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REVISION OF THE GENERA *DYNAMENELLA*,
ISCHYROMENE, *DYNAMENOPSIS*, AND *CYMODOCELLA*
(CRUSTACEA: ISOPODA), INCLUDING A NEW GENUS
AND FIVE NEW SPECIES OF EUBRANCHIATE
SPHAEROMATIDS FROM QUEENSLAND WATERS

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ABSTRACT

Collections of isopod crustaceans from a wide variety of intertidal marine habitats in Queensland, Australia, contained five new species and a new genus of eubranchiate sphaeromatids. Descriptions are given for the different stages of their growth and some ecological considerations are discussed.

The new genus is *Paradella* and the new species are: *Paradella octaphymata*, new genus, new species; *Dynamenella liochroea*, new species; *D. ptychura*, new species; *D. trachydermata*, new species; and *Ischyromene polytyla*, new species.

Ischyromene Racovitza, *Dynamenella* Hansen, *Cymodocella* Pfeffer, and *Dynamenopsis* Baker are redefined and rediagnosed. The importance of founding species on descriptions of adult males is stressed, but this should be supplemented with descriptions of all other stages of the life cycle if possible. The form of the brood pouch of the ovigerous female and the form of the penes and appendix masculina of the mature male should be included as these characters are relatively consistent at the generic level.

Until recently the marine isopods of Australia were poorly known, but information gained by surveys in the last decade demonstrates that isopods are an important component of the fauna of littoral and shallow sublittoral benthic habitats of the tropical and subtropical regions of Queensland at least. The reasons for the paucity of isopod records are that many ecologists have tended to deal in detail only with the larger elements of the macrofauna (e.g., Endean *et al.*, 1956a, b; Stephenson *et al.*, 1958) and many species of isopods are small and live in cryptic habitats. Also until recently there was a dearth of aids to the identification of isopods.

A wide variety of marine habitats on the coast and offshore islands of Queensland were examined and a large number of isopod species were found. Many new records of distribution and new species have been recorded—Serolidae (Holdich and Harrison, 1980a), Gnathiidae (Holdich and Harrison, 1980b), Cirolanidae (Holdich *et al.*, 1981), and certain Sphaeromatidae (Holdich and Harrison, 1980c, 1981a, b). The Infra-orders Asellota and Valvifera do not seem to be well represented, but the Anthuridea are common in the shallow sublittoral and are currently being studied.

Many genera of Sphaeromatidae are not well defined. This is because workers often put a new species into a genus which is not appropriate for the characters found (e.g., Hurley and Jansen, 1977; Bruce, 1980), and others describe new species and define new genera on subadult specimens or females which belong to already described species based on males (e.g., Menzies and Glynn, 1968; Pires, 1980a). This is particularly so with the eubranchiate sphaeromatids included here.

The only record of an eubranchiate sphaeromatid isopod from Queensland waters is that of *Dynamene curalii* Holdich and Harrison described from coral reefs (Holdich and Harrison, 1980c). However, other species belonging to genera of eubranchiate sphaeromatids have now been collected and identified. In the

current paper, six of these eubranchiates are considered together because they occupy similar habitats and resemble the '*Dynamenella*' form of sphaeromatid. They do in fact, as will be shown, belong to three distinct genera. A detailed discussion of these genera, and two others with which they have been confused, is given below with the hope of clarifying their systematic positions. In future papers the rest of the eubranchiates and the hemibranchiate sphaeromatids collected from Queensland will be examined.

METHODS

A wide variety of littoral habitats were examined on the mainland coast of Queensland, on two continental islands offshore (Magnetic Is. and Lizard Is.), and on a coral cay (Heron Is.). Detailed examination was made of beach rock; rock crevices; under stones on sand; in sand and mud; amongst algae, barnacles, rock oysters, mangrove roots, coral, sponges, bryozoan and ascidian colonies, serpulid tubes, and wood jetsam. When isopods were not obvious in the field, part of the substratum was collected and examined under a dissecting microscope, whilst being gently fragmented in 2% formalin to agitate the infauna.

Isopods from sublittoral collections made by the James Cook University Three Bays Survey, and collections from the museums listed below, were also examined for '*Dynamenella*-like' sphaeromatids. In addition, collections from Hinchinbrook Is., North Stadbroke Is., and Goat Is. were kindly donated by N. L. Bruce.

The following abbreviations are used here to indicate the institutions where the specimens examined are to be found: Queensland Museum (Q.M.); Australian Museum (A.M.); South Australian Museum (S. Aust. M.); Western Australian Museum (W.A.M.); South African Museum (S. Afr. M.); Canterbury Museum, New Zealand (C.M.); New Zealand Oceanographic Institute (N.Z.O.I.); British Museum (Natural History) (B.M.N.H.); United States National Museum (U.S.N.M.); Muséum National d'Histoire Naturelle, Paris (M. d'H.N.); Naturhistoriska Riksmuseet, Stockholm (N.R.).

Any material mentioned below but not designated a museum reference number has been placed in a reference collection in the Department of Zoology, Nottingham University.

SYSTEMATICS

For the correct placement of the sphaeromatids from Australia, a thorough review of the literature on *Ischyromene* Racovitza and *Dynamenella* Hansen was necessary. Much taxonomic confusion was uncovered and the review was extended to include *Dynamenopsis* Baker and *Cymodocella* Pfeffer. Type and other identified material was obtained from several museum collections so that the review was based on more than the literature and its many ill-defined species. Because the genus *Ischyromene* has virtually been ignored in the past, many species belonging to this genus have been placed in the genera *Dynamenella* and *Cymodocella* (e.g., Hurley and Jansen, 1977; Sivertsen and Holthuis, 1980; Simes, 1981). These three genera and *Dynamenopsis* (which has been confused with *Dynamenella*) have been redefined and the species redistributed on the basis of the generic characters given. The results of this are outlined below.

Order Isopoda

Family Sphaeromatidae

Subfamily Dynameninae

Ischyromene Racovitza, 1908

Diagnosis.—Eubranchiate Sphaeromatidae with antennular peduncle article 1 not extended anteriorly as a plate. Both sexes with pereon and pleon lacking dorsal processes. Pleon with posterior margin bearing two sutures at each side. Both sexes with both rami of uropod lamellar; endopod greater than half length of exopod. Apex of pleotelson with either a simple, ventral groove or an enclosed, dorsally directed foramen. Pereopods stout; accessory unguis often markedly

bifid. Endopod of pleopod 1 triangular with internal half indurate. Exopod of pleopod 3 without an articulation. Sexual dimorphism not pronounced.

Adult Male.—Pereonite 7 often longer than that of females, with posterior margin markedly bilobed. Penes short, separate to base with rounded apices. Appendix masculina narrow, arising from internoproximal angle of endopod of pleopod 2 and extending to, or beyond, apex of endopod.

