest at midpoint with long iridescent setae; anterolateral spine curved upwards, reaching sinus between rostrum and supraocular spine, second lateral spine considerably shorter than anterolateral, third and fourth spines set at an angle along anterior cervical groove, last two lateral spines on branchial region smaller. Rostrum spiniform, curved upwards, 0.4 times carapace length; supraocular spines 0.6 length of rostrum.

*Sternum:* Thoracic sternites with longitudinal striae. Sternite 3 half width of sternite 4. Sternal plastron mid-length 0.6 width of sternite 7.

*Pleon:* Pleonites 2 – 4 covered in squamae, each with 4 spines along transverse ridge; pleonite 4 with strong median spine on posterior transverse ridge. Telson 1.8 times wider than long with several transverse squamae; anterior margin sinusoidal, concave and smooth over half length, remainder separated by notch, strongly convex with crenellate margin; lateral margin convex, longer anteriorly than posteriorly.

*Eye:* Ocular peduncles as long as broad. Maximum corneal diameter 0.9 basal width of supraocular spines.

*Antennule:* Article 1 with distomesial spine longer than both 2 distolateral and small lateral spines.

*Antenna:* Article 1 with strong distomesial process exceeding both antennular and antennal peduncles; article 2 with large distomesial process overreaching article 3, with small mesial spine on process, small distal spine on lateral margin; articles 3 – 4 unarmed.

*Mxp3:* Ischium 1.4 times length of merus, with spine on distoflexor margin. Merus with spine around midlength on flexor margin and strong distal spine on extensor margin, followed by several eminences. Carpus, propodus and dactylus unarmed with long setae.

*Female P1:* Approximately 3.6 – 3.7 times carapace length, covered in flat squamae fringed with short setae and longer iridescent setae. Merus 1.0 – 1.1 times carapace length, carpus 0.5 – 0.6 merus length, palm 0.8 times merus length, finger 0.9 length of propodus. Merus with 1 + 9 spines on dorsal margin, 6 – 7 spines on mesial margin, 16 spines on lateral margin and distal spine with 1 – 3 spine-like squamae on ventral margin. Carpus with 1 + 3 spines on dorsal margin, 4 spines on lateral margin and 3 spines on mesial margin. Palm with 6 spines on dorsal margin, 1 + 4 spines on mesial margin and some spine-like squamae, 1 + 3 spines on lateral face on distal margin, 1 – 3 oblique spines on proximal lateral margin, with 1 – 3 spines on lower lateral face; finger cutting edges with ridge of c. 50 denticles.

*P2 – 4*: P2 moderately long and slender, 3.1 – 3.3 times carapace length, merus 1.2 – 1.4 times carapace length, 6.8 – 9.6 times as long as greatest width, carpus 0.2 – 0.3 times merus length, propodus 0.5 – 0.6 times as long as merus, dactylus 0.4 times merus length; ischium extensor margin with 1 + 3 – 4 spines, flexor margin with distal spine on extensor margin, merus with 1 + 15 – 20 spines along extensor margin with 1 + 8 spines on flexor margin; propodus with row of robust setae on flexor margin, with distal pair; carpus with 1 + 1 – 3 spines on extensor margin, large distal spine on flexor margin; dactylus 5.6 times as long as basal width, evenly curved over distal two-thirds, with row of 20 robust setae distal to heel of flexor margin. P3 2.9 – 3.1 times carapace length, merus 0.8 – 1.2 times carapace length, 6.3 – 6.5 times longer than greatest width, carpus 0.3 times merus length, propodus 0.7 times merus length, dactylus 0.6 – 0.7 times propodus length; ischium with 1 + 3 spines on extensor margin, with distal spine on flexor margin, merus with 1 + 15 – 20 spines on extensor margin, with 1 + 7 – 10 on flexor margin; propodus with row of robust setae on flexor margin, with distal pair; carpus with 1 + 3 spines on extensor margin, large distal spine on flexor margin; dactylus distal two-thirds evenly curved, 6.1 times longer than basal width, with row of 3 – 4 robust setae distal to heel of flexor margin. P4 2.8 – 3.1 times carapace length, merus 1.1 – 1.2 times carapace length, 6.0 – 7.0 times longer than greatest width, carpus 0.3 times merus length, propodus 0.6 – 0.7 times merus length, dactylus 0.5 – 0.6 propodus length; ischium extensor margin with 1 + 3 spines on flexor margin, extensor margin with distal spine, merus with 1 + 15 spines on extensor margin, flexor margin with 1 + 8 spines, with 1 – 4 proximal spines on lateral face; propodus with row of robust setae on flexor margin, with distal pair; carpus with 1 + 3 spines on extensor margin, large distal spine on flexor margin; dactylus less curved than dactyli 2 or 3, less setose distally, 6.1 times longer than basal width, dactylus with 2 robust setae distal to heel of flexor margin.

*Male. Based on SAMC-A094740, pcl 18.0 mm.* Anterolateral margin of telson similar as in female. P1 merus as long as carapace, carpus 0.6 times merus length, propodus 0.8 times merus length, finger 0.9 times propodus length. Merus with 1 + 5 spines on dorsal margin, 14 spines on lateral face, 5 – 8 spines on mesial margin. P2 3 times carapace length, carpus 0.3 times merus length, dactylus 0.6 times propodus length, dactylus with row of 13 robust setae on flexor margin, distal to heel. P3 2.9 times carapace length, dactylus 0.5 times propodus length, dactylus with 2 robust setae distal to heel on flexor margin. P4 2.8 times carapace length, dactylus 0.6 times propodus length; dactylus with 3 robust setae distal to heel of flexor margin.

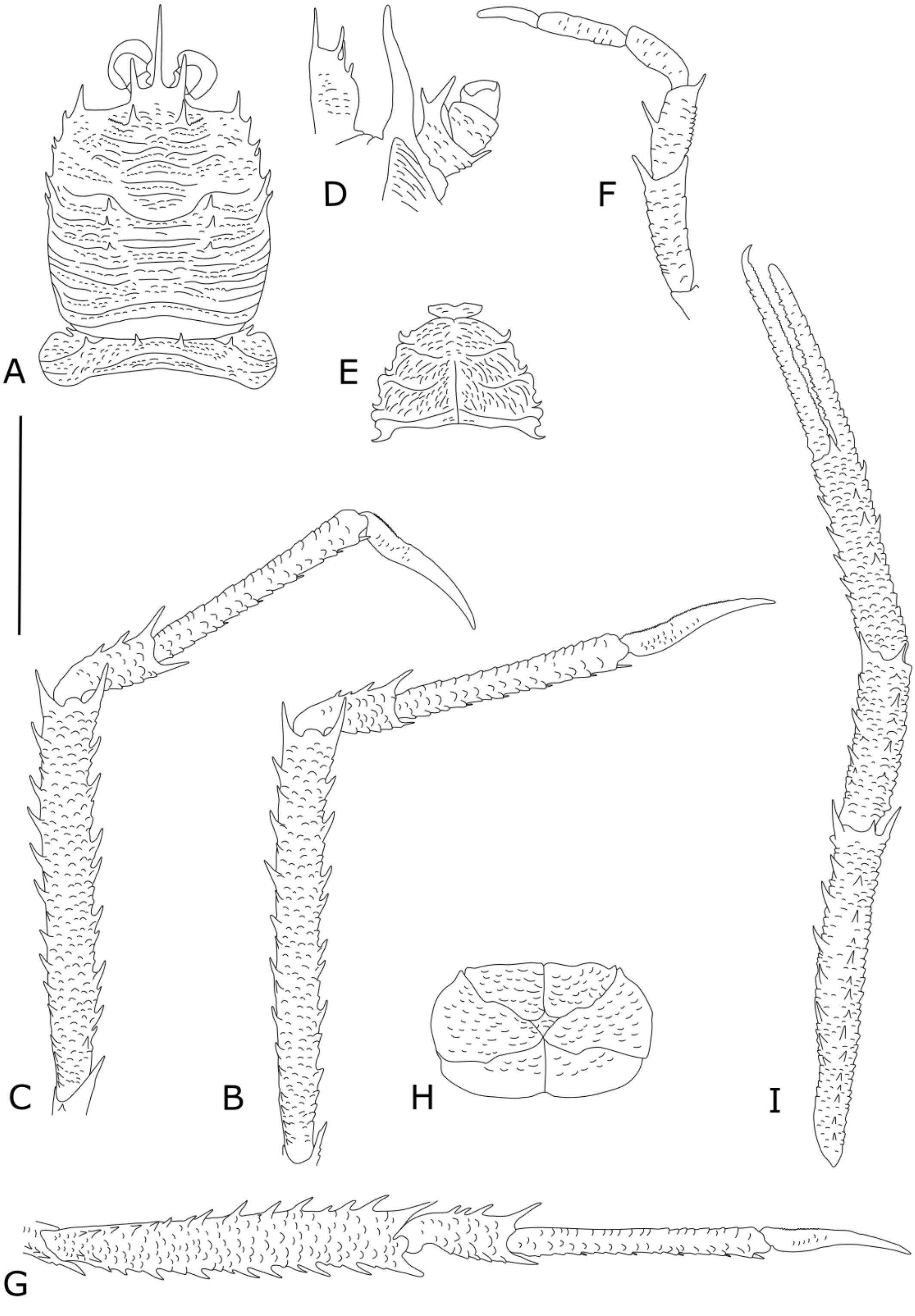

**Figure 4.2:** *Agononida africerta* Poore & Andreakis, 2012*,* ovig. ♀, 19.3 mm (SAMC-A094759), South of Richard's Bay, South Africa. **A** – Carapace and anterior pleonite, dorsal view; **B** – Right P2, lateral view; **C** – Right P3, lateral view; **D** – Cephalic region, showing antennular and antennal peduncles, ventral view; **E** – Sternal plastron, ventral view; **F** – Left Mxp3, lateral view; **G** – Right P4, lateral view; **H** – Telson; **I** – Right P1, dorsal view. Scale bar: A, E = 20.0 mm; B, C, G – I = 15.0 mm D, F = 10.0 mm.

**Variation:** Ranges noted in description. Some variation with regards to morphometrics between South African specimens and original description. Several ratios between segments of appendages vastly different, for example, P1 palm originally described as 1.9 times merus length, however South African specimens P1 palm 0.8 times merus length; Mxp3 ischium 1.4 times longer than merus, while it is 0.6 times merus length in original description.

**Coloration (in life, Figure 4.16A):** After Poore & Andreakis (2014).

Carapace and pleonites 1 – 3 orange/red, darker around bases of spines, rostrum and supraocular spines. Pleonites 4 – 6 whitish. P1 – 4 meri orange/red (banded white and orange/red in supermales), spines and squamae more strongly coloured. P1 with lighter orange patches at carpus-propodus joint and bases of fingers. In supermales, merus-carpus, carpus-propodus joints and fingers darker than rest of appendage. P2 – 4 with small orange spot at base of carpus and propodus, while distal two-thirds of dactyli bright red. Extensor margin of P1 – 4 meri with iridescent blue setae. Antennal flagellum mostly red, often whitish distally.

**General distribution:** Mozambique, Madagascar, Glorieuses Island, Mayotte Island, 394 – 833 m, and now South Africa.

**South African distribution:** Shelf edge South of Knysna to uThukela, 280 – 512 m (Figure 4.13).

**Genetic data:** COI, 16S, see Appendix Table 4.1 and 4.2.

**Remarks:** This species forms part of the *Agononida incerta* complex uncovered by Poore & Andreakis (2012, 2014). These authors examined material from Mozambique and Madagascar, which were previously recorded as *A. incerta,* and deemed these to be a new species, *A. africerta*. They also suggested that the Kensley (1977) material, which they erroneously deemed as being from Mozambique, but was actually collected from iSimangaliso Marine Protected Area, is also likely to be this species. Upon examination of morphological and genetic data for the South African material it can be confirmed that these specimens, previously identified as *Munida incerta* (later changed to *A. incerta*) are indeed *A. africerta*. This study greatly expands the distribution of this species, as the '*M. incerta*' material was only reported from iSimangaliso Marine Protected Area to the shelf edge off Knysna (Figure 4.13). The South African material does differ in several aspects with regards to morphometrics when compared to Poore & Andreakis (2012), however, it is worth noting that their measurements were taken from photographs, as opposed to measuring physical specimens. Meanwhile, the specimens agreed well with regards to diagnostic characters. This species is frequently caught in the same sampling events as crustaceans *Gonionida benguela* de Saint-Laurent & Macpherson, 1988 on the south and east coast, as well as *Scyramathia hertwigi* Chun, 1900, *Metanephrops mozambicus* Macpherson, 1990 and *Haliporoides triarthrus* Stebbing, 1914 on the east coast. The South African material aligns well with Mozambican *A. africerta* material and has almost no genetic divergence at 0.0 – 0.2% (16S; Appendix Table 4.1) and 0.0 % (COI; Appendix Table 4.1). The South African *A. africerta* material also has low divergence with *A. vanuacerta* (0.8 – 1.2% 16S) and *A. indocerta* (0.8 – 1.4% 16S; 2.7 – 3.0% COI). Interestingly, *A. madagascerta* which is also known from the area, is more distantly related, with a divergence of 12.7 – 13.1%. The COI and 16S phylogenetic trees (Appendix Figures 4.20, 4.21) of *Agononida* are quite similar and show that the South African material of *A. africerta* clusters together with Mozambican material of *A. africerta* and are quite closely related to *A. indocerta* and *A. vanuacerta,* while *A. madagascerta* forms a monophyletic group.

### Genus ***Babamunida*** Cabezas, Macpherson & Machordom, 2008 – **NEW RECORD**

*Babamunida* Cabezas et al., 2008: 69; Baba et al., 2008: 55 (compilation); Macpherson & Baba, 2011: 57; Machordom et al., 2022: 952; Poore & Ahyong, 2023: 280.

**Type species:** *Munida callista* Macpherson, 1994. Gender: feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace lateral margins straight or slightly convex, with distinct setigerous ridges on dorsal surface, setae non-iridescent; epigastric spines present; occasionally with additional gastric spines; usually 3 or 4 (rarely 5) spines on branchial margin; frontal margin mostly oblique, seldom transverse, slightly concave; distinct anterolateral spine; posterior margin unarmed; pterygostomian flap not visible in dorsal view, unarmed. Spiniform rostral spine, clearly longer than supraocular spines; all generally carinate dorsally; supraocular spines not reaching end of corneas; bases between rostral and supraocular spines with deep longitudinal grooves. Epistome with ridge originating from marginal ridge of mouth, leading to ventral margin of orbit, distinctly anterior to base of antennal peduncle, with no protuberance near marginal ridge. Pleonites generally unarmed, rarely with spines. Incomplete telson subdivision, with wide posterior plates, each as long as wide. Thoracic sternum wider than long, max width at 7th sternite; sternite 3, 3 – 5 times wider than long; sternite 4 with wide anterior margin, somewhat concave; posterior margin of sternite 3 contiguous with sternite 4 medially. Eyes freely movable, large, corneas dilated. Antennular basal article with 2 distal spines, with 2 additional spines on lateral margin. Antennal article 1 not fused with epistome, short distomesial spine (rarely long), not exceeding article 2. Mxp3 merus armed with 2 or 3 marginal spines along flexor border. Moderately slender P1. P2 – 4 relatively long and slender with mesiolaterally flattened dactyli, flexor margin with row of seta-like movable spines. P4 merus more than 0.5 the length of P2 merus, not reaching the frontal margin of the carapace. P5 without toothbrush-like setae. G1 and G2 present.

**Remarks:** There are currently 12 species within this genus, of which only one is known from the Indian Ocean (and now South Africa). None are known from the Eastern Atlantic.

***Babamunida brucei*** (Baba, 1974) – **NEW RECORD**

**Figure 4.3**

*Munida brucei* Baba, 1974: 55, figures 1, 2 (off East coast of Kenya (type locality), 119 m); Baba, 2005: 260 (key, synonymies, Maroon Point, Mauritius, 37 – 46 m).

*Babamunida brucei* — Cabezas et al., 2008: 69 (transfer to new genus); Baba et al., 2008: 55 (compilation); Castro, 2011: 15 (list of Hawaii occurrences, with doubts); Macpherson et al., 2023: 384 (compilation, SWIO).

**Material examined:** Not available. Type material – Kenya, 02°52.50'S; 40°50.00'E, 119 m, 08/12/1971, NHMUK-1973.203, 1 ♂ 15.5 mm (including rostrum).

**Variation:** N/A.

**Description:** <u>See Baba (1974).</u>

**General distribution:** Kenya, Mauritius, 37 – 119 m, and now South Africa.

**South African distribution:** South of Richards Bay, KwaZulu-Natal, 95 – 105 m (Figure 4.13).

**Genetic data:** Not available.

**Figure 4.3:** *Babamunida brucei* (Baba, 1974), South of Richard's Bay, 95 – 105 m. Photograph by: SeaEye Falcon 12177 during ACEP: Imida Frontiers in 2017.

**Remarks:** Due to the elusive nature of *Babamunida* species, identification from colour photographs is often the only way to record their presence. This has been shown to be effective by Poupin et al. (2012) and Schnabel et al. (2009), who reported on *B. hystrix* (Macpherson & de Saint-Laurent, 1991) and *B. kanaloa* Schnabel, Martin & Moffitt, 2009. Schnabel et al. (2009) states that specific coloration can be used for species diagnoses in this group. This specimen was observed, but not collected, during the African Coelacanth Ecosystem Program (ACEP): Imida Frontiers expedition led by Kerry Sink with the SeaEye Falcon 12177 remotely operated vehicle (ROV) (Figure 4.3). The identification is made based on the distinct rostrum and short supraocular spines, the broad P1 carpus and palm, the P4 merus which is more than half the length of the P2 merus and does not reach the anterior margin of the carapace, as well as the colour pattern, which is diagnostic in this species. As described by Baba (1974), the colour pattern includes reddish-brown body, purple transverse lines on the posteriormost ridge on the carapace and posterior margins of second to fourth pleonite and lastly pale spots and bands on the chelipeds and walking legs. The specimen reported here agrees well with all these characters, moreover, as *B. brucei* is the only species from this genus known from the Indian Ocean (East coast of Kenya), there is confidence in this identification.

This is the first record of the genus *Babamunida* in South Africa. Species in this genus are elusive, and many have been observed to occupy burrows or holes (Schnabel et al., 2009; Poupin et al., 2012) and if they are observed in the open, they rapidly move to a nearby hole or burrow. This obviously increases the difficulty of collections and could be the reason they have not previously been collected from South Africa.

### Genus ***Curtonida*** Macpherson & Baba in Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022 – **NEW RECORD**

*Curtonida* Macpherson & Baba *in* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 954.

**Type species:** *Munida spinosa* Henderson, 1885. Gender: Feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace with convex branchial margin; distinct ridges of different length on dorsal surface; pair of epigastric spines behind ocular peduncles normally flanked by spines; no protogastric spines; anteriormost lateral marginal spine mesial to anterolateral angle; unarmed posterior margin; pterygostomian flap invisible in dorsal view, unarmed. Rostrum spiniform, flanked by supraocular spines, bases of rostral and supraocular spines with shallow longitudinal grooves. Epistome with ridge originating from marginal ridge of mouth, leading laterally to level of antennal gland aperture. Pleonites armed on anterior ridge of pleonite 2 or unarmed on all. Posterior plates of telson each as long as wide. Thoracic sternum marginally wider than long (along midline); widest at sternite 7; sternite 3 roughly 3 times wider than long; sternite 4 narrowly contiguous to sternite 3. Corneas small, eyes freely movable. Basal article of antennule moderately long and slender, twice longer than wide, with 2 distal and 2 lateral spines. Basal antennal article not fused with epistome, with distomesial spine. Mxp3 slender, with elongated ischium. P1 fingers shorter than palm. P2 – 4 relatively slender, spinose; dactyli flexor margin with row of seta-like spines each arising from small process; P4 moderately long and slender, mero-carpal articulation not reaching frontal margin of carapace. G1 and G2 present.

**Remarks:** There are currently six known species in this recently-erected genus, established for species with an especially convex branchial margin and a first lateral spine mesial to the anterolateral angle. This genus (along with ten others) was erected based on morphological and molecular evidence that showed the genus *Munida* Leach, 1820 to have several distinct clades that should be separated into different genera. Of the previously known munidids from South Africa, none were transferred to *Curtonida* in Machordom et al. (2022) and now only one species from this genus is known to occur in South Africa.

***Curtonida manqingae*** (Liu, Lin & Huang, 2013) – **NEW RECORD**

**Figure 4.16B**

*Munida sp.* – Kensley, 1968: 287 (West of Cape Town, 2525 – 2782 m).

*Munida manqingae* Liu, Lin & Huang 2013: 380, figures 1, 2 (Southwest Indian Ridge (type locality), 2218 m).

*Curtonida manqingae* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 954 (new combination).

**Material examined:** South Africa, 33°52'S; 16°51'E, 2524 – 2780 m, 09/12/1959, SAMC-A010525, 1 ovig. ♀ 8.7 mm.

**Description:** See Liu et al. (2013).

**Variation:** N/A.

**Coloration:** As per Liu et al. (2013).

Anterior part of carapace (anterior branchial, cardiac, gastric and hepatic region), antennal, antennular and ocular peduncles deep pink. Posterior part of carapace (intestinal and posterior branchial region) and pleon pink. P1 – 5 and telson light pink. No updated colour information available, as examined specimen was preserved in ethanol.

**General distribution:** Western Indian Ocean, 2218 m, and now South Africa.

**South African distribution:** West of Cape Town, 2523 – 2780 m (Figure 4.13).

**Genetic data:** Not available.

**Remarks:** This addition not only represents a new species record for South Africa, but also a new genus record. Although the only material was a disarticulated specimen, it agrees well with the original description. Interestingly, the species was described from a hydrothermal vent field on the Southwest Indian Ridge at a similar deep depth of 2218 m and is one of two species in the family known to occur in hydrothermal vent fields, the other being *Typhlonida magniantennulata* (Baba & Türkay, 1992). This is the first time a specimen has been collected since the original description of a single ovigerous female and increases the known depth record substantially, representing one of the deepest munidid records ever recorded. There is some mention of the specimen in Kensley (1968) although it is only listed as *Munida sp.,* followed by a brief description of some characters. The specimen was collected using a beam trawl, together with *Galacantha rostrata* A. Milne-Edwards, 1880, a common munidopsid from South Africa more than 2500 m deep.

### Genus ***Gonionida*** Macpherson & Baba in Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022

*Gonionida* Macpherson & Baba *in* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 956.

**Type species:** *Munida asprosoma* Ahyong & Poore, 2004. Gender: feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace with straight or slightly convex lateral margin; dorsal surface with distinct transverse setiferous ridges; non-iridescent setae; pair of epigastric spines positioned directly behind ocular peduncles flanked by spines; no protogastric spines; distinct anterolateral spine; lateral branchial margin with 5 spines; posterior margin unarmed; pterygostomian flap unarmed and not visible in dorsal view. Rostrum spiniform (rarely laterally compressed), flanked by supraocular spines; bases of rostral and supraocular spines with shallow longitudinal grooves. Epistome with ridge originating from marginal ridge of mouth, laterally leading to level of antennal gland aperture. Posterior plates of telson wide, each plate as long as wide. Sternum wider than long with sternite 7 widest; sternite 3, 3 – 4 times wider than long; sternite 4 triangular with narrow anterior margin; anterior section contiguous to sternite 3 at most along 1/3 of the length; posterior sternites lacking carinae on lateral parts. Eyes freely moveable with dilated corneas. Article 1 of antennule approximately twice as long as wide, with 2 distal and 2 lateral spines; distomesial spine more than half length of distolateral spine. Well-developed antennal peduncle; article 1 separate from epistome, distomesial spine well-developed, usually reaching or exceeding article 2 distally. Mxp3 slender with elongate ischium, merus flexor margin with more than 1 spine. Fingers of P1 shorter than palms. P2 – 4 somewhat slender, spinose; dactyli flexor margin with row of seta-like spines arising from low, small process; merus of P4 approximately half length of P2 merus, not reaching anterior margin of carapace. Males with G1 and G2 present.

**Remarks:** This recently-erected genus was shown to be the sister clade to *Trapezionida* and is differentiated from it by the shape of the 4th thoracic sternite (triangular in *Gonionida* and trapezoidal in *Trapezionida*) and the length of P4 merus (2/3 length of P2 merus in *Trapezionida* and usually about half the length in *Gonionida*). Currently there are 63 species in the genus, all from the Indian and Pacific Oceans, except for *G. benguela*, which is the most common munidid found in the southeast Atlantic along the continental shelf edge of South Africa and Namibia (de Saint Laurent & Macpherson, 1988; Atkinson & Sink, 2018), but only three species from this genus is known from South Africa.

***Gonionida benguela*** (de Saint Laurent & Macpherson, 1988)

**Figures 4.4, 4.16C**

*Munida sancti-pauli* – Barnard, 1950: 489, figure 92b (off Cape Point, 458 m).

*Munida sanctipauli* – Kensley, 1981: 34 (list).

*Munida benguela* de Saint Laurent & Macpherson, 1988: 106, figures 1, 2a, c, 3a, d, f – i (South of Namibia (type locality), South Africa, 450 – 825 m); Baba, 1990: 962 (Madagascar, 480 – 710 m); Macpherson, 1991: 404 (list, Namibia); Baba, 2005: 95, 260 (key, synonymies, off Durban and off Natal, 500 – 730 m); Baba et al., 2008: 89 (synonymies); Macpherson et al., 2017: 37, figures 11B, C (key, Mozambique, Madagascar, 352 – 732 m); Atkinson & Sink, 2018: 175, colour figures; McCallum et al., 2021: 139 (Western Australia, 392 m).

*Gonionida benguela* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 956 (new combination); Macpherson et al., 2023: 385 (Mayotte Island, 788 – 800 m).

**Material examined:** South Africa, 34°10’0’S; 26°50’18’E, 670 m, 02/06/1990, SAMC-A40002, 1 ♂ 17.1 mm; South Africa, 32°21’0’S; 16°28’12’E, 450 m, 09/02/2004, SAMC-A094552, 2 ♂ 20.4 – 22.3 mm; South Africa, 32°16’48’S; 16°22’48’E, 455 m, 07/02/2004, SAMC-A094553, 4 ♂ 17.6 – 21.5 mm; South Africa, 35°11’54.61’S; 22°56’34.8’E, 512 m, 05/10/2016, SAMC-A094741, 2 ♂ 16.7 – 16.8 mm; South Africa, 35°18’18.71’S; 22°47’12.8’E, 555 m, 18/04/2021, SAMC-A094748, 1 ♂ 19.0 mm; South Africa, 35°11’43.4’S; 23°00’32.4’E, 527 m, 18/04/2021, SAMC-A094749, 1 ♂ 18.0 mm; South Africa, 29°42’36’S; 31°29’24’E, 263 – 267 m, 30/01/2018, SAMC-A094756, 1 ♀ 18.0 mm; South Africa, 29°21’36’S; 31°58’12’E, 397 – 403 m, 01/02/2018, SAMC-A094758, 1 ♂ 12.8 mm; South Africa, 34°06’2.52’S; 17°31’21.72’E, 514 m, 01/02/2022, SAMC-A094754, 1 ovig. ♀ 16.5 mm; South Africa, 32°01’58.8’S; 16°05’E, 500 m, 23/09/1971, SAMC-A79354, 1 ♂ 15.8 mm; South Africa, 35°18’30’S; 22°46’48’E, 545 m, 24/04/2009, SAMC-A069682, 1 ovig. ♀ 19.6 mm; South Africa, 33°15’S; 17°10’12’E, 471 m, 20/01/1999, SAMC-A094561, 2 ♂ 19.9 – 22.6 mm, 2 ♀ 18.3 – 20.0 mm; South Africa, 32°01’12’S; 16°16’12’E, 459 m, 09/02/2004, SAMC-A094565, 1 ovig. ♀ 17.4 mm; South Africa, 35°12’S; 22°56’52.8’E, 500 m, 02/05/2004, SAMC-A094564, 1 ♀ 21.0 mm; South Africa, 30°05’24’S; 14°53’24’E, 470 m, 03/08/1989, SAMC-A094563, 1 ♂ 12.2 mm; South Africa, 31°03’18.12’S; 15°42’13.38’E, 451 m, 13/01/2012, SAMC-A073877, 1 ♂ 12.4 mm.

**Description:**

*Carapace:* Slightly longer than wide, secondary striae between main transverse ridges. Gastric region with 3 – 4 pairs of epigastric spines, longest pair behind supraocular spines; row of scales behind epigastric spines. One parahepatic, 1 – 2 dorsal branchial and 1 postcervical spine each side. Frontal margins transverse. Lateral margins relatively straight. Anterolateral spine well-developed, reaching level of sinus between rostrum and supraocular spines; 1 – 2 spines in front of anterior branch of cervical groove, with several scales. Branchial lateral margins with 5 spines. Rostrum spiniform, almost half length of carapace, curved upwards distally. Supraocular spines reaching about the middle of the rostrum, slightly divergent, curving upwards.

*Sternum:* Thoracic sternites with smooth surface; sternite 3 with median notch on anterior margin, with weak denticles laterally; sternite 4 triangular with short arcuate striae medially; sternite 7 without pronounced lateral processes.

*Pleon:* Pleonite 2 armed with 8 – 10 spines on anterior margin, pleonites 3 – 6 unarmed; pleonites 2 – 5 with two distinct transverse ridges, anterior ridge medially interrupted in pleonites 2 – 4; posteromedian margin of pleonite 6 straight.

*Eye:* Ocular peduncles slightly wider than long, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

*Antennule:* Article 1 with 2 well-developed, subequal distal spines; 2 lateral spines, distal much longer than proximal, exceeding distomesial spine.

*Antenna:* Article 1 with strong distomesial spine, not exceeding article 2. Article 2 with distomesial spine exceeding article 3 and 4; distolateral spine barely exceeding midlength of article 3. Article 3 unarmed.

*Mxp3:* Ischium with small distal spine on flexor margin. Merus shorter than ischium, armed with 2 well-developed spines on flexor margin, proximal spine almost twice as long as distal spine; extensor margin unarmed. Carpus unarmed.

*P1:* Female P1 between 2.4 – 2.9, male P1 2.7 – 2.9 times length of carapace, cylindrical, covered in long iridescent and short dense setae, armed with spines and fine scales on surface. Merus 0.9 – 1.0 times carapace length, 2.0 – 2.7 carpus length, armed with rows of spines on dorsal, ventral and mesial surface, distalmost spine strongest. Carpus 0.8 times length of palm, 1.5 – 1.7 times longer than broad with rows of spines on dorsal, ventral, lateral and mesial surface, distal spines strongest. Palm slightly shorter than finger, 1.8 – 2.4 times longer than broad, with rows of dorsal, ventral and lateral spines. Fixed finger with row of 5 spines, movable finger with proximal and distal spine; tips of fingers sharp, curved towards each other.

*P2 – 4*: Moderately long and slender, with short, dense setae and long iridescent setae on extensor margin, with fine scales on surface. P2 2.0 – 2.3 times carapace length. Meri shorter successively (P3 merus 0.8 length of P2 merus, P4 merus 0.6 length of P3 merus); P2 merus 0.8 – 0.9 carapace length, roughly 6.0 times longer than broad, 1.7 times propodus length; P3 merus 5.0 – 5.5 times longer than broad, 1.4 – 1.5 times longer than P3 propodus; P4 merus 3.3 – 3.8 times longer than broad, 1.2 – 1.4 times longer than P4 propodus. Extensor margin of P2 merus with row of 11 – 12 proximally diminishing spines, 8 – 9 spines on P3 and only distal spine on P4; flexor margins with some spines distally, followed proximally by some eminences; lateral margins unarmed. Carpi with 2 – 4 spines on extensor margin of P2 – 3, 1 distal spine on P4; lateral margins with row of several granules sub-paralleling extensor margin on P2 – 4; flexor margin with well-developed distal spine. Propodi 6.6 – 5 (P2 – 3) – 4.3 (P4) times as long as broad; extensor margin unarmed; flexor margin with 5 – 6 slender, movable spines and 1 – 2 well-developed distal spines. Dactyli slender, P2 – 3 length 0.7 – 0.8 times that of propodi, P4 almost same length as P4 propodi; flexor margin with 6 – 8 movable spinules; distal third unarmed, without spinule at base of unguis; P2 dactylus 5.3 times as long as wide.

**Variation:** Ranges noted in description. Dorsal surface of carapace with small spines rarely present posterior to parahepatic spine.

**Coloration (in life; Figure 4.16C):** Colour of dorsal surface of carapace and pleonites 2 – 3 brick red or pinkish; pleonites 4 – 6 and telson white (pleonite 4 occasionally partially reddish). Rostrum and supraocular spines mostly reddish, seldomly white. P1 pinkish or reddish. P2 – 4 pinkish or reddish, distal part of propodi and proximal part of dactyli whitish.

**General distribution:** Namibia, Mozambique, Mayotte Island, Madagascar and South Africa, 252 – 825 m.

**South African distribution:** Orange River to Mozambican border, 263 – 825 m (Figure 4.14).

**Genetic data:** COI, see Appendix Table 4.3.

**Remarks:** This species is by far the most common and widely-distributed of the Munididae and is frequently caught by demersal trawl research vessels. It is the only munidid found along the entire coastline of South Africa. Often caught along with *Agononida africerta* on the south and east coast. Other species frequently found in the same trawls include the majoid crab *Scyramathia hertwigi* Chun, 1900, the hermit crab *Parapagurus bouvieri* Stebbing, 1910, the mud crab *Dyspanopeus* sp. and the whelk *Fusitriton magellanicus* (Röding, 1798). The South African material aligns with Mozambican material as it has a divergence of 0.0% (COI; Appendix Table 4.3). *Gonionida benguela* is closely related to the newly described *G. crosnieri* Macpherson, Rodriguez-Flores & Machordom, 2023 with a divergence of 2.3% (COI, see Macpherson et al., 2023), a greater than 24.0% divergence (though the sequence is small at 320 base pairs) to *G. hoda* and a 10.9 – 11.1% divergence to *G. shaula*. The COI tree of *Gonionida* (Appendix Figure 4.22) shows that South African *G. benguela* material (which are from both

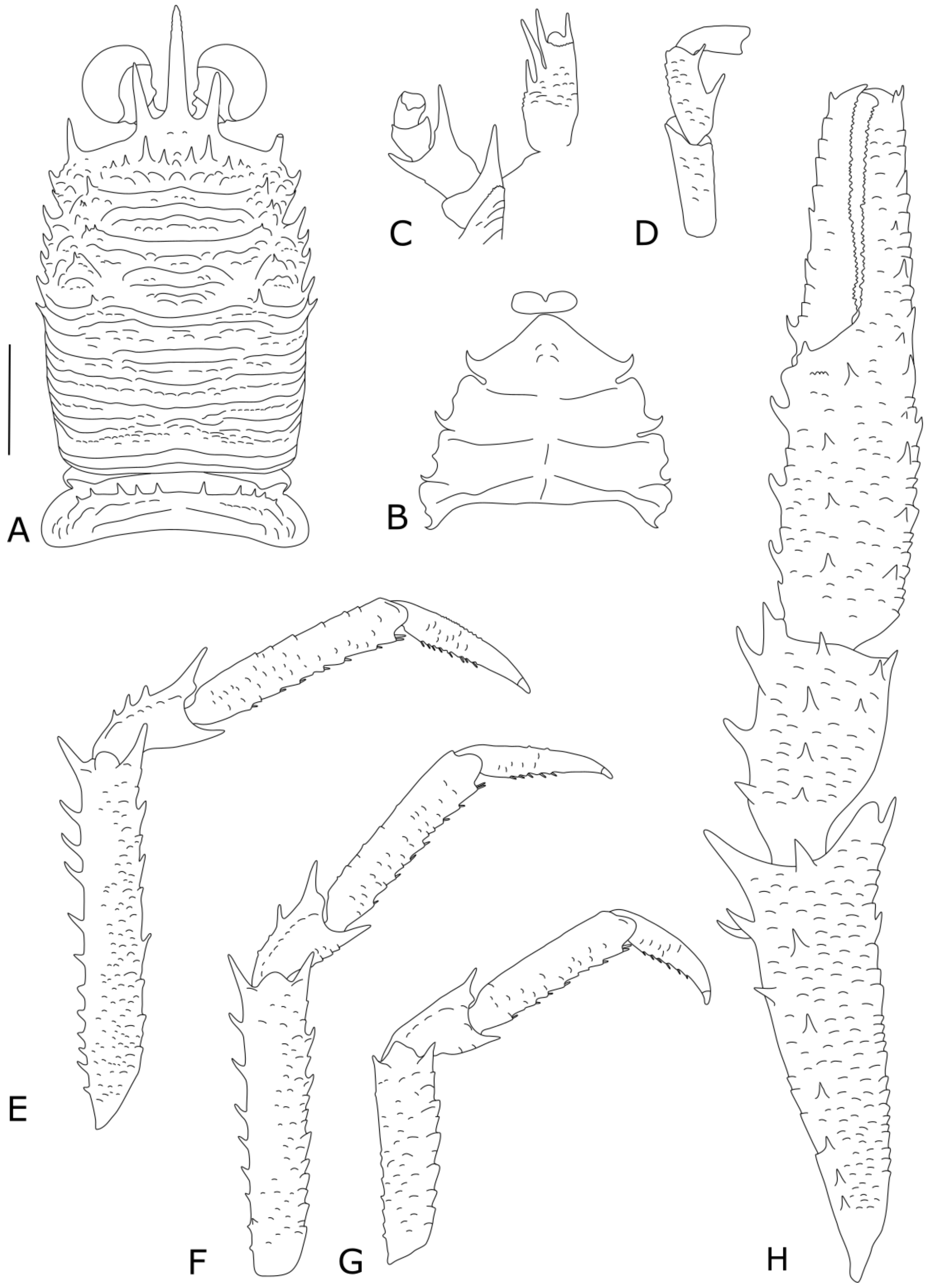

**Figure 4.4:** *Gonionida benguela* (de Saint Laurent & Macpherson, 1988), ♂, 19.2 mm (SAMC-A094748), South of Knysna, South Africa. **A** – Carapace and anterior pleonite, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Right P2, lateral view; **F** – Right P3, lateral view; **G** – Right P4, lateral view; **H** – Right P1, dorsal view. Scale bar: A = 10.0 mm; B – H = 5.0 mm.

the east and west coast) clusters together with Mozambican material of the same species and forms a well-supported group, with *G. shaula* distantly related. *Gonionida benguela* can morphologically be separated from *G. shaula*, as it does not have spines along the anterior margin of the third pleonite and has a palm shorter than fingers and not 1.4 times longer than fingers, as in *G. shaula*. It can also be distinguished from *G. hoda* as it has transverse frontal margins and the first antennal article with a strong distomesial spine reaching end of the second article, instead of oblique frontal margins and a weaker distomesial spine on the first antennal article not reaching end of the second article.

***Gonionida hoda*** (Macpherson, Rodriguez-Flores & Machordom, 2017) – **NEW RECORD**

**Figure 4.16D**

*Munida hoda* Macpherson, Rodriguez-Flores & Machordom, 2017: 15, figures 5, 11D (Mozambique (type locality), 630 – 715 m); Miranda et al., 2020: 348 (DNA sequence).

*Gonionida hoda* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 941 (new combination); Macpherson et al., 2023: 385 (compilation, SWIO).

**Material examined:** South Africa, 31°44’18’S; 29°32’12’E, 350 m, 04/07/1985, SAMC-A094550, 1 ♂ 5.9 mm; South Africa, 31°44’18’S; 29°32’42’E, 300 m, 04/07/1985, SAMC-A094551, 2 ♂ 5.1 – 5.9 mm.

**Description:** See Macpherson, Rodriguez-Flores & Machordom (2017).

**Variation:** Branchial dorsal spine and small spine on extensor margin of Mxp3 merus present in SA specimens.

**Coloration:** After Macpherson et al. (2017).

Carapace and pleonites 2 – 3 reddish or pinkish; pleonites 4 – 6, as well as tailfan, whitish. Rostrum and supraocular spines red. P1 pinkish to reddish, with fingers whitish. P2 – 4 pinkish, distal region of propodi and dactyli whitish.

**General distribution:** Mozambique, 630 – 715 m and now South Africa.

**South African distribution:** South of Port St. Johns, 300 – 350 m (Figure 4.14).

**Genetic data:** Not available, (though a short sequence of 320 base pairs is available on Genbank).

**Remarks:** The South African specimens agree well with the original description and were found slightly shallower than previously recorded. Previously only known from southern Mozambique. This is only the second time since the original description that this species has been collected and represent a small southwards range extension. This species is somewhat similar to *G. shaula*, however it differs as the third pleonite is unarmed. See *G. benguela* remarks for differences.

***Gonionida shaula*** Macpherson & de Saint Laurent, 2002

**Figure 4.17A**

*Munida vigiliarum* – Tirmizi, 1966: 201, figure 20 (Zanzibar, 421 – 457 m) (not *M. vigiliarum* Alcock, 1901).

*Munida shaula* Macpherson & de Saint Laurent, 2002: 475, figure 3D (Reunion Island (type locality), Madagascar & Zanzibar, 280 – 510 m); Baba, 2005: 274 (key, synonymies); Baba et al., 2008: 121 (synonymies); Macpherson, Rodriguez-Flores & Machordom, 2017: 42, figure 13B (key, Mozambique & Madagascar, 263 – 450 m); McCallum et al., 2021: 150 (Western Australia, 324 – 356 m).

*Gonionida shaula* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 940 (new combination); Macpherson et al., 2023: 385 (Mayotte Island, 460 – 473 m).

*Munida kuboi* – Baba, 1990: 925 (key), 964 (not Yanagita, 1943); Baba, 2005: 112, 266 (key, synonymies, off Durban, South Africa, 412 m) (not *M. kuboi* Yanagita, 1943).

