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A new genus and species of the hermit crab family Paguridae (Crustacea: Decapoda: Anomura: Paguroidea) from Australia

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Abstract

A new genus, *Catapaguropsis*, and new species, *Catapaguropsis queenslandica*, are described from off Queensland, northeastern Australia. The new genus is compared and contrasted to two other genera of the family Paguridae, *Catapagurus* and *Pteropagurus*, with which it shares certain common characters. The new species is notable for its exhibited sexual dimorphism.

Key words: Crustacea, Decapoda, Paguroidea, Paguridae, new genus, new species, Australia

Introduction

The hermit crab fauna of Queensland, Australia, is best known from the Great Barrier Reef and surrounding environs (Tudge 1995). However, the deeper waters off the Queensland coast have been found to contain some distinctive taxa. For example, McLaughlin & Lemaitre (2001) described a new paguroid family from a pair of specimens collected off Brisbane. McLaughlin (2004a) described a new species of *Catapagurus* A. Milne-Edwards, 1880, from off Tully that provided the evidence necessary to invalidate the resurrection of the genus *Hemipagurus* Smith, 1881 by Asakura (2001). Further, off Thursday Island, McLaughlin (2004b) found the first representative of a species previously known only from a single incomplete specimen collected by scientists of the 1873–1876 *Challenger* Expedition.

During the International Crustacean Conference held in Brisbane in 1990, two specimens of an unusual hermit crab were examined briefly by the first author. These specimens were among a number of hermit crabs subsequently sent to the second author as part of her study of Australian paguroids. Although the female specimen exhibits

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characters relating it to the genus *Catapagurus*, there are also sufficient differences in both sexes to justify assignment to a distinct genus. Therefore, we propose the new genus *Catapaguropsis* for the new species described herein as *Catapaguropsis queenslandica.*

The specimens used in this study are deposited in the Queensland Museum, Brisbane with the catalog reference code W. Terminology for the generic diagnosis and species' description follows that of McLaughlin (2003) and McLaughlin & Rahayu (2006). One measurement, shield length (sl), measured from the midpoint of the rostral lobe to the midpoint of the posterior margin of the shield provides an indication of animal size. The abbreviations stn and ovig. refer to station and ovigerous, respectively.

Taxonomy

Family Paguridae Latreille, 1802

Catapaguropsis n. gen.

Diagnosis. Eleven pairs of biserial phyllobranchiate gills. Rostrum broadly subtriangular or reduced to broadly rounded lobe; lateral projections moderately well developed. Ocular peduncles stout, corneas prominently dilated; ocular acicles triangular, each often with small submarginal spine. Antennal peduncle with supernumerary segmentation. Mandible (Fig. 2A) with entirely calcified cutting edge except for small, corneous blunt tooth at outer lower angle. Maxillule (Fig. 2B) with external lobe of endopod rudimentary or vestigial, internal lobe with long distal seta. Maxilla (Fig. 2C) with endopod exceeding distal margin of scaphognathite. First maxilliped (Fig. 2D) with slender endopod exceeding distal margin of basial endite. Second maxilliped without distinguishing characters. Third maxilliped (Fig. 2F) with crista dentata reduced, no accessory tooth. Sternite of third maxillipeds (thoracic somite IX of Pilgrim 1973) unarmed. Sternite of chelipeds (thoracic somite X) quite narrow, incompletely fused to larger sternite of second pereopods. Sternites of second and third pereopods (thoracic somites XI, XII) very broad, with distinct median concavities.

Chelipeds long, slender; right appreciably stouter, but not necessarily longer. Ambulatory legs sexually dimorphic; second pereopods distinctly shorter than third in male, dactyls slender; second and third pereopods approximately equal in females, dactyls somewhat blade-shaped. Fourth pereopods in males simple, propodal rasp absent; fourth pereopods in females semichelate, propodal rasp with single row of scales; preungual process elongate and setose in both males and females. Fifth pereopods minutely chelate.

Males with short, stout right sexual tube directed externally; very short left sexual tube; no unpaired pleopods. Females with paired gonopores; no paired and modified first pleopods, unpaired biramous left pleopods 2–4, pleopod 5 absent. Pleon reduced in males. Uropods symmetrical. Telson with weak transverse incisions; posterior lobes separated by broad median concavity, unarmed or with few minute spinules.

Type species. *Catapaguropsis queenslandica* n. sp., by present designation.