Ovigerous Female.—Mouthparts not metamorphosed. Brood pouch formed posteriorly as a pocket, opening anteriorly at the level of pereopod 4; anteriorly formed as three pairs of large oostegites arising from pereopods 2 to 4 and overlapping well in the midline. Brood not incubated in the brood pouch thus formed, but in invaginations of the ventral body wall.

Type-species.—*Ischyromene lacazei* Racovitza, 1908.

Additional species:	Current name:	Recommendation based on examination of:
<i>I. australis</i> (Richardson, 1906), new combination	<i>Dynamenella australis</i>	Specimens
<i>I. australoides</i> (Barnard, 1940), new combination	<i>D. australoides</i>	Types
<i>I. barnardi</i> (Menzies and Glynn, 1968), new combination	<i>D. barnardi</i>	Literature
<i>I. bicarinata</i> Harrison, 1981	<i>I. bicarinata</i>	Types
<i>I. brunnea</i> (Vanhöffen, 1914), new combination	<i>D. brunnea</i>	Type
<i>I. codii</i> (Nobili, 1906), new combination	<i>D. codii</i>	Types
<i>I. condita</i> (Hurley and Jansen, 1977), new combination	<i>D. condita</i>	Type
<i>I. cordiforaminalis</i> (Chilton, 1883), new combination	<i>D. cordiforaminalis</i>	Specimens
<i>I. eatoni</i> (Miers, 1875), new combination	<i>Cymodocella eatoni</i>	Types
<i>I. hirsuta</i> (Hurley and Jansen, 1971), new combination	<i>D. hirsuta</i>	Type
<i>I. huttoni</i> (Thomson, 1879), new combination	<i>Cymodocella huttoni</i>	Specimens
<i>I. insulsa</i> (Hurley and Jansen, 1977), new combination	<i>D. insulsa</i>	Type
<i>I. macrocephala</i> (Krauss, 1843), new combination	<i>D. macrocephala</i>	Specimens
<i>I. menziesi</i> (Sivertsen and Holthuis, 1980), new combination	<i>D. menziesi</i>	Literature
<i>I. mortenseni</i> (Hurley and Jansen, 1977), new combination	<i>D. mortenseni</i>	Literature
<i>I. ovalis</i> (Barnard, 1914), new combination	<i>Cymodocella ovalis</i>	Literature
<i>I. rubida</i> (Baker, 1926), new combination	<i>D. rubida</i>	Type
<i>I. sapmeri</i> (Kensley, 1976), new combination	<i>Cymodocella sapmeri</i>	Literature

Additional species:	Current name:	Recommendation based on examination of:
<i>I. scabricula</i> (Heller, 1865), new combination	<i>D. scabricula</i>	Specimens
<i>I. tuberculata</i> (Menzies, 1962b) new combination	<i>D. tuberculata</i>	Types

Remarks.—Species of the genus *Ischyromene* show a number of variable characters. Epistome shape varies between species and may be a useful distinguishing characteristic; species may be more or less flattened with laterally extended coxal plates; the pleotelsonic apex may have a simple groove or an enclosed foramen; the pereopodal accessory unguis may be bifid or simple (this character is perhaps size related, with the smaller species showing the bifid form more clearly than the larger species); and the uropodal rami are sometimes apically rounded (e.g., *I. lacazei*) or they may have sinuous margins with the exopodal apex acute (e.g., *I. australis*).

With the transfer of many species to this genus it can be seen that, far from being restricted to the Mediterranean as previous records suggest, *Ischyromene* is a predominantly temperate genus centred in the southern hemisphere. The western Mediterranean may well be the Old World northern distributional limit of this genus (Fig. 7A).

Ischyromene polytyla, new species

Synonyms.—None.

Material Examined.—Holotype adult male, 4.2 mm (Q.M.: W.8055) (+1 microslide).

Type-locality.—Burleigh Heads, South East Queensland (28°S). From dead wood. Coll. N. Svernivig, 03.iv.1979.

Etymology.—The adjectival specific name *polytyla* is derived from the Greek *poly* + *tylos*, i.e., many + lump.

Description of Adult Male (Fig. 1a–n).—*Ischyromene* with tergum of pereonite 7 rugose (especially obvious in lateral view). Pleon with scattered, prominent tubercles. Pleotelson with main dome bearing small, round, prominent tubercles with an additional tubercle anterior to the base of each uropod. Apical ventral groove of pleotelson with lip thickened and smoothly rounded in dorsal view; lip margins parallel in posterior view and groove open ventrally. Ventral margins of pleotelson narrow, lacking outcurved ridges.

Appendages: Antennule with peduncular article 1 longer than articles 2 and 3 together; flagellum of 12 articles. Antenna with 20-articled flagellum extending to level of pereonite 5. Mouthparts not examined in detail; maxillipedal palp articles 2 and 3 with pronounced setose lobes and article 4 with low setose lobe. Pereopods robust, increasing in length posteriorly; merus, carpus, and propodus with superior fringes and dense inferior pads of setae. All pereopods with bifid accessory unguis. Penes flattened, each four times as long as broad with semicircular tip. Basis of pleopod 1 bearing five internal coupling hooks; exopod subovate, slightly longer than triangular endopod; inner half of endopod (that region not overlapped by exopod) indurate; both rami with long, terminal, plumose setae. Basis of pleopod 2 bearing five internal coupling hooks; exopod subovate, half length of subtriangular endopod; both rami with terminal and external plumose

