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KERGUELENICA PETRESCUI (CRUSTACEA: CUMACEA), A NEW SPECIES FROM AUSTRALIAN WATERS

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ABSTRACT

Kerguelenica is a genus that was originally described on the basis of female specimens collected off the coast of the Kerguelen Islands by M. Ledoyer in 1977. At the time, *Kerguelenica* was recognized as a problematic genus in that the family placement was unclear due to the lack of male specimens, and Ledoyer (1977) placed the genus in Pseudocumatidae with some unease. We describe a new species of *Kerguelenica* from specimens collected from the continental slope of Australia and Tasmania, from depths of 1000-1800 m. The adult male and ovigerous female are fully described and figured. The new species can be distinguished from the only other species in the genus, *K. platycephala*, by several characters. The new species has an ocular lobe, lacks a pair of dorsal protuberances on the carapace, in maxilliped 3 the ischium is present and the merus is very broad but the carpus is less broad than the merus, the basis of pereiopod 3 is slightly shorter than twice the length of the other articles together, and the telson is more than half the uropod peduncle length. In comparison, *K. platycephala* has no ocular lobe, bears a pair of dorsal protuberances on the carapace, maxilliped 3 is without an ischium and both the merus and carpus are broad, the basis of pereiopod 3 is 1.5× the other articles together, and the telson is half the length of the uropod peduncles. In other respects, the two species are quite similar in appearance. However, the description of the new species and especially the adult male do not resolve the issue of the family affinity of the genus.

KEY WORDS: Cumacea, Pseudocumatidae, *Kerguelenica*

INTRODUCTION

The waters around Australia are known for their great diversity in various crustacean groups, especially the peracarids, and the cumacean fauna is quite rich, both in shallow and deeper waters. With continued study of the Australian fauna, representatives of seven of the eight families have been discovered (Petrescu, 2004), the only exception to date being a representative of Pseudocumatidae. Pseudocumatidae is a small family currently comprising 29 species in 13 genera, although there are an additional two species being described (AM). The family is primarily known from the North Atlantic and associated basins (Mediterranean, Black Sea, Sea of Azov, Caspian Sea), with a single representative from the southern hemisphere, *Kerguelenica platycephala* Ledoyer, 1977.

The genus *Kerguelenica* was erected in 1977 to accommodate a new species, *K. platycephala* Ledoyer, 1977, described from waters around the Kerguelen Islands. At the time, Ledoyer was uncertain about the family to which the genus belonged, considering the similarities to both Diastylidae [at the time, Diastylidae included the genera now assigned to Gynodiastylidae] and Pseudocumatidae, deciding in the end to place it in Pseudocumatidae due to the uniarticulate uropod exopod (Ledoyer 1977). Ledoyer did not have any adult males among the specimens that he described, and cumacean family diagnoses typically require a combination of male and female characters for correct family placement.

The new species *Kerguelenica petrescui* is described based on ample material collected from waters east and northeast of Tasmania, including a full description of the adult male as well as the ovigerous female.

MATERIAL AND METHODS

Epibenthic sled and dredge collections were made as part of a sampling program to explore and document the biodiversity of the continental slope off the southern coast of Australia, particularly off the coasts of Tasmania and Victoria (Poore et al., 1994). The material was made available by the Museum Victoria, Melbourne, Australia.

Specimens were mounted in a mixture of 80% glycerin/20% ethanol and drawn using a camera lucida on a Leica dissecting microscope and Leica compound microscope. Body length is measured from the tip of the pseudorostral lobes to the posterior border of pleonite 6. Illustrations were completed using a Wacom tablet and the Adobe Illustrator and Adobe Photoshop programs, after the techniques in Coleman (2003).

SYSTEMATICS

Kerguelenica Ledoyer, 1977

Kerguelenica Ledoyer, 1977: 209-210, fig. 9; Băcescu, 1992: 378.

Diagnosis.—Carapace dorso-ventrally compressed, with marginal carina, antenna 2 of female of 3 articles, male without exopods on pereiopods 3-4, female maxilliped 3 with exopod, telson shorter than pleonite 6, roughly triangular, with 2 terminal setae, endopod of uropod uniarticulate.

Kerguelenica platycephala Ledoyer, 1977

Kerguelenica platycephala Ledoyer, 1977: 209-210, fig. 9.

Diagnosis.—Adult female. Carapace swollen dorsally along branchial region, antero-lateral angle broadly rounded, pseudorostrum short, antennal notch absent, no trace of eye lobe. Pereonites 2-3 swollen dorsally with dorso-ventral furrow. Antennule main flagellum of 3 articles, accessory flagellum of 2 articles. Pereiopod 3 with uniarticulate

rudimentary exopod, pereiopod 4 rudimentary exopod reduced to a slight protuberance.

Male unknown.

Material.—Holotype in the "collection de l'auteur" (Ledoyer, 1977), 2 female paratypes, MNHN Cu.165, 4-5.5 mm; 4 other specimens from the same location recorded by Ledoyer 1977, deposition unknown.