Etymology. The generic name is derived from *Catapagurus*, with the Greek ending opsis meaning like or relating to appearance and reflecting the similarity of the new genus to *Catapagurus*; gender feminine.

Distribution. Queensland, Australia; 296–303 m.

Remarks. Similarities with the genus *Catapagurus* are manifest primarily in the female, and include ambulatory legs with blade-shaped dactyls, ambulatory meri each with one or more subdistal spines on the dorsal surface, and the tendency for loss of the left fifth pleopod. Also, both the new genus and *Catapagurus* have a preungual process on the fourth pereopod. However, the absence of an accessory tooth on the crista dentata will immediately distinguish females of *Catapaguropsis* from *Catapagurus*.

It is not unusual in pagurids for the left or right second and/or third pereopods to be slightly longer than its member pair, but in *Catapaguropsis*, as in *Pteropagurus* McLaughlin & Rahayu, 2006, the third pereopods are markedly longer than the second. However, this difference is restricted to males in *Catapaguropsis*; females have ambulatory legs of generally equal length. Similarly, dimorphism in the fourth pereopods has been reported in certain species of *Pagurus* (Rahayu & Komai 2000, Komai & Osawa 2001, Komai & Rahayu 2004) but these differences relate to size and setation from left to right, and do not appear influenced by animal size or sex. In *Catapaguropsis*, differences in the structure and rasp development are sex related as noted in the species description. In *Catapaguropsis*, as in *Pteropagurus*, the sternite of the third pereopods is noticeably broadened, but in males of *Pteropagurus*, it is also dimorphic in its posterior extension. No dimorphism is seen in this sternite in *Catapaguropsis*. The two genera also share small body size, elongate chelipeds and ambulatory legs, absence of male pleopods, and symmetrical uropods.

Catapaguropsis queenslandica **n. sp. (Figs. 1–5)**

Type material. **Off Baldina, NE Queensland**. *Holotype* male (sl = 2.1 mm), R/V Franklin stn 42-2, 17°21.8'S, 146°48.5'E, 303–296 m, 15 May 1986 (W16589).

Paratype. Ovig. female (sl = 1.9 mm), same data as holotype.

Description. Shield (Fig. 1A) somewhat vaulted, broader than long, weakly calcified; anterior margin between rostral lobe and lateral projections concave; anterolateral margins sloping; posterior margin roundly truncate. Rostral lobe broadly rounded or roundly subtriangular, produced little if at all beyond level of lateral projections, latter unarmed or with tiny terminal spine. Carapace lateral lobes elongate, reaching anterior 0.3 of shield. Posterior carapace short, with broad median plate; cardiac sulci reaching to posterior margin. Branchiostegites membranous, unarmed.

Ocular peduncles very short, only slightly more than half length of shield; corneal diameter approximately equal to total peduncular length (including cornea). Ocular acicles triangular, reaching slightly beyond proximal margins of ultimate peduncular segments in female (Fig. 1B), shorter in male, each terminally acute or with tiny submarginal spine; separated basally by more than twice basal length of one acicle.

Antennular peduncles overreaching distal margins of corneas by more than lengths of ultimate peduncular segments; ultimate segment with few long, stiff setae on distal margin; penultimate segment with few scattered setae; basal segment with unarmed dorsolateral margin.

Antennal peduncles overreaching distal corneal margins by approximately 0.5 lengths of ultimate segments. Fifth and fourth segments unarmed; third segment with small ventral spine; second segment with dorsolateral distal angle produced, terminating in small spine, dorsomesial angle with small spine; first segment unarmed. Antennal acicle reaching distal margin of fourth peduncular segment, slender, terminating in simple spine. Antennal flagella missing. Third maxilliped with prominent spine on dorsodistal margin of merus.