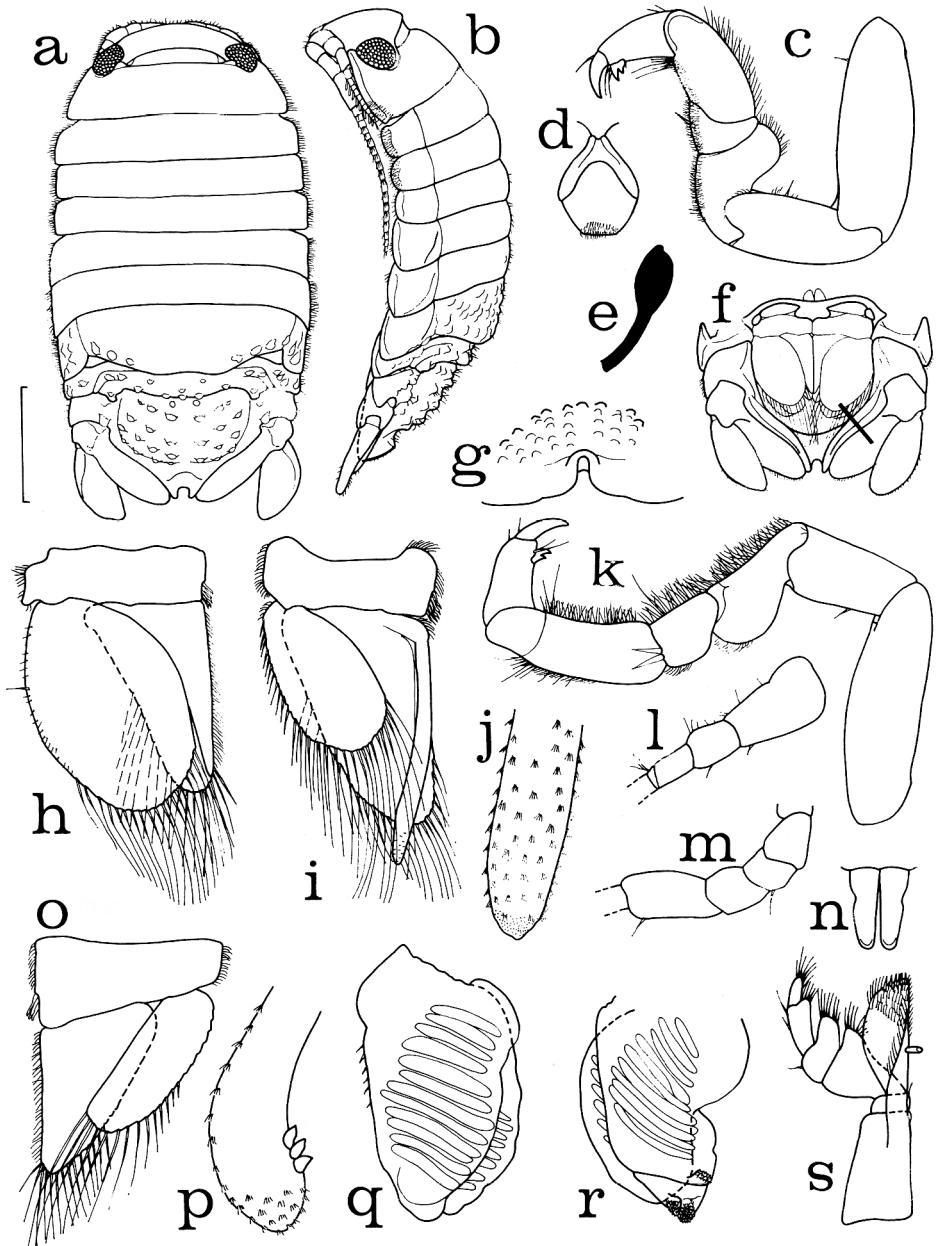


Fig. 1. *Ischyromene polytyla*, new species. Adult male holotype (a) dorsal, (b) lateral, (c) pereopod 1, (d) epistome and labrum, (e) transverse section (T.S.) through pleotelsonic margin at level of bar on 'f,' (f) ventral, pleotelson, (g) posterior, pleotelson, (h) pleopod 1, (i) pleopod 2, (j) appendix masculina apex, (k) pereopod 7, (l) antennular peduncle, (m) antennal peduncle, (n) penes. *Ischyromene lacazei* Racovitza. Adult male (o) pleopod 3, (p) appendix masculina apex, (q) pleopod 4, (r) pleopod 5, (s) maxilliped. Scale line represents 1 mm.

setae; endopod with appendix masculina just longer than ramus, narrow, lying alongside longitudinal ridge on anterior surface of endopod, and curving away from midline of body, widening slightly distally to rounded apex bearing microtrichia. Pleopods 4 and 5 not examined in detail (Fig. 10–s are from type-species of genus). Uropod with endopod just longer and narrower than exopod, extending just beyond apex of pleotelson; both rami smoothly rounded apically.

Colour of Specimen in Alcohol.—Cream, with dorsal surface, pleopods, ventral pereon, and bases of pereopods with evenly distributed, small, black chromatophores.

Female.—Unknown.

Distribution and Habitat.—Known only from wood in the intertidal region of southeastern Queensland. (Well-weathered and relatively permanent wood provides a very 'popular' settling place for peracarid crustaceans and a number of isopod species have been recorded from this habitat in Queensland.)

Remarks.—As only one specimen of *I. polytyla* is known, the maxilliped and pleopods 3 to 5 were not removed for illustration. These appendages do not, however, appear to differ in form from those of the type-species of the genus. As these appendages have never been illustrated for *I. lacazei*, they are shown here in Fig. 10–s. For comparative purposes the apex of the appendix masculina of *I. lacazei*, with its three external, subapical teeth, is also shown. *I. polytyla*, new species, resembles *I. lacazei* in dorsal view, but *I. polytyla* can be distinguished by the smoothly rounded margin of the pleotelsonic notch and the form of the appendix masculina.

Dynamenella Hansen, 1905

Synonym.—*Clanella* Boone, 1923.

Diagnosis.—Eubranchiate Sphaeromatidae with antennular peduncle article 1 not extended anteriorly as a plate. Both sexes with pereon and pleon lacking dorsal processes, and with both rami of uropod lamellar, the endopod being greater than half length of exopod. Pereopod 1 markedly more robust than other pereopods. All pereopods with simple, not bifid, accessory unguis. Exopod of pleopod 3 with or without articulation. Sexual dimorphism obvious.

Adult Male.—Penes long, tapering, fused at base. Appendix masculina arising from internoproximal angle of endopod of pleopod 2 and extending to or beyond apex of endopod. Appendix masculina usually broad proximally, tapering to an acute tip. Apex of pleotelson with dorsally directed foramen connected to apex by narrow slit. Ventral margins of pleotelson various; flattening posteriorly, or directed medially, or with narrow outcurved ridges which meet in posterior midline. Uropods broader than those of females and immature specimens.

Ovigerous Female.—Mouthparts not metamorphosed. Apex of pleotelson various; bearing slight notch, simple groove, or foramen connected to apex by narrow slit. Uropods narrower than those of adult male. Brood pouch lacking oostegites, formed from two opposing ventral pockets covering entire ventral pereon and opening in midline between fourth pereopods.

Type-species.—*Dynamenella perforata* (Moore, 1901).