**Material examined:** South Africa, 29°56’ S; 31°19’30 E, 412 m, 26/08/1929, ZMUC CRU-11526, 2 ♂ 5.3 – 6.4 mm, 1 ovig. ♀ 6.3 mm.

**Description:** See Macpherson & de Saint Laurent (2002).

**Variation:** South African specimens have 3 lateral spines on antennular article 1 (not 2 as in original description); 2 – 4 spines on pleonite 2 (not 7 – 9 spines); transverse ridges mostly uninterrupted.

**Coloration:** After Macpherson et al. (2017).

Carapace and pleon orange to orange-red; rostrum and supraocular spines orange-reddish; pleonites 5 – 6 whitish with few orange ridges; tailfan whitish. P1 pink-whitish, with some red bands on distal portions of carpus, palm and fingers; several dorsal spines reddish. P2 – 4 whitish with some red bands.

**General distribution:** Mozambique, Madagascar, La Réunion, Zanzibar and South Africa, 263 – 510 m.

**South African distribution:** East of Durban, 412 m (Figure 4.14).

**Genetic data:** Not available.

**Remarks:** The material reported under this name included specimens previously reported by Baba (2005) under the name *Munida kuboi* from off Durban at 412 m depth. That record represented a huge range extension, since *G. kuboi* was previously known to occur only off southeast Asia. Prior to Baba (2005), *Gonionida shaula* was described from Madagascar by Macpherson & de Saint Laurent (2002), which included some material reported under the name *Gonionida kuboi.* Baba (2005) acknowledged this newly described species, but noted that one of the South African specimens bore a distomesial spine on the antenna that terminated at the midlength of article 4, and as Baba states "However, it bears the spine terminating in midlength of the article 4, not overreaching the peduncle". It is worth noting that the original description by Macpherson & de Saint Laurent (2002) does not state that the spine overreaches the peduncle but reaches the end of the peduncle. The ZMUC CRU-11526 specimens have distomesial spines on the antennal peduncle 2 that either almost reaches or reaches the end of the peduncle. This is much different to *G. kuboi,* where the distomesial spine only reaches the end of article 3. Based on this information, as well as considering the known distribution ranges of *G. kuboi* (Bali Sea, between Cebu and Bohol, Illana Bay off SW Mindanao, N of Sulawesi, S of Mindoro, South China Sea off SW Luzon, Taiwan, and the Sea of Japan and Sagami Bay, Japan) and *G. shaula* (SWIO) these *G. kuboi* specimens from South Africa are transferred to *G. shaula* (See *G. benguela* remarks for genetic divergence values and morphological differences). This species was collected along with two other squat lobster species; *Galathea lumaria* Baba, 2005 and *Uroptychus simiae* Kensley, 1977.

### Genus ***Raymunida*** Macpherson & Machordom, 2000 – **NEW RECORD**

*Raymunida* Macpherson & Machordom, 2000: 253; Baba, 2005: 201; Baba et al., 2008: 178 (compilation); Macpherson & Baba, 2011: 22; Machordom et al., 2022: 946; Poore & Ahyong, 2023: 282.

**Type species:** *Raymunida cagnetei* Macpherson & Machordom, 2000, by original designation.

**Diagnosis:** After Macpherson & Machordom (2000).

Carapace with distinct transverse striae, usually ciliated and granulated with some secondary striae between main striae. Spiniform rostrum, flanked by well-developed supraocular spines overreaching the end of the corneae. Row of epigastric spines always present, often well-developed. Pairs of parahepatic, anterior branchial and post-cervical spines usually present. Lateral margin straight or slightly convex; distinct transverse setiferous ridges on dorsal surface; setae non-iridescent; pair of epigastric spines behind ocular peduncles flanked by spines; no protogastric spines present; distinct anterolateral spine; branchial lateral margin with 3 – 5 spines; unarmed posterior margin; pterygostomian flap not visible in dorsal view, unarmed. Rostrum spiniform, flanked by supraocular spines; longitudinal grooves between bases of rostral and supraocular spines shallow. Epistome with ridge arising from mouth marginal ridge, laterally leading to level of antennal gland aperture. Transverse ridges present on pleonites. Telson with wide posterior plates, each as long as wide. Thoracic sternum wider than long; sternite 3, 3 – 4 times wider than long; sternite 4 trapezoidal, transverse anterior margin, widely contiguous or subparallel to posterior margin of sternite 3 for at least 3/4 of its width; posterior sternites with or without carinae on lateral parts; maximum width at sternite 7. Eyes freely movable, corneas dilated; eyelashes present. Antennular article 1 relatively long and slender, roughly twice as long as wide with 2 distal and 2 lateral spines; distomesial spine more than half length of distolateral. Antennal peduncle occasionally reduced; article 1 free from epistome, distomesial spine well-developed, generally reaching or exceeding end of article 2. Mxp3 slender, ischium elongate. P1 finger shorter than palm. P2 – 4 spinose, somewhat slender; dactyli flexor margin with row of movable spines arising from low, small process; P4 moderately long, roughly 2/3 length of P2 merus, not reaching anterior margin of carapace. Both G1 and G2 present.

**Remarks:** At present, it is being debated whether the genus *Raymunida* should be retained within the Munididae. Machordom et al. (2022) showed *Raymunida* and *Alainius* Baba, 1991 (currently in family Galatheidae) formed a highly supported clade, clearly separated from other genera of Munididae. Both these genera have epipods on P1 – 3, which is absent in all other munidids. For now, *Raymunida* is retained in the Munididae, however, the position of this genus will be explored in an upcoming study (Macpherson pers. comm.). There are currently 14 species in the genus, with only one provisionally reported here for the first time from South Africa.

***Raymunida* cf. *vittata*** Macpherson, 2009 – **NEW RECORD**

**Figures 4.5, 4.17B**

*Raymunida vittata* Macpherson, 2009: 446 (Vanuatu (type locality), 32 – 188 m), figure 7; Osawa, 2012: 140 (Japan, 95.5 – 123 m), figures 3, 4B; Poupin et al., 2022a: 148, figure 9F (Mayotte, 70 – 81 m); Macpherson et al., 2023: 366, figure 4C (Mozambique Channel, North Madagascar, Glorieuses Islands, Philippines, Vanuatu, Solomon Islands, Papua-New Guinea, 60 – 180 m).

*Raymunida elegantissima* – Macpherson & Machordom, 2001: 703, figure 1E – H (not *R. elegantissima* (de Man, 1902))

**Material examined:** South Africa, 27°02’24.00’S; 32°54’54.00’E, 75 m, 06/06/1990, SAMC-A094532, 1 ovig. ♀ 6.6 mm; South Africa, 27°14’36.00’S; 32°48’48.00’E, 74 m, 09/06/1990, SAMC-A094534, 1 ♂ 4.6 mm; South Africa, 27°32’48.12’S; 32°42’36.00’E, 68 m, 03/06/1987, SAMC-A094533, 1 ♂ 9.7 mm (with externa of a Thompsoniidae Høeg & Rybakov, 1992 on P1 – 4); South Africa, 27°33’12.00’S; 32°42’48.00’E, 85 m, 03/06/1987, SAMC-A094579, 1 ♂ 7.2 mm.

**Description (of South African specimens):**

*Carapace:* Length 1.1 times width, transverse ridges on dorsal surface with short, non-iridescent setae and long, scattered iridescent setae; 2 main uninterrupted transverse striae on posterior part of cardiac region. Gastric region with 5 pairs of well-developed epigastric spines, last pair smallest. Dorsal surface with 1 parahepatic, 1 – 2 branchial anterior and 1 postcervical spine on each side. Frontal margins transverse, slightly concave lateral margin, small spine lateral to limit of orbit, next to anterolateral spine. Lateral margins slightly convex. First spine on lateral margin on anterolateral angle clearly not reaching level of sinus between rostrum and supraocular spines; marginal spine between anterolateral spine and cervical groove, 0.3 length of anterolateral spine. Anterior branchial margins with 2 spines, first as long as or slightly longer than anterolateral spine; posterior branchial margins with 2 spines. Rostrum 0.5 – 0.6 times carapace length, curved downwards mesially and slightly upwards distally, supraocular spines exceeding mid-length of rostrum, not exceeding end of cornea, slightly divergent.

*Sternum:* Sternum length 0.9 times width. Sternites smooth, third sternite with pair of spines laterally; fourth sternite with some striae, anterior margin as wide as third sternite, contiguous to entire posterior margin of third sternite. Sternum incised somewhat deeply along midline.

*Pleon:* Pleonites unarmed, transverse ridges with numerous short setae on anterior margin, with some long, scattered iridescent setae. Pleonites 2 – 4 with 2 transverse ridges.

*Eye:* Ocular peduncles length 0.7 times width, with simple eyelashes with single long iridescent seta on anterior margin of ocular peduncles. Maximum corneal diameter 0.3 distance between anterolateral spines bases.

*Antennule:* Basal antennular segment 0.2 carapace length (excluding distal spines), almost reaching end of cornea with 2 distal spines, distomesial spine distinctly shorter than distolateral spine; 2 lateral spines, distal spine well-developed, overreaching end of distolateral spine, proximal spine short.

*Antenna:* Basal segment of antennal peduncle with well-developed distomesial spine almost reaching end of antennal peduncle, not reaching end of antennular peduncle (excluding distal spines); article 2 with 2 distal spines, distomesial spine shorter than distolateral, not reaching end of article 3; distolateral spine overreaching end of article 3, 1 small spine at mid-length of mesial margin. Article 3 with small distomesial spine. Article 4 unarmed.

*Mxp3:* Ischium with distal spine on flexor margin. Merus 0.8 length of ischium, with 2 well-developed spines on flexor margin, with small distal spine on extensor margin. Carpus with small distal spine on flexor margin.

*P1:* 3.1 – 3.5 times carapace length, with some simple, short setae and numerous long, iridescent setae on all margins. Merus 0.9 – 1.1 carapace length, 1.8 – 2.0 times carpus length, with 6 proximally diminishing dorsal spines, 4 mesial spines, distalmost strongest, 1 – 2 lateral spines, with 3 – 4 ventral spines. Carpus 0.7 – 1.0 palm length, almost twice as long as broad, with numerous spines on dorsal and mesial margin, distomesial spine strongest, with row of ventral spines. Palm 2.4 – 2.7 times longer than broad, with rows of dorsal, lateral and mesial spines. Fingers 1.3 – 1.5 longer than palm; fixed finger with row of spines on lateral margin; movable finger with 3 proximal spines and a single distal spine on mesial margin.

*P2 – 4:* Long and slender, 2.1 – 2.4 times carapace length, with long iridescent setae and short, plumose setae on extensor margin. Meri shorter posteriorly (P3 merus 0.9 – 1.0 length of P2 merus; P4 merus 0.7 – 0.9 length of P3 merus); P2 merus 0.9 – 1.0 times carapace length, 5.5 – 6.0 times as long as broad, 1.3 – 1.4 times propodus length; P3 merus 3.6 – 4.2 times as long as broad, 1.1 – 1.3 times P3 propodus length; P4 merus 2.6 – 3.3 times as long as broad, 0.9 – 1.0 times P4 propodus length. Extensor margins of meri with 11 spines on P2 – 3, with 2 spines on P4; flexor margins with 1 – 2 distal spines, followed by several eminences on P2 – 4. Carpi with 4, 3, 1 – 2 spine/s on extensor margins of P2 – 4 respectively; with distoventral spine. Propodi 6.9 – 7.4 (P2 – 3)– 6.2 (P4) times as long as broad; extensor margin unarmed; flexor margin with 4 – 6 movable spines on P2 – 4, with distolateral and distomesial spines. Dactyli 0.4 – 0.6 times propodi length; flexor margin with 4 – 6 spinules on P4 – P2, distal spine at base of unguis on P2 – 3. Mero-carpal articulation of P4 almost reaching frontal margin of carapace.

Epipods on P1 – P3.

**Variation:** Ranges noted in description. Distal spines of antennal article 2 variable, occasionally distolateral spine longer than distomesial, unlike original description of distomesial spine longer. All South African specimens with antennal article 3 armed with small distomesial spine, unarmed in original description.

**Coloration (in life; Figure 4.5):** Carapace and pleon orange-red, with some white bands along dorsal surface; lateral margins with white blotches. Chelipeds have white and red bands, distal portion of fingers red (white in western Pacific specimens; Macpherson et al., 2023). Walking legs red with no bands.

**General distribution:** Western Pacific Ocean from New Caledonia, Vanuatu to Japan, 32 – 194 m, Madagascar, Mozambique, Mozambique Channel, 60 – 277 m, and now South Africa.

**South African distribution:** Off Boteler Point and Sodwana Bay, KwaZulu-Natal, 68 – 85 m (Figure 4.13).

**Genetic data:** COI, 16S, see Appendix Table 4.3 and 4.4.

**Figure 4.5:** *Raymunida* cf. *vittata* from a reef at Roonies, Sodwana Bay, ~32 m. Photograph by Mike and Valda Fraser.

**Remarks:** This species is recorded as cf. as the status of *Raymunida vittata, R. elegantissima* (De Man, 1902) and *R. lineata* Osawa, 2005 remain unresolved (Macpherson et al., 2023). Genetic data show that there are two clades, one clade with mostly *R. vittata* specimens and a couple *R. elegantissima* specimens, while the other clade consists mostly of *R. elegantissima* specimens and a couple *R. vittata* specimens. The South African material forms part of the *R. vittata* clade. To add to the confusion, Emmerson (2016) lists *R. lineata* from KwaZulu-Natal, although the reference to this is listed as IOC-Mainbaza, (Bouchet. et al. pers. comm.) and it is unclear where the specimen was from. Without conclusive evidence, this should not be retained as a species record from South Africa. The South African material has low divergence values of 0.2 – 0.4% (16S; Appendix Table 4.4) and 0.9 – 1.1% (COI; Appendix Table 4.5) to *R. vittata* known from the SWIO. This material is also quite similar to *R. elegantissima* and has a divergence of 0.4% (16S) and 0.9 – 1.2% (COI). It is, however, quite distantly related to *R. insulata* Macpherson & Machordom, 2001, at 5% (16S) and 15.6% (COI). The 16S and COI trees (Appendix Figures 4.23, 4.24) of *Raymunida* show that *R. elegantissima* and *R. vittata* form two groups. One group consists of specimens of both these species from the Indo-Pacific region, while the other group consists only of *R. vittata* (and includes the South African material) from the SWIO. This supports the confusion within the *Raymunida elegantissima-vittata-lineata* complex, as highlighted by Macpherson et al. (2023). More material of these species from different areas are required to resolve this species complex.

One of the specimens bears the externa of a Thompsoniidae (Rhizocephalan) species. Apparently *Thompsonia* has been reported from South Africa (Hoeg & Rybakov, 1992), but more work is required to confirm the identification. This record from South Africa represents a small range extension, as this species was previously reported from Mozambique and the greater SWIO region (Poupin et al., 2022a; Macpherson et al., 2023). The specimen displayed in Figure 4.5 was not examined, though it is very similar to the *R. vittata* specimen reported from Poupin et al. (2022a), Figure 9F from Mayotte.

### Genus ***Trapezionida*** Macpherson & Baba in Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022

*Trapezionida* Macpherson & Baba *in* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960.

**Type species:** *Munida acantha* Macpherson, 1994. Gender: feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace lateral margin straight or slightly convex; distinct transverse setiferous ridges on dorsal surface; setae non-iridescent; pair of epigastric spines behind ocular peduncles flanked by spines; no protogastric spines present; distinct anterolateral spine; branchial lateral margin with 3 – 5 spines; unarmed posterior margin; pterygostomian flap not visible in dorsal view, unarmed. Spiniform rostrum, flanked by supraocular spines; longitudinal grooves between bases of rostral and supraocular spines shallow. Epistome with ridge arising from mouth marginal ridge, laterally leading to level of antennal gland aperture. Transverse ridges present on pleonites. Telson with wide posterior plates, each as long as wide. Thoracic sternum wider than long; sternite 3, 3 – 4 times wider than long; sternite 4 trapezoidal, transverse anterior margin, widely contiguous or subparallel to posterior margin of sternite 3 for at least 3/4 of its width; posterior sternites with or without carinae on lateral parts; maximum width at sternite 7. Eyes freely movable, corneas dilated; eyelashes present. Antennular article 1 relatively long and slender, roughly twice as long as wide with 2 distal and 2 lateral spines; distomesial spine more than half length of distolateral. Antennal peduncle occasionally reduced; article 1 free from epistome, distomesial spine well-developed, generally reaching or exceeding end of article 2. Mxp3 slender, ischium elongate. P1 finger shorter than palm. P2 – 4 spinose, somewhat slender; dactyli flexor margin with row of movable spines arising from low, small process; P4 moderately long, roughly 2/3 length of P2 merus, not reaching anterior margin of carapace. Both G1 and G2 present.

**Remarks:** The genus *Trapezionida* was recently erected for species formerly placed within the large genus *Munida* (Machordom et al., 2022) with a trapezoid thoracic sternite 4 and a P4 merus about 66% the length of P2 merus. There are currently 164 species in the genus, making it the most speciose within the Munididae. Of these, nine species are found in South African waters.

***Trapezionida antonbruuni*** (Tirmizi & Javed, 1980) – **NEW RECORD**

**Figures 4.6, 4.17C**

*Phylladiorhynchus antonbruuni* Tirmizi & Javed, 1980: 256, figure 1 (Mozambique (type locality), 62 m).

*Munida antonbruuni* – Baba, 1991: 480 (transfer to *Munida,* New Caledonia); Tirmizi & Javed, 1993: 126, figure 56 (redescription of the holotype); Baba, 2005: 259 (key, synonymies); Baba et al., 2008: 86 (synonymies); Macpherson et al., 2017: 32 (key).

*Trapezionida antonbruuni* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination); Macpherson et al., 2023: 386 (compilation, SWIO).

**Material examined:** South Africa, 29°52'42.31'S; 31°10'0.41'E, 99 m, 05/02/2021, SAMC-A094791, 3 ♂ 1.6 – 1.8 mm. South Africa, 30°47'6'S; 30°29' 6'E, 44 m, 17/05/1958, SAMC-A094578, 2 ♂ 1.6 – 1.7 mm, South Africa, 29°49'14.41'S; 31°14'17.05'E, 110 m, 05/02/2021, SAMC-A094745, 1 ♂ 1.9 mm.

**Description:**

*Carapace*: 1.1 times longer than broad, with weak secondary transverse striae often interrupted between main transverse ridges. Carapace with few scattered setae, dorsal ridges nude. Gastric region with 2 – 3 pairs of small epigastric spines, longest pair behind supraocular spines. One pair of postcervical spines present behind mid-transverse ridge. Frontal margins transverse. Lateral margins marginally convex. First lateral spine at anterolateral angle, well-developed, almost reaching base of supraocular spines; 1 spine behind anterolateral, anterior to cervical groove on well-rounded hepatic region. Branchial margins with 5 spines. Rostrum broad, triangular about 0.5 – 0.6 times length of remaining carapace, distally notched and slightly upturned. Supraocular spines minute, about 0.2 times rostrum length.

*Sternum:* Surface of thoracic sternites smooth. Sternite 3 somewhat boat-shaped, anterior margin with median notch. Sternite 4 anterior margin rounded and contiguous to sternite 3.

*Pleon:* Pleonites unarmed. Pleonites 2 and 3 with 1 uninterrupted ridge behind anterior ridge. Pleonites 4 and 5 with interrupted short ridges behind anterior ridge. Posteromedian ridge of pleonite 6 straight.

*Eye:* Ocular peduncles approximately as long as broad, maximum corneal diameter 0.4 times distance between bases of anterolateral spines.

*Antennule:* Article 1 with 2 well-developed distal spines, distomesial shorter than distolateral; 3 lateral spines, proximal spine minute, distal spine well-developed, exceeding distomesial spine.

*Antenna:* Article 1 distomesial spine reaching mid-length of article 2. Article 2 with distomesial spine almost reaching distal margin of article 3; distolateral spine reaching mid-length of article 3. Article 3 with minute distomesial spine.

*Mxp3:* Ischium with small distal spine on both flexor and extensor margin. Merus shorter than ischium; flexor margin with 2 spines, proximal spine well-developed, distal spine sharp; extensor margin with small distal spine. Carpus unarmed.

*P1:* 2.4 – 2.7 times carapace length, with some iridescent, long setae. Merus 0.8 – 0.9 times carapace length, 2.7 times carpus length, with distal spines on dorsal, ventral, lateral and mesial margins, dorsolateral spine strongest, rows of small spines dorsally. Carpus 0.6 – 0.7 times palm length, 1.7 – 2.1 times longer than broad, with spines on mesial and lateral margin and tooth-like process on ventral margin. Palm 2.0 – 3.0 times longer than broad, with row of lateral and mesial spines. Fingers as long as palm; few spines on lateral margin of fixed finger, with several distal spines, inner margin with row of small spines; movable finger with small distolateral spine.

*P2 – 4:* Moderately long and slender, with some long, iridescent setae on extensor margin, with setiferous scales on lateral surface. P2, 2.2 – 2.5 times carapace length. Meri shorter posteriorly (P3 merus 0.8 – 0.9 times length of P2 merus, P4 merus 0.8 times length of P3); P2 merus 0.8 – 0.9 times carapace length, 7.5 – 10.6 times longer than broad, 1.4 – 1.6 times propodus length; P3 merus 5.3 – 7.5 as long as broad, 1.2 – 1.5 times as long as P3 propodus; P4 merus 4.9 – 6.7 times as long as broad, 1.0 – 1.3 times propodus length. Extensor margins of P2 – 3 meri with row of 8 weak spines, distal largest, P4 with 2 proximal spines and a large distal spine; flexor margins with 7 – 9 spines, lateral margins unarmed. Carpi with 2 – 3 spines on extensor margin; flexor margin with distal spine, followed by some eminences. P2 – 4 propodi 7.4 – 8.2 times longer than broad; extensor margin unarmed; flexor margin with 5 – 6 slender, movable spines. Dactyli long, slender, 0.9 – 1.0 times propodi length; flexor margin with 4 – 5 spinules, without spinule at base of unguis.

**Variation:** Ranges noted in description. All specimens with antennal article 3 with minute distomesial spine, distolateral in original description. P1 is 2.4 – 2.7 times carapace length, described to be more than 3.0.

**Coloration:** Unknown.

**General distribution:** Mozambique, 62 m, and now South Africa.

**South African distribution:** East Coast from Durban to Port Shepstone, 44 – 99 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** This is the first time specimens of this enigmatic species have been collected since the original description of a single female by Tirmizi & Javed (1980). More importantly, this is the first time a male has been observed and illustrated. This is a new record for South Africa, but an unsurprising one, as the holotype was collected East of Beira, Mozambique, and thus these new specimens represent only a small range extension and slightly increased depth range.

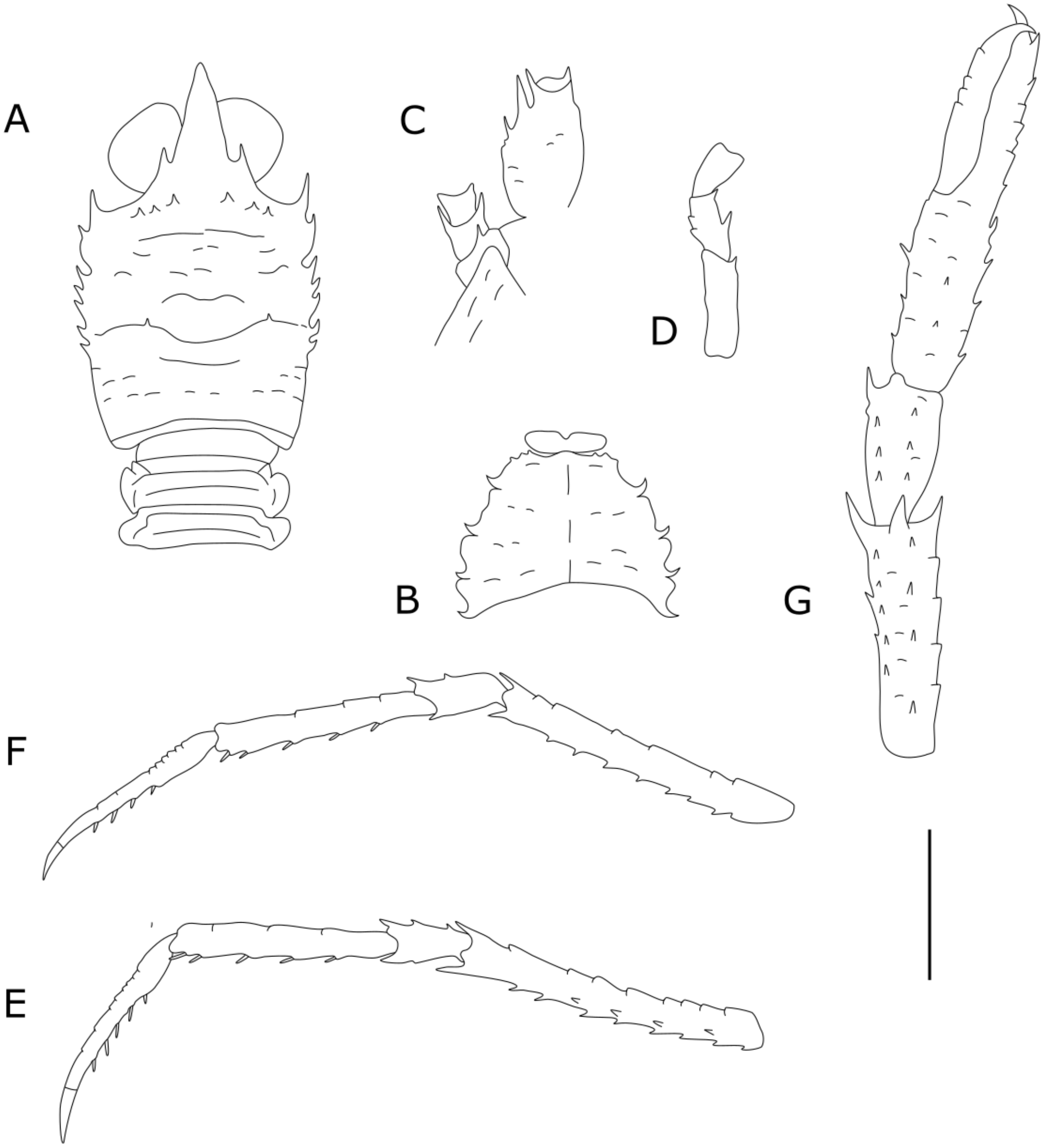

**Figure 4.6:** *Trapezionida antonbruuni* (Tirmizi & Javed, 1980), ♂, 1.6 mm (SAMC-A094791), East of Durban, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Right Mxp3, lateral view; **E** – Left P2, lateral view; **F** – Left P3, lateral view; **G** – Right P1, dorsal view. Scale bar: A = 1.0 mm; B – G = 0.6 mm.

The South African material corresponds well to the original description, as it is also very small at ~ 2 mm, has five lateral spines on lateral margins behind cervical groove, has no granules on lateral parts of seventh thoracic sternite, is unarmed on the second pleonite, has large eyes and has a longer distolateral spine on antennular article 1 than distomesial. However, there are some slight differences, the P1 ratio to carapace length is 2.4 – 2.7, while this was described originally to be in excess of 3.0. It is worth noting that the original description was based on a single female specimen, giving no indication of variation. Unfortunately, DNA extractions were unsuccessful.

This species is easily recognised from other *Trapezionida* species in South African waters by the broad rostrum with minute supraocular spines and the small size (pcl < 2.0 mm). *Trapezionida janetae* is also a similar size, however has a slender rostrum and five pairs of epigastric spines, instead of three pair in *T. antonbruuni*.

***Trapezionida* aff. *antonbruuni*** (Tirmizi & Javed, 1980)

*Phylladiorhynchus antonbruuni* Tirmizi & Javed, 1980: 256, figure 1 (Mozambique, 62 m).

*Munida antonbruuni* – Baba, 1991: 480 (transfer to *Munida,* New Caledonia); Tirmizi & Javed, 1993: 126, figure 56 (redescription of the holotype); Baba, 2005: 259 (key, synonymies); Baba et al., 2008: 86 (synonymies); Macpherson et al., 2017: 32 (key).

*Trapezionida antonbruuni* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination).

**Material examined:** South Africa, 29°50'3.98'S; 31°14'8.99'E, 135 m, 05/02/2021, SAMC-A094784, 1 ♂ 2.1 mm.

**Remarks:** This specimen is similar to *T. antonbruuni*, however, the distomesial spine of the basal antennular article is clearly longer than the distolateral spine. The fact that this species is currently known only from a singular female does not aid in the identification of other specimens as the intraspecific variation is not known. The difference in distal antennular spines is a significant difference, as the relative lengths of antennular distal spines is a consistent character, therefore this specimen cannot be identified with certainty as *T. antonbruuni* and hence aff. is used.

***Trapezionida babai*** (Tirmizi & Javed, 1976)

? *Munida gracilis* – Balss, 1915: 4, figure 1 (Red Sea, 212 – 341 m).

*Munida gracilis* – Lewinsohn, 1969: 132 (no record).

*Munida babai* Tirmizi & Javed, 1976: 81, figures 1 – 3 (off Natal (type locality), 118 – 150 m); Baba, 1990: 962 (Madagascar, 185 – 210 m); Tirmizi & Javed, 1993: 122, figures 54, 55 (off Durban, 118 – 150 m); Baba, 2005: 259 (key, synonymies, West Malay Peninsula, 70 m); Poore et al., 2008: 19 (Southwest Australia, 100 – 107 m); Macpherson et al., 2017: 54 (key, Madagascar, 155 – 456 m); McCallum et al., 2021: 138 (Western Australia, 100 – 177 m).

Not *Munida babai* – Baba, 1988: 89, figure 32 (= *Munida gilii* Macpherson, 1993); Wu et al., 1998: 107, figure 19, 21G (possibly = *M. gilii* Macpherson, 1993).

*Trapezionida babai* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination); Macpherson et al., 2023: 386 (compilation, SWIO).

**Material examined:** None available. Type material – South Africa, 29°35.00'S; 31°38.00'E, 150 m, 09/09/1964, USNM 181103, 1 ♂ 6.0 mm (including rostrum).

**Description:** See Tirmizi & Javed (1976).

**Coloration:** Unknown.

**General distribution:** Madagascar, Mozambique, Red Sea, Southwest Australia and South Africa, 70 – 456 m.

**South African distribution:** East of Durban, KwaZulu–Natal, 118 – 150 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** No specimens of *T. babai* were available for examination in the present study and this record is based on the literature cited above. This species was originally described from South Africa and remains valid. It has subsequently been described from other Indian Ocean localities. In South Africa this species is easily recognized by the spines on the anterior margin of the fourth pleonite and the short supraocular spines.

***Trapezionida* cf. *barbeti*** (Galil, 1999) – **NEW RECORD**

**Figure 4.7**

*Munida barbeti* Galil, 1999: 59, figure 1 (Flic en Flac, Mauritius (type locality), 55 m); Baba et al., 2008: (compilation); Poupin, 2022a: 148, figures 3, 7E, 9B, C (Mayotte, 70 – 90 m).

*Trapezionida barbeti* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination); Macpherson et al., 2023: 387 (compilation, SWIO).

**Material examined:** Images taken on SCUBA, but not collected. Type material – Mauritius, 20°17.00'S; 57°22.00'E, 55 m, 11/05/1997, SAMC-A043262, 1 ♀ 8.9 mm.

**Description:** See Galil (1999).

**General distribution:** Flic en Flac, Mauritius, 55 m, and now South Africa.

**South African distribution:** Aliwal shoal, KwaZulu-Natal, 30 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** This species was identified from two high quality photographs (Figure 4.7) taken by Mike and Valda Fraser. The identification is made based on several inferences, the first is the shallow depth from which it was recorded. It is relatively uncommon for a munidid to be reported from less than 50 m depth. Secondly, several characters are shared between the specimens in the photographs (Figure 4.7) and *T. barbeti* as described from Mauritius. These are the five pairs of epigastric spines, the four spines on the branchial margin (also relatively uncommon), as well as the spinature on the chelipeds. Lastly, the colour of the animals corresponds well to the original description by Galil (1999), which reads: "Carapace vivid red, triangular yellow patches on hepatic region. Pleon red with round yellow patch anteriorly. Chelipeds and pereiopods striped red and yellow". Clearly, these specimens are similar to *T. barbeti*, however, as we do not have any collected material, the identification is given as *Trapezionida* cf. *barbeti.* A similar identification for this species was made by Poupin et al. (2022a) who also identified this species in Mayotte based off colour images (which look identical to the South African images, see Figure 4.7 from this study and Figures 9B, C of Poupin et al., 2022a). This species is also noted as a frequently observed inhabitant of the mesophotic zone (between 30 – 150 m), which is no different in South African waters and can be assumed is the case for most of the SWIO region. This represents a probable new record for South Africa and is a modest range extension, as this species was described from Mauritius, and has been reported from Mayotte, Seychelles and La Reunion.

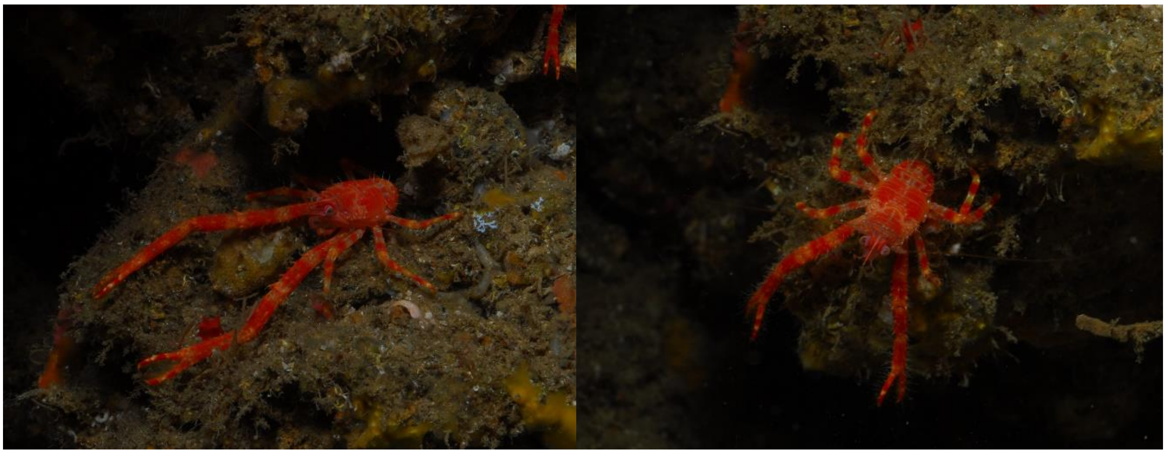

**Figure 4.7:** Two specimens of *Trapezionida* cf. *barbeti* (Galil, 1999) on hard substrate reef from Aliwal Shoal, southern extension, 30 m. Photographs by Mike and Valda Fraser.

***Trapezionida janetae*** (Tirmizi & Javed, 1992)

**Figures 4.8, 4.17D**

*Munida janetae* Tirmizi & Javed, 1992: 317, figure 2 (off Somalia (type locality) and Durban, South Africa, 78 – 118 m); Tirmizi & Javed, 1993: 98, figure 42 (redescription of holotype); Macpherson & de Saint Laurent, 2002: 481 (key); Baba, 2005: 265 (key, synonymies); Baba et al., 2008: 102 (synonymies); Macpherson et al., 2017: 44 (key, Red Sea, 55 m).

*Trapezionida janetae* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination); Macpherson et al., 2023: 387 (compilation, SWIO).

**Material examined:** South Africa, 29°49'14.41'S; 31°14'17.05'E, 110 m, 05/02/2021, SAMC-A094799, 9 ♂ 2.2 – 3.2 mm; South Africa, 29°49'14.41'S; 31°14'17.05'E, 110 m, 05/02/2021, SAMC-A094762, 1 ♂ 1.8 mm.

**Description:**

*Carapace:* Slightly longer than broad, with secondary striae between main transverse ridges. Dorsal transverse ridges with short non-iridescent setae and some scattered long, iridescent setae. Gastric region with 5 – 6 pairs of epigastric spines, largest pair posterior to supraocular spines; row of 1 – 2 small median spines behind rostral spine. One parahepatic, dorsal branchial and postcervical spine on each side. Frontal margins serrated, transverse. First lateral spine well-developed at anterolateral angle, not reaching level of sinus between rostrum and supraocular spines; 2 – 3 spines in front of anterior branch of cervical groove. Branchial margins with 5 spines. Rostrum spiniform, keeled dorsally, serrate distally, about 0.5 length of carapace. Supraocular spines short, less than third the length of rostrum, not reaching end of corneas, directed slightly upwards.

*Sternum:* Sternite 3 as wide as sternite 4 anterior margin, V-shaped notch on anterior margin. Sternite 4 transverse anterior margin, with some striae; sternites 5 – 7 smooth.

*Pleon:* Pleonite 2 anterior ridge unarmed; pleonite 2 and 3 with deep, median groove, anterior half of each pleonite with 1 fine ridge, lateral parts of each pleonite with 2 fine ridges. Pleonite 4 with 2 uninterrupted, mesial ridges, pleonite 5 with 1 posteromedian ridge. Pleonite 6 with 2 ridges, anterior ridge short, posteromedian ridge interrupted medially.

*Eye:* Ocular peduncles wider than long, maximum corneal diameter 0.4 distance between bases of anterolateral spines.

*Antennule:* Two subequal distal spines on article 1, along with 2 – 3 more lateral spines, distalmost largest exceeding distal spines of antennule.

*Antenna:* Article 1 with distomesial spine barely overreaching article 2. Article 2 distomesial spine reaching midlength of article 4, distolateral spine reaching just past halfway of article 3. Article 3 with small distolateral spine, some with small distomesial spine.

*Mxp3:* Ischium with small distal spine on flexor and extensor margin. Merus with 2 spines on flexor margin, small distal spine on extensor. Carpus unarmed.

*P1:* 2.4 – 2.7 times carapace length, with some short, plumose setae and several long iridescent setae along mesial margins of articles. Merus 0.9 length of carapace, 3.0 times longer than carpus, with some small dorsal spines; strong distal spines, distomesial largest reaching mid-length of carpus, distolateral spine followed proximally by several eminences. Carpus 0.6

length of palm, 1.2 times as long as broad, with 3 – 4 spines on mesial margin, distal spine strongest, with some small dorsal spines present. Palm 1.8 times as long as broad, with rows of dorsal, lateral and mesial spines. Fingers marginally longer than palm, fixed and movable finger with row of spines, ending with strong distal spines.

*P2 – 4*: Moderately long and slender, with some plumose and long iridescent setae along extensor margin. P2 2.1 – 2.3 times carapace length. Meri shorter posteriorly (P3 merus 0.9 length of P2 merus; P4 merus 0.8 length of P3 merus); P2 merus 0.7 length of carapace, 5.6 times longer than broad, 1.2 – 1.3 times longer than propodus; P3 merus 5.0 times longer than broad, 1.1 – 1.2 times P3 propodus length; P4 merus 4.1 longer than broad, as long as P4 propodus. Extensor margins of P2 – 3 meri with row of 9 – 10 spines, with 3 – 4 proximal spines on P4, no distal spine present; flexor margins with some distal spines, followed by several eminences, lateral margins unarmed. Carpi with 2 – 4 spines on extensor margin of P2 – 3, P4 with 1 spine; lateral surface with some striae, no granules on P2 – 4; flexor margin with distal spine. Propodi 4.7 – 5.1 (P2 – 3) – 4.5 (P4) times longer than broad; unarmed on extensor margin; flexor margin with 7 – 9 movable spines on flexor margin of P2 – 4. Dactyli slender, 0.8 – 0.9 length of propodi; 5 – 7 spinules on flexor margin, none on base of unguis.

**Variation:** Ranges noted in description. All South African specimens Mxp3 with 2 spines on flexor margin, 3 in original description. Sternite 3 V-shaped, more rounded in original description. Rostrum keeled, if keel is present on original it was not illustrated in original description. Some with distomesial spine on antennal article 3.