Chelipeds subequal in length, but right appreciably stouter; both lacking hiatus between dactyl and fixed finger. Right cheliped (Fig. 3A–C, F) with chela 2.6 (female) to 3.2 (male) as long as broad; left chela 5.5 (female) to 7.3 (male) as long as broad. Dactyl 0.5 (male) to 0.6 (female) length of palm; dorsomesial margin rounded, dorsal surface weakly convex, all surfaces unarmed, but with numerous scattered, moderately long setae ventrally; cutting edge serrate (Fig. 3C) with 2 low, broad, calcareous teeth, terminating in tiny corneous claw, slightly overlapped by fixed finger. Palm slightly longer than carpus, dorsomesial and dorsolateral margins rounded and unarmed, dorsal surface weakly convex, also unarmed, fixed finger similarly unarmed, but ventral surfaces of both palm and fixed finger with numerous moderately long setae; cutting edge of fixed finger serrate (Fig. 3C) with 2 broad, low calcareous teeth, terminating in tiny corneous claw. Carpus slightly longer than merus; dorsomesial and dorsolateral margins each with row of irregularly-sized spines, largest in male; male with 1 very small spine on distomesial margin, ventromesial and ventrolateral margins each with row of tiny spines; female without spines on distomesial margin or either ventral margin. Merus laterally compressed; male with prominent spine on dorsodistal margin, row of small spines on dorsomesial margin, decreasing in size proximally, mesial face with few spinules ventrally, ventromesial and ventrolateral margins each with row of small spines; female with small spine on dorsodistal margin, other margins and surfaces unarmed. Ischium unarmed in both sexes.

Left cheliped (Fig. 3D, G, E) long and very slender. Dactyl approximately 1.5 length of palm longer than palm; surfaces rounded and unarmed, but with very sparsely scattered, moderately short setae; cutting edge with row of tiny, slender corneous teeth, terminating in minute corneous claw and sparse tuft of very short setae. Fixed finger similarly rounded and unarmed but with sparsely scattered setae; cutting edge with 4 minute calcareous teeth interspersed with minute corneous teeth, terminating in minute corneous claw and very sparse tuft of short setae. Palm with convex dorsal surface unarmed and glabrous; dorsomesial and dorsolateral margins rounded. Carpus and merus both noticeably longer than palm but only slightly longer than dactyl; dorsomesial and dorsolateral carpal margins each with row of very small, rather widely-spaced spines, female with dorsodistal spine considerably more prominent; surfaces all unarmed and with very few scattered setae. Merus with very small (male) or prominent (female) dorsodistal spine; surfaces unarmed; ventromesial and ventrolateral margins not delimited. Ischium unarmed, but with 1 or 2 spiniform protuberance on dorsal surface proximally.

Second and third pereopods (Fig. 4) sexually dimorphic. Male with second pereopods distinctly shorter than third; dactyls long, slender, left second approximately equal to length of propodus, left third 0.9 of propodal length, right second 0.8, right third 0.7 length of propodus, each with both dorsal and ventral row of moderately short, fine setae, all terminating in short, slender corneous claws. Propodi approximately twice length of carpi; surfaces all unarmed but each with dorsal and ventral row of short, fine, closely-spaced setae. Dorsal margins of carpi each with row of short, fine setae, dorsodistal margins each with minute or tiny spinule. Meri nearly three times length of carpi, unarmed, but each with few minute protuberances dorsally. Ischia unarmed. Second and third pereopods of female (second left missing) of approximately equal length. Dactyls 0.7–0.8 length of propodi, somewhat blade-shaped; terminating in small corneous claws; unarmed, but each with dorsal and ventral row of moderately long, fine setae. Propodi approximately twice length of carpi, unarmed but each with dorsal and ventral row of moderately long, fine setae. Carpi approximately 0.8 length of meri; dorsodistal margins each usually with tiny hooked spine, dorsal margins serrate, each with row of moderately short, fine setae. Meri each with small dorsodistal spine and 2 subdistal spines or spiniform protuberances on dorsal margin, also row of sparse setae dorsally. Fourth pereopods of female (Fig. 5A) weakly semichelate, propodal rasps each with single row of corneous scales; fourth pereopods of male (Fig. 5B) simple, no propodal rasp; preungual process (Fig. 5C) present in both sexes, slightly exceeding distal claw on dactyl, with distal portion setose. Fifth pereopods (Fig. 5D) similar in both sexes, minutely chelate. Sternites of second and third pereopods each with median concavity, more pronounced in male; anterior lobe of third subrectangular in both sexes.

Male with coxae of fifth pereopods approximately equal, right with stout, short sexual tube appearing as posterior coxal extension (Fig. 1D) directed to exterior; coxa of left with very short tube directed posteriorly; pleon markedly reduced posteriorly; no paired or unpaired pleopods. Female with paired gonopores; without paired first pleopods, pleon damaged but with only unpaired pleopods 3 and 4 present, no unpaired fifth; non-eyed eggs 0.5–0.6 mm diameter.

Uropods and telson (Fig. 5E, F) symmetrical in both sexes, markedly reduced in size in male. Telson with slight lateral incisions separating anterior and posterior portions; posterior lobes separated by broad, U-shaped median concavity; terminal margin unarmed or with 1or 2 microscopic spinules.

