

## THE GYNODIASTYLIDAE (CRUSTACEA: CUMACEA)

SARAH GERKEN

Darling Marine Center, University of Maine, Walpole, ME 04573, USA

Present address: Biology Department, James Madison University, Burruss Hall, MSC 7801,  
Harrisonburg, VA 22807, USA (gerkensa@jmu.edu)

### Abstract

Gerken, S., 2001. The Gynodiastylidae (Crustacea: Cumacea). *Memoirs of Museum Victoria* 59: 1–276.

The Gynodiastylidae are a small family of Cumacea, of 58 previously published species, found primarily in the Southern Hemisphere. Investigation of the collections of Museum Victoria, the Australian Museum, and the South Australian Museum yielded six new genera and 45 new species, diagnosed and figured in this monograph. All previously known species are diagnosed and figured (from type specimens where possible, or from the literature when type specimens were not available). Full descriptions of all species are available via the DELTA database, Gynodiastylidae, which can be accessed at [www.museum.vic.gov.au/memoirs](http://www.museum.vic.gov.au/memoirs).

### Introduction

Cumaceans are small crustaceans (1–30 mm), frequently encountered in benthic marine and littoral environments, that brood their young in a ventral marsupium. Many cumacean species inhabit the surface layer of sediment, partially burying themselves and pursuing a deposit-feeding lifestyle, while others can be found clinging to algal turf on rocks. No parasitic species are known although it is presumed from their mandible morphology that some are predators on small organisms such as foraminiferans. Plankton samples, especially those taken at night, occasionally contain cumaceans, particularly adult males which are perhaps searching for mates; females are rarely if ever collected in night plankton tows (Corbera, 2000). Cumaceans can be extremely abundant, in some cases being among the ten most abundant species in benthic samples (Watling, pers. comm.) but distributions tend to be patchy, both locally and globally.

In the most commonly accepted crustacean classification scheme, the Cumacea form an order within the Superorder Peracarida of the Class Malacostraca (Hessler and Watling, 1999). The cumacean bauplan consists of a relatively bulbous cephalothorax, usually called the carapace, composed of the head and at least the first three thoracic somites fused together, usually five free thoracic segments, and a slender six-segmented abdomen. Within these constraints, carapace design and overall body form can vary widely.

Despite the variation, the basic body plan is conserved and cumaceans are readily recognisable as such. Unfortunately, there are very few fossil records of this group, leaving the age of the group uncertain. The oldest known fossils are from the Late Permian (*Ophthalmiastylis* Malzahn, 1972) and clearly belong to the modern family Diastylidae.

Historically, cumaceans have caused some consternation among taxonomists. Although cumaceans are a clearly recognisable group, their familial divisions are not as obvious. Various workers have classified the order into 4–26 families, of which eight are currently accepted. However, the family definitions overlap to such an extent that the most difficult task in identification of a species is placement into a family (Day, 1980). A large portion of the uncertainty stems from a lack of work on the group. Approximately 60 authors have published on cumaceans since 1780, describing 119 genera containing over 1200 species, and the bulk of published work has concentrated on simply describing species. Virtually nothing is known about the evolutionary history of the Cumacea or the relationships within the group.

The Gynodiastylidae are a small, relatively well defined group, resident primarily in the Southern Hemisphere with a few species recorded from Japan, Thailand, and the Arabian Gulf. Most species are from depths less than 100 m (Day, 1980). In contrast to the other putative

family level cumacean groups, the Gynodiastylidae contain few species (58 published), are found in a limited range of depths (0–680 m published), and are relatively clearly diagnosed, with no exceptions to the two main characters used for diagnosis of the family (lack of pleopods in the male and lack of an exopod on maxilliped 3 in the female). This combination of traits makes the Gynodiastylidae an excellent candidate for monographic treatment.

### Morphology

The cumacean body is divided externally into carapace, thorax (pereon), and abdomen (pleon) (Fig. 1). In the Gynodiastylidae, the carapace represents the fusion of the head and the first three, or in a few cases four, thoracic segments. The pseudorostral lobes may be directed sharply dorsally, horizontally, or ventrally. The orientation of the pseudorostral lobes is a sexually dimorphic character in the gynodiastylid genera *Allodiastylis* and *Zimmeriana*, with the female pseudorostrum dorsally or horizontally directed, and the male pseudorostrum ventrally directed. The carapace is also frequently sexually dimorphic within the Gynodiastylidae, although to a lesser extent than in the most other Cumacea. In the male, ornamentation of the carapace is occasionally reduced (ridges or spines may be lost), and the ventral margin of the carapace may be swollen, with a pronounced lateral ridge, to accommodate the expanded peduncle of antenna 2. The eye lobe is broad rather than narrow, and the presence of lenses is sexually dimorphic, with adult males possessing more functional lenses than females; females frequently are entirely without functional lenses.

In general, within the Gynodiastylidae sexual dimorphism is less pronounced than in other families (Fig. 3), although there are some genera with sexual dimorphism approaching that found in other families (*Allodiastylis*, *Zimmeriana*).

The peduncular articles of antenna 1 may be moderate or greatly expanded (*Allodiastylis*, *Sheardia*). The main and accessory flagella are similar in length, with the only difference being the longer terminal setae on the main flagellum (Fig. 2).

Antenna 2 in the male is reduced, with three or four peduncular articles, and 7–13 flagellar articles; in contrast, antenna 2 of all other adult male cumaceans has a 5-article peduncle and more than 20 flagellar articles (Fig. 3). The most distal peduncle article is the longest, in most cases longer than the other peduncle articles together, and bears many setae organised into distinct rows or ranks on the anterior surface of the article. The

flagellum is very short, never reaching beyond the posterior margin of the carapace, and frequently shorter than the peduncle. Each flagellar article bears one or two rows of setae.

Mouthparts and maxillipeds are very similar throughout the family; typical examples are presented in Fig. 2.

Pereopod 1 is the fourth thoracic appendage or the first walking leg. In Gynodiastylidae this appendage ranges in size from less than the carapace length to more than twice the carapace length. There are four basic morphologies:

(1) less than the length of the carapace to slightly longer than the carapace, bearing setae but without any conspicuous groupings of long setae, and all distal articles shorter than basis (simple) (Fig. 2);

(2) longer than the carapace, with a brush of long setae organised in a tight rank, set into a pocket on the distal face of the propodus, dactylus half propodus length, usually much less (propodus brush) (Figs 1, 3);

(3) from 1.5 to 2 times carapace length, with carpus, propodus, and sometimes dactylus longer than basis, without many long conspicuous setae on distal half of dactylus (elongate); and

(4) Proportions as in 3, but with many long conspicuous setae on distal half of dactylus (elongate, with dactylus brush).

Pereopod 2 may have a slender basis, or the basis may be expanded to as much as 10 times the width of the other articles. The expansion of the basis may be more pronounced in the adult male, but is not a sexually dimorphic character. Pereopods 3, 4 and 5 are very similar in structure, decreasing in size posteriorly. In a few species, pereopod 4 bears pronounced lobes, possibly a sexually dimorphic character.

Pleopods are absent in all males (Fig. 3).

Exopods are present on all males on maxilliped 3, pereopod 1 and pereopod 2, and dependent on species may be present on pereopod 3 or both pereopods 3 and 4. Exopods in females are never found on maxilliped 3, and may be found in any of the following combinations:

(1) present and fully developed on pereopods 1 and 2, absent on pereopods 3 and 4 (Fig. 2);

(2) present and fully developed on pereopods 1 and 2, present and rudimentary on pereopods 3 and 4;

(3) absent from pereopods 1–4; or

(4) absent from pereopods 1 and 2, present and rudimentary on pereopods 3 and 4.

The telson is variable within Gynodiastylidae, most commonly small but in some species large and tubular. There may be two terminal setae or

none, and in some species the terminal setae of the adult male are larger than the terminal setae of the female. Presence of the terminal setae may be difficult to determine, as in many species the terminal setae are reduced to minute nubs (Fig. 2).

#### *History of study of Gynodiastylidae*

During the first half of the twentieth century, cumacean taxonomists placed great value on the morphology of the telson for defining families and genera of telson bearing forms of Cumacea. In the North Atlantic, where the majority of the specimens were obtained, the telson is of remarkable consistent systematic value. However, outside the North Atlantic basin, telson morphology seems to be of less value. As species were described from all over the world, intermediate forms were added and it became apparent that telson size is not a discrete character but instead a continuously varying character (Day, 1980).

*Gynodiastylis* Calman, 1911 originally included four species, three with a brush of setae on the propodus and one without such a brush. Of Calman's four species, three possess biarticulate uropod endopods and one a uniaarticulate endopod. The species were placed in the same genus, despite differences in the exopod numbers of the adult males, pereopod 1 morphology, and uropod endopod article numbers. Calman (1911) gave two reasons, the first being overall similarity of body form and telson, and the second that the four species were united by the absence of pleopods in the male and the lack of an exopod on maxilliped 3 in the female. At the time, with only four species known, these features were not recognised as characteristics of a higher level grouping.

Herbert Hale added 33 species to the Gynodiastylidae between 1928 and 1951. In 1946, Hale wrote the first systematic treatise on the group, describing 26 new species. Hale (1936, 1946) recognised four new genera in the group, two on the basis of pereopod 1 morphology. However, following the lead of Calman (1911), that telson morphology and habitus are important in defining genera, Hale persisted in grouping together species with a brush of long setae on the propodus of pereopod 1 with species without such a brush in the genus *Gynodiastylis*. Thus, at the beginning of the work in hand, the Gynodiastylidae consisted of 58 species in six genera, with the vast majority of the species in *Gynodiastylis*.

#### *Generic characters*

Historically, genera in the Gynodiastylidae have been defined on the basis of antenna 1 morphology, pereopod 1 morphology, numbers and states

of exopods in the female (Hale, 1946; Day, 1980), and to a lesser extent on the basis of habitus and telson size and shape (Calman, 1911; Hale, 1946). There are three forms of antenna 1: a simple antenna without expansion of the peduncular articles; expansion of peduncular articles 1 and 2 without an increase in the length of article 3; and expansion of peduncular articles 1 and 2 with an increase in the length of article 3. Four forms of pereopod 1 have been observed: simple; propodus brush; elongate without a brush; and elongate with a brush on the dactylus. In the female, four combinations of exopods have been observed: present on pereopods 1 and 2 and rudimentary on pereopods 3 and 4; present on pereopods 1 and 2 and absent on pereopods 3 and 4; absent from pereopods 1–4; and absent from pereopods 1 and 2 and rudimentary on pereopods 3 and 4. In the context of cumacean taxonomy, the pereopod 1 morphologies (with the exception of the simple form) are derived, as are the expanded peduncle forms of antenna 1. Patterns of exopods on the female have been used to define not only genera, but also higher level taxa such as the Bodotriinae. Exopod patterns in the female are consistent within cumacean genera (the sole exception is *Diastylis* Say, 1818; but it has been noted that this genus requires revision (Day, 1980)). As has been previously remarked, the use of the telson as a defining character is without value as the telson is a continuously variable character (Day, 1980). With 45 new species described, it seems appropriate to re-evaluate generic definitions within the Gynodiastylidae, with the goal of defining genera consistently and in line with the accepted practices of generic definition within the order.

Two genera, *Allodiastylis* and *Sheardia*, are characterised by expansion of articles 1 and 2 of the peduncle of antenna 1. In the case of *Allodiastylis*, it is likely the expansion exists to accommodate the musculature necessary to move the long article 3. The expansion in *Sheardia* is less obvious, as article 3 is not particularly large, and therefore the expansion is probably not necessary to accommodate musculature. However, both of these genera are currently consistent and do not require revision.

*Gynodiastylis* sensu Calman, 1911 incorporated three species with a brush on the propodus of pereopod 1, and one species with a simple pereopod 1; the females of all four species possess exopods on pereopods 1 and 2 only. Hale (1946) added to the genus species both with and without the propodus brush, with the rationale that the habitus and telson were similar, and Calman (1911) had not discriminated between

brush-bearing and non-brush-bearing forms. With 30 new species that would fit *Gynodiastylis* sensu Hale, it seems worthwhile to rethink the inclusion of propodus brush-bearing and non-brush-bearing species in the same genus. Four species that have a propodus brush and exopods on pereopods 1–4 in the female were removed to the genus *Axiogynodiastylis*, in order to maintain consistency within genera in terms of exopod patterns in the female. Species that possess a simple pereopod 1 and exopods on pereopods 1 and 2 in the female are removed to *Litogynodiastylis*. Additionally, three species with the simple pereopod 1 and exopods on pereopods 1–4 in the female were removed to *Eogynodiastylis*, again in order to maintain consistency.

The genus *Zimmeriana* Hale, 1946 is clearly identifiable on the basis of two features, a brush of many long setae disposed all about the tip of the dactylus of pereopod 1, and the female entirely without exopods. However, a single female specimen was observed, which combines the dactylus brush on pereopod 1 with the presence of rudimentary exopods on pereopods 3 and 4. Despite the fact that erecting a new genus on the basis of a monotypic species engenders a certain amount of uneasiness, in order to maintain consistency within the generic characters in the family, this species must be placed in the new genus *Pseudozimmeriana*. It is possible that the single specimen is an aberrant individual. However, in this case, the exopods, although tiny, are clearly of two articles and bear small terminal setae as in all other instances in which rudimentary exopods are present.

Hale's (1946) genus, *Dicoides*, is defined by an elongate pereopod 1 without a brush, and with exopods on pereopods 1–4 in the female. In the course of this work, two species were encountered with an elongate pereopod 1, but exopods only on pereopods 3 and 4 in the female. These two species are assigned to the new genus *Paradicoides* rather than *Dicoides* to maintain consistency.

Within the Gynodiastylidae, there are groups of genera united by the morphology of pereopod 1, with *Axiogynodiastylis*, *Gynodiastylis*, and *Haliana* forming the *Gynodiastylis*-group, *Litogynodiastylis*, *Eogynodiastylis*, and *Dayus* forming the *Litogynodiastylis*-group, *Dicoides* and *Paradicoides* forming a group, and *Zimmeriana* and *Pseudozimmeriana* forming a fourth group. The affinities of *Allodiastylis* and *Sheardia*

are not clear, as there is no reason to suppose that *Allodiastylis* and *Sheardia* form a group, and any affinities with the other groups are unclear.

#### *Functional morphology*

The extreme morphology of the first pereopods in some genera of gynodiastylids (*Dicoides*, *Zimmeriana*, *Gynodiastylis*-group) has long been recognised as a probable impediment to locomotion (Day, 1980), with the level of impediment directly related to the extremity of the morphology. The functions of these bizarre morphologies have never been elucidated, as only one person has published observations of a living gynodiastylid (Harada, 1962).

Two species of *Gynodiastylis* sensu stricto are known to construct tubes, *G. tubicola* Harada, 1962, and *G. tubifaturex* sp. nov. Harada (1962) observed live animals constructing tubes in beakers with fine sediment, the only live observation of tube building known for a cumacean. *Gynodiastylis tubifaturex* is believed to construct tubes because several (~8) individuals in the collections of the Australian Museum are preserved with a tube of mucus surrounding the body, generally with a few fine grains of sediment adhered to the mucus. In conjunction with the observations of Harada (1962) and the new species, it is suggested that other species of *Gynodiastylis* sensu stricto may also build tubes. The tubes found around *G. tubifaturex* are not particularly robust, and it is likely that normal sieving procedures, as carried out on box-core samples, may well remove or destroy such tubes.

The brush of setae on the propodus of pereopod 1 is usually made up of long, microserrate setae. In some instances, the brush setae are reported as simple. However, this is probably due to a lack of resolution or magnification when the setae were examined. The dactylus on this form of pereopod is small and slender, and bears 1 or 2 setae of a similar length and type to those that make up the brush. The bases of the brush setae are organised as a single row, set into a pocket on the anterior-distal surface of the propodus. When the dactylus is straightened (pulled up away from the relaxed position, with the tip of the dactylus hanging down in a subchelate position), the setae of the brush fan out. The fan of microserrate setae bears a marked resemblance to known filter feeding structures in tube building amphipods (e.g. *Cerapus crassicornis* Sars, 1900). It is reasonable to suggest that the *Gynodiastylis*-group of genera

use the brush of setae on the propodus to filter feed.

The elongate pereopod 1 reaches an extreme morphology in *Dicoides areolata* and *Paradicoides megadactylus*, in which pereopod 1 is as long or longer than the entire body. In *D. areolata* pereopod 1 is heavily calcified and robust, with few, short setae. Other species of *Dicoides* have slightly less extreme morphologies of pereopod 1, with the leg being somewhat shorter and/or less robust than that seen in *D. areolata*. However, it is clear that the large pereopod 1 must impede locomotion; it cannot be folded out of the way because the final three articles of the most extreme forms are each nearly the length of the carapace (viz. in *Paradicoides megadactylus*). No function has been postulated for this form of pereopod 1 and none is suggested here. Elongation of pereopod 1 is not sexually dimorphic, therefore it is unlikely to be of benefit in attracting a mate. In some species of *Dicoides* (*D. micron*, *D. minusculus*) the dactylus has many short setae disposed all about the distal half of the article, and the dactylus brush of the *Zimmeriana*-type species can clearly be derived by the elongation of these setae.

The dactylus brush found on the *Zimmeriana*-type pereopod 1 approaches the volume of the carapace, and females entirely lack exopods. No function has been postulated for these brushes, although it is likely the presence of the brush impedes locomotion. The setae of the dactylus brush are simple, are not organised into a fan, and therefore are not congruent with use as a filter feeding apparatus.

#### Methods

All 102 taxa were scored into a DELTA (version 4.09, p. v) data matrix with 315 characters (males and females scored separately, giving a matrix of 315 by 204) (Dallwitz et al., 1999). Full descriptions of all species are available via the DELTA database, Gynodiastylidae, which can be accessed at [www.museum.vic.gov.au/memoirs](http://www.museum.vic.gov.au/memoirs).

Every taxon encountered in this study was scored for as many of the 315 characters as possible. Type material was scored for each species, primarily from inspection of the literature, but holotypes were compared with the literature and rescored if the types were accessible. Some types are not deposited in museums and were impossible to obtain, particularly those from Japanese waters.

All available collections (Museum Victoria,

South Australian Museum, Australian Museum) of unidentified Southern Hemisphere cumaceans were thoroughly investigated for distributions, life stages, and new taxa. For many species numerous specimens were identified and listed in short form here. Full locality details are available from the museums concerned.

New taxa and undescribed stages of previously described taxa were dissected, mounted in an 8 parts glycerol/ 2 parts 70% ethanol mixture, and drawn using a camera lucida on a Wild compound microscope. When sufficient numbers of specimens were available, new taxa were dissected completely and all appendages drawn. In the case of monotypic taxa, maxilliped 3–pereopod 5, telson, uropods, and antenna 1 were drawn. Antenna 2 of the adult male was always illustrated, even if the taxon was monotypic. Additional maxillipeds for some monotypic taxa were illustrated. However, maxillipeds 1 and 2 of some monotypic taxa could not be removed without destroying the carapace, and preservation of carapace morphology in holotype specimens was considered a very high priority.

In the following account genera are grouped according to their affinities, rather than strictly alphabetically. Species within the genera are listed alphabetically. All lengths in the written description are total body lengths, measured from the anterior tip of the pseudorostral lobes to the posterior border of the last pleonite (the telson is excluded from the total body length). In order to clearly illustrate carapace details, exopod setae are not included on full body illustrations. Exopods bear two setae per annulation; for clarity, a single seta per annulation is illustrated. Scale bars in the figures apply to the full body figures. Setal classification and terminology follow the scheme presented by Watling (1989).

Museum abbreviations are: Australian Museum, Sydney (AM), Museum Victoria, Melbourne (NMV), South Australian Museum, Adelaide (SAM), National Institute of Water and Atmosphere, Wellington (NIWA), Zoological Museum, Berlin (ZMB), Zoological Museum, Copenhagen (ZMC), The Natural History Museum, London (BMNH), and US National Museum of Natural History (USNM).

#### Gynodiastylidae Stebbing

Gynodiastylidae Stebbing, 1912: 146.—Day, 1980: 194.

### Key to genera of *Gynodiastylidae*

1. Antenna 1 articles 1 and 2 expanded ..... 2
- Antenna 1 articles 1 and 2 not expanded ..... 3
2. Antenna 1 article 3 longer than articles 1 and 2 together ..... *Allodiastylis*
- Antenna 1 article 3 shorter than articles 1 and 2 together ..... *Sheardia*
3. Pereopod 1 with brush of long setae on the propodus. .... 4
- Pereopod 1 without brush entirely or with brush of long setae on dactyl .... 6
4. Female with exopods on at least pereopods 1 and 2 ..... 5
- Female entirely without exopods ..... *Haliana*
5. Female with full exopods on pereopods 1 and 2 and rudimentary exopods on pereopods 3 and 4 ..... *Axiogynodiastylis*
- Female with exopods only on pereopods 1 and 2 ..... *Gynodiastylis*
6. Pereopod 1 long (at least twice length of any other pereopod), uropod exopod broad with many stout setae ..... 7
- Pereopod 1 normal (less than twice length of any other pereopod) uropod exopod slender, with few setae ..... 10
7. Pereopod 1 with brush of long setae on dactyl ..... 8
- Pereopod 1 without brush of long setae on dactyl ..... 9
8. Female entirely without exopods ..... *Zimmeriana*
- Female with minute rudimentary exopods on pereopods 3 and 4 ..... *Pseudozimmeriana*
9. Female with full exopods on pereopods 1 and 2, rudimentary exopods on pereopods 3 and 4 ..... *Dicoides*
- Female with rudimentary exopods on pereopods 3 and 4, without exopods on pereopods on 1 and 2 ..... *Paradicoides*
10. Female with exopods ..... 11
- Female entirely without exopods ..... *Dayus*
11. Female with full exopods on pereopods 1 and 2 and rudimentary exopods on pereopods 3 and 4 ..... *Eogynodiastylis*
- Female with full exopods on pereopods 1 and 2, without exopods on pereopods 3 and 4 ..... *Litogynodiastylis*

#### *Allodiastylis* Hale

*Allodiastylis* Hale, 1936: 426.

*Type species.* *Allodiastylis cretatus* Hale, 1936.

*Diagnosis. Female and subadult male.* Pseudorostrum long, slender, distinctly dorsally directed, with several long setae at tip. Eye lobe short, broad, without lenses. First antenna long, more than half length of carapace, first 2 peduncle articles expanded (more than twice width of third article), third peduncle article longer than first 2 articles together. Pereopod 1 of moderate length, carpus and propodus subequal. Female entirely without exopods. Uropod endopod of 2 articles. Telson at least 1.5 times length of last pleonite, usually much longer, tubular, with no post-anal part, with pair of terminal setae.

*Adult male.* Pseudorostrum robust and distinctly ventrally directed. Eye lobe long, very broad, with several lenses. Antenna 2 with 3–4 article peduncle and 11 article flagellum. Exopods present on maxilliped 3 and pereopods 1–4. Telson terminal setae long.

*Distribution.* Eastern Australia including Tasmania, New Zealand; 1–1264 m.

*Species.* *Allodiastylis acanthanasillos* sp. nov., *A. acanthodes* sp. nov., *A. cretata* Hale, 1936, *A. hirtipes* Hale, 1946, *A. johnstoni* Hale, 1946, *A. tenuipes* Hale, 1946.

*Remarks.* The sexual dimorphism in the habitus of the males and females is notable; it may be difficult to determine the species of a male *Allodiastylis* if it is not collected with females.

#### Key to species of *Allodiastylis* (females and subadult males)

1. Uropod rami subequal ..... 2
- Uropod rami unequal (exopod distinctly longer than endopod) ..... 3
2. Carapace with spines and setae ..... *A. acanthanasillos*
- Carapace with sparse, tiny granules ..... *A. hirtipes*

3. Carapace with many tricuspid spines or tubercles ..... *A. acanthodes*  
 — Carapace with granules or smooth ..... 4  
 4. Uropod peduncle shorter than or equal to telson ..... *A. johnstoni*  
 — Uropod peduncle distinctly longer than telson ..... 5  
 5. Antenna 1 with articles 1 and 2 as deep as long, pereopod 3 longer than  
 carapace; pereopods 1–5 slender ..... *A. tenuipes*  
 — Antenna 1 with articles 1 and 2 longer than deep, pereopod 3 shorter than  
 carapace, pereopods 1–5 not especially slender ..... *A. cretata*

Note: Adult males are markedly dimorphic, with the pseudorostrum horizontal or ventrally directed, the eyelobe enlarged, carapace ornamentation diminished, and usually with a marked ventral horizontal swelling of the carapace to accommodate the enlarged antenna 2. Males are known for some but not all species.

***Allodiastylis acanthasillos* sp. nov.**

Figures 4, 5

*Material examined.* Holotype. New Zealand. Chatham Rise, E of South Island, 44°29.89–31.9'S, 178°57.88–179°66.57'W, 1065 m, 7 Sep 1989 (stn V362 DAB), NIWA H-802 (subadult female).

*Diagnosis. Female and subadult male.* Carapace bearing many dispersed spines and long setae. Pseudorostrum without teeth, bearing several long setae, sharply dorsally directed. Antenna 1 articles 1 and 2 not dilated. Pereopods without conspicuous long setae. Telson bearing several spines and many setae, irregularly dispersed, slightly shorter than uropod peduncles. Uropod peduncles bearing many setae irregularly dispersed on surface, rami subequal. *Adult male.* Unknown.

*Etymology.* From Greek, *acanthus* meaning thorns and *anasillos* meaning bristling hairs, in reference to the combination of spines and setae evident on the carapace and abdomen.

*Distribution.* E of New Zealand; 1065 m.

*Remarks.* This species is similar to *Allodiastylis johnstoni*, but the presence of spines and setae on the carapace of *A. acanthasillos* is very different from the small granules figured on the carapace of *A. johnstoni* by Hale (1946). In *A. johnstoni* the telson is much shorter than the uropod peduncles, and the uropod exopod is clearly longer than the endopod. In *A. acanthasillos* the telson is nearly as long as the uropod peduncles, and the uropod rami are subequal.

***Allodiastylis acanthodes* sp. nov.**

Figures 6–9

*Material examined.* Holotype. Australia. Tas., western Bass Strait, 5 km SW of Bluff Point (40°48.1'S, 144°38.0'E), 42 m, bryozoans, M.F. Gomon et al., RV

*Hai Kung*, 2 Feb 1981 (stn BSS 126), NMV J48137 (ovigerous female).

Paratypes. Australia. Tas., western Bass Strait, 5 km SW of Bluff Point (40°48.1'S, 144°38.0'E), 42 m, bryozoans, M.F. Gomon et al., RV *Hai Kung*, 2 Feb 1981 (stn BSS 126), NMV J48138 (3 ovigerous females, 8 subadult females, 3 subadult males); J48273 (1 subadult female dissected); J48287 (1 adult female dissected), 48 km ENE of Cape Tourville (42°00.25'S, 148°43.55'E), 1264–1130 m, gravel with lumps of sandy mud aggregate, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 30 Oct 1988 (stn SLOPE 81), NMV J48142 (2 ovigerous females, 7 subadult females, 2 adult males); J48272 (1 adult male dissected).

Other material. Australia. Tas., Bass Strait, 34–42°S, 148–151°E, 51 females, 10 males: NMV J48139; J48140; J48141; J48143; J48144; J48145.

*Diagnosis. Female and subadult male.* Carapace with many spines and tricuspid tubercles. Pseudorostrum with teeth on dorsal and ventral margins, bearing several long setae. Antenna 1 articles 1 and 2 not dilated. Pereopods without conspicuous long setae. Telson lateral margins produced as several stout teeth proximally, slightly shorter than uropod peduncles. Uropod exopod longer than uropod endopod. *Adult male.* Carapace smooth, with a single ventrolateral ridge, antennal notch distinct. Pseudorostrum without teeth, slightly dorsally directed. Telson with no ornamentation, shorter than uropod peduncles. Relative proportion of uropod rami unknown, broken on all specimens.

*Etymology.* From Greek, *acanthus* meaning thorns or spines, in reference to the spines covering the body.

*Distribution.* Tas., Bass Strait; 42–1277 m.

*Remarks.* This species is a typical *Allodiastylis* except that in the adult male the pseudorostral lobes are slightly dorsally directed (in the female they are directed sharply dorsally), but clearly not ventrally directed. The adult male otherwise does not resemble the females; but it was found in the

same sample with ovigerous and pre-ovigerous females, and it is more similar to the females than in the other *Allodiastylis* species.

*Allodiastylis cretata* Hale

Figure 10

*Allodiastylis cretata* Hale, 1936: 426–429, figs 16–17.—Hale, 1937: 72–73, fig. 8.—Hale, 1946: 429.