Distribution.—South East Kerguelen, Indian Ocean, St 24 (61), 50°10.07′S, 69° 48.07′E, 195 m.

Kerguelenica petrescui n. sp.

Material.—Holotype ovigerous female, Museum Victoria J54452, 39°48′36″S, 146°18′48″E, 1118-1277 m. Paratypes: 1 adult male, dissected, Museum Victoria J54454, 39°48′36″S, 146°18′48″E, 1118-1277 m; 1 adult male, dissected, Museum Victoria J54459, 39°48′36″S, 146°18′48″E, 1118-1277 m; 1ovigerous female, dissected, Museum Victoria J54457, 39°48′36″S, 146°18′48″E 1118-1277 m; 9 ovigerous females, 3 adult males, 16 juveniles, Museum Victoria J54453, 39°48′36″S, 146°18′48″E 1118-1277 m; 1 ovigerous female, Museum Victoria J54458, 38°21′54″-38°21′24″S, 149°20′00″-149°20′54″E J54458, 1000 m; 6 females, 3 males, Museum Victoria J54455, 42°00′15″-41°57′46″S, 148°43′33″-148°42′05″E, 1200 m; 1 juvenile, Museum Victoria J54456, 38°29′20″-38°26′49″S, 149°19′59″-149°20′47″E, 1800 m.

Distribution.—Bass Strait, Tasmania, Victoria, and New South Wales slope of Australia, 38-42°S, 146-150°E.

Depth.—1000-1800 m.

Diagnosis.—Carapace and pereon smooth. Female and male antennule main flagellum of 4 articles, accessory flagellum in female of 3 articles, in male of 2 articles. Antenna 2 of male short, only 0.75 × length of carapace. Female with uniarticulate rudimentary exopod on pereiopod 3, without rudimentary exopod on pereiopod 4. Uropod rami subequal.

Description.—Adult female, 4.2 mm. Carapace more than twice length of pereon, dorso-ventrally compressed, with marginal carina, pseudorostral lobes 0.3 carapace length, pseudorostrum short, antero-lateral angle broadly rounded, antennal notch absent. Eye lobe acute, without any trace of visual elements (Fig. 1A-B).

Antennule peduncle of 3 articles; article 1 subequal to articles 2 and 3 together, disto-medial margin toothed, with simple seta; article 2 longer than article 3, with 3 simple setae; article 3 with 2 simple setae; main flagellum of 4 articles, article 2 with 2 multi-annulate setae distally, article 3 with simple seta and 2 long simple setae distally, article 4 rounded apically; accessory flagellum of 3 articles, little longer than article 1 of main flagellum, with 3 simple setae distally (Fig. 1C).

Antenna of 4 articles, article 1 small, with 1 pappose seta, article 2 large, with 1 pappose seta; article 3 half the length of article 4, with 1 pappose seta; article 4 rounded apically (Fig. 1D).

Mandible navicular, with row of 9 lifting setae and 1 simple seta, lacinia mobilis with 4 cusps, incisor with 4 cusps (Fig. 1E).

Maxillule with 2 lobes; outer broad lobe lateral margin with 1 simple seta, medial margin with fine hair-like setae, apical margin with row of 1 pappose and 8 stout setae; inner narrow lobe with 5 setae terminally; palp with 2 long setae (Fig. 1F).

Maxilla broad endite apical margin with 14 simple setae, disto-medial corner with 3 stout setae, medial margin with 27 setae; inner narrow endite with 4 micro-serrate setae apically, outer narrow endite with 5 micro-serrate setae apically (Fig. 1G).

Maxilliped 1 basis shorter than other articles together, medial lobe apical margin with 6 plumose setae and 1 rounded tubercle, lateral margin with 8 plumose setae, medial margin with 2 hook setae; ischium absent; merus shorter than carpus, with 1 plumose seta; carpus broad, length subequal to dactylus and propodus together, medial face with 4 simple, 3 pappose and 5 comb setae; propodus with 2 pappose and 3 simple setae, medial margin toothed; dactylus with 1 micro-serrate and 3 simple setae (Fig. 1H).

Maxilliped 2 basis subequal to other articles together, with 3 pappose setae distally; ischium unarmed; merus subequal to carpus, with 3 pappose setae, disto-lateral corner toothed; carpus subequal to dactylus and propodus together, with 4 pappose setae; propodus margins toothed, with 5 pappose setae, dactylus shorter than propodus, with 4 simple setae and 1 stout terminal seta (Fig. 1I).

Maxilliped 3 basis longer than other articles together, with 7 plumose setae, lateral margin with fine hair-like setae; ischium unarmed; merus about half carpus length, with 2 plumose setae, toothed disto-laterally; carpus longer than dactylus and propodus together, with 6 plumose and 2 simple setae, medial margin toothed; propodus about half carpus length, with 4 plumose setae; dactylus about half propodus length with 5 simple setae and 1 stout terminal seta; exopod shorter than basis, flagellum with plumo-annulate setae (Fig. 1J).