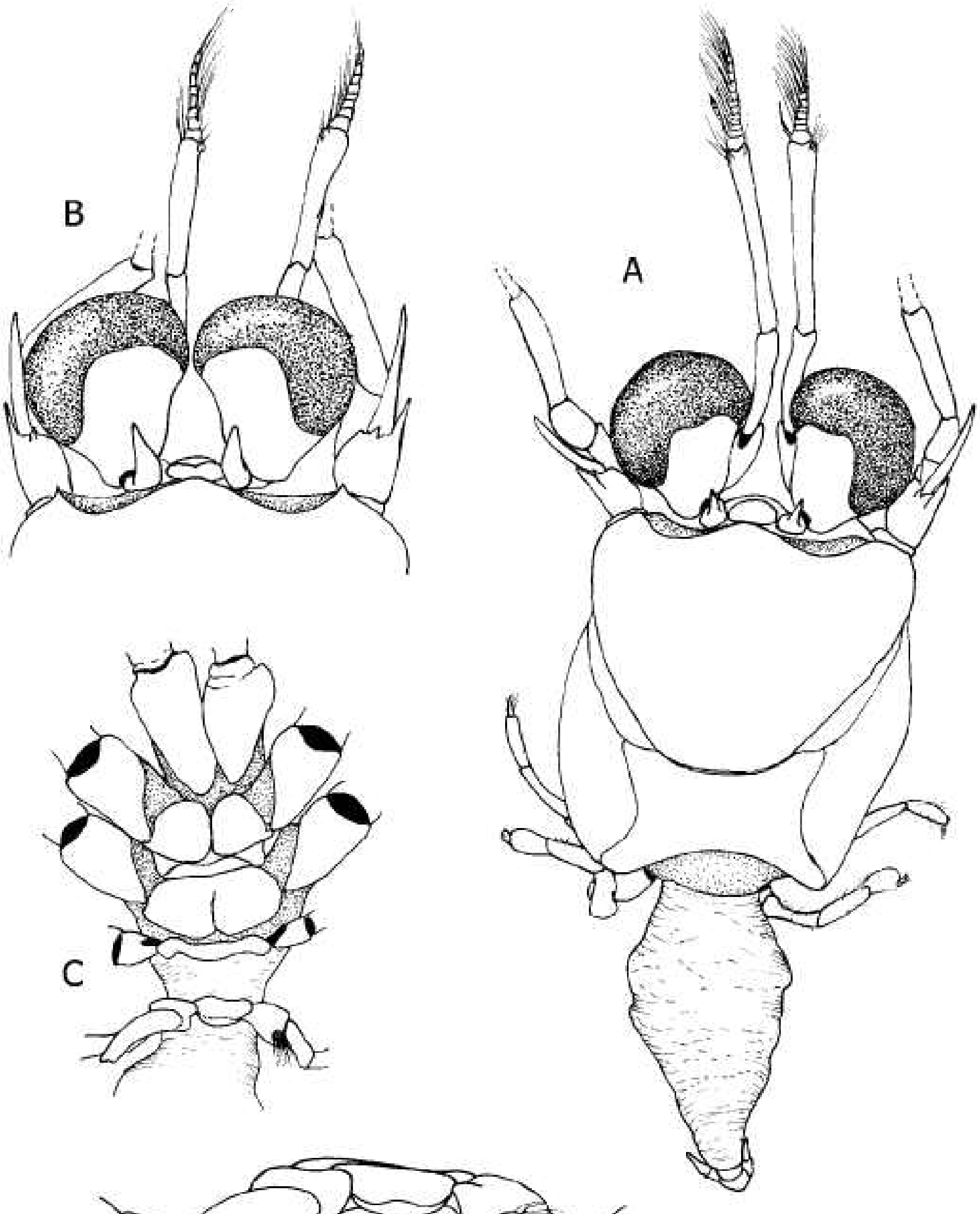

FIGURE 1. *Catapaguropsis queenslandica* n. gen. and n. sp., A, C–D, holotype male (sl = 2.1 mm) (W16589); B, paratype ovig. female (sl = 1.9 mm) (W16589). A, shield, cephalic appendages (antennal flagella missing), posterior carapace, fourth and fifth pereopods, and pleon (dorsal view); B, anterior portion of shield and cephalic appendages (antennal flagella missing) (dorsal view); C, thoracic sternites, coxae of pereopods 1–5, and sexual tubes (ventral view); D, sternite of fifth pereopods (thoracic somite XIV), and coxae with sexual tubes (ventral view). Scale equals 1 mm (A–C), and 0.5 mm (D).