*Material examined.* Holotype. Australia. SA, Gulf St Vincent, Sellicks Reef, on stones, SAM C2019 (female).

Paratype. Australia. SA, Gulf of St Vincent, Sellicks Reef, on stones, SAM C2020 (juvenile male).

Other material. Australia. Tas., 48 km ENE of Cape Tourville (42°00.25' S, 148°43.55' E), 1264–1130 m, gravel with lumps of sandy mud aggregate, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 30 Oct 1988 (stn SLOPE 81), NMV J47800 (21 subadult females).

*Diagnosis. Female and subadult male.* Carapace with pair of dorsolateral ridges, terminating in anterior dorsal prominence with several spines. Pseudorostrum ventral margin with teeth, bearing several long setae. Antenna 1 articles 1 and 2 not dilated. Pereopods without conspicuous long setae. Telson without setae or teeth, equal to uropod peduncle. Uropod exopod longer than endopod. *Adult male.* Carapace with pair of dorsolateral ridges and pair of ventrolateral ridges. Pseudorostrum without teeth, bearing several long setae, sharply ventrally directed. Telson without lateral ornamentation, shorter than uropod peduncles.

*Distribution.* Tas., SA; 0–1264 m.

*Remarks.* Hale's (1936) description of the adult female is of an aberrant individual, similar to a male, with the pseudorostral lobes horizontal. According to Hale (1937), the normal state of the pseudorostral lobes in the female is sharply dorsally directed.

*Allodiastylis hirtipes* Hale

Figure 11

*Allodiastylis hirtipes* Hale, 1946: 429–431, figs 51–52.

*Material examined.* Holotype. Australia. NSW, 4 mi. off Eden, 70 m, SAM C2719 (ovigerous female).

Other material. Australia. Tas., Bass Strait, NSW, 34–43°S, 144–151°E: 20 females, 9 males, 3 undetermined, NMV J47802; J47807; J47806; J47801; J47803; J47805; J47804; AM P55751; P56103; P60977; P55787; P61025; P56200; P61024; P55777.

*Diagnosis. Female and subadult male.* Carapace covered with sparse, tiny granules. Pseudorostrum with teeth ventrally, bearing several long setae. Antenna 1 articles 1 and 2 not dilated. Pereopods 1–5 with conspicuous long setae on basis. Telson lateral margins with many strong teeth, shorter than uropod peduncles. Uropod rami subequal in length. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 10–466 m.

*Remarks.* The conspicuous long setae on the pereopods distinguish this species from all other *Allodiastylis*. The long setae are frequently fouled with mucus, as is the carapace.

*Allodiastylis johnstoni* Hale

Figure 12

*Allodiastylis johnstoni* Hale, 1946: 432–435, figs 53–54.

*Material examined.* Holotype. Australia. NSW, Sydney Harbor, Vaucluse, stones, SAM C2135 (female).

Other material. Australia. Tas., Bass Strait, NSW, WA, 28–42°S, 114–151°E: 355 females, 83 males, 102 undetermined. NMV numerous registrations. AM P61017; P60990.

*Diagnosis. Female and subadult male.* Carapace with pair of dorsolateral ridges, bearing tiny granules or reticulations. Pseudorostrum with ventral teeth, bearing several long setae. Antenna 1 articles 1 and 2 not dilated. Pereopods without conspicuous long setae. Telson without lateral ornamentation, longer than uropod peduncles. Uropod exopod longer than uropod endopod. *Adult male.* Carapace with pair of dorsolateral ridges and pair of ventrolateral ridges. Pseudorostrum ventrally directed, without teeth, bearing several short setae. Telson shorter than uropod peduncles.

*Distribution.* Southern Australia; 1–996 m.

*Remarks.* Hale (1946), described this species as “closely allied” to *Allodiastylis cretata*. However, in the female of *A. cretata* the telson is clearly shorter than the uropod peduncles and the dorsolateral ridges are more distinct and terminate in a prominence with spines. Another similar species is *A. hirtipes*. However, as in *A. cretata* the telson of the female is clearly shorter than the uropod peduncles, and dorsolateral ridges are not present on the carapace. In *A. johnstoni*, there are a few moderate setae present on the basis of the pereopods, similar to the situation in *A. hirtipes* but both the number of setae and the length of the setae are much less in *A. johnstoni*.



*Allodiastylis tenuipes* Hale

Figure 13

*Allodiastylis tenuipes* Hale, 1946: 435–437, figs 55–56.

*Material examined.* Holotype. Australia. NSW, Ulladulla, Brush I., 45 fm (82 m), SAM C2702 (ovigerous female).

Other material. Australia. Tas., Bass Strait, 34–42°S, 143–151°E: 22 females, 5 males. NMV J47849; J47850; J47851; J47852; J47853; J47854; J47855; J47856; J47857.

*Diagnosis. Female and subadult male.* Carapace coarsely granulate. Pseudorostrum with weak teeth ventrally, bearing several setae of moderate length. Antenna 1 articles 1 and 2 dilated. Pereopods with a few moderately long setae. Telson produced as few teeth proximally, shorter than uropod peduncles. Uropod exopod longer than endopod. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 17–1119 m.

*Remarks.* This species is similar to *Allodiastylis acanthodes* but the telson is much shorter, articles 1 and 2 of the first antenna are distinctly dilated, and the first antenna accessory flagellum is much longer, being as long as the first article of the main flagellum. In comparison, the accessory flagellum of *A. acanthodes* is minute, much less than half the length of the main flagellum.

**Key to species of *Dayus***

1. Carapace with spines at least on both margins of pseudorostral lobes, and variously present elsewhere on the carapace ..... *D. acanthus*
- Carapace without spines, although fine granulations or tubercles may be present ..... 2
2. Uropod exopod shorter than endopod, entire animal frequently covered in thick mucus with clean grains of sand embedded in the mucus..... *D. pharoheradus*
- Uropod exopod longer than or equal to endopod, pereopods long and slender ..... *D. makrokolus*

*Dayus acanthus* sp. nov.

Figures 14–16

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 65 km S of Cape Schanck (39°08.3'S, 144°43.9'E), 66 m, coarse sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 201 S), NMV J45451 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 25 km S of Aireys Inlet (38°44.6'S, 144°09.0'E), 77 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 19 Nov 1981 (stn BSS 182 S), NMV J45453 (1 ovigerous female, 1 subadult female); J45454

*Dayus* gen. nov.

*Type species. Dayus pharoheradus* sp. nov.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal or weakly directed dorsally or ventrally. Carapace with tumidities and teeth or ridges. Eye lobe present, without lenses. Antenna 1 small to moderate. Pereopod 1 simple, slender. Female entirely without exopods. Uropod endopod of 2 articles. Telson between 0.5–1 length of pleonite 6, with pair of terminal setae. *Adult male.* Eye lobe with lenses. Antenna 2 with peduncle of 4 articles, flagellum of 10–11 articles. Exopods present on maxilliped 3, pereopods 1–4.

*Etymology.* The genus is named for Jennifer Day, in recognition of her work on the family Gynodiastylidae, and in particular her recognition of the Gynodiastylidae as a family-level taxon.

*Distribution.* Tas. to northern WA; 1–520 m.

*Species. Dayus acanthus* sp. nov., *D. makrokolus* sp. nov., *D. pharoheradus* sp. nov.

*Remarks.* The genus is very similar to *Litogynodiastylis*, but there is a complete absence of exopods on the female.

(1 ovigerous female); central Bass Strait, 38 km SW of Cape Paterson (38°55.5'S, 145°17.0'E), 70 m, fine sand, R.S. Wilson, RV *Tangaroa*, 12 Nov 1981 (stn BSS 155), NMV J45455 (1 ovigerous female in poor condition); central Bass Strait, 65 km S of Cape Schanck (39°08.3'S, 144°43.9'E), 66 m, coarse sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 201 S), NMV J45452 (1 adult male); western Bass Strait, 30 km SSW of Warrnambool (38°38.2'S, 142°35.0'E), 59 m, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 188 G), NMV J45468 (1 ovigerous female).

Other material. Australia. Tas., Bass Strait, NSW, 34–40°S, 143–151°E: 41 females, 12 males. NMV J48007; J48008; J48009; J29941; J29940; J29942; J29953; J29945; J29950; J29957; AM P55733; P55804.

*Diagnosis. Female and subadult male.* Carapace with many stout spines. Pseudorostrum with dorsal and ventral spines. Pereopods normal. Eyelobe with pair of dorsal teeth. Telson 0.5 times uropod peduncle length. Uropod rami subequal. *Adult male.* As in female, except pereopods with spines on the basis. Exopods present on maxilliped 3 and pereopods 1–4. Telson 0.4 times uropod peduncle length.

*Etymology.* From Greek, *acanthus* meaning thorny, in reference to the abundance of spines on the carapace.

*Distribution.* NSW, Bass Strait; 1–84 m.

*Remarks.* This species is the only species of *Dayus* in which the carapace is significantly ornamented; the ornamentation is much greater in the male, but spines are clearly visible along the margins of the pseudorostral lobes in the females. Also, this species is rather smaller than *D. pharocheradus*.

***Dayus makrokolosus* sp. nov.**

Figures 17–20

*Material examined.* Holotype. Australia. WA, Northwest Shelf, between Port Hedland and Dampier (19°5'S, 117°26'E), 120 m, muddy sand, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 12 Jun 1983 (stn NWA 52), NMV J45456 (ovigerous female).

Paratypes. Australia. WA, North Lumps, 2 km off Mullaaloo (31°47.30'S, 115°42.80'E), 6 m, red algal turf on top of reef, SCUBA, G.C.B. Poore and H.M. Lew Ton, 2 May 1986 (stn SWA 107), NMV J45464 (2 subadult females); WA, Northwest Shelf, between Port Hedland and Dampier (19°5'S, 117°26'E), 120 m, muddy sand, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 12 Jun 1983 (stn NWA 52), NMV J45457 (5 subadult males); J45459 (14 females); J45458 (1 subadult male); J45460 (1 ovigerous female); J45462 (1 adult male (damaged)); J45461 (1 ovigerous female). SA, Tiparra Bay, Tiparra Reef West ground, 2.3 nm. W of Tiparra Light (34°4'S, 137°23'E), 10 m, ascidians with red and green algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 11), NMV J45463 (1 subadult female, 1 subadult male).

Other material. Australia. Bass Strait, 38–40°S 145–147°E: 3 females. NMV J48010; J29954.

*Diagnosis. Female and subadult male.* Carapace without spines. Pseudorostrum without teeth. Eyelobe without teeth. Pereopods long and

slender. Telson 0.3 times uropod peduncle length. Uropod exopod slightly longer than uropod endopod. *Adult male.* As in female, except carapace with ventrolateral swelling. Telson and uropods unknown, dissected specimen broken.

*Etymology.* From Greek, *makrokolos* meaning long legged.

*Distribution.* Bass Strait, WA; 6–66 m.

*Remarks.* This species is much smaller than *Dayus pharocheradus*. The carapace is smooth, although the male exhibits some swelling, which differentiates this species from *D. acanthus*.

***Dayus pharocheradus* sp. nov.**

Figures 21–24

*Material examined.* Holotype. Australia. SA, Tiparra Bay, Tiparra Reef (34°4'S, 137°23'E), 11 m, algae on sponges and ascidians, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 18), NMV J45443 (ovigerous female).

Paratypes. Australia. SA, Tiparra Bay, Tiparra Reef (34°4'S, 137°23'E), 11 m, sand, shell fragments and seagrass, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 19), NMV J45445 (2 subadult females); Vic., central Bass Strait, 100 km SSE of Cape Liptrap (39°45.9'S, 145°33.3'E), 74 m, muddy fine sand, R.S. Wilson, RV *Tangaroa*, 13 Nov 1981 (stn BSS 156), NMV J48265 (1); central Bass Strait, 60 km SW of Cape Schanck (39°00.2'S, 144°33.9'E), 74 m, sandy shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 202 S), NMV J45447 (1 subadult male); eastern Bass Strait, 43 km SE of Port Albert (38°53.7'S, 147°06.5'E), 58 m, coarse shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 18 Nov 1981 (stn BSS 177 S), NMV J45446 (1 subadult male); eastern Bass Strait, 8 km S of South East Point, Wilsons Promontory (39°12.9'S, 146°27.3'E), 65 m, medium sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 18 Nov 1981 (stn BSS 180 S), NMV J45444 (1 subadult female); WA, Northwest Shelf, between Port Hedland and Dampier (19°37'S, 118°53'E), 30 m, coarse shell, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, *Soela*, RV, 3 Jun 1983 (stn NWA 14), NMV J45448 (1 subadult male); SA, Tiparra Bay, Tiparra Reef West ground, 2.3 nm. W of Tiparra Light (34°4'S, 137°23'E), 10 m, sponge, red and green algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 6), NMV J45450 (1 ovigerous female); SA, Tiparra Light, Tiparra Bay, Tiparra Reef (34°4'S, 137°23'E), 5 m, *Zostera* and coarse rubble, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 17), NMV J45449 (1 subadult male).

Other material. Australia. Tas., Bass Strait, SA, 34–42°S, 137–151°E: 46 females, 5 males. NMV J48011; J48012; J48013; J48014; J48015; J48016; J48017; J48018; J48019; J48020; 48021; J29948; J48022; J29949.

*Diagnosis. Female and subadult male.* Carapace covered in strong, blunt tubercles. Pseudorostrum without teeth. Eyelobe without teeth. Pereopods of moderate length, not markedly slender. Telson 0.5 times uropod peduncle length. Uropod exopod shorter than uropod endopod. *Adult male.* Carapace with few to no tubercles, distinct ventrolateral swelling. Eyelobe with lenses. Telson 0.4 times uropod peduncle length. Uropod exopod shorter than uropod endopod.

*Etymology.* From Greek, *pharos* meaning cloak and *cheradus* meaning gravel, debris, or mud, in reference to the thick coat of mucus adhering to the species, frequently with large (relative to the organism) grains of sand also adhered.

*Distribution.* Bass Strait to northern WA; 5–520 m.

*Remarks.* *Dayus pharocheradus* is larger than the other two species of *Dayus*, and the uropod exopod being shorter than the uropod endopod serves to clearly distinguish the species from both *D. acanthus* and *D. makrokolosus*. In many cases, specimens were observed coated in mucus to which clean sand grains were strongly adhered.

***Eogynodiastylis* gen. nov.**

*Type species.* *Gynodiastylis laciniacristatus* Gerken and Gross, 2000.

*Diagnosis. Female and subadult male.* Pseudorostrum approximately horizontal, may be weakly dorsally or ventrally directed. Carapace complex, with combinations of ridges, tubercles, tumidities. First antenna small to moderate. Eye lobe small, without lenses. Pereopod 1 simple, relatively short. fully developed exopods present on pereopods 1 and 2, rudimentary exopods present on pereopods 3 and 4 in the female. Uropod endopod of 1 or 2 articles. Telson subequal to last pleonite, with or without a small post-anal part, with or without pair of terminal setae. *Adult male.* unknown.

*Etymology.* From Greek, *eos* meaning dawn, in accordance with the supposition that this is among the first gynodiastylid genera to evolve, in combination with *Gynodiastylis*.

*Distribution.* Bass Strait, WA; 18–95 m.

*Species.* *Eogynodiastylis aganaktikos* sp. nov., *E. laciniacristata* (Gerken and Gross, 2000), *E. paeminosa* sp. nov.

*Remarks.* The exopods are rudimentary, and may be difficult to see without a compound microscope, particularly if the animals are decalcified.

**Key to species of *Eogynodiastylis***

1. Uropod endopod uniarticulate ..... *E. aganaktikos*
- Uropod endopod biarticulate ..... 2
2. Pereopod 4 ischium produced as large lobe ..... *E. laciniacristata*
- Pereopod 4 ischium without lobe ..... *E. paeminosa*

***Eogynodiastylis aganaktikos* sp. nov.**

Figures 25–26

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 60 km SW of Cape Schanck (39°00.2'S, 144°33.9'E), 74 m, sandy shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 202 S), NMV J47971 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 60 km SW of Cape Schanck (39°00.2'S, 144°33.9'E), 74 m, sandy shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 202 S), NMV J45711 (1 ovigerous female); NMV J45712 (1 subadult female); J47970 (1). Tas., Southern Ocean, 15 km E of Cape Connella (43°24.6'S, 147°32.5'E), 82 m, WHOI epibenthic sled, R.S. Wilson, RV *Soela*, 22 Oct 1984 (stn S05/84 64), NMV J47967 (8), eastern Bass Strait, 15.3 km ESE of eastern edge of Lake Tyers (37°53.39'S, 148°15.40'E), 43 m, coarse sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 97), NMV J27407; eastern Bass Strait, 15.3

km ESE of eastern edge of Lake Tyers (37°53.39'S, 148°15.40'E), 43 m, coarse sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 98), NMV J27408 (10).

Other material. Australia. Tas., Bass Strait, NSW, 34–40°S, 144–151°E: 18 females, 2 males. NMV J47964; J47965; J47966; J27406; J27413; J27411; J47968; J47969; J27769; J27409; J27410; J27412; AM P55799; P61039.

*Diagnosis. Female and subadult male.* Carapace with a sharp ridge sweeping from the anteroventral corner dorsally, multiple sharp ridges anterior of the sweeping ridge, single incomplete sharp ridge ventrally posterior of the sweeping ridge. Antenna 1 articles 1 and 2 with several strong teeth. Telson longer than uropod peduncles, lateral margins falcate (with single pair of very strong teeth). Uropod endopod uniarticulate. *Adult male.* Unknown.

*Etymology.* From Greek, *aganaktikos*, meaning fretful. The pattern of ridges on the anterior part of the carapace presents a furrowed brow, or a look of fretfulness.

*Distribution.* NSW, Tas., Bass Strait; 18–82 m.

*Remarks.* This species is recognizable from the carapace morphology, and can be easily differentiated from the other species of *Eogynodiastylis* as *E. aganaktikos* is the only species with a uniaarticulate uropod endopod.

***Eogynodiastylis laciniacristata* (Gerken and Gross) comb. nov.**

Figure 27

*Gynodiastylis laciniacristatus* Gerken and Gross, 2000: 95–103, figs 1–5.

*Material examined.* Holotype. Australia. Vic., western Bass Strait, 10 km W of Cape Otway, (39°49.0'S, 143°24.0'E), 56 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 184 S), NMV J45433 (ovigerous female).

Paratypes. Australia. Vic., western Bass Strait, 10 km W of Cape Otway, (39°49.0'S, 143°24.0'E), 56 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 184 S), NMV J45436 (1 ovigerous female, 1 subadult female); J45434 (1 ovigerous female); Tas., central Bass Strait, 20 km NNE of Bold Head, King I., (40°00.0'S, 144°20.9'E), 48 m, coarse sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 22 Nov 1981 (stn BSS 200 G), NMV J45438 (1 ovigerous female); central Bass Strait, 35 km N of Cape Wickham, King I., (39°13.6'S, 143°55.6'E), 85 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 205 S), NMV J45440 (1 subadult female); central Bass Strait, 60 km SW of Cape Schanck, (39°00.2'S, 144°33.9'E), 74 m, sandy shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 202 S), NMV J45439 (1 ovigerous female); western Bass Strait, 30 km SSW of Warrnambool, (38°38.2'S, 142°35.0'E), 59 m, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 188 S), NMV J45435 (1 ovigerous female); western Bass Strait, 44 km SW of Cape Otway (39°06.3'S, 142°55.6'E), 81 m, medium sand, R.S. Wilson et al., RV *Tangaroa*, 21 Nov 1981 (stn BSS 192), NMV J45437 (1 ovigerous female); WA, Northwest Shelf, between Port Hedland and Dampier (20°1'S, 117°11'E), 48 m, crinoids and sandy shell, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 11 Jun 1983 (stn NWA 48), NMV J45441 (1 subadult female, damaged); WA, Northwest Shelf, between Port Hedland and Dampier (19°38'S, 118°6'E), 49 m, shelly sand, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 13 Jun 1983 (stn NWA 56), NMV J45442 (1 subadult female).

Other material. Australia. Bass Strait, 39°S, 134–144°E: 6 females. NMV J48040; J48041.

*Diagnosis. Female and subadult male.* Carapace with a sharp ridge sweeping from the anteroventral corner dorsally, with a sharp prominence anterodorsal of sweeping ridge. Antenna 1 articles 1 and 2 with several teeth. Telson longer than uropod peduncles, lateral margins smooth. Uropod endopod biarticulate, longer than exopod. Adult male. Unknown

*Distribution.* Bass Strait, WA; 11–100 m.

*Remarks.* The lobe on the ischium of pereopod 4 is diagnostic and easily visible, unless broken off. There is another species, *Gynodiastylis megasiphon*, that has paired lobes on the merus and basis, in addition to a lobe on the ischium of pereopod 4. However, the first pereopods of *G. megasiphon* are brush bearing, and the carapace morphologies are very different. Thus, *E. laciniacristata* and *G. megasiphon* should be easily differentiated.

***Eogynodiastylis paeminosa* sp. nov.**

Figures 28–30

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 65 km S of Cape Schanck, (39°08.3'S, 144°43.9'E), 66 m, coarse sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 201 S), NMV J47973 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 65 km S of Cape Schanck, (39°08.3'S, 144°43.9'E), 66 m, coarse sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 201 S), NMV J47976 (1 ovigerous female dissected); western Bass Strait, 25 km S of Cape Otway (39°06.0'S, 143°35.8'E), 95 m, fine sand, 95% carbonate, WHOI epibenthic sled, M.F. Gomon et al., RV *Hai Kung*, 31 Jan 1981 (stn BSS 118 S), NMV J47974 (1 subadult male dissected); western Bass Strait, 26 km SW of Cape Otway (39°01.0'S, 143°22.1'E), 84 m, medium sand, M.F. Gomon et al., RV *Hai Kung*, 31 Jan 1981 (stn BSS 120), NMV J47972 (3 subadult males).

Other material. Australia. Bass Strait, 39°S, 134–144°E: 3 females. NMV J47975; J47977.

*Diagnosis. Female and subadult male.* Carapace with a sharp ridge sweeping from the anteroventral corner dorsally, distinct anterodorsal prominence produced as multiple teeth, anterior of the sweeping ridge. Antenna 1 articles 1 with single strong tooth. Telson longer than uropod peduncles, lateral margins serrate. Uropod endopod biarticulate. Adult male. Unknown.

*Etymology.* From Latin, *paeminosa* meaning rough or uneven, in reference to the carapace.

*Distribution.* Bass Strait, southern Australia; 66–95 m.

*Remarks.* The female of *E. paeminosa* bears tiny exopods on pereopods 3 and 4, much smaller than the exopods present on pereopods 3 and 4 of *E. aganaktikos* and *E. laciniacristata*. Also, the pereopod 4 ischium is not produced as a distinct large lobe.

***Litogynodiastylis* gen. nov.**

*Gynodiastylis.*—Calman, 1911: 371–372.

*Type species.* *Gynodiastylis laevis* Calman, 1911.

*Diagnosis. Female and subadult male.* Pseudo-rostral lobes horizontal or weakly directed dorsally or ventrally. Carapace smooth or complex, with ridges, tubercles, tumidities. Eye lobe with or without lenses. First antenna small to moderate. Pereopod 1 simple, relatively short. Female with fully developed exopods on pereopods 1 and 2, pereopods 3 and 4 without exopods. Uropod endopod of 1, 2, or 3 articles. Telson 0.5–2 times length of last pleonite, with or without post-anal part, with or without terminal setae. *Adult male.* Eye lobe with or without lenses, frequently with more lenses than female. Antenna 2 peduncle of 3–4 articles, flagellum of 10–12 articles. Exopods present on maxilliped 3 and pereopods 1 and 2, pereopods 1–3, or pereopods 1–4. Uropod

endopod of 1, 2, or 3 articles; number of articles may be less than in female.

*Etymology.* From Greek *lito* meaning simple or plain, in reference to the unmodified pereopod 1, in combination with *Gynodiastylis*.

*Distribution.* Australia, Tasmania; 1–400 m.

*Species.* *Litogynodiastylis alata*, *L. ambigua* (Hale, 1946), *L. attenuata* (Hale, 1946), *L. brevipes* (Hale, 1946), *L. caperata* sp. nov., *L. charadra* sp. nov., *L. concava* (Hale, 1946), *L. crenagloba* sp. nov., *L. echinata* (Hale, 1946), *L. gongyla* sp. nov., *L. inepta* (Hale, 1946), *L. laevis* (Calman, 1911), *L. lewtonae* sp. nov., *L. lumacaudata* sp. nov., *L. margarita* (Hale, 1946), *L. microornata* sp. nov., *L. munda* (Hale, 1951), *L. mutabilis* (Hale, 1946), *L. ornata* (Hale, 1946), *L. poorei* sp. nov., *L. pseudomargarita* sp. nov., *L. quadricristata* (Hale, 1946), *L. roscida* (Hale, 1946), *L. serrata* sp. nov., *L. trachyphasis* sp. nov., *L. tumida* (Hale, 1937), *L. turgida* (Hale, 1946), *L. vicaria* (Hale, 1951).

*Remarks.* This genus is separable from *Gynodiastylis*, *Axiogynodiastylis*, and *Haliana* by the unmodified pereopod 1, and from the similar genus *Eogynodiastylis* by the lack of rudimentary exopods on pereopods 3 and 4 in the female.

**Key to species of *Litogynodiastylis***

1. Carapace smooth ..... 2
- Carapace with spines, tubercles, ridges or tumidities ..... 4
2. Telson with serrate lateral margins, with 1 pair lateral setae and 1 pair terminal setae ..... *L. ambigua*
- Telson unarmed, lateral margins entire ..... 3
3. Uropod endopod uniarticulate, male with exopods on pereopods 1 and 2 only ..... *L. laevis*
- Uropod endopod biarticulate, male with exopods on pereopods 1–3 ..... *L. attenuata*
4. Sides of carapace closely beset with spines, without ridges ..... *L. echinata*
- Sides of carapace without spines, or if spines present, ridges also present .. 5
5. Carapace covered with tubercles ..... 6
- Carapace with few or no tubercles ..... 7
6. Carapace with tubercles but no lateral ridges ..... *L. roscida*
- Carapace with tubercles and lateral ridge curving up to meet dorsal ridges ..... *L. poorei*
7. Each side of carapace with well defined ridge, curving up from antennal angle to meet a dorsolateral ridge ..... 8
- Without entire ridge, although a partial ridge may be present ..... 11
8. Carapace strongly decorated with many heavy ridges and tubercles..... *L. trachyphasis*
- Carapace with reticulations or tubercles, without heavy lateral ridges ..... 9
9. Telson with at least 1 pair lateral teeth, and in adult apex pointed and projecting for short distance beyond bases of pair of subterminal setae. Uropod endopod uniarticulate in both male and female ..... *L. mutabilis*

—	Telson with lateral margins entire, apex with 1 pair small setae. Uropod endopod biarticulate in both male and female .....	10
10.	Male with exopods on pereopods 1 and 2, adults of both sexes 2.5–3.5 mm .....	<i>L. microornata</i>
—	Male with exopods on pereopods 1–4, adults of both sexes 4–5 mm .....	<i>L. ornata</i>
11.	Carapace with 2 pairs of dorsal ridges .....	12
—	Carapace with 1 pair or no dorsal ridges .....	13
12.	Dorsal ridges connected by short transverse ridge at midpoint. Carapace without setae .....	<i>L. quadricristata</i>
—	Dorsal ridges unconnected. Carapace covered with clusters of tiny hairlike setae .....	<i>L. gongyla</i>
13.	Carapace with 2 parallel rows of dorsal teeth .....	<i>L. serrata</i>
—	Carapace without rows of dorsal teeth .....	14
14.	Carapace with incomplete, weak lateral ridge, beginning at antennal angle. Eyelobe with pair of spines. Telson lateral margins incised to form 1 large tooth on each side .....	<i>L. brevipes</i>
—	Carapace without incomplete, weak lateral ridge .....	15
15.	Carapace with 2 incomplete dorsal rows of heavy tubercles or blunt teeth and single ventral lateral incomplete row of tubercles .....	<i>L. crenagloba</i>
—	Carapace without rows of tubercles .....	16
16.	Carapace with many lateral complete and incomplete ridges .....	<i>L. turgida</i>
—	Carapace without lateral complete ridges, with tumidities or swellings .....	17
17.	Carapace anterodorsal portion of frontal lobe produced as point. Telson margins serrate. Telson longer than uropod peduncles .....	<i>L. lumacaudata</i>
—	Anterodorsal portion of frontal lobe not produced as point .....	18
18.	Female with triarticulate uropod endopod (male with biarticulate endopod)... ..	19
—	Female with biarticulate uropod endopod (male with biarticulate or unknown) .....	21
19.	Carapace with 3 or more lateral projections on each side. Telson without lateral setae .....	<i>L. tumida</i>
—	Carapace with 2 lateral projections on each side .....	20
20.	Posterior dorsolateral swelling of carapace 0.5 carapace length. Telson longer than uropod peduncles; lateral margins strongly serrate. (male telson shorter than peduncles, lateral margins smooth) .....	<i>L. alata</i>
—	Posterior dorsolateral swelling of carapace less than 0.3 carapace length. Telson shorter than uropod peduncles; lateral margins weakly serrate.....	<i>L. caperata</i>
21.	Pereopod 2 with basis longer than all remaining articles together .....	22
—	Pereopod 2 basis shorter than all remaining articles together .....	23
22.	Carapace with deeply concave sides. Uropod exopod shorter than endopod... ..	<i>L. concava</i>
—	Carapace with weakly concave sides. Uropod exopod subequal to endopod .....	<i>L. pseudomargarita</i>
23.	Telson longer than or equal to uropod peduncles (male with exopods on pereopods 1–3) .....	<i>L. lewtonae</i>
—	Telson shorter than uropod peduncles (male with exopods on pereopods 1–4 where known) .....	24
24.	Carapace with distinct dorsal ridges bounding deep dorsal depression.....	<i>L. charadra</i>
—	Carapace with no dorsal depression .....	25
25.	Antenna 1 not extending past tips of pseudorostral lobes; article 1 expanded .....	<i>L. munda</i>
—	Antenna 1 extending past tips of pseudorostral lobes; article 1 not expanded.. ..	26

26. Carapace with lateral depression ..... 27  
 — Carapace with sides an unbroken curve ..... *L. margarita*  
 27. Telson less than half length of uropod peduncles. Pereopod 2 basis 3 or more times width of ischium ..... *L. inepta*  
 — Telson more than half length of uropod peduncles. Pereopod 2 basis twice width of ischium ..... *L. vicaria*

***Litogynodiastylis alata* sp. nov.**

Figures 31–35

*Material examined.* Holotype. Australia, Tas., Maria I. 5 km NE of Mistaken Cape (42°37.00'S, 148°12.50'E), 100 m, fine muddy bryozoa, WHOI epibenthic sled, R.S. Wilson, RV *Challenger*, 23 Apr 1985 (stn TAS 31), NMV J48097 (ovigerous female).