Additional species:	Current name:	Recommendation based on examination of:
<i>D. elegans</i> (Boone, 1923)	<i>Dynamenella elegans</i>	Literature
<i>D. josephi</i> Glynn, 1968b	<i>Dynamenella josephi</i>	Literature
<i>D. marginata</i> (Bruce, 1980), new combination	<i>Cymodocella marginata</i>	Literature
<i>D. nipponica</i> (Nishimura, 1969), new combination	<i>Cymodocella nipponica</i>	Literature
<i>D. platura</i> Nobili, 1906	<i>Dynamenopsis platura</i>	Types
<i>D. quilonensis</i> Pillai, 1954	<i>Dynamenella quilonensis</i>	Literature
<i>D. savignyi</i> (Edwards, 1840), new combination	<i>Dynamenopsis dumerilii</i> (Audouin, 1826)	Specimen
<i>D. tropica</i> Silva, 1960	<i>Dynamenella tropica</i> and <i>Dynamenella antonii</i> Silva, 1960	Literature Literature

Remarks.—*Dynamenella tropica* appears to be based on subadult males and females of *D. antonii* (based on adult male), but by page priority *D. tropica* is retained as the senior subjective synonym.

Dynamenella elegans appears to be a species very close to, and possibly conspecific with, *D. tropica* (fide Menzies and Glynn, 1968: 59).

Sphaeroma dumerilii Audouin, 1826, was found to be a junior homonym of *Sphaeroma dumerilii* Leach, 1818, by Edwards (1840), who proposed the replacement name *Sphaeroma savignyi* for Audouin's species. When Monod (1933) transferred this species to the genus *Dynamenopsis* he used Audouin's name, calling the species *Dynamenopsis dumerilii* (Audouin). The International Code of Zoological Nomenclature (1961) is not clear on this matter, but following Blackwelder's interpretation (1967: 551, Fig. B), even though Audouin's name has been transferred to a different genus, it still competes in homonymy with that of Leach. To avoid any potential nomenclatural confusion, the present authors are using Edwards' replacement name in transferring the species to the genus *Dynamenella* as *Dynamenella savignyi* (Edwards).

The type locality of *Dynamenella platura* was originally unknown but Nobili (1907: 423) stated that, as the specimens came from the collections of Dr. Seurat, they certainly came from the Tuamotu Islands. The label in the type bottle now reads "I. Gambier" [sic] (part of the Tuamotu Archipelago in the mid South Pacific). *Ischyromene codii*, another species from Seurat's collections, was collected from the Gambier Islands two years after *D. platura*. Unless separate collections were made in the same area, it seems possible that the types of *D. platura* were not collected in the Gambier Islands, but were from some other location. Monod (1934) has reported *D. platura* from Indo-China.

Of the other species currently placed in the genus *Dynamenella*: *D. benedicti* (Richardson, 1899) and *D. fraudatrix* Kussakin, 1962, are both in fact hemibranchiate sphaeromatids and their correct generic placement is unknown; *D. sheareri* (Hatch, 1947), *D. conica* Boone, 1923, and *D. glabra* (Richardson, 1899) have been inadequately described and no opinion can be given as to their status; *D. dioxus* Barnard, 1914; *D. navicula* Barnard, 1914; *D. parva* Baker, 1929; and *D. taurus* Barnard, 1940, are all eubranchiates which cannot be placed in any of the five genera considered here and their correct placement is unknown at the present

time. *D. angulata* (Richardson, 1901) is based on subadult males of a species of *Paracerceis* Hansen, since by the use of transmitted light the adult male pleotelsonic form of a *Paracerceis* can be seen within the pleotelsons of type specimens. The remaining eight species will be considered below (see *Paradella*, new genus, and *Cymodocella*).

In his generic diagnosis of *Dynamenella*, Hansen (1905: 107) stated "Both sexes . . . without real processes." Barnard (1914: 410) modified this to "7th pereaeon segment with or without processes in male." He did this in order to include his species *Dynamenella dioxus* in this genus and justified the emendation by saying that in *Dynamenella perforata*, *D. australis* (i.e., *Ischyromene australis*), and *D. scabricula* (i.e., *I. scabricula*) the seventh pereonite is extended backwards in two lobes. This lobing of the seventh pereonite cannot be equated with Hansen's "processes" (nor can the mediolateral ridging shown by species such as *Dynamenella diana*e (Menzies) (see below), which Pires (1980b) also referred to as "processes." Hansen was referring to the unmistakable extensions shown by species of such genera as *Dynamene* Leach, *Isocladus* Miers, *Zuzara* Leach, *Cilicæa* Leach, and others. None of the species in the five genera considered in this paper show similar extensions. Examination of a type specimen of *D. dioxus* shows that this species should not be placed in the genus *Dynamenella*.

Hansen stated (1905: 126) that he examined an adult male and an immature male of *Dynamenella perforata*. He did not examine an ovigerous female of this species (the type of the genus) but included specimens of *Dynamene eatoni* Miers (actually an *Ischyromene*) in *Dynamenella*. If Hansen was examining specimens of *Ischyromene* and including them in *Dynamenella*, this would explain why he stated "marsupial lamellae overlap each other somewhat" for *Dynamenella*, when in fact *Dynamenella* lacks oostegites. It would also explain why Hansen grouped *Dynamenella* with those genera lacking an articulation on the exopod of pleopod 3, when *D. perforata* possesses such an articulation.

Species of *Dynamenella* vary in the presence or absence of an articulation on the exopod of pleopod 3, and in the shape of the pleotelsonic foramen. With the exception of Monod's record of *D. platyura*, the remaining Old World species of *Dynamenella* lack an exopodal articulation, while the New World species possess one. With pleotelsonic foramina being variable in other genera (e.g., *Ischyromene*) it is not felt by the authors that the pleopodal articulation alone can be considered as a basis for systematic separation above species level in this group.

The form of the uropodal rami in species of *Dynamenella* varies in a manner similar to that shown by *Ischyromene*.

Geographically, the species of *Dynamenella* appear to be found in tropical and subtropical locations, but at present are only represented on the African continent by records of *D. savignyi* from the coast of the Red Sea in Egypt (Fig. 7B).

Dynamenella liochroea, new species

Synonyms.—None.

Material Examined.—Holotype adult male, 4.14 mm (Q.M.: W.7932). Type-locality: Casuarina Beach, Lizard Island, Queensland (14°40'S, 145°30'E). Crevice in beach rock. Upper shore. Coll. D. M. Holdich, 12.vi.1976. Paratypes.—From type-locality. Collection details as above. 4 adult males, 6 subadult males (one as Q.M.: W.7933), 10 ovigerous females, 12 nonovigerous females, 3 juveniles;—Casuarina Beach, Lizard Island. In fine sand and around base of beach rock. Intertidal. Coll. D. M. Holdich, 07.vi.1976. 4 adult males, 6 ovigerous females, 11 nonovigerous females, 5 juveniles;—Casuarina Beach, Lizard Island. In crevices in beach rock. Midshore. Coll. D. M. Holdich, 09.vi.1976. 8 adult males, 1 subadult male, 13 ovigerous females, 6 nonovigerous females (one as Q.M.: W.7934), 6 juveniles;—South Casuarina Beach, Lizard Island. In fine sand. Intertidal. Coll. D. M. Holdich,