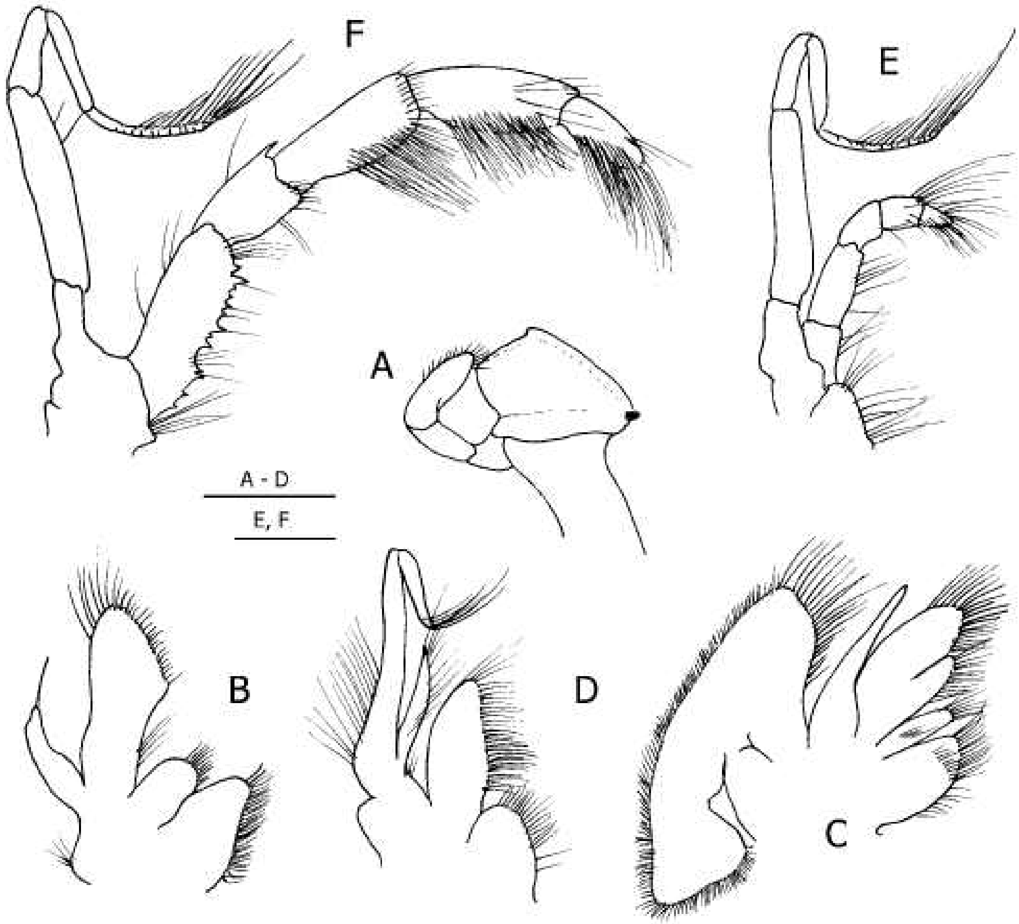

FIGURE 2. *Catapaguropsis queenslandica* n. gen. and n. sp., paratype ovig. female (sl = 1.9 mm) (W16589). Left mouthparts (internal view). A, mandible incisor process and palp; B, maxillule; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped. Scales equal 1 mm (A–D), and 0.5 mm (E, F).

Etymology. The specific epithet, *queenslandica*, is derived from the Australian state of Queensland.

Color. Unknown.

Habitat. Unknown.

Distribution. Known only from the type locality.

Variation. Although morphological variation cannot be assessed from the present two specimens, marked sexual dimorphism is apparent. Most notable are the difference in lengths of the male second and third pereopods, and the differences in the shapes of the pereopodal dactyls and propodi of the fourth pereopods between the male and female. Differences in the sizes of the uropods and telsons of the male and female also are substantial, but it is not known whether these are adaptations to different habitats or simply reflect abnormal development of these structures in the male holotype.