Paratypes. Australia. Tas. 15 km E of Maria I., (42°37'S, 148°20'E), 102 m, WHOI epibenthic sled, R.S. Wilson, RV *Soela*, 9 Oct 1984 (stn S05/84 01), NMV J48275 (1 adult male dissected); NMV J48276 (1 subadult female dissected); NMV J48095 (4 subadult females, 1 subadult male), Vic., Central Bass Strait, 38 km SW of Cape Paterson, (38°55.5'S, 145°17.0'E), 70 m, fine sand, R.S. Wilson, R.V. *Tangaroo*, 12 Nov 1981 (stn BSS 155), NMV J48096 (2).

*Diagnosis. Female and subadult male.* Carapace with distinct posterior dorsolateral prominences, and a distinct ventrolateral swelling. Pseudorostrum with one pair ill-defined dorsal carinae. Eyelobe with 3 lenses. Pereopod 2 dactylus covered in fine hairlike setae. Telson longer than uropod peduncles, lateral margins serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod triarticulate, longer than exopod. Terminal setae of uropod rami unknown, broken. *Adult male.* Carapace as in female, except pseudorostrum without dorsal carinae. Eyelobe with lenses. Pereopod 2 without fine hairlike setae. Exopods present on maxilliped 3–pereopod 2. Telson shorter than uropod peduncles, lateral margins with few to no teeth, not obviously serrate, setae as in females. Uropod endopod biarticulate, longer than exopod. Uropod endopod terminal seta unknown, broken; exopod terminal seta simple.

*Etymology.* From Latin, *alatus* meaning winged, in reference to the large dorsal wings on the carapace.

*Distribution.* Eastern Tas., Bass Strait; 70–102 m.

*Remarks.* This species is superficially similar to *Litogynodiastylis caperata*, particularly in the carapace morphology but the posterior dorsolateral swellings are approximately half the carapace length in *L. alata*, while the posterior dorsolateral swellings in *L. caperata* are less than one third the carapace length. Also, in *L. alata* the telson in

the female is distinctly longer than the uropod peduncles, while in *L. caperata* the telson in the female is distinctly shorter than the uropod peduncles.

***Litogynodiastylis ambigua* (Hale) comb. nov.**

Figures 36–37

*Gynodiastylis ambigua* Hale, 1946: 387–392, figs 21–23.

*Material examined.* Holotype. Australia. NSW, Jibbon Station, 70 m, SAM C2674 (type A, ovigerous female).

Paratypes. Australia. NSW, Jibbon Station, 70 m, SAM C2673 (type A, female); C2676 (type B, ovigerous female); C2677 (type B, ovigerous female); C2693, C2694 (type C, adult male and ovigerous female).

Other material. Australia. Tas., Bass Strait, Vic., NSW, 34–40°S, 143–151°E: 137 females, 27 males. NMV J45325; J48326; J48327; J48328; J48329; J48330; J48331; J48332; J48333; J48334; J48335; J48336; J48337; J48338; J48339; AM P60979; P55750; P60980; P56097; P60981; P56107; P56102; P55808; P60986; P56223; P60991; P61001; P61002; P61004; P61013; P61015; P61023; P55784.

*Diagnosis. Female and subadult male.* Carapace smooth, unornamented. Pseudorostrum ventrally directed. Eyelobe with 3 lenses. Pereopod 2 basis expanded. Telson subequal to uropod peduncles, lateral margins serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod triarticulate, much longer than exopod. Terminal setae of uropod rami simple. *Adult male.* As in female, except exopods present on maxilliped 3–pereopod 2. Telson longer than uropod peduncles. Uropod endopod biarticulate, much longer than exopod.

*Distribution.* South-eastern Australia; 1–400 m.

*Remarks.* Hale (1946) observed three different forms, varying in size, robustness, and carapace dimensions, hence the appellation *ambigua*. The three forms were described as variants of a single species (Hale, 1946, types A–C) because the appendages of the females in all three forms are very similar. The size and robustness of the various forms could be attributed to environmental variations, therefore the three variants are considered a single species.

*Litogynodiastylis attenuata* (Hale) comb. nov.

Figure 38

*Gynodiastylis attenuata* Hale, 1946: 392–394, figs 24–25.

*Material examined.* Holotype. Australia. Qld, Moreton Bay, Myora Bight, SAM C2680 (adult male).

Paratype. Qld, Moreton Bay, Myora Bight, SAM C2678 (female).

Other material. Australia. WA, Northwest Shelf, between Port Hedland and Dampier (19°5'S, 117°26'E), 120 m, muddy sand, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 12 Jun 1983 (stn NWA 52), NMV J48249 (1 adult male). WA, King George Sound, N of False I. (35°0.7'S, 118°10.1'E), 28 m, shelly sand on flat bottom, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Apr 1984 (stn SWA 53), NMV J48340 (1).

*Diagnosis. Female and subadult male.* Unknown.

*Adult male.* Carapace smooth, without ornamentation. Pseudorostrum ventrally directed, broadly truncate. Eyelobe with 3 lenses. Pereopod 2 basis expanded. Exopods present on maxilliped 3–pereopod 3. Telson longer than uropod peduncles, lateral margins smooth, without lateral or terminal setae. Uropod endopod biarticulate, much longer than exopod. Uropod endopod terminal seta with long subterminal setule; exopod terminal seta with long subterminal setule.

*Distribution.* Qld, WA; 0–120 m.

*Remarks.* This species is most similar to *Litogynodiastylis ambigua* and *L. laevis*. The telson of *L. ambigua* is ornamented and bears setae, unlike the telson of *L. attenuata*. In *L. laevis*, the uropod endopod is uniarticulate, while in *L. attenuata* the uropod endopod is biarticulate.

*Litogynodiastylis brevipes* (Hale) comb. nov.

Figure 39

*Gynodiastylis brevipes* Hale, 1946: 414–416, figs 41–42.

*Material examined.* Holotype. Australia. NSW, 4 mi. off Eden, 70 m, SAM C2656 (female).

Other material. Australia. Vic., Bass Strait, 37–40°S, 145–149°E: 24 females, 13 males. NMV J45276; J39246; J45274; J45297; J39682; J39653; J39654; J39666; J45266; J23388; J23387.

*Diagnosis. Female and subadult male.* Carapace with ill-defined, incomplete ridges that border a shallow anterolateral depression. Pseudorostrum with 2 pairs of distinct ridges. Eyelobe with 1 pair of distinct ridges, 3 lenses, and pair of teeth. Pereopod 2 basis not expanded, without fine hairlike setae on any article. Telson shorter than uropod

peduncles, lateral margins falcate, bearing 1 pair stout terminal setae. Uropod endopod biarticulate, longer than exopod. Terminal setae of uropod rami simple. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 40–200 m.

*Remarks.* The carapace of *Litogynodiastylis brevipes* is most similar to the carapace of *Gynodiastylis subtilis*. However, the unmodified pereopod 1 of *L. brevipes* is very different from the brush-bearing pereopod 1 of *G. subtilis*.

*Litogynodiastylis caperata* sp. nov.

Figures 40–41

*Material examined.* Holotype. Australia. SA, Venus Bay, off Venus Bay township (33°13.80'S, 134°40.10'E), 3 m, sand flats opposite jetty, hand dredge, G.C.B. Poore, 23 Apr 1985 (stn SA 86), NMV J48003 (subadult female).

Paratypes. Australia. SA, Venus Bay, off Venus Bay township (33°13.80'S, 134°40.10'E), 3 m, sand flats opposite jetty, hand dredge, G.C.B. Poore, 23 Apr 1985 (stn SA 86), NMV J48005 (1 subadult female); Vic., Western Port, off Crib Point (38°20.15'S, 145°15'E), 3 m, fine sand mud, Smith-McIntyre grab, A.J. Gilmour (MSG), FV *Melita*, 5 Apr 1965 (stn CPBS-E 10), NMV J48004 (1).

*Diagnosis. Female and subadult male.* Carapace with posterior dorsolateral swelling, one third or less than the entire carapace length, with distinct ventrolateral ridge. Pseudorostrum horizontal, without carinae. Eyelobe without apparent lenses. Pereopod 2 unmodified. Telson shorter than uropod peduncles, lateral margins weakly serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod triarticulate, longer than exopod. Terminal setae with single subterminal setule. *Adult male.* Unknown.

*Etymology.* From Latin, *caperata* meaning folds, referring to the several large folds in the carapace.

*Distribution.* Vic., SA; 3 m.

*Remarks.* Carapace morphology of *Litogynodiastylis alata* is similar. However, in *L. caperata* the posterior dorsolateral swelling is much shorter relative to the carapace length.

*Litogynodiastylis charadra* sp. nov.

Figures 42–45

*Material examined.* Holotype. Australia. Tas., western Bass Strait, 36 km SSW of Stokes Point, King I. (40°26.7'S, 143°41.4'E), 85 m, medium sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 22 Nov 1981 (stn BSS 198 G), NMV J47999 (ovigerous female).



Paratypes. Australia. Vic., eastern Bass Strait, 15.2 km E of eastern edge of Lake Tyers (37°51.99'S, 148°14.98'E), 40 m, sand-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 25 Sep 1990 (stn MSL-EG 31), NMV J23417 (1 adult male); eastern Bass Strait, 8.6 km WSW of Cape Conran (37°51.19'S, 148°38.53'E), 51 m, mud-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 28 Sep 1990 (stn MSL-EG 56), NMV J23420 (1 adult male).

*Diagnosis. Female and subadult male.* Carapace posterior half produced as dorsally directed hump, with pair of distinct dorsal ridges bounding a very deep dorsal depression. Pseudorostrum horizontal, without carinae. Eyelobe with distinct lenses. Pereopod 2 unmodified. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair stout terminal setae. Uropod endopod biarticulate, much longer than exopod. Terminal setae of uropod rami with single long subterminal setule. *Adult male.* Carapace as in female. Pereopod 2 basis weakly expanded. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles, lateral margins weakly serrate, bearing 1 pair stout lateral setae, 1 pair stout terminal setae. Uropod endopod biarticulate, slightly longer than exopod. Terminal setae of uropod rami with single long subterminal setule.

*Etymology.* From Greek, *charadra* meaning deep gully or rift, in reference to the deep dorsal depression in the carapace and pereonites.

*Distribution.* Bass Strait; 40–85 m.

*Remarks.* This species is very similar to *Litogynodiastylis lewtonae*. However, the males are distinguishable on the basis of the number of exopods and the telson and uropod proportions and armature. In *L. lewtonae*, the male bears four pairs of exopods, and in *L. charadra* the male bears five pairs of exopods. The female of *L. lewtonae* is not known. However, it is expected to be distinguishable on the basis of the telson and uropod armature, and possibly size. The males of *L. charadra* are 1.5 times the size of males of *L. lewtonae*, although the single female specimen is approximately the same size as male *L. lewtonae*. In other species (e.g. *Dicoides fletti*) there are notable differences in size, both within the same life stage, such as ovigerous females, and between the sexes, therefore the sexually dimorphic size difference observed in *L. charadra* does not preclude the specimens belonging to the same species.

*Litogynodiastylis concava* (Hale) comb. nov.

Figure 46

*Gynodiastylis concava* Hale, 1946: 417–418, figs 43–44.

*Material examined.* Holotype. Australia. NSW, 4 mi. off Eden, 70 m, SAM C2720 (ovigerous female).

Paratypes. NSW, 4 mi. off Eden, 70 m, SAM C2721, C2722 (females).

Other material. Australia. Vic., Bass Strait, NSW, 34–40°S, 144–151°E: 15 females, 1 male. NMV J39244; J48229; J48230; J48231; J48232; J48233; J48234.

*Diagnosis. Female and subadult male.* Carapace deeply concave laterally. Pseudorostrum without carinae. Eyelobe without lenses. Pereopod 2 basis serrate, with few strong teeth distally. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, longer than exopod. Terminal setae of uropod rami simple. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 37–363 m.

*Remarks.* The concave sides of the carapace in this species are distinctive.

*Litogynodiastylis crenagloba* sp. nov.

Figures 47–48

*Material examined.* Holotype. Australia. Tas., E of Rocky Cape lighthouse, below Rocky Cape cave (40°51'S, 145°31'E), 1 m, *Amphibolus antarcticus*, hand, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1988 (stn TAS 53), NMV J48279 (subadult female).

*Diagnosis. Female and subadult male.* Carapace globular, dorsolateral row of tubercles or strong teeth on posterior two thirds, ventrolateral row of strong tubercles, frontal lobe with distinct pair of dorsal carinae. Pseudorostrum horizontal, without carinae. Eyelobe without lenses. Pereopod 2 basis expanded. Telson shorter than uropod peduncles, lateral margins smooth, bearing several pairs slender lateral setae and 1 pair tiny terminal nubs. Uropod endopod biarticulate, shorter than exopod. Terminal setae of uropod rami complex, distal one third microserrate, with a single long subterminal setule. *Adult male.* Unknown.

*Etymology.* From Latin, *crena* meaning rounded projections, and *globus* meaning ball, referring to the globular shape of the carapace and the patterns of rounded teeth apparent on the carapace.

*Distribution.* Bass Strait; 0–1 m.

*Remarks.* Despite a strong similarity to *Litogynodiastylis gongyla*, this species can be distinguished by the following characters: carapace smooth with a few rows of teeth, whereas in *L. gongyla* the carapace is covered with groups of small hairs; telson, uropod peduncles, and pleonite 6 all subequal, whereas in *L. gongyla* the telson is much shorter than the uropod peduncles; uropod terminal setae complex, whereas in *L. gongyla* the uropod terminal setae are simple.

***Litogynodiastylis echinata* (Hale) comb. nov.**

Figure 49

*Gynodiastylis echinata* Hale, 1946: 394–396, figs 26–27.

*Material examined.* Holotype. Australia. NSW, off Eden, 70 m, SAM C2652 (female).

Other material. Australia. Vic., Bass Strait, NSW, 34–42°S, 145–151°E: 7 females, 1 subadult male. NMV J48431; J48432; J48433; J48434; J48435.

*Diagnosis. Female and subadult male.* Carapace, pleon, pereon, and appendages all bear many stout spines. Pseudorostrum with many spines, not organised into rows. Eyelobe without lenses, with pair of teeth. Pereopod 2 unmodified, except for multiple spines present on all articles. Telson longer than uropod peduncles, lateral margins strongly serrate, bearing 1 pair small terminal setae. Uropod endopod triarticulate, shorter than exopod. Terminal setae of uropod rami simple. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 67–102 m.

*Remarks.* This species is unique in possessing multiple strong spines on the entire body and all appendages.

***Litogynodiastylis gongyla* sp. nov.**

Figures 50–52

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 25 km S of Aireys Inlet, (38°44.6'S, 144°09.0'E), 77 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 19 Nov 1981 (stn BSS 182 S), NMV J45465 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 60 km SW of Cape Schanck, (39°00.2'S, 144°33.9'E), 74 m, sandy shell, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 202 S), NMV J45466 (1 ovigerous female); Tas., eastern Bass Strait, 94 km NE of North Point, Flinders I., (38°53.7'S, 147°55.2'E), 71 m, medium sand, WHOI epibenthic

sled, R.S. Wilson, RV *Tangaroa*, 15 Nov 1981 (stn BSS 171 S), NMV J45467 (1 ovigerous female); NMV J29208 (1 adult male); NMV J29215 (1 adult male).

Other material. Australia. Vic., Tas., Bass Strait, NSW, 34–42°S, 143–151°E: 9 females, 7 adult males. NMV J48250; J48254; J48037; J48038; J45278; J48039; J48253; J39262; J29207; J48255; J48258; AM P55809; P55812.

*Diagnosis. Female and subadult male.* Carapace globular, with two pairs thick dorsal ridges, medial pair extending onto frontal lobe, lateral pair produced as teeth or tubercles anteriorly, extending onto pseudorostral lobes, single ridge sweeping from anterolateral corner dorsally and joining proximal dorsal ridge; covered in small clusters of fine hair like setae. Pseudorostrum blunt, without carinae. Eyelobe without lenses. Pereopod 2 basis expanded. Telson shorter than uropod peduncles, lateral margins smooth, without setae. Uropod endopod biarticulate, slightly shorter than exopod. Terminal setae of uropod rami simple. *Adult male.* Carapace with same pattern of ridges as female, but expanded ventrally, without clusters of fine hairlike setae. Pseudorostrum ventrally directed. Exopods present on maxilliped 3–pereopod 2. Terminal setae of uropod rami complex, distal third microserrate, with single plumose terminal setule.

*Etymology.* From Greek, *gongyla* meaning ball or sphere, in reference to the very globular carapace.

*Distribution.* Bass Strait; 1–84 m.

*Remarks.* The pattern of ridges on the carapace is similar to the pattern of ridges on the carapace of *Litogynodiastylis quadricristata*. However, in *L. quadricristata* the paired dorsal ridges are connected by short transverse ridges at about the mid-point, while in *L. gongyla* the dorsal ridges are not connected. Also, the clusters of tiny hairlike setae present on the carapace, pleon, and pereon of *L. gongyla* are not present on *L. quadricristata*.

***Litogynodiastylis inepta* (Hale) comb. nov.**

Figure 53

*Gynodiastylis inepta* Hale, 1951: 364–367, figs 7–8.

*Material examined.* Holotype. Australia. WA, Garden I., Careening Bay, 3 fm, SAM C3262 (adult male).

Other material. Australia. Vic., eastern Bass Strait, 13.3 km E of eastern edge of Lake Tyers (37°51.70'S, 148°14.60'E), 37 m, coarse sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 94), NMV J48245 (1 adult male).

*Diagnosis. Female and subadult male.* Unknown. *Adult male.* Carapace with distinct lateral

depression, with ventral swelling. Pseudorostrum without carinae. Eyelobe with 3 large lenses. Pereopod 2 basis moderately expanded. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair slender lateral setae, 1 pair stout terminal setae. Uropod endopod biarticulate, shorter than exopod. Terminal setae of uropod rami with single short subterminal setule.

*Distribution.* Bass Strait, southern WA; 0–37 m.

*Remarks.* This species is similar to *Litogynodiastylis tumida*, but can be differentiated by the uropod rami and peduncles. In *L. tumida*, the uropod exopod is shorter than the endopod, while in *L. inepta* the uropod exopod is longer than the endopod. Also, in *L. inepta* the uropod peduncles are more than twice the length of pleonite 6, while in *L. tumida* the uropod peduncles are much less than twice the length of pleonite 6.

***Litogynodiastylis laevis* (Calman) comb. nov.**

Figure 54

*Gynodiastylis laevis* Calman, 1911: 371–372, pl. 35 figs 32–39.—Stebbing, 1912: 147.—Stebbing, 1913: 161–162, fig. 111.—Gamô, 1961: 106–108.—Jones, 1963: 73–75, figs 335–342.

Material examined. Cotype. New Zealand, Lyttelton Harbour, 1–5 fm, ZMC.

Other material. Australia. Tas., off Freycinet Peninsula (41°57.50'S, 148°37.90'E), 400 m, coarse shell, WHOI epibenthic sled, M.F. Gomon et al., RV *Franklin*, 27 Jul 1986 (stn SLOPE 48), NMV J48244 (1 subadult male).

*Diagnosis. Female and subadult male.* Carapace smooth, without ornamentation. Pseudorostrum broadly truncate. Eyelobe without obvious lenses. Pereopod 2 unmodified. Telson longer than uropod peduncles, lateral margins smooth, bearing 1 pair stout terminal setae. Exopods present on maxilliped 3–pereopod 2. Uropod endopod unarticulate, longer than exopod. Terminal setae of uropod rami complex, distal half microserrate. *Adult male.* As in the female, except telson without terminal setae.

*Distribution.* Tas., New Zealand; 0–400 m.

*Remarks.* The species is similar to *Litogynodiastylis ambigua* in overall form. However, the unarticulate uropod endopod distinguishes *L. laevis* from *L. ambigua* with certainty.

***Litogynodiastylis lewtonae* sp. nov.**

Figures 55–57

*Material examined.* Holotype. Australia. Vic., eastern Bass Strait, 15.5 km SW of Pt Ricardo (37°53.14'S, 148°28.94'E), 45 m, medium sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 108), NMV J27803 (adult male).

Paratypes. Australia. Vic., eastern Bass Strait, 13.3 km E of eastern edge of Lake Tyers (37°51.70'S, 148°14.60'E), 37 m, coarse sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 94), NMV J27800 (6 adult males); J48284 (1 adult male dissected); eastern Bass Strait, 13.3 km E of eastern edge of Lake Tyers (37°51.70'S, 148°14.60'E), 37 m, coarse sand, Smith-McIntyre grab, N. Coleman, RV *Sarda*, Feb 1991 (stn MSL-EG 96), NMV J27802 (5 adult males).

Other material. Australia. Vic., Bass Strait, 37°S, 148°E: 7 adult males, 4 subadult males. NMV J23416; J23418; J27799; J39689; J27797; J27798; J57801; J23419; J48285.

*Diagnosis. Females.* Unknown. *Adult male.* Carapace with distinct dorsally directed swelling on posterior portion of dorsum. Pseudorostrum ventrally directed. Eyelobe with 3 lenses. Pereopod 2 basis somewhat expanded, otherwise unmodified. Exopods present on maxilliped 3–pereopod 3. Telson subequal to uropod peduncles, lateral margins smooth, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, slightly longer than exopod. Terminal setae of uropod rami with single moderate subterminal setule.

*Etymology.* This species is named after Helen Lew Ton, as she identified the species as new and sorted them from among the Museum Victoria gynodiastylid material.

*Distribution.* Bass Strait; 36–50 m.

*Remarks.* This species is smaller than *Litogynodiastylis charadra*, the telson is subequal to the uropod peduncles rather than shorter than the uropod peduncles as in *L. charadra*, and *L. lewtonae* has 4 pairs of exopods in the male, rather than 5 pairs as in *L. charadra*.

***Litogynodiastylis lumacaudata* sp. nov.**

Figures 58–59

*Material examined.* Holotype. Australia. Vic., eastern Bass Strait, 40 km SSW of Lakes Entrance, (38°18.0'S, 147°37.0'E), 55 m, muddy fine shell, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 31 Jul 1983 (stn BSS 209), NMV J48093 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 38 km SW of Cape Paterson, (38°55.5'S, 145°17.0'E), 70 m, fine sand, R.S. Wilson, RV *Tangaroa*, 12 Nov 1981 (stn BSS 155), NMV J48085 (2 subadult females, 3 adult males); Tas., eastern Bass Strait, 24 km NNE of Eddy-stone Point (40°43.9'S, 148°32.5'E), 56 m, muddy sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 163), NMV J48087 (2 ovigerous females, 8 subadult females, 6 adult males, 3 subadult males); eastern Bass Strait, 40 km SSW of Lakes Entrance (38°18.0'S, 147°37.0'E), 55 m, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 31 Jul 1983 (stn BSS 209), NMV J48092 (1 ovigerous female).

Other material. Australia. Vic., Bass Strait, 38–40°S, 142–148°E: 8 females, 10 undetermined. NMV J48082; J48083; J48084; J48086; J48088; J48089; J48090; J48091; J48277; J48278.

*Diagnosis. Female and subadult male.* Carapace with a single sharp ridge sweeping dorsally from the anterolateral portion of the carapace, with a distinct anterolateral prominence dorsal of the sweeping ridge produced as a sharp corner. Pseudorostrum sharp. Eyelobe without lenses. Pereopod 2 unmodified. Telson longer than uropod peduncles, lateral margins weakly serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod triarticulate, subequal to exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Unknown.

*Etymology.* From Latin, *luma* meaning thorny, and *caudata* referring to the telson.

*Distribution.* Bass Strait; 33–70 m.

*Remarks.* The combination of carapace morphology and a serrate telson, longer than the uropod peduncles, serve to distinguish this species from all other species of *Litogynodiastylis*.

*Litogynodiastylis margarita* (Hale) comb. nov.

Figure 60

*Gynodiastylis margarita* Hale, 1946: 409–412, figs 37–38.

*Material examined.* Holotype. Australia. NSW, 4 mi. off Port Hacking, 80 m, SAM C2689 (female).

Paratypes. NSW, 4 mi. off Port Hacking, 80 m, SAM C2690 (male), C2551 (female), C2723 (female).

Other material. Australia. Tas., central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4'S, 147°32.6'E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48241 (12 females, 1 male).

*Diagnosis. Female and subadult male.* Carapace with gentle swellings, especially posterodorsally. Pseudorostrum sharp. Eyelobe with 4 lenses. Pereopod 2 unmodified. Telson less than half

uropod peduncle length, lateral margins smooth, bearing 1 pair slender lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, longer than exopod. Terminal setae of uropod rami short, simple. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 0–51 m.

*Remarks.* The species is large, attaining lengths of over 6 mm (Hale, 1946). The carapace is similar to the carapace of *Litogynodiastylis tumida*. However, *L. tumida* is much smaller (3.0 mm or less) with distinct prominences in the carapace folds, rather than gentle tumidities that are not distinct enough to be named folds.

*Litogynodiastylis microornata* sp. nov.

Figures 61–65

*Material examined.* Holotype. Australia. Vic., eastern Bass Strait, 1.3 km WSW of Cape Conran (37°49.37'S, 148°43.02'E), 33 m, sand-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 28 Sep 1990 (stn MSL-EG 52), NMV J48261 (subadult female).

Paratypes. Australia. Vic., eastern Bass Strait, 1.3 km WSW of Cape Conran (37°49.37'S, 148°43.02'E), 33 m, sand-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 28 Sep 1990 (stn MSL-EG 52), NMV J48259 (1 adult male dissected); J48260 (1 ovigerous female dissected); J48257 (1 ovigerous female).

*Diagnosis. Female and subadult male.* Carapace with pair of ridges running anteroventrally from the midpoint of the carapace onto the pseudorostrum lobes, with a second incomplete ridge paralleling the posteroventral corner of the carapace. Pseudorostrum sharp. Eyelobe with 2 lenses. Pereopod 2 basis expanded. Telson slightly shorter than uropod peduncles, lateral margins smooth, bearing 1 pair small slender lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, longer than exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Carapace as in female, with the addition of a ventrolateral swelling obscuring the incomplete posteroventral ridge. Exopods present on maxilliped 3–pereopod 2. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair tiny terminal setae.