**Coloration:** Unknown.

**General distribution:** Somalia, Red Sea and South Africa, 55 – 118 m.

**South African distribution:** Off Durban, 110 – 118 m (Figure 4.15).

**Genetic data:** Not available.

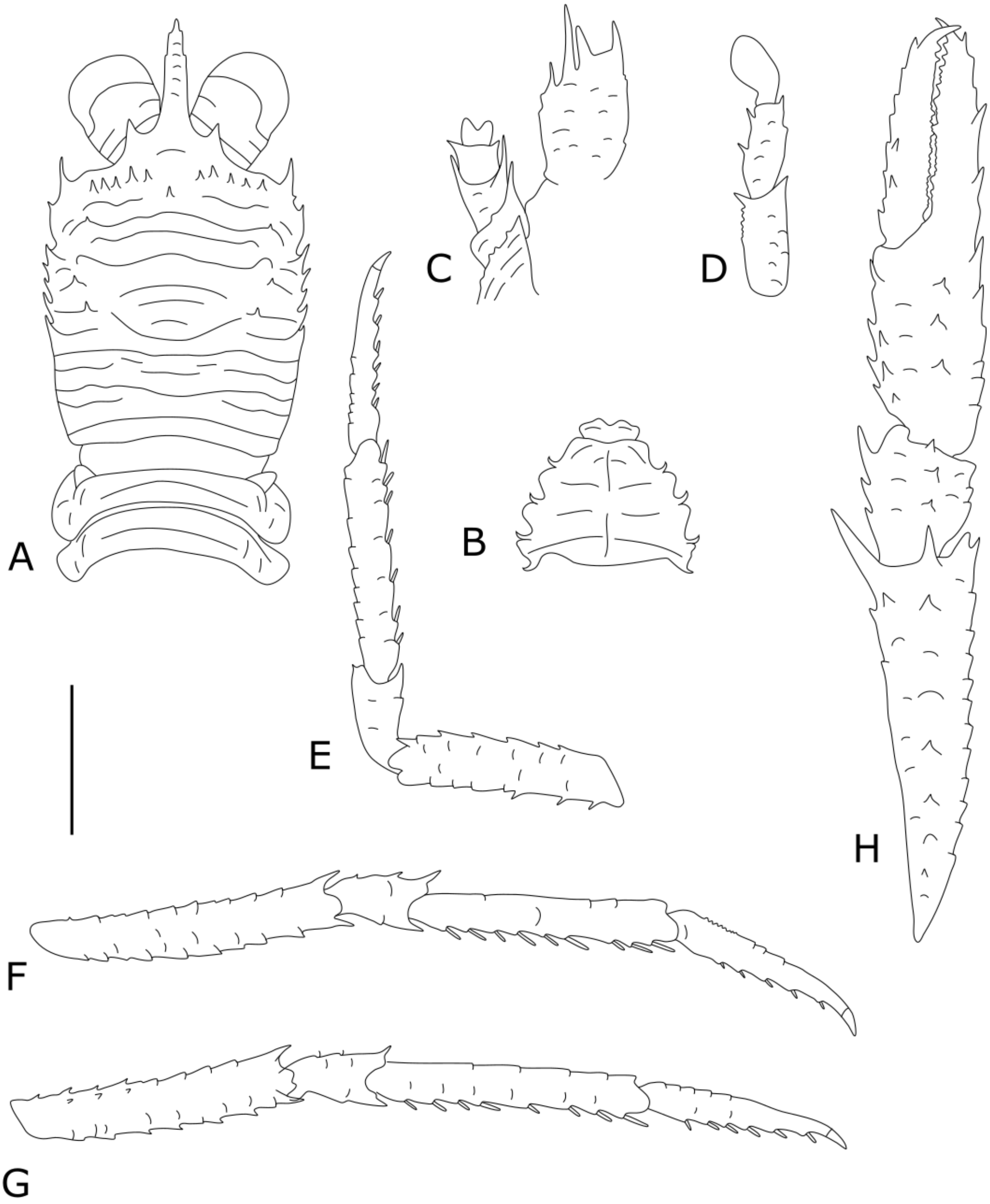

**Figure 4.8:** *Trapezionida janetae* (Tirmizi & Javed, 1992), ♂, 1.8 mm (SAMC-A094762), A – E, G; *T. janetae*, ♂, 2.0 mm (SAMC-A094799), F, H, both off Umgeni River, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Right P4, lateral view; **F** – Right P2, lateral view; **G** – Right P3, lateral view; **H** – Right P1, dorsal view. Scale bar: A, H = 1.0 mm; B – G = 0.6 mm.

**Remarks:** This is only the second time that additional specimens have been collected since the original description of two females. These males correspond well to the original description and were collected from roughly the same location as the paratype. This species was sampled along with another munidid, *T. antonbruuni,* as well as some galatheids, *Galathea labidolepta* Stimpson, 1858, and an undescribed species of *Fennerogalathea* Baba, 1988. This species can easily be distinguished from other species in the genus found in South African waters by the small size (pcl < 3.5 mm), the short supraocular spines, the five pairs of epigastric spines and P1 fingers that are longer than the palm.

***Trapezionida limula*** (Macpherson & Baba, 1993) **– NEW RECORD**

**Figures 4.9, 4.11B, D, 4.18A**

*Munida japonica* – Baba, 1990: 964 (Madagascar, 42 – 115 m).

*Munida limula* Macpherson & Baba, 1993: 402, figure 11 (Madagascar (type locality), 42 – 115 m); Baba, 2005: 267 (key, synonymies); Baba et al., 2008: 105 (synonymies); Macpherson et al., 2017: 32, 37, figure 12A (key, South Madagascar, 23 – 209 m).

*Munida semoni* – Barnard, 1950: 491, figure 92c (key, synonymies, off Scottburgh and Umhlangakulu River, Natal, 91 – 168 m); Kensley, 1981: 34 (list).

*Trapezionida limula* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960 (new combination); Macpherson et al., 2023: 387 (compilation, SWIO).

**Material examined:** South Africa, missing locality data, 91 m, 14/03/1901, SAMC-A8235, 1 ♂ 6.2 mm; South Africa, 29°46'S; 31°17'E, 130 m, 23/04/1958, SAMC-A19510, 1 ♂ 6.1 mm; South Africa, 27°42.9'S; 32°40.9'E, 160 m, 08/06/1988, SAMC-A094572, 1 ovig. ♀ 5.4 mm; South Africa, 28°17.99'S; 32°33.6'E, 100 – 120 m, 10/06/1988, SAMC-A094536, 1 ♂ 7.4 mm. South Africa, 27°43.2'S; 32°39.7'E, 50 m, 08/06/1988, SAMC-A094538, 1 ♂ 6.8 mm. South Africa, 27°06'S; 32°53.3'E, 74 m, 06/06/1990, SAMC-A094537, 1 ovig. ♀ 5.4 mm. South Africa, 27°11.1'S; 32°50.9'E, 100 m, 09/06/1990, SAMC-A094535, 1 ovig. ♀ 6.3 mm; South Africa, missing locality data (E of Durban), 183 m, 01/03/1963, SAMC-A094575, 1 ovig. ♀ 5.4 mm; South Africa, 29°50.1'S; 31°14.1'E, 135 m, 05/02/2021, SAMC-A094779, 1 ♂ 4.5 mm, 1 ♀ 3.1 mm.

**Description:**

*Carapace:* Slightly longer than broad, with several secondary striae present between main transverse ridges. Dorsal ridges with short, dense non-iridescent setae and numerous scattered long iridescent setae. Gastric region with 5 – 6 pairs of epigastric spines, longest pair behind supraocular spines; row of 1 – 2 small median epigastric spines behind rostral spine. Parahepatic spines 1 – 3, 1 dorsal branchial and 1 postcervical spine on each side. Frontal margins moderately oblique, serrated. Lateral margins slightly convex, with 8 spines. First well-developed at anterolateral angle, not reaching level of sinus between rostrum and supraocular spines; 2 spines in front of anterior branch of cervical groove, with a small spine between anterolateral and second spine. Branchial margins with 5 spines. Rostrum spiniform, 0.6 times carapace length. Supraocular spines not reaching mid-length of rostrum, slightly divergent, directed slightly upwards. Pterygostomian flap with transverse striae and small scales on upper margin.

*Sternum:* Surface of thoracic sternites 4 – 5 with several short striae; sternites 6 – 7 without striae, lateral portion of sternite 7 with granules.

*Pleon:* Pleonite 2 anterior ridge with 8 spines; pleonites 2 – 4 each with 3 – 4 uninterrupted transverse striae; pleonite 5 with 2 short ridges; pleonite 6 with 3 ridges; first and second interrupted medially, posterior short median ridge. Males with G1 and G2.

*Eye:* Ocular peduncles as long as broad, maximum corneal diameter 0.3 distance between bases of anterolateral spines.

*Antennule:* Article 1 with 2 well-developed distal spines, distomesial longer than distolateral; 2 – 3 lateral spines, distal spine much longer than proximal spines almost exceeding distomesial.

*Antenna:* Article 1 with distomesial spine exceeding distal margin of article 2. Article 2 with distomesial spine slightly exceeding antennal peduncle and a smaller mesial spine; distolateral spine slightly exceeding article 3. Article 3 unarmed.

*Mxp3:* Ischium with distal spine on both flexor and extensor margins. Merus with 3 spines on flexor margin and distal spine on extensor margin; carpus unarmed. Surface of all segments covered with small scales.

*P1:* About 3.0 times carapace length, with short non-iridescent setae. Merus as long as carapace, 2.9 times carpus length, with several dorsal and mesial spines, distal spines short, distomesial spine not reaching proximal third of carpus. Carpus about half length of palm, 1.7 times as long as broad, with small spines on dorsal and well-developed spines on mesial margins. Palm 2.9 times as long as broad, with some dorsal spines, a row of lateral spines and some proximal spines on mesial margin. Fingers 1.2 times longer than palm; fixed finger with row of spines on lateral margin; movable finger with small proximal spines along mesial margin.

*P2 – 4*: Moderately long and slender, with some short, plumose and long iridescent setae along extensor margin of articles. P2 1.9 – 2.1 times carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus, P4 merus 0.7 length of P3 merus); P2 merus 0.8 length of carapace, 10.0 times as long as broad, 1.3 times as long as propodus; P3 merus 4.7 times as long as broad, 1.1 – 1.2 times as long as P3 propodus; P4 merus 3.8 times as long as broad, as long as P4 propodus. Extensor margins of P2 – 3 meri with 9 – 12 proximally diminishing spines, 1 distal spine and several proximal spines on P4; flexor margins with some distal spines followed proximally by some eminences; lateral margins unarmed. Carpi with 4 proximally diminishing spines on extensor margins on P2 – 3, P4 with distal spine; flexor margin with distal spine; lateral surface with several granules sub-parallel to extensor margin of P2 – 4. Propodi 5.6 (P2 – 3) – 6.1 (P4) times as long as broad; extensor margin unarmed; flexor margin with 10 – 12 movable spines on P2 – 4. Dactyli slender, length 0.6 – 0.7 of propodi; extensor margin unarmed; flexor margin with 7 – 8 movable spinules, with a spinule at the base of the unguis, lateral margin with proximal notch; P2 dactylus 4.8 times as long as broad.

**Variation:** Ranges noted in description. Most specimens have a row of 2 median epigastric spines, instead of 1 spine as originally described. Antennular article 1 with 3 (4 in one specimen) lateral spines instead of 2 depicted in original description. Antennal article 1 with distomesial spine clearly exceeding distal margin of article 2 instead of barely reaching. Some specimens with distolateral spine on antennal article 3.

**Coloration:** After Macpherson et al. (2017).

Carapace and pleon orange with several red patches. Rostrum and supraocular spines orange, distally reddish. P1 orange with some red bands; fingers orange with few white spots. P2 – 4 reddish and whitish transverse bands.

**Genetic data:** COI, see Appendix Table 4.6.

**General distribution:** Madagascar, Mozambique (this study) 23 – 209 m, and now South Africa.

**South African distribution:** Aliwal Shoal to Sodwana Bay, KwaZulu-Natal, 50 – 183 m (Figure 4.15).

**Remarks:** Some *Trapezionida semoni* (Ortmann, 1894) specimens identified by Barnard (1950) and Kensley (1981) are herein transferred to *T. limula*, as the specimens have a distal spine on the extensor margin of Mxp3 merus, a diagnostic character of *T. limula* which is absent in *T. semoni*. These specimens correspond well to the original description in all other regards. Some of the *T. semoni* material are also transferred to *T. mesembria* (Macpherson, Rodriguez-Flores & Machordom, 2017) in this study. South African specimens of *T. limula* is most closely related to *T. roshanei* with a divergence of 19.5 – 19.8% (COI; Appendix Table 4.6) (McCallum et al., 2021, western Australia material of *T. roshanei*). Interestingly, *T. limula* seems quite distantly related to other species in the genus, however this is the first ever sequence of the species and more material is required to understand relationships with other species. This species is depicted here as it was previously described in 1993, and this description follows the most up-to-date convention on taxonomically important features. This species is superficially similar to *T. janetae*, as both species has five pairs of epigastric spines and median epigastric spine, as well as five lateral spines behind cervical groove, though can easily be distinguished as it has a row of spines on the anterior margin of the second pleonite and granules on the lateral parts of the seventh thoracic sternite, both characters absent in *T. janetae*.

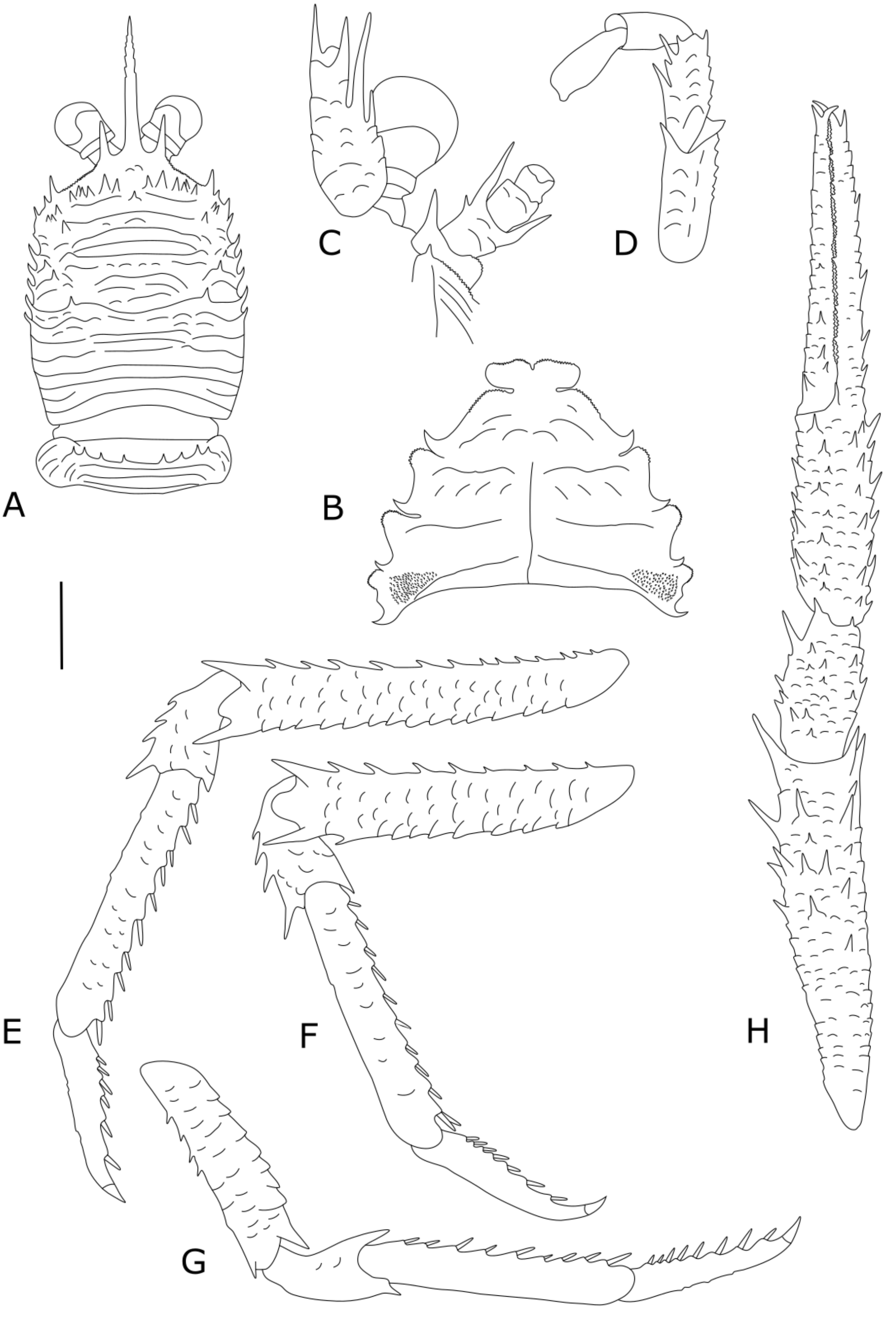

**Figure 4.9:** *Trapezionida limula* (Macpherson & Baba, 1993), ovig. ♀, 6.3 mm (SAMC-A094535), South of Kosi Bay, South Africa. **A** – Carapace and anterior pleonite, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Left P2, lateral view; **F** – Left P3, lateral view; **G** – Left P4, lateral view; **H** – Right P1, dorsal view. Scale bar: A = 2.0 mm; B – G = 1.0 mm; H = 1.5 mm.

***Trapezionida mesembria*** (Macpherson, Rodríguez-Flores & Machordom, 2017) – **NEW RECORD**

**Figure 4.18B**

*Munida mesembria* Macpherson et al., 2017: 18, figures 6, 12B (key, Mozambique (type locality), 112 – 357 m).

*Trapezionida mesembria* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 940 (new combination); Macpherson et al., 2023: 387 (compilation, SWIO).

**Material examined:** South Africa, 31°05'48'S; 30°18'48'E, 140 m, 08/07/1985, SAMC-A094549, 1 ♀ 5.1 mm; South Africa, 30°10'20.64'S; 30°50'8.52'E, 168 m, 07/03/1901, SAMC-A0900, 1 ♂ 6.8 mm, 2 ovig. ♀ 7.7 – 9.2 mm.

**Description:** See Macpherson et al. (2017).

**Variation:** The South African material examined has a small distolateral spine on antennal article 3.

**Coloration:** After Macpherson et al. (2017).

Carapace and pleon orange with some red patches. Rostrum and supraocular spines orange. P1 mostly orange with some reddish bands; fingers orange with several white and red spots. P2 – 4 mostly orange, with reddish transverse bands.

**General distribution:** Mozambique, 112 – 357 m, and now South Africa.

**South African distribution:** Port Edward to Aliwal Shoal, 140 – 168 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** Some of the material in the Natural History Collections of the Iziko South African Museum previously identified as *Trapezionida semoni* by Barnard (1950) and Kensley (1981), are in fact *T. mesembria*, based on the second pleonite lacking spines, which are present on *T. semoni*. The South African material represents a small range extension for this recently described species from Mozambique. The material agrees quite well with the original description, except for the presence of a small distolateral spine on the third antennal article. Unfortunately, molecular analyses were not possible as the specimens were too old.

***Trapezionida nesiotes*** (Macpherson, 1999) – **NEW RECORD**

**Figure 4.18C**

*Munida nesiotes* Macpherson, 1999: 480, figure 3 (Seychelles Islands (type locality), 200 m); Macpherson & de Saint Laurent, 2002: 481 (key); Baba, 2005: 269 (key, synonymies); Baba et al., 2008: 109 (synonymies); Macpherson et al., 2017: 32, 42, figure 13A (Mozambique, 264 – 277 m).

*Trapezionida nesiotes* – Macpherson & Baba *in* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 940 (new combination); Macpherson et al., 2023: 387 (compilation, SWIO).

**Material examined:** South Africa, 27°0.7'S; 32°55.2'E, 70 m, 06/06/1990, SAMC-A094569, 1 ♀ 4.9 mm; South Africa, 31°56.1'S; 29°26.5 E, 410 – 430 m, 20/07/1982, SAMC-A094766, 1 ovig. ♀ 7.3 mm; South Africa, 31°50.7'S; 29°28.5'E, 150 – 160 m, 20/07/1982, SAMC-A094570, 1 ♀ 12.7 mm; South Africa, 30°18'0.00'S; 30°54'36.00'E, 226 m, 29/01/2018, SAMC-A094757, 2 ♀ 9.5 – 11.3 mm, 2 ♂ 8.7 – 12.2 mm.

**Description:** See Macpherson (1999).

**Coloration (in life, Figure 4.15C):** Carapace and pleonites 2 – 4 orange-reddish, pleonites 5 – 6 light orange with white spots, tailfan orange-whitish. Rostrum and supraocular spines orange, rostrum distally white. P1 orange with numerous white spines. P2 – 4 orange with white spines, distal region of propodus and dactyli whitish.

**General distribution:** Mozambique, Seychelles Islands 200 – 277 m, and now South Africa.

**South African distribution:** Coffee Bay to Kosi Bay, 70 – 430 m (Figure 4.15).

**Genetic data:** COI, see Appendix Table 4.6.

**Remarks:** This species was first described from the Seychelles Islands and later reported from Mozambique by Macpherson et al. (2017). These current records thus represent a small range extension into South African waters. This species was collected from habitat with coarse sand and reef gravel together with several potential VME species, such as *Balanophyllia* cup corals, *Narella* sp., *Thouarella* sp., and >100 kg of several sponge species. Also, included in the sample were hermit crabs *Dardanus arrosor* (Herbst, 1976) and *Paguropsis confusa* Lemaitre, Rahayu & Komai, 2018. The South African material has a 0.0 – 0.2% (COI; Appendix Table 4.6) divergence from Mozambican *T. nesiotes* material and the other closest relative from the region is *T. euripa* (Macpherson, Rodríguez-Flores & Machordom, 2017) at 21.5 – 21.8% divergence. The *Trapezionida* COI tree (Appendix Figure 4.25) shows that *T. nesiotes* material from South Africa clusters with the Mozambican material of the same species.

***Trapezionida* cf. *sphinx*** (Macpherson & Baba, 1993)

**Figure 4.18D**

*Munida sphinx* Macpherson & Baba, 1993: 414, figures 18 – 19 (Madagascar (type locality), Indonesia, 90 – 300 m); Macpherson & de Saint Laurent, 2002: 477 (La Réunion Island and Zanzibar, 183 – 300 m); Baba, 2005: 126, 275 (key, synonymies, Mauritius and Bali Sea, 100 – 366 m); Baba et al., 2008: 122 (synonymies); Macpherson et al., 2017: 33 (key, Madagascar, 179 – 331 m); Macpherson et al., 2020: 73 (Papua New Guinea, 133 – 198 m).

*Munida japonica* – Tirmizi & Javed, 1993: 109, figure 47 (western Indian Ocean off Tanzania, southern Mozambique and South Africa, 100 – 165 m)(not *M. japonica* Stimpson, 1858).

*Trapezionida sphinx* – Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 940 (new combination); Macpherson et al., 2023: 388 (compilation, SWIO).

**Material examined:** Mozambique, 24° 46' S; 35° 18' E, 110 m, 18/08/1964, SAMC – A094541, 1 ♂ 8.7 mm.

**Description:** See Macpherson & Baba (1993).

**Coloration:** Carapace, pleonites and appendages ground colour pale, ridges orange/reddish, walking legs with some reddish transverse bands. Rostrum and supraocular spines orange. Tailfan whitish.

**General distribution:** Indonesia, Madagascar, Mauritius, Mozambique, Zanzibar and South Africa, 90 – 366 m.

**South African distribution:** Off Durban, KwaZulu-Natal, 138 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** This species was previously thought to be *Trapezionida japonica*, however Baba (2005) questioned the validity of this identification (as well as others). It is well known that *T. japonica* has been misidentified several times in the past and forms part of a species complex including *T. sphinx, T. eudora* and *T. limula* (see Macpherson & Baba, 1993). The original *T. japonica* specimen from South Africa could not be examined as the material was never deposited in the Smithsonian Museum, as stated by Tirmizi & Javed (1993). The examination of a Mozambican specimen identified as *T. sphinx* provided more insight on the *T. japonica* complex, as some *T. japonica* specimens have previously been synonymized with *T. sphinx* (Baba, 2005). It is thus highly likely that the Tirmizi & Javed (1993) specimen from South Africa is in fact *T. sphinx*, however new South African material is required to confirm this. This species was collected from the same sampling event as *Galathea* cf. *pubescens* and *Phylladiorhynchus* cf. *janiqueae.*

### *Trapezionida* n. sp. A (to be named only when formally published)

**Figures 4.10, 4.11A, C, 4.19A**

**Material examined: Known only from the holotype.**

**Holotype** – South Africa, Northeast of St. Lucia (type locality), 28°17'18.0'S; 32°33'36.0'E, 100 – 120 m, 10/06/1988, SAMC-A094536, 1 ♂ 7.4 mm.

**Description:**

*Carapace:* 1.1 times longer than broad, with few secondary striae between main transverse ridges. Ridges with short non-iridescent setae and some scattered iridescent setae. Gastric region with 6 pairs of epigastric spines, longest pair posterior to supraocular spines, median row of 2 spines. One parahepatic, 1 branchial dorsal and 1 postcervical spine on each side. Frontal margins ridged, oblique. Lateral margins slightly convex. First lateral spine well-developed at anterolateral angle, not reaching level of sinus between rostrum and supraocular spines; second spine anterior to cervical groove, about half the length of first, with small spine in-between. Branchial margins with 5 spines. Rostrum spiniform, 0.6 times carapace length, dorsally carinated, ridged distally. Supraocular spines short, not reaching midlength of rostrum nor end of corneas, spines subparallel, directed slightly upwards.

*Sternum:* Anterior margin of sternite 4 ridged, broadly triangular, nearly transverse, narrowly contiguous to sternite 3. Sternites 4 and 5 with numerous striae on surface. Posterolateral margins of sternite 7 with granules.

*Pleon:* Anterior ridge of pleonite 2 with 9 spines; pleonites 2 – 3 each with 4 transverse ridges on tergite behind anterior ridge; pleonites 4 – 5 with 2 uninterrupted transverse ridges and some short, interrupted ridges. Posteromedian margin of pleonite 6 straight.

*Eye:* Ocular peduncles longer than broad, maximum corneal diameter 0.3 distance between bases of anterolateral spines.

*Antennule:* Article 1 with 2 well-developed distal spines, distomesial slightly longer than distolateral; two lateral spines, distal much longer than proximal, exceeding distomesial spine, with smaller lateral spines below proximal spine.

*Antenna:* Article 1 with distomesial spine almost reaching distal margin of article 2. Article 2 with well-developed distal spines, distomesial exceeding end of article 3, distolateral spine almost reaching end of article 3. Article 3 unarmed.

*Mxp3:* Ischium with small distal spine on flexor margin and well-developed spine on extensor margin, carinated laterally with some transverse striae. Merus longer than ischium with transverse striae laterally; flexor margin with 3 subequal spines; extensor margin with small distal spine followed by several eminences.

*P1:* 4.7 times carapace length, with short, plumose and few long, iridescent setae along mesial margins of articles. Merus 1.7 length of carapace, 3.7 times longer than carpus, with row of dorsal and mesial spines; distal spines somewhat well-developed, distomesial spine not reaching proximal third of carpus. Carpus 0.5 length of palm, 1.9 times longer than broad, with numerous spines on dorsal and mesial margins. Palm 5.1 times longer than broad, with rows of small dorsal and mesial spines. Fingers 1.4 times longer than palm; movable finger with proximal spine on dorsal surface with mesial spines and ending in distal spine; fixed finger with some distal spines, ending in strong spine.

*P2 – 4:* Somewhat long and slender with short plumose and long iridescent setae on extensor margin of articles. P2 2.5 times carapace length. Meri shorter posteriorly (P3 merus 0.8 length of P2 merus; P4 merus 0.7 length of P3 merus); P2 merus 0.9 length of carapace, 6 times longer than broad, 1.3 times longer than P2 propodus; P3 merus 4.8 times longer than broad, 1.1 times as long as P3 propodus; P4 merus 3.6 times longer than broad, as long as P4 propodus. Extensor margins of P2 – P3 meri with row of 12 and 7 spines respectively, proximally diminishing spines and distal spine on P4; flexor margins with some distal spines followed by several eminences; lateral margins unarmed. P2 – 3 carpi with 5 spines on extensor margin, P4 with distal spine only; flexor margins with distal spine; lateral margins with several granular ridges, sub-paralleling extensor margin on P2 – 4. Propodi 4.2 – 4.5 times (P3 – P2) – 3.6 (P4) times as long as broad; extensor margin unarmed; flexor margin with 9 – 10 slender, movable spines on P2 – 4, distal spines paired. Dactyli slender, 0.7 times length of propodi; flexor margin with 7 – 9 movable spinules, without spinule at base of unguis.

**Variation:** N/A.

**Coloration:** Unknown

**South African distribution:** Northeast of St Lucia, KwaZulu-Natal, 100 – 120 m (Figure 4.15).

**Genetic data:** Not available.

**Remarks:** *Trapezionida* n. sp. A belongs to the group of species that has five spines on the branchial lateral margins of the carapace, the lateral parts of thoracic sternite 7 have granules, and spines are present on the anterior margin of the second pleonite. It is most closely related to *T. limula* (Macpherson & Baba, 1993) from Madagascar, Mozambique and now South Africa (present study), but the two species differ in P1 length, shape and spinature. The new species is considerably different from *T. limula,* as the P1 is 4.7 times the carapace length for the new species, whereas it is 3.9 times in *T. limula*. Moreover, the fingers and palm are especially slender in the new species, as the palm is 5.1 times longer than wide for the new species and 2.9 times for *T. limula*. The P1 of the new species is overall much less spinose than *T. limula* and possesses weaker spines on mesial margins (Figure 4.11C, D). Furthermore, the propodus of the walking legs are considerably more slender in the new species, compared to *T. limula.* Lastly, the new species does not possess a spine on the mesial margin of second antennal segment, which is present in *T. limula* (Figure 4.11 A, B).

The new species is also similar to *T. euripa* (Macpherson, Rodríguez-Flores & Machordom, 2017) from Madagascar, however, the new species can be easily distinguished using several characters. The new species' second and third pleonites have fewer transverse ridges (four) than *T. euripa* (eight). The anterior branchial spines are absent in *T. euripa*, whereas they are present in the new species. Moreover, the distomesial spine of antennular article 1 is longer than the

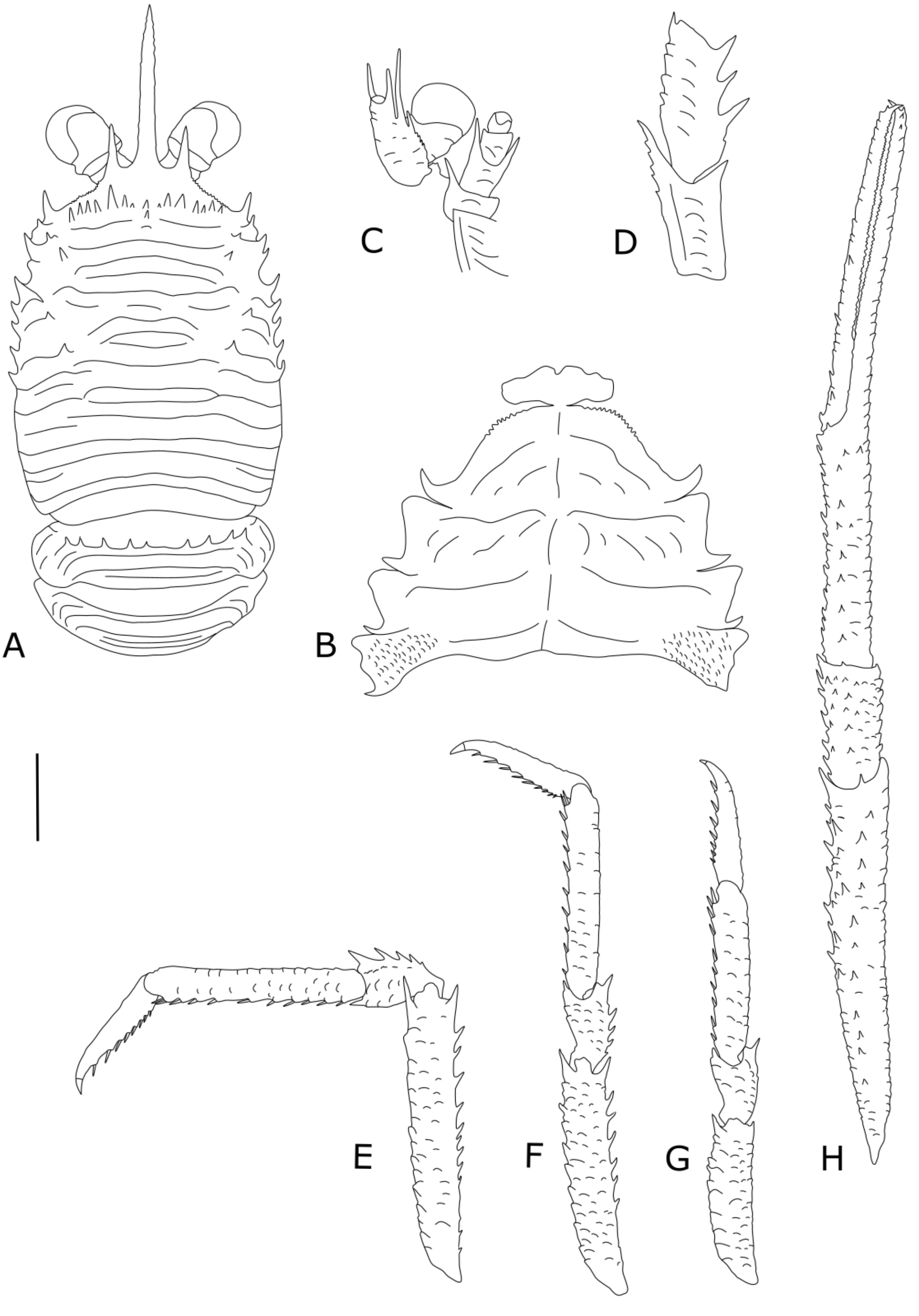

**Figure 4.10:** *Trapezionida* n. sp. A, ♂, 7.4 mm (SAMC-A094536), Northeast of St Lucia, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Right P2, lateral view; **F** – Left P3, lateral view; **G** – Left P4, lateral view; **H** – Right P1, dorsal view. Scale bar: A, C, E – G = 2.0 mm; B, D = 1.0 mm; H = 1.5 mm.

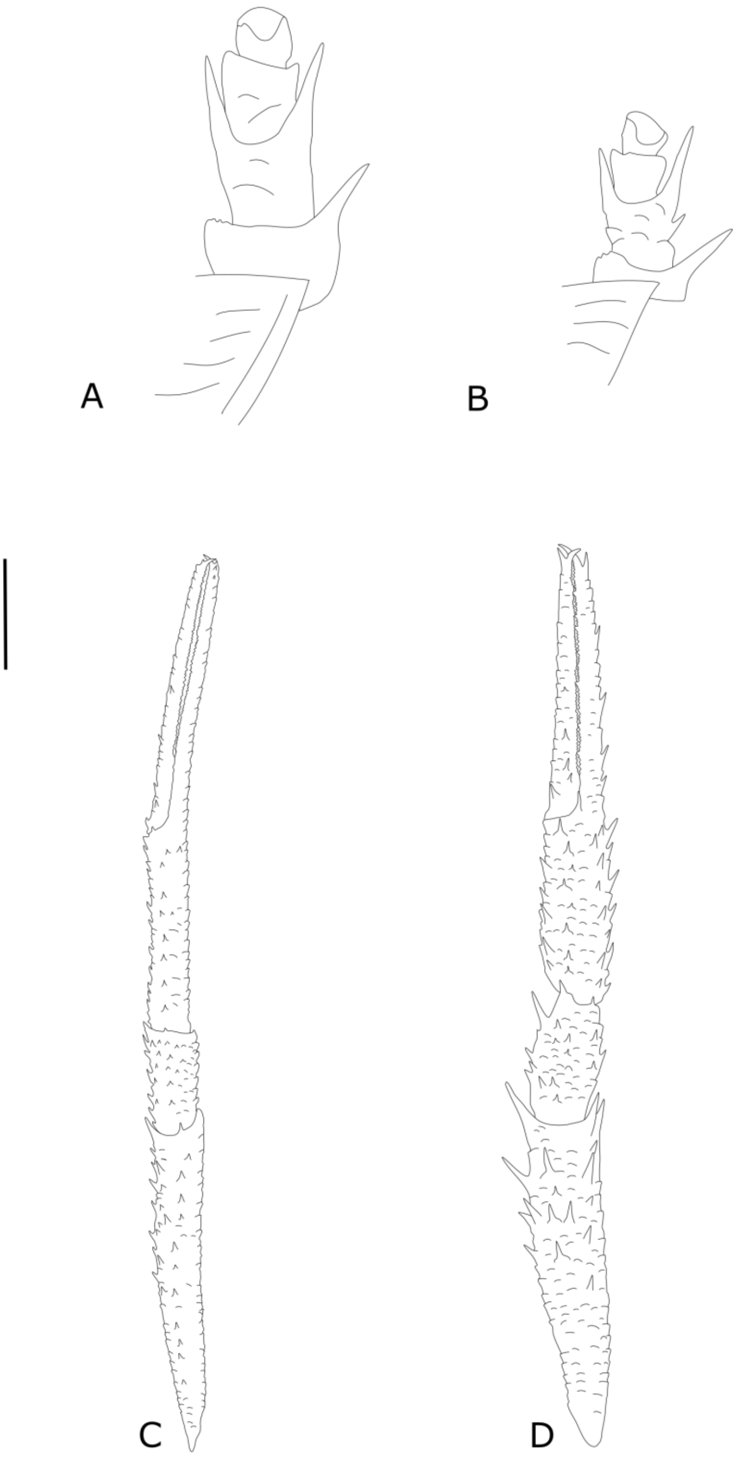

**Figure 4.11:** *Trapezionida* n. sp. A, ♂, 6.4 mm (SAMC-A094536), Northeast of St Lucia, South Africa – A, C; *T. limula*, ovig. ♀, 6.3 mm (SAMC- A094535) – B, D. **A**, **B** – Right antennal peduncle, ventral view; **C**, **D** – Right P1, dorsal view. Scale bar: A, B = 1.0 mm; C = 4.0 mm, D = 2.0 mm.

distolateral in the new species, while it is subequal in T. *euripa*. The new species has a distal spine present on extensor margin of Mxp3 merus, absent in *T. euripa*. The P1 length, shape and spination differ as the new species' P1 is 4.7 times carapace length, while it is 3.0 times in *T. euripa*. The cheliped palm of the new species is considerably more slender as it is 5.1 times longer than broad, compared to 2.5 times in *T. euripa*. The P1 is overall much less spinose than that of *T. euripa* and possesses weaker spines on mesial margins.

Unfortunately, no genetic data could be obtained for this new species as it was preserved in formalin.

### Genus ***Typhlonida*** Macpherson & Baba in Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022

*Typhlonida* Macpherson & Baba *in* Machordom, Ahyong, Andreakis, Baba, Buckley, Garcia-Jimenez, McCallum, Rodriguez-Flores & Macpherson, 2022: 960.

**Type species:** *Munida tiresias* Macpherson, 1994. Gender: feminine.

**Diagnosis:** After Machordom et al. (2022).

Carapace moderately convex with distinct transverse ridges of different lengths; pair of epigastric spines behind ocular peduncles, often flanked by spines; no protogastric spines present; lateral margins straight or marginally convex, bearing 5 spines, with distinct anterolateral spine; posterior margin of carapace unarmed; pterygostomian flap not visible in dorsal view, unarmed. Spiniform rostrum flanked by supraocular spines; longitudinal grooves between bases of rostral and supraocular spines shallow. Epistome with ridge arising from marginal ridge of mouth, leading laterally to level of antennal gland aperture. Transverse ridges of pleonites setiferous, anterior ridges unarmed or armed on pleonite 2 or pleonites 2 – 4. Telson with wide posterior plates, each plate as long as wide. Thoracic sternite marginally wider than long; sternite 3 width 3.0 – 4.0 times length; sternite 4 triangular, anterior margin narrowly contiguous to sternite 3; maximum width at sternite 7. Eyes freely moveable, corneas small (large in some species), usually not wider than ocular peduncle; eyelashes present. Article 1 of antennule moderately long and slender, armed with 2 distal and 2 lateral spines; distomesial spine short, not more than half length of distolateral spine. Antennal peduncle well-developed; article 1 not fused with epistome, distomesial spine usually small (seldom absent), reaching end of article 2 at most. Mxp3 slender, ischium elongate. P1 finger not longer than palm. P2 –

4 relatively slender, spinose; flexor margin of dactyli with row of movable spines, each arising from low, small process; P4 moderately long, mero-carpal articulation not reaching anterior margin of carapace.

**Remarks:** There are currently 26 described species in the genus *Typhlonida*. They are usually deep-water inhabitants, found on the continental slope to abyssal plains of the Atlantic, Indian and Pacific Oceans. The small cornea is a diagnostic feature in most species of this genus, however, some have large corneas (e.g. *T. miles* (A. Milne Edwards, 1880) and *T. pygmaea* (Macpherson, 1996)).

### *Typhlonida* n. sp. A (to be named only when formally published)

**Figures 4.12, 4.19B**

**Material examined: Known only from the holotype.**

**Holotype** – South Africa, East of Margate (type locality), 30°53'S; 30°31'E, 850 m, 11/05/1977, SAMC-A016046, 1 ovig. ♀ 6.2 mm.

**Description:**

*Carapace:* Slightly longer than broad, marginally convex, with some secondary striae between main transverse striae, with scales on gastric and anterior branchial regions. Dorsal ridges with short, dense setae anteriorly, and some scattered, long, non-iridescent setae. Gastric region with 3 pairs of epigastric spines, largest behind supraocular spines. Parahepatic, branchial dorsal and postcervical spines absent. Frontal margins transverse. Lateral margins slightly convex. First lateral spine well-developed, almost reaching sinus between rostrum and supraocular spines; second lateral spine in front of anterior branch of cervical groove. Branchial margin with 5 lateral spines. Rostrum spiniform, 0.5 times remaining carapace length, with small, lateral eminences on distal half and some dorsal carinae, slightly curved upwards. Supraocular spines almost reaching midlength of rostrum, not reaching end of corneas, directed upwards.

*Sternum:* About 0.8 times broader than long. Surfaces of sternites smooth. Sternite 4 anterior margin oblique, contiguous to sternite 3.

*Pleon:* Anterior ridge of pleonite 2 with 4 spines, 2 median and 2 lateral; pleonites 2 – 3 each with uninterrupted transverse ridge behind anterior ridge; pleonites 4 – 5 smooth; pleonite 6 with short posterior stria, convex medially.

*Eye:* Cornea as wide as peduncle. Ocular peduncles slightly broader than long, maximum corneal diameter 0.3 distance between bases of anterolateral spines.

*Antennule:* Article 1 with 2 distal spines, distomesial spine minute, distolateral well-developed; 2 lateral spines, distal spine much longer than proximal, overreaching distolateral spine.

*Antenna:* Basal article with distomesial spine almost reaching distal margin of article 2. Article 2 with distomesial spine almost reaching distal margin of article 3, distolateral small, not reaching midlength of article 3. Article 3 with short distomesial spine.

*Mxp3:* Ischium with small distal spines on both flexor and extensor margin. Merus shorter than ischium; 2 spines on flexor margin, proximal larger than distal; extensor margin unarmed. Carpus unarmed.