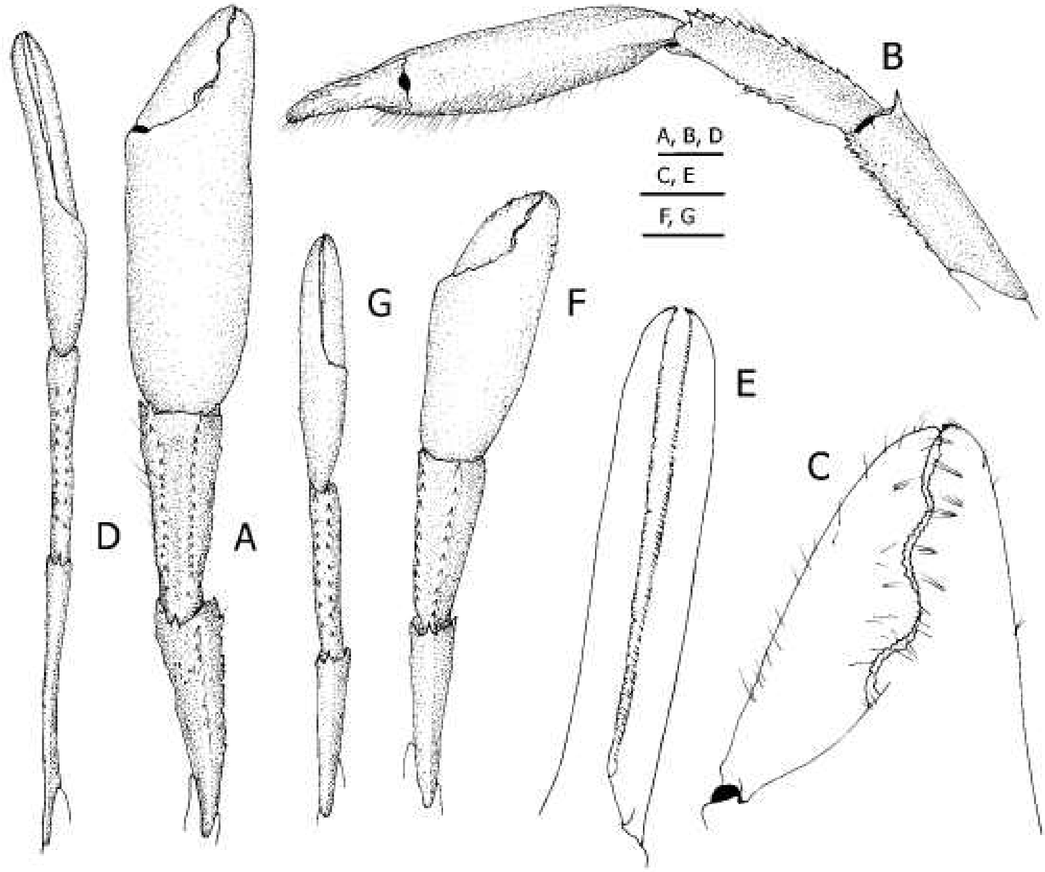

FIGURE 3. *Catapaguropsis queenslandica* n. gen. and n. sp., A–E, holotype male (sl = 2.1 mm) (W16589), F, G, paratype ovig. female (sl = 1.9 mm) (W16589). A, right cheliped (dorsal view); B, same (mesial view); C, dactyl and fixed finger of same (dorsal view); D, left cheliped (dorsal view); E, dactyl and fixed finger of same (dorsal view); F, right cheliped (dorsal view); G, left cheliped (dorsal view). Scales equal 1 mm (A, B, D, F, G), and 0.5 mm (C, E).

Remarks. Although sexually dimorphic preferences for particular species or sizes of gastropod shells have been demonstrated for some hermit crab species (Blackstone & Joslyn 1984, Asakura 1995, Elwood & Kennedy 1988), only two species, *Calcinus verrillii* (Rathbun, 1901), and *Calcinus tubularis* (Linnaeus, 1767), are known to be dimorphic in their basic habitat preferences. In both species, females most commonly occupy attached vermetid and turritellid tubes whereas males are found in typical mobile gastropod shells (Rodrigues *et al.* 2000, Gherardi 2004). Neither the study by Rodrigues *et al.* (2000) nor Gherardi (2004) addressed morphological dimorphism if any was present; however, Rodrigues *et al.* (2002), in a continuation of their work with *C. verrillii*, examined the effect the two habitats had on uropod symmetry. These authors found statistically significant differences in uropods, with tube dwellers having symmetrical uropods while in shell-dwelling individuals the uropods were asymmetrical. The influence of housing on uropod symmetry has been reported by several authors (see Imafuku & Ando 1999 for review), but Rodrigues *et al.*'s (2002) study is the first to indicate that some examples of sexual dimorphism may be directly influenced by habitat. The domicile or domiciles of *Catapaguropsis queenslandica* n. sp. are not known; however, certain dimorphic attributes suggest that it or they are unlikely to be gastropod shells, and very possibly are different for the sexes.