*Etymology.* The species is named *microornata* in reference to Hale's (1946) species *L. ornata*, which has a similar carapace morphology but is significantly larger.

*Distribution.* Bass Strait; 0–33 m.

*Remarks.* This species is similar to *Litogynodiastylis ornata*, but is much smaller and the male

has exopods on maxilliped 3 through pereopod 2 only, unlike *L. ornata* in which the male bears exopods on maxilliped 3 through pereopod 4.

***Litognodiastylis munda* (Hale) comb. nov.**

Figure 66

*Gynodiastylis munda* Hale, 1951: 359–362, figs 3–4.

*Material examined.* Holotype. Australia. WA, Rottnest I., 2.25 fm, SAM C3249 (female).

*Diagnosis. Female and subadult male.* Carapace with pair of ridges dorsolaterally, running from the frontal lobe to the posterior margin, with a few incomplete lateral ridges posteriorly. Pseudorostrum blunt. Eyelobe without lenses. Pereopod 2 basis slightly expanded, otherwise unmodified. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair small slender lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, subequal to exopod. Terminal setae of uropod rami simple. *Adult male.* Unknown.

*Distribution.* Southern WA; 0–10 m.

*Remarks.* This species is similar to *Litognodiastylis concava* but the sides of the carapace are flat rather than concave, and the pseudorostrum is blunt rather than sharp, as it is in *L. concava*.

***Litognodiastylis mutabilis* (Hale) comb. nov.**

Figures 67–68

*Gynodiastylis mutabilis* Hale, 1946: 399–404, figs 30–32.

*Material examined.* Holotype. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2692 (ovigerous female).

Paratypes. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2714 (adult male), C2685 (juvenile female).

*Diagnosis. Female and subadult male.* Carapace with ridge sweeping dorsally from the anterolateral corner, with several ridges anterior of the sweeping ridge; the anterior portion of the carapace is ventrally directed. Pseudorostrum blunt, with pair of dorsal carinae. Eyelobe with 2 lenses and pair of dorsal carinae. Pereopod 2 basis moderately expanded. Telson longer than uropod peduncles, lateral margins falcate and serrate, bearing 1 pair stout subterminal setae (terminal margin of telson produced as sharp process between subterminal setae). Uropod endopod uniarticulate, longer than exopod. Terminal setae of uropod rami simple. *Adult male.* Carapace with same pattern of ridges as female, somewhat dorsolaterally flattened. Pereopod 2 basis expanded.

Exopods present on maxilliped 3–pereopod 4. Telson longer than uropod peduncles, lateral margins falcate, bearing 1 pair stout subterminal setae.

*Distribution.* NSW, Bass Strait; 51–200 m.

*Remarks.* The combination of deeply inclined frontal lobes with several toothed ridges and a ridge sweeping dorsally from the anteroventral corner of the carapace and uniarticulate uropod endopods is unique within *Litognodiastylis*.

***Litognodiastylis ornata* (Hale) comb. nov.**

Figure 69

*Gynodiastylis ornata* Hale, 1946: 404–407, figs 33–34.

*Material examined.* Holotype. Australia. Tas., off Babel I., 0–50 m, SAM C2688 (ovigerous female).

Paratype. Australia. Tas., off Babel I., 0–50 m, SAM C2337 (adult male).

Other material. Australia. Vic., Tas., Bass Strait, NSW, 34–42°S, 142–150°E: 87 females, 23 males. NMV J48158; J48159; J48160; J48161; J48162; J48163; J48164; J48165; J48166; J48167; J48168; J48169; J48170; J48171; J48172; J45265; J45277; J48201; J48173; J48174; J48175; J49176; J48177; J48178; J48179; J48180; J48181; J39670; J45827; J48182; J48183; J48184; AM P55741; P56216.

*Diagnosis. Female and subadult male.* Carapace with a ridge sweeping dorsally from the anteroventral corner, second ridge running dorsally from the midpoint of the antennal notch to join the sweeping ridge posterior to the border of the frontal lobe, both ridges irregularly crenellated, depression between ridges; carapace posterior to sweeping ridge covered with irregular blunt ridges or large reticulations. Pseudorostrum sharp, without carinae. Eyelobe with 3 lenses, without carinae. Pereopod 2 basis expanded. Telson shorter than uropod peduncles, lateral margins smooth, bearing 1 pair tiny terminal setae. Uropod endopod biarticulate, slightly longer than exopod. Terminal setae of uropod rami with a single terminal setule. *Adult male.* Carapace as in female, with the addition of ventrolateral swelling; ridges sharp rather than irregularly crenellated. Exopods present on maxilliped 3–pereopod 4.

*Distribution.* Tas., Bass Strait; 0–130 m.

*Remarks.* The pattern of ridges in combination with the pattern of large reticulations or irregular ridges on the carapace is unique, although it may be difficult to discern on decalcified or newly molted individuals.

*Litogynodiastylis poorei* sp. nov.

Figures 70–73

*Material examined.* Holotype. Australia. Vic., eastern Bass Strait, 19 km E of Lake Tyers Entrance, (37°50.5'S, 148°16.0'E), 26 m, coarse sand, WHOI epibenthic sled, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 30 Jul 1983 (stn BSS 206 S), NMV J48152 (ovigerous female).

Paratypes. Australia. Vic., eastern Bass Strait, 11.7 km W of Pt Ricardo (37°49.90'S, 148°30.01'E), 29 m, sand-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 28 Sep 1990 (stn MSL-EG 123), NMV J27402 (3 ovigerous females, 18 subadult females, 7 adult males, 2 subadult males); eastern Bass Strait, 11.7 km W of Pt Ricardo (37°49.90'S, 148°30.01'E), 29 m, sand-shell, Smith-McIntyre grab, Marine Science Laboratories, RV *Sarda*, 28 Sep 1990 (stn MSL-EG 120), NMV J27399 (1 ovigerous female, 2 subadult females, 3 adult males, 2 subadult males); eastern Bass Strait, 19 km E of Lake Tyers Entrance (37°50.5'S, 148°16.0'E), 26–26 m, coarse sand, WHOI epibenthic sled, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 30 Jul 1983 (stn BSS 206 S), NMV J48153 (1 ovigerous female dissected).

Other material. Australia. Vic., Bass Strait, 37–39°S, 143–148°E: 42 females, 14 males (1 dissected), 3 manca 1. NMV numerous registrations.

*Diagnosis. Female and subadult male.* Carapace covered with strong tubercles, with pair of posterior dorsal ridges continuing anteriorly onto the pseudorostral lobes as tuberculate ridges, ventral ridge sweeping anterodorsally and joining tuberculate ridge, frontal lobe with pair of carinae continuing onto the eyelobe. Note, in some individuals the lateral ridges on the carapace were more tuberculate than others, but the shape of the ridge, whether as a continuous ridge or closely spaced tubercles, was consistent. Pseudorostrum sharp, with pair of dorsal tuberculate carinae. Eyelobe with 2 lenses. Pereopod 2 basis moderately expanded. Telson shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod endopod biarticulate, subequal to exopod. Uropod endopod terminal seta with a single subterminal setule; terminal seta complex, with a plumose terminal setule. *Adult male.* Carapace as in female, with the addition of a ventrolateral swelling. Pseudorostrum sharp, with pair of dorsal carinae. Eyelobe with 2 lenses, with pair of dorsal carinae. Pereopod 2 basis expanded. Exopods present on maxilliped 3–pereopod 2. Uropod endopod biarticulate, longer than exopod.

*Etymology.* This species is named in honour of Gary C. B. Poore, Senior Curator (Crustacea) at Museum Victoria, whose kindness made available its vast gynodiastylid collections.

*Distribution.* Bass Strait; 21–85 m.

*Remarks.* This species can be distinguished from the similar species *Litogynodiastylis roscida* and *L. gongyla* by the combination of tubercles and ridges, as *L. roscida* possesses tubercles only, and *L. gongyla* possesses ridges and clumps of tiny setae, but few or no tubercles.

*Litogynodiastylis pseudomargarita* sp. nov.

Figures 74–75

*Material examined.* Holotype. Australia. Tas., eastern Bass Strait, 42 km SW of Babel I. (40°14.4'S, 148°40.0'E), 60 m, fine sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 165), NMV J48289 (subadult female).

*Diagnosis. Female and subadult male.* Carapace with weak lateral sulcus and weak anterodorsal swelling. Pseudorostrum blunt. Eyelobe with 2 lenses. Pereopod 2 basis expanded. Telson equal in length to uropod peduncles, lateral margins serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod endopod biarticulate, equal to exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Unknown.

*Etymology.* The species is named *pseudomargarita*, because it is very similar to *L. margarita* (Hale, 1946).

*Distribution.* Bass Strait; 60 m.

*Remarks.* *Litogynodiastylis pseudomargarita* can be distinguished from *L. margarita* by both pereopod 2 and the telson. In *L. pseudomargarita*, the telson is equal to the length of the uropod peduncles, while in *L. margarita* the telson is much shorter than the uropod peduncles. In *L. pseudomargarita* pereopod 2 basis is strongly expanded and all the subsequent articles are reduced, such that the basis is longer than all the other articles together, while in *L. margarita* pereopod 2 basis is slightly expanded, but the subsequent articles are not reduced, and the basis is clearly shorter than the merus and carpus together.

*Litogynodiastylis quadricristata* (Hale) comb. nov.

Figure 76

*Gynodiastylis quadricristata* Hale, 1946: 412–414, figs 39–40.

*Material examined.* Holotype. Australia. Qld, Noosa River, below Gympie Terrace, surface, SAM C2682 (female).

Other material. Australia. NSW, 34°S, 150°E, AM P55809 (1 subadult female).

**Diagnosis. Female and subadult male.** Carapace with 2 pairs of dorsal ridges running anteriorly from the posterior margin of the carapace connected by short transverse ridges at about the mid-point of the carapace, with a single pair of ridges continuing onto the frontal lobe from the transverse ridges, and another pair of lateral ridges continuing anterolaterally to the corners of the frontal lobe suture. Pseudorostrum blunt. Eyelobe without lenses. Pereopod 2 basis expanded. Telson equal in length to uropod peduncles, lateral margins smooth, without setae. Uropod endopod biarticulate, subequal to exopod. Terminal setae of uropod rami simple. *Adult male.* Unknown.

**Distribution.** Qld, NSW; 0–50 m.

**Remarks.** The species is somewhat similar to *Litogynodiastylis gongyla*, but can be differentiated by the following attributes: *L. gongyla* has many clumps of tiny setae all over the carapace, pereon and pleon, *L. quadricristata* does not; *L. gongyla* does not have transverse ridges connecting the dorsal ridges, *L. quadricristata* has transverse ridges connecting the dorsal ridges; the telson of *L. gongyla* is distinctly shorter than the uropod peduncles, while the telson of *L. quadricristata* is equal to the uropod peduncles in length.

***Litogynodiastylis roscida* (Hale) comb. nov.**

Figure 77

*Gynodiastylis roscida* Hale, 1946: 396–399, figs 28–29.

**Material examined.** Holotype. Australia. Tas., Marion Bay, 10–17 fm, SAM C2744 (female).

Other material. Australia. Vic., central Bass Strait, 6 km S of Cape Schanck (38°33.6' S, 144°54.3' E), 55 m, medium sand, R.S. Wilson, RV *Tangaroa*, 12 Nov 1981 (stn BSS 154), NMV J48346 (1 ovigerous female).

**Diagnosis. Female and subadult male.** Carapace covered with strong tubercles, with 1 pair dorsal ridges posterior of frontal lobe, one pair of dorsal ridges present on frontal lobe, without lateral ridges. Pseudorostrum sharp, with pair of dorsal carinae. Eyelobe without lenses. Pereopod 2 basis expanded, tuberculate. Telson shorter than uropod peduncles, lateral margins with few serrations distally, bearing few pairs small slender lateral setae and no terminal setae. Uropod endopod biarticulate, equal to exopod. Terminal setae of uropod simple. *Adult male.* Unknown.

**Distribution.** Bass Strait, Tas.; 0–55 m.

**Remarks.** The most similar species is *Litogynodiastylis poorei*, but the species can be distinguished on the basis of the carapace. In *L. poorei* the carapace has conspicuous lateral ridges, and *L. roscida* has no conspicuous lateral ridges.

***Litogynodiastylis serrata* sp. nov.**

Figures 78–81

**Material examined.** Holotype. Australia. Vic., S of Point Hicks (38°17.70' S, 149°11.30' E), 400 m, coarse sand, gravel, mud, many sponges, WHOI epibenthic sled, M.F. Gomon et al., RV *Franklin*, 24 Jul 1986 (stn SLOPE 40), NMV J48133 (ovigerous female).

Paratypes. Australia. Vic., S of Point Hicks (38°17.70' S, 149°11.30' E), 400 m, coarse sand, gravel, mud, many sponges, WHOI epibenthic sled, M.F. Gomon et al., RV *Franklin*, 24 Jul 1986 (stn SLOPE 40), NMV J48134 (3 ovigerous females, 6 subadult females, 2 subadult males), NMV J48263 (1 subadult female dissected); NSW, Off Eden (37°0.60' S, 150°20.70' E), 363 m, coarse shell, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 21 Jul 1986 (stn SLOPE 22), NMV J48264 (1 adult male dissected).

Other material. Australia. Vic., Bass Strait, 37–40°S, 144–150°E: 3 females, 1 adult male. NMV J48136; J48274; J48135; J48262.

**Diagnosis. Female and subadult male.** Carapace with pair of distinct dorsal spine rows, with several spines on the frontal lobe, with ridges running anteriorly from the posterior corner of the frontal lobe onto the pseudorostrum. Pseudorostrum blunt, with pair of dorsal carinae. Eyelobe without lenses, with pair of dorsal teeth. Pereopod 2 basis moderately expanded. Telson slightly shorter than uropod peduncles, lateral margins falcate, bearing 1 pair stout terminal setae. Uropod endopod biarticulate, longer than exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Carapace as in female. Eyelobe with lenses. Exopods present on maxilliped 3–pereopod 4. Terminal setae of uropod rami broken, unknown.

**Etymology.** From Latin, *serrata* meaning toothed like a saw, referring to the rows of saw like teeth dorsally and ventrally on the carapace.

**Distribution.** NSW, Bass Strait; 40–42 m.

**Remarks.** An additional adult male was observed, found in the same sample as the holotype and paratype adult male, which had the same overall appearance, but without teeth on the carapace. It is probable that this male is the same species, but recently molted or possibly aberrant. This specimen is the last listed in *Other material*.

*Litogynodiastylis trachyphasis* sp. nov.

Figures 82–84

*Material examined.* Holotype. Australia. Vic., eastern Bass Strait, 19 km E of Lake Tyers Entrance (37°50.5'S, 148°16.0'E), 26 m, coarse sand, WHOI epibenthic sled, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 30 Jul 1983 (stn BSS 206 S), NMV J48081 (ovigerous female).

Paratypes. Australia. Tas., central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4'S, 147°32.6'E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48077 (4 ovigerous females); Vic., central Bass Strait, 100 km SSE of Cape Liptrap (39°45.9'S, 145°33.3'E), 74 m, muddy fine sand, R.S. Wilson, RV *Tangaroa*, 13 Nov 1981 (stn BSS 156), NMV J48068 (1); central Bass Strait, 20 km NNE of Bold Head, King I. (40°00.0'S, 144°20.9'E), 48 m, coarse sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 22 Nov 1981 (stn BSS 200 G), NMV J48080 (1 adult male dissected); eastern Bass Strait, 19 km E of Lake Tyers Entrance (37°50.5'S, 148°16.0'E), 26 m, coarse sand, WHOI epibenthic sled, M.F. Gomon and R.S. Wilson, FV *Silver Gull*, 30 Jul 1983 (stn BSS 206 S), NMV J48079 (1 subadult female dissected).

Other material. Australia. Tas., Bass Strait, 37–42°S, 145–150°E: 21 females, 11 males. NMV J48067; J48069; J48070; J48071; J48072; J48073; J48074; J48075; J48076; J48078; J48298.

*Diagnosis. Female and subadult male.* Carapace with many lateral ridges, extending posteriorly from a ridge sweeping dorsally from the anteroventral corner; many lateral ridges and tuberculate ridges anterior of the sweeping ridge. Pseudorostrum blunt, with several rows of strong tubercles. Eyelobe without lenses, with dorsal teeth. Pereopod 2 basis moderately expanded. Telson longer than uropod peduncles, lateral margins smooth, without setae. Uropod endopod uniaarticulate, shorter than exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Carapace and pseudorostrum as in female. Eyelobe with lenses. Exopods present on maxilliped 3–pereopod 4. Telson equal in length to uropod peduncles, lateral margins falcate, bearing 1 pair long stout terminal setae. Terminal setae of uropod rami simple.

*Etymology.* From Greek, *trachy* meaning rough and *phasis* meaning appearance or aspect, referring to the rough appearance of the carapace.

*Distribution.* Bass Strait; 26–520 m.

*Remarks.* The plethora of lateral ridges and tubercles on the carapace make this species unique within *Litogynodiastylis*.

*Litogynodiastylis tumida* (Hale) comb. nov.

Figures 85–86

*Paradiastylis tumida* Hale, 1937: 66–68, figs 3–4.  
*Gynodiastylis tumida*.—Hale, 1946: 419–421, fig. 45.

*Material examined.* Syntypes. Australia. SA, Gulf St Vincent, Port Willunga Reef, 1 fm, SAM C2144, C2145, C2146, C2147.

Other material. Hale, 1946, type A: Australia. Vic., Tas., Bass Strait, 37–43°S, 145–151°E 82 females, 15 males. NMV J48185; J48186; J48107; J48108; J48109; J48110; J45304; J45309; J48111; J48112; J48113; J48114; J48115; J48116; J48117; J48118; J48119; J48120; J48121; J48122; J48123.

Hale, 1946, type B: Australia. Tas., Tasman Sea, 15 km E of Maria I., (42°37'S, 148°20'E), 102 m, WHOI epibenthic sled, R.S. Wilson, RV *Soela*, 9 Oct 1984 (stn S05/84 01), NMV J48187 (10 females).

Hale, 1946, Tasmanian form: Australia. Tas., 40–43°S, 145–147°E: 5 individuals. NMV J45310; J48125; J45306; J48126.

*Diagnosis. Female and subadult male.* Carapace with 2 pairs of large dorsolateral prominences, and 2 pairs of ventrolateral prominences (the relative sharpness and dullness of the prominences can be widely variable). Pseudorostrum sharp, without dorsal carinae. Eyelobe with 3 lenses. Pereopod 2 unmodified. Telson much shorter than uropod peduncles, lateral margins serrate, bearing 1 pair long slender lateral setae and 1 pair stout terminal setae. Uropod endopod triarticulate, longer than exopod. Terminal setae of uropod rami with a single subterminal setule. *Adult male.* Carapace as in female, with the addition of pronounced ventrolateral swelling. Exopods present on maxilliped 3–pereopod 4. Uropod endopod biarticulate, longer than exopod.

*Distribution.* Bass Strait, Tas., SA; 0–400 m.

*Remarks.* Hale (1946) included several different forms within this species. The different forms have similar carapace ornamentation or elaboration, but the degree of the ornamentation varies. For example, the young male from Tasmania described by Hale (1946) and attributed to this species has much more pronounced folds and ridges in the carapace than any of the females described by Hale (1937, 1946).

*Litogynodiastylis turgida* (Hale) comb. nov.

Figures 87, 182 J–L

*Gynodiastylis turgidus* Hale, 1928: 42–43, figs 11–12.—Hale, 1929: 346–347, fig. 346.—Hale, 1936: 420–422, figs 10–11.



*Material examined.* Holotype. Australia. SA, Robe, 3 fm, SAM C1750 (female).

Other material. Australia. NSW, 33°S, 151°E: 41 females, 10 males. NMV J48248; J39255; J48308; AM P22649; P22650.

*Diagnosis. Female and subadult male.* Carapace with several irregular lateral ridges, both complete and incomplete ridges present. Pseudorostrum sharp, without dorsal carinae. Eyelobe without lenses. Pereopod 2 basis expanded. Telson much shorter than uropod peduncles, lateral margins smooth, without setae. Uropod endopod biarticulate, much longer than exopod. Terminal setae of uropod rami simple. *Adult male.* Carapace as in female, with the addition of pronounced ventrolateral swelling. Eyelobe with 3 lenses. Exopods present on maxilliped 3–pereopod 4.

*Distribution.* NSW, SA, Tasmania; 10–115 m.

*Remarks.* The plethora of lateral carapace ridges in this species is similar to *Litogynodiastylis trachyphasis*. However, *L. trachyphasis* has a dorsally sweeping, laterally transverse ridge, and the ridges in *L. trachyphasis* are much stronger or heavier than in *L. turgida*; in addition, *L. trachyphasis* has unarticulate uropodendopods while *L. turgida* has biarticulate uropod endopods.

***Litogynodiastylis vicaria* (Hale) comb. nov.**

Figure 88

*Gynodiastylis vicaria* Hale, 1951: 362–364, figs 5–6.

*Material examined.* Holotype. Australia. WA, Esperance Bay, SAM C3224 (adult male).

Other material. Australia. Vic., Bass Strait, 37–38°S, 145–148°E: 15 females, 4 males. NMV J39673; J48200; J48309; J48310.

*Diagnosis. Females.* Unknown. *Adult male.* Carapace with shallow lateral depression, pronounced ventrolateral swelling. Pseudorostrum blunt. Eyelobe with 3 lenses. Pereopod 2 basis slightly expanded. Telson much shorter than uropod peduncles, lateral margins smooth, bearing 1 pair stout terminal setae. Uropod endopod biarticulate, equal to exopod. Terminal setae of uropod rami simple.

*Distribution.* Bass Strait, WA; 3–43 m.

*Remarks.* Hale (1951) remarked that this species is closest to *Litogynodiastylis tumida*, but the resemblance is vague, at best. This male more closely resembles *L. concava*, although the carapace morphology is rather different, being much less concave than the carapace of *L. concava*.

***Sheardia* Hale**

*Sheardia* Hale, 1946: 358–361.

*Type species. Sheardia antennata* Hale, 1946.

*Diagnosis. Female and subadult male.* Pseudorostrum lobes horizontal. Eye lobe with lenses. First antenna, peduncle articles 1 and 2 expanded, peduncle article 3 slender, shorter than articles 1 and 2 together. Pereopod 1 simple. Female with fully developed exopods on pereopods 1 and 2, no exopods on pereopods 3 and 4. Uropod endopod triarticulate. Telson shorter than pleonite 6, with pair of terminal setae. *Adult male.* never illustrated.

*Distribution.* South-eastern Australia; 50–82 m.

*Species. Sheardia antennata* Hale, 1946.

*Remarks.* The genus is unique in possessing greatly expanded articles 1 and 2 of antenna 1 in combination with article 3 being shorter than articles 1 and 2 together; also, pereopod 1 is simple and the females possess fully developed exopods on pereopods 1 and 2 without any exopods on pereopods 3 and 4. Day (1980) reported receiving males that probably belong to this genus, but she neither described nor illustrated the specimens, except to note that the males possess exopods on maxilliped 3–pereopod 4 and do not possess pleopods.

***Sheardia antennata* Hale**

Figure 89

*Sheardia antennata* Hale, 1946: 358–361, figs 1–2.

*Material examined.* Holotype. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2699 (female).

Other material. Australia. Vic., Bass Strait, SA, NSW, 34–39°S, 137–151°E: 10 females, 2 males. NMV J47858; J47859; AM P55739; P55746; P46213; P56229.

*Diagnosis. Female and subadult male.* Carapace with shallow lateral depression, several gentle swellings. Pseudorostrum sharp, without dorsal carinae. Eyelobe with 3 lenses. Pereopod 2 unmodified. Telson much shorter than uropod peduncles, lateral margins smooth, with 1 pair long terminal setae. Uropod endopod triarticulate, shorter than exopod. Terminal setae of uropod rami simple. *Adult male.* undescribed.

*Distribution.* Great Barrier Reef to SA; 50–82 m.

*Remarks.* The carapace of this species is similar to the carapace morphologies seen in *Litogynodiastylis concava*, *L. tumida*, and *L. munda*, but the

expansion of articles 1 and 2 of antenna 1 serve to distinguish this genus and species.

### *Dicoides* Hale

*Dicoides* Hale, 1946: 421–428.

*Type species.* *Dic brevidactylum* Hale, 1937.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal or dorsally directed. Carapace with tumidities or ridges. Eye lobe with or without lenses. Siphon long or short. First antenna short to moderate. Pereopod 1 elongate, may be stout, propodus longer than basis, propodus and carpus subequal. Female with fully developed exopods on pereopods 1 and 2, rudimentary exopods on pereopods 3 and 4. Uropod endopod of 3 articles. Uropod exopod broad, bearing many stout setae in addition to long terminal setae. Telson 0.5–2 times pleonite 6 length, with or without pair of terminal setae. *Adult*

*male.* Pseudorostral lobes horizontal. Antenna 2 peduncle of 3–4 articles, flagellum of 11–13 articles. Exopods present on maxilliped 3–pereopod 4. Uropod endopod of 2 or 3 articles.

*Distribution.* Australia, South Africa; 1–363 m.

*Species.* *Dicoides areolata* Hale, 1946, *D. brevidactylum* (Hale, 1937), *D. fletti* Hale, 1946, *D. minusculus* sp. nov., *D. micron* sp. nov., *D. occidentalis* Hale, 1951, *D. siphonatus* Day, 1980, *D. verminaris* sp. nov.

*Remarks.* Members of this genus are frequently encountered with pereopod 1 broken off at the basis-ischium boundary, and are then easily confused with some species of *Gynodiastylis* and *Litogynodiastylis*. Several species in this genus exhibit a distinct pair of spines on the eyelobe.

### Key to species of *Dicoides*

1. Telson equal than or longer than uropod peduncle ..... 2
- Telson shorter than uropod peduncles ..... 3
2. Carpus, propodus and dactylus of pereopod 1 massive, dactylus longest; siphon short ..... *D. areolata*
- Pereopod 1 not massive; siphon more than 0.5 carapace length.....  
..... *D. brevidactylum*
3. Siphon equal to or greater than 0.5 carapace length ..... 4
- Siphon less than 0.5 carapace length ..... 5
4. Carapace with 3–4 shallow longitudinal grooves ..... *D. siphonatus*
- Carapace smooth, siphon iridescent ..... *D. verminaris*
5. Pereopod 1 with few setae on carpus, propodus and dactyl ..... 6
- Pereopod 1 with many setae on carpus, propodus, and dactyl ..... 7
6. Carapace smooth, without depression, adult male with entire pseudorostral lobes ..... *D. micron*
- Carapace with ventro-lateral depression, adult male with tips of pseudorostral lobes excavated ..... *D. occidentalis*
7. Adults 2.5 mm or less, carapace without depressions ..... *D. minusculus*
- Adults 5.0 mm or more, carapace with shallow lateral depression and dorso-lateral horizontal elongate tumidity ..... *D. fletti*

### *Dicoides areolata* Hale

Figures 90–91

*Dicoides areolata* Hale, 1946: 421–424, figs 46–47.

*Material examined.* Holotype. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2700 (ovigerous female).

Paratypes. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2701 (adult male), C2708 (female), C2653 (female).

Other material. Australia. Tas., Bass Strait, NSW, 34–42°S, 142–151°E: 61 females, 11 males. NMV J47860; J47861; J47862; J47863; J47864; J47865;

J47866; J47867; J47868; J47869; J47870; J47871; J47872; J47991; J47992; AM P60993; P60996; P60998; P56209; P61011.

*Diagnosis. Female and subadult male.* Pseudorostrum weakly dorsally directed. Eyelobe with 2 lenses. Siphon less than half carapace length. Pereopod 1 more than twice carapace length, bearing few short setae. Telson longer than uropod peduncles, with 1 pair tiny terminal setae or none. Uropod endopod equal in length to exopod. Body length 3.0–3.6 mm. *Adult male.* Pseudorostrum as in female. Eyelobe with lenses.

Pereopod 1 more than twice carapace length, more slender than in female, bearing few short setae. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles. Uropod endopod triarticulate, slightly shorter than exopod. Body length 2.6 mm.

*Distribution.* NSW, Bass Strait, Tas; 50–124 m.

*Remarks.* Within *Dicoides*, the massive, well calcified pereopod 1 of *D. areolata* is unique. Specimens of *D. areolata* in particular frequently lose pereopod 1 during the collection process. However it is still possible to differentiate *D. areolata* from all other *Dicoides*. This species is much larger and more robust than *D. brevidactylum*, *D. micron*, *D. minusculus*, or *D. verminaris*. In *D. areolata*, the telson is longer than the uropod peduncles, while in *D. fletti* the telson is distinctly shorter than the uropod peduncles.