09.vi.1976. 2 adult males, 3 nonovigerous females;—Casuarina Beach, Lizard Island. On beach rock on sand. Intertidal. Coll. D. M. Holdich, 10.vi.1976. 1 adult male, 1 subadult male (supplying 1 microslide, Q.M.: W.7935), 2 nonovigerous females, 2 juveniles;—Casuarina Beach, Lizard Island. Beach rock. Upper shore. Coll. D. M. Holdich, 12.vi.1976. 3 adult males, 1 ovigerous female (as Q.M.: W.7936);—West Point, Lizard Island. In rock crevice. Upper shore. Coll. D. M. Holdich, 13.vi.1976. 1 juvenile;—Ramsay Bay, Hinchinbrook Island, Queensland (18°22'S, 146°14'E). In sand. Intertidal. Coll. N. L. Bruce, 22.viii.1978. 1 adult male;—Picnic Bay, Magnetic Island, Townsville, Queensland (19°10'S, 146°50'E). From semipermanent logs and pieces of wood at top of dead coral zone. Midshore. Coll. D. M. Holdich, 09.vii.1976. 3 adult males (one supplying three microslides, Q.M.: W.7937), 1 ovigerous female, 1 nonovigerous female;—Pallarenda, Townsville. Among pink barnacles on wooden pier pile. Midshore. Coll. D. M. Holdich, 14.v.1976. 1 subadult male, 2 ovigerous females, 2 nonovigerous females, 3 juveniles;—Pallarenda, Townsville. From pink striped barnacles and small rock oysters on rocks below splash zone. Upper shore. Coll. D. M. Holdich, 14.v.1976. 1 adult male, 1 nonovigerous female;—Kissing Point, Townsville. In sand by rocks at edge of pool. Intertidal. Coll. D. M. Holdich, 11.v.1976. 14 juveniles;—Kissing Point, Townsville. From sand and rocks around edge of swimming pool. Intertidal. Coll. D. M. Holdich, 10.vii.1976. 1 adult male, 1 subadult male, 3 nonovigerous females, 2 juveniles;—Kenny (South of Mission Beach), Kurrimine, Queensland (17°54'S, 146°05'E). Under stones on sand near jetty. Midshore. Coll. D. M. Holdich, 19.v.1976. 14 adult males, 11 subadult males, 28 nonovigerous females, 6 juveniles;—Kenny, Kurrimine. In fine sand. Midshore. Coll. D. M. Holdich, 19.v.1976. 2 subadult males, 1 immature male, 1 nonovigerous female;—Kurrimine. In red filamentous alga on red sandstone rocks. Midshore. Coll. D. M. Holdich, 19.v.1976. 3 adult males, 1 nonovigerous female;—Yorkey's Knob, Cairns, Queensland (16°51'S, 145°43'E). From tree trunk (bored by *Teredo* sp.) on sand by jetty. Intertidal. Coll. D. M. Holdich, 28.v.1976. 2 adult males;—Yorkey's Knob, Cairns. In fine sand by rocks. Midshore. Coll. D. M. Holdich, 28.v.1976. 6 adult males, 4 subadult males, 3 nonovigerous females, 9 juveniles.

Etymology.—The specific name *liochoera* is derived from the Greek *leios* + *chroia*, i.e., smooth + skin.

Description of Adult Male (Fig. 2a–k, m; Fig. 3a–h).—*Dynamenella* with pleon bearing low, transverse tubercle either side of midline. Pleotelson smooth in dorsal view, but appearing slightly rugose in lateral view. Subapical foramen circular, directed anterodorsally, separated from apex by slit which is closed anteriorly and widens posteriorly. Ventral margins of pleotelson flattening posteriorly, not extending to meet in midline at apex.

Appendages: Antennule with peduncular article 1 twice length and twice breadth of article 2; article 3 half length of articles 1 and 2 together; flagellum 9-articled. Antennal peduncular articles 2, 4, and 5 increasing in length; articles 1 and 3 short; all articles subequal in breadth; 12-articled flagellum extending to level of pereonite 3. Mouthparts of usual sphaeromatid form but distal molar region of left mandible with a conical tooth which fits into an indentation in corresponding region of right mandible. Endite of maxilliped with numerous surface microtrichia; palp articles 2 to 4 with setose lobes. Pereopod 1 robust. Pereopods 2 and 3 very slender. Pereopod 4 robust. Pereopods 5, 6, and 7 becoming slender and increasing in length. Merus, carpus, and propodus of all pereopods with dense, inferior mats of setae; basis and ischium with superior setae; all dactyls with simple accessory unguis. Penes fused at base, tapering distally to acute tips with thickened regions midway along external margins. Pleopod 1 with distal margin of endopod broadly rounded, internal margin thickened, convex. Endopod of pleopod 2 with appendix masculina flattened, broad proximally, tapering to narrowly rounded tip just beyond ramal apex. Exopod of pleopod 3 lacking an articulation. Bases of pleopods 1 to 3 each bearing three internal coupling hooks; all rami with long, terminal, plumose setae. Endopod of pleopod 4 apically truncate. Exopod of pleopod 5 with a subterminal articulation and three, finely toothed, internodistal bosses. Uropodal rami subequal, broad, rounded, extending well beyond apex of pleotelson.