*P1:* 2.3 times carapace length, with fine, plumose setae, and long, scattered non-iridescent setae. Merus 0.7 times carapace length, 2.9 times carpus length, with some dorsal spines; distal spines well-developed, distomesial spine almost reaching midlength of carpus. Carpus 0.6 times length of palm, 1.2 times longer than broad; with strong spines on mesial margin and row of spines on dorsal margin. Palm 1.7 times as long as broad, with row of spines along lateral and mesial margins. Fingers 1.1 length of palm; fixed finger with row of strong spines along lateral margin; movable finger with small basal spine.

*P2 – 4:* Moderately long and slender, with numerous plumose setae and some long, scattered setae on extensor margins of appendages. P2 2.0 times carapace length. Meri shorter posteriorly (P3 merus 0.9 times length of P2 merus, P4 merus 0.8 times length of P3 merus); P2 merus 0.8 length of carapace, 7.0 times as long as broad, 1.5 times length of P2 propodus; P3 merus 6.0 times as long as broad, 1.3 times length of P3 propodus; P4 merus 4.0 times longer than broad, 1.2 times propodus length. Extensor margins of meri with row of 8 – 10 proximally diminishing spines on P2 – 3, unarmed on P4; flexor margins with 2 – 3 spines distally on P2 – 3, P4 with single distal spine, followed proximally by several eminences on all articles; P2 – 3 with distomesial spine. Carpi with 1 – 2 spines on extensor margin; lateral surfaces of P2 – 4 with several granules sub-paralleling extensor margins; flexor margins with small distal spine. Propodi 6.6 – 6.1 (P2 – 3) – 4.7 (P4) times longer than broad; extensor margins unarmed; flexor margin with 7 – 9 slender movable spines on P2 – 3, P4 with 5 spines, P2 – 4 distally with one fixed spine. Dactyli slender 0.7 – 0.8 times length of propodi; flexor margin with 6 – 8 movable spinules on P2 – 4, without spinule at base of unguis; dactyli 5.0 times longer than broad.

**Coloration:** Unknown.

**South African distribution:** East of Margate, KwaZulu-Natal, 850 m (Figure 4.13).

**Genetic data:** Not available.

**Remarks:** This is the first record of this genus in South African waters. This species belongs to the group of species with five small spines on the branchial lateral margins, no granules on lateral margins of seventh thoracic sternite, small eyes, maximum corneal diameter less than 1/3 distance between anterolateral spine bases. *Typhlonida* n. sp. A is closely related to some species of this recently erected genus, of which some have been described from the SWIO region. These are *Typhlonida alaos* Macpherson, Rodríguez-Flores & Machordom, 2023, *T. pygmaea* (Macpherson, 1996) and *T. typhle* (Macpherson, 1994). The new species can easily be distinguished from *T. alaos* by the size of the supraocular spines, exceeding the corneae in *Typhlonida* n. sp. A but do not reach the end of the eyes in *T. alaos*. Moreover, the distomesial spine of the basal antennular article is small, but well-developed in *T. alaos*, while it is minute in *Typhlonida* n. sp. A. Lastly, the new species also has a distomesial spine on third antennal article, absent in *T. alaos*. *Trapezionida* n. sp. A can also be differentiated from *T. typhle* as the new species has a distomesial spine on the third antennal article, absent in *T. typhle*. *Typhlonida* n. sp. A also has shorter dactyli clearly shorter than propodi, while *T. typhle* has dactyli slightly shorter than propodi. The new species has two spines on flexor margin of Mxp3, while *T. typhle* only has one spine. Lastly, *Typhlonida* n. sp. A has a lateral spine on the basal antennular article that exceeds the distolateral spine, whereas it does not reach the distolateral spine in *T. typhle*.

This species is also somewhat similar to other *Typhlonida* species. These include *T. galalala* (McCallum, Ahyong & Andreakis, 2021), however *T. galalala* has a spine on the extensor margin of P4 merus and a frontal spine, as well as a more slender P1; while also superficially similar to *T. sanctipauli* (Henderson, 1885) also known from the area, however *T. sanctipauli* has dorsal spines on carapace and has large eyes, corneas wider than eyestalk. There are some similarities to *T. tiresias* (Macpherson, 1994), however this species has a spine on frontal margin between anterolateral and supraocular spines; while *T. watatsumi* (Komai, 2014), has a distomesial spine well-developed unlike the new species, only proximal spine on fixed finger and no spines on the second pleonite.

Unfortunately, no genetic data could be obtained for this new species as it was preserved in formalin after collection by dredge.

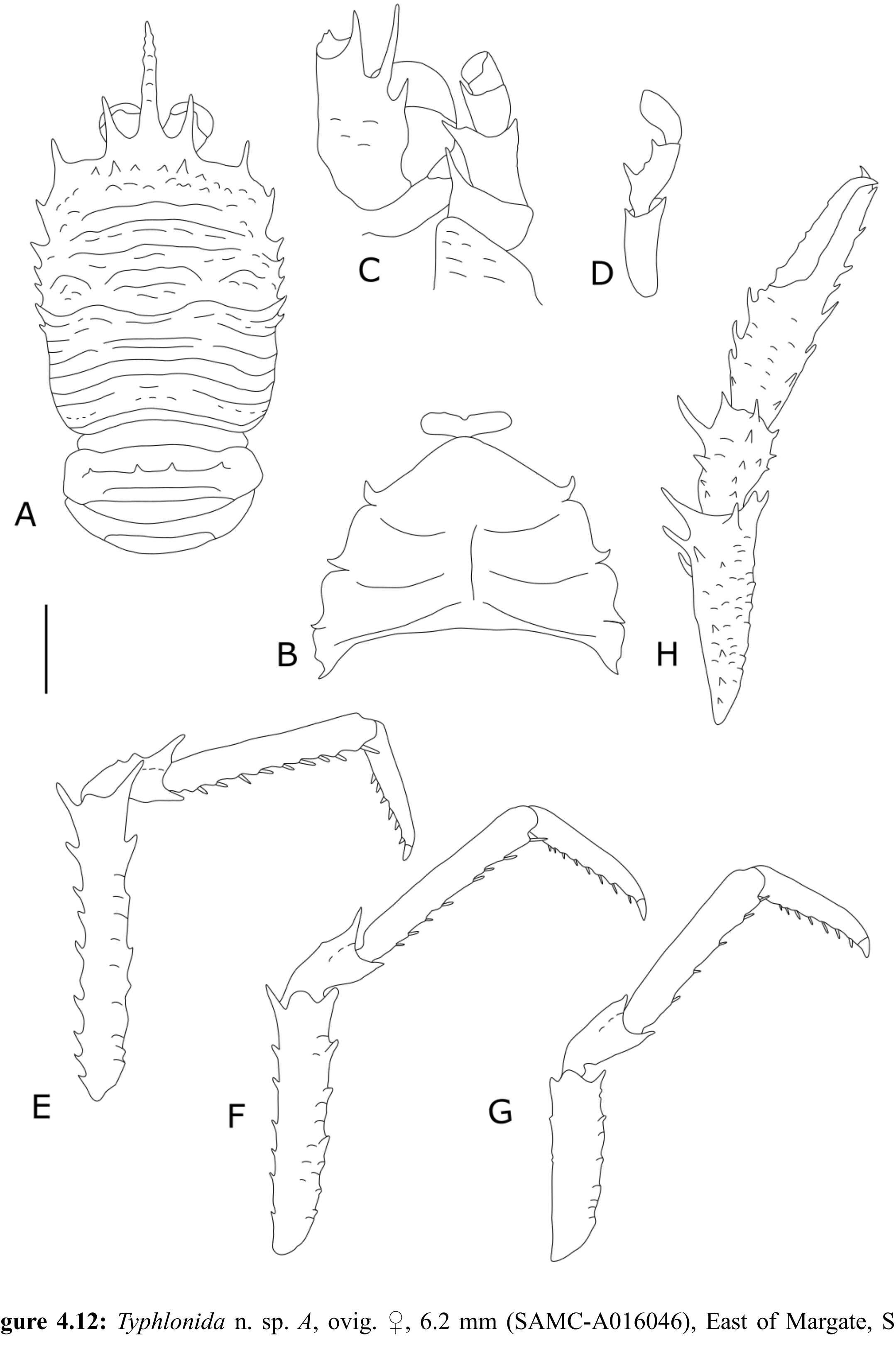

**Figure 4.12:** *Typhlonida* n. sp. *A*, ovig. ♀, 6.2 mm (SAMC-A016046), East of Margate, South Africa. **A** – Carapace and anterior pleonites, dorsal view; **B** – Sternal plastron, ventral view; **C** – Cephalic region showing antennular and antennal peduncles, ventral view; **D** – Left Mxp3, lateral view; **E** – Right P2, lateral view; **F** – Right P3, lateral view; **G** – Right P4, lateral view; **H** – Right P1, dorsal view. Scale bar: A, H = 2.0 mm; B – G = 1.0 mm.

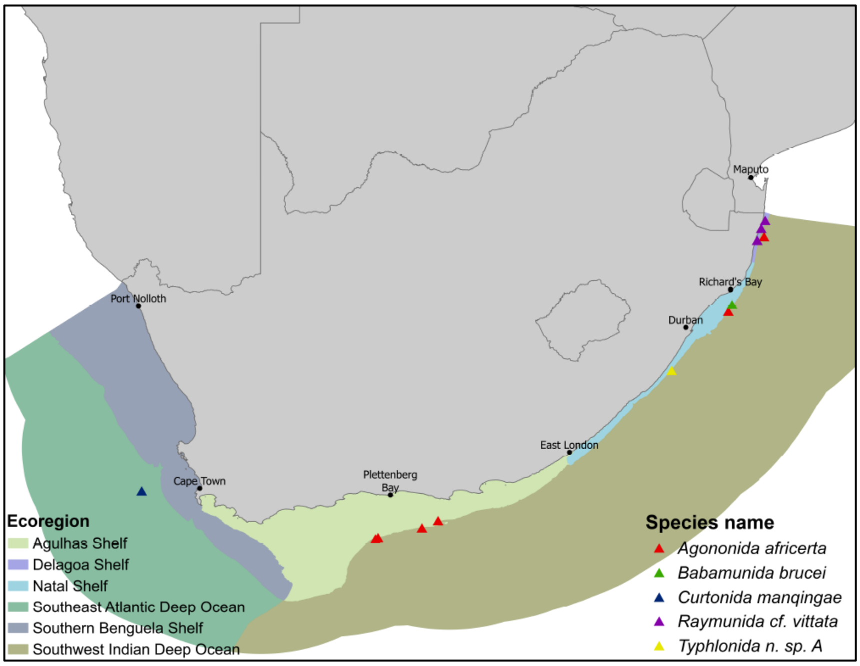

**Figure 4.13:** Distribution map of species in the genera *Agononida, Babamunida, Curtonida, Raymunida* and *Typhlonida* found in South Africa.

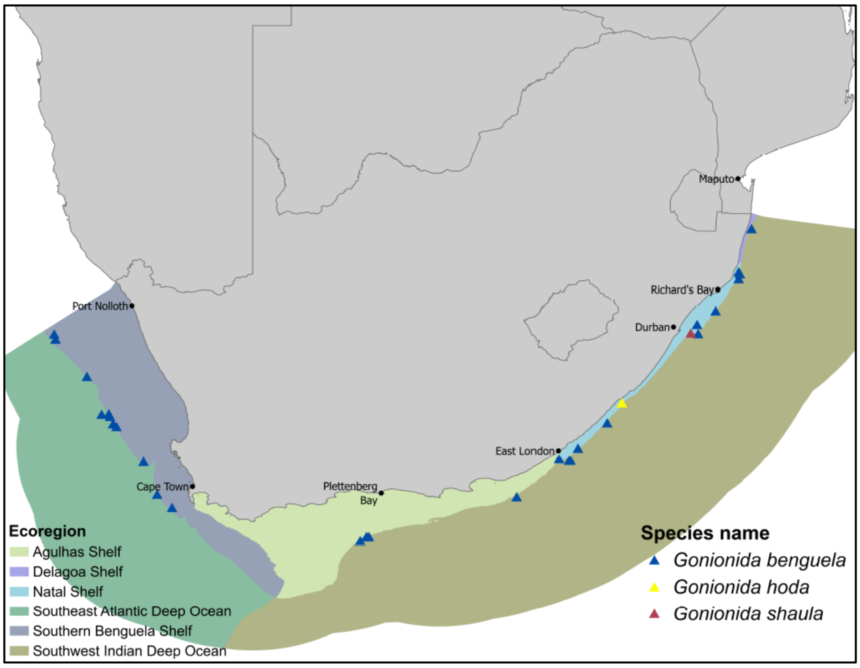

**Figure 4.14:** Distribution map of species in the genus *Gonionida* found in South Africa.

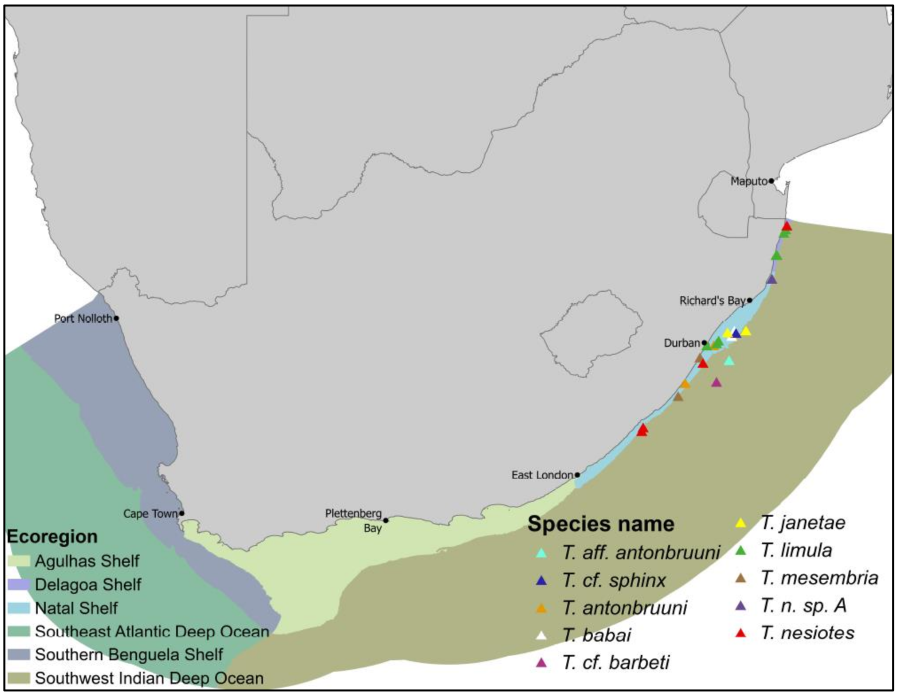

**Figure 4.15:** Distribution map of species in the genus *Trapezionida* found in South Africa.

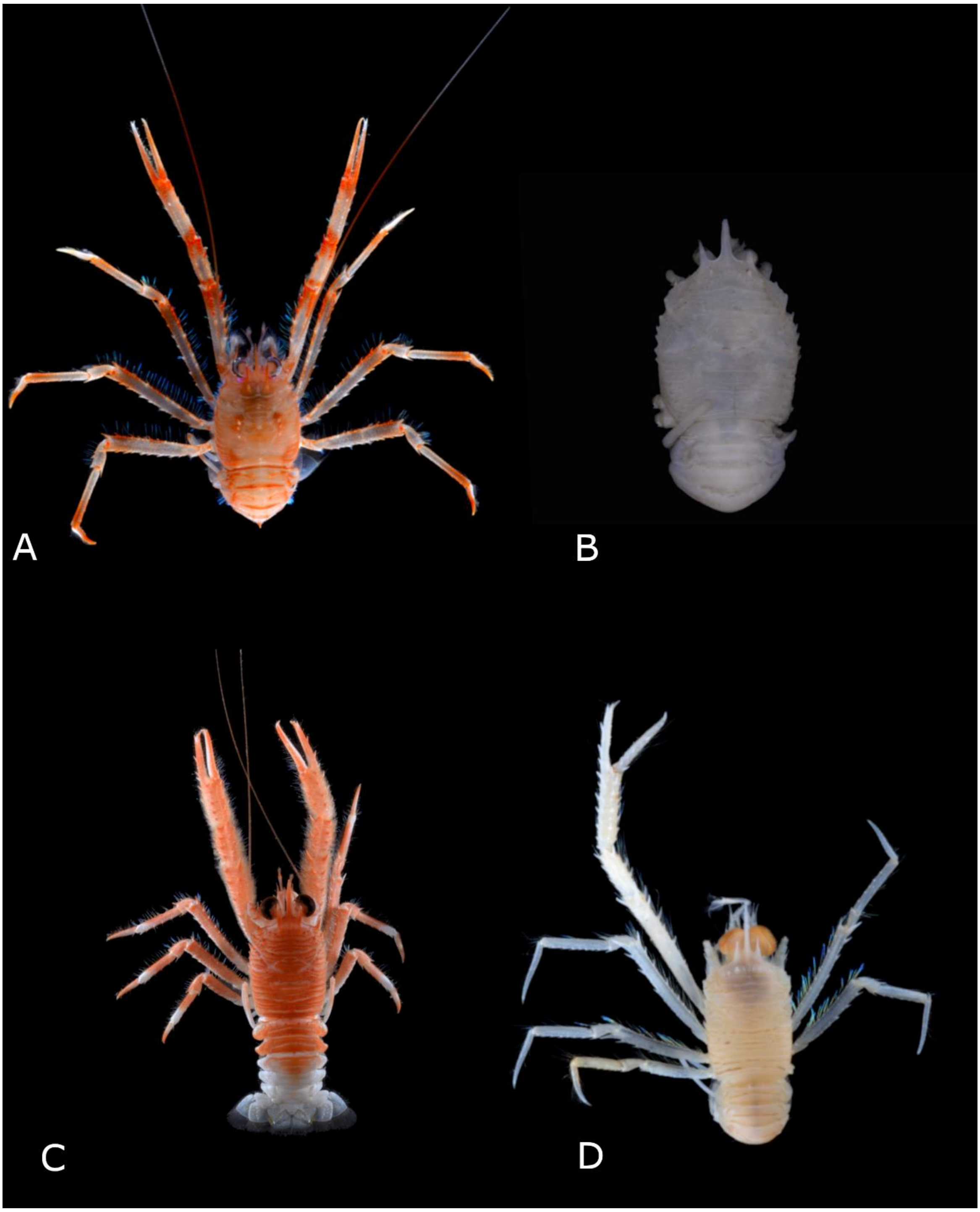

**Figure 4.16:** Dorsal view of live (A, C) and preserved (B, D) specimens. **A** – *Agononida africerta* Poore & Andreakis, 2012, South of Knysna, South Africa, ♂, 18.8 mm (SAMC-A094740); **B** – *Curtonida manqingae* (Liu, Lin & Huang, 2013), East of Sodwana Bay, South Africa, ovig. ♀, 8.7 mm (SAMC-A010525); **C** – *Gonionida benguela* (de Saint Laurent & Macpherson, 1988), South of Knysna, South Africa, ♂, 17.6 mm (SAMC-A094749); **D** – *Gonionida hoda* (Macpherson, Rodríguez-Flores & Machordom, 2017), East of Mgazi River, South Africa, ♂, 5.9 mm (SAMC-A094550).

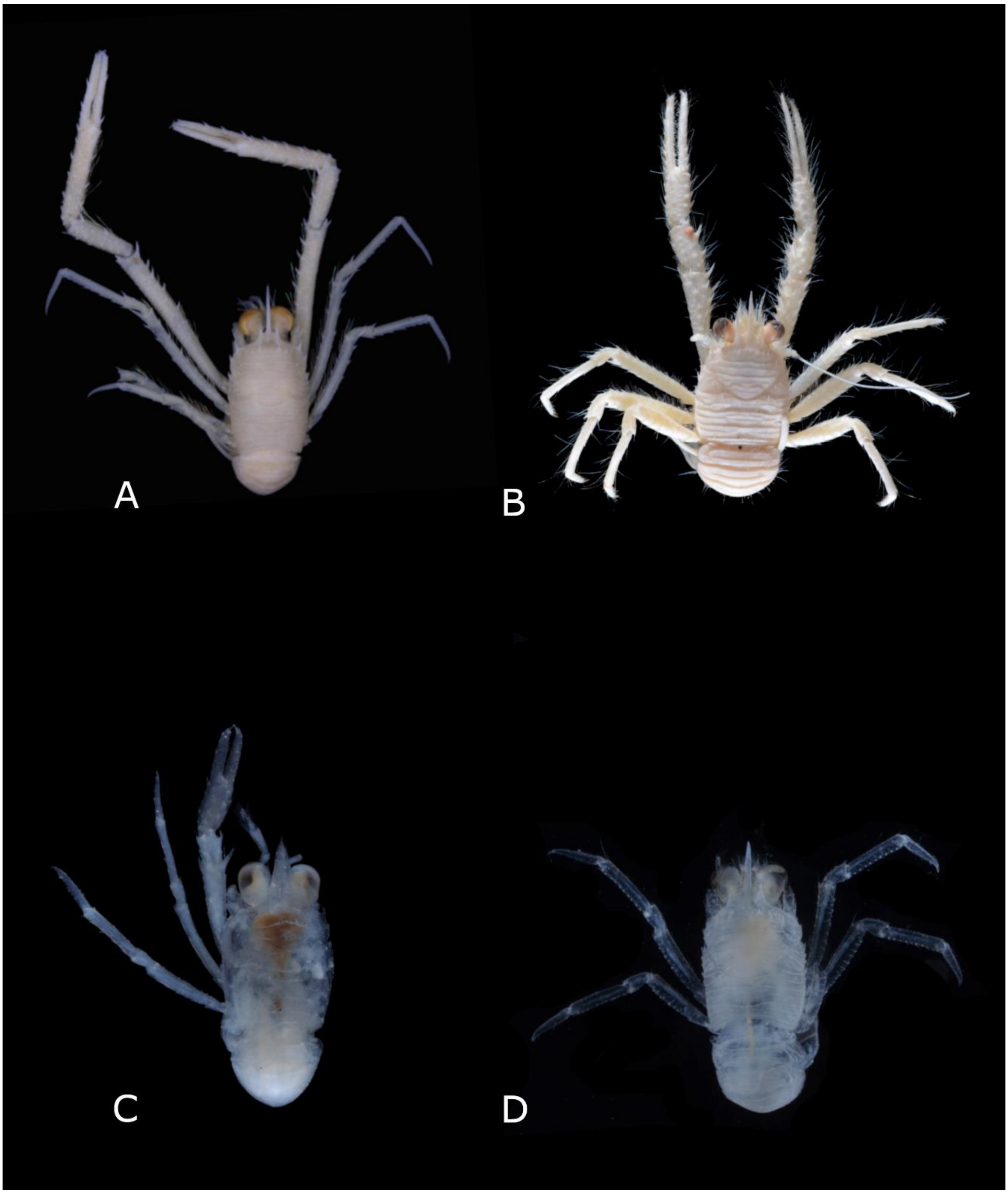

**Figure 4.17:** Dorsal view of preserved specimens. **A** – *Gonionida shaula* (Macpherson & de Saint Laurent, 2002), East of Durban, South Africa, ♂, 6.4 mm (ZMUC CRU-11526); **B** – *Raymunida* cf. *vittata* Macpherson, 2009, off Boteler Point, South Africa, ovig. ♀, 6.6 mm (SAMC-A094532); **C** – *Trapezionida antonbruuni* (Tirmizi & Javed, 1980), Durban Bay, South Africa, ♂, 1.6 mm (SAMC-A094791); **D** – *Trapezionida janetae* (Tirmizi & Javed, 1992), East of Umgeni River, South Africa, ♂, 2.8 mm (SAMC-A094799).

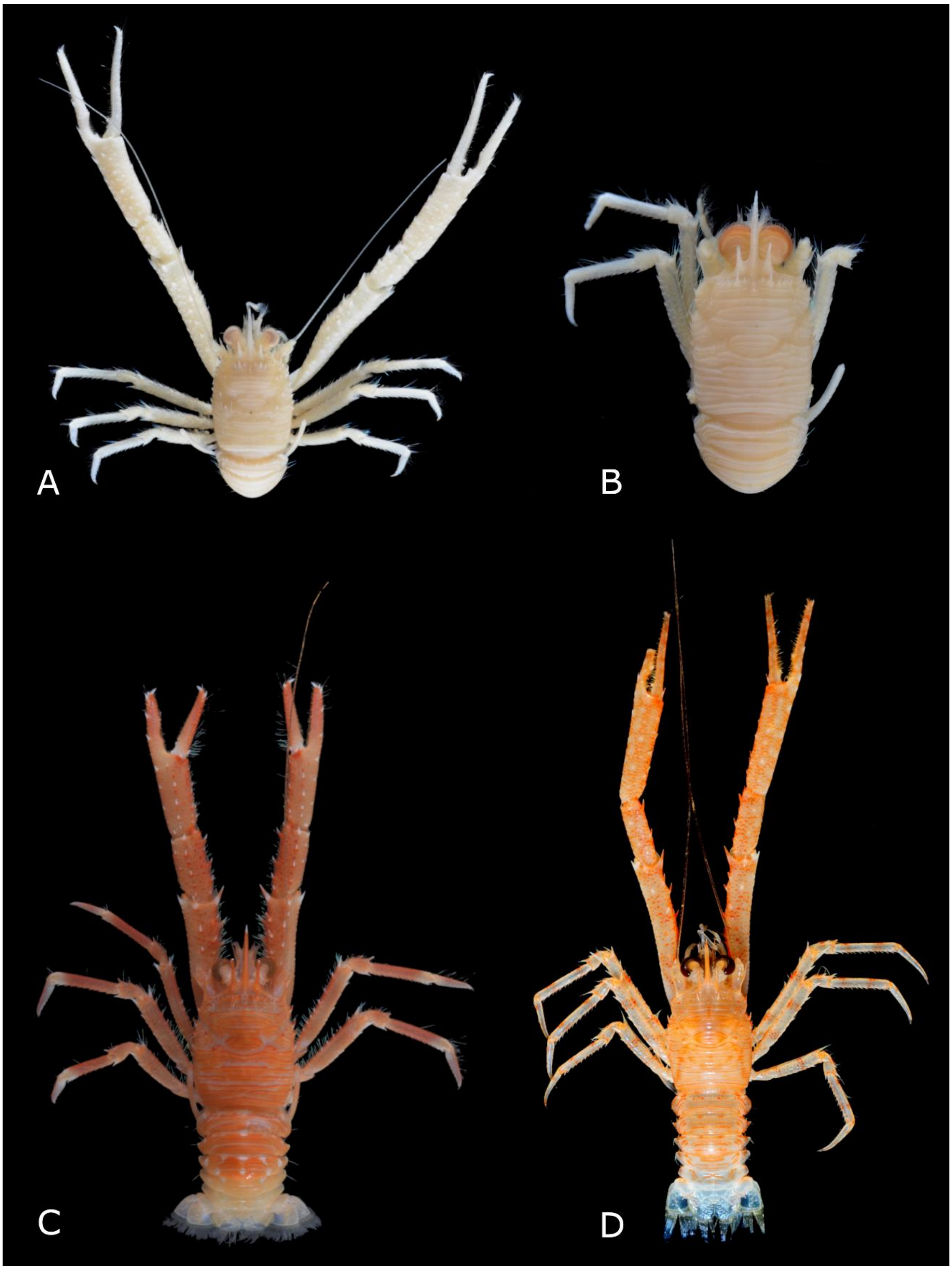

**Figure 4.18:** Dorsal view of live (C, D) and preserved (A, B) specimens. **A** – *Trapezionida limula* (Macpherson & Baba, 1993), East of Sodwana Bay, South Africa, ♂, 6.8 mm (SAMC-A094538); **B** – *Trapezionida mesembria* (Macpherson, Rodríguez-Flores & Machordom, 2017), North of Port Edward, South Africa, ♀, 5.1 mm (SAMC-A094549); **C** – *Trapezionida nesiotes* (Macpherson, 1999), East of Scottburgh, South Africa, ♂, 11.3 mm (SAMC-A094757); **D** – *Trapezionida sphinx* (Macpherson & Baba, 1993), New Caledonia, ♂, 10.2 mm (MNHN-IU-2021-1666). Photo by: D – Laure Corbari (MNHN & Chagnoux, 2024).

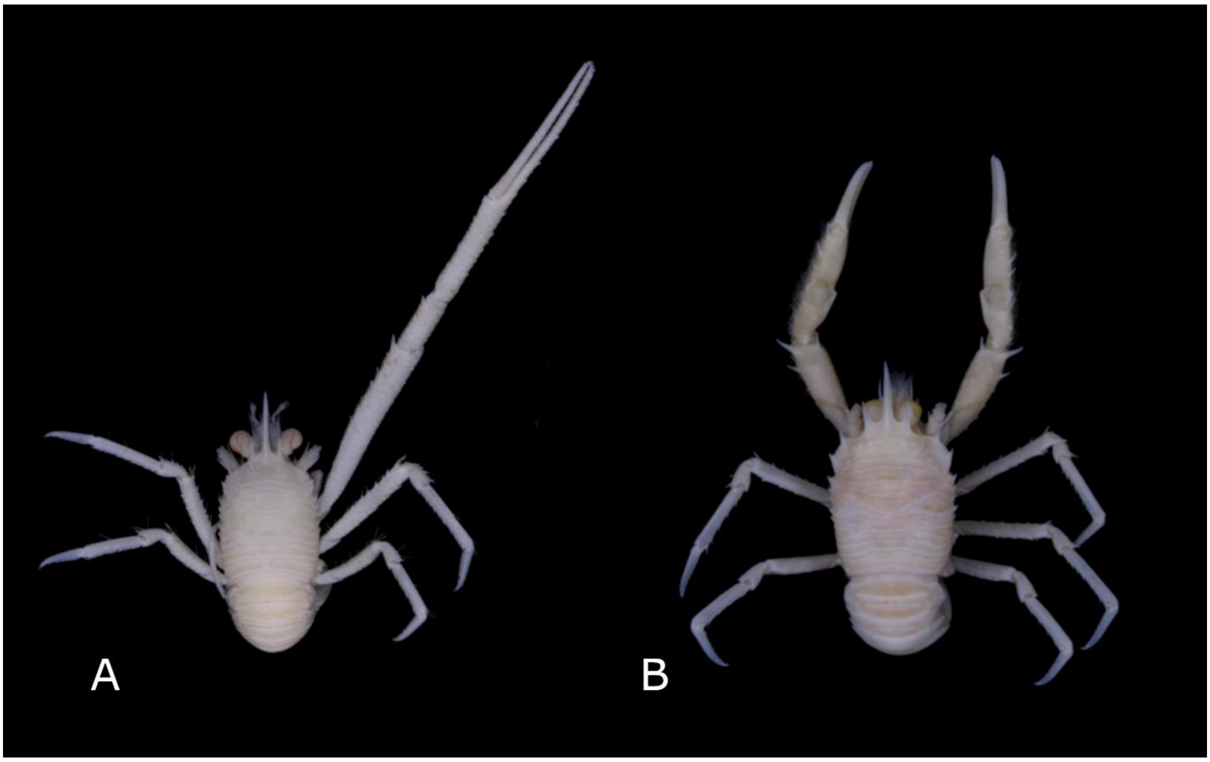

**Figure 4.19:** Dorsal view of preserved specimens. **A** – *Trapezionida* n. sp. A, East of St. Lucia, South Africa, holotype, ♂, 7.4 mm (SAMC-A094536); **B** – *Typhlonida* n. sp. A, ovig. East of Margate, South Africa, holotype, ♀, 6.2 mm (SAMC-A016046).

# Discussion

Following this study, 17 munidid squat lobster species from seven genera are recognized in the squat lobster fauna list for South Africa, more than doubling the previous number. Nine species and three genera are reported from South Africa for the first time (however two of the new records, *Babamunida brucei* and *Trapezionida barbeti* require further work and specimen collections to confirm their identifications as both are identified from *in-situ* images only). Two species are also described as new to science, one each from the genera *Trapezionida* Macpherson & Baba, 2023 and *Typhlonida* Macpherson & Baba, 2023. *Trapezionida* n. sp. A is quite similar to *T. limula* and *T. euripa*. However, the slender and greatly elongated chelipeds are diagnostic. The new species of *Typhlonida* (a first for South Africa from that genus) is similar to *T. alaos, T. pygmaea* and *T. typhle*, though the new species is easily distinguished based on the long supraocular spines and lateral spine on antennular article 1 that exceeds the distolateral spine.

Three previously identified records were found to be incorrectly identified and are transferred to other species within the same genera already known from the region. The *Gonionida kuboi* material from South Africa is transferred to *G. shaula*, while *Trapezionida japonica* material is identified as *T. sphinx.* Lastly, several studies reported on *Trapezionida semoni* specimens from South Africa and highlighted the need for a revision of the material (Macpherson & Baba, 1993; Baba, 2005; Macpherson et al., 2017). Here, it is confirmed that *T. semoni* is not present in South Africa and material previously identified under the name is now moved to *T. limula* or to *T. mesembria.* As stated by Macpherson et al. (2023), the *Raymunida elegantissima-lineata-vittata* complex requires more work, including molecular analyses to clarify the taxonomic statuses of component species. Moreover, the systematic status of the genus Raymunida remains uncertain, based on molecular and morphological analyses (Machordom et al., 2022). However, for now the genus is retained in the Munididae.

Of the 17 munidids now known from South Africa, only the two new species are endemic, giving an endemicity rate of 11.8%. These figures are comparable to those in other countries in the region such as Mozambique and Madagascar, that have 18 and 16 known species respectively, with endemicity rates of 16.7% and 25% (Macpherson et al., 2023). Four species are shared between these three countries; *A. africerta, G. benguela, G. shaula* and *R. vittata.* However, when considering the SWIO region, the endemicity rate is almost 80%, suggesting the habitat is quite similar and that many species are shared throughout the region. Of the 45 species listed by Macpherson et al. (2023) to occur in the SWIO, 14 are now known to occur in South Africa and two more species are added here, bringing the total number of SWIO munidids to 47.

Several re-descriptions are also added to improve and standardise descriptions, making species comparisons easier to infer. These included *A. africerta* previously only described from photographs, *G. benguela* that was described in 1988, and importantly, *T. antonbruuni* and *T. janetae,* both of which were previously known from a single or few specimens and their descriptions were outdated.

Sequences derived from South African munidid material aligns with conspecifics from the region where sequence data was available, such as for *A. africerta, G. benguela* and *T. nesiotes*. *Raymunida* cf. *vittata* however requires more material from the different *Raymunida* species to resolve the species complex. Similarly, more *T. limula* material is required to understand its affinities to other species in the genus, as this study provided the first and only DNA sequence for this species.

It seems that the South African Munididae have an Indian Ocean affinity, as only two species are recorded on the west coast of South Africa, *G. benguela* and *C. manqingae,* with only one additional species *Iridonida speciosa* (von Martens, 1878) reported from the entire west coast of Africa. This is supported by the fact that many munidids found in South Africa share morphological and molecular similarities with other Indian Ocean species. As shown by Poore and Andreakis (2012, 2014) the *Agononida incerta* (Henderson, 1888) complex unveiled many cryptic species, of which one was *A. africerta* from Mozambique. They showed that *A. africerta* divergence was less than 2% from Indo-Pacific species *A. indocerta* Poore & Andreakis, 2012 and *A. vanuacerta* Poore & Andreakis, 2014. The present findings suggest that South African *A. africerta* specimens share these similarities and also have low divergence from *A. indocerta* and *A. vanuacerta* (1.2 – 2.9% divergence). These similarities between South African munidids and Indian Ocean munidids are also highlighted in the *Raymunida elegantissima-lineata-vittata* complex, as South African *R.* cf. *vittata* specimens have a divergence lower than 2.5% to *R. elegantissima* from the Indian Ocean. Lastly, all South African munidids (except the two new endemic species) are also found outside of South Africa in the Indian Ocean region, indicating an Indian Ocean affinity.

Although many species are now added to the South African munidid fauna list and great advances have been made on the systematics of the group, their diversity is likely still underestimated. This is mainly due to the fact that most benthic collections from South Africa have been done on the south and west coast, as most commercial fishing and hence fisheries research takes place on these coasts. Historically, around 83% of existing samples taken within South Africa are also from depths shallower than 100 m, while 99% are from depths shallower than 1000 m (Griffiths et al., 2010). Given that most munidid genera are continental shelf and slope dwellers (Ahyong et al., 2011), it is likely that many species from deeper South African waters remain undocumented. Unfortunately, throughout the duration of this study only some ad-hoc collections could be made on the east coast and no dedicated collections were possible, due to financial and logistical constraints. Future studies should focus on more targeted collections on the east coast, as this is where the greatest diversity is likely to occur, as well as on deeper continental shelf and slope areas around the coast.

# Chapter 5: Taxonomic revision of the family Munidopsidae (Anomura: Galatheoidea) from South Africa

## Introduction

Squat lobsters in the family Munidopsidae Ortmann, 1898 are the deepest dwelling members of the Galatheoidea Samouelle, 1819. The family contains virtually no shallow-water species and is the most abundant group of decapods at abyssal depths, with an average depth of 1455 m (Baba et al., 2008; Macpherson et al., 2010; Ahyong et al., 2011; Schnabel et al., 2011a, b). Members are also known to occur in unique habitats, such as cold seeps (Chevaldonné & Olu, 1996), hydrothermal vents (Baba & Williams, 1988) and seamounts (Rowden et al., 2010). Also included in this family is the only squat lobster found in shallow anchialine caves, *Munidopsis polymorpha* Koelbel, 1892, which was collected from caves in the Canary Islands (Wilkens et al., 1990; Cabezas et al., 2008). Munidopsidae mostly have reduced eyes, a characteristic often exhibited by deep-water inhabitants, and more heavily-calcified bodies than other galatheoids (Ahyong et al., 2011). However, the main synapomorphy of the group distinguishing them from other galatheoids is the reduction or loss of the flagellum on maxilliped 1 (Ahyong et al., 2010).

The Munidopsidae is the second smallest galatheoid family (with only a few more species than the Galatheidae Samouelle, 1819), and currently includes five genera, comprising just over 300 species (Rodríguez-Flores et al., 2023; WoRMS Editorial Board, 2024). The recognized genera are: *Galacantha* A. Milne-Edwards, 1880, *Janetogalathea* Baba & Wicksten, 1997, *Leiogalathea* Baba, 1969, *Munidopsis* Whiteaves, 1874 and *Shinkaia* Baba & Williams, 1998 (Dong et al., 2021; Rodríguez-Flores et al. 2022). *Janetogalathea* is a new addition to the Munidopsidae, having been transferred by Rodríguez-Flores et al. (2023) from the Galatheidae, as was the case for *Leiogalathea* some years earlier (Ahyong et al., 2009, 2011; Schnabel et al., 2011a). The genus *Munidopsis* is by far the most speciose in the family, with over 270 species, but these may ultimately be split into separate genera, but systematic work is ongoing, with proposals that the genus is not monophyletic remains to be tested (Poore & Ahyong, 2023).

In South Africa, the first munidopsid to be recorded was *Galacantha rostrata* A. Milne-Edwards, 1880, which Stebbing (1908) reported from off Cape Point at a depth of 1650 m. Barnard (1950) made mention of a single additional munidopsid, *Munidopsis simplex* (A. Milne-Edwards, 1880) in his descriptive catalogue, while Kensley (1968, 1977) described two new species; *M. chacei* and *M. barnardi* and also added *M. dasypus* Alcock, 1894 to the South African fauna. Almost 30 years thereafter, Baba (2005) and Macpherson and Segonzac (2005), each added two species, *M. antonii* (Filhol, 1884), *M. teretis* Baba, 2005 and *M. aries* (A. Milne-Edwards, 1880), *M. laurentae* Macpherson & Segonzac, 2005 respectively. The last species added was *Munidopsis gladiola* Macpherson (2007), described from off Durban. Macpherson & Segonzac (2005) also lists *Munidopsis parfaiti* (Filhol, 1885) as occurring off South Africa/Namibia, though it is not included in this study, as the location lies some 1500 km west of South Africa, far outside the EEZ (Economic Exclusive Zone). Emmerson (2016) lists all the species mentioned above, with no new additions, giving a total of 10 known munidopsids from South Africa.

This study aims to compile a thorough systematic account of South African munidopsids using the most updated nomenclature and re-describing outdated or poorly described species using modern techniques. South African munidopsids have never been formally revised and have only formed part of larger works, or ad-hoc species descriptions. Given the recent updates in the taxonomy and systematics of this group since the last South African munidopsid was reported on, a revision on the group is long overdue.

## Methods

This study is based on the examination of historic material from numerous expeditions around the South African coast and housed in the Natural History Collections of the Iziko South African Museum, Cape Town, and the Muséum national d'Histoire naturelle, Paris (MNHN), spanning the period 1903 to 1975. Access to deeper waters is very limited in South Africa, no new specimens were collected from this family during the course of the study. Due to this and the fact that existing material was too old, no genetic analyses were conducted. Specimens examined were collected across a depth range of 900 – 3038 m (though the known range for Munidopsidae in South Africa is 900 – 4500 m).

Drawings were made using a WILD stereomicroscope and a Nikon SMZ1270, both equipped with a camera lucida, and digitally traced in Inkscape 1.21 (www.inkscape.com) using a Wacom Intuos Pro. Photos were taken using a Nikon D3100 camera and edited with GIMP 2.10.30 software (www.gimp.com). Images credited to TPA Botha, unless stated otherwise.

Maps were created using ESRI ArcGIS 3.3.0. Photos were accessed from several sources including MNHN & Chagnoux, (2024) and Harvard University & Morris (2024).

The terminology and measurements used in this study follow Baba et al. (2009, 2011). Specimen sizes are indicated by the postorbital carapace length (pcl), measured from the base of the rostrum along the midline to the posterior margin of the carapace. The rostrum is measured from the base to the distal tip. Appendages are measured in dorsal (pereopod 1) and lateral (pereopods 2 – 4) midlines. Where applicable, ranges of morphological and meristic variations are included in the description, holotype measurements given in parentheses. Abbreviations and symbols used are: ♀ = female; ♂ = male; Mxp3 = maxilliped 3; ovig. = ovigerous; P1= pereopod 1 (cheliped); P2 – 4 = pereopods 2 – 4.