#### *Dicoides brevidactylum* (Hale)

##### Figure 92

*Dic brevidactylum* Hale, 1937: 69–71, figs 6–7.

*Dicoides brevidactyla* Hale, 1946: 424–425, fig. 48.

*Material examined.* Holotype. Australia. SA, Gulf St Vincent, Sellicks Reef, 1 fm, SAM C2151 (female).

Paratype. Australia. SA, Gulf St Vincent, Sellicks Reef, 1 fm, SAM C2152 (male).

Other material. Australia. Bass Strait, SA, WA, NSW, 29–42°S, 114–151°E: 2 females, 7 males, 17 undetermined. NMV J47873; J47874; J48290; J47875; J47876; J47877; J47878; J47879; J47880; J47881; J47882; J47883; J47884; J47885; J47886; J47887; J47888; J47889; J47890.

*Diagnosis. Female and subadult male.* Pseudorostrum moderately dorsally directed. Eyelobe without lenses. Siphon more than half carapace length. Pereopod 1 not quite twice carapace length, bearing a few setae of moderate length. Telson shorter than uropod peduncles. Uropod endopod shorter than exopod. Body length 2.5–2.7 mm. *Adult male.* Unknown.

*Distribution.* Bass Strait to WA; 1–120 m.

*Remarks.* This species may easily be confused with *Dicoides verminaris*. However, in *D. verminaris* the siphon is iridescent and annulated, rather than dull and smooth as in *D. brevidactylum*, and the proportions of pereopod 1 are very different. In *D. verminaris*, the basis of pereopod 1 is subequal in length to the carpus, while in *D. brevidactylum* the basis is much shorter than the carpus.

#### *Dicoides fletti* Hale

##### Figure 93

*Dicoides fletti* Hale, 1946: 425–428, figs 49–50.

*Material examined.* Holotype. Australia. Tas., Babel I., 25 m, SAM C2341 (female).

Other material. Australia. Tas., Bass Strait, SA, WA, NSW, 33–42°S, 118–151°E: 216 females, 80 males, 4 manca 1, 170+ undetermined. NMV numerous registered specimens; AM numerous registered specimens.

*Diagnosis. Female and subadult male.* Pseudorostrum weakly dorsally directed, bearing several setae. Eyelobe without lenses. Siphon short. Pereopod 1 more than twice carapace length, carpus and propodus bearing many setae (density of setae varies considerably). Telson shorter than uropod peduncles. Uropod endopod longer than exopod. Body length 5.0–5.4 mm. *Adult male.* Pseudorostrum horizontal, without setae. Pereopod 1 much longer than carapace, carpus and propodus bearing several to many setae. Exopods present on maxilliped 3–pereopod 4. Uropod endopod triarticulate, longer than exopod. Body length 4.6 mm.

*Distribution.* Southern to north-western Australia; 0–363 m.

*Remarks.* Ovigerous females of very disparate sizes were observed in some samples, and some specimens had many more setae on pereopod 1 than others, but there were no clear distinctions, either geographically or sexually. Within single samples, individuals of the same sex and stage were observed to vary markedly in size and in the numbers of setae on the first pereopods. The large range of morphological variability observed in this species suggests that it may in fact be a species flock, or comprising several morphologically cryptic species.

#### *Dicoides micron* sp. nov.

##### Figures 94–98

*Material examined.* Holotype. Australia. Tas., central Bass Strait, 35 km NNE of Cape Wickham, King I., (39°16.0'S, 144°05.4'E), 82 m, sandy shell, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 204 G), NMV J48124 (ovigerous female).

Paratypes. Australia. Vic., western Bass Strait, 40 km SSW of Warrnambool (38°42.8'S, 142°35.6'E), 69 m, coarse sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 189 S), NMV J48293 (1 adult male dissected); Western Port (38°26.48'S, 145°13.03'E), 23 m, sand, Smith-McIntyre grab, N. Coleman, 25 Nov 1973 (stn WBES 1748), NMV

J48292 (1 ovigerous female); Western Port (38°26.48'S, 145°13.03'E), 23 m, sand, Smith-McIntyre grab, N. Coleman, 25 Nov 1973 (stn WBES 1748), NMV J48291 (1 ovigerous female dissected).

**Diagnosis.** *Female and subadult male.* Pseudorostrum dorsally directed. Eyelobe without lenses. Siphon short. Pereopod 1 longer than carapace, less than twice carapace length, bearing many short setae. Telson less than half uropod peduncle length. Uropod endopod longer than exopod. Body length 3.1 mm. *Adult male.* Pseudorostrum horizontal. Pereopod 1 twice as long as carapace, bearing several short setae. Exopods present on maxilliped 3–pereopod 4. Uropod endopod biarticulate, longer than exopod. Body length 2.3 mm.

**Etymology.** From Greek, *micron* meaning small, because this species is tiny relative to *D. areolata* or *D. fletti*.

**Distribution.** Vic., Bass Strait; 23–82 m.

**Remarks.** This species can be differentiated from *Dicoides brevidactylus* on the basis of the siphon and the telson. In *D. brevidactylus* the siphon is much more than half the length of the carapace, and the telson is more than half the length of the uropod peduncles, while in *D. micron* the siphon is much less than half the carapace length, and the telson is less than half the length of the uropod peduncles.

#### ***Dicoides minusculus* sp. nov.**

Figures 99–102

**Material examined.** Holotype. Australia. Vic., central Bass Strait, 26 km SE of Aireys Inlet (38°39.8'S, 144°18.2'E), 79 m, very fine sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 19 Nov 1981 (stn BSS 181 G), NMV J48030 (subadult female dissected).

Paratype. Australia. Vic., western Bass Strait, 10 km W of Cape Otway (39°49.0'S, 143°24.0'E), 56 m, fine sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 184 G), NMV J48031 (1 subadult male dissected).

**Diagnosis.** *Female and subadult male.* Pseudorostrum horizontal. Eyelobe without lenses. Siphon short. Pereopod 1 more than twice carapace length, bearing many setae. Telson more than half the uropod peduncle length, but distinctly shorter than the uropod peduncles. Uropod endopod longer than exopod. Body length 2.2 mm. *Adult male.* Exopods present on maxilliped 3–pereopod 4. Telson about half uropod peduncle length. Uropod endopod triarticulate, longer than exopod. Body length 2.1 mm.

**Etymology.** From Latin, the diminutive form of *miniscule*, meaning small or tiny.

**Distribution.** Bass Strait; 59 m.

**Remarks.** This species is very similar to *Dicoides micron*, but can be differentiated on the basis of the telson and pereopod 1. In *D. micron* the telson is less than half the uropod peduncle length and pereopod 1 bears a few short setae, while in *D. minusculus* the telson is half the uropod peduncle length or more and pereopod 1 bears many setae, similar to pereopod 1 in *D. fletti*.

#### ***Dicoides occidentalis* Hale**

Figure 103

*Dicoides occidentalis* Hale, 1951: 367–370, figs 9–10.

**Material examined.** Holotype. Australia. WA, Esperance Bay, SAM C3223 (adult male).

Other material. Australia. Bass Strait, 37–40°S, 143–148°E: 7 ovigerous females, 2 subadult females, 2 adult males, 7 subadult males, 2 undetermined; NMV J47945; J47946; J47947; J47948.

**Diagnosis.** *Female.* Unknown. *Adult male.* Pseudorostrum horizontal. Eyelobe with lenses. Siphon short. Pereopod 1 longer than carapace, less than twice carapace length, bearing very few setae. Exopods present on maxilliped 3–pereopod 4. Telson less than half uropod peduncle length. Uropod endopod triarticulate, equal to exopod. Body length 2.2 mm.

**Distribution.** Bass Strait, WA; 50–79m.

**Remarks.** There are two features unique (within the genus) to this species of *Dicoides*, the first being the relatively short pereopod 1 and the second being the equal uropod rami.

#### ***Dicoides siphonatus* Day**

Figure 104

*Dicoides siphonatus* Day, 1980: 198–201, fig. 2.

**Type material.** Holotype. South Africa, off Still Bay (34°40'S 21°39'E), 80 m, South African Museum, A15723 (ovigerous female, not seen).

**Diagnosis.** *Female and subadult male.* Pseudorostrum horizontal. Eyelobe without lenses. Siphon more than half carapace length. Pereopod 1 more than twice carapace length, bearing several short setae. Telson shorter than uropod peduncles. Uropod endopod shorter than exopod. Body length 2.5–3.4 mm. *Adult male.* Pereopod 1 nearly twice as long as carapace, bearing several short setae. Exopods present on maxilliped

3–pereopod 4 (exopod on pereopod 4 is rudimentary). Telson half uropod peduncle length. Uropod endopod triarticulate, shorter than exopod. Body length 3.1–3.3 mm.

*Distribution.* South Africa; 18–102 m.

*Remarks.* This species can be differentiated from *Dicoides brevidactylum* by the telson, and from *D. verminaris* by the carapace. In *D. brevidactylum*, the telson is more than half the length of the uropod peduncles, while in *D. siphonatus* the telson is less than half the length of the uropod peduncles. In *D. verminaris*, the carapace has no lateral ridges or sculpturing, while in *D. siphonatus*, the carapace has several lateral ridges.

***Dicoides verminaris* sp. nov.**

Figures 105–108

*Material examined.* Holotype. Australia. Tas., central Bass Strait, 5 km E of Cape Edie, Robbins I. (40°41.8'S, 145°07'E), 16 m, fine shelly sand, M.F. Gomon and G.C.B. Poore, RV *Sarda*, 3 Nov 1980 (stn BSS 110), NMV J48023 (ovigerous female).

Paratypes. Australia. Tas., central Bass Strait, 23 km E of Cape Rochon, Three Hummock I. (40°22.2'S, 145°17'E), 40 m, mainly sand, M.F. Gomon and G.C.B. Poore, RV *Sarda*, 3 Nov 1980 (stn BSS 112), NMV J48294 (4 ovigerous females, 3 subadult females, 3 adult males, 2 subadult males); central Bass Strait, 23 km E of Cape Rochon, Three Hummock I. (40°22.2'S, 145°17'E), 40 m, mainly sand, M.F. Gomon and G.C.B. Poore, RV *Sarda*, 3 Nov 1980 (stn BSS 112), NMV J48295 (1 adult male dissected); SA, Pearson I., E side in bay (33°57.30'S, 134°15.70'E), 10 m, algae in *Posidonia* meadow, coarse sand, SCUBA, G.C.B. Poore, FV *Limnos*, 17 Apr 1985 (stn SA 56), NMV J48034 (1 subadult female dissected).

Other material. Australia. Tas., Bass Strait, WA, SA, 33–40°S, 117–151°E: 32 females, 8 males, 35 undetermined. NMV and AM various registrations.

*Diagnosis. Female and subadult male.* Pseudorostrum horizontal. Eyelobe with lenses. Siphon longer than carapace, iridescent, with many closely spaced annulations. Pereopod 1 stout, twice carapace length, bearing few short setae. Telson shorter than uropod peduncles. Uropod endopod slightly shorter than exopod. Body length 2.0 mm. *Adult male.* Pereopod 1 twice carapace

length, bearing few short setae. Exopods present on maxilliped 3–pereopod 4. Telson half uropod peduncle length. Uropod endopod biarticulate, subequal to exopod. Body length 2.2 mm.

*Etymology.* From Latin, *vermis* meaning worm and *naris* meaning nose, in reference to the long, snakelike iridescent siphon.

*Distribution.* Bass Strait, WA; 2–95 m.

*Remarks.* This species is can be differentiated from *Dicoides brevidactylum* by the proportions of pereopod 1 and the siphon, and from *D. siphonatus* by the carapace. In *D. brevidactylum*, the basis of pereopod 1 is much shorter than the carpus, and the siphon is smooth and dull, while in *D. verminaris* the basis of pereopod 1 is subequal in length to the carpus, and the siphon is annulated and iridescent. In *D. siphonatus* the carapace has several lateral ridges, and in *D. verminaris* the sides of the carapace are smooth.

***Paradicoides* gen. nov.**

*Type species. Paradicoides megadactylus* sp. nov.

*Diagnosis. Female and subadult male.* Pseudorostrum lobes horizontal or dorsally directed. Eye lobe without lenses, with pair of spines. First antenna small to moderate. Pereopod 1 elongate, propodus as long or longer than basis, carpus and propodus subequal. Female without exopods on pereopods 1 and 2, with rudimentary exopods on pereopods 3 and 4. Uropod endopod of 3 articles. Uropod exopod broad, bearing many stout setae in addition to long terminal setae. Telson 1–2 times pleonite 6 length, with pair of small terminal setae. *Adult male.* Antenna 2 peduncle of 3–4 articles, flagellum of 11 or 12 articles. Exopods on maxilliped 3 and pereopods 1–4. Uropod endopod of 2 or 3 articles.

*Etymology.* *Para* meaning similar, with *dicoides*.

*Distribution.* South-eastern Australia; 40–1840 m.

*Species. Paradicoides acanthommatus* sp. nov., *P. megadactylus* sp. nov.

*Remarks.* Pereopod 1 is very distinctive, and the exopods on the females, while rudimentary, are readily apparent under a dissecting microscope.

**Key to species of *Paradicoides***

1. Dactylus longer than propodus ..... *P. megadactylus*  
 — Dactylus less than 0.5 length of propodus ..... *P. acanthommatus*

*Paradicoides acanthommatus* sp. nov.

Figures 109–112

*Material examined.* Holotype. Australia. Vic., 76 km S of Point Hicks (38°29.33'S, 149°19.98'E), 1840–1750 m, sandy mud, fine shell, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 26 Oct 1988 (stn SLOPE 69), NMV J48127 (ovigerous female).

Paratypes. Australia. Vic., 76 km S of Point Hicks (38°29.33'S, 149°19.98'E), 1840–1750 m, sandy mud, fine shell, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 26 Oct 1988 (stn SLOPE 69), NMV J48283 (1 adult male); J48282 (1 subadult female dissected); J48128 (22 subadult females).

*Diagnosis. Female and subadult male.* Carapace with single ventral ridge. Pseudorostrum dorsally directed. Eyelobe without lenses. Pereopod 1 basis with several large, stout teeth or spines. Telson distinctly longer than uropod peduncles, produced as several large lateral teeth proximally, bearing 1 pair tiny terminal setae. Uropod endopod shorter than exopod. *Adult male.* Pereopod 1 basis produced as few small teeth medially. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles, at least twice pleonite 6 length. Uropod endopod equal in length to exopod.

*Etymology.* From Greek, *acanthus* meaning spine, *ommatus* meaning eye, referring to the pair of spines on the eyelobe.

*Distribution.* Bass Strait; 1750–1840 m.

*Remarks.* The females of this species superficially resemble *Allodiastylis*, particularly in the dorsally directed pseudorostrum and overall appearance of the carapace. However, the rudimentary exopods on pereopods 3 and 4 of the female clearly differentiate this species from all *Allodiastylis*. This species is also clearly differentiable from *Paradicoides megadactylus* by the dactylus of pereopod 1: in *P. megadactylus*, the dactylus of pereopod 1 is longer than the propodus, and in *P. acanthommatus* the dactylus of pereopod 1 is less than half the length of the propodus.

*Paradicoides megadactylus* sp. nov.

Figures 113–116A

*Material examined.* Holotype. Australia. Vic., S of Point Hicks (38°17.70'S, 149°11.30'E), 400 m, coarse sand, gravel, mud, many sponges, WHOI epibenthic sled, M.F. Gomon et al., CSIRO RV *Franklin*, 24 Jul 1986 (stn SLOPE 40), NMV J48151 (ovigerous female).

Paratypes. Australia. Tas., Off Freycinet Peninsula (42°2.20'S, 148°38.70'E), 800 m, coarse shelly sand, WHOI epibenthic sled, M.F. Gomon et al., RV

*Franklin*, 27 Jul 1986 (stn SLOPE 45), NMV J48149 (1 ovigerous female, 4 subadult females, 3 subadult males). Vic., S of Point Hicks (38°17.70'S, 149°11.30'E), 400 m, coarse sand, gravel, mud, many sponges, WHOI epibenthic sled, M.F. Gomon et al., RV *Franklin*, 24 Jul 1986 (stn SLOPE 40), NMV J48147 (9 ovigerous females, 2 subadult females, 2 subadult males). Cobblers (Bate Bay), NSW, Australia (34°07'S, 151°10'E), 50 m, 3 Jan 1991, AM P60941 (1 ovigerous female dissected); P60942 (1 adult male dissected).

Other material. Australia. Bass Strait, NSW, 34–40°S, 144–151°E: 12 females. NMV J48146; J48148; J48150; AM P60943; P60944; P60945; P55780; P55788; P60946.

*Diagnosis. Adult female and subadult male.* Carapace smooth, with a weak lateral sulcus. Pseudorostrum horizontal. Eye lobe without lenses. Pereopod 1 3 times length of carapace. Telson shorter than uropod peduncles. Uropod endopod equal in length to exopod. *Adult male.* Carapace as in female, with the addition of a ventrolateral swelling. Exopods present on maxilliped 3–pereopod 4. Uropod endopod slightly shorter than exopod.

*Etymology.* *Megadactylus* referring to the extremely long terminal article of pereopod 1.

*Distribution.* NSW, Bass Strait; 40–800 m.

*Remarks.* *Paradicoides megadactylus* is easily distinguishable from *P. acanthommatus* by the length of the pereopod 1 dactylus, telson length and carapace morphology. In *P. megadactylus*, the pereopod 1 dactylus is longer than the propodus, and in *P. acanthommatus* the pereopod 1 dactylus is less than half the length of the propodus. In *P. acanthommatus* the telson is tubular and more than twice the length of pleonite 6, while in *P. megadactylus* the telson is close to the length of pleonite 6. The carapace of *P. megadactylus* is smooth, without reticulations or teeth on the anterior ventral margin or the pseudorostrum, while the carapace of *P. acanthommatus* is closely reticulated, and the anterior ventral margin and pseudorostral margin are both serrate.

*Pseudozimmeriana* gen. nov.

*Type species.* *Pseudozimmeriana problema* sp. nov.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal. Eye lobe without lenses. First antenna small to moderate. Pereopod 1 with brush of many long setae terminally on dactyl. Female with no exopods on pereopods 1 and 2, with rudimentary exopods on pereopods 3

and 4. Uropod endopod of 2 articles. Uropod exopod broad, bearing many stout setae in addition to long terminal setae. Telson 1.5 times pleonite 6 length, with pair of terminal setae. *Adult male*. Unknown.

*Etymology*. *Pseudo* with *Zimmeriana*, meaning similar to *Zimmeriana*, acknowledging that this genus may easily be confused with *Zimmeriana*.

*Distribution*. Bass Strait; 1750–1840 m.

*Species*. *Pseudozimmeriana problema*.

*Remarks*. The only character in which this genus differs from *Zimmeriana* is in the presence of rudimentary exopods on pereopods 3 and 4 in the female. It is with some uneasiness that a monotypic genus is erected. However, to maintain consistency with the other genera in the family, the new genus is necessary.

***Pseudozimmeriana problema* sp. nov.**

Figures 116B–D, 117–118A

*Material examined*. Holotype. Australia. Tas., eastern Bass Strait, 37 km NNE of Eddystone Point (40°43.8'S, 148°37.2'E), 67 m, muddy sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 164), NMV J48300 (subadult female dissected).

*Diagnosis*. *Adult female and subadult male*. Carapace bulbous, without any obvious sculpturing. Telson slightly shorter than uropod peduncle length, lateral margins smooth, bearing 1 pair slender lateral setae and 1 pair small stout terminal setae. Uropod endopod triarticulate, shorter than exopod. *Adult male*. Unknown.

*Etymology*. From Greek, *problema* meaning a question posed for solution, a puzzle, or a riddle.

*Distribution*. Bass Strait; 1750–1840 m.

*Remarks*. This species looks very much like a species of *Zimmeriana*. However, adding it to this genus would require an expansion of the definition of *Zimmeriana*. The rudimentary exopods on pereopods 3 and 4 are very tiny, and are only visible with a compound microscope.

***Zimmeriana* Hale**

*Zimmeriana* Hale, 1946: 438–443.

*Type species*. *Dic lasiodactylum* Zimmer, 1914.

*Diagnosis*. *Female and subadult male*. Pseudorostral lobes horizontal. Eye lobe without lenses, with or without pair of spines. First antenna small to moderate. Pereopod 1 with brush of many long setae terminally on dactyl. Female entirely without exopods. Uropod endopod of 2 or 3 articles. Uropod exopod broad, bearing many stout setae in addition to long terminal setae. Telson 1–3.5 times pleonite 6 length, with or without pair of terminal setae. *Adult male*. Pseudorostral lobes horizontal or ventrally directed. Eye lobe with or without lenses. Antenna 2 peduncle of 4 articles, flagellum of 7 articles. Exopods on maxilliped 3 and pereopods 1–4.

*Distribution*. NSW to WA, Japan; 5–220 m.

*Species*. *Zimmeriana azumai* Gamô, 1986, *Z. lasiodactylum* (Zimmer, 1914), *Z. longirostris* Hale, 1946, *Z. robustacrus* sp. nov., *Z. spinicauda* (Hale, 1937), *Z. vibrissa* sp. nov.

*Remarks*. *Zimmeriana* is a distinctive genus with the brush of long setae on the dactylus of the pereopod 1. Unlike the *Gynodiastylis*-group and *Dicoides*, pereopod 1 rarely breaks during collection.

**Key to species of *Zimmeriana***

1. Telson with spines ventrally ..... *Z. spinicauda*
- Telson without ventral spines ..... 2
2. Telson shorter than or equal to uropod peduncle ..... 3
- Telson longer than uropod peduncle ..... 4
3. Pereopod 1 carpus longer than basis, pereopod 2 carpus at least twice length of merus ..... *Z. longirostris*
- Pereopod 1 carpus equal to basis, pereopod 2 carpus half merus length ..... *Z. lasiodactylum*
4. Uropod endopod biarticulate in female ..... *Z. robustacrus*
- Uropod endopod triarticulate in female (may be biarticulate in male) ..... 5
5. Pereopod 2 carpus more than twice merus length ..... *Z. azumai*
- Pereopod 2 carpus less than twice merus length ..... *Z. vibrissa*

*Zimmeriana azumai* Gamô

Figures 119–121

*Zimmeriana azumai* Gamô, 1986: 37–43, figs 1–4.

*Type material.* Japan. Shijiki Bay, Hirado-jima I., northwest of Kyushu, 30–32 m; deposition unknown (not seen).

*Diagnosis. Adult female and subadult male.* Carapace with a weak lateral sulcus, several denticles dorsally on the frontal lobe. Eyelobe with pair of teeth. Pereopod 1 carpus longer than basis. Pereopod 2 carpus more than twice merus length. Telson longer than uropod peduncles. Uropod endopod triarticulate, much shorter than exopod. *Adult male.* Carapace as in female. Pereopod 1 carpus shorter than basis. Pereopod 2 carpus more than twice merus length. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles. Uropod endopod biarticulate, much shorter than exopod.

*Distribution.* Japan; 11–50 m.

*Remarks.* The most similar species is *Zimmeriana lasiodactylum*. However, the telson of *Z. azumai* is very different, being tubular and at least twice the length of pleonite 6, while in *Z. lasiodactylum* the telson is the same length or shorter than pleonite 6.

*Zimmeriana lasiodactylum* (Zimmer)

Figure 122

*Dic lasiodactylum* Zimmer, 1914: 193–195, figs 17–18.—Hale, 1936: 422–424, fig 12, 13h.—Hale, 1937: 69, fig. 5a.—Zimmer, 1941: 66, fig. 100.

*Zimmeriana lasiodactylum*.—Hale, 1946: 443, fig. 60A.—Jones, 1969: 165.

*Type material.* Holotype. Southwest Australia, Champion Bay, Geraldton, ZMB 18495 (ovigerous female, not seen).

*Material examined.* Australia. WA, Vic., 29–38°S, 114–145°E: 7 undetermined. NMV J47949; NMV J47950.

*Diagnosis. Adult female and subadult male.* Carapace with pair of posterodorsal swellings and weak lateral sulcus. Pereopod 1 carpus equal to basis. Pereopod 2 carpus twice merus length. Telson without terminal setae, equal in length to uropod peduncles. Uropod endopod triarticulate, shorter than exopod. *Adult male.* Unknown.

*Distribution.* Vic., WA; 9–23 m.

*Remarks.* The most similar species is *Zimmeriana azumai*. However, the telson of *Z. azumai* is much longer than pleonite 6, while the telson of

*Z. lasiodactylum* is the same length or shorter than pleonite 6.

*Zimmeriana longirostris* Hale

Figures 123–125

*Dic lasiodactylum*.—Hale, 1936: 422–424, fig. 12b (part).—Hale, 1937: 69, fig. 5a.

*Zimmeriana longirostris* Hale, 1946: 438–443, fig. 57–59, 60B.—Jones, 1969: 165.

*Material examined.* Holotype. Australia. SA, St Vincent Gulf, Sellicks Reef, 0.5–1 fm, SAM C2658 (female).

Paratypes. Australia. SA, St Vincent Gulf, Sellicks Reef, 0.5–1 fathom, SAM C2655 (male), C2022 (female), C2659 (female).

Other material. Australia. NSW, Tas., Vic. Bass Strait, WA, SA, 29–42°S, 114–150°E: 4 ovigerous females, 3 subadult females, 19 undetermined. NMV J47951; J47952; J47953; J47954; J47955; J47956; J47957; J47958; J47959; J47960; J20744; J20745.

*Diagnosis. Adult female and subadult male.* Carapace with a weak lateral sulcus. Pseudorostrum long, bearing several setae. Pereopod 1 carpus longer than basis. Pereopod 2 carpus twice as long as merus. Telson shorter than uropod peduncles. Uropod endopod triarticulate, shorter than exopod. *Adult male.* Carapace with pseudorostrum ventrally directed. Eye lobe with lenses. Exopods present on maxilliped 3–pereopod 4. Uropod endopod biarticulate (with faint hint of a second articulation), shorter than exopod.

*Distribution.* NSW to WA; 5–220m.

*Remarks.* This species is very similar to *Zimmeriana lasiodactylum*, but can be differentiated by the proportions of pereopods 1 and 2. In *Z. lasiodactylum*, the carpus of pereopod 1 is subequal to the basis, while in *Z. longirostris* the carpus of pereopod 1 is distinctly longer than the basis. In *Z. lasiodactylum*, the carpus of the pereopod 2 is 1.5 times the length of the merus, while in *Z. longirostris* the carpus of the pereopod 2 is more than twice the length of the merus. In general, the appendages of *Z. longirostris* are slender and elongate in comparison to the appendages of *Z. lasiodactylum*.

*Zimmeriana robustacrus* sp. nov.

Figures 118A, 126–127

*Material examined.* Holotype. Australia. Tas., western Bass Strait, 5 km SW of Bluff Point (40°48.1'S, 144°38.0'E), 42 m, bryozoans, M.F. Gomon et al., RV *Hai Kung*, 2 Feb 1981 (stn BSS 126), NMV J45264 (subadult female).



*Diagnosis. Adult female and subadult male.* Carapace with weak anterodorsal swelling, without lateral sulcus. Pereopod 1 carpus longer than basis. Pereopod 2 carpus slightly longer than merus, less than 1.5 times merus length. Telson much longer than uropod peduncles. Uropod endopod biarticulate, slightly shorter than exopod. *Adult male.* Unknown.

*Etymology.* From Latin, *robustus* meaning strong and *crus* meaning leg, in reference to the robust form of the pereopods, particularly pereopod 1.

*Distribution.* Bass Strait; 42 m.

*Remarks.* This species can be distinguished from all other *Zimmeriana* by the biarticulate endopod in the female, as females of all other species of *Zimmeriana* have triarticulate uropod endopods.

#### *Zimmeriana spinicauda* (Hale)

Figure 128

*Dic lasiodactylum.*—Hale, 1936: 422–424, fig. 12a, 13a–g (not *Zimmer*).

*Dic lasiodactylum* var. *spinicauda* Hale, 1937: 69, fig. 5b.

*Zimmeriana spinicauda.*—Hale, 1946: 438.—Jones, 1969: 165.

*Material examined.* Holotype. Australia. SA, Gulf St Vincent, Sellicks Reef, Port Willunga Reef, SAM.

Other material. Australia. SA, Tiparra Bay, Tiparra Reef (34°4'S, 137°23'E), 11 m, sand, shell fragments and seagrass, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 19), NMV J47963 (2).