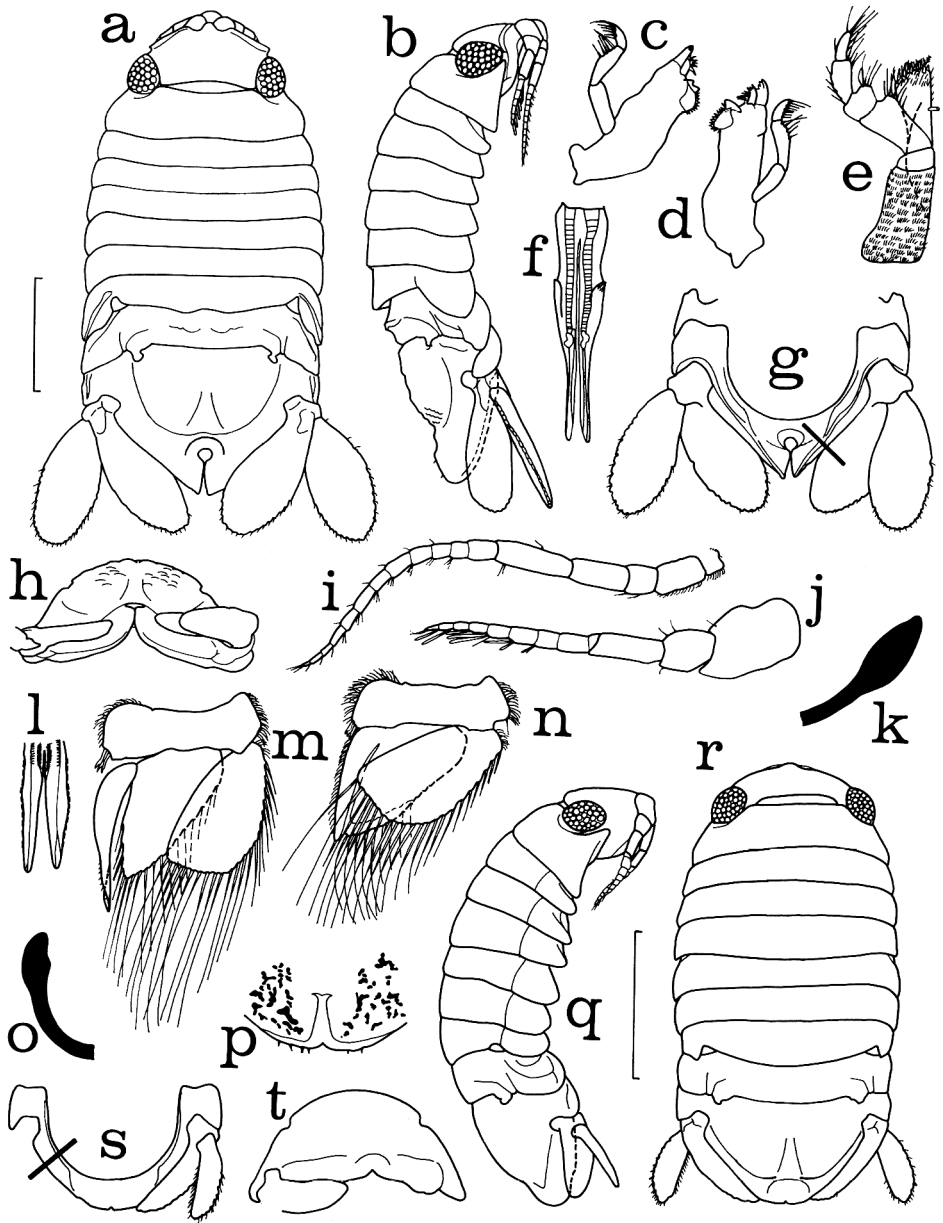


Fig. 2. *Dynamenella liochroea*, new species. Adult male (a) dorsal, (b) lateral, (c) right mandible, (d) left mandible, (e) maxilliped, (f) penes, (g) ventral, pleotelson, (h) posterior, pleotelson, (i) antenna, (j) antennule, (k) T.S. through pleotelsonic margin at level of bar on 'g,' (m) pleopod 2.—Subadult male (l) penes, (n) pleopod 2, (p) posterior, pleotelson.—Ovigerous female (o) T.S. through pleotelsonic margin at level of bar on 's,' (q) lateral, (r) dorsal, (s) ventral, pleotelson, (t) posterior, pleotelson. Each scale line represents 1 mm.

Description of Ovigerous Female (3.00 mm) (Fig. 2o, q-t).—*Dynamenella* with pleon and pleotelson smooth. Posteromedial margin of pleotelson with shallow notch. Ventral margins of pleotelson lacking outcurved ridges; flattening terminally. Endopod of uropod narrow with acutely rounded apex extending to level of apex of pleotelson; exopod $\frac{3}{4}$ length of endopod with serrate external and distal margins and rounded apex.

Description of Nonovigerous Female.—As above but lacking brood pouch.

Description of Subadult Male (Fig. 2l, n, p).—Resembling nonovigerous female, but dorsal to apical notch of pleotelson having narrow, vertical band of transparent cuticle. Penes obvious but half length of adult penes and separate to base, lacking thickened regions. Endopod of pleopod 2 with appendix masculina visible through cuticle along internal margin, but not free; internal margin extended only slightly at apex with short terminal seta.

Description of Immature Male (i.e., stage before subadult male).—Resembling small nonovigerous female but bearing penes. Penes short, separate to base, each $1\frac{1}{2}$ times as long as broad. No indication of appendix masculina.

Colour of Specimens in Alcohol.—Variable. From uniform cream with only few chromatophores, to dark, mottled purple-brown. Many individuals cream, with patches of dark colour. All individuals lacking chromatophores on ventral pereon and pereopods.

Distribution and Habitat.—Found only on the mainland coast of Queensland from Townsville north to Cairns, and on the continental islands, Lizard Island and Magnetic Island. Found in wood, amongst filamentous red algae, in beach rock and rock crevices on upper and middle shore, under stones on sand and in fine sand around rocks on the midshore. Present on a variety of shores, usually among fine sand and rocks.

Remarks.—Compared to other species of *Dynamenella*, *D. liochroea*, new species, resembles *D. perforata* but differs in having the pleotelson smooth dorsally, not finely tuberculate; in lacking an articulation on the exopod of pleopod 3; and in having a circular foramen on the pleotelson.

Dynamenella ptychura, new species

Synonyms.—None.

Material Examined.—Holotype adult male, 2.5 mm (Q.M.: W.7939). Type-locality: Heron Island, Capricorn Group, Great Barrier Reef (23°25'S, 151°55'E). In beach rock crevice on upper shore. Coll. D. M. Holdich, 13.iv.1976. Paratypes.—From type-locality. Collection details as above. 52 adult males (one supplying three microslides, Q.M.: W.7940), 39 subadult males (one as Q.M.: W.7941, another supplying microslide, Q.M.: W.7942), 2 immature males (one supplying microslide, Q.M.: W.7943), 281 ovigerous females (one as Q.M.: W.7944), 54 nonovigerous females (one as Q.M.: W.7945), 336 juveniles;—Heron Island. On *Turbinaria* sp. on inner reef flat. Intertidal. Coll. D. M. Holdich, 08.iv.1976. 1 ovigerous female;—Heron Island. Under slab of beach rock. At level of high water neap tide. Coll. N. L. Bruce, 08.xii.1979. 2 adult males, 1 ovigerous female (Q.M.: W.8582);—Ramsay Bay, Hinchinbrook Island, Queensland (18°22'S, 146°14'E). In sand. Intertidal. Coll. N. L. Bruce, 22.viii.1978. 3 adult males, 3 subadult males, 3 ovigerous females, 2 nonovigerous females;—Casuarina Beach, Lizard Island. From crevices in beach rock. Midshore. Coll. D. M. Holdich, 09.vi.1976. 1 adult male, 2 ovigerous females;—Casuarina Beach, Lizard Island. From crevices in beach rock. Upper shore. Coll. D. M. Holdich, 12.vi.1976. 3 adult males, 2 ovigerous females, 1 nonovigerous female;—West Point, Lizard Island. In crevice. Upper shore. Coll. D. M. Holdich, 13.vi.1976. 19 adult males, 7 subadult males, 21 ovigerous females, 14 nonovigerous females;—Between Research Point and Freshwater Beach, Lizard Island. On clumps of oysters. Intertidal (Station 78 Liz-PBW-3). Coll. Weate, Oldfield, and Berents, 16.iv.1978. 2 adult males. (AM.: P.27017).