## Systematic account

### Family **Munidopsidae** Ortmann, 1898

Munidopsinae Ortmann, 1898: 1151; Balss, 1957: 1596; Baba, 1988: 53; Baba, 2005: 67.

Shinkaiinae – Baba & Williams, 1998: 152, 155.

Munidopsidae Ahyong et al., 2010: 63; Macpherson & Baba, 2011: 24; Poore & Ahyong, 2023: 283.

**Type genus:** *Munidopsis* Whiteaves, 1874.

**Diagnosis:** After Ahyong et al. (2010).

Rostrum well-developed, spiniform or subtriangular; supraocular spines absent. Carapace (excluding rostrum) as long as or longer than wide; dorsal surface varied, either ornamented, smooth, tuberculate, spinose or with transverse striae. Tailfan well-developed, not folded against preceding pleonite; telson either distinctly or indistinctly subdivided into several plates. Eyes with well-developed corneas or reduced. Antennal article 1 directed anteriorly or anterolaterally. Maxilliped 1 exopod with flagellum absent or reduced. Maxilliped 3 pediform with elongated ischium and merus, not expanded mesially; epipod present. Chelipeds subcylindrical to ovate in cross-section.

**Genera included:** *Galacantha*; *Janetogalathea*; *Leiogalathea*; *Munidopsis*; *Shinkaia*.

**Remarks:** There are currently 311 known species in this family distributed among five genera, with the overwhelming majority of species in the genus *Munidopsis* (WoRMS Editorial Board, 2024). In South Africa two genera are present with a total of 10 species.

## Key to species of the family Munidopsidae in South Africa

1. Carapace cardiac and mesogastric region and pleonites 2 – 4 with row of prominent spines in midline…………..……..……..….... ***Galacantha rostrata* (p. 177; fig. 5.1A)**

   Carapace and pleonites without complete row of spines in midline..……... **2 (fig. 5.1B)**

2. P2 reaching or overreaching end of P1…………………..………..…………………... **3**

   P2 not reaching end of P1…………………………..……….…...……………..…… **9**

3. Fixed finger with denticulate carina present on distolateral margin…………………... …………………………….. .. .. .. .. ..…..…. ***Munidopsis teretis* (p. 202; fig. 5.1D)**

   Fixed finger without denticulate carina on distolateral margin………..….. **4 (fig. 5.1E)**

4. Rostrum broad, as wide as long. Carapace dorsal surface without gastric spines ……………………….………………………... ***Munidopsis aries* (p. 183; fig. 5.1C)**

   Rostrum slender, at least twice longer than wide. Carapace mostly smooth, with few tubercles and well-developed spines……………………………………… **5 (fig. 5.1B)**

5. Carapace with longitudinal rows of submedian spines……………………………….. ……………………………….……….…. ***Munidopsis chacei* (p. 185; fig. 5.1B)**

   Carapace without longitudinal row of submedian spines…..…..……….…. **6 (fig. 5.1F)**

6. Epipods absent on P1…………………………………………………………………..**7**

   Epipods on P1………………………………………………………………………… **8**

7. Sixth pleonite with posteromedian lobe rounded. Carapace with two spines on lateral margin (few small spines present)…………… ***Munidopsis gladiola* (p. 189; fig. 5.1H)**

   Sixth pleonite with posteromedian lobe straight. Carapace with five well-developed spines on lateral margins (few small spines present)……………………………… ………………………….…….……… ***Munidopsis laurentae* (p. 191; fig. 5.1I)**

8. Eyestalk long and slender. P2 – 4 dactyli with cristiform ridge bordered by setae on each of lateral and mesial faces…………………... ***Munidopsis antonii*** **(p. 181; fig. 5.1J)**

Eyestalk relatively short. P2 – 4 dactyli without cristiform ridge on each of lateral and mesial faces…………………………....… ***Munidopsis subsquamosa*** **(p. 200; fig. 5.1K)**

9. Eyes small. Carapace with no dorsal spines (except transverse row on posterior margin)…..……………………..…..…...… ***Munidopsis kensleyi*** **(p. 190; fig. 5.1G)**

Eyes large. Carapace with dorsal spines on gastric and cardiac regions…….. …………..…………………..………..……… ***Munidopsis simplex*** **(p. 192; fig. 5.1F)**

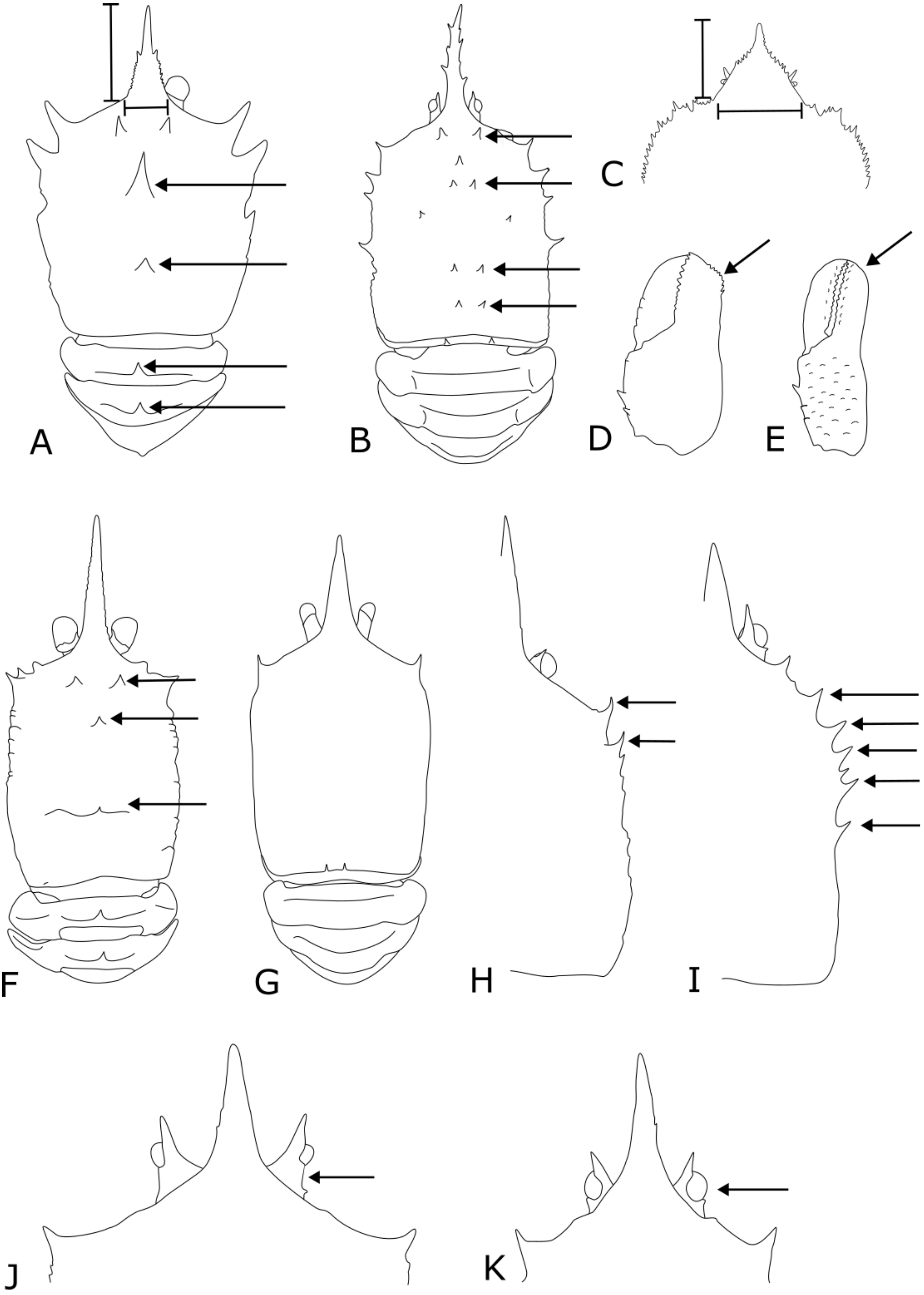
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**Figure 5.1:** **A** – *Galacantha rostrata* carapace and anterior pleonites, dorsal view, arrows depicting spines in midline; **B** – *Munidopsis chacei* carapace and anterior pleonites, dorsal view, arrows depicting submedian spines; **C** – *Munidopsis aries* rostrum and frontal margin, dorsal view (simplified from Macpherson & Segonzac, 2005); **D** – *Munidopsis teretis* P1 palm and finger, dorsal view, arrow depicting carina distolateral margin (simplified from Baba, 2005); **E** – *Munidopsis chacei* P1 palm and finger, dorsal view, arrow depicting distolateral margin; **F** – *Munidopsis simplex* carapace and anterior pleonites, dorsal view, arrows depicting eye, gastric and cardiac spines; **G** – *Munidopsis kensleyi* carapace and anterior pleonites, dorsal view, arrow depicting eye (adapted after Ahyong & Poore, 2004); **H** – *Munidopsis gladiola* right lateral margin of carapace, dorsal view, arrows depicting lateral spines (simplified from Macpherson, 2007); **I** – *Munidopsis laurentae* right lateral margin of carapace, dorsal view, arrows depicting lateral spines (simplified from Macpherson & Segonzac, 2005); **J** – *Munidopsis antonii* rostrum and frontal margin, dorsal view, arrow depicting eyestalk (simplified from Baba, 2005); **K** – *Munidopsis subsquamosa* rostrum and frontal margin, dorsal view, arrow depicting eyestalk.

## Genus ***Galacantha*** A. Milne-Edwards, 1880

*Galacantha* A. Milne-Edwards, 1880: 52 (gender: feminine); Henderson, 1888: 1666; A. Milne-Edwards & Bouvier, 1894: 268; A. Milne-Edwards & Bouvier, 1897: 55; Alcock, 1901: 274; Stebbing, 1908: 19; Stebbing, 1910: 364; Doflein & Balss, 1913: 147; Barnard, 1950: 494; Tirmizi, 1966: 206; Macpherson, 2007: 7; Baba et al., 2008: 61 (compilation); Baba et al., 2009: 101; Macpherson & Baba, 2011: 25; Poore & Ahyong, 2023: 284.

**Type species:** *Galacantha rostrata* A. Milne-Edwards, 1880, by original designation.

**Diagnosis:** After Macpherson (2007).

Carapace slightly longer than wide, subquadrangular, dorsal surface covered with small granules, simple spines, scale-like or spine-like tubercles, armed with one extremely well-developed, laterally compressed mesogastric and one moderately large cardiac spine. Lateral margins somewhat convex, with 1 or 2 prominent anterior spines. Frontal margin oblique, without antennal spine. Carapace posterior margin smooth. Rostrum with rostral spine distally pointing up and sometimes with 2 small sub-parallel spines or well-developed divergent spines at end of horizontal section. Small spine ventral to frontal margin between ocular and antennal peduncle. Sternites smooth. Pleonite 2 – 4 tergites with 2 moderately elevated transverse ridges, anterior ridge of each with prominent median spine. Eyes movable and spineless, cornea subglobular. P1 with granules or small spines. P2 overreaching P1. P2 – 4 long, slender; dactyli compressed laterally, flexor border moderately curved, with proximally diminishing low teeth. Epipods on P1 – 3.

**Remarks:** Globally only 11 species are known, of which only the cosmopolitan *G. rostrata* is reported from South African waters.

***Galacantha rostrata*** A. Milne-Edwards, 1880

**Figure 5.10A**

*Galacantha rostrata* A. Milne Edwards, 1880: 52, figures 10I, J (Bequia (type locality), 2912 m); Smith, 1882: 21, plate 9, figures 2, 2a (off east coast of USA, 2270 – 2549 m); Smith, 1884: 355; A. Milne Edwards & Bouvier, 1894: 271; Faxon, 1893: 180 (between Mariato Point and Cocos Island, Galera Point and Galapagos Islands, and between Galapagos Islands and Acapulco, 2150 – 2489 m); Faxon, 1895: 78, plate B, figures 1, 1a (between Mariato Point and Cocos Island, Galera Point and Galapagos Islands, and between Galapagos Islands and Acapulco, 2150 – 2489 m); A. Milne Edwards & Bouvier, 1897: 60, plate 4, figures 21 – 24 (Bequia, 2912 m) [species redescription]); A. Milne-Edwards & Bouvier, 1900: 308, plate 6, figure 9 (Cape Ghir and Morocco, 2075 – 2200 m); Hansen, 1908: 35 (West of Iceland, 2379 m); Stebbing, 1908: 20 (off Cape Point, South Africa, 1647 m); Barnard, 1950: 494, figures 92e, f (off Cape Point, 1647 m); Kensley, 1968: 292 (West of Cape Point, South Africa, 2269 – 2782 m); Macpherson, 2007: 18, figures 10I, J (Madagascar 1600 – 2500 m, New Caledonia, 1820 – 2040 m); Ahyong, 2007: 4, figures 2C, D (Norfolk Ridge, 1760 – 1786 m); Baba et al., 2008: 62 (synonymies); Ahyong et al., 2010: 61, figure 2N; Taylor et al., 2010: 15 (key to Australian species); Webber et al., 2010: 226 (list); Ahyong et al., 2011: 368, figure 1H (DNA sequences); Yaldwyn & Webber, 2011: 213 (list, New Zealand); Guzman & Sellanes, 2015: 286, figure 2 (off Antofagasta, Chile, 1775 m); Macpherson et al., 2017: 55 (Arabian Sea, southern Madagascar, Somalian coast, 1760 – 2325 m); González, 2018: 417 (list, Canary Island and Cape Verde); Garcia Raso et al., 2018: 228 (compilation, Iberian fauna); Farrelly & Ahyong, 2019: 55, figure 101 (Great Australian Bight, 1760 – 2826 m); Schnabel et al., 2023: 432 (list); Macpherson et al., 2023: 388 (compilation, SWIO).

*Munidopsis rostrata* – Smith 1885: 493; Smith, 1886: 45, plate 6, figures 1, (off Virginia, 2118 – 2154 m); Chace, 1942: 75 (south coast of Cuba, 2928 – 3294 m); Haig, 1955: 39 (no record); Khodkina, 1975: 263, figures 1, 3 (eastern Pacific Ocean off Chile and Ecuador, 1800 – 2265 m); Kensley, 1981: 34 (list); Baba, 1982a: 112 (Izu Shoto, Japan, 1940 – 2800 m); Wenner, 1982: 370 (Middle Atlantic Bight, 1876 – 2767 m); Andrade, 1985: 111 (Juan Fernandez archipelago); de Saint Laurent, 1985: Table 2 (Bay of Biscay, 1920 – 3800 m); Baba, 1988: 161 (Teluk Tomini, Makassar Strait, 1998 – 2161 m); Wicksten 1989: 315 (list); Baba, 1994a: 18 (off Central Queensland, 1517 – 1539 m); Hendrickx & Harvey, 1999: 376 (list); d'Udekem d'Acoz, 1999: 168 (compilation); Watabe, 2000: 30 (Hatoma Knoll off Iriomote-jima, Ryukyu Islands, ~1500 m); Davie, 2002: 65 (no record); Baba & Poore, 2002: 239, figure 5 (New South Wales and Victoria, 1642 – 1986 m); Ahyong & Poore, 2004: 56 (New South Wales, 2984 – 3058 m); Ingle & Christiansen, 2004: 144, figures 117, 120 (compilation); Poore, 2004: 237, figure 65f (compilation); Baba, 2005: 180, 294 (key, synonymies, between San Tome and Cameroon, Bay of Bengal, Makassar Strait, 1600 – 2610 m); Macpherson & Segonzac, 2005: 41 (off Ireland to Gulf of Guinea, 1884 – 3215 m); Serejo et al., 2007: 149, figure 12A (off Bahia, Brazil, 2137 m).

*Galacantha talismanii* Filhol, 1885: plate 3 (type locality: Cape Ghir, 2075 – 2085 m).

*Galacantha investigatoris* Alcock & Anderson, 1894: 173 (type locality: Laccadive Sea, 2200 m); Alcock & Anderson, 1895: plate 12, figures 4, 4a (no record).

*Galacantha rostrata* var. investigatoris – Alcock, 1901: 276 (Arabian Sea off Minikoy, 2196 m).

Not *Galacantha rostrata* – A. Milne-Edwards & Bouvier, 1900: plate 6, figure 9 (= *Galacantha spinosa* A. Milne-Edwards, 1880).

Not *Galacantha rostrata* – Alcock, 1901: 275 (= *Galacantha bellis* Henderson, 1885); Alcock & McArdle, 1901: plate 55, figures 5, 5a; Tirmizi, 1966: 206, figures 23, 24.

Not *Munidopsis rostrata* – Miyake, 1982: 144, plate 48, figure 4 (= *Galacantha subspinosa* Macpherson 2007, also see Baba, 1988).

**Material examined:** South Africa, 34°44'29.04'S; 17°40'58.80'E, 1646 m, 21/07/1903, SAMC-A0907, material lost; South Africa, 33°25'59.88'S; 16°33'E, 2268 m, 26/08/1959, SAMC-A010449, 1 ♀ 23.5 mm; South Africa, 33°49'0.12'S; 16°30'E, 2743 m, 27/08/1959, SAMC-A010466, 1 ♂ 6.6 mm, 1 ♀ 14.1 mm; South Africa, 33°52'S; 16°51'E, 2524 – 2780 m, 09/12/1959, SAMC-A010518, 1 ♀ 12.4 mm; South Africa, 33°52'S; 16°51'E, 2524 – 2780 m, 09/12/1959, SAMC-A010519, 3 ♀ 6.3 – 10.7 mm; South Africa, 34°36'S; 17°0'E, 2743 m, 10/12/1959, SAMC-A010546, 2 ♂ 10.1 – 11.1 mm; South Africa, 33°49'0.12'S; 16°30'E, 2743 m, 27/08/1959, SAMC-A010567, 3 ♂ 4.8 – 7.2 mm, 11 ♀ 5.0 – 12.4 mm; South Africa, 33°25'59.88'S; 16°30'E, 2268 m, 26/08/1959, SAMC-A010450, material lost.

**Variation:** Rostrum length variable, with ratio to carapace length ranging from 0.3 – 0.5. Rostrum length to width ratio ranging between 1.8 and 3.1. Rostrum lateral spines weak, barely visible dorsally. Epigastric spines small, hardly visible dorsally. P1 to carapace length ratio ranges between 1.7 – 1.8.

**Coloration:** Uniform orange throughout.

**General distribution:** Western and eastern Atlantic, Indian Ocean and western and eastern Pacific, 1600 – 3294 m.

**South African distribution:** Off west coast between Cape Town and Saldanha Bay, 1646 – 2743 m (Figure 5.8).

**Remarks:** *Galacantha rostrata* is arguably the most cosmopolitan species in the family, as it has been reported from the Indian Ocean, as well as both sides of the Atlantic and Pacific (Macpherson, 2007; Schnabel et al., 2011b). In South Africa it occurs on the west coast, though it is highly likely to also occur on the east coast (and in-between) as it has been reported from southern Madagascar (Macpherson et al., 2017). This species was collected along with *Munidopsis chacei, M. simplex* and *M. subsquamosa* as well as with a specimen of *Curtonida manqingae* (Liu, Lin & Huang, 2013), which was recorded from South Africa for the first time (see Chapter 4). This species is easily recognized in southern African waters by the presence of several well-developed dorsal spines in the midline of the carapace and second to fourth pleonites.

## Genus ***Munidopsis*** Whiteaves 1874

*Munidopsis* Whiteaves, 1874: 212 (gender: feminine); Henderson, 1888: 148; Faxon, 1895: 81; A. Milne Edwards & Bouvier, 1897: 63; Alcock, 1901: 247; Doflein & Balss, 1913: 148; Stebbing, 1914: 7; Schmitt, 1921: 167; Chace, 1942: 72 (key to western Atlantic species); Barnard, 1950: 493; Zariquiey Alvarez, 1968: 268; Poore, 2004: 235; Baba, 2005: 128; Baba et al., 2008: 128 (compilation); Baba et al., 2009: 202; Macpherson & Baba, 2011: 26; Poore & Ahyong, 2023: 284.

*Anoplonotus* Smith, 1883: 50 (type species: *A. politus* Smith, 1883, by original designation).

*Bathyankyristes* Alcock & Anderson, 1894: 173 (included species: *B. spinosus* Alcock & Anderson, 1894; *B. laevis* Alcock & Anderson, 1894).

*Elasmonotus* A. Milne Edwards, 1880: 60; Henderson, 1888: 158 (included species: *E. longimanus* A. Milne Edwards, 1880; *E. brevimanus* A. Milne Edwards, 1880; *E. armatus* A. Milne Edwards, 1880; *E. abdominalis* A. Milne Edwards, 1880).

*Galathodes* A. Milne Edawards, 1880: 53 (included species: *G. erinaceus* A. Milne Edwards, 1880; *G. spinifer* A. Milne Edwards, 1880; *G. robustus* A. Milne Edwards, 1880; *G. serratifrons* A. Milne Edwards, 1880; *G. abbreviatus* A. Milne Edwards, 1880; *G. reynoldsi* A. Milne Edwards, 1880; *G. simplex* A. Milne Edwards, 1880; *G. sigbei* A. Milne Edwards, 1880; *G. latifrons* A. Milne Edwards, 1880; *G. tridens* A. Milne Edwards, 1880).

*Orophorynchus* A. Milne Edwards, 1880: 58 (included species: *O. aries* A. Milne Edwards, 1880; *O. spinosus* A. Milne Edwards, 1880; *O. squamosus* A. Milne Edwards, 1880; *O. sharreri* A. Milne Edwards, 1880; *O. nitidus* A. Milne Edwards, 1880; *O. spinoculatus* A. Milne Edwards, 1880).

*Elasmonotus* (*Galathopsis*) Henderson, 1885: 417 (included species: *Elasmonotus* (*Galathopsis*) *laevigata* Henderson, 1885; *E.* (*G.*) *debilis* Henderson, 1885) erected as subgenus.

*Munidopsis* (*Munidopsis*) – Alcock, 1901: 248.

*Munidopsis* (*Bathyankyristes*) – Alcock, 1901: 249; Tirmizi, 1966: 211.

*Munidopsis* (*Elasmonotus*) – Alcock, 1901: 249; Tirmizi, 1966: 211.

*Munidopsis* (*Galathodes*) – Alcock, 1901: 249; Tirmizi, 1966: 211.

*Munidopsis* (*Orophorynchus*) – Alcock, 1901: 249; Tirmizi, 1966: 211.

**Type species:** *Munidopsis curvirostra* Whiteaves, 1874, by original designation. Gender: feminine.

**Diagnosis:** After Baba (2005).

Carapace mostly rugose, seldomly spinulose, occasionally smooth, anterolateral margin spinose, dentate, entire; regions mostly well defined. Rostrum styliform or triangular. Antennal spines present or absent. Sternal plastron quite broad, surface mostly smooth. tergites with transverse grooves and ridges, with or without spines; pleonite 6 tergite with lateral lobes often strongly produced, median margin convex or transverse, occasionally posteriorly produced, overreaching lateral lobes. G1 and G2 present. Telson subdivided. Ocular peduncles fixed or movable, sometimes with eye spines. Antennal flagellum long, usually overreaching P1. Epipods on Mxp2 and Mxp3, occasionally on P1 and P2 – 3. Dactyli of P2 – 4 flexor margin entire or with row of fixed, proximally diminishing spines, rarely subchelate with distal part of propodi. No flagellum on Mxp1. Eggs large, few present.

**Remarks:** There are currently 279 species known globally, with nine reported in South Africa.

***Munidopsis antonii*** (Filhol, 1884)

**Figure 5.10B**

*Galathodes antonii* Filhol, 1884: 230, figure 2 (Northeast of Azores (type locality), 3975 – 4010 m).

*Munidopsis antonii* – Henderson, 1888: 151, plate 18 figures 1, 1a (Southwest of Australia, and off Juan Fernandez, 2516 – 3294 m); Luke, 1977: 28 (list, Baja California, Basin off Bahia Magdalena, and off St. San Juan, Peru, 3427 – 3676 m); Baba, 1982a: 113, plate 1, figure 2 (Izu Shoto, Japan, 3420 – 3960 m); de Saint Laurent, 1985: Table 2 (Bay of Biscay, 3992 – 4510 m); Hendrickx & Harvey, 1999: 376 (list); d'Udekem d'Acoz, 1999: 166 (review of species occurrences); Davie, 2002: 65 (no record); Baba, 2005: 284, 132, figures 52 – 54 (key, synonymies, Mozambique Channel, off Sri Lanka, Tasman Sea, off Zamboanga, West of Costa Rica, and Gulf of Panama, 3660 – 3800 m); Macpherson & Segonzac, 2005: 14 (Northeast Atlantic, off

Namibia, Gulf of Guinea, off South Africa, Azores, Northwest Atlantic, Bay of Biscay, 3134 – 4460); Macpherson, 2007: 38 (West of Sri Lanka, 3450 – 3625 m); Jones & Macpherson, 2007: 480 (off California, 4100 m); Osawa & Takeda, 2007: 137, figure 3C, D (south of Tosa Bay, 2739 – 3278 m); Baba et al., 2008: 132 (synonymies); Taylor et al., 2010: 9, figure 3 (key to Australian species); Yaldwyn & Webber, 2011: 213 (list, New Zealand); Schnabel & Ahyong, 2015: 249 (key); Marin, 2018: 331 (Northwest Pacific, Sea of Okhotsk, 3296 – 3350 m); Garcia Raso et al., 2018: 228 (compilation, Iberian fauna); Macpherson et al., 2023: 389 (compilation, SWIO).

*Munidopsis Antonii* – A. Milne-Edwards & Bouvier, 1900: 321, plate 4, figure 2, plate 30, figures 20 – 24 (North and Northeast of Azores, 3975 – 4010 m); Hansen, 1908: 38, plate 3, figures 3a, 3b (southern part of Davis Straits, 2626 m); Bouvier, 1922: 47 (Bay of Biscay, 3910 m).

*Munidopsis beringana* Benedict, 1902: 279, figure 23 (Bering Sea, 3241 m); Rathbun, 1904: 167 (no record); Makarov, 1938: 101, figure 36 (Sea of Okhotsk, 3500 m); Ambler, 1980: 24 (Cascadia Basin and Tufts Plain off Oregon, 2800 – 3990 m); Wicksten, 1989: 315 (list); Chevaldonné & Olu, 1996: 290 (no record); Martin & Haney, 2005: 478 (review of hydrothermal vents and cold seeps).

*Munidopsis antoni* [lapsus] – Haig, 1955: 40 (no record); Andrade, 1985: 111 (Juan Fernandez Islands).

**Material examined:** None available. Type material – Northeast Azores, 38°30.00’S; 28°0.00’E, 3975 – 4010 m, 24/08/1883, ZMUC CRU-6602, 1 ♀ 31.8 mm.

**Description:** See Baba (2005).

**Variation:** N/A.

**Coloration:** Unknown.

**General distribution:** Worldwide, from the Atlantic in the Davis Strait, NE and N of the Azores, and Bay of Biscay; Pacific Ocean in the Sea of Okhotsk, Bering Sea, off Oregon, W coast of Baja California, Costa Rica, Gulf of Panama, off Peru, W of Chile near Juan Fernandez, SW and SE of Australia and Hachijo-jima, Japan, off Sri Lanka, Tasman Sea, off Zamboanga, Mozambique and off South Africa, 2516 – 4010 m.

**South African distribution:** West of Saldanha, 3675 m (Figure 5.9).

**Remarks:** As outlined in Baba (2005), this species exhibits variation in several characters, including rostrum length and direction, as well as carapace spination (specifically on the hepatic, cardiac and posterior margins). Specimens from the Mozambique Channel were noted to have more spine-like processes on the dorsal surface of the carapace as opposed to tubercles. This species is among the most cosmopolitan of the Munidopsidae, as it has an extraordinary distribution spanning the Atlantic, Indian and Pacific Ocean. In South Africa, it was collected as part of the 'WALVIS' survey in the southeast Atlantic during 1978 – 1979 and was collected together with *M. aries* (Macpherson & Segonzac, 2005) and the specimen is housed at the MNHN.

In southern African waters, this species is most similar to *M. subsquamosa*, though can readily be distinguished as the second to fourth pereopod dactyli have a cristiform ridge bordered by setae on each of lateral and mesial faces, it only has two spines along carapace lateral margin and the carapace dorsal surface has a few small tubercles, as opposed to *M. subsquamosa* that does not have a cristiform ridge on the second to fourth pereopod dactyli bordered by setae both the lateral and mesial faces, has numerous spines on the lateral margin and numerous, large tubercles on carapace dorsal surface.

***Munidopsis aries*** (A. Milne-Edwards, 1880)

**Figures 5.10C**

*Orophorhynchus aries* A. Milne-Edwards, 1880: 58 (Bequia (type locality), 2912 m); A. Milne-Edwards & Bouvier, 1894: 209; Milne-Edwards & Bouvier 1897: 111, plate 9, figures 7 – 11, plate 10, figures 1, 2.

*Munidopsis aries* – Benedict, 1902: 316 (key); Pequegnat & Pequegnat, 1970: 139 (key); Pequegnat & Pequegnat, 1971: 5, figure 12B (key); Wenner, 1982: 367 (off New England, 3605 – 3642 m); Gore, 1983: 203, figure 2 (Venezuelan Basin, Caribbean Sea, 3475 – 4095 m); Macpherson & Segonzac, 2005: 15, figure 3 (off Angola, Iberia abyssal plain, off Mauritania, off South Africa, Northwest and Northeast Atlantic, 2615 – 5320 m); Macpherson, 2007: 39 (Réunion Island, 3180 – 3480 m); Baba et al., 2008: 132 (synonymies); Garcia Raso et al., 2018: 228 (compilation, Iberian fauna); Rotllant et al., 2021: 448, Tables 19.2, 19.3 (Uruguay, 3000 m); Gerdes et al., 2021: 35, figure

18 (Central and South eastern Indian ocean, 2576 m); Macpherson et al., 2023: 389 (compilation, SWIO).

*Munidopsis sundi* Sivertsen & Holthuis, 1956: 44, plate 4, figures 2, 4 (South of Azores, 2615 m); Pequegnat & Pequegnat, 1971: 22, figure 13 (Columbian Basin, Caribbean Sea, 4151 m); Wenner, 1982: 371 (Middle Atlantic Bight, 2933 m).

**Material examined:** None available. Type material – Bequia, 12°52'30.00'N; 61°36'W, 2910 m, 22/02/1879, ZMUC CRU-4761, 1 ♂ 15.7 mm.

**Description:** See A. Milne-Edwards (1880).

**Variation:** N/A.

**Coloration:** Light brown, whitish.

**Global distribution:** Angola, Azores Islands, Bequia, Colombia, Gulf of Mexico, Iberian Abyssal Plain, Mauritiana, Middle Atlantic Bight, Venezuela Basins and South Africa, 2615 – 5320 m.

**South African distribution:** West of Saldanha, 3675 m (Figure 5.9).

**Remarks:** The specimen reported from South Africa in Macpherson & Segonzac (2005) is noted as occurring East of East London, and is erroneously listed as: "Off South Africa, WALVIS, Stn CP14, 32º28.9'S, 32º28.6'E, 3675 m, 13.01.1979" however the station is West of South Africa and should rather read:" Off South Africa, WALVIS, Stn CP14, 32°29'S, 13°26'E, 3675 m, 13.01.1979" (Macpherson, pers. comm.). This species is not only the largest munidopsid, but the largest known galatheoid species, with a carapace length of over 90.0 mm (Macpherson & Segonzac, 2005) and the specimen is housed at the MNHN.

In southern African waters, this species is most similar to *M. teretis*, though it can easily be differentiated as it has a rostrum that is as wide as long, a fixed finger without denticulate carina on distolateral margin and the carapace dorsal surface without gastric spines, where in *M. teretis* the rostrum is not as broad as long, a fixed finger with denticulate carina and has a pair of epigastric tubercles or very small spines.

***Munidopsis chacei*** Kensley, 1968

**Figures 5.2, 5.3, 5.10D**

*Munidopsis chacei* Kensley, 1968: 288, figures 1, 3a, 3b (West of Cape Point, South Africa (type locality), 2745 m); Kensley, 1974: 67 (no record); Kensley, 1981: 34 (list); Baba, 2005: 286 (key, synonymies); Baba et al., 2008: 136 (synonymies); Macpherson et al., 2023: 390 (compilation, SWIO).

**Material examined:**

**Holotype –** South Africa, West of Cape Town (type locality), 33°49'0.12'S; 16°30'E, 2745 m, 27/08/1959, SAMC-A010470, 1 ovig. ♀ 33.9 mm.

**Paratypes –** South Africa, 33°49'0.12'S; 16°30'E, 2745 m, 27/08/1959, SAMC-A012707, 1 ♂ 25.3 mm, 1 ♀ 22.3 mm.

**Description:**

*Carapace:* 1.2 times longer than broad; dorsal surface granulated, moderately convex in lateral view. Two well-developed epigastric spines, one large median protogastric spine followed by 2 slightly smaller mesogastric spines. Regions well delineated by deep furrows, with distinct anterior and posterior cervical grooves. Cardiac region with anterior region preceded by distinct groove, with pair of small spines each side, followed by 2 pairs of median spines on weakly-triangular posterior margin. Elevated posterior ridge with 2 – (4) 5 spines. Rostrum narrow, spine-like, distinctly directed upwards, with 3 – 4 lateral spines; 0.5 times carapace length. Frontal margins strongly oblique, antennal spine absent. Lateral margins straight bearing 4 spines; first, at anterolateral angle, slender, second spine strong, directed slightly more laterally than first, third spine weaker, fourth long and slender. Pterygostomian flap with small granules, anteriorly acute.

*Sternum:* Slightly wider than long, maximum width at sternite 7. Sternite 3 moderately broad, 2.5 times wider than long, anterior margin with shallow median notch. Sternite 4 with narrow anterior margin; surface smooth, 3 times wider than sternite 3, 1.4 times wider than long.

*Pleon:* Pleonites 2 – 4 each with 2 elevated, mesial ridges, unarmed. Pleonite 6 with well-developed posterolateral lobes, overreaching almost transverse posteromedian margin. Telson comprised of 8 plates, anteromedian plate notched posteriorly, 1.4 times wider than long.

*Eye:* Ocular peduncles slender, slightly movable, with well-developed mesial eyespines directed anterolaterally.

*Antennule:* Article 1 somewhat granular, with strong distodorsal and distolateral spines, 2 small distomesial spines, and small spine proximal to distodorsal spine on ventral surface.

*Antenna:* Peduncle reaching half of length of rostrum; article 1 with weak distolateral spine, distomesial angle rounded; article 2 with well-developed distolateral spine and small distomesial spine; article 3 with 3 distal spines (distomesial, distolateral and distodorsal); article 4 with small distomesial spine.

*Mxp3:* Ischium surface granulate, two-thirds length of merus; extensor and flexor margin each with distal spine. Merus flexor margin with 3 small spines; extensor margin with distal spine. Carpus, propodus, dactylus unarmed.

*P1:* 1.5 (1.6) – 2.0 times carapace length, granulate. Merus (2.3) – 2.9 times carpus length with row of spines along lateral and dorsal margin, distal spines strongest with distomesial spine. Carpus 1.3 – (1.6) times longer than wide with row of 4 mesial spines. Palm (1.4) – 1.6 times carpus length, 1.5 – (1.8) times longer than wide, as long as fingers, with 1 – 2 mesial spines. Fingers not gaping; prehensile edges with row of small subtriangular teeth, fixed finger smooth with tufts of setae.

*P2 – 4:* Surface of articles granulate. P2 longer than P3 and P4, overreaching end of P1. P2 merus elongate, 0.6 (0.7) – 0.9 carapace length, 6.0 times longer than wide, 1.4 times propodus length. P2 – 4 meri with row of spines on extensor and flexor margin, distal spine largest, occasionally with spines on lateral margin. Carpus extensor margin with row of 5 spines; penultimate distal spine largest; flexor margin unarmed. Propodi slender, 7.0 – 7.5 times longer than wide, 0 – 1 distal spinule on flexor margin, extensor margin unarmed. Dactyli slightly curved, 0.8 propodi length, flexor margin with 11 – 13 triangular teeth, each with proximally diminishing movable spine, ultimate tooth closer to dactylar tip than penultimate tooth.

Epipods absent on pereiopods.

**Variation:** Ranges noted in description, however most specimens with spines on dorsal surface of carapace with sequence of 2-1-2-2-2 with one specimen with a sequence of 2-0-2-0-1-0, with posterior margin with 4 – 5 spines. P1 palm with 2 – 3 well-developed mesial spines.

**Coloration:** Unknown.

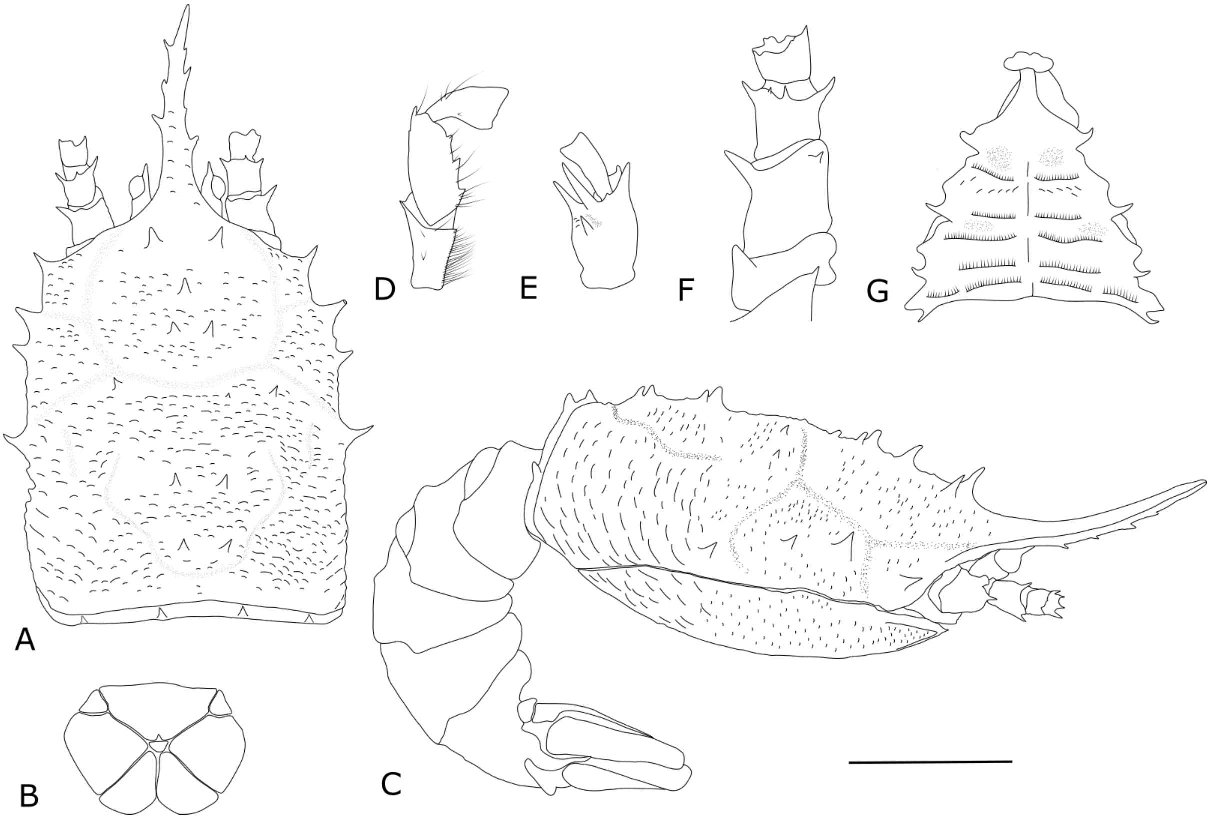

**Figure 5.2:** *Munidopsis chacei* Kensley, 1968, holotype, ovig. ♀, 33.9 mm (SAMC-A010470), West of Cape Town, South Africa. **A** – Carapace, dorsal view; **B** – Telson; **C** – Carapace and abdomen, lateral view; **D** – Mxp3, lateral view; **E** – Right antennule, ventral view; **F** – Right antenna, ventral view; **G** – Sternum, ventral view. Scale bar: A, C = 14.0 mm; B = 8.0 mm; D – F = 4.0 mm; G = 6 mm.

**Global distribution:** South Africa (endemic).

**South African distribution:** West of Cape Town, 2745 m (Figure 5.9).

**Remarks:** There has been much confusion regarding this species, starting when Ambler (1980) synonymised *M. chacei* with *M. bairdii* (Smith, 1884), which was described from the east coast of the USA. This synonymy did not appear in subsequent publications, although it was mentioned by Baba (2005), who still treated *M. chacei* as a valid species and not a junior synonym based on the submedian spines on the carapace (2-2-2-2-1 in *M. bairdii* and 2-1-2-2-2 in *M. chacei*), and the number of spines on the posterior-most transverse ridge (10 in *M. bairdii* and 4 in *M. chacei*). However, Macpherson (2007) agreed with the synonymy and stated that: "the specific characters of *M. chacei* fall within the range of variation of *M. bairdii*, and as Ambler (1980) suggested, they can be considered as synonyms". Neither Baba et al., (2008), Schnabel & Ahyong (2015) or Macpherson et al., (2023) incorporated the synonymy suggested by Ambler (1980) and Macpherson (2007), and all maintained *M. chacei* as a valid species. The variation of *M. chacei* observed in this study is quite substantial and rarely consistent with the variation reported for *M. bairdii* (though it should be noted only three specimens were available for examination). There is thus still no conclusive evidence regarding the status of *M. chacei*. However, herein it is suggested that it should remain a valid species until more specimens are collected to better quantify the intraspecific variation. Molecular analyses are also required to confirm specific identities.