*Diagnosis. Adult female and subadult male.* Carapace with many spines. Pereopod 1 carpus longer than basis. Pereopod 2 carpus twice as long as merus. Telson with ventral spines or teeth, much longer than uropod peduncles. Uropod endopod triarticulate, much shorter than exopod. *Adult male.* Unknown.

*Distribution.* SA; 11 m.

*Remarks.* The beginning of the description in Hale (1936) refers to specimens of *Zimmeriana longirostris* (called *Dic lasiodactylum*, corrected in Hale, 1946) which are significantly smaller than *Z. spinicauda*, on the order of 1.75–2 mm, in contrast to *Z. spinicauda* at 3 mm. This species is very distinctive, as it is the only species with spines all over the carapace, and also the only species with spines or teeth on the ventral surface of the telson.

#### *Zimmeriana vibrissa* sp. nov.

Figures 129–131

*Material examined.* Holotype. Australia. SA, Tiparra Bay, Tiparra Reef west ground, 2.3 nm. W of Tiparra Light (34°4'S, 137°23'E), 10 m, sponge, red and green algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 6), NMV J48042 (ovigerous female).

Paratypes. Australia. SA, Tiparra Bay, Tiparra Reef west ground, 2.3 nm. W of Tiparra Light (34°4'S, 137°23'E), 10 m, sponge, red and green algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 6), NMV J48043 (1 ovigerous female dissected).

Other material. Australia. Tas., WA, SA, Bass Strait, 31–39°S, 115–147°E: 12 undetermined. NMV J48044; J48045; J48046; J48047; J48048; J48049; J48050.

*Diagnosis. Adult female and subadult male.* Carapace with multiple spines dorsally, no lateral spines. Pereopod 1 carpus longer than basis. Pereopod 2 carpus less than twice length of merus. Telson longer than uropod peduncles. Uropod endopod triarticulate, much shorter than exopod. *Adult male.* Unknown.

*Etymology.* From Latin, *vibrissa* meaning stiff tactile hair, in reference to the stiff setae on the dactylus of the pereopod 1.

*Distribution.* Bass Strait, SA, WA; 5–57 m.

*Remarks.* This species is most similar to the small individuals of *Zimmeriana spinicauda* recorded by Hale (1936). However, in this species there are no spines on the telson, nor are there spines on the lateral surfaces of the carapace.

#### *Axiogynodiastylis* gen. nov.

*Gynodiastylis.*—Hale, 1946: 364–366.

*Type species. Gynodiastylis rochfordi* Hale, 1946.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal or ventrally directed. Eye lobe with or without lenses. First antenna small to moderate. Pereopod 1 with distinct brush of long setae on propodus. Female with fully developed exopods on pereopods 1 and 2, rudimentary exopods on pereopods 3 and 4. Uropod endopod of 1, 2 or 3 articles. Telson 0.5–1 times pleonite 6 length, with pair of terminal setae. *Adult male.* Antenna 2 with peduncle of 3 or 4 articles, flagellum of 11 articles. Exopods present on maxilliped 3 and pereopods 1–4 (where known). Uropod endopod of 2 or 3 articles.

*Etymology.* From Greek *axios* meaning of the same, or of equal worth, in combination with *gynodiastylis*, meaning a taxon that is similar to *Gynodiastylis* in habitus.

*Distribution.* NSW to SA, New Zealand; 11–1065 m.

*Species.* *Axiogynodiastylis fimbriatus* sp. nov., *A. kopua* sp. nov., *A. reticulatus* sp. nov., *A. rochfordi* (Hale, 1946) comb. nov.

*Remarks.* This genus is very similar to *Gynodiastylis*, and as the definition is based on female characters, it may be difficult or impossible to differentiate between males of *Gynodiastylis* and *Axiogynodiastylis* if females are not also present.

#### Key to species of *Axiogynodiastylis*

1. Carapace with multiple longitudinal ridges, uropod endopod triarticulate ..... *A. rochfordi*
- Carapace without longitudinal ridges, uropod endopod 1–3 articulate ..... 2
2. Uropod endopod uniaarticulate, carapace smooth ..... *A. kopua*
- Uropod endopod 2 or 3 articulate ..... 3
3. Uropod endopod biarticulate, carapace reticulated ..... *A. reticulata*
- Uropod endopod triarticulate, carapace smooth ..... *A. fimbriata*

#### *Axiogynodiastylis fimbriata* sp. nov.

Figures 132–134

*Material examined.* Holotype. New Zealand. Chatham Rise, E of South Island, 44°30.1' S 174°18.8' E, 760 m, (stn S147 TAM), 25 Oct 1979, NIWA H-803 (ovigerous female).

Paratypes. New Zealand. Chatham Rise, E of South Island, 44°30.1' S 174°18.8' E, 760 m, (stn S147 TAM), 25 Oct 1979, NIWA P-1274 (1 subadult female); 44°29.89–31.9' S, 178°57.88–179°66.57' W, 1065 m, (stn V362 DAB), 7 Sep 1989, NIWA P-1275 (1 subadult female).

*Diagnosis.* *Adult female and subadult male.* Carapace with distinct vertical depression just posterior to anterior margin, producing a flared effect on the anterior margin. Pereopod 2 covered in tiny hair like setae. Telson longer than uropod peduncles. Uropod exopod distal margin lined with fine hairlike setae, otherwise uropod rami without such setae. Uropod endopod triarticulate, subequal to exopod. Uropod terminal setae finely microserrate. *Adult male.* Unknown.

*Etymology.* From Latin, *fimbriatus* meaning fringe, border or edge, in reference to the flared out anterior margin of the carapace, and the setae fringing the edge.

*Distribution.* Eastern New Zealand; 760–1065 m.

*Remarks.* This species can be distinguished from *Axiogynodiastylis kopua* and *A. reticulata* by the triarticulate uropod endopod, as *A. kopua* has a uniaarticulate endopod and *A. reticulata* has biarticulate endopod. Also, this species can be differentiated from the one other species in the genus with a triarticulate uropod endopod, *A. rochfordi*, by the complete lack of lateral ridges on the carapace.

#### *Axiogynodiastylis kopua* sp. nov.

Figures 135–137

*Material examined.* Holotype. New Zealand. Chatham Rise, E of South Island, 44°30.1' S 174°18.8' E, 760 m, (stn S147 TAM), 25 Oct 1979, NIWA H-804 (subadult female).

*Diagnosis.* *Adult female and subadult male.* Carapace smooth, unornamented. Pereopod 2 without fine hairlike setae. Telson shorter than uropod peduncles. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, subequal to exopod. Uropod endopod subterminal seta microserrate distally, with long subterminal setule; terminal seta microserrate distally, tip expanded and covered with fine setules. *Adult male.* Unknown.

*Etymology.* From the Maori, *kopua* meaning deep water, in reference to the depth at which the holotype was collected.

*Distribution.* New Zealand; 760 m.

*Remarks.* This species has unique terminal setae on the uropods, and is the only species in the genus with a uniaarticulate uropod endopod.

#### *Axiogynodiastylis reticulata* sp. nov.

Figures 138–143

*Material examined.* Holotype. Australia. Tas., central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4' S, 147°32.6' E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48269 (ovigerous female).

Paratypes. Australia. Tas., central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4' S, 147°32.6' E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48270 (1

subadult female dissected); central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4'S, 147°32.6'E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48268 (5 females, 1 male); central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4'S, 147°32.6'E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48271 (1 adult male dissected).

*Diagnosis. Adult female and subadult male.* Carapace with incomplete ventrolateral ridge, complete and incomplete dorsal ridges, carapace entirely finely reticulated. Pereopod 2 without fine hairlike setae. Telson shorter than uropod peduncles, lateral margins serrate. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod rami terminal setae with a single subterminal setule. *Adult male.* Carapace ridges as in female, may appear finely reticulated or patchily covered in pointed tubercles. Exopods present on maxilliped 3–pereopod 4. Telson slightly shorter than uropod peduncles.

*Etymology.* From Latin, *reticulatus* referring to the reticulated patterning of the carapace.

*Distribution.* Bass Strait; 51 m.

*Remarks.* Exopods on pereopods 3 and 4 of the female are tiny, and may not be easily visible with a dissecting microscope. This species can be distinguished from all other species in the genus by either the carapace morphology or the biarticulate uropod endopod. The most similar species in the closely allied genus *Gynodiastylis* is *G. subtilis*. However, *G. subtilis* does not have reticulations on the carapace and the ventrolateral ridge on the carapace is less than a third the carapace length, while in *Axiogynodistylis reticulata* the ventro-lateral ridge extends more than half the length of the carapace.

***Axiogynodiastylis rochfordi* (Hale) comb. nov.**

Figures 144–146

*Gynodiastylis rochfordi* Hale, 1946: 364–366, figs 3–4.

*Material examined.* Holotype. Australia. NSW, Ulladulla, Brush I., 45 fm, SAM C2695 (subadult male).

Other material. Australia. Tas., Bass Strait, SA, NSW, 34–41°S, 137–151°E: 80 females, 53 males, 5 manca I. NMV numerous registrations; AM numerous registrations.

*Diagnosis. Adult female and subadult male.* Carapace with multiple lateral ridges, pseudorostrum with pair of dorsal carinae. Pereopod 2 distal arti-

cles covered with fine hairlike setae. Telson shorter than uropod peduncles. Uropod rami covered in fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae with single subterminal setule. *Adult male.* As in female, except pereopod 2 and uropod rami without fine hairlike setae. Exopods present on maxilliped 3–pereopod 4.

*Distribution.* NSW to SA; 11–520 m.

*Remarks.* This species is the largest *Axiogynodiastylis*, reaching lengths of over 5 mm in the female. This species can be distinguished from all others in the genus by the multiple lateral ridges.

***Gynodiastylis* Calman**

*Gynodiastylis* Calman, 1911: 368–370.—Zimmer, 1914: 187–190.—Hale, 1928: 42–45.—Hale, 1946: 362–421.—Gamô, 1961: 104–109.—Harada, 1962: 293–306.—Jones, 1963: 71–76.—Gamô, 1968: 186–187.—Day, 1980: 201–215.—Blazewicz and Heard, 1999: 362–367.

*Type species. Gynodiastylis carinata* Calman, 1911.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal or ventrally directed. Eye lobe with or without lenses. First antenna small to moderate. Pereopod 1 with a distinct brush of long setae on the propodus. Female with fully developed exopods on pereopods 1 and 2, no exopods on pereopods 3 and 4. Uropod endopod of 1, 2 or 3 articles. Telson 0.5–1.5 times pleonite 6 length, with or without pair of terminal setae. *Adult male.* Antenna 2 peduncle of 3–4 articles, flagellum of 7–12 articles. Exopods present on maxilliped 3, pereopods 1 and 2, 1–3 or 1–4. Uropod endopod of 1, 2 or 3 articles, may have fewer articles than in female.

*Distribution.* South Africa, Arabian Gulf, Thailand, Australia, Japan, Antarctic Ocean; 1–1264 m.

*Species. Gynodiastylis ampla* Hale, 1946, *G. anguicephala* Harada, 1962, *G. arabica* sp. nov., *G. baios* sp. nov., *G. blax* sp. nov., *G. bicristata* Calman, 1911, *G. carinata* Calman, 1911, *G. carinirostris* Hale, 1946, *G. dikondyla* sp. nov., *G. dilatata* Hale, 1946, *G. fulgida* Day, 1980, *G. hartmeyeri* Zimmer, 1914, *G. insolitaseta* sp. nov., *G. jazdzewskii* Blazewicz and Heard, 1999, *G. koataata* sp. nov., *G. lata* Hale, 1946, *G. lineata* Day, 1980, *G. megasiphon* sp. nov., *G. milleri* Jones, 1963, *G. multicarinata* sp. nov., *G. nitida*, Harada, 1962, *G. nordaustriana* Băcescu, 1991, *G. polita* Hale, 1946,

*G. pygmaeoinsolitaseta* sp. nov., *G. robusta* Hale, 1946, *G. rotundicaudata* Gamô, 1961, *G. rugosa* sp. nov., *G. sierra* sp. nov., *G. similis* Zimmer, 1914, *G. strumosa* Hale, 1946, *G. subtilis* Hale, 1946, *G. truncatifrons* Hale, 1928 *G. tubicola* Harada, 1962, *G. tubifacurex* sp. nov.

*Remarks.* Although species of *Gynodiastylis* are frequently collected with pereopod 1 broken off at the basis-ischium boundary, it may still be possible to identify the species on the basis of the carapace morphology and pattern of exopods.

#### Key to species of *Gynodiastylis*

1. Carapace covered with setae ..... *G. anasillos*
- Carapace not covered with setae ..... 2
2. Carapace smooth ..... 3
- Carapace sculptured, or with ridges, tumidities, or depressions ..... 17
3. Pseudorostral lobes with 1 pair sharp dorsal carinae ..... 4
- Pseudorostral lobes without carinae ..... 5
4. Uropod endopod uniarticulate in both sexes ..... *G. profunda*
- Uropod endopod triarticulate in female ..... *G. carinirostris*
5. Uropod rami longer than or equal to uropod peduncle ..... 6
- Uropod rami shorter than uropod peduncle ..... 12
6. Uropod endopod uniarticulate ..... 7
- Uropod endopod bi or triarticulate ..... 9
7. Uropod endopod equal to exopod ..... *G. rotundicaudata*
- Uropod endopod longer than exopod ..... 8
8. Telson less than 0.5 uropod peduncle length ..... *G. curvirostris*
- Telson greater than 0.5 peduncle length ..... *G. arabica*
9. Uropod endopod biarticulate ..... 10
- Uropod endopod triarticulate ..... 11
10. Telson greater than or equal to uropod peduncles ..... *G. koataata*
- Telson shorter than uropod peduncles ..... *G. similis*
11. Telson less than 0.5 uropod peduncle length ..... *G. platycarpus*
- Telson more than 0.5 uropod peduncle length ..... *G. hartmeyeri*
12. Uropod endopod triarticulate in both sexes ..... *G. pygmaeoinsolitaseta*
- Uropod endopod uni or biarticulate ..... 13
13. Uropod endopod uniarticulate ..... 14
- Uropod endopod biarticulate ..... 16
14. Telson greater than two-thirds uropod peduncle length ..... 15
- Telson less than two-thirds uropod peduncle length; uropod terminal setae complex, with many long setules terminally ..... *G. insolitaseta*
15. Telson equal in length to uropod peduncles ..... *G. nitida*
- Telson shorter than uropod peduncles; uropod terminal setae with single subterminal setule ..... *G. fulgida*
16. Antenna 1 visible; telson less than half uropod peduncle length ..... *G. baios*
- Antenna 1 not visible, tucked into groove on ventral surface of pseudorostrum; telson more than half uropod peduncle length ..... *G. tubifacurex*
17. Carapace mostly smooth, ridges few and incomplete if present ..... 18
- Carapace sculptured, or with multiple ridges or rugose appearance ..... 22
18. Carapace with pair of dorsally directed swellings mid-dorsally; uropod endopod uniarticulate ..... *G. dikondyla*
- Carapace without dorsal swellings; uropod endopod bi- or triarticulate ..... 19
19. Uropod endopod biarticulate ..... 20
- Uropod endopod triarticulate ..... 21
20. Carapace with 1 pair dorsal ridges, extending onto pseudorostrum ..... *G. blax*
- Carapace with 1 ventrolateral ridge, may sweep dorsally; anterior margin of carapace may be weakly or strongly toothed ..... *G. truncatifrons*

21. Telson much shorter than uropod peduncles, lateral margins smooth ..... *G. polita*  
 — Telson subequal to uropod peduncles, lateral margins strongly serrate ..... *G. subtilis*
22. Carapace sculptured, with swellings, folds, or tumidities, few ridges if any.... 23  
 — Carapace with many ridges, many weak ridges may combine to create rugose appearance ..... 28
23. Anterodorsal portion of carapace with 3 ridges, strongly toothed; central ridge not paired ..... *G. sierra*  
 — Without strongly toothed ridges on the anterodorsal part of the carapace .. 24
24. Siphon much longer than carapace ..... *G. megasiphon*  
 — Siphon short ..... 25
25. Uropod rami equal to peduncle length ..... 26  
 — Uropod rami less than two-thirds peduncle length ..... 27
26. Pereonites 3–4 fused; medial margin of uropod endopod with many (12–19) setae ..... *G. robusta*  
 — Pereonites 3–4 free; medial margin of uropod endopod with few (6–9) setae ..... *G. dilatata*
27. Uropod peduncle less than twice uropod endopod length; telson with third of length postanal; carapace with distinct carinae, branchial region not swollen ..... *G. ampla*  
 — Uropod peduncle more than twice uropod endopod length; telson with insignificant postanal portion; carapace with folds but without distinct carinae, branchial region swollen ..... *G. strumosa*
28. Carapace with strongly defined ridges, may be complete or incomplete .... 29  
 — Carapace with weakly defined, incomplete ridges ..... 34
29. Carapace with 1 pair large, sharp dorsal ridges ..... 30  
 — Carapace with ridges, but without 1 pair large dorsal ridges ..... 31
30. Carapace with only 1 pair large, sharp dorsal ridges ..... *G. bicristata*  
 — Carapace with 1 pair large sharp dorsal ridges and few incomplete lateral ridges on the posterior portion ..... *G. sulcata*
31. Carapace with horizontal ridges on posterior two-thirds, posterior to sweepingridge (from anteroventral corner to posterior corner of frontal lobe) ..... *G. nordaustriana*  
 — Carapace with ridges extending onto anterior portion ..... 32
32. Carapace with 3 complete lateral ridges, and 1 pair dorsal ridges on pseudorostrum ..... *G. carinata*  
 — Carapace with more than 3 complete lateral ridges ..... 33
33. Telson less than or equal to half uropod peduncle length .... *G. multicarinata*  
 — Telson longer than half uropod peduncle length ..... *G. lineata*
34. Carapace well calcified, with strongly rugose appearance, distinct lateral sulcus; Telson equal in length to uropod peduncles ..... *G. rugosa*  
 — Carapace weakly calcified, rugose appearance due to multiple incomplete ridges; telson shorter than uropod peduncles ..... 35
35. Uropod endopod longer than or equal to peduncle ..... *G. jazdzewskii*  
 — Uropod endopod shorter than peduncle ..... 36
36. Pair of sharp dorsal carinae on pseudorostrum ..... 37  
 — Pseudorostrum without dorsal carinae ..... *G. anguicephala*
37. Telson less than half uropod peduncle length ..... *G. lata*  
 — Telson greater than half uropod peduncle length ..... 38
38. Carapace with many complete and incomplete ridges; uropods slender .... 39  
 — Carapace with few incomplete ridges; uropods stout ..... *G. milleri*
39. Pseudorostral lobes with a distinct pair of dorsal carinae ..... *G. tubicola*  
 — Pseudorostral lobes without pair of dorsal carinae ..... *G. costata*

***Gynodiastylis ampla* Hale**

Figure 147

*Gynodiastylis ampla* Hale, 1946: 376–378, figs 12–13.

*Material examined.* Holotype. Australia. NSW, Ulladulla, 75 m, SAM C2654 (female).

Paratypes. Australia. NSW, Ulladulla, 75 m, SAM C2681 (male), C2657 (females).

*Diagnosis. Adult female and subadult male.* Carapace with lateral ridge running posteriorly from anterodorsal corner, pair of posterior dorsolateral ridges, a deep lateral sulcus, and faint pits posteriorly which join together and give the impression of irregular, vague wavy ridges. Eyelobe with 3 lenses. Pereopod 1 with propodus less than half carpus length. Pereopod 2 basis not expanded, without fine hairlike setae. Pereopods 3–5 dactyluses not modified. Telson shorter than uropod peduncles, lateral margins serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, equal in length to exopod. Uropod terminal setae simple. Body length 9.2 mm. *Adult male.* As in female, with exopods on maxilliped 3–pereopod 4. Body length 8.2 mm.

*Distribution.* NSW; 75 m.

*Remarks.* This species is one of the largest species, and can be distinguished from most other species in the genus by size alone. *Gynodiastylis rugosa* is the only species of a similar size, and *G. ampla* can be distinguished by the following features: uropod rami subequal in length, whereas in *G. rugosa* the uropod exopod is much shorter than the endopod; pereopod 2 is without fine hairlike setae, while in *G. rugosa* pereopod 2 is densely beset with fine hairlike setae.

***Gynodiastylis anasillos* sp. nov.**

Figures 148–149

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 65 km S of Cape Schanck (39°08.3'S, 144°43.9'E), 66 m, coarse sand, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 23 Nov 1981 (stn BSS 201 G), NMV J48001 (subadult female).

Paratype. Australia. NSW, Off Nowra (34°59.52'S, 151°5.94'E), 204 m, coarse shell, WHOI epibenthic sled, G.C.B. Poore et al., RV *Franklin*, 14 Jul 1986 (stn SLOPE 1), NMV J48000 (1 subadult female).

*Diagnosis. Adult female and subadult male.* Carapace covered with many setae, without any other sculpturing or ornamentation. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus

length. Pereopod 2 entirely densely beset with fine hairlike setae. Pereopods 3–5 with the dactylus produced as several comblike processes, terminal seta dentate. Telson shorter than uropod peduncles. Uropod rami covered in fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod exopod produced as terminal lobe. Uropod terminal setae simple. Body length 4.5 mm. *Adult male.* Unknown.

*Etymology.* From Greek, *anasillos* meaning bristling hairs, in reference to the setae covering the carapace.

*Distribution.* NSW, Bass Strait; 204–1119 m.

*Remarks.* The carapace covered with setae is unique within the genus.

***Gynodiastylis anguicephala* Harada**

Figure 150

*Gynodiastylis anguicephala* Harada, 1962: 303–305, figs 7–8.—Gamô, 1963: 88.—Gamô, 1968: 186–187.

*Type material.* Holotype. Japan. off Sirahama (Izu Peninsula), Gunchu-ko (Ehime Prefecture), and Onahama Bay (Miyagi Prefecture), 10–20 m, deposition unknown (not seen).

*Diagnosis. Adult female and subadult male.* Carapace with complete and incomplete lateral and dorsolateral ridges. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 not illustrated. Telson shorter than uropod peduncles, with 2 pair slender lateral setae and 1 pair small terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, shorter than exopod. Uropod terminal setae with single subterminal setule. Body length 2.0 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4, and uropod rami subequal.

*Distribution.* Japan; 10–20 m.

*Remarks.* This species can be distinguished from all other species by the combination of the small size and location; there are no other species of a similar size reported from Japan.

***Gynodiastylis arabica* sp. nov.**

Figures 151–152

*Material examined.* Holotype. United Arab Emirates, Um al Dalkh oilfield, 30 km offshore Abu Dhabi, 24°62'N, 54°17'E, 12–20 m, (stn UA12), USNM 1001139 (adult male).

*Diagnosis. Adult female and subadult male.* Unknown. *Adult male.* Carapace smooth, unorna-

mented. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Exopods present on maxilliped 3–pereopod 4. Telson much shorter than uropod peduncles, lateral margins smooth, bearing 1 pair of tiny terminal setae. Uropod rami without fine hairlike setae. Uropod endopod uniarticulate, longer than exopod. Uropod terminal setae complex, distally microserrate with long setules, with single very long subterminal setule. Body length 2.1 mm.

*Etymology.* *Arabica*, from the place of collection, the Arabian Gulf.

*Distribution.* Arabian Gulf, off Abu Dhabi, 12–20 m.

*Remarks.* This species is the first recorded gynodiastylid from the Arabian Gulf. It is expected that gynodiastylids will be found all around the Indian Ocean coast. However, this is the first record between the Gulf of Thailand and South Africa. This species is most similar to *Gynodiastylis insolitaseta* and *G. pygmaeinsolitaseta*. However, in *G. insolitaseta* the uropod rami are subequal in length, and the telson is entirely without terminal setae, while in *G. arabica* the uropod exopod is much shorter than the endopod, and the telson bears pair of small terminal setae. In *G. pygmaeinsolitaseta* the uropod endopod is triarticulate, while the uropod endopod of *G. arabica* is uniarticulate.

#### *Gynodiastylis baios* sp. nov.

Figures 153–156

*Material examined.* Holotype. Australia. SA, "Hotspot" reef, 5 n mi. W of N end of Flinders I. (33°40.50'S, 134°22'E), 12 m, brown, green, red algae, large forms, SCUBA, S. Shepherd, FV *Limnos*, 19 Apr 1985 (stn SA 64), NMV J47998 (ovigerous female).

Paratypes. Australia. WA, Thistle Cove, eastern end (34°0'S, 122°12'E), 8 m, brown algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 11 Apr 1984 (stn SWA 28), NMV J47996 (3); J47993 (1 ovigerous female dissected); WA, Thistle Cove, eastern end (34°0'S, 122°12'E), 7 m, red algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 11 Apr 1984 (stn SWA 27), NMV J47995 (1); Vic., western Bass Strait, 30 km SSW of Warrnambool (38°38.2'S, 142°35.0'E), 59 m, Smith-McIntyre grab, R.S. Wilson, RV *Tangaroa*, 20 Nov 1981 (stn BSS 188 G), NMV J47994 (1 adult male dissected); J47997 (2).

*Diagnosis.* *Adult female and subadult male.* Carapace smooth, unornamented, with deep antennal notch. Eyelobe with 2 lenses. Pereopod

1 with propodus less than half carpus length. Pereopod 2 with patches of fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, much longer than exopod. Uropod terminal setae with single subterminal setule. Body length 2.4–2.6 mm. *Adult male.* As in female, except uropod rami with fine bristles distally. Exopods present on maxilliped 3–pereopod 4. Body length 2.0 mm.

*Etymology.* From Greek, *baios* meaning small, in reference to the diminutive size of the species.

*Distribution.* Bass Strait, SA, WA; 7–59 m.

*Remarks.* This species is most similar to *Gynodiastylis blax* and *G. pygmaeinsolitaseta*. *Gynodiastylis baios* has a smooth carapace, while *G. blax* has pair of dorsal ridges. The uropod terminal setae of *G. baios* are simple with a single subterminal setule, while the uropod terminal setae of *G. pygmaeinsolitaseta* are complex and unique to that species.

#### *Gynodiastylis blax* sp. nov.

Figures 157–158

*Material examined.* Holotype. Australia. WA, Seven Mile Beach, North of Dongara (29°12'S, 114°53'E), 1 m, mixed algae beneath overhang on reef, airlift, G.C.B. Poore and H.M. Lew Ton, 22 Apr 1986 (stn SWA 83), NMV J47961 (ovigerous female).

Paratype. Australia. WA, Seven Mile Beach, North of Dongara (29°12'S, 114°53'E), 1 m, mixed algae beneath overhang on reef, airlift, G.C.B. Poore and H.M. Lew Ton, 22 Apr 1986 (stn SWA 83), NMV J47962 (1 ovigerous female dissected).

*Diagnosis.* *Adult female and subadult male.* Carapace with pair of dorsal ridges, otherwise smooth. Eyelobe with 3 lenses. Pereopod 1 with propodus less than half carpus length. Pereopod 2 dactylus with fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncles. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, slightly longer than exopod. Uropod terminal setae microserrate with single subterminal setule. Body length 2.4 mm. *Adult male.* Unknown.

*Etymology.* From Greek, meaning dull.

*Distribution.* Bass Strait, southern Australia; 1 m.

*Remarks.* This species can be distinguished from most other small species of *Gynodiastylis* by the single pair of dorsal ridges on the carapace; all other small species have either multiple ridges or no ridges, except *G. bicristata*. The ridges in *G. bicristata* are much sharper and more pronounced, and the overall carapace is shorter and has a pronounced arch shape dorsally, relative to the carapace of *G. blax*.

***Gynodiastylis bicristata* Calman**

Figure 159

*Gynodiastylis bicristata* Calman, 1911: 374–376, pl. 36 figs 11–22.—Zimmer, 1941: 27, fig. 27.—Hale, 1951: 358–359.—Zimmer, 1952: 28.—Gamô, 1968: 187.

*Material examined.* Syntypes, Gulf of Thailand, Koh Kam 5–10 fm; between Koh Mesan and Cape Liant, 5–8 fm; Japan, 33°10'N 129°18'E, 40 fm, ZMC, BMNH.

*Diagnosis. Adult female and subadult male.* Carapace with pair of pronounced, sharp dorsal ridges, carapace has arched shape dorsally and is relatively short. Eyelobe without lenses. Pereopod 1 with propodus less than half carpus length. Pereopod 2 covered with fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncle length, lateral margins smooth, without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae simple. Body length 1.9 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Body length 1.7 mm.

*Distribution.* Japan, Gulf of Thailand (Koh Kam); 42–80 m.