Etymology.—The specific name *ptychura* is formed from the Greek *ptyche* + *ura*, i.e., fold + tail.

Description of Adult Male (Fig. 3i–n, r, s).—*Dynamenella* with pleon bearing low, transverse tubercle either side of midline. Pleotelson granulose, especially obvious in lateral view, with irregular, small tubercles over main dome; anterior region of dome, either side of midline, with short, granular, longitudinal ridge, with several raised tubercles posterior to this. Subapical foramen circular, directed anterodorsally, separated from apex by slit which is closed along entire length. Ventral margins of pleotelson folded as outcurved ridges extending posteromedially to meet in midline ventral to foramen.

Appendages: Antennule as in *D. liochroea*. Antennal peduncle articles increasing in length 1 to 5; 13 flagellar articles extending to level of pereonite 3. Mouthparts similar to those of *D. liochroea*. Pereopods following general pattern of those of *D. liochroea* but less setose superiorly. Penes fused at base, tapering to external thickenings at midpoint, then margins subparallel in distal half, with apices rounded. Pleopod 1 as in *D. liochroea* but endopod thickened internoproximally, with internal margin slightly concave. Appendix masculina of pleopod 2 approximately 1½ times length of endopod, flattened, broad proximally, tapering only slightly to rounded apex. Pleopods 3 to 5 similar to those of *D. liochroea*. Rami of uropod broad, extending well beyond apex of pleotelson; endopod with apex slightly obtusely angled and upcurved; exopod externally and distally serrate with apex rounded.

Description of Ovigerous Female (2.72 mm) (Fig. 3q, t–w).—*Dynamenella* with pleon bearing low tubercle either side of midline. Pleotelson weakly rugose with main dome, either side of midline, bearing two short, low, longitudinal ridges, one posterior to other. Apex of pleotelson slightly extended, bearing small, subovate, posterodorsally directed foramen connected to the posteromedial margin by vertical, closed slit. Ventral margins of pleotelson lacking outcurved ridges, and flattened terminally. Endopod of uropod with acute apex not extending as far as apex of pleotelson; exopod ⅔ length of endopod with serrate apex.

Description of Nonovigerous Female.—As above but lacking brood pouch.

Description of Subadult Male (Fig. 3o, p).—Resembling nonovigerous female, but with penes and endopod of pleopod 2 resembling those of subadult male of *D. liochroea*, except penes slightly broader terminally.

Description of Immature Male (i.e., stage before subadult male).—Resembling small nonovigerous female but bearing penes. Penes short, separate to base, each twice as long as broad. No indication of appendix masculina.

Colour of Specimens in Alcohol.—Pale with fine grey chromatophores. Chromatophores absent from ventral pereon and pereopods.

Distribution and Habitat.—Found on offshore islands. Common on Lizard Island and Heron Island.

Found mainly on the upper shore in beach rock crevices, amongst rock oysters and in sand. All stages of the life history have been found in crevices.

Remarks.—*D. ptychura*, new species, resembles *D. platyura* but differs in having a circular foramen on the pleotelson; in lacking an articulation on the exopod of pleopod 3; and in the form of the appendix masculina. The female of *D. platyura* shows a simple notch on the pleotelson, not a foramen as in *D. ptychura*.