Pereiopod 1 basis longer than other articles together, medial and lateral margins toothed distally, with 9 plumose setae and fine hair-like setae; ischium partly covered by merus, unarmed, disto-medial corner with tooth; merus about half carpus length, with 3 plumose setae, medial margin toothed; carpus 0.25 × basis, medial margin with narrow hyaline lamella and 2 plumose setae; propodus subequal to carpus with 4 simple setae; dactylus less than half propodus length, with simple setae; exopod shorter than basis, first flagellar article with toothed lateral margin, flagellum with plumo-annulate setae (Fig. 2A).

Pereiopod 2 basis subequal to other articles together, half of medial margin with narrow hyaline lamella, lateral margin with 2 plumose and 1 simple setae and fine hair-like setae; ischium unarmed, with tooth on disto-lateral corner; merus 0.3 × carpus with 2 micro-serrate setae laterally; carpus 0.45 × basis, with 2 simple and 2 micro-serrate setae; propodus 0.35 × dactylus with 1 simple seta; dactylus lateral margin partly toothed, with 7 simple setae; exopod subequal to basis, flagellum with plumo-annulate setae (Fig. 2B).

Pereiopod 3 basis 1.8 × other articles together, with 1 plumose seta; ischium about half merus length with 1 simple seta; merus shorter than carpus with 1 simple seta; carpus

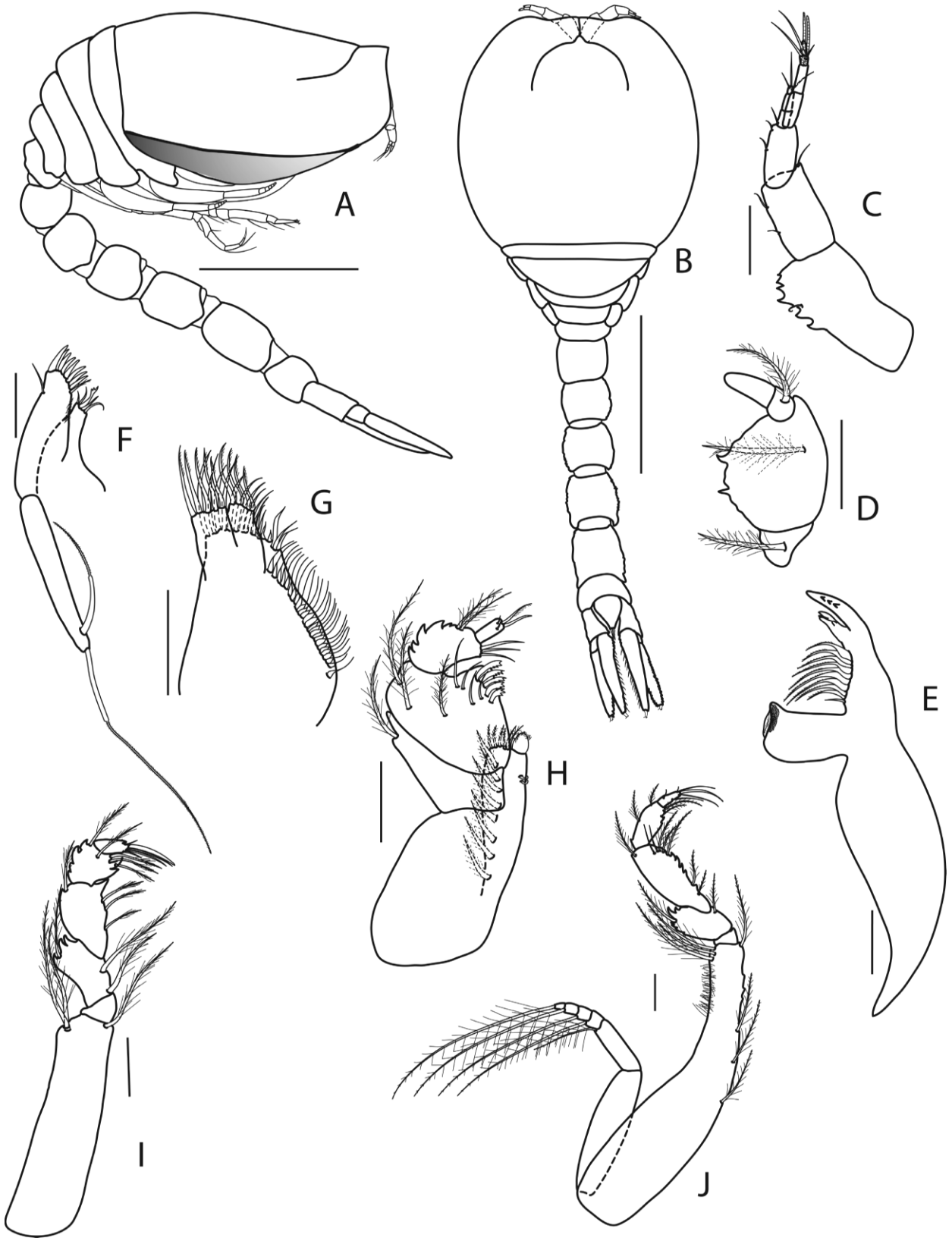

Fig. 1. *Kerguelenica petrescui* ovigerous female, holotype J54452 A, paratype J54457, B-J, scale bars A-B, 1.0 mm, C-J 0.1 mm. A, side; B, dorsal; C, antennule; D, antenna; E, mandible; F, maxillule; G, maxilla; H, maxilliped 1; I, maxilliped 2, J maxilliped 3.