*Remarks.* The distribution of this species is unprecedented in the family, with specimens reported from the Gulf of Thailand and Japan, when the distributions of most species are confined to a subarea of a single country or continent. This species is most similar to *G. sulcata*. However, *G. sulcata* is found on the coast of South Africa. The two species are remarkably alike, both bearing pair of large, sharp dorsal ridges on a relatively short, stout carapace. A third species, collected from the Bass Strait and southern Australia, very similar to both *G. bicristata* and *G. sulcata*, is present in the collections of the Museum Victoria (pers. obs, provisional n. sp. A).

***Gynodiastylis carinata* Calman**

Figure 160

*Gynodiastylis carinata* Calman, 1911: 368–370, pl. 35 figs 6–31.—Zimmer, 1913: 480.—Zimmer, 1941: 36, fig. 48.—Jones, 1963: 71–73, figs 313–334.

*Gynodiastylis carinatus.*—Stebbing, 1912: 147.—Stebbing, 1913: 162, fig. 112.

*Material examined.* New Zealand, Lyttelton Harbour, 1–5 fm, ZMC.

*Diagnosis. Adult female and subadult male.* Carapace with several complete lateral and dorsolateral ridges. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod rami with fine hairlike setae. Uropod endopod biarticulate, shorter than exopod. Uropod terminal setae microserrate. Body length 4.0. *Adult male.* As in female, with exopods on maxilliped 3–pereopod 2. Body length 2.9–3.0 mm.

*Distribution.* New Zealand; 0–10 m.

*Remarks.* This species is distinctive among the New Zealand *Gynodiastylis*-group fauna, in having several complete lateral ridges. All other species from New Zealand, of both *Gynodiastylis* and *Axiogynodiastylis*, have carapaces entirely without lateral ridges.

***Gynodiastylis carinirostris* Hale**

Figure 161

*Gynodiastylis carinirostris* Hale, 1946: 381–383, figs 16–17.

*Material examined.* Holotype. Australia. NSW, Botany Bay, off Kurnell, 20 ft, SAM C2669 (female).

Other material. Australia. Tas., eastern Bass Strait, 100 km NE of North Point, Flinders I., (38°52.6'S, 148°25.2'E), 140 m, fine sand, WHOI epibenthic sled, R.S. Wilson. RV *Tangaroa*, 15 Nov 1981 (stn BSS 170 S), NMV J48218 (1).

*Diagnosis. Adult female and subadult male.* Carapace entirely smooth except for pair of sharp dorsal carinae on the pseudorostrum. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, with pair of stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, much longer than



exopod. Uropod terminal setae microserrate distally, with a single long subterminal setule. Body length 4.7. *Adult male*. Unknown.

*Distribution*. NSW, Bass Strait; 6–140 m.

*Remarks*. This species is similar to *Gynodiastylis profunda* in having a smooth carapace in combination with a pair of sharp dorsal carinae on the pseudorostrum. However, in *G. profunda* the uropod endopod is uniaarticulate in both sexes, while in *G. carinirostris* the uropod endopod is triarticulate in the female (unknown in the male).

### *Gynodiastylis costata* Calman

Figures 162–163

*Gynodiastylis costata* Calman, 1911: 372–374, pl. 36 figs 1–10.—Zimmer, 1952: 28.—Gamô, 1968: 187.

*Gynodiastylis costatus*.—Stebbing, 1912: 147.—Stebbing, 1913: 163.—Gamô, 1962: 206–208, figs 39–40.—Gamô, 1963: 88.

*Material examined*. Gulf of Thailand, Koh Kam 20 fm; North of Koh Chuen, 15 fm; between Koh Mesan and Cape Liant, 5–8 fm, syntypes, ZMC, BMNH.

*Diagnosis. Adult female and subadult male*. Carapace with multiple complete and incomplete lateral ridges. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 some articles covered with fine hairlike setae. Pereopod 3 several articles covered with fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncles. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae simple. Body length 2.4. *Adult male*. As in female, with exopods present on maxilliped 3–pereopod 2. Body length 1.7–1.9 mm.

*Distribution*. Japan, Gulf of Thailand; 9–37 m.

*Remarks*. This species is most similar to *Gynodiastylis lata* and *G. carinata*. *Gynodiastylis carinata* is only known from New Zealand and is 3–4 mm in the adult stages, while *G. costata* is known from Thailand and Japan and is 2.5 mm or less in the adult stages. *Gynodiastylis lata* is of a similar size, being 2 mm in length, but is found only in Australia, and the uropod rami are much more disparate in size, with the uropod endopod being much longer than the exopod. *Gynodiastylis costata* is known from Thailand and Japan, and the uropod rami are much more similar in size, with the uropod endopod being only slightly longer than the exopod.

### *Gynodiastylis curvirostris* Day

Figure 164

*Gynodiastylis curvirostris* Day, 1980: 205–208, fig. 5.

*Type material*. Holotype. South Africa. S of Durban, 31°04'S 30°10'E, 72 m, South African Museum A15275 (adult male, not seen).

*Diagnosis. Adult female and subadult male*. Carapace smooth, unornamented, pseudorostrum ventrally directed. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson much shorter than uropod peduncles, lateral margins smooth, with many fine setae distally. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, longer than exopod. Uropod terminal setae microserrate with long setules distally, with one longer subterminal setule. Body length 1.8–2.4. *Adult male*. As in female, with exopods on maxilliped 3–pereopod 2. Body length 2.6 mm

*Distribution*. South Africa; 37–75 m.

*Remarks*. The combination of a smooth carapace and ventrally directed pseudorostrum in both sexes is unique in the genus, particularly since the pseudorostrum direction tends to be sexually dimorphic.

### *Gynodiastylis dikondyla* sp. nov.

Figures 165–167

*Material examined*. Holotype. Australia. WA, Thistle Cove, eastern end (34°0'S, 122°12'E), 8 m, brown algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 11 Apr 1984 (stn SWA 28), NMV J47990 (ovigerous female).

Paratypes. Australia. Tas., eastern Bass Strait, 100 km NE of North Point, Flinders I., (38°52.6'S, 148°25.2'E), 140 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 15 Nov 1981 (stn BSS 170 S), NMV J48301 (1 SEM stub); eastern Bass Strait, 37 km NNE of Eddystone Point (40°43.8'S, 148°37.2'E), 67 m, muddy sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 164), NMV J47983 (1 ovigerous female); eastern Bass Strait, 85 km NE of North Point, Flinders I. (39°02.4'S, 148°30.6'E), 120 m, muddy sand, R.S. Wilson, RV *Tangaroa*, 15 Nov 1981 (stn BSS 169), NMV J47985 (1 ovigerous female, 1 subadult female); Tasman Sea, 15 km E of Maria I., (42°37'S, 148°20'E), 102 m, WHOI epibenthic sled, R.S. Wilson, RV *Soela*, 9 Oct 1984 (stn S05/84 01), NMV J47984 (1 ovigerous female); WA, Thistle Cove, eastern end (34°0'S, 122°12'E), 8 m, brown algae,

SCUBA, G.C.B. Poore and H.M. Lew Ton, 11 Apr 1984 (stn SWA 28), NMV J47989 (1 ovigerous female dissected); SA, Tiparra Bay, Tiparra Reef west ground, 2.3 n. mi. W of Tiparra Light (34°4'S, 137°23'E), 10 m, sponge, red and green algae, SCUBA, G.C.B. Poore and H.M. Lew Ton, 15 Mar 1985 (stn SA 6), NMV J47988 (1).

Other material. Australia. Bass Strait, 38°S, 148°E: 10 undetermined. NMV J47986; J47987.

**Diagnosis.** *Adult female and subadult male.* Carapace produced as pair of distinct rounded swellings mid-dorsally, otherwise unornamented. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified, stout and short. Telson much shorter than uropod peduncles. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, slightly longer than exopod. Uropod terminal setae complex, with many thin strands terminally. Body length 4.3 mm. *Adult male.* Unknown.

**Etymology.** From Greek, *kondyla* meaning prominence, *di* in reference to the large paired dorsal prominences of the carapace.

**Distribution.** Bass Strait to WA; 8–130 m.

**Remarks.** This species is similar to *Gynodiastylis insolitaseta*, in both habitus and uropod terminal setae. However, the paired prominences found dorsally on the carapace are obvious. Multiple individuals were present in the collection, therefore it is unlikely that the dorsal prominences are an aberration.

### *Gynodiastylis dilatata* Hale

Figures 168–169

*Gynodiastylis dilatata* Hale, 1946: 372–375, figs 9–11.

**Material examined.** Holotype. Australia. NSW, off Eden, 30 m, coarse sand, K. Sheard, trawl, Oct 1943, SAM C2704 (adult male).

Other material. Australia. NSW, 34°S, 151° E: AM P55745; P56204; P56206; P61005; P61012.

**Diagnosis.** *Adult female and subadult male.* Unknown. *Adult male.* Carapace with complete ventrolateral ridge and dorsolateral ridge, paired posterior dorsal tumidities. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae, carpus remarkably long. Pereopods 3–5 dactylus and terminal seta unmodified. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles, lateral margins weakly serrate, with 1 or 2 pairs stout lateral setae and 1 pair stout

terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae simple. Body length 3.0 mm.

**Distribution.** NSW; 120–234 m.

**Remarks.** Hale (1946: 371) suggested that the female specimens he described as *Gynodiastylis robusta* might belong with this male. However, in the course of the present work, adult male *G. robusta* were encountered and it is now clear that *G. dilatata* is a separate species. *Gynodiastylis robusta* has the third and fourth pereonites fused in both the male and female, while in *G. dilatata* the third and fourth pereonites are free.

### *Gynodiastylis fulgida* Day

Figure 170

*Gynodiastylis fulgida* Day, 1980: 213–215, fig. 8.

**Type material.** Holotype. South Africa. Still Bay, 34°40'S 21°39'E, 80 m, South African Museum A15278 (ovigerous female, not seen).

**Diagnosis.** *Adult female and subadult male.* Carapace with small, regularly spaced pits, pseudorostrum weakly ventrally directed. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth and without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, equal to exopod. Uropod terminal setae with single subterminal setule. Body length 2.4–3.0 mm. *Adult male.* Unknown.

**Distribution.** South Africa; 29–80 m.

**Remarks.** This species is most similar to *Gynodiastylis curvirostris*. However, the carapace of *G. curvirostris* is smooth, and the carapace of *G. fulgida* has regularly spaced small pits. Also, the uropod terminal setae of *G. fulgida* are simple with a single subterminal setule, while the uropod terminal setae of *G. curvirostris* are complex, covered with long setules distally and with a single longer subterminal setule.

### *Gynodiastylis hartmeyeri* Zimmer

Figure 171

*Gynodiastylis hartmeyeri* Zimmer, 1914: 187, fig. 14.—Hale, 1951: 359.

**Type material.** Australia. WA, Cape Heirisson, 26°01'S 113°21'E, 11–12.5 m, ZMB (not seen).

*Material examined.* Australia. Tas., Vic. Bass Strait, NSW, 34–43°S, 147–151°E: 11 ovigerous females, 1 subadult female, 1 male, 1 undetermined. NMV J48225; J48226; J48227; J48228; AM P61028.

*Diagnosis. Adult female and subadult male.* Carapace smooth and unornamented. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth and without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal simple. Body length 2.3 mm. *Adult male.* Unknown

*Distribution.* NSW, Bass Strait, WA; 8–122 m.

*Remarks.* The drawings and description in Zimmer (1914) are nearly useless, both *G. hartmeyer* and *G. similis* being described and illustrated almost identically. Redescription of the species is necessary. Hale (1951: 359) stated “the distal half of the telson is subtriangular as seen from above, not rounded as in the related *similis*.”

***Gynodiastylis insolitaseta* sp. nov.**

Figures 172–177

*Material examined.* Holotype. Australia. WA, Northwest Shelf, between Port Hedland and Dampier (19°37'S, 118°53'E), 30 m, coarse shell, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, *Soela*, RV, 3 Jun 1983 (stn NWA 14), NMV J48051 (ovigerous female).

Paratypes. Australia. WA, Northwest Shelf, between Port Hedland and Dampier (19°37'S, 118°53'E), 30 m, coarse shell, WHOI epibenthic sled, G.C.B. Poore and H.M. Lew Ton, RV *Soela*, 3 Jun 1983 (stn NWA 14), NMV J48053 (1 ovigerous female dissected). Locality? AM P55790 (1 subadult female dissected); P55790 (1 adult male dissected); P45827 (2 ovigerous females, 10 subadult females, 5 adult males).

Other material. Australia. Tas., Bass Strait, WA, NSW, 19–38°S, 118–151°E: 6 ovigerous females, 41 subadult females, 5 adult males, 12 subadult male, 8 undetermined. NMV numerous registrations; AM P45827; P55790; P61030; P61031.

*Diagnosis. Adult female and subadult male.* Carapace smooth and unornamented. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins lined with fine hairlike setae, and without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate,

equal in length to exopod. Uropod terminal setae complex, produced as many individual strands terminally. Body length 6.6 mm. *Adult male.* As in female, except telson without lateral hairlike setae. Exopods present on maxilliped 3–pereopod 4. Uropod endopod slightly shorter than exopod. Body length 3.0 mm.

*Etymology.* From Latin, *insolita* meaning unusual, odd or queer, in combination with *setus* referring to the terminal setae on the uropods.

*Distribution.* NSW to WA; 27–70 m.

*Remarks.* The terminal setae on the uropods are very complex. *Gynodiastylis pygmaeoinsolitaseta* is very similar to *G. insolitaseta* in overall appearance. However, the species can be distinguished on the basis of the different uropod terminal setae and overall body length as *G. insolitaseta* is much larger than *G. pygmaeoinsolitaseta*, despite the vast difference in size between the ovigerous female and adult male *G. insolitaseta*.

***Gynodiastylis jazdzewskii* Blazewicz and Heard**

Figure 178

*Gynodiastylis jazdzewskii* Blazewicz and Heard, 1999: 362–367, figs 1–2.

*Type material.* Holotype. Antarctica. Ross Sea, 76°01.5'–01.0'S, 179°49.9'–52.3'E, 388–399 m, Feb 1972, USNM 243765 (adult male, damaged, not seen).

*Diagnosis. Adult female and subadult male.* Unknown. *Adult male.* Carapace with many small, irregular, wavy ridges and scattered tubercles. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Exopods present on maxilliped 3–pereopod 4. Telson shorter than uropod peduncles, lateral margins serrate and with 1 pair slender lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, equal to exopod. Uropod terminal setae simple. Body length 3.2 mm.

*Distribution.* Ross Sea, Antarctica; 388–399 m.

*Remarks.* This species is the first record of the Gynodiastylidae in Antarctica. The specimen is damaged, but clearly belongs in the *Axiogynodiastylis*-*Gynodiastylis* group; final determination of the appropriate genus depends upon collection of the female of the species.

*Gynodiastylis koataata* sp. nov.

Figures 179–181

*Material examined.* Holotype. New Zealand. Karamea Bight, 40°55.19'S, 171°37.30'E, 154 m, 9 Feb 1983, (stn S397 E), NIWA H-805 (adult male).

*Diagnosis. Adult female and subadult male.* Unknown. *Adult male.* Carapace smooth, unornamented, antennal notch deep. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus with bumps or teeth on margin, terminal setae dentate. Exopods present on maxilliped 3–pereopod 4. Telson equal in length to uropod peduncles, lateral margins smooth, with 1 pair stout terminal setae. Uropod exopod lateral margin lined with fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod endopod terminal seta finely microserate with single subterminal setule, exopod terminal setae microserate with long setules and single very long subterminal setule. Body length 2.4 mm.

*Etymology.* From the Maori, *koataata* meaning translucent, in reference to the translucent or transparent nature of the holotype.

*Distribution.* New Zealand; 154 m.

*Remarks.* The most similar species in New Zealand is *Axiogynodiastylis kopua*, which can be distinguished from *G. koataata* by the uniaarticulate uropod endopod.

*Gynodiastylis lata* Hale

Figure 182A–H

*Gynodiastylis lata* Hale, 1946: 366–369, figs 5–6. —Hale, 1951: 359.

*Material examined.* Holotype. Australia. Qld, Moreton Bay, Myora Bight, surface, SAM C2638 (ovigerous female).

Paratype. Australia. Qld, Moreton Bay, Myora Bight, surface, SAM C2639 (adult male).

Other material. Australia. Tas., Bass Strait, WA, NSW, 29–39°S, 114–151°E: 2 ovigerous females, 5 subadult females, 3 subadult males. NMV J48242; J48243; J40666; AM P22650; P46795; P52870.

*Diagnosis. Adult female and subadult male.* Carapace subtriangular in dorsal view, with many complete and incomplete lateral ridges, weak lateral sulcus. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth

and without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, shorter than exopod. Uropod terminal setae simple. Body length 2.2 mm. *Adult male.* As in female, except carapace subrectangular in dorsal view. Eyelobe with 3 lenses. Exopods on maxilliped 3–pereopod 4. Body length 2.0 mm.

*Distribution.* Qld to WA; 120–1119 m.

*Remarks.* This species is most similar to *Gynodiastylis bicristata* and *G. costata*. *Gynodiastylis bicristata* has a pair of large, sharp dorsal ridges bounding the dorsal depression; *G. lata* has no such dorsal ridges. In *G. costata* the uropod rami are subequal in length, while in *G. lata* the uropod endopod is much longer than the exopod.

*Gynodiastylis lineata* Day

Figure 183

*Gynodiastylis lineata* Day, 1980: 210–213, fig. 7.

*Type material.* Holotype. South Africa. N of Durban, off Tongaat, 29°34'S 31°17'E, 54 m, South African Museum A15727 (ovigerous female, not seen).

*Diagnosis. Adult female and subadult male.* Carapace with many complete and incomplete lateral ridges. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 with fine hairlike setae on margins of merus and carpus. Pereopods 3–5 with fine hairlike setae covering several articles; dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth and without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, longer than exopod. Uropod terminal setae simple. Body length 2.4–3.4 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Uropod endopod biarticulate. Body length 2.6–2.9 mm.

*Distribution.* South Africa; 50–103 m.

*Remarks.* The carapace of this species is most similar to *Axiogynodiastylis rochfordi*. However, in *A. rochfordi* the uropod endopod is triarticulate in both sexes, while in *Gynodiastylis lineata* the uropod endopod is uniaarticulate in the female and biarticulate in the male. However, it must be noted that the common pattern in the Gynodiastylidae is for the male to have fewer articles in the uropod endopod than the female. It is possible that this species exhibits the reverse pattern, with fewer articles in the female uropod exopod, or that the figures are mislabeled.

*Gynodiastylis megasiphon* sp. nov.

Figures 184–187

*Material examined.* Holotype. Australia. Vic., central Bass Strait, 57 km S of Rodondo I. (39°43.5'S, 146°18.8'E), 80 m, muddy shell, R.S. Wilson, RV *Tangaroa*, 13 Nov 1981 (stn BSS 159), NMV J48098 (ovigerous female).

Paratypes. Australia. Vic., central Bass Strait, 57 km S of Rodondo I. (39°43.5'S, 146°18.8'E), 80 m, muddy shell, R.S. Wilson, RV *Tangaroa*, 13 Nov 1981 (stn BSS 159), NMV J48101 (2 ovigerous females); Tas., eastern Bass Strait, 100 km NE of North Point, Flinders I., (38°52.6'S, 148°25.2'E), 140 m, fine sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 15 Nov 1981 (stn BSS 170 S), NMV J48288 (1 adult male dissected); J48266 (1 ovigerous female dissected).

Other material. Australia. Tas., Bass Strait, Vic., NSW, 34–40°S, 146–151°E: 2 ovigerous females, 3 subadult females, 8 undetermined. NMV J48099; J48100; J48102; J48103; J48104; J48105; J48106; J48267; AM P55768; P55778.

*Diagnosis. Adult female and subadult male.* Carapace with entire ventrolateral ridge, with pair of dorsal ridges, anterodorsal swelling. Eyelobe with 3 lenses. Siphon as long or longer than carapace. Pereopod 1 propodus more than half carpus length. Pereopod 2 with fine hairlike setae covering merus-propodus. Pereopods 3–5 dactylus and terminal seta unmodified. Pereopod 4 produced as distinct, large lobes on basis, ischium and merus. Telson equal in length to uropod peduncles, lateral margins serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, equal to exopod. Uropod terminal setae with single subterminal setule. Body length 3.7 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Uropod endopod biarticulate. Body length 3.6 mm.

*Etymology.* *Megasiphon* in reference to the extremely long siphon.

*Distribution.* NSW, Bass Strait; 45–188 m.

*Remarks.* This species is similar to *Gynodiastylis robusta*. However, it can be distinguished by the following characteristics: the siphon is extremely long, the carapace has a different ridge pattern, the carpus and propodus of pereopod 1 are elongate, pereopod 2 is as long as the carapace, and pereonites 3 and 4 are free. In comparison, in *G. robusta*, the siphon is shorter than the carapace, the carapace has a boxy shape, pereopod 1 is less elongate, pereopod 2 is shorter than the carapace, and pereonites 3 and 4 are fused.

*Gynodiastylis milleri* Jones

Figure 188

*Gynodiastylis milleri* Jones, 1963: 75–76, figs 343–350.

*Type material.* Holotype. New Zealand, Auckland, Devonport Wharf, 3 fm, New Zealand Oceanographic Institute (now NIWA) No. 10 (female, not seen).

Other material. Australia. Flinders I., "The Hotspot" reef, 5 n miles W of N end of Flinders I. (33°40.50'S, 134°22.00'E), 17 m, tufted red algae on flat rock face, SCUBA, G.C.B. Poore, FV *Limnos*, 19 Apr 1985 (stn SA 63), NMV J48246 (1). Giles Point, by boat ramp (35°3'S, 13746'E), 1 m, tufted algae on limestone reef, G.C.B. Poore and H.M. Lew Ton, 19 Mar 1985 (stn SA 38), NMV J48247 (3).

*Diagnosis. Adult female and subadult male.* Carapace with few incomplete lateral ridges on the anterior half of the carapace. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins serrate and with 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae simple. Body length 4.0 mm. *Adult male.* Unknown.

*Distribution.* SA, New Zealand; 1–17 m.

*Remarks.* In Jones (1963) the figure labelled pereopod 3 is clearly a maxilliped 3 rather than pereopod 3. This species can be distinguished from *Gynodiastylis carinata* by the lesser number of ridges.

*Gynodiastylis multicarinata* sp. nov.

Figures 189–190

*Material examined.* Holotype. Australia. Tas., eastern Bass Strait, 30 km N of North Point, Flinders I., (39°26.3'S, 147°48.7'E), 49 m, medium sand, WHOI epibenthic sled, R.S. Wilson, RV *Tangaroa*, 17 Nov 1981 (stn BSS 173 S), NMV J48006 (1 ovigerous female).

*Diagnosis. Adult female and subadult male.* Carapace with many complete and incomplete lateral ridges. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 with fine hairlike setae on merus and carpus. Pereopods 3–5 with fine hairlike setae covering several articles; dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth and without terminal setae. Uropod rami with fine hairlike setae or bristles. Uropod endopod biarticulate, longer than

exopod. Uropod terminal setae with single subterminal setule. Body length 2.3 mm. *Adult male*. Unknown.

*Etymology*. From Latin, *carinatus* meaning ridge and *multi* referring to the plethora of horizontal ridges present on the carapace.

*Distribution*. Bass Strait; 49 m.

*Remarks*. This species is similar to *Gynodiastylis lata* and *G. bicristata*. In *G. bicristata*, a pair of large sharp dorsal ridges are present; no such ridges are present in *G. multicarinata*. In *G. lata*, a lateral sulcus is present in the carapace; no such sulcus is present in *G. multicarinata*.

### *Gynodiastylis nitida* Harada

Figure 191

*Gynodiastylis nitida* Harada, 1962: 295–297, fig. 1.—Gamô, 1963: 88.—Gamô, 1968: 186.

*Gynodiastylis nitidus*.—Day, 1980: 202.

*Type material*. Holotype. Japan, off Sirahama and Shimoda, Gunchuko, 10–30 m, deposition unknown (not seen).

*Diagnosis*. *Adult female and subadult male*. Carapace smooth and unornamented. Eyelobe with 6 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson equal in length to uropod peduncles, lateral margins smooth and with 1 pair tiny terminal setae. Uropod rami without fine hairlike setae. Uropod endopod unarticulate, equal in length to exopod. Uropod terminal setae with a single long subterminal setule. Body length 4.4 mm. *Adult male*. Unknown.

*Distribution*. Japan; 10–30 m.

*Remarks*. In Japanese waters, the most similar species is *Gynodiastylis rotundicaudata*. However, *G. nitida* has a pointed rather than round telson, and does not have a membranous lamellae on the medial margin of the carpus of pereopod 1.

### *Gynodiastylis nordaustriana* Băcescu

Figure 192

*Gynodiastylis nordaustriana* Băcescu, 1991: 9–13, fig. 2

*Type material*. Holotype. Australia. WA, North-west Shelf, 19°04'S, 118°51'E, 81 m, "Grigore Antipa" Museum, Bucharest (damaged female, not seen).

*Diagnosis*. *Adult female and subadult male*. Carapace with many lateral ridges posterior of a ridge sweeping dorsally from the anterolateral corner.

Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 with fine hairlike setae on margins. Pereopods 3–5 with fine hairlike setae covering several articles, basis with many stout teeth, dactylus and terminal seta unmodified. Telson longer than uropod peduncles, lateral margins serrate and with 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae microserrate with single long subterminal setule. Body length 4.3–4.5 mm. *Adult male*. Unknown.

*Distribution*. North-western Australia; 81 m.

*Remarks*. There is no lateral view, nor any indication of antennae on Băcescu's (1991) illustrations. He noted the two specimens were very damaged. Also, figure 2F is apparently pereopod 4, as stated in the legend, not maxilliped 3 as stated in the text. This species is similar to *Axiogynodiastylis rochfordi* and *Gynodiastylis multicarinata* in the possession of multiple lateral ridges on the carapace. Neither *A. rochfordi* nor *G. multicarinata* have a ridge sweeping anteriorly from the anteroventral corner of the carapace, while *G. nordaustriana* does have such a ridge.

### *Gynodiastylis platycarpus* Gamô

Figure 193

*Gynodiastylis platycarpus* Gamô, 1961: 105–108, figs 1–2.—Harada, 1962: 297–299, figs 2–3.—Gamô, 1963: 88.—Gamô, 1968: 186.—Day 1980: 202.

*Type material*. Holotype. Japan, Sagami Bay, off Manazuru, 20–30 m, deposition unknown (not seen).

*Diagnosis*. *Adult female and subadult male*. Carapace with 1 short ridge on pseudorostral lobe (not on pseudorostrum proper), with dorsal dark spots. Eyelobe with 2 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus terminal seta dentate. Telson shorter than uropod peduncles, lateral margins serrate, with 1 pair lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, equal to exopod. Uropod terminal setae simple. Body length 3.7–3.9 mm. *Adult male*. As in female, except carapace without dark spots, with exopods on maxilliped 3–pereopod 3. Body length 2.2 mm.

*Distribution*. Japan; 20–30 m.

*Remarks*. According to Gamô (1961), even in living animals, the dark spots on the carapace that are evident in the female are not found on the

male. The most similar species is *Gynodiastylis hartmeyeri*, which can be distinguished by the telson more than half the length of the uropod peduncle, while in *G. platycarpus* the telson is less than half the length of the uropod peduncle.

### *Gynodiastylis polita* Hale

Figure 194

*Gynodiastylis polita* Hale, 1946: 384–387, figs 19–20.

*Material examined.* Holotype. Australia. NSW, off Eden, 60 m, SAM C2712 (ovigerous female).

Other material. Australia. Tas., Bass Strait, Vic., 37–42°S, 148–149°E: 50 females, 11 males. NMV J48219; J48220; J48221; J48222; J48223; J48224.

*Diagnosis. Adult female and subadult male.* Carapace with indistinct incomplete midlateral ridge on anterior portion of carapace. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 without fine hairlike setae, dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, with 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae with single long subterminal setule. Body length 2.9 mm. *Adult male.* Unknown.

*Distribution.* NSW, Bass Strait; 43–1264 m.

*Remarks.* This species resembles *G. hartmeyeri*. However, *G. polita* is larger, and the telson is armed.

### *Gynodiastylis profunda* Day

Figure 195

*Gynodiastylis profundus* Day, 1980: 208–210, fig. 6.

*Type material.* Holotype. South Africa. Mozambique Channel, 27°59'S, 32°40'E, 550 m, South African Museum A15726 (ovigerous female, not seen).