In southern African waters this species is most similar to *M. gladiola* and *M. laurentae*. It can be distinguished from these species as neither of them have longitudinal rows of submedian spines on the carapace dorsal surface, as well as the fact that *M. gladiola* only has two spines and *M. laurentae* has five spines on the carapace lateral margin, as opposed to four in *M. chacei*.

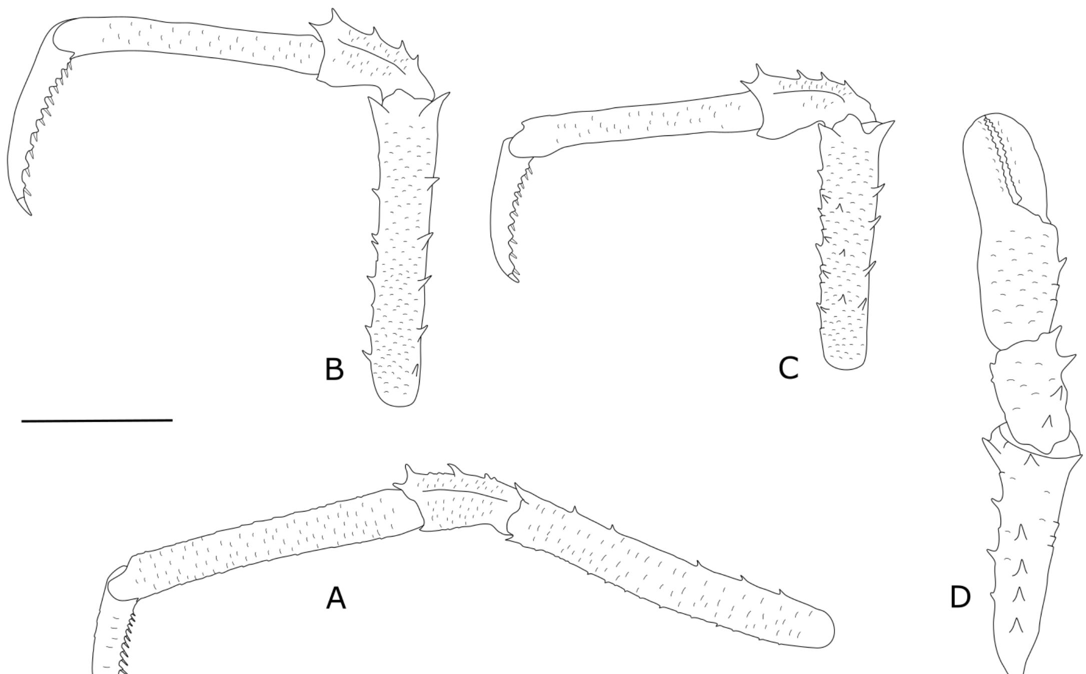

**Figure 5.3:** *Munidopsis chacei*, holotype, ovig. ♀, 33.9 mm (SAMC-A010470), West of Cape Town, South Africa (setae omitted). **A** – Left P2, lateral view; **B** – Left P3, lateral view; **C** – Left P4, lateral view; **D** – Left P1, dorsal view. Scale bar = 5.0 mm.

***Munidopsis gladiola*** Macpherson, 2007

**Figures 5.11A**

*Munidopsis gladiola* Macpherson, 2007: 68, figure 32 (southeast Atlantic (type locality), southwest Indian Ocean, 2608 – 3590 m); Baba et al., 2008: 142 (synonymies).

**Material examined:** None available. Type material – Southeast Atlantic, 32°8.0'S; 13°03'54.00'E, 3590 m, 12/01/1979, MNHN-Ga1595, 1 ovig. ♀ 20.7 mm.

**Description:** See Macpherson (2007).

**Variation:** N/A.

**Coloration:** Unknown.

**Global distribution:** Southeast Atlantic (Walvis Ridge) and southwest Indian Ocean (south of Madagascar and east of South Africa), 2608 – 4163 m.

**South African distribution:** East of Durban, 2608 – 2625 m (Figure 5.9).

**Remarks:** When this species was described in 2007 it was never explicitly stated as occurring within the South African EEZ (though coordinates are from inside the EEZ). This species was hence not included by Emmerson (2016) and has subsequently not been incorporated into the South African fauna list. The species has previously been collected with the rare *M. laurentae* (see below). This species is most similar to *M. chacei* (see differences under *M. chacei* remarks) and *M. laurentae*, though it can be differentiated from *M. laurentae* as it has two spines on carapace lateral margin as opposed to five and the chelipeds have few spines on the lateral and mesial margins, whereas it has numerous spines on lateral and mesial margins of the chelipeds in *M. laurentae.*

***Munidopsis kensleyi*** Ahyong & Poore, 2004

**Figure 5.11B**

*Munidopsis dasypus* – Kensley, 1977: 176, figure 10 (South Africa, 900 m); Kensley, 1981: 34 (list); Baba & Poore, 2002: 233, figure 2 [Not *M. dasypus* Alcock, 1894].

*Munidopsis kensleyi* Ahyong & Poore, 2004: 50, figure 50 (New South Wales (type locality), 476 – 1150 m); Poore, 2004: 237, figure 65c (compilation); Baba, 2005: 290 (key, synonymies); Macpherson, 2007: 73, figure 55I (from Solomon Islands, Vanuatu, Chesterfield Islands, New Caledonia and Wallis and Futuna, 296 – 1313 m); Baba et al., 2008: 145 (synonymies); Osawa et al., 2008: 47, figure 1H (Taiwan, 638 – 1129 m); Poore et al., 2008: 21 (Southwest Australia, 1260 – 1295 m); Baba et al., 2009: 204, 238, figure 215 (Taiwan, 638 – 1060 m); Taylor et al., 2010: 11, figures 4, 5G (western Australia, 1000 – 1295 m); Poore et al., 2011: plate 22B; Macpherson et al., 2017: 55 (Mozambique, 261 – 898 m); Farrelly & Ahyong, 2019: 58, figure 109 (East Central Australia, 1053 m); Macpherson et al., 2020: 103 (Papua New Guinea, 1000 – 1045 m); Macpherson et al., 2023: 390 (compilation, SWIO).

**Material examined:** South Africa, 37°14'48.0'S; 32°58'E, 900 m, 24/05/1975, SAMC-A015296, 1 ovig. ♀ 14.0 mm.

**Description:** See Ahyong and Poore (2004).

**Variation:** Some variation was observed compared to Ahyong and Poore (2004). Telson only comprised of 8 plates, with small median plate missing. Mxp3 median spine on flexor margin well-developed, not small as originally described. P1 2.9 times carapace length (greater than 2.0 – 2.5 given by Ahyong & Poore, 2004). P2 – 4 meri with only distal spine on extensor margin. P2 – 4 dactyli with 8 teeth on flexor margin, not 5 – 7 as in original description.

**Coloration (in life; as per Figure 5.11B):**

Pinkish-orange, rostrum and P1 merus darker than rest. Pleon and telson mostly white.

**Global distribution:** Australia, Chesterfield Islands, Solomon Islands, New Caledonia, Wallis, Futuna, Vanuatu, Taiwan and South Africa, 476 – 1313 m.

**South African distribution:** Off Sodwana Bay, KwaZulu-Natal, 900 m (Figure 5.9).

**Remarks:** This species was first identified in South Africa as *Munidopsis dasypus* Alcock, 1894 by Kensley (1977). However, *M. kensleyi* was described by Ahyong and Poore (2004), who deemed the South African *M. dasypus* material to represent this newly-described species (named in honor of Brian Kensley, who first identified material from the species). This was based on the differences in lateral carapace spination, as well on walking legs and chelae, this being more pronounced in *M. dasypus* (Ahyong & Poore, 2004). Later, Ahyong et al. (2011) showed these two species forming a phylogenetic clade, with pairwise distance analysis showing divergence values of 3.1% for the COI region and 1.9% for the 16S region (as calculated by TPA Botha), supporting the validity of these species.

The South African specimen exhibits some differences from the original description (see under variation), though the species is maintained as a valid species in southern African waters. This species is most similar to *M. simplex* in southern African waters, though can be distinguished as the merus extensor margins of the second to fourth pereopod has between one and four spines, whereas it is unarmed in *M. simplex*. Furthermore, *M. kensleyi* has no spines on the carapace and pleonites dorsal surface (except for some small spines on the posterior margin of the carapace), while *M. simplex* has spines in midline on dorsal surface of carapace and second and third pleonites. Lastly the second article of the antenna has a lateral distal spine, whereas it is unarmed in *M. simplex*.

***Munidopsis laurentae*** Macpherson & Segonzac, 2005

**Figure 5.11C**

*Munidopsis laurentae* Macpherson & Segonzac, 2005: 31, figure 8 (off South Africa (type locality), 3550 m); Baba et al., 2008: 147 (synonymies).

**Material examined:** None available. Type material – Off South Africa, 32°18.20’S; 13°15.90’E, 3550 m, 12/01/1979, MNHN-Ga5295, 1 ♀ 24.7 mm.

**Description:** See Macpherson and Segonzac (2005).

**Variation:** N/A.

**Coloration:** Unknown.

**Global distribution:** Off South Africa, 3550 m.

**South African distribution:** West of Paternoster, 3550 m (Figure 5.9).

**Remarks:** This rare species was collected in the late 1970's by the French expedition, WALVIS and is endemic to South Africa, the original description remaining the only known record. In South Africa it was collected along with a specimen of *M. gladiola.* This species is most similar to *M. chacei* and *M. gladiola* in southern African waters (see under respective species remarks for differences).

***Munidopsis simplex*** (A. Milne-Edwards, 1880)

**Figures 5.4 – 5.7, 5.11D**

*Galathodes simplex* A. Milne-Edwards, 1880: 56 (Guadaloupe, Dominica, Martinique and St Vincent (type localities), 609 – 1797 m).

*Munidopsis simplex* – A. Milne-Edwards & Bouvier, 1894: 275 (key); A. Milne-Edwards & Bouvier, 1897: 89, plate 5, figures 2 – 7 (Antilles, 500 – 1797 m); Young, 1900: 406 (key), 408; Benedict, 1902: 277 (key), 326 (list); Pérez, 1927: 286 (no record); Chace, 1942: 92 (north coast of Cuba, 1601 – 1857 m); Barnard, 1950: 493, figure 92d (off Cape Point and off west coast of Cape Peninsula, 457 – 1830 m); Pequegnat & Pequegnat, 1970: 156, figures 5 – 13 (northwest, southwest and northeast Gulf of Mexico, 1001 – 1830 m); Pequegnat & Pequegnat, 1971: 6 (key); Mayo, 1974: 312, figure 49 (Straits of Florida, Bahama Islands, Columbia, off Surinam, off British Columbia, off Venezuela, off Martinique and St Croix Basin, 1116 – 3971 m); Kensley, 1981: 34 (list); Baba et al., 2008: 161 (synonymies); Felder et al., 2009: 1066 (Gulf of Mexico, compilation); Vazquez-Bader & Gracia, 2016: 21 (Gulf of Mexico, 806 m).

**Material examined:** South Africa, 34°41'26.52'S; 35°2'42.36'S; 17° 40' 58.80 E - 18° 53' 23.64 E, 1189 – 1830 m, 14/07/1903 – 19/08/1903, SAMC-A0912-0918, 8 ♂ 5.6 – 12.7 mm, 8 ovig. ♀ 9.1 – 14.3 mm (combined specimens covering multiple sampling events due to lost data). South Africa, locality data lost (West of Cape), depth data lost, 1926, SAMC-A06880, 8 ♂ 5.4 – 11.2 mm, 1 ♀ 4.1 mm, 3 ovig. ♀ 8.3 – 9.8 mm.

**Description:**

*Carapace:* Longer than broad, dorsal surface granulated. Two large epigastric spines, 1 median protogastric, 1 median mesogastric spine and 1 large median cardiac spine. Regions well-delineated by deep channels, distinct anterior and posterior cervical grooves. Posterior cardiac region weakly triangular, slightly raised, preceded by deep transverse furrow. Posterior margin unarmed. Rostrum narrow, spine-like, slightly upcurved, lateral margins straight; 0.6 times carapace length. Frontal margins slightly oblique behind ocular peduncle, then strongly oblique toward anterolateral spine of carapace; unarmed. Lateral margins slightly oblique, only armed with well-developed spine at anterolateral angle. Pterygostomian flap with granules, anteriorly acute with no spine.

*Sternum:* Slightly longer than broad, widest at sternite 7. Sternite 3 moderately broad, 3 times wider than long, anterior margin with small median notch, flanked by 2 lobes, anterolaterally angular. Sternite 4 anterior margin narrow, somewhat raised above sternite 3; some granules present, posteriorly depressed, almost 3 times wider than sternite 3 and twice wider than long.

*Pleon:* Pleonites 2 – 4 with 2 short, elevated transverse ridges, anterior ridge armed with thick median spine (pleonite 4 unarmed). Pleonites 5 – 6 unarmed, pleonite 6 posteromedian margin straight, flanked by 2 small lobes. Telson comprised of 10 plates, median plate divided into 3 small plates, 1.9 times as wide as long.

*Eye:* Ocular peduncle movable; cornea relatively large (maximum corneal diameter 0.7 – 0.9 times rostrum width), subglobular, longer than wide, unarmed.

*Antennule:* Article 1 granulate with 3 distal spines, distomesial spine weakest, sometimes bifid, distolateral and distodorsal well-developed, spiniform; margin between distomesial and distolateral serrated, lateral margin unarmed, with several eminences.

*Antenna:* Peduncle barely overreaching eye, almost reaching halfway end of rostrum; article 1 unarmed, anterior margin serrated, anterolateral and anteromesial margin lobed; article 2 unarmed, distomesially acute; article 3 unarmed, article 4 with small distolateral spine.

*Mxp3:* Ischium slightly shorter than merus, flexor margin unarmed, extensor margin ending in small spine; crista dentata finely denticulate. Merus flexor margin with 2 thick proximal spines, proximalmost largest, extensor margin with minute distal spine, followed by several eminences; carpus, propodus and dactylus unarmed.

*P1:* 2.0 – 2.9 times carapace length, granulate. Merus 2.5 times carpus length, with thick distolateral spine and distinct mesial spine over halfway length of merus. Carpus 1.8 – 2.0 times longer than wide, with 2 distinct distomesial spines, followed by several eminences. Palm 1.3 – 1.5 times carpus length, 2.3 – 3.0 times longer than wide, 1.2 – 1.4 times longer than fingers, unarmed. Fingers not gaping, mesial margin with row of small teeth, fixed finger smooth, without denticulate carina on distolateral margin.

*P2 – 4:* Surface of articles granulate. P2 longer than P3 and P4, 1.9 – 2.1 times carapace length; merus 0.5 – 0.8 times carapace length, 5.1 times longer than wide, 1.5 – 1.7 times length of propodus. Meri successively shorter (P3 merus 0.9 length of P2 merus; P4 merus 0.9 length of P3 merus). P2 – 4 meri unarmed with eminences along flexor and extensor margins. Carpi unarmed with eminences on extensor margin, lateral surface with several granules forming a ridge sub-paralleling extensor margin. Propodi 4.3 – 4.6 times longer than wide, extensor and flexor margin unarmed. Dactyli 0.8 – 0.9 length of propodus; setose, distal spine curved, flexor margin with 12 proximally diminishing teeth, ultimate tooth closer to penultimate tooth than to dactylar tip.

Epipods absent on pereiopods.

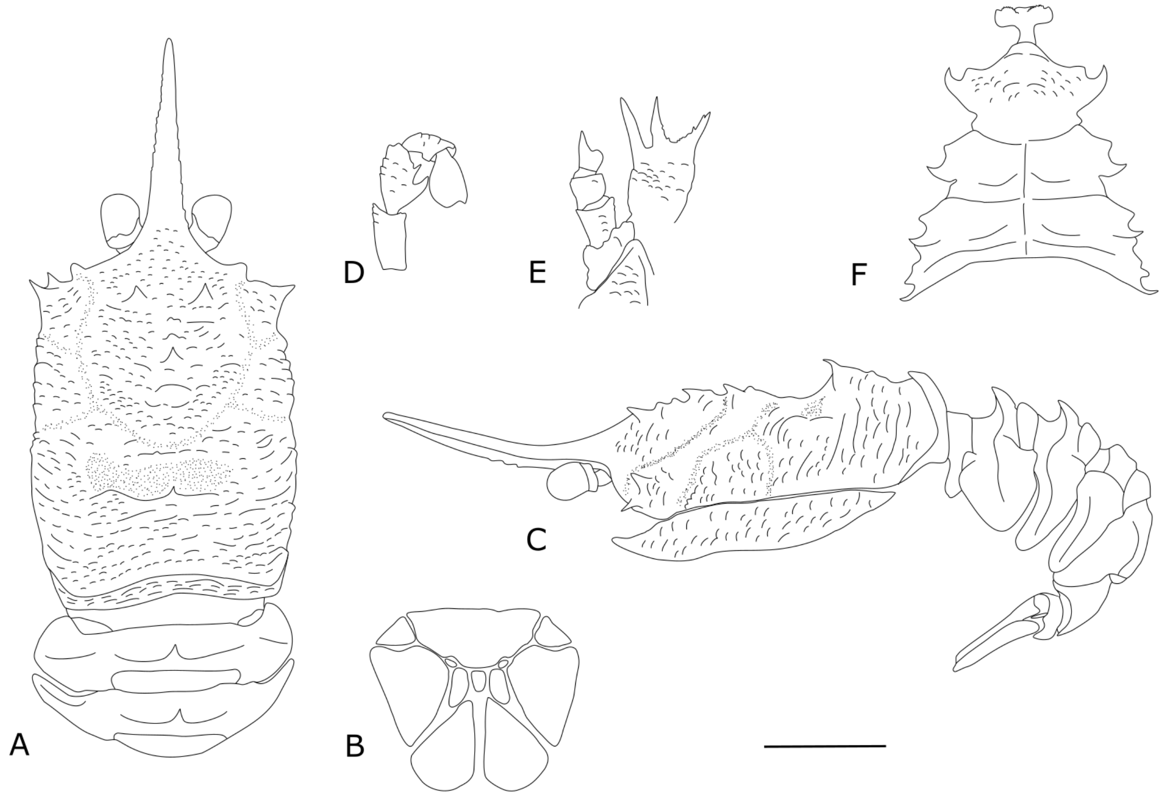

**Figure 5.4:** *Munidopsis simplex* (A. Milne-Edwards, 1880), ♂, 10.7 mm (SAMC-A0912-918), West of Cape Point, South Africa. **A** – Carapace, second and anterior pleonites, dorsal view; **B** – Telson; **C** – Carapace and pleon, lateral view; **D** – Mxp3, lateral view; **E** – Cephalic region showing antenna and antennule, ventral view; **F** – Sternum, ventral view. Scale bar: A, C = 2.0 mm; B, D – F = 1.5 mm.

**Variation:** Rostrum length variable, ranging from 0.3 – 0.9 carapace length (see Figure 5.6, Table 5.1). Carapace length to width ratio variable ranging between 1.0 – 1.3. P1 to carapace length ranging between 2.0 – 2.9, with P1 merus to carapace length ranging between 0.7 – 1.0. In some specimens the carapace dorsal surface bears distinct spines in gastric and cardiac region, not only tubercles. Carapace lateral margin occasionally with spine posterior to anterolateral spine. Occasionally pleonite 4 armed with mesial spine on anterior margin. Some specimens with 3 spines on Mxp3 merus flexor margin instead of 2.

**Coloration:** After Mayo (1974).

Carapace, chelipeds, eyestalks and mouthparts light orange; pleons pale, transverse ridges on tergites orange; walking legs and tailfan pale, whitish distally; corneae distinctly white.

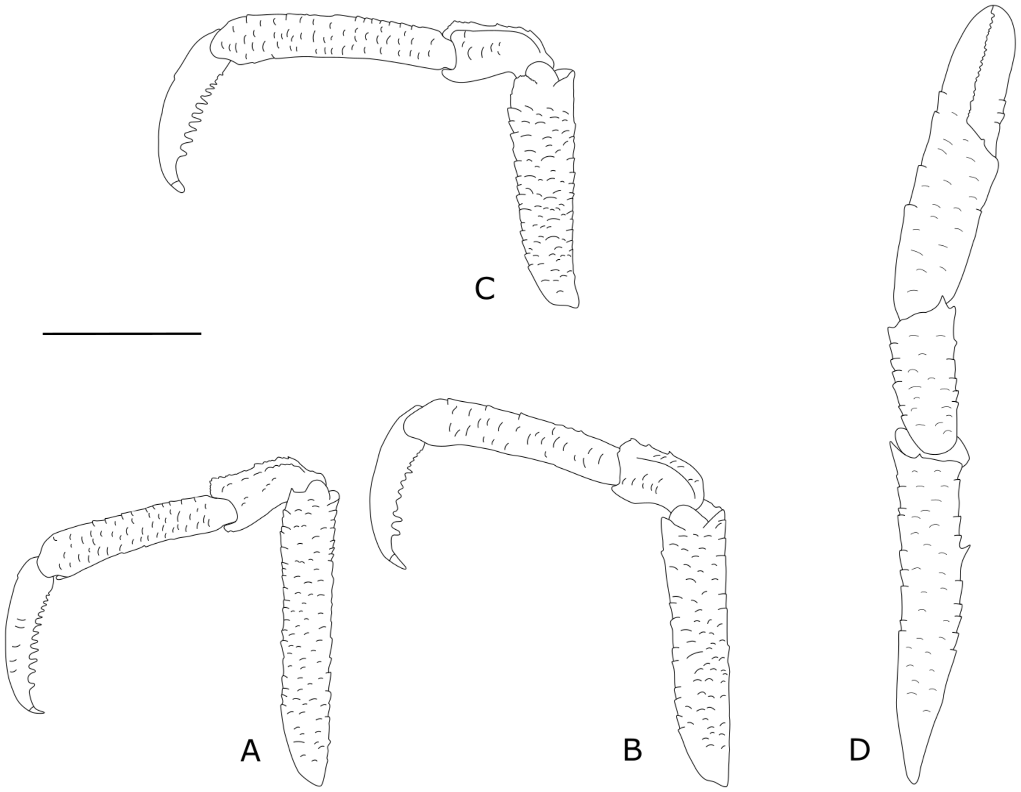

**Figure 5.5:** *Munidopsis simplex* (A. Milne-Edwards, 1880), ♂, 10.7 mm (SAMC-A0912-918), West of Cape Point, South Africa. **A** – Left P2, lateral view; **B** – Left P3, lateral view; **C** – Left P4, lateral view; **D** – Left P1, dorsal view. Scale bar = 2.0 mm.

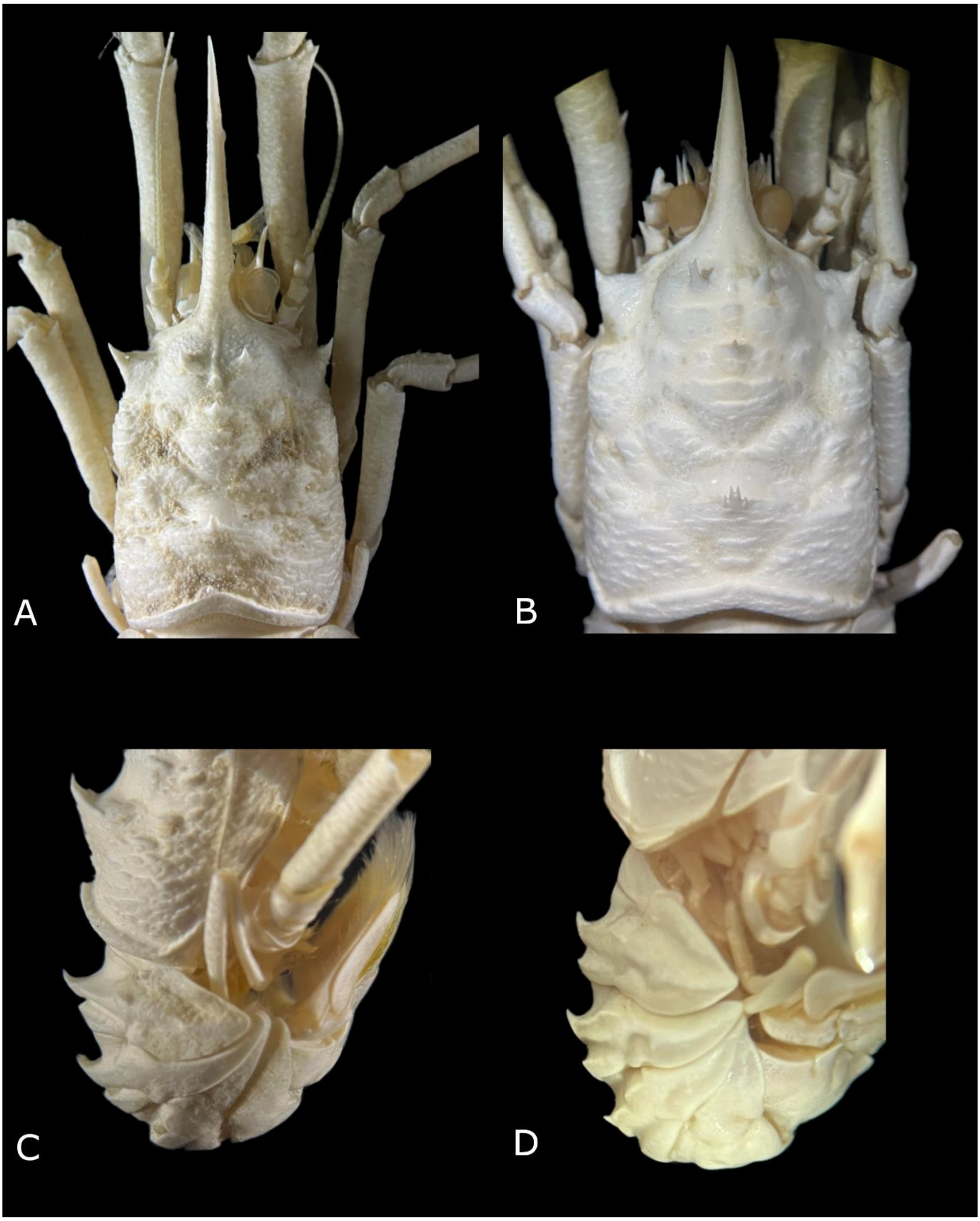

**Figure 5.6:** *Munidopsis simplex* (A. Milne-Edwards, 1880), A, C – SAMC-A0912-918, ♂, 10.7 mm; B – SAMC-A0912-918, ovig. ♀, 11.4 mm; D – SAMC-A06880, ♂, 8.4 mm. **A** – Carapace and rostrum, dorsal view; **B** – Carapace and rostrum, dorsal view; **C** – Pleonites 2 – 4, lateral view; **D** – Pleonites 2 – 4, lateral view.

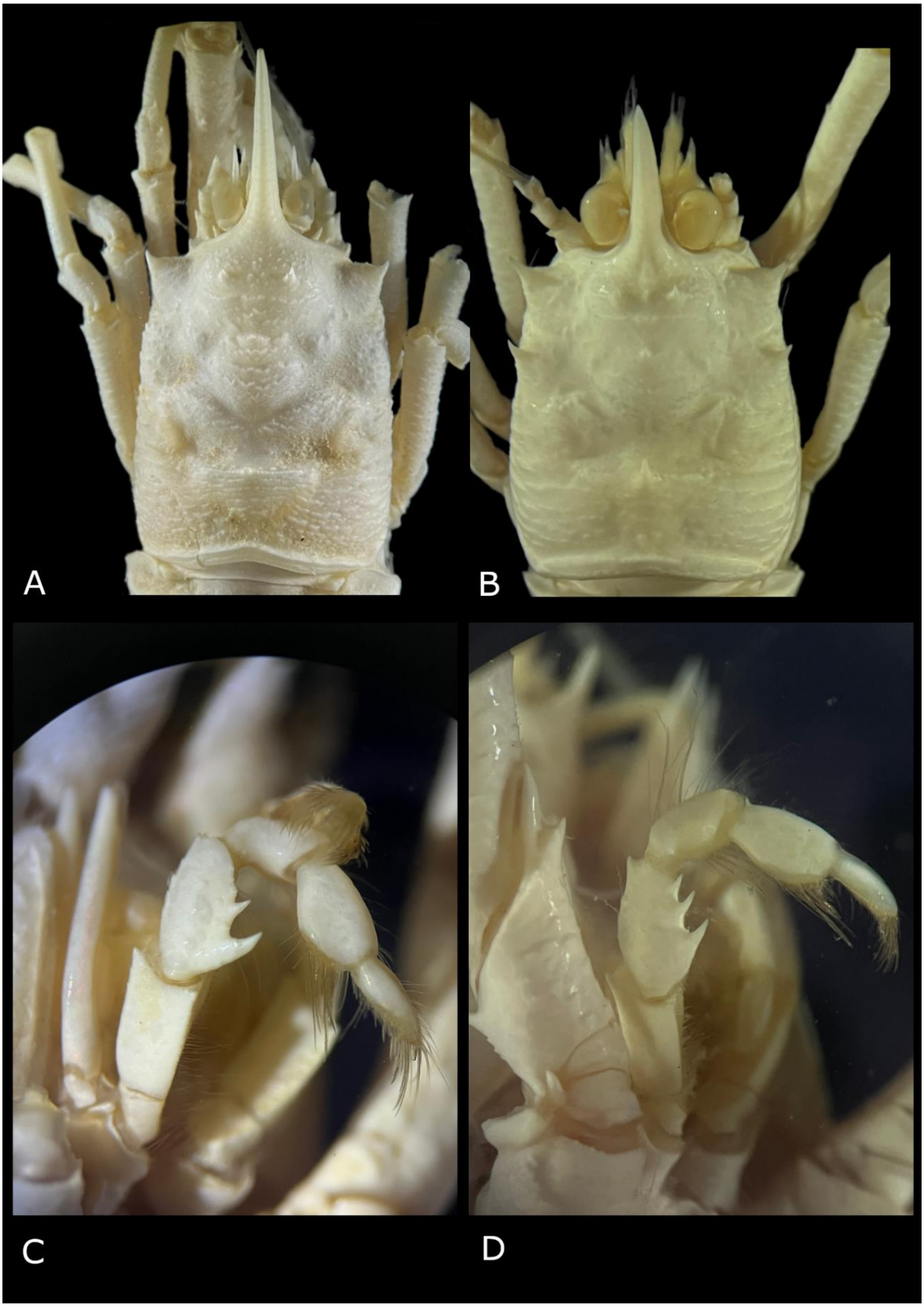

**Figure 5.7:** *Munidopsis simplex* (A. Milne-Edwards, 1880)*,* A – SAMC-A0912–918, ovig. ♀, 14.2 mm; B, D – SAMC-A06880, ♂, 8.4 mm; C – SAMC-A0912–918, ♂, 10.7 mm. **A** – Carapace showing lateral margin with one spine, dorsal view; **B** – Carapace showing lateral margin with two spines; **C** – Mxp3 merus with two spines, lateral view; **D** – Mxp3 merus with three spines, lateral view.

**Global distribution:** Antilles, Cuba, Dominica, Guadaloupe, Gulf of Mexico, Martinique, St Vincent and South Africa, 457 – 1857 m.

**South African distribution:** Off Cape Point and off west coast of Cape Peninsula, 457 – 1830 m (Figure 5.9).

**Remarks:** The status of South African specimens of *M. simplex* remains questionable. *Munidopsis simplex* was originally described as having tubercles on the gastric region of the carapace and a simple rostrum that is slightly upcurved. Pequenat and Pequenat (1970) suggested that some of the features differentiating *M. simplex* and *M. curvirostra* are the rostrum:carapace length ratio (roughly 0.4 – 0.5 for *M. simplex* and closer to 0.7 – 0.8 for *M. curvirostra*) and the curve on the rostrum (more strongly-upcurved in *M. curvirostra*). However, the variation observed in South African specimens do not conform to any one of these, as the rostrum/carapace length ratio ranges from 0.3 – 1.0 (Figure 5.6, Table 5.1) and some specimens exhibit a strongly-upcurved rostrum. Furthermore, additional previously unreported variation of several characters were observed, as some specimens exhibited a second spine on the carapace lateral margin, posterior to the anterolateral spine, some had a mesial spine on the anterior ridge of the fourth pleonite, and lastly some had three spines on the merus flexor margin of Mxp3 (Figure 5,7, Table 5.1). These characters varied between specimens collected from the same station and in varying combinations of these characters. For now, this species is maintained as valid in South Africa, however for the reasons presented, the species requires more specimens (specifically fresh specimens) to conduct genetic analyses and confirm its validity.

There were also some issues regarding the data associated with South African *M. simplex* specimens. Firstly, the specimens from samples SAMC-A0912-918, although collected from seven sampling events, were unfortunately all placed in the same bottle. Separating the specimens proved impossible, as neither the cruise report, nor the notes of K.H. Barnard (who identified the specimens), had any information regarding size or sex. Secondly, the SAMC-A06880 specimens have no associated data, except for a comment that says “West of Cape” and the date is given only as 1926. Both these cases are unfortunate, but as these specimens are valuable and rare, they are included here.

This species is most similar to *M. kensleyi* in southern African waters (see under that species remarks for differences).

**Table 5.1:** Variation observed in important characters in South African *M. simplex* specimens.

| SAM nr. | Sex | pcl (mm) | Rostrum length (mm) | Rostrum: carapace ratio | Carapace lateral spines | Mxp3 merus flex. spines | Pleonite 4 spines | Medial gastric spine |
|---|---|---|---|---|---|---|---|---|
| A06880 | ♂ | 8.2 | 2.6 | 0.3 | 2 | 2 | Yes | 0 |
| A06880 | ♂ | 8.9 | 4 | 0.5 | 2 | 2 | Yes | 0 |
| A06880 | Ovig. ♀ | 9.5 | 4.3 | 0.5 | 2 | 2 | Yes | 0 |
| A06880 | ♂ | 5.4 | 3 | 0.6 | 2 | 2 | Yes | 1 |
| A06880 | ♀ | 4.1 | 1.4 | 0.3 | 2 | 2 | No | 0 |
| A06880 | Ovig. ♀ | 9.8 | 1.7 (broken) | N/A | 2 | 3 | No | 0 |
| A06880 | ♂ | 5.6 | 2.5 | 0.5 | 2 | 2 | Yes | 1 |
| A06880 | ♂ | 11.2 | 3.7 (broken) | N/A | 2 | 2 | Yes | 0 |
| A06880 | Ovig. ♀ | 8.3 | 2.4 | 0.3 | 2 | 2 | Yes | 0 |
| A06880 | ♂ | 8.4 | 2.7 | 0.3 | 2 | 3 | Yes | 1+1 |
| A06880 | ♂ | 7.6 | 3.5 | 0.5 | 2 | 3 | Yes | 1 |
| A06880 | ♂ | 9.5 | 5.4 | 0.6 | 2 | 3 | Yes | 0 |
| A0912-918 | ♂ | 11.9 | 8.5 | 0.7 | 1 | 2 | Yes | 0 |
| A0912-918 | ♂ | 8.5 | 6.6 | 0.8 | 1 | 2 | No | 1 |
| A0912-918 | ♂ | 8.6 | 6.3 | 0.7 | 1 | 2 | No | 1 |
| A0912-918 | ♂ | 9.5 | 7.1 | 0.8 | 1 | 2 | No | 1 |
| A0912-918 | ♂ | 11.5 | 6.4 | 0.6 | 1 | 2 | No | 1+1 |
| A0912-918 | Ovig. ♀ | 10.7 | 7.7 | 0.7 | 1 | 2 | No | 0 |
| A0912-918 | Ovig. ♀ | 11.0 | 6.4 | 0.6 | 1 | 2 | No | 1 |
| A0912-918 | Ovig. ♀ | 9.8 | 4.7 | 0.5 | 1, 2 | 2 | Yes | 0 |
| A0912-918 | ♀ | 13.9 | 8.2 | 0.6 | 1 | 2 | No | 0 |
| A0912-918 | ♂ | 11.9 | 11.3 | 1.0 | 1 | 2 | No | 1+1 |

***Munidopsis subsquamosa*** Henderson, 1885

**Figure 5.12A**

*Munidopsis subsquamosa* Henderson, 1885: 414 (off Japanese coast, southeast of Nojima-zaki, Boso Peninsula (type locality), 3431 m); Henderson, 1888: 152, plate 17; figures 4, 4a (off Yokohama, southeast of Nojima-zaki, Boso Peninsula, 3431 m); Gordon, 1955: 244, figures 1B, 2C, 2C', 3D (designation and reexamination of male lectotype); Baba, 1982a: 114, figure 5, plate 2, figure 2 (Izu Shoto, Japan, 2670 – 3960 m); Chevaldonné & Olu, 1996: 291 (no record); Hendrickx & Harvey, 1999: 377 (list); d'Udekem d'Acoz, 1999: 169 (compilation); Ahyong & Poore, 2004: 58, figure 13 (Queensland and New South Wales, 1789 – 3058 m); Poore, 2004: 237, figure 65h (compilation); Baba, 2005: 186, 296, figures 88 – 90 (key, synonymies, reexamination and comparison of type material of *M. subsquamosa, M. subsquamosa aculeata* and *M. barnardi*); Macpherson & Segonzac, 2005: 43 (Namibia, 2840 – 2953 m); Martin & Haney, 2005: 480 (hydrothermal vents and cold seeps review); Baba et al., 2008: 164 (synonymies). Taylor et al., 2010: 15 (key to Australian species); Guzman & Sellanes, 2015: 295, figure 9 (off Caldera, Chile, 1000 m); Macpherson et al., 2017: 56, (Arabian Sea, 2880 – 2920 m); Farrelly & Ahyong, 2019: 59, figure 112 (East Central Australia, 2460 – 4800 m); Retamal et al., 2021: list (compilation, Chile); Macpherson et al., 2023: Appendix 2 (compilation, SWIO).

*Munidopsis subsquamosa* var. *aculeata* Henderson, 1888: 153, plate 16, figures 1, 1a (type localities: between Marion Island, the Crozets and off Chile, 2516 – 2654 m), 2 male syntypes (BMNH 1888: 33); Gordon, 1955: 244, figures 1C, 1D, 2B, 2B', 3B, 3C (reexamination of syntypes).

*Munidopsis aculeata* – Haig, 1955: 41 (no record).

*Munidopsis barnardi* Kensley, 1968: 290, figures 2, 3c, 3d (West of Cape Point, 2708 – 2965 m); Kensley, 1974: 66 (no record); Kensley, 1981: 34 (list).

Not *Munidopsis subsquamosa aculeata* – Faxon, 1895: 86 (= *M. producta* Baba, 2005).

Not *Munidopsis subsquamosa* – Van Dover et al., 1985: 224 (Galapagos Rift, eastern Pacific 13°N and 21°N areas, active thermal vent sites [= probably *M. recta* Baba, 2005]).

Not *Munidopsis subsquamosa* – de Saint Laurent, 1985: Table 2 (Bay of Biscay, 2775 – 4260 m) (= *M. exuta* Macpherson & Segonzac, 2005).

Identity questionable: *Munidopsis subsquamosa* – Faxon, 1895: 85 (Panama, 2692 – 3060 m); Luke, 1977: 29 (list; off Arica, Chile, 1097 – 1152 m); Ambler, 1980: 26 (off Oregon and off Panama, 2692 – 3000 m); Williams & Turner, 1986: 619 (St Croix, 4000 m); Wicksten, 1989: 316 (list).

**Material examined:** South Africa, 33°49'0.12'S; 16°30'E, 2745 m, 27/08/1959, SAMC-A012636, 1 ♀ 15.8 mm (*M. barnardi* holotype). South Africa, 33°49'59.88'S; 16°30'E, 2708 – 3038 m, 09/12/1959, SAMC-A010497, 1 ♂ 15.2 mm. South Africa, 33°49'0.1'S; 16°30'E, 2745 m, 27/08/1959, SAMC-A010465, 2 ♂ 13.5 – 13.7 mm. South Africa, 34°37'S; 17°0.0'18.0'E, 2891 – 2965 m, 08/12/1959, SAMC-A010485, 1 ♂ 9.9 mm, 1 ♀ 14.9 mm.

**Description:** See Baba (2005).

**Variation:** Some differences compared to account provided by Baba (2005) as some specimens bear medial gastric spine between gastric spines, while others have anterolateral spine similar or larger than antennal spine. Occasionally, no frontal spine present. Several individuals with P1 carpus and merus more spinose. Some specimens with 10 – 12 denticles on P2 – 4 instead of 12 – 15 in Baba (2005).

**Coloration:** Unknown.

**Global distribution:** Australia, Chile, Crozet Islands, Japan, Marion Island, Namibia and South Africa, 1789 – 3960 m.

**South African distribution:** West of Cape Point, 2708 – 2965 m (Figure 5.9).

**Remarks:** This is one of the most cosmopolitan squat lobster species and is found in all major oceans. There has been some confusion regarding some of the subspecies (Baba, 2005; Komai et al., 2017), and several species have been separated from this species complex. In South Africa, these specimens were originally described as *M. barnardi* Kensley 1968, though Baba (2005) found no differences between these and *M. subsquamosa* and synonymised the two. Upon examination of the holotype and additional material, this synonymy should be upheld. This species has previously been collected in South Africa along with *M. chacei* and *G. rostrata.* In South African waters *Munidopsis subsquamosa* is most similar to *M. antonii* (see differences under *M. antonii* remarks).

***Munidopsis teretis*** Baba, 2005

**Figure 5.12B**

*Munidopsis teretis* Baba, 2005: 190, 297, figure 91 (key, synonymies, off Durban (type locality), 3520 m; Tasman Sea, 3930 m); Osawa et al., 2006: 427, figures 4E, F (Taiwan, 3564 – 3579 m); Baba et al., 2008: 165 (synonymies); Baba et al., 2009: 270, figure 247 (Taiwan, 3564 – 3579 m).