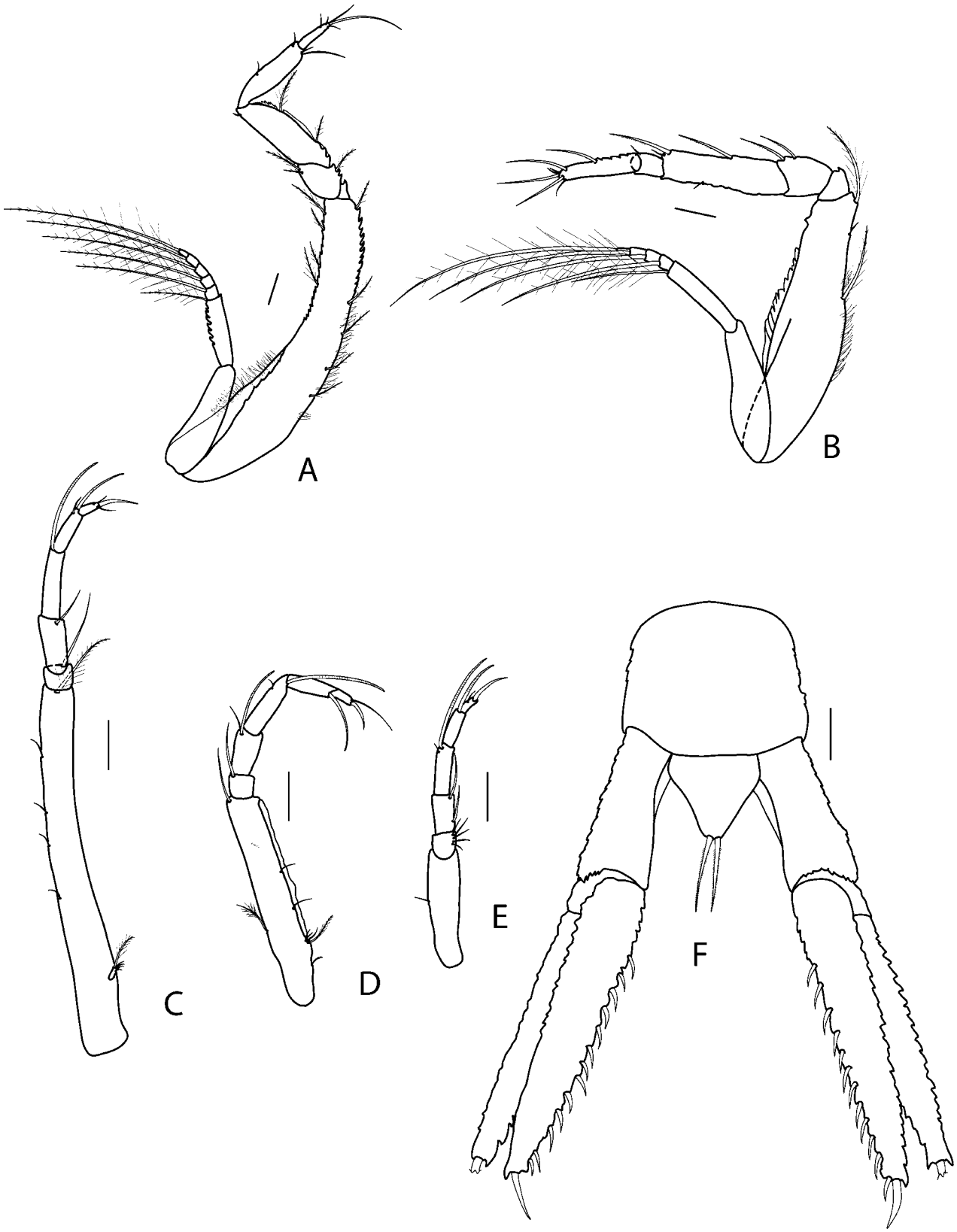

Fig. 2. *Kerguelenica petrescui* ovigerous female, paratype J54457, scale bars 0.1 mm. A, pereiopod 1; B, pereiopod 2; C, pereiopod 3; D, pereiopod 4; E, pereiopod 5, F, telson and uropods.

with 1 multi-annulate seta; propodus twice dactylus length, with 1 simple and 1 multi-annulate seta; dactylus with 2 simple setae and 1 stout terminal seta; rudimentary exopod uniarticulate with row of 4 simple setae and 1 plumose seta apically (Fig. 2C).