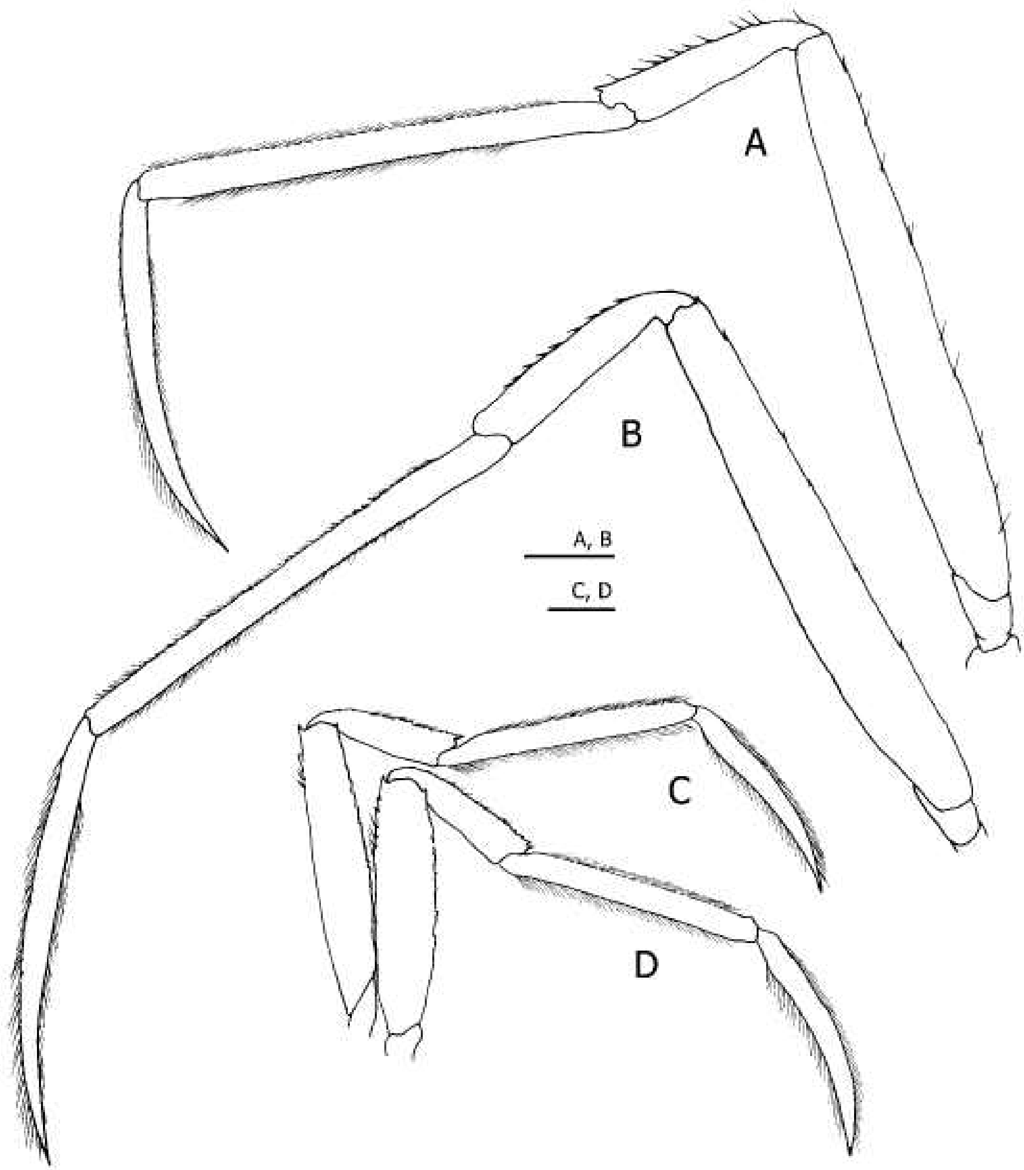

FIGURE 4. *Catapaguropsis queenslandica* n. gen. and n. sp., A, B, holotype male (sl = 2.1 mm) (W16589), C, D, paratype ovig. female (sl = 1.9 mm) (W16589). Second (A, C) and third (B, D) pereopods (lateral view). Scales equal 1 mm.