**Material examined:** None available. Type material – South Africa, 32°00'S, 32°41'E, 3520 m, 05/02/1951, ZMUC CRU-11283, 1 ♀ 27.1 mm

**Description:** See Baba (2005).

**Coloration:** As per Osawa et al. (2006).

Colour reported as same as *M. profunda* Baba, 2005, entirely white carapace, pleon, P1 – 4. Cornea orange-pink. Setae on P1 – 4 greyish-brown.

**Global distribution:** Taiwan, Tasman Sea and South Africa, 3520 – 3930 m.

**South African distribution:** Off Durban, KwaZulu-Natal, 3520 m (Figure 5.9).

**Remarks:** This rare species has only been collected on three occasions, one of which is the type locality east of Durban (specimen housed in the Zoological Museum at the University of Copenhagen). This species is most similar to *M. aries* in southern African waters (see differences under *M. aries* remarks).

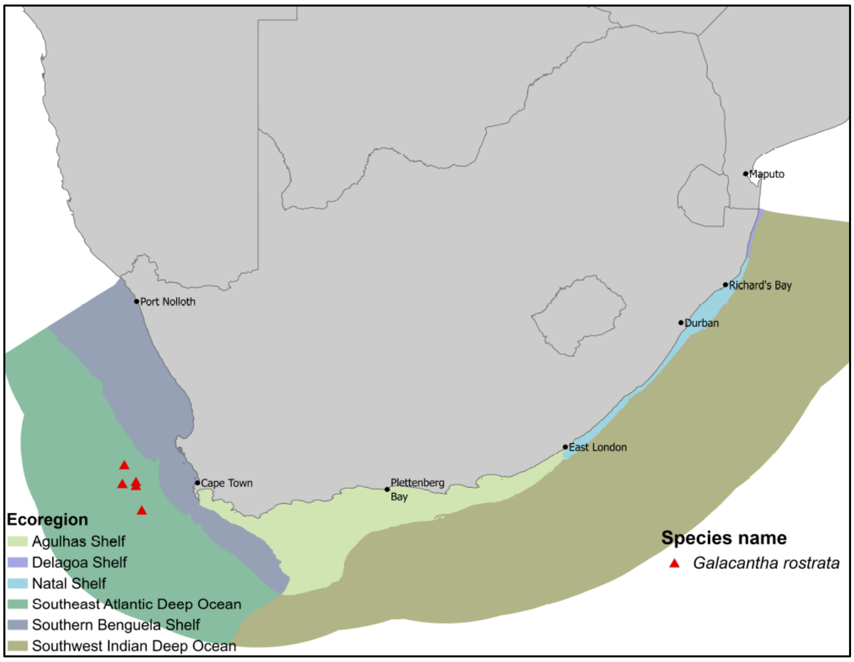

**Figure 5.8:** Distribution map of species in the genus *Galacantha* found in South Africa.

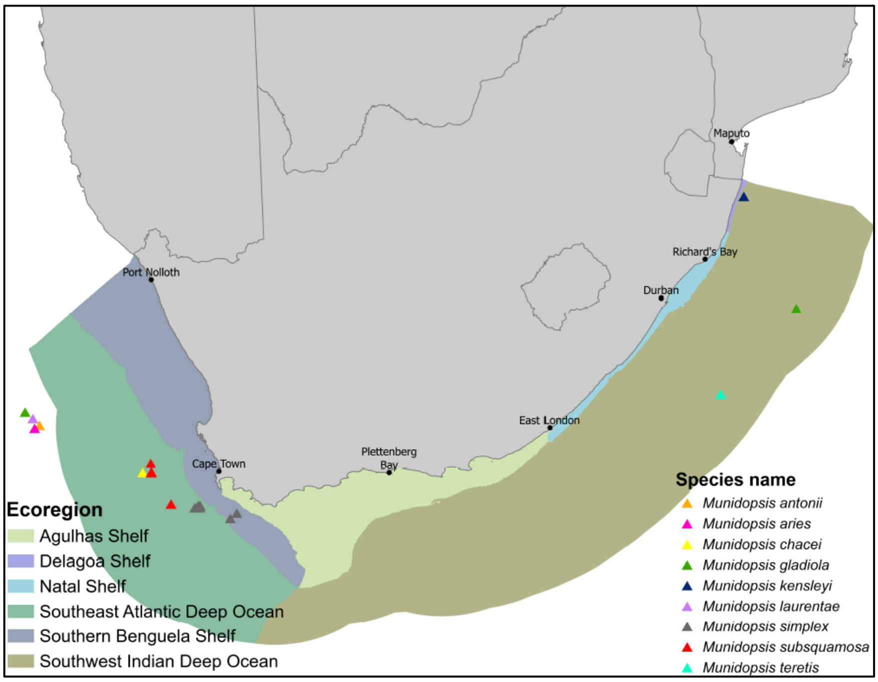

**Figure 5.9:** Distribution map of species in the genus *Munidopsis* found in South Africa. Data for some species extracted from existing publications (Baba, 2005; Macpherson & Segonzac, 2005; Macpherson, 2007).

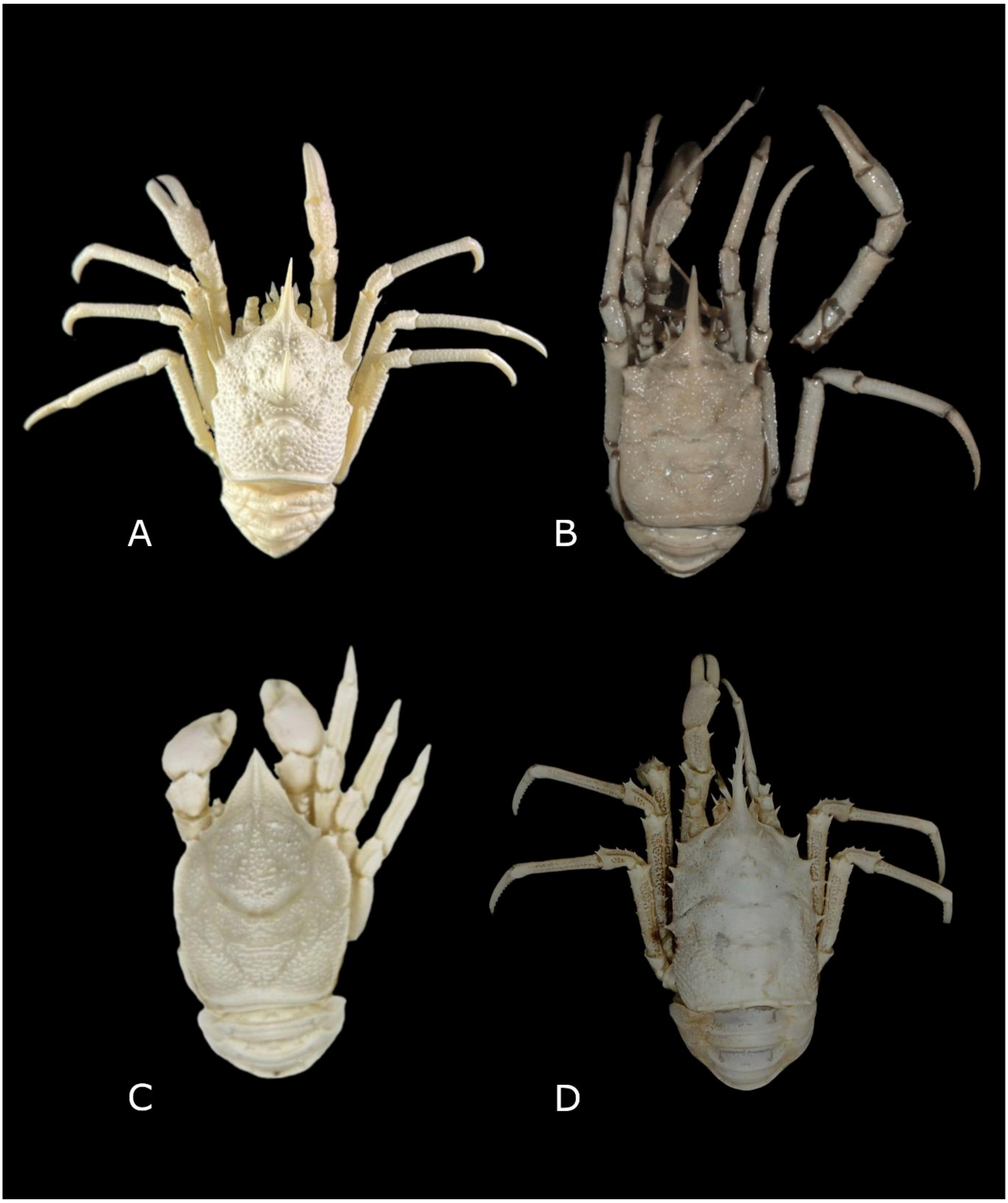

**Figure 5.10:** Dorsal view of preserved specimens. **A** – *Galacantha rostrata* A. Milne-Edwards, 1880, West of Cape Town, South Africa, ♂, 11.1 mm (SAMC-A10546); **B** – *Munidopsis antonii* (Filhol, 1884), northeast of Azores, ♂, 11.5 mm (MNHN-IU-2014-11110); **C** – *Munidopsis aries* (A. Milne-Edwards, 1880), Bequia, ♂, 16.0 mm (MCZ-IZ-CRU-4761); **D** – *Munidopsis chacei* Kensley, 1968, West of Saldanha, South Africa, ovig. ♀, 33.9 mm (SAMC-A010470). Photo by: A – Noémy Mollaret (MNHN & Chagnoux, 2024); B – Harvard University M, Morris P J (2024).

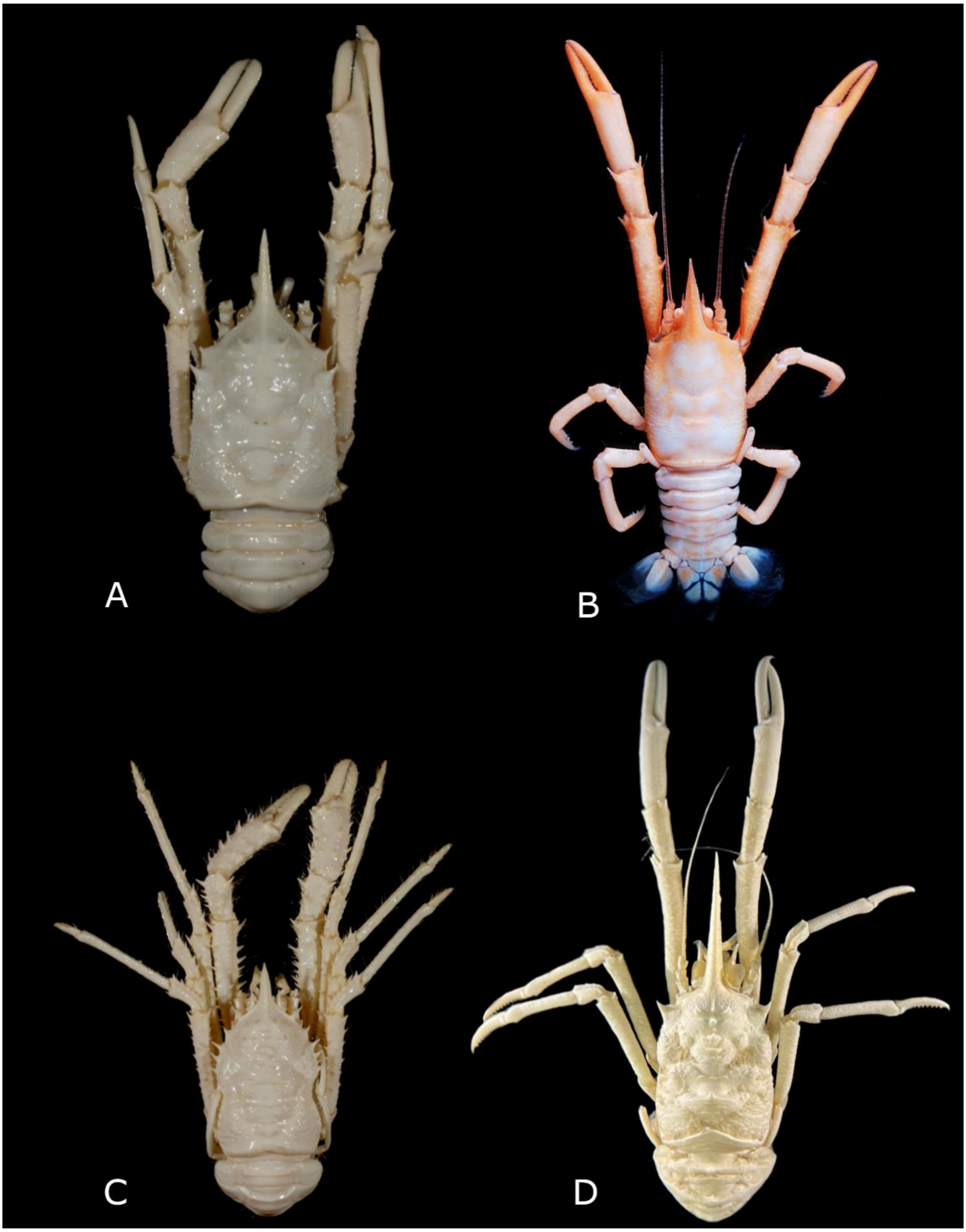

**Figure 5.11:** Dorsal view of live (B) and preserved (A, C, D) specimens. **A** – *Munidopsis gladiola* Macpherson, 2007, east of Durban, South Africa, ♂, 12.6 mm (MNHN-IU-2014-7542); **B** – *Munidopsis kensleyi* Ahyong & Poore, 2004, east of Maputo, Mozambique, ♂, 8.7 mm (MNHN-IU-2008-10164); **C** – *Munidopsis laurentae* Macpherson & Segonzac, 2005, west of Saldanha, South Africa, ♀, 24.7 mm (MNHN-IU-2010-1660); **D** – *Munidopsis simplex* (A. Milne-Edwards, 1880), west of Cape Town, South Africa, ♂, 10.7 mm (SAMC-A0912-918). Photo by: A, C – Laura Flamme; B – T. Y. Chan.

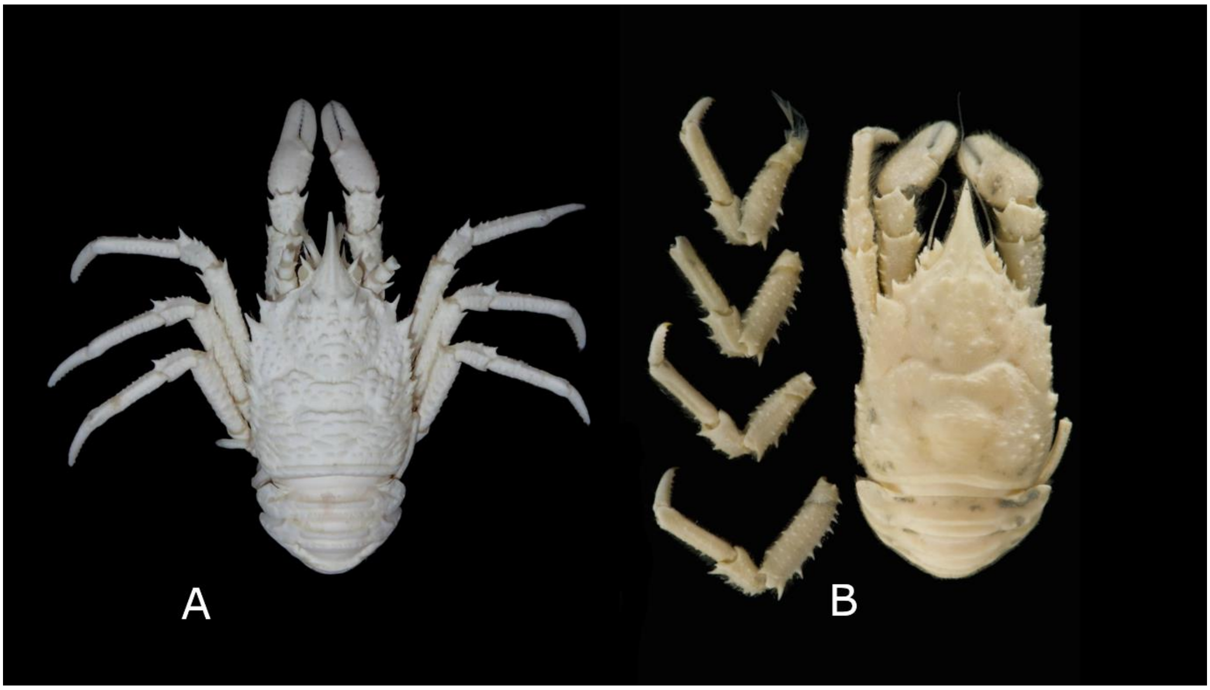

**Figure 5.12:** Dorsal view of preserved specimens. **A** – *Munidopsis subsquamosa* Henderson, 1885*,* west of Cape Town, South Africa, ♂, 13.5 mm (SAMC-A010465); **B** – *Munidopsis teretis* Baba, 2005, east of Coffee Bay, South Africa, ♀, 17.7 mm (ZMUC CRU-11283). Photo by: B – Eibye-Jacobsen et al., 2024.

# Discussion

This is the first revision of the Munidopsidae of South Africa, reporting on a total of ten species. Two of these, *M. chacei* and *M. simplex*, are redescribed herein, with updated drawings and photographs after concern was raised regarding their status (Ambler, 1980; Macpherson pers. comm.). The ten known species represent only 3% of the global munidopsid fauna, a conservative number for a very biodiverse country such as South Africa (Griffiths et al., 2010). One reason for this may be that many species occur outside of EEZ's, as they are found at such great depths. Also, this is likely due to the fact that very few samples have been collected off South Africa at depths >1000 m, where most of these species occur, indeed most such samples have been collected by foreign-led research cruises (Baba, 2005; Macpherson & Segonzac, 2005). Particularly during the last 45 years there have been no munidopsid specimens collected from deeper than 1000 m in South Africa. It is highly likely that, with increased sampling effort, more species will be added to the South African fauna, especially as many more species are found in the greater SWIO region. Macpherson et al. (2017, 2023) report that Mozambique has a total of 11 species, while Madagascar has 16. Although the totals for each of these countries are relatively similar to that of South Africa, it is interesting to note that both regions only share one species with South Africa, indicating a much more diverse fauna is present in the wider region.

Recently, Macpherson et al. (2023) published a checklist of galatheoids in the SWIO, which included 39 munidopsid species, seven of which are reported herein as occurring in South Africa. Interestingly, both *M. gladiola* and *M. teretis* were not included in the checklist, though it appears this was an oversight and these should be added to the checklist (Macpherson, pers. comm.). This increases the number of munidopsids in the SWIO region to 41 species.

Of the ten species reported for South Africa, four are located on the east coast and six on the west coast, with none found between Cape Town and East London. This is somewhat surprising and unlike the trend normally observed for marine invertebrates in South Africa, where the greatest diversity is usually on the east coast (Griffiths et al., 2010). Only *M. chacei* and *M. laurentae* are endemic to South Africa, while many of the other species have large distributional ranges (e.g. *M. aries, M. antonii, M. subsquamosa, M. simplex* and *M. teretis*), as is often the case for deep-sea taxa, as conditions at these depths are generally more stable (McClain & Hardy, 2010). Interestingly, only *M. gladiola* is found on both the east and west coast. Two of the ten species are exclusively reported from the Indian Ocean, while two are exclusively found in the Atlantic Ocean. These distribution patterns give no clear indication of whether the family has more of an Atlantic or Indian Ocean affinity, and does not seem to follow the pattern of higher diversity on the east coast as is the case for other squat lobster families in South Africa (and marine invertebrates in general, Griffiths et al., 2010).

This study should be considered a first step towards documenting the munidopsid fauna of South Africa. More samples are required to fill in gaps in knowledge regarding biogeography, ecology, genetics and the taxonomy of this deep-sea group. Genetic analyses were not possible for the Munidopsidae in this study due to the samples being too old and degraded. Fresh samples will be valuable, as these will enable genetic analyses, which along with additional morphological analyses, will help resolve the taxonomy of the group. Unfortunately, sampling these deep-sea habitats is not only expensive, but access to vessels and appropriate equipment is difficult.

# Chapter 6: Synthesis

This study provides a taxonomic revision of the squat lobster fauna of South Africa. In total it adds 15 species to the South African fauna list, four of which are new to science and 11 new distribution records (a 47.9% increase), while two species are synonymised and hence removed. Overall, the number of known species is thus raised from 32 prior to this study to 45 (Table 6.1). In the process, six new genera are also reported for the first time from the region increasing the number of recorded genera to 17. Six species have also undergone name change updates, resolving the taxonomic statuses of several dubious species. Moreover, illustrated redescriptions are provided for 12 species, illustrating new characters or improving previously inadequate descriptions. Finally, illustrated keys are presented for each family, enabling accessible species-level identifications of the South African squat lobster fauna. This study thus represents the largest single contribution made to date to the South African squat lobster fauna (Figure 6.1).

**Table 6.1:** Changes made to the South African squat lobster fauna list as a result of this study.

| | |
|---|---|
| Number of species prior to this study | 32 |
| Species new to science | 4 |
| Species newly recorded from South Africa | 11 |
| Removed from the list due to synonymy | 2 |
| Total new number of species | 45 |
| | |
| Genera newly reported on | 6 |
| Updated number of genera | 17 |
| Names updated from previous list | 6 |

South Africa is now known to host 3.2% of global squat lobster species (Table 6.2). This is less than half the percentage reported for South African Decapoda as a whole at 6.8% of the global fauna (Griffiths, 1999). This suggests that the South African squat lobster fauna remains underestimated, which is highly likely, as this study is the first revision of the group in the country. The reason for this is almost certainly that very little sampling has been done in key squat lobster habitats (1% of the South African EEZ deeper than 1000 m has thus far been sampled, Griffiths et al., 2010, while very little sampling has been done in seamount areas or in tropical areas on the east coast). The lack of South African taxonomists actively engaged in research on the group has also greatly contributed to the lack of research activity and hence of species added to the fauna list in the last 50 years. Some of the material identified in this study had remained unidentified in the museum collections since it was collected more than 100 years ago. This is the first study focused on South African squat lobsters since Brian Kensley's contribution in 1981.

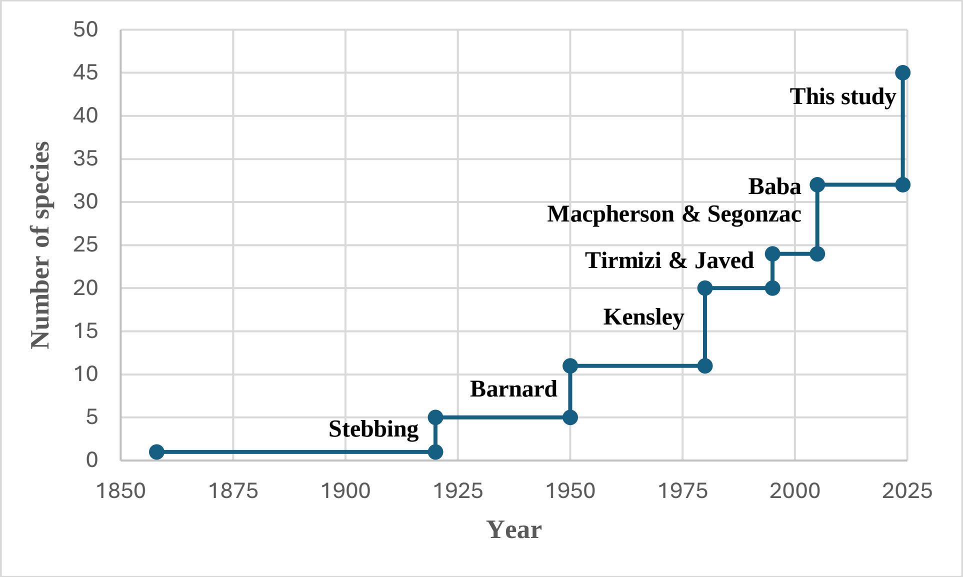

**Figure 6.1:** Squat lobster species accumulated in South Africa since the first description in 1858.

The South African squat lobster fauna show an endemicity rate of 26.7% (Table 6.2), slightly less than the average reported for all South African marine invertebrates of 33% (Griffiths et al., 2010). Schnabel et al. (2011b) reported similar low endemicity rates for the South-East Atlantic and Indian Ocean region, at 33% and 10% endemicity, respectively. However, numerous species have been added to these regions (specifically the Indian Ocean) since Schnabel et al. (2011b) and these numbers are in need of revision (Macpherson & Robainas-Barcia, 2013, 2015; Rodriguez-Flores et al., 2021; Macpherson et al., 2017, 2023). It should be noted that these endemicity rates may be slightly inflated, and will be more accurate as sampling effort increases in neighboring countries.

**Table 6.2:** Squat lobster numbers globally (WoRMS Editorial Board, 2024) and in South Africa (SA), percentage South African species of global, percentage endemicity and biogeographic affinity of each of the four families present in South Africa.

| Family | Number of species globally | Number of species SA | % SA species of global | % Endemic to SA | Biogeographic affinity |
|---|---|---|---|---|---|
| **Chirostylidae** | 329 | 8 | 2.4 | 62.5 | Indo-Pacific |
| **Galatheidae** | 276 | 10 | 3.6 | 30.0 | Atlantic & Indian Ocean |
| **Munididae** | 498 | 17 | 3.4 | 11.8 | Indo-Pacific |
| **Munidopsidae** | 311 | 10 | 3.2 | 20.0 | Atlantic & Indian Ocean |
| **Total** | 1414 | 45 | 3.2 | 26.7 | |

When looking at individual families an interesting pattern emerges; 62.5% of South African Chirostylidae are endemic, not only to the country, but to the east coast specifically (Figure 6.2). This is somewhat similar to what is reported by Schnabel et al. (2011b), who also found that chirostyloids in particular had restricted ranges. This supports the hypothesis that groups with abbreviated larval development and a shorter planktonic larval duration (PLD), such as most chirostyloids, have smaller ranges and are less likely to maintain widespread panmictic populations (Meyer, 2003; McClain & Hardy, 2010; Schnabel, 2020). Though these life history traits may explain patterns observed, sampling effects should not be excluded as 'artificially' elevating apparent endemicity rates, as is occasionally the case in South Africa (Griffiths et al., 2010). The Munididae are the only family that are found around the entire coast and offshore areas, distributed mostly along the shelf edge. Unsurprisingly, all four families are found on the tropical east coast, consistent with the pattern that the majority of squat lobster species are distributed in tropical areas, across all depth strata (Baba et al., 2008; Schnabel et al., 2011b).

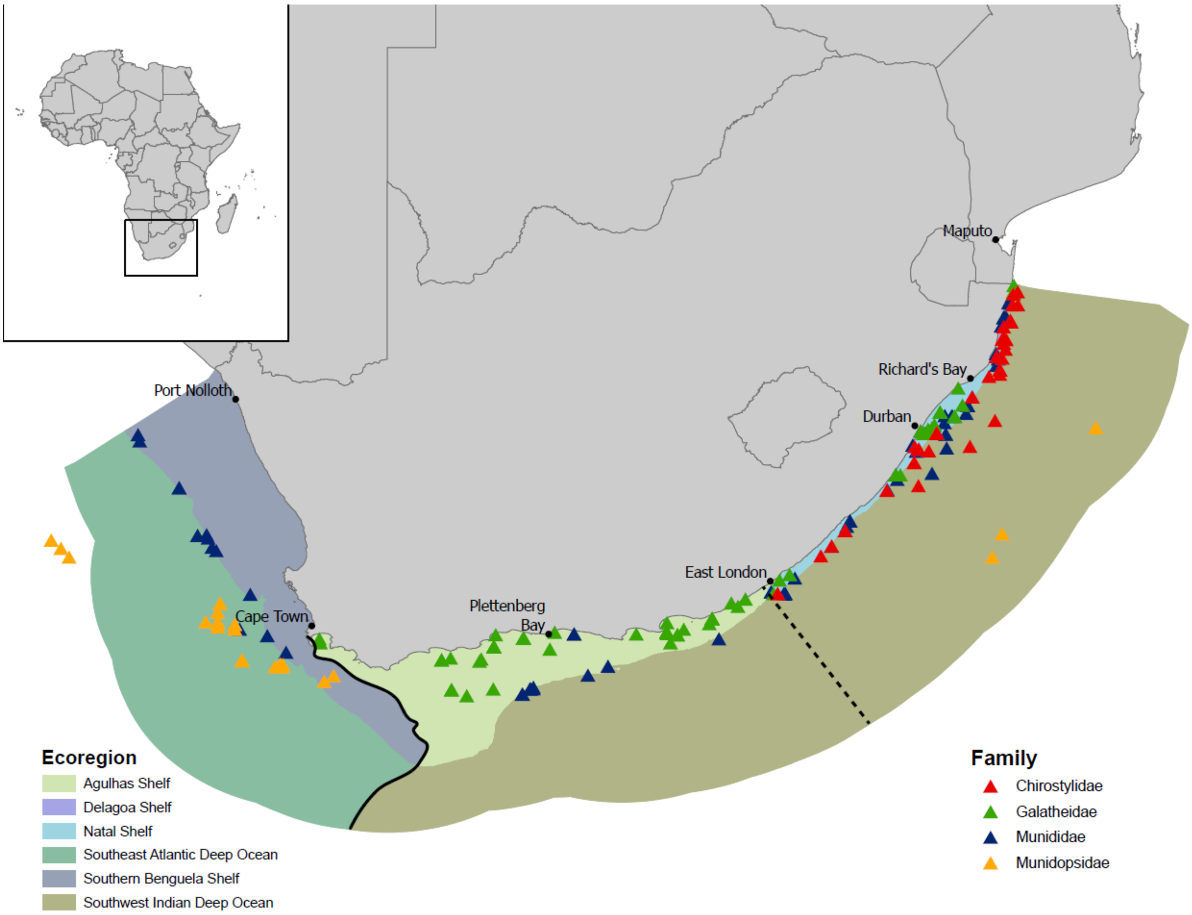

**Figure 6.2:** Biogeography of squat lobster families around the South African coast and greater EEZ area.

Comparing the South African squat lobster fauna to that of other regions for which data are available, South Africa is now known to have exactly the same number of species as Mozambique, although Madagascar and New Zealand both have substantially more species (Table 6.3). These differences are, however, almost certainly more a reflection of difference in sampling intensity and research effort between these countries, rather than any actual variation in species richness (though it should be mentioned New Zealand has an EEZ nearly four times the size of South Africa, so likely sampling bias is not the only reason for differences in diversity). For example, the 86 New Zealand chirostyloid species are known from 710 sampling events (Schnabel, 2020), while the eight South African species are known from only 40 sampling events. Until recently, only 89 species across galatheoids and chirostyloids were known from New Zealand, however Schnabel (2020) added 48 chirostyloid species to the New Zealand fauna list, while Schnabel et al. (2023) lists 74 galatheoids, resulting in a new total of

160 species. This highlights the difference that adequate sampling and a dedicated taxonomist can make to increasing the fauna list of a country or region.

**Table 6.3:** Number of species present in South Africa, compared to three other countries. Numbers from: Webber et al., 2010; Schnabel, 2020; Macpherson et al., 2023; Schnabel et al., 2023; Baba et al., 2024.

| | **South Africa** | **Mozambique** | **Madagascar** | **New Zealand** |
|---|---|---|---|---|
| **Chirostyloidea** | 8 | 9 | 24 | 86 |
| **Galatheidae** | 10 | 7 | 21 | 15 |
| **Munididae** | 17 | 18 | 16 | 33 |
| **Munidopsidae** | 10 | 11 | 15 | 26 |
| **Total** | 45 | 45 | 76 | 160 |

The depth distributions observed for South African genera are consistent with previous reports for genera globally (Schnabel et al., 2011b). Unsurprisingly, the genus *Munidopsis* (family Munidopsidae) were the deepest-dwelling, surpassing depths of 3500 m (Figure 6.3) and also had the greatest depth range, exceeding 3000 m. The record of *Curtonida manqingae* (family Munididae) from 2523 – 2780 m off Cape Town greatly increased the previous South African depth record for the family, which was less than 1000 m. Globally, this is also one of the deepest ever records for the family. New material reported herein also extended the depth distribution of South African *Uroptychus* (family Chirostylidae) from 400 – 1360 m to 136 – 1360 m. Interestingly, 77% of genera (76% of species) were found between 0 – 500 m deep, with only four genera found deeper than 1000 m. Moreover, 80% of species were found in the upper 1400 m of water, similar to Schnabel et al. (2011b), who found that nearly 90% of global species occur in this depth range. These results should be interpreted with caution, as the reported depth ranges are certainly subject to sampling bias, with numbers of samples declining rapidly in deeper depths. For example, Griffiths et al. (2010) reported that 99% of all benthic samples within the South African EEZ up to that date had been taken from shallower than 1000 m, with 83% shallower than 100 m.

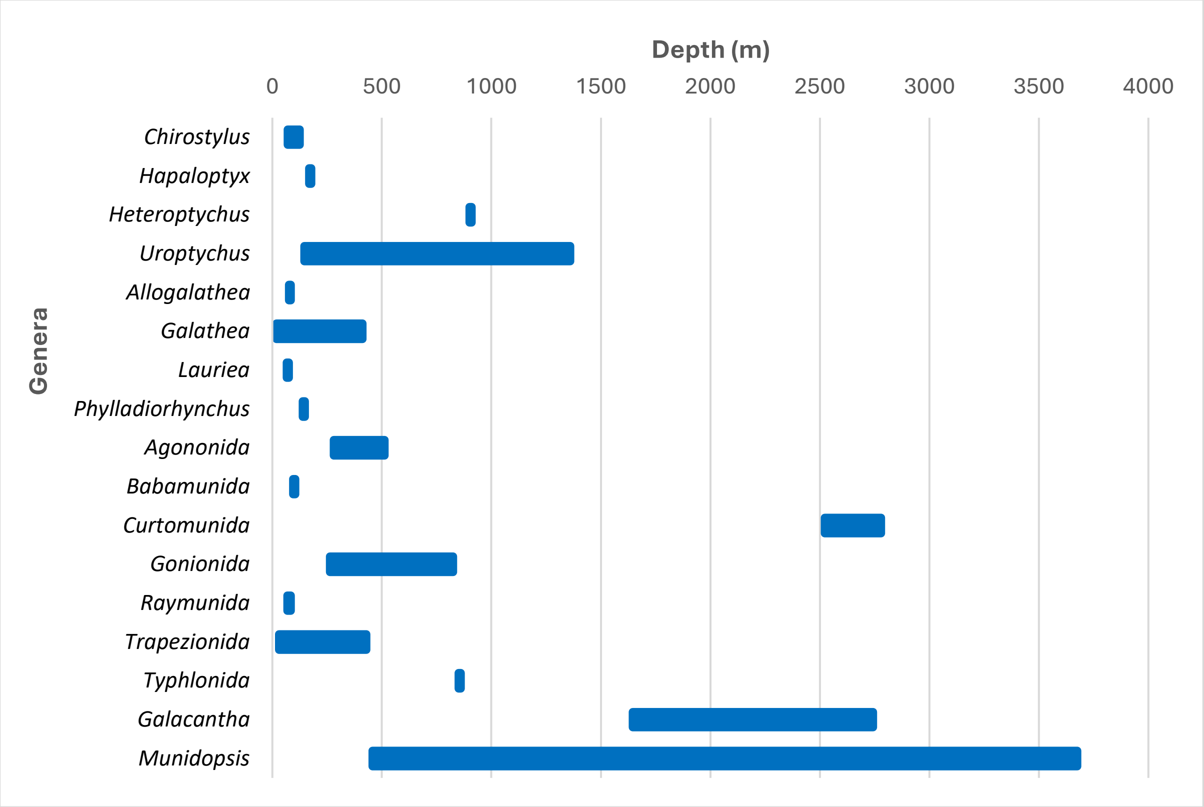

**Figure 6.3:** Depth distribution ranges of the squat lobster genera recorded in South Africa.

More than half of the species reported from South Africa were collected from single sampling events, while 84% of species were recorded in five or fewer sampling events. Moreover, 38% of South African squat lobster species are represented by a single specimen, while 64% are known from five or fewer individuals. These data not only highlight the rarity of species in the group, but also how under-sampled they are. More rigorous sampling is needed, especially on the east coast, as this region shows the highest diversity, but is not as well-sampled as the south and west coast, which support more commercial fisheries, so have been subject to more surveys (Griffiths et al., 2010). The comparatively low number of squat lobster specimens available from South Africa limits meaningful studies on biogeography, population composition or conservation, however with increasing sampling efforts, especially in deeper waters, future studies should consider these options. Moreover, as more intensive sampling has taken place on the west coast, there are not only several ‘presence’ records, but also a substantial amount of ‘absence’ records. These records could prove useful for future studies to do species distribution modelling and habitat suitability modeling to give an indication of where some of these species could be located where sampling has not yet been conducted.

This monograph not only improves the taxonomic resolution on South African squat lobsters, but is an important first step towards providing foundational knowledge on this group and enabling future work to take up this information into other important research areas such as biodiscovery, conservation, ecology, evolution and marine spatial planning (Mace, 2004; Richard & Evans, 2006; Löbl et al., 2023). Squat lobsters are often associated with VMEs, though their usefulness as indicator species for these important habitats is not yet fully understood. Information resulting from Yan et al. (2020) did, however, contribute to decision-making to protect VMEs by using genetic analyses on squat lobsters to improve knowledge of connectivity of the species. The present study is the first to contribute South African squat lobster genetic sequences, which can now be used as a starting point for similar studies. As of now, hydrothermal vents are yet to be discovered in South African waters, however, squat lobsters could be key in their future discovery. In particular, the addition of *Curtonida manqingae* from west of Cape Town at depths of 2524 – 2780 m (Chapter 4), a species described from hydrothermal vent fields along the Southwest Indian Ridge (Liu et al., 2013) is of interest. Squat lobsters have previously 'led' scientists to the discovery of hydrothermal vent sites, as a site off the western side of Galápagos being named "Sendero del Cangrejo," which means "Trail of the Crabs". This name was chosen as scientists aboard the R/V Falkor saw a squat lobster using their ROV, and the number of crabs increased until they discovered the vent site. Discovery of such unique habitats is incredibly important, as there is still much to discover, not only about these habitats, but also on the plethora of mostly endemic fauna they host (Rogers et al., 2012). As we are currently facing a global extinction (Wilson, 1985; Orr et al., 2020), the risk of losing known species is a biodiversity crisis. Even more concerning is the prospect of losing undescribed species before their value or ecological importance has been quantified (Liu et al., 2022).

This study constitutes the greatest single contribution made to the South African squat lobster fauna and is the first monographic study on the group. It also highlights the fact that the South African squat lobster fauna is much more diverse than previously thought. However, with more targeted sampling for this group, it is highly likely that even more new species will be uncovered.