Pereiopod 4 basis subequal to other articles together, with 1 micro-serrate, 1 plumose, 1 pappose and 6 simple setae, medial margin with narrow hyaline lamella; ischium about half merus length, with 1 simple seta; merus shorter than carpus with 1 simple and 1 multi-annulate seta; carpus subequal to dactylus and propodus together, with 1 simple and 1 multi-annulate seta; propodus with 1 multi-annulate seta; dactylus about half propodus length with 1 simple seta and 1 stout terminal seta; rudimentary exopod absent (Fig. 2D).

Pereiopod 5 basis shorter than other articles together with 1 simple seta; ischium greater than half merus length, with row of 5 simple setae on medial margin; merus shorter than carpus with 2 simple setae; carpus 0.4 × basis with 1 multi-annulate and 1 simple seta distally; propodus about twice dactylus length with 1 multi-annulate seta distally; dactylus with 1 simple seta and 1 stout terminal seta (Fig. 2E).

Telson 0.5 × pleonite 6, 0.6 × peduncle, almost triangular in shape, with 2 terminal setae (Fig. 2F).

Uropod peduncles 0.9 × pleonite 6, with toothed lateral and distal margins, medial margin unarmed; endopod uniarticulate, subequal to exopod, with toothed margins, medial margin with 12-13 simple setae, 1 simple seta terminally; exopod biarticulate, article 1 0.2 × article 2, margins toothed, with 1 simple seta terminally (Fig. 2F).

Adult male, 3.7 mm. Carapace twice the length of pereon, dorso-ventrally compressed, with a marginal carina, pseudorostral lobe 0.3 × carapace length, antero-lateral angle broadly rounded, antennal notch absent. Eye lobe acute, without any trace of visual elements (Fig. 3A-B).

Antennule peduncle of 3 articles; article 1 subequal to articles 2 and 3 together, disto-lateral corner toothed; article 2 greater than article 3, with simple setae, medial margin toothed; article 3 with simple seta laterally, and with simple and pedunculate setae distally; main flagellum of 4 articles, articles 1-4 each with a few long simple setae, article 3 also with 2 multi-annulate setae distally; accessory flagellum biarticulate, subequal to article 1 and 2 of main flagellum, article 1 with 2 simple setae, article 2 with 7 simple setae (Fig. 3C).

Antenna tucked under carapace, 0.75 × length of carapace; peduncle article 1 unarmed, 0.5 × article 2; article 2 with 1 pappose seta; articles 3-4 small, unarmed; article 5 almost twice other articles together, with rows of hair-like setae along anterior margin, and with 4 simple setae distally, flagellum of 17 articles, articles 1-16 with a row of hair-like setae on anterior margin, last article with terminal hair-like setae (Fig. 3D).

Maxilliped 3 basis longer than other articles together, with 3 plumose setae, disto-lateral corner with 2 long plumose setae, lateral margin with fine hair-like setae; ischium short, unarmed; merus about half carpus length, with 2 plumose setae, lateral margin toothed; carpus greater than dactylus and propodus together, with 6 plumose setae, toothed; propodus with 6 plumose setae, medial margin toothed; dactylus about half propodus length, with 3 simple setae and 1 stout terminal seta; exopod shorter than basis, basal article with 2 plumose setae, flagellum with plumo-annulate setae (Fig. 3E).

Pereiopod 1 basis longer than other articles together, with 3 plumose and 1 pappose setae, narrow hyaline lamella midway along lateral margin, disto-medial margin toothed; ischium short, unarmed; merus less than half carpus length, with 1 plumose seta, medial margin toothed; carpus 0.3 × basis length, medial margin with narrow hyaline lamella and 2 plumose setae; propodus subequal to carpus length, with 1 plumose and 2 simple setae, medial margin with narrow hyaline lamella; dactylus less than half propodus length with 4 simple setae and 1 stout terminal seta; exopod shorter than basis, basal article with 2 plumose and 3 simple setae, article 2 lateral margin with narrow hyaline lamella, flagellum with plumo-annulate setae (Fig. 3F).

Pereiopod 2 basis subequal to other articles together, with 1 plumose and 1 pappose seta, lateral margin with narrow hyaline lamella; ischium about half merus length, unarmed; merus less than half carpus length, with 1 plumose and 1 micro-serrate seta; carpus half basis length, toothed, with 3 micro-serrate and 1 simple setae, lateral margin partly with narrow hyaline lamella; propodus about half dactylus length, with 1 simple seta; dactylus with 7 simple setae, toothed; exopod subequal to basis, basal article with 1 pappose seta, flagellum with plumo-annulate setae (Fig. 3G).

Pereiopod 3 basis longer than other articles together, toothed, with simple setae, 1 plumose and 1 pappose seta, lateral margin with narrow hyaline lamella; ischium half merus length, with 2 simple setae, toothed; merus shorter than carpus with simple seta, toothed; carpus subequal to dactylus and propodus together, with 1 simple and 1 multi-annulate seta, toothed; propodus with 1 simple and 1 multi-annulate seta, toothed; dactylus less than half propodus length, with 2 simple setae and stout terminal seta; exopod absent, single pappose seta marking exopod position (Fig. 4A).