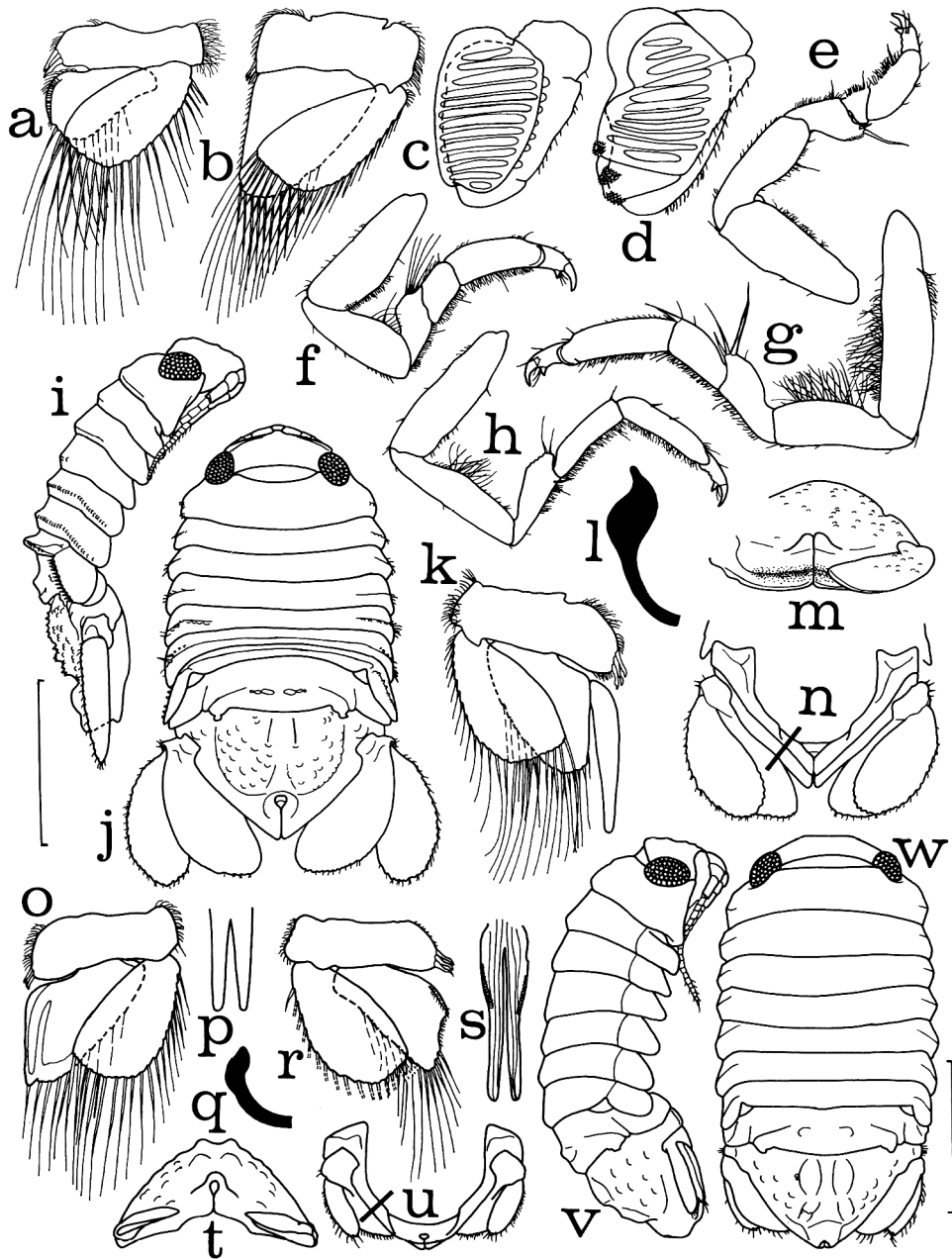


Fig. 3. *Dynamenella liochroea*, new species. Adult male (a) pleopod 1, (b) pleopod 3, (c) pleopod 4, (d) pleopod 5, (e) pereopod 1, (f) pereopod 4, (g) pereopod 7, (h) pereopod 2. *Dynamenella ptychura*, new species. Adult male (i) lateral, (j) dorsal, (k) pleopod 2, (l) T.S. through pleotelsonic margin at level of bar on 'n,' (m) posterior, pleotelson, (n) ventral, pleotelson, (r) pleopod 1, (s) penes.—Subadult male (o) pleopod 2, (p) penes.—Ovigerous female (q) T.S. through pleotelsonic margin at level of bar on 'u,' (t) posterior, pleotelson, (u) ventral, pleotelson, (v) lateral, (w) dorsal. Each scale line represents 1 mm.

Dynamenella trachydermata, new species

Synonyms.—None.

Material Examined.—Holotype adult male, 2.68 mm (Q.M.: W.7946). Type-locality: Kissing Point, Townsville, Queensland (19°14'S, 146°48'E). From rock crevice above red alga zone. Upper shore. Coll. D. M. Holdich, 11.v.1976. Paratypes.—From type-locality. Collection details as above. 2 adult males (one supplying three microslides, Q.M.: W.7947), 144 ovigerous females (one as Q.M.: W.7948), 6 nonovigerous females, 1 juvenile;—Kissing Point, Townsville. In sand by rocks at edge of pool. Intertidal. Coll. D. M. Holdich, 11.v.1976. 1 ovigerous female;—Kissing Point, Townsville. From sand and rocks around edge of swimming pool. Intertidal. Coll. D. M. Holdich, 10.vii.1976. 5 adult males, 1 subadult male;—Kissing Point, Townsville. From rock crevices by swimming pool. Upper shore. Coll. D. M. Holdich, 10.vii.1976. 1 adult male, 57 ovigerous females, 13 juveniles;—Ramsay Bay, Hinchinbrook Island, Queensland. In sand. Intertidal. Coll. N. L. Bruce, 22.viii.1978. 1 ovigerous female;—Pallarenda, Townsville. Among pink barnacles on wooden pier pile. Midshore level. Coll. D. M. Holdich, 14.v.1976. 4 adult males, 1 ovigerous female, 3 nonovigerous females;—Pallarenda, Townsville. From pink striped barnacles and small rock oysters on rocks below splash zone. Upper shore. Coll. D. M. Holdich, 14.v.1976. 8 adult males, 2 subadult males, 74 ovigerous females, 2 nonovigerous females, 8 juveniles;—Kurrimine, Queensland. On soft red sandstone rock. Upper shore. Coll. D. M. Holdich, 18.v.1976. 6 adult males, 7 ovigerous females, 1 ovigerous female with penes of subadult male form, 2 nonovigerous females;—Kurrimine. In red weed on red rocks. Midshore. Coll. D. M. Holdich, 19.v.1976. 1 adult male, 1 ovigerous female, 2 juveniles;—Palm Beach, Cairns, Queensland. On rock oysters and red algae on vertical face. Intertidal. Coll. D. M. Holdich, 25.v.1976. 9 subadult males, 3 ovigerous females, 26 nonovigerous females, 58 juveniles;—Palm Beach, Cairns. In rock crevice in oyster zone. Intertidal. Coll. D. M. Holdich, 27.v.1976. 4 adult males, 1 subadult male, 25 ovigerous females, 5 nonovigerous females;—Clifton Beach (south end), Cairns. In log bored by *Teredo* sp. Intertidal. Coll. D. M. Holdich, 30.v.1976. 1 adult male, 2 subadult males;—Yorkey's Knob, Cairns. From log, bored by *Teredo* sp., on sand by jetty. Intertidal. Coll. D. M. Holdich, 28.v.1976. 5 adult males, 3 subadult males (one as Q.M.: W.7949, another supplying 1 microslide, Q.M.: W.7950), 2 ovigerous females, 3 nonovigerous females (one as Q.M.: W.7951), 4 juveniles;—Yorkey's Knob, Cairns. In crevice below rock oyster zone. Intertidal. Coll. D. M. Holdich, 28.v.1976. 3 adult males, 4 ovigerous females, 2 nonovigerous females.

Etymology.—The specific name *trachydermata* is derived from the Greek *trachydermon*, i.e., rough skin.

Description of Adult Male (Fig. 4a–j).—*Dynamenella* with dorsal body surface granular. Pleon bearing pronounced, transverse tubercle either side of midline. Pleotelson obviously tuberculate over main dome. Subapical foramen elliptical; directed anterodorsally; separated from apex by slit which is closed anteriorly and widens posteriorly. Ventral margins of pleotelson flattening posteriorly, not extending to meet in midline at apex.

Appendages: Antennule, antenna, and mouthparts as for those of *D. liochroea*. Pereopods following general pattern of those of *D. liochroea*, superior setae longest on basis and ischium of pereopod 7. Penes as in *D. liochroea*. Pleopod 1 as in *D. liochroea* but endopod thickened internoproximally with internal margin straight. Appendix masculina flattened, broad proximally, tapering to narrowly rounded apex just beyond apex of endopod of pleopod 2. Pleopods 3 to 5 similar to those of *D. liochroea*, but terminal article of exopod of pleopod 5 relatively shorter. Rami of uropod similar to those of *D. ptychura*.

Description of Ovigerous Female (2.45 mm) (Fig. 4n–q).—*Dynamenella* with pleon very slightly raised in midline. Pleotelson weakly rugose on main dome; apex not extended, bearing pronounced vertical incision with subparallel, lateral margins. Ventral margins of pleotelson lacking outcurved ridges and flattened terminally. Endopod of uropod with narrowly rounded apex extending to level of apex of pleotelson; exopod $\frac{2}{3}$ length of endopod with rounded apex.

Description of Nonovigerous Female.—As above but lacking brood pouch.