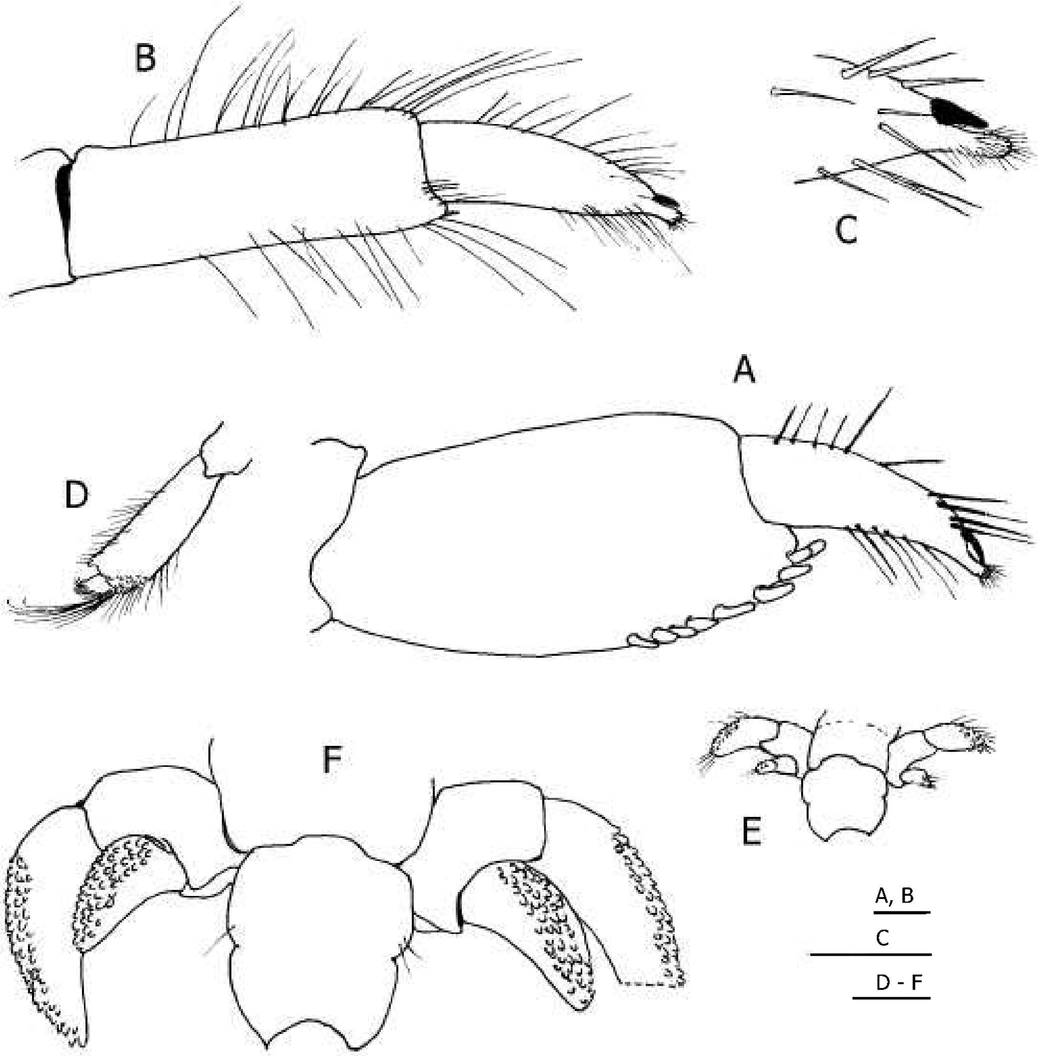

FIGURE 5. *Catapaguropsis queenslandica* n. gen. and n. sp., A, F, paratype ovig. female (sl = 1.9 mm) (W16589), B–E, holotype male (sl = 2.1 mm) (W16589). A, B, propodus and dactyl of right fourth pereopod (lateral view); C, tip of dactyl of fourth pereopod of holotype showing corneous claw and preungual process; D, propodus and dactyl of left fifth pereopod (lateral view); E, F, uropods and telson of male (E) and female (F). Scales equal 0.1 mm (A–C), and 0.25 (D–F).

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