Pereiopod 4 basis subequal to other articles together, with 2 pappose setae; ischium half merus length, with 1 multi-annulate seta; merus shorter than carpus, with 1 multi-annulate seta; carpus subequal to dactylus and propodus together, with 1 simple and 1 multi-annulate seta, lateral margin toothed; propodus with 1 simple and 1 multi-annulate seta; dactylus less than half propodus length, with 2 simple setae and 1 stout terminal seta; exopod absent, single pappose seta marking exopod position (Fig. 4B).

Pereiopod 5 basis subequal to dactylus, propodus and carpus together, with 1 simple seta; ischium greater than half merus length, with 2 simple setae; merus with 2 simple and 1 multi-annulate setae; carpus subequal to dactylus and propodus, with 1 simple and 1 multi-annulate seta; propodus with 1 simple and 1 multi-annulate seta; dactylus with 2 simple setae and 1 stout terminal seta (Fig. 4C).

Telson 0.7 × pleonite 6 length, almost triangular in shape, with 2 terminal setae (Fig. 4D).

Uropod peduncles subequal to pleonite 6, with toothed lateral and distal margins, medial margin unarmed; endopod uniarticulate, subequal to exopod, with toothed lateral margin, medial margin with 12-13 simple setae, 1 simple

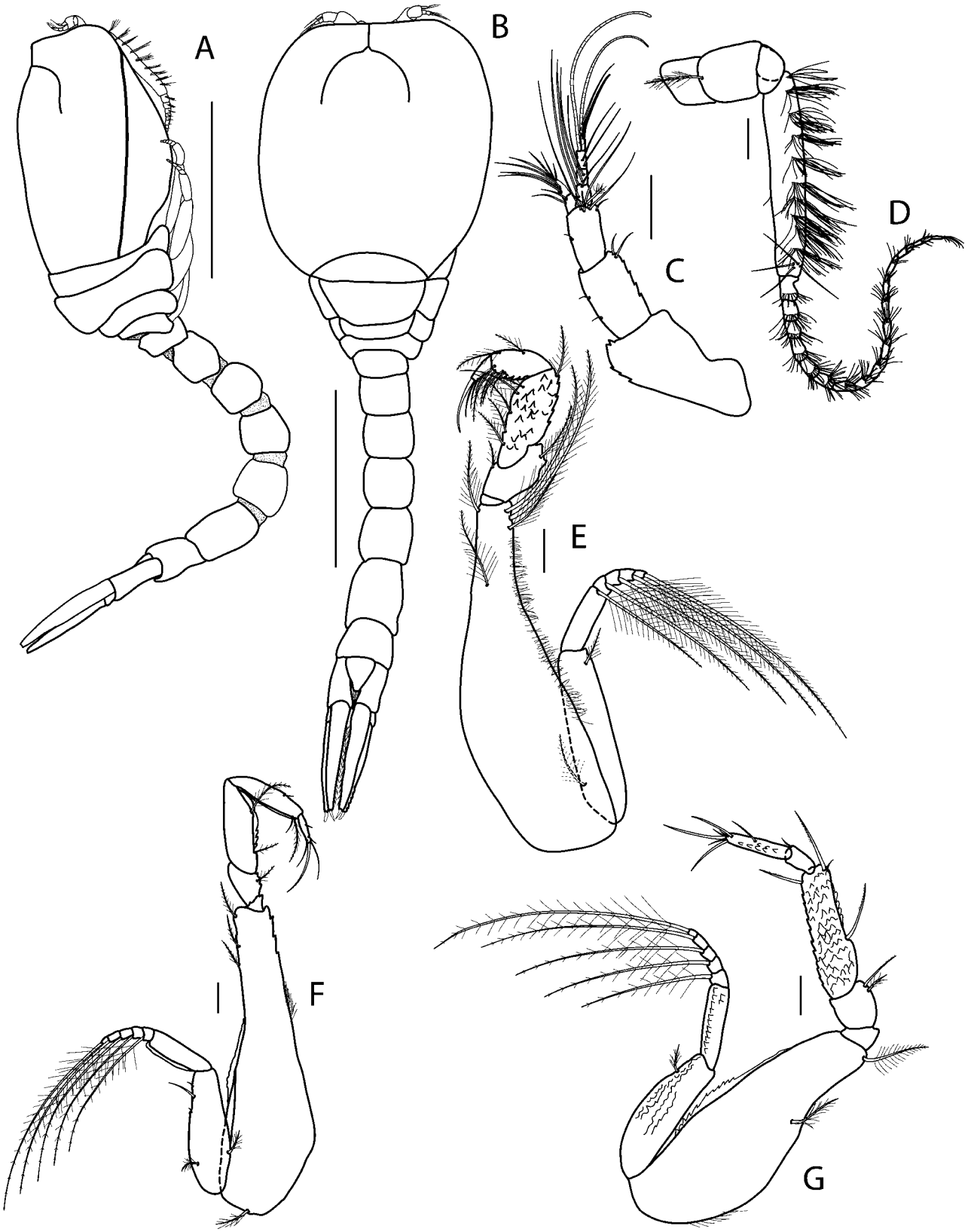

Fig. 3. *Kerguelenica petrescui*, adult male, paratype J54454, scale bars A-B 1.0 mm, C-G 0.1 mm. A, side; B, dorsal; C, antennule; D, antenna; E, maxilliped 3; E, pereiopod 1; F, pereiopod 2.