# Appendix

**Table 3.1:** Mitochondrial (COI) uncorrected pairwise interspecific variation distance matrix among *Galathea* species. Intraspecific differences are marked in bold in the diagonal.

| | ***G. labidolepta*** | ***G. intermedia*** | ***G. bolivari*** | ***G.*** **n. sp.** ***A*** | ***G. nexa*** | ***G. dispersa*** | ***G. strigosa*** | ***G. tanegashimae*** |
|---|---|---|---|---|---|---|---|---|
| ***G. labidolepta*** | **0.5 – 1.4** | | | | | | | |
| ***G. intermedia*** | 11.4 – 13.0 | **0.0** | | | | | | |
| ***G. bolivari*** | 11.3 – 12.0 | 12.0 – 12.2 | **4.0 – 4.1** | | | | | |
| ***G.*** **n. sp.** ***A*** | 18.4 – 18.9 | 17.0 – 18.3 | 18.0 – 18.5 | **0.0** | | | | |
| ***G. nexa*** | 18.9 – 19.1 | 17.6 – 18.8 | 17.3 – 18.3 | 2.7 | **0.4** | | | |
| ***G. dispersa*** | 18.4 – 19.6 | 16.3 – 20.1 | 18.8 – 19.8 | 11.4 – 12.0 | 12.0 – 13.1 | **1.6** | | |
| ***G. strigosa*** | 19.5 – 20.2 | 17.0 – 20.4 | 18.5 – 20.0 | 13.1 – 12.5 | 13.1 – 14.2 | 14.9 – 16.0 | **0.9** | |
| ***G. tanegashimae*** | 19.6 – 20.5 | 19.6 – 20.9 | 19.6 | 20.7 | 19.8 | 23.0 – 23.5 | 19.2 – 19.7 | **0.0** |

**Table 3.2:** Mitochondrial (16S) uncorrected pairwise interspecific variation distance matrix among *Galathea* species. Intraspecific differences are marked in bold in the diagonal.

| | ***G.*** **n. sp. A** | ***G.*** **n. sp. B** | ***G. labidolepta*** | ***G. rostrata*** | ***G. squamifera*** | ***G. strigosa*** |
|---|---|---|---|---|---|---|
| ***G.*** **n. sp. A** | **0.0** | | | | | |
| ***G.*** **n. sp. B** | 0.2 | **0.0** | | | | |
| ***G. labidolepta*** | 19.7 – 20.1 | 19.4 – 19.7 | **0.2** | | | |
| ***G. rostrata*** | 10.3 | 10.0 | 16.5 – 16.9 | – | | |
| ***G. squamifera*** | 9.9 – 10.2 | 9.6 – 9.9 | 19.3 – 19.7 | 7.9 - 8.2 | **0.0 – 0.2** | |
| ***G. strigosa*** | 10.0 | 9.7 | 17.9 – 18.2 | 7.3 | 8.9 – 9.2 | – |

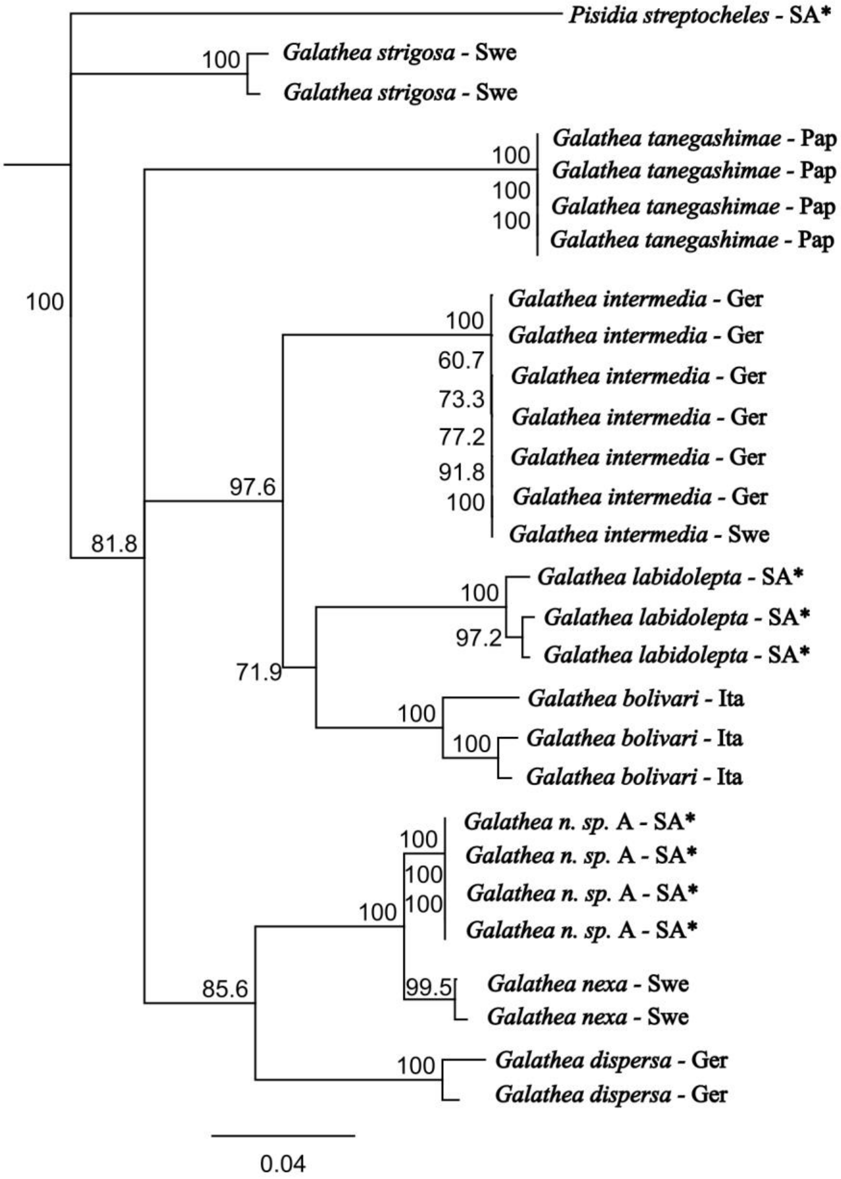

**Figure 3.12:** Neighbour-joining (NJ) tree based on COI sequences, showing phylogenetic relationships between closely related species of *Galathea* from South Africa, Europe and Papua New Guinea with *Pisidia streptocheles* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Ger – Germany, Ita – Italy, Pap – Papua New Guinea, SA – South Africa, Swe – Sweden. Asterisk (*) indicates sequence generated by this study.

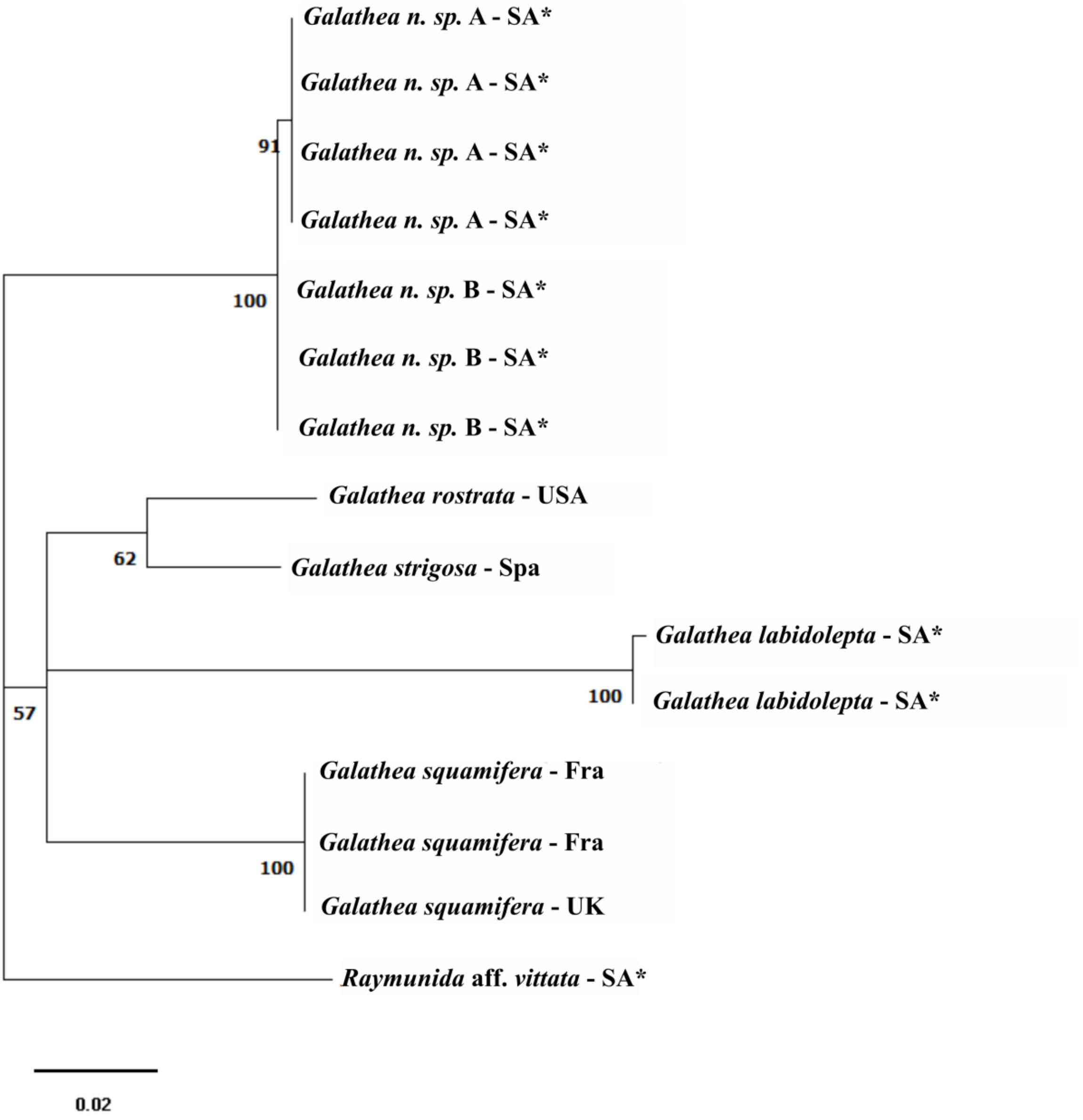

**Figure 3.13:** Neighbour-joining (NJ) tree based on 16S sequences, showing phylogenetic relationships between closely related species of *Galathea* from South Africa and several European countries with *Raymunida* cf. *vittata* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Fra – France, SA – South Africa, Spa – Spain, UK – United Kingdom, USA – United States of America. Asterisk (*) indicates sequence generated by this study.

**Table 4.1:** Range of the uncorrected pairwise genetic distances as percentages based on COI sequences of *Agononida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 607 base pairs.

| | ***A. africerta*** | ***A. indocerta*** | ***A. madagascerta*** |
|---|---|---|---|
| ***A. africerta*** | **0.0** | | |
| ***A. indocerta*** | 2.7 – 3.1 | **0.0 – 0.3** | |
| ***A. madagascerta*** | 12.7 – 13.1 | 12.7 – 13.4 | **0.0 – 0.6** |

**Table 4.2:** Range of the uncorrected pairwise genetic distances as percentages based on 16S sequences of *Agononida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 522 base pairs.

| | ***A. africerta*** | ***A. indocerta*** | ***A. vanuacerta*** |
|---|---|---|---|
| ***A. africerta*** | **0 – 0.2** | | |
| ***A. indocerta*** | 0.8 – 1.4 | **0 – 0.4** | |
| ***A. vanuacerta*** | 0.8 –1.2 | 0.8 – 1.4 | **0.2** |

**Table 4.3:** Range of the uncorrected pairwise genetic distances as percentages based on COI sequences of *Gonionida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 616 base pairs.

| | ***G. benguela*** | ***G. shaula*** |
|---|---|---|
| ***G. benguela*** | **0.0** | |
| ***G. shaula*** | 10.9 – 11.1 | **0.5** |

**Table 4.4:** Range of the uncorrected pairwise genetic distances as percentages based on 16S sequences of *Raymunida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 491 base pairs.

| | ***R. elegantissima*** | ***R. insulata*** | ***R. cf. vittata*** | ***R. vittata*** |
|---|---|---|---|---|
| ***R. elegantissima*** | **0.0** | | | |
| ***R. insulata*** | 4.9 – 5.0 | – | | |
| ***R. cf. vittata*** | 0.4 | 5.0 | – | |
| ***R. vittata*** | 0.0 – 0.6 | 5.0 | 0.2 – 0.4 | **0.0 - 0.6** |

**Table 4.5:** Range of the uncorrected pairwise genetic distances as percentages based on COI sequences of *Raymunida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 579 base pairs.

| | ***R. elegantissima*** | ***R. insulata*** | ***R.* cf. *vittata*** | ***R. vittata*** |
|---|---|---|---|---|
| ***R. elegantissima*** | **0.0 – 0.5** | | | |
| ***R. insulata*** | 15.5 – 16.1 | **0.5** | | |
| ***R.* cf. *vittata*** | 0.9 – 1.2 | 15.6 | – | |
| ***R. vittata*** | 0.0 – 0.9 | 15.2 – 15.8 | 0.9 – 1.1 | **0.2 – 0.7** |

**Table 4.6:** Range of the uncorrected pairwise genetic distances as percentages based on 16S sequences of *Trapezionida* species found in the Southwestern Indian Ocean. Intraspecific differences are marked in bold in the diagonal. Sequences were trimmed to 579 base pairs.

| | ***T. austrina*** | ***T. babai*** | ***T. euripa*** | ***T. limula*** | ***T. mesembria*** | ***T. nesiotes*** | ***T. roshanei*** | ***T. tetracantha*** |
|---|---|---|---|---|---|---|---|---|
| ***T. austrina*** | **0.0** | | | | | | | |
| ***T. babai*** | 26.2 | – | | | | | | |
| ***T. euripa*** | 16.7 | 25.3 | – | | | | | |
| ***T. limula*** | 24.1 | 27.0 | 23.7 | – | | | | |
| ***T. mesembria*** | 10.7 | 21.1 | 13.2 | 22.9 | **0.0** | | | |
| ***T. nesiotes*** | 27.3 – 27.6 | 24.3 – 24.6 | 21.5 – 21.8 | 31.0 – 31.4 | 24.1 – 24.4 | **0.0 – 0.2** | | |
| ***T. roshanei*** | 15.1 – 15.3 | 21.1 – 21.4 | 13.3 – 13.5 | 19.5 – 19.8 | 12.0 - 12.2 | 22.2 –22.7 | **0.3** | |
| ***T. tetracantha*** | 29.1 | 27.0 | 23.3 | 26.9 | 25.7 | 21.67 – 21.9 | 21.2 | – |

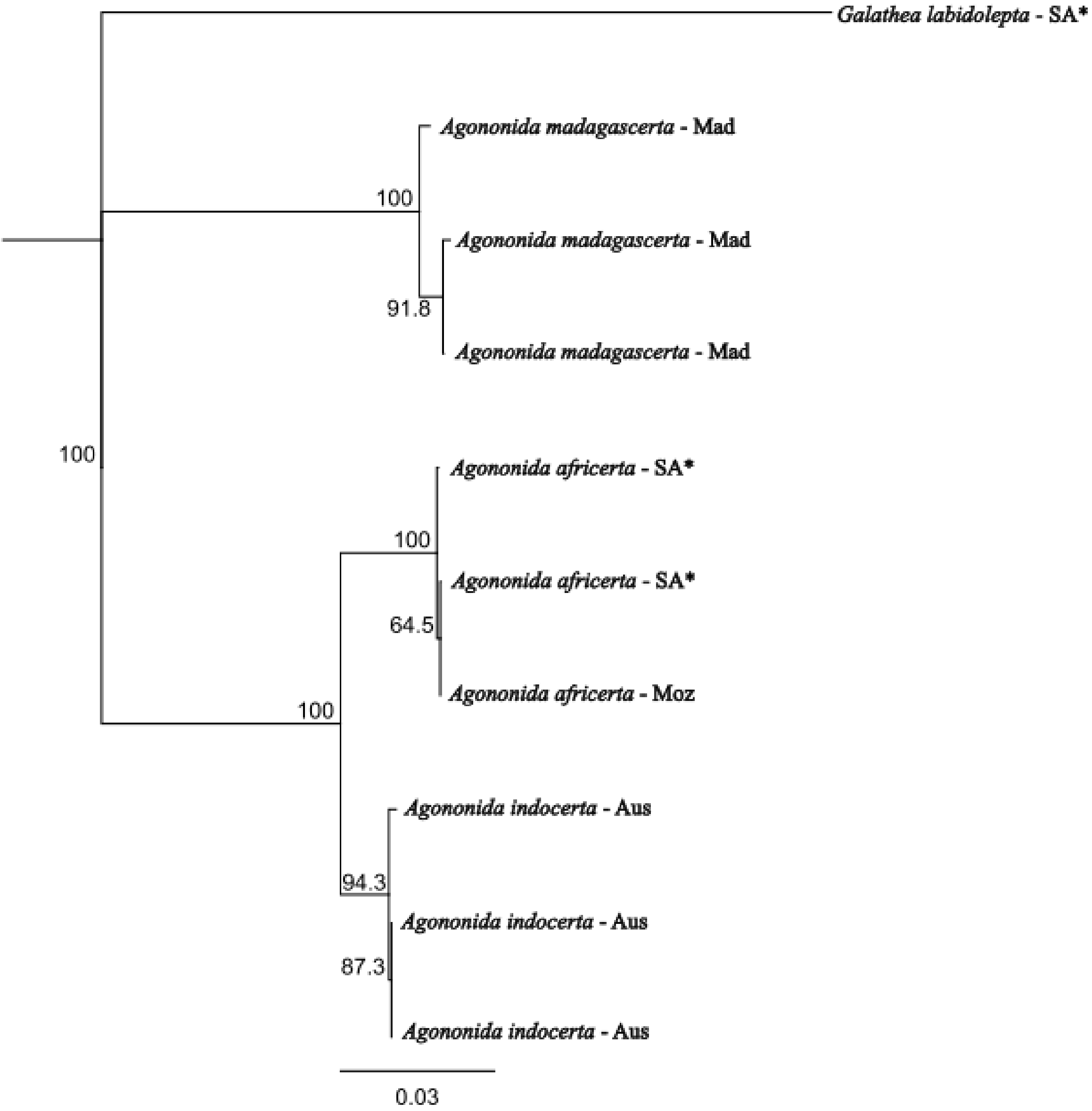

**Figure 4.20:** Neighbour-joining (NJ) tree based on COI sequences, showing phylogenetic relationships between species of *Agononida* occurring in the Southwestern Indian Ocean (SWIO) and Australia with *G. labidolepta* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Aus – Australia, Mad – Madagascar, Moz – Mozambique, SA – South Africa. Asterisk (*) indicates sequence generated by this study.

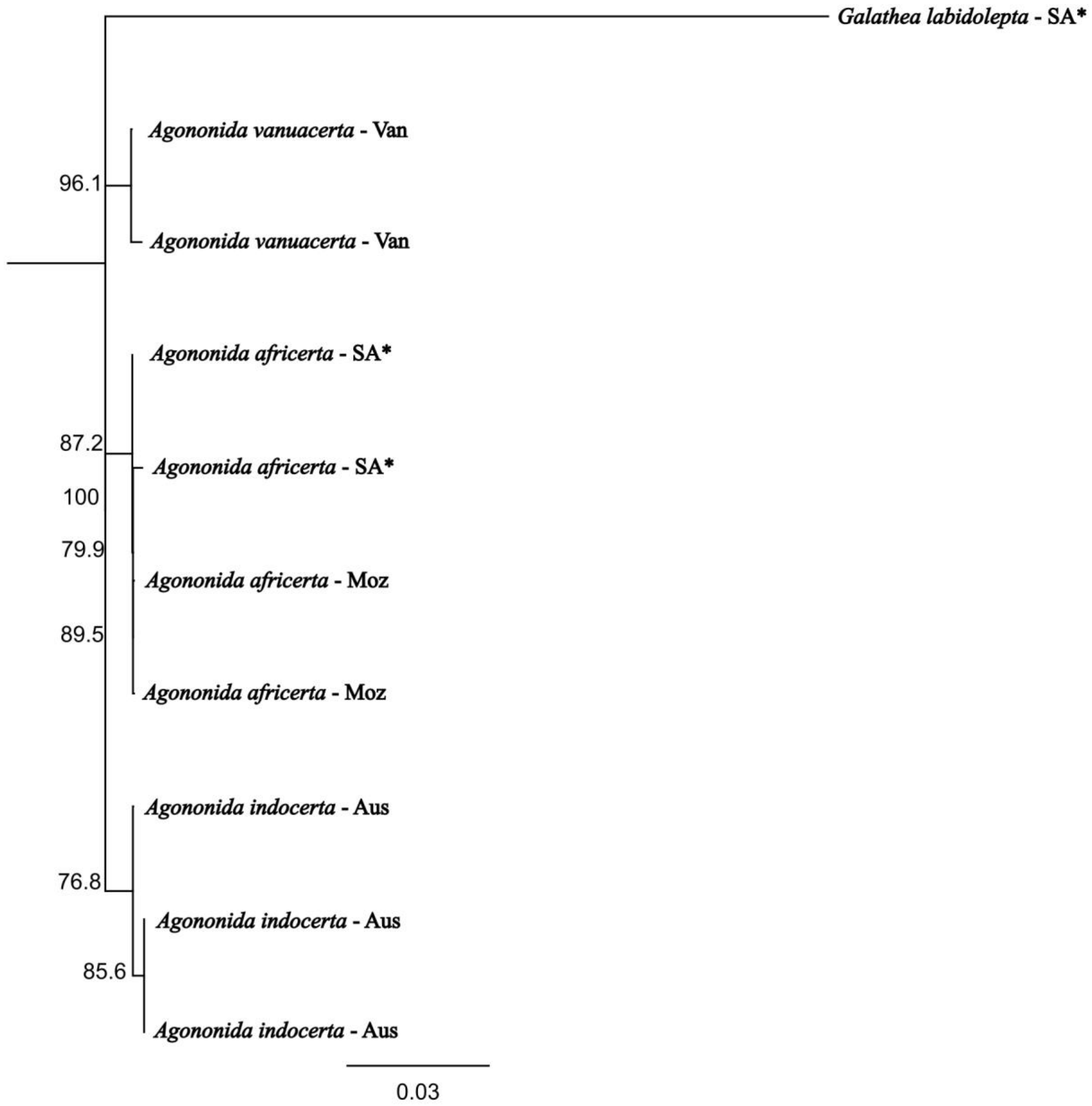

**Figure 4.21:** Neighbour-joining (NJ) tree based on 16S sequences, showing phylogenetic relationships between species of *Agononida* occurring in the Southwestern Indian Ocean (SWIO) and Australia with *G. labidolepta* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Aus – Australia, Moz – Mozambique, SA – South Africa, Van – Vanuatu. Asterisk (*) indicates sequence generated by this study.

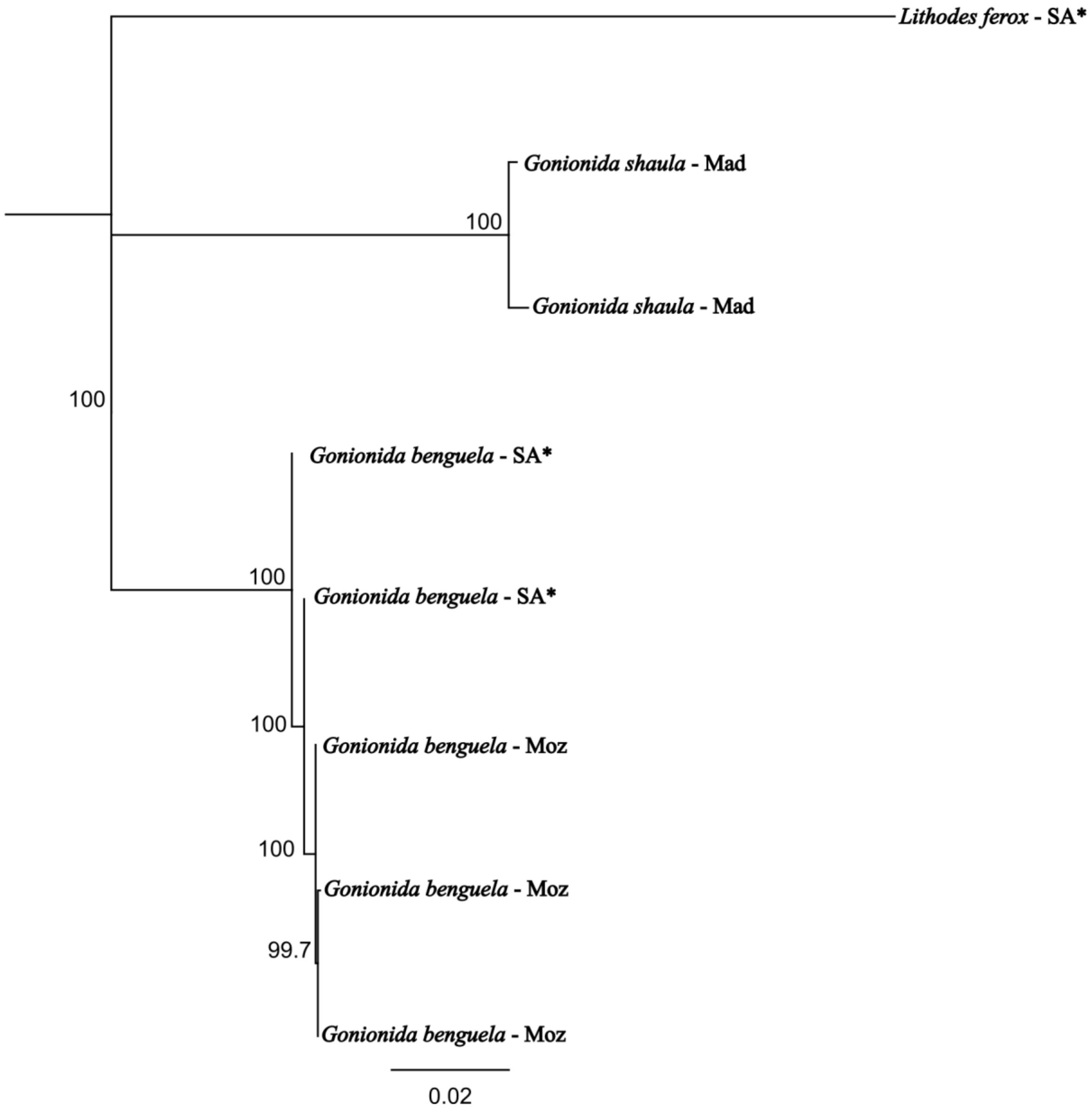

**Figure 4.22:** Neighbour-joining (NJ) tree based on COI sequences, showing phylogenetic relationships between species of *Gonionida* occurring in the Southwestern Indian Ocean (SWIO) with *Lithodes ferox* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Mad – Madagascar, Moz – Mozambique, SA – South Africa. Asterisk (*) indicates sequence generated by this study.

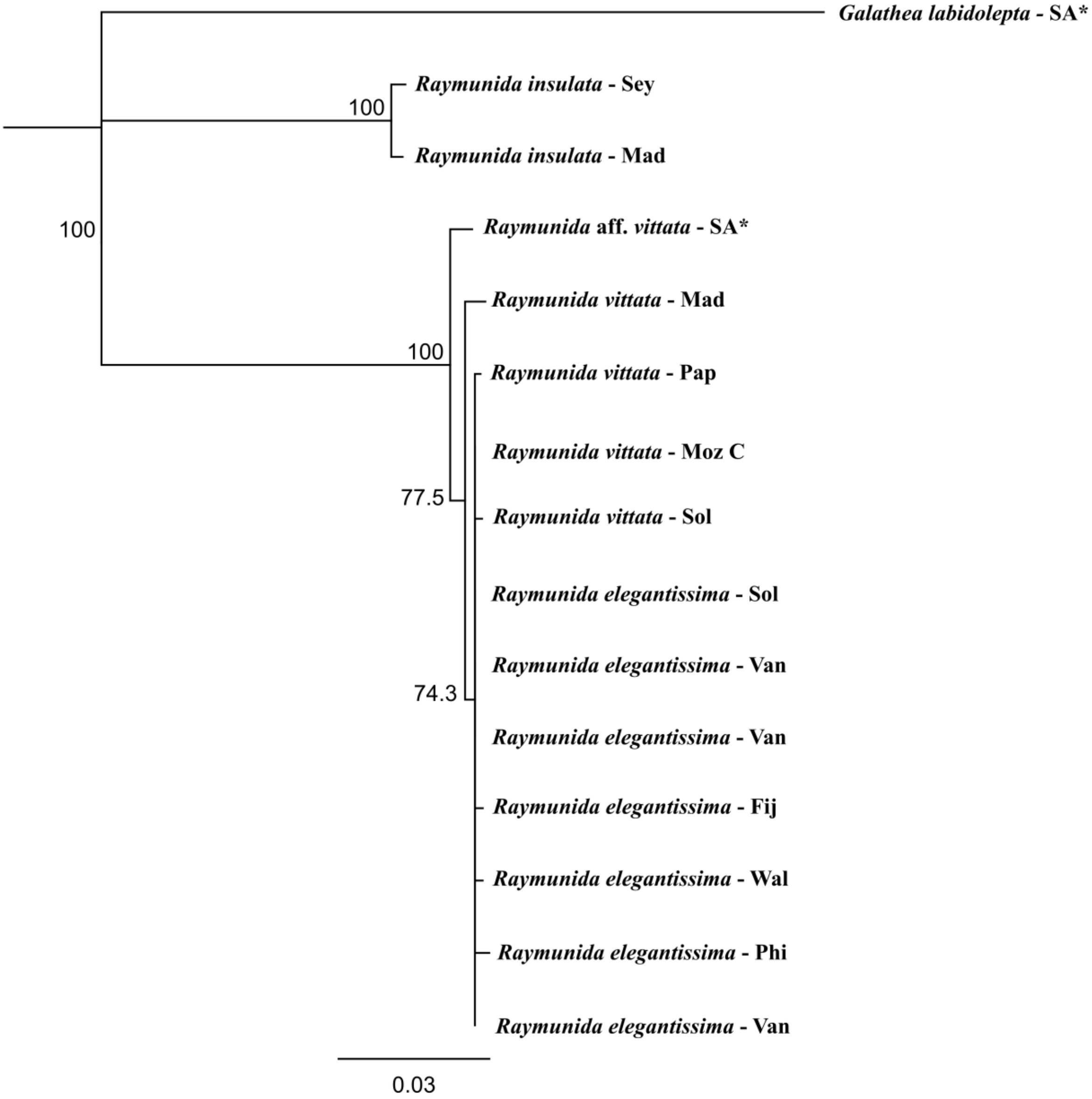

**Figure 4.23:** Neighbour-joining (NJ) tree based on COI sequences, showing phylogenetic relationships between species of *Raymunida* occurring in the Southwestern Indian Ocean (SWIO) and Pacific Ocean with *G. labidolepta* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Fij – Fiji, Mad – Madagascar, Moz C – Mozambique Channel, New – New Caledonia, SA – South Africa, Sey – Seychelles, Sol – Solomon Islands, Pap – Papua New Guinea, Phi – Philippines, Wal – Wallis Islands. Asterisk (*) indicates sequence generated by this study.

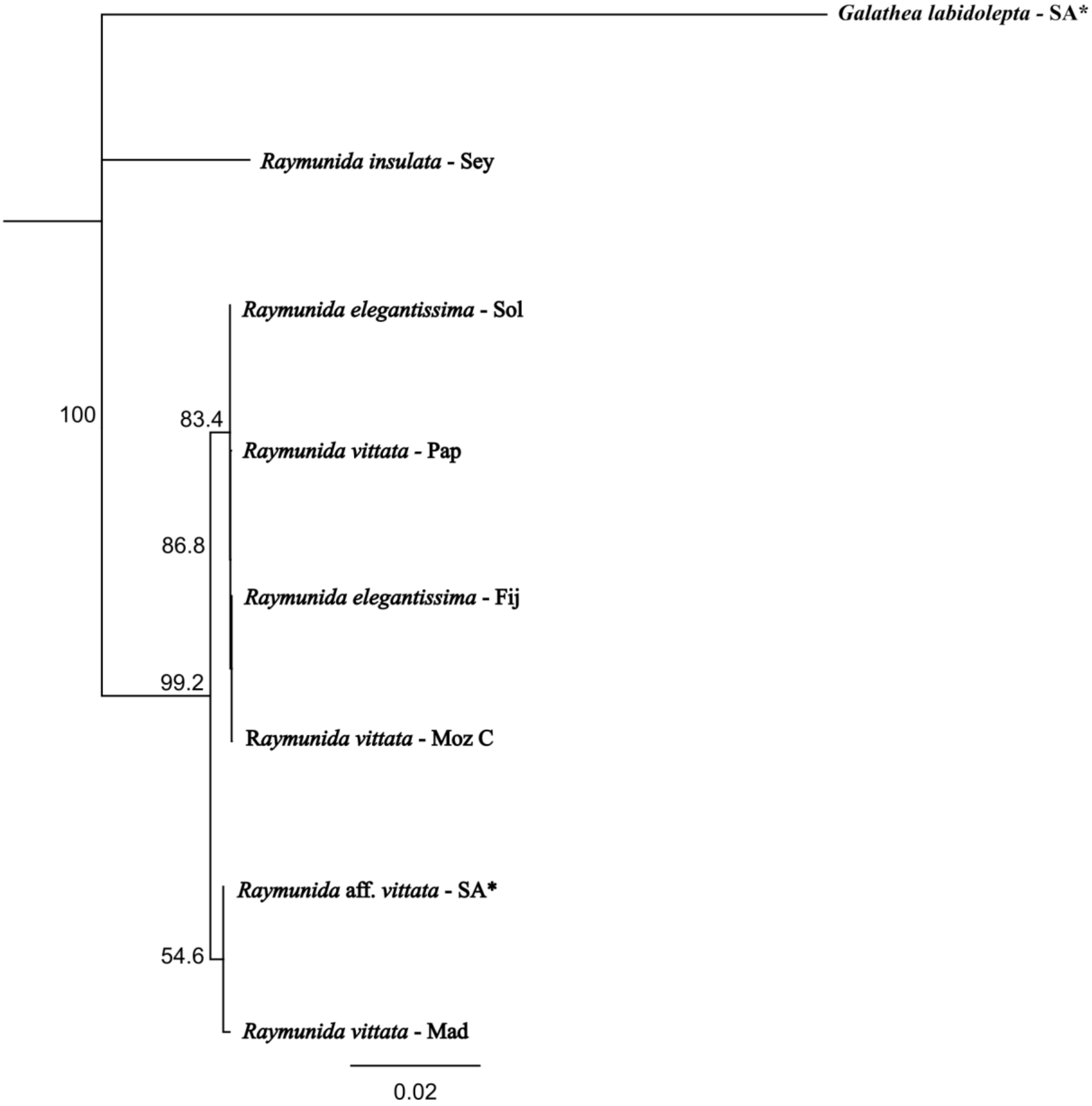

**Figure 4.24:** Neighbour-joining (NJ) tree based on 16S sequences, showing phylogenetic relationships between species of *Raymunida* occurring in the Southwestern Indian Ocean (SWIO) and Pacific Ocean with *G. labidolepta* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Fij – Fiji, Mad – Madagascar, Moz C – Mozambique Channel, Pap – Papua New Guinea, SA – South Africa, Sey – Seychelles, Sol – Solomon Islands. Asterisk (*) indicates sequence generated by this study.

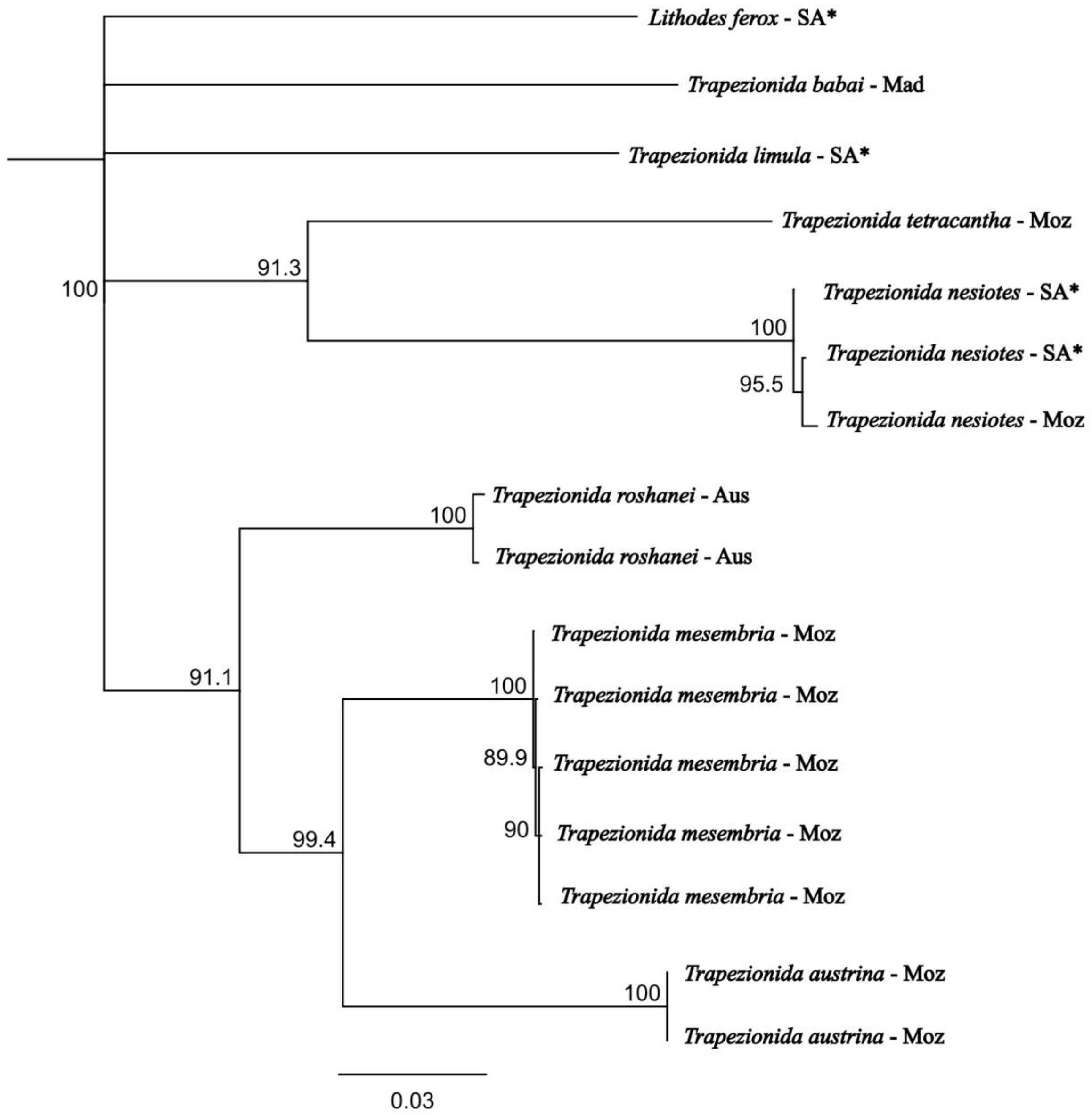

**Figure 4.25:** Neighbour-joining (NJ) tree based on COI sequences, showing phylogenetic relationships between species of *Trapezionida* occurring in the Southwestern Indian Ocean (SWIO) and Australia with *Lithodes ferox* as outgroup. Numbers above branches indicate bootstrap values for the NJ analyses. Aus – Australia, Mad – Madagascar, Moz – Mozambique, SA – South Africa. Asterisk (*) indicates sequence generated by this study.

**Table 6.1:** List of COI and 16S sequences from different galatheoid specimens with their associated accession numbers from the Natural History Collections of the Iziko Museum (SAMC), as well as their Barcode of Life Data system (BOLD) accessions numbers.

| **SAMC no.** | **Species** | **COI** | **16S** | **BOLD accession no.** |
|---|---|---|---|---|
| SAMC-A094759 | *Agononida africerta* | X | X | SMUCT034-24 |
| SAMC-A094759 | *Agononida africerta* | X | X | SMUCT035-24 |
| SAMC-A094757 | *Trapezionida nesiotes* | X | | SMUCT036-24 |
| SAMC-A094757 | *Trapezionida nesiotes* | X | | SMUCT037-24 |
| SAMC-A094758 | *Gonionida benguela* | X | | SMUCT038-24 |
| SAMC-A094754 | *Gonionida benguela* | X | | SMUCT039-24 |
| SAMC-A094779 | *Trapezionida limula* | X | | SMUCT040-24 |
| SAMC-A094750 | *Galathea labidolepta* | X | X | SMUCT041-24 |
| SAMC-A094769 | *Galathea labidolepta* | X | | SMUCT042-24 |
| SAMC-A094807 | *Galathea sp.* A | X | X | SMUCT043-24 |
| SAMC-A094807 | *Galathea sp.* A | X | X | SMUCT044-24 |
| SAMC-A094807 | *Galathea sp.* A | X | | SMUCT045-24 |
| SAMC-A094802 | *Galathea sp.* A | | X | SMUCT046-24 |
| SAMC-A094802 | *Galathea sp.* A | | X | SMUCT047-24 |
| SAMC-A094802 | *Galathea sp.* A | X | | SMUCT049-24 |
| SAMC-A094743 | *Galathea sp.* A | | X | SMUCT050-24 |
| SAMC-A094775 | *Galathea sp.* B | | X | SMUCT051-24 |
| SAMC-A094781 | *Galathea sp.* B | | X | SMUCT052-24 |
| SAMC-A094786 | *Galathea sp.* B | | X | SMUCT053-24 |

# Checklist of extant squat lobster species (Chirostyloidea and Galatheoidea) from South Africa

**Infraorder** Anomura MacLeay, 1838

**Superfamily** Chirostyloidea Ortmann, 1892

**Family** Chirostylidae Ortmann, 1892

*Chirostylus* cf. *dolichopus* Ortmann 1892

*Hapaloptyx difficilis* Stebbing, 1920

*Heteroptychus edwardi* (Kensley, 1981)

*Uroptychus boucheti* Baba, Corbari & Macpherson, 2024

*Uroptychus foulisi* Kensley, 1977

*Uroptychus remotispinatus* Baba & Tirmizi, 1979

*Uroptychus simiae* Kensley, 1977

*Uroptychus undecimspinosus* Kensley, 1977

**Superfamily** Galatheoidea Samouelle, 1819

**Family** Galatheidae Samouelle, 1819

*Allogalathea elegans* (Adams, 1847)

*Galathea hydrae* (Macpherson & Robainas-Barcia, 2015)

*Galathea labidolepta* (Stimpson, 1858)

*Galathea lumaria* Baba, 2005

*Galathea* cf. *pubescens* Stimpson, 1858

*Galathea tanegashimae* Baba, 199

*Galathea* n. sp. A

*Galathea* n. sp. B

*Lauriea gardineri* (Laurie, 1926)

*Phylladiorhynchus* cf. *janiqueae* Rodríguez-Flores, Macpherson & Machordom, 2021

**Family** Munididae Ahyong, Baba, Macpherson & Poore, 2010

*Agononida africerta* Poore & Andreakis, 2012

*Babamunida brucei* (Baba, 1974)

*Curtonida manqingae* (Liu, Lin & Huang, 2013)

*Gonionida benguela* (de Saint Laurent & Macpherson, 1988)

*Gonionida hoda* (Macpherson, Rodríguez-Flores & Machordom, 2017)

*Gonionida shaula* (Macpherson & de Saint Laurent, 2002)

*Raymunida* cf. *vittata* Macpherson, 2009

*Trapezionida antonbruuni* (Tirmizi & Javed, 1980)

*Trapezionida babai* (Tirmizi & Javed, 1976)

*Trapezionida* cf. *barbeti* (Galil, 1999)

*Trapezionida janetae* (Tirmizi & Javed, 1992)

*Trapezionida limula* (Macpherson & Baba, 1993)

*Trapezionida mesembria* (Macpherson, Rodríguez-Flores & Machordom, 2017)

*Trapezionida nesiotes* (Macpherson, 1999)

*Trapezionida* cf. *sphinx* (Macpherson & Baba, 1993)

*Trapezionida* n. sp. A

*Typhlonida* n. sp. A

**Family** Munidopsidae Ortmann, 1898

*Galacantha rostrata* A. Milne-Edwards, 1880

*Munidopsis antonii* (Filhol, 1884)

*Munidopsis aries* (A. Milne-Edwards, 1880)

*Munidopsis chacei* Kensley, 1968

*Munidopsis gladiola* Macpherson, 2007

*Munidopsis laurentae* Macpherson & Segonzac, 2005

*Munidopsis kensleyi* Ahyong & Poore, 2004

*Munidopsis simplex* (A. Milne-Edwards, 1880)

*Munidopsis subsquamosa* Henderson, 1885

*Munidopsis teretis* Baba, 2005

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