*Diagnosis. Adult female and subadult male.* Carapace smooth, unornamented except for pair of dorsal carinae on pseudorostrum. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length, carpus with median hyaline fringe. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod uniaarticulate, longer than exopod. Uropod terminal setae microseminate distally with long setules, with a single very long subterminal setule. Body

length 3.5–4.2 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Body length 3.7–4.6 mm.

*Distribution.* South Africa; 51–680 m.

*Remarks.* This species is similar to *Gynodiastylis carinirostris*. However, in *G. profunda* the uropod endopod is uniaarticulate, while in *G. carinirostris*, the uropod endopod is triarticulate.

### *Gynodiastylis pygmaeoinstitutasetta* sp. nov.

Figures 196–198

*Material examined.* Holotype. Australia. WA, North Lumps, 2 km off Mullaloo (31°47.30'S, 115°42.80'E), 6 m, red algal turf on top of reef, SCUBA, G.C.B. Poore and H.M. Lew Ton, 2 May 1986 (stn SWA 107), NMV J48066 (ovigerous female).

Paratypes. Australia. Vic., Tasman Sea, eastern slope, 50 km S of Mallacoota (38°06.2'S, 149°45.5'E), 188 m, WHOI epibenthic sled, R.S. Wilson, RV *Soela*, 14 Oct 1984 (stn S05/84 30), NMV J48059 (22 ovigerous females); Tas., central Bass Strait, 25 km SW of Cape Frankland, Flinders I. (40°09.4'S, 147°32.6'E), 51 m, shelly sand, R.S. Wilson, RV *Tangaroa*, 14 Nov 1981 (stn BSS 162), NMV J48058 (11 adult male); Port Phillip Bay, northern section (37°53.0'S, 144°51.5'E), 8 m, sand, Smith-McIntyre grab, G.C.B. Poore and S.F. Rainer et al., FV *Melita*, 7 Jun 1971 (stn PPBES 901), NMV J48063 (1 ovigerous female dissected); J48064 (1 adult male dissected).

Other material. Australia. Bass Strait, Vic., SA, NSW, 33–39°S, 134–150°E: 1 subadult male, 1 subadult female, 21 undetermined. NMV numerous registrations; AM.

*Diagnosis. Adult female and subadult male.* Carapace smooth and unornamented. Eyelobe with 2 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins thickly lined with fine hairlike setae, and with 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae complex, microseminate distally with long setules, tip expanded into disk covered with bristles, with single very long subterminal setule. Body length 2.0–2.4 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Telson without fine hairlike setae on lateral margin. Body length 2.8 mm.

*Etymology.* From Latin, *pygmaeus* meaning dwarf, *insolitus* meaning unusual or odd, and *setus* in reference to the uropod terminal setae.

*Distribution.* NSW to WA; 2–188 m.

*Remarks.* This species is similar to all the small species of *Gynodiastylis* with smooth, unornamented carapaces. However, the uropod terminal setae of *G. pygmaeinsolitaseta* are unique within the genus.

***Gynodiastylis robusta* Hale**

Figures 199–203

*Gynodiastylis robusta* Hale, 1946: 369–371, figs 7–8.

*Material examined.* Holotype. Australia. Tas., off Babel I., 0–50 m, SAM C2724 (ovigerous female).

Other material. Australia. Tas., Bass Strait, NSW, Indonesia, Gag I., 34–42°S, 144–151°E: 13 ovigerous females, 51 subadult females, 7 adult males, 23 subadult males, 1 manca 1, 10 undetermined. NMV numerous registrations; AM numerous registrations.

*Diagnosis. Adult female and subadult male.* Carapace with single ventral ridge running entire length of carapace, with paired ridges on frontal lobe, with deep lateral sulcus. Siphon short. Pereonites 3–4 fused. Eyelobe with 3 lenses. Pereopod 1 propodus more than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins serrate, with 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, equal to exopod. Uropod terminal setae with single subterminal setule. Body length 4.4 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Uropod endopod biarticulate. Body length 3.2 mm.

*Distribution.* NSW, Tas., Bass Strait; 50–1424 m.

*Remarks.* This species is remarkable for the relatively long propodus on pereopod 1, the boxy (stout) carapace shape, and the fusion of pereonites 3 and 4 (unique within the family). The most similar species is *Gynodiastylis megasiphon*. However, the siphon of *G. megasiphon* is longer than the carapace, while the siphon of *G. robusta* is much shorter than the carapace.

***Gynodiastylis rotundicaudata* Gamô**

Figure 204

*Gynodiastylis rotundicaudatus* Gamô, 1961: 106–109, figs 3–4.—Gamô, 1963: 88.—Day, 1980: 202.

*Gynodiastylis rotundicaudata* Gamô, 1968: 186.

*Type material.* Japan, Sagami Bay, off Manazuru, deposition unknown (not seen).

*Diagnosis. Adult female and subadult male.* Carapace smooth, without ornamentation. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length, carpus with medial hyaline fringe. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson equal in length to uropod peduncles, lateral margins smooth and lined with fine hairlike setae, with 1 pair tiny terminal setae. Uropod peduncle and endopod medial margins lined with fine hairlike setae. Uropod endopod uniarticulate, longer than exopod. Uropod terminal setae with a single subterminal setule. Body length 4.4 mm. *Adult male.* Unknown.

*Distribution.* Japan.

*Remarks.* In the original description by Gamô (1961), the figure legends are incorrect. The figure labelled as Figure 2 is clearly the full body drawing of the holotype of *Gynodiastylis rotundicaudata*, rather than *G. platycarpus* appendages, as the figure legend states; consequently, the figure labelled Figure 3 should be Figure 2. This species is based on a single specimen, collected by Gamô, and the deposition of the holotype is unknown; no other specimens have been collected. The most similar species are *G. hartmeyeri*, *G. similis*, *G. carinirostris*, and *G. platycarpus*. However, *G. hartmeyeri*, *G. similis*, and *G. carinirostris* have endopods with 2 or 3 articles, and *G. platycarpus* has a telson much shorter than the uropod peduncles, with a distinct stout pair of terminal setae. In comparison, *G. rotundicaudata* has an uniarticulate uropod endopod and the telson is equal in length to the uropod peduncles and bears a pair of tiny terminal setae.

***Gynodiastylis rugosa* sp. nov.**

Figures 205–206

*Material examined.* Holotype. Australia. WA, ESE of Penguin I., Warnbro Sound, 32°18.5'S, 115°41.6'E, 7 Nov 90, 3 m, AM P41250 (ovigerous female).

*Diagnosis. Adult female and subadult male.* Carapace with many incomplete wavy ridges, giving the carapace a rough appearance, with a lateral depression in the anterior half of the carapace, and dorsal carinae on the pseudorostrum. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 with fine hairlike setae on distal articles. Pereopods 3–5 dactylus with teeth or bumps on the medial margin, terminal seta unmodified. Telson slightly shorter than uropod peduncles, lateral margins weakly



serrate, bearing 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod rami margins lined with fine hairlike setae. Uropod endopod triarticulate, much longer than exopod. Uropod terminal setae terminally dentate with a single long plumose terminal setule. Body length 9.0 mm. *Adult male*. Unknown.

*Etymology*. From Latin, *rugosa*, meaning wrinkled or shriveled, in reference to the rugose carapace.

*Distribution*. WA; 3 m.

*Remarks*. Only the holotype was observed. However, this species is distinctive in both size and carapace morphology. The only other species that achieves a similar size is *Gynodiastylis ampla*. *Gynodiastylis rugosa* can be differentiated from *G. ampla* easily; in *G. ampla*, the rami of the uropods are equal in length, while in *G. rugosa* the uropod endopod is much longer than the exopod.

#### *Gynodiastylis sierra* sp. nov.

Figures 207–208

*Material examined*. Holotype. Australia. Tas., western Bass Strait, 59 km WNW of Cape Farewell, King I. (39°28'S, 143°17'E), 103 m, coarse sand, Smith-McIntyre grab, G.C.B. Poore, HMAS *Kimbla*, 10 Oct 1980 (stn BSS 81), NMV J45311 (ovigerous female).

*Diagnosis. Adult female and subadult male*. Carapace with paired dorsal ridges of spines, with a solitary medial dorsal ridge of spines on the frontal lobe. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 with fine hairlike setae. Pereopods 3–5 with fine hairlike setae covering several articles; dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, with 1 pair tiny terminal setae. Uropod endopod article 1 with fine hairlike setae. Uropod endopod biarticulate, equal to exopod. Uropod terminal setae finely microserrate with a single subterminal setule. Body length 2.8 mm. *Adult male*. Unknown.

*Etymology*. From Latin, *sierra* meaning with a jagged skyline.

*Distribution*. Bass Strait; 103 m.

*Remarks*. The architecture of the carapace is very unusual, with 3 ridges of spines dorsally on the frontal lobe. Unfortunately, only the holotype is known, despite thorough searching of the collections of Museum Victoria.

#### *Gynodiastylis similis* Zimmer

Figure 209

*Gynodiastylis similis* Zimmer, 1914: 189, figs 15–16.—Hale, 1936: 418–419, fig. 9.—Zimmer, 1941: 66, fig. 101.

*Type material*. Holotype. Australia. WA, Shark Bay, NW of Middle Bluff, 7–8 fm, ZMB (female, not seen).

*Material examined*. Australia. Vic., Bass Strait, WA, 29–42°S, 114–150°E: 7 ovigerous females, 11 subadult females, 3 adult males, 9 subadult males. NMV J40664; J20707; J22172; J45288; J40665; J40663; AM P55749.

*Diagnosis. Adult female and subadult male*. Carapace smooth and unornamented. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod rami covered with fine hairlike setae. Uropod endopod biarticulate, equal to exopod. Uropod terminal setae simple. Body length 2.0–2.2 mm. *Adult male*. As in female, except with exopods on maxilliped 3–pereopod 4. Uropod endopod uniarticulate. Body length 1.8–2.0 mm.

*Distribution*. Bass Strait, WA; 3–400 m.

*Remarks*. The drawings of this species in the original description by Zimmer (1914) are very simplified and weakly detailed. This species is most similar to *Gynodiastylis hartmeyeri*, but can be distinguished by the biarticulate uropod endopod in the female and uniarticulate endopod in the male, as the uropod endopod is triarticulate in *G. hartmeyeri*.

#### *Gynodiastylis strumosa* Hale

Figure 210

*Gynodiastylis strumosa* Hale, 1946: 407–409, figs 35–36.

*Material examined*. Holotype. Australia. Tas., off Babel I., 39°55'S, 148°31'E, 0–50 m, SAM C2726 (ovigerous female).

Other material. Australia. Tas., Bass Strait, Vic., WA, NSW, 19–40°S, 118–151°E: 22 ovigerous females, 14 subadult females. NMV J40661; J40662; J39672; J22139; J39669; J45646; J45275; J22086; J39686; J20670; AM P56230; P42013; P61050.

*Diagnosis. Adult female and subadult male*. Carapace with weak ridges and tumidities, with a lateral sulcus. Eyelobe without lenses. Pereopod 1 broken. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta

unmodified. Telson shorter than uropod peduncles, lateral margins serrate, with 1 pair stout lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae simple. Body length 4.1 mm. *Adult male*. Unknown.

*Distribution*. NSW to WA; 22–200 m.

*Remarks*. Hale's specimen and all the specimens observed in this study have pereopod 1 broken, therefore it is not entirely certain that this species is in fact a *Gynodiastylis*.

#### *Gynodiastylis subtilis* Hale

Figure 211

*Gynodiastylis subtilis* Hale, 1946: 379–381, figs 14–15.

*Material examined*. Holotype. Australia. NSW, Ulladulla, 75 m, SAM C2671 (subadult female).

Other material. Australia. Tas., Bass Strait, WA, NSW, 19–40°S, 115–151°E: 9 ovigerous females, 7 subadult females, 2 subadult males, 1 adult male. NMV J45271; J39665; J45268; J45263; J39664; J20665; J20659; AM P55807; P55796.

*Diagnosis. Adult female and subadult male*. Carapace smooth and shiny, with a single partial anteroventral ridge, extending 0.3 the carapace length. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson slightly shorter than uropod peduncles, lateral margins serrate, with 1 or 2 pairs stout lateral setae and 1 pair stout terminal setae. Uropod rami without fine hairlike setae. Uropod endopod triarticulate, longer than exopod. Uropod terminal setae with single subterminal setule. Body length 4.4 mm. *Adult male*. Unknown.

*Distribution*. NSW to WA; 30–82 m.

*Remarks*. This species is superficially similar to *Gynodiastylis polita*. However, in *G. polita* the telson is much shorter than the uropod peduncles and the lateral margins are smooth, while in *G. subtilis* the telson is only slightly shorter than the uropod peduncles, and the lateral margins are strongly serrate.

#### *Gynodiastylis sulcata* Day

Figure 212

*Gynodiastylis sulcatus* Day, 1980: 203–205, figs 3–4.

*Type material*. Holotype. South Africa, near Durban, off Hibberdene, 30°37' S 30°40' E, 74 m, South African Museum A15724 (ovigerous female, not seen).

*Diagnosis. Adult female and subadult male*. Carapace concave middorsally between pair of large sharp dorsolateral ridges, with 3 short lateral ridges posteriorly and 1 ventrolateral ridge extending the length of the carapace. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, without terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae simple. Body length 2.7 mm. *Adult male*. As in female, except with exopods on maxilliped 3–pereopod 4. Body length 2.7 mm.

*Distribution*. South Africa; 60–86 m.

*Remarks*. This species is most similar to *Gynodiastylis bicristata*. However, the uropod exopod articles are of equal length in *G. sulcata*, while in *G. bicristata* uropod exopod article 1 is much shorter than article 2. Day (1980) claimed the presence of short lateral ridges posteriorly on the carapace of *G. sulcata* also differentiates the species. However, weak short posterior lateral ridges are present on the type material of *G. bicristata* in the Copenhagen Museum, although the ridges are very difficult to visualize as the specimens are entirely decalcified and transparent.

#### *Gynodiastylis truncatifrons* Hale

Figures 213–214

*Gynodiastylis truncatifrons* Hale, 1928: 43–45, figs 13–14.—Hale, 1937: 65.—Hale, 1946: 383–384, fig. 18.

*Material examined*. Holotype. Australia. SA, Gulf St Vincent, off Semaphore, 5 fm, SAM C1754 (female).

Other material. Australia. Tas., Bass Strait, WA, NSW, 18–42°S, 118–151°E: 17 ovigerous females, 7 subadult females, 9 subadult males. NMV J39232; J22080; J45322; J22085; J39252; J20669; J20663; J20661; J45257; J22109; J22111; AM P56210; P56208.

*Diagnosis. Adult female and subadult male*. Carapace with distinct anterior medial-lateral ridge running less than half carapace length, sweeping dorsally to meet distal corner of pseudorostral lobe, anterior half of ventral margin strongly serrate. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson equal in length to uropod peduncles, lateral margins smooth, with 1 pair stout lateral setae and 1 pair stout terminal

setae. Uropod rami margins lined with fine hair-like setae. Uropod endopod biarticulate, longer than exopod. Uropod terminal setae microserrate. Body length 3.7–7.2 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Body length 3.2–5.0 mm.

*Distribution.* NSW to WA; 30–130 m.

*Remarks.* This species is distinctive, with a smooth shiny carapace with single ridge beginning ventrally at the anterolateral corner and sweeping posteriorly and dorsally to meet the distal corner of the pseudorostral lobe suture. In some cases, the anterior margin of the carapace is lined with long stout setae as well. However, these setae are not always present.

### *Gynodiastylis tubicola* Harada

Figure 215

*Gynodiastylis tubicola* Harada, 1962: 299–303, figs 4–6.—Gamô, 1963: 88.—Gamô, 1968: 187.

*Gynodiastylis tubicolus* Day, 1980: 202.

*Type material.* Japan, Sagami Bay, off Shirahama, 30 m, deposition unknown (not seen).

*Diagnosis. Adult female and subadult male.* Carapace with many partial and complete lateral ridges, with a distinct lateral sulcus, pseudorostrum with pair of dorsal carinae. Eyelobe with 3 lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus and terminal seta unmodified. Telson shorter than uropod peduncles, lateral margins smooth, with 1 pair lateral setae, lined with fine hairlike setae, and 1 pair small terminal setae. Uropod rami without fine hairlike setae. Uropod endopod biarticulate, equal to exopod. Uropod terminal setae with single subterminal setule. Body length 3.7 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Body length 2.7 mm.

*Distribution.* Japan; 30 m.

*Remarks.* This is the first species of cumacean reported to construct tubes (Harada, 1962).

### *Gynodiastylis tubifurex* sp. nov.

Figures 216–221

*Material examined.* Holotype. Australia. Cobblers (Bate Bay), NSW, Australia. 151°10'E, 34°07'S, 50 m, 3 Jan 91 (stn T4–324 S2 R1), AM P55794 (ovigerous female).

Paratypes. Australia. NSW, Cobblers (Bate Bay), 151°10'E, 34°07'S, 50 m, 3 Jan 91, AM P55814 (1 adult male); P55803 (1 ovigerous female, 1 adult male);

P55800 (1 subadult female); P55792 (1 ovigerous female dissected); P55806 (1 adult male dissected); Cobblers (Bate Bay), 151°10'E, 34°07'S, 50 m, 29 Oct 90, P55753 (1 ovigerous female); NSW, E of Providential Head, Wattamolla, 151°08.5'E, 34°08'S, 50 m, 11 Jan 90, P56096 (1 ovigerous female).

*Other material.* Australia. Bass Strait, NSW, 34–37°S, 148–151°E: 7 ovigerous females, 23 subadult females, 8 adult males, 2 subadult males. NMV J48094; J39687; AM numerous registrations.

*Diagnosis. Adult female and subadult male.* Carapace smooth, shiny, unornamented. Eyelobe without lenses. Pereopod 1 propodus less than half carpus length. Pereopod 2 without fine hairlike setae. Pereopods 3–5 dactylus medial margin with teeth or bumps, and terminal seta dentate. Telson shorter than uropod peduncles, lateral margins smooth, with 1 pair stout terminal setae. Uropod exopod with fine hairlike setae. Uropod endopod biarticulate, much longer than exopod. Uropod terminal setae microserrate distally, with single subterminal setule, tip of seta bent laterally 90 degrees. Body length 6.3 mm. *Adult male.* As in female, except with exopods on maxilliped 3–pereopod 4. Body length 4.2 mm.

*Etymology.* From Latin, *tubus* meaning tube, and *facturex* meaning builder or creator.

*Distribution.* NSW, Bass Strait; 1–70 m.

*Remarks.* In the adult males, there are grooves in the underside of the pseudorostral lobes and inside the carapace in which both pairs of antennae are hidden. The first antennae are much shorter than the pseudorostral lobes in both sexes, and are generally not visible externally. This is the only species in which the first antennae are not visible externally.

### *Haliana* Day

*Haliana* Day, 1980: 215–218.

*Type species.* *Haliana eckloniae* Day, 1980.

*Diagnosis. Female and subadult male.* Pseudorostral lobes horizontal. Eye lobe with lenses. First antenna small to moderate. Pereopod 1 with distinct brush of long setae on propodus. Female entirely without exopods. Uropod endopod of 2 articles. Telson shorter than pleonite 6, with pair of terminal setae. *Adult male.* Unknown.

*Distribution.* South Africa (34°58'S, 18°21'E), 4 m.

*Species.* *Haliana eckloniae* Day, 1980.

*Remarks.* Day (1980) considered this genus problematic, in the remarkable similarity to *Gynodiastylis* sensu Hale, 1946 (incorporating species both with and without a brush of setae on the propodus of pereopod 1), but felt that she could not dilute the generic definition of *Gynodiastylis* to include a species entirely without exopods in the female. As her material consisted of three females, identical in the lack of exopods, it is clear that the lack of exopods is not due to an aberration of a single individual. With the division of *Gynodiastylis* sensu Hale presented in this paper, *Haliana* can now be regarded as a good genus.

### *Haliana eckloniae* Day

Figure 222

*Haliana eckloniae* Day, 1980: 215–218, fig. 9.

*Type material.* Holotype. South Africa, Cape Peninsula, Oudekraal, 34°58'S 18°21'E, in holdfast of *Ecklonia maxima*, South African Museum A15729 (ovigerous female, not seen).

*Diagnosis.* *Adult females and subadult males.* Carapace with 3 distinct lateral ridges. Pseudo-rostrum with pair of indistinct dorsal carinae. Eyelobe without pigment, with 2 slightly raised areas. Pereopod 1 propodus about half the length of the carpus. Pereopods 2–5 with fine hairlike setae on the margins. Pereopods 3–5 dactylus with hooked terminal seta. Telson much shorter than uropod peduncles, lateral margins smooth, with 1 pair tiny terminal setae. Uropod endopod biarticulate, much longer than exopod. Uropod terminal setae simple. Body length 2.8 mm. *Adult male.* Unknown.

*Distribution.* South Africa; 4 m.

*Remarks.* Day (1980) considered this a good species within a problematic genus (see remarks on the genus).

### Acknowledgements

The author is indebted to Museum Victoria, the South Australian Museum, Australian Museum, Zoological Museum of Copenhagen, and Smithsonian Institution National Museum of Natural History for access to type and non-type collections and generous loans of cumacean material. Also, Museum Victoria, the South Australian Museum, and Australian Museum generously provided both working space and assistance in field collection.

This work was largely funded by a grant from the National Science Foundation PEET (Partnerships for Enhancing Expertise in

Taxonomy) program to Les Watling and Irving Kornfield. The Diane du Plessis Memorial Scholarship helped support the author while writing this monograph. Additionally, the University of Maine at Orono Association of Graduate Students generously provided support on multiple occasions for travel to present portions of this work and for fieldwork.

The holotype specimen of *Gynodiastylis arabica* was collected as part of an environmental study conducted in offshore Abu Dhabi by TEXPLOR for the HSE Department of the Zakum Development Company (ZADCO).

### References

- Băcescu, M., 1991. *Campylaspis wardi* new species and *Gynodiastylis nordaustriana* new species from the littoral waters of Northern Australia. *Travaux du Museum d'Histoire Naturelle "Grigore Antipa"* 31: 317–322.
- Blazewicz, M. and Heard, R. W., 1999. First record of the family Gynodiastylidae Stebbing, 1912 (Crustacea: Malacostraca) from Antarctic waters with the description of *Gynodiastylis jazdzewskii*, a new species. *Proceedings of the Biological Society of Washington* 112 (2): 362–367.
- Calman, W. T., 1904. On the Cumacea collected by Professor Herdman, at Ceylon, in 1902. *Ceylon Pearl Oyster Fisheries, Supplementary Report* 12: 159–180.
- Calman, W. T., 1911. On new or rare Crustacea of the Order Cumacea from the collection of the Copenhagen Museum, Part II. *Transactions of the Zoological Society of London* 18: 341–399.
- Corbera, J., 2000. Systematics and distribution of cumaceans collected during BENTART-95 cruise around South Shetland Islands (Antarctica). *Scientia Marina* 64 (1): 9–28.
- Dallwitz, M. J., Paine, T.A. and Zurcher, E.J., 1999. *User's guide to the DELTA system: a general system for processing taxonomic descriptions*. Fourth Edition. CSIRO Division of Entomology: Canberra. 210 pp.
- Day, J., 1977. South African Cumacea, Part 3: Families Lampropidae and Ceratocumatidae. *Annals of the South African Museum* 76(3): 137–189.
- Day, J., 1980. South African Cumacea, Part 4: Families Gynodiastylidae and Diastylidae. *Annals of the South African Museum* 82 (6): 187–292.
- Gamô, S., 1961. On two new species of cumacean crustacean genus *Gynodiastylis* (Diastylidae). *Zoological Magazine, Tokyo* 70: 105–109.
- Gamô, S., 1962. On the cumacean Crustacea from Tanabe Bay, Kii Peninsula. *Publications of the Seto Marine Biological Laboratory* 10 (2): 153–210.
- Gamô, S., 1963. On the cumacean Crustacea obtained from Amami-Oshima Island, southern Japan. *Science Reports of the Yokohama National University, section 2, Biology and Geology* (10): 29–60.

- Gamô, S., 1968. Studies on the Cumacea (Crustacea, Malacostraca) of Japan, Part III. *Publications of the Seto Marine Biological Laboratory* 16 (3): 147–192.
- Gamô, S., 1986. A new cumacean, *Zimmeriana azumai* sp. nov. (Crustacea) from Japan. *Bulletin of the Biogeographical Society of Japan* 41 (5): 37–43.
- Gerken, S. and Gross, J., 2000. *Gynodiastylis laciniacristatus*, sp. nov. (Crustacea: Cumacea) from Australia. *Proceedings of the Biological Society of Washington* 113 (1) 95–103.
- Hale, H.M., 1928. Australian Cumacea. *Transactions of the Royal Society of South Australia* 52: 31–47.
- Hale, H.M., 1929. *The crustaceans of South Australia. Part 2.* South Australian Government Printer: Adelaide. pp. 202–380.
- Hale, H.M., 1936. Three new Cumacea from South Australia. *Records of the South Australian Museum* 5 (4): 395–438.
- Hale, H.M., 1937. Further notes on the Cumacea of South Australia. *Records of the South Australian Museum* 6 (1): 61–74.
- Hale, H.M., 1946. Australian Cumacea, No. 12, the family Diastylidae (part 2) *Gynodiastylis* and related genera. *Records of the South Australian Museum* 8 (3): 357–444.
- Hale, H.M., 1951. Australian Cumacea, No. 17, the family Diastylidae (cont.). *Records of the South Australian Museum* 9 (4): 355–370.
- Harada, I., 1962. Cumacean fauna of Japan II, family Diastylidae (Part 2), Genus *Gynodiastylis*. *Japanese Journal of Zoology* 13 (3): 293–306.
- Hessler, R.R. and Watling, L., 1999. Les pécararides: un groupe controversé. In: Forest, J. *Traité de zoologie. Anatomie, systématique, biologie . . . Tome 7 Crustacés Fascicule 3A Pécararides. Mémoires de l'Institut Océanographique. Monaco* 19: 1–10.
- Jones, N.S., 1963. The marine fauna of New Zealand: crustaceans of the Order Cumacea. *New Zealand Oceanographic Institute Memoir* 23: 1–81.
- Jones, N.S., 1969. The systematics and distribution of Cumacea from depths exceeding 200 meters. *Galathea Reports* 10: 100–180.
- Norman, A.M., 1869. Shetland final dredging report.- Part II. On the Crustacea, Tunicata, Polyzoa, Echinodermata, Actinia, Hydrozoa, & Porifera. *Report of the British Association for the Advancement of Science (Norwich, 1868)* 38: 247–336.
- Malzahn, E., 1972. Cumaceenfundes aus dem nieder-rheinischen Zechstein. *Geologische Jahrbucher* 90: 441–62.
- Reyss, D., 1975. Deux Cumacés nouveaux de l'Atlantique tropical: *Atlantistylis chauvini* n. g. n. sp. (Diastylidae) et *Pseudodiastylis delamarei* n. sp. (Lampropidae). *Crustaceana* 28 (2): 168–179.
- Sars, G.O., 1869. Undersogelser over Christianaffjordens Dybvands-fauna. *Nyt Magazin for Naturvidenskaberne, Christiania* 16: 305–362.
- Sars, G.O., 1900. *An account of the Crustacea of Norway with short descriptions and figures of all the species. Vol. 3. Cumacea.* Bergen Museum: Bergen. 114 pp.
- Say, T., 1818. An account of the Crustacea of the United States (continued). *Journal of the Academy of Natural Sciences of Philadelphia* 4: 313–319.
- Stebbing, T.R.R., 1893. *A History of Crustacea. Recent Malacostraca.* Kegan Paul, Trench, Trübner and Co.: London. xvii, 466 pp.
- Stebbing, T.R.R., 1912. The Symphoda, Part 6. *Annals of the South African Museum* 10: 129–176.
- Stebbing, T.R.R., 1913. Cumacea. *Das Tierreich* 39: 1–210.
- Watling, L., 1989. A classification system for crustacean setae based on the homology concept. In Felgenhauer, B.E., Watling, L. and Thistle, A.B., *Functional morphology of feeding and grooming in Crustacea. Crustacean Issues* 6: 15–26.
- Zimmer, C., 1913. Die Cumaceen der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition 1901–03* 14 (3): 437–491.
- Zimmer, C., 1914. Cumacea. *Die Fauna Südwest-Australiens* 5: 176–195.
- Zimmer, C., 1941. Cumacea. *Bronns Klassen und Ordnungen des Tierreichs* 5 (1) 4: 1–266.
- Zimmer, C., 1952. Indochinesische Cumaceen. *Mitteilungen aus dem Zoologischen Museum in Berlin* 28: 5–35.