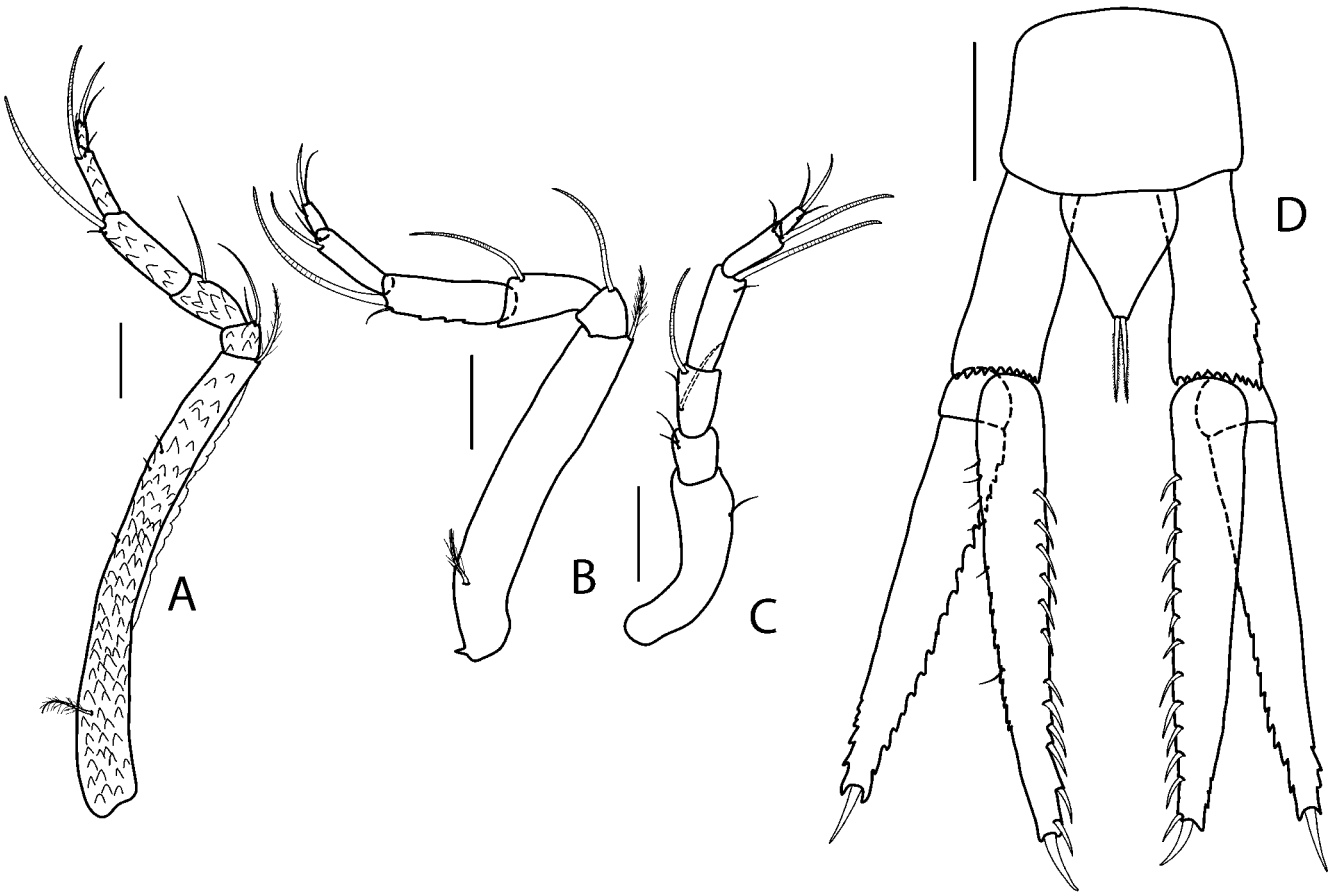

Fig. 4. *Kerguelenica petrescui*, adult male, paratype J54454, scale bars A-D 0.1 mm. A, pereiopod 3; B, pereiopod 4; C, pereiopod 5; D, telson and uropods.

seta terminally; exopod biarticulate, article 1 0.1 × article 2, margins toothed, with 1 simple seta terminally (Fig. 4D).

Etymology.—The species is named *petrescui* for Iorgu Petrescu, in honor of his many excellent contributions to cumacean systematics.

Remarks.—Although only the female of *Kerguelenica platycephala* is known, it is separated from *K. petrescui* by a number of features. An ocular lobe without lenses is present, while in *K. platycephala*, there is no trace of an ocular lobe illustrated. The carapace and pereon are smooth while in *K. platycephala* the carapace is swollen dorsally along the branchial region and pereonites 2-3 are swollen dorsally with a dorso-ventral furrow. The antennule main and accessory flagella have 4 and 3 articles, compared with 3 and 2 in *K. platycephala*. There is no rudimentary exopod on P4 in *K. petrescui* while in *K. platycephala* the rudimentary exopod is present as a slight protuberance. The ischium is visible on maxillipeds 2 and 3 while in *K. platycephala* the ischium is not visible on maxillipeds 2 and 3. The merus of maxilliped 3 is broad, but the carpus is much less broad than the merus, while in *K. platycephala* the merus and carpus are both broad. The basis of pereiopod 3 is 1.95 × the other articles together, while in *K. platycephala* the basis is 1.5 × the other articles together. The telson is more than half the length of the uropod peduncles, while in *K. platycephala* the telson is approximately half the length of the uropod peduncles.

Discussion

The genus demonstrates aspects of Diastylidae, Pseudocumatidae, and Gynodiastylidae, with a small telson with 2 long terminal setae, natatory exopods on maxilliped 3-pereiopod 2 in both the male and female, the male entirely without pleopods, male with the antennal flagellum short but more than 13 articles, carapace dorsoventrally flattened with a marginal carina, and a uniarticulate uropod endopod.

Diastylidae is defined by the telson being well developed with 0 to 2 terminal setae, females with natatory exopods on maxilliped 3 to pereiopod 2, males with natatory exopods on maxilliped 3 to pereiopod 2-4, male with 0 to 2 pairs of pleopods without a process (0 pair *Atlantistylis*, 1 pair *Ektonodiastylis*, all other genera in which male is known, 2 pairs), mandibles navicular (truncate in *Diastyloides* only), and uropod endopod of 1 to 3 articles (1 article in *Holostylis* only), carapace not dorsoventrally flattened. Gynodiastylidae is similar to Diastylidae, but is separated by the female lacking an exopod on maxilliped 3, a lack of pleopods in the male, and a very short antennal flagellum in the adult male, no longer than 13 articles and usually 7 articles. Pseudocumatidae is also similar to Diastylidae, separated by the tiny antennular flagellum, males with 0 to 2 reduced or

rudimentary pleopods, small telson without terminal setae, uniarticulate uropod endopod, and the carapace may be dorsoventrally flattened with a marginal carina.

The characters present in *Kerguelenica* do not allow it to be placed in any of the three families with any degree of certainty, as it shares characteristics with all three families. The lack of pleopods and the short antennal flagellum in the male are suggestive of a relationship with the Gynodiastylidae; however, loss or reduction of morphological characters is frequently interpreted as convergent. In addition, *Kerguelenica* cannot be a member of Gynodiastylidae as the female bears an exopod on maxilliped 3 and the carapace is dorsoventrally flattened, two characters that are not characteristic of the Gynodiastylidae. In the same vein, while the dorsoventrally flattened carapace and uniarticulate uropod endopod are suggestive of a relationship with Pseudocumatidae, the presence of terminal setae on the telson and the state of the antennular accessory flagellum do not agree with the current diagnosis of that family. Similarly, the well developed terminal setae on the telson are suggestive of Diastylidae, but a uniarticulate uropod endopod is known from only one genus (*Holostylis*) and the carapace is never dorsoventrally flattened.

The presence of a single genus ascribed to Pseudocumatidae in the southern hemisphere has been puzzling, as the family is otherwise restricted to the North Atlantic and tectonically related basins, and is highly endemic in the Caspian and Black seas. The Antarctic is a region of high endemism among cumaceans, but only at the specific level; *Kerguelenica* was the only endemic cumacean genus (Corbera 2000). With the addition of the new Australian species, it is clear that *Kerguelenica* is not endemic to the Antarctic. Based on the current distribution of the genus in two distant locations, it may be expected that other species will be found in temperate to cool waters, perhaps around New Zealand and South Africa, at continental shelf and slope depths. It is unlikely that there is much potential for dispersion in this genus, as both the males and females have the same number of small exopods, suggesting that these organisms do not spend much time in the water column.

A recent morphological phylogenetic analysis (McCarthy et al., in prep) supports the placement of *Kerguelenica* outside Pseudocumatidae, and forcing *Kerguelenica* to be part of the in-group significantly lengthens the tree. Thus, at this point in time, the familial placement of *Kerguelenica* is declared *incertae sedis*, awaiting revision of the cumacean families. It would not, in our opinion, be helpful at this point to erect a new family to contain the genus *Kerguelenica*. It would also not be helpful to further dilute the diagnosis of a family in order to accommodate *Kerguelenica*.

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Les Watling and 2 anonymous reviewers provided helpful comments. Danielle Defaye of the MNHN graciously loaned the paratypes of *Kerguelenica platycephala* for our inspection. Gary Poore and Jo Taylor of the Museum Victoria were extremely hospitable, as always, during the visit of SG in 2006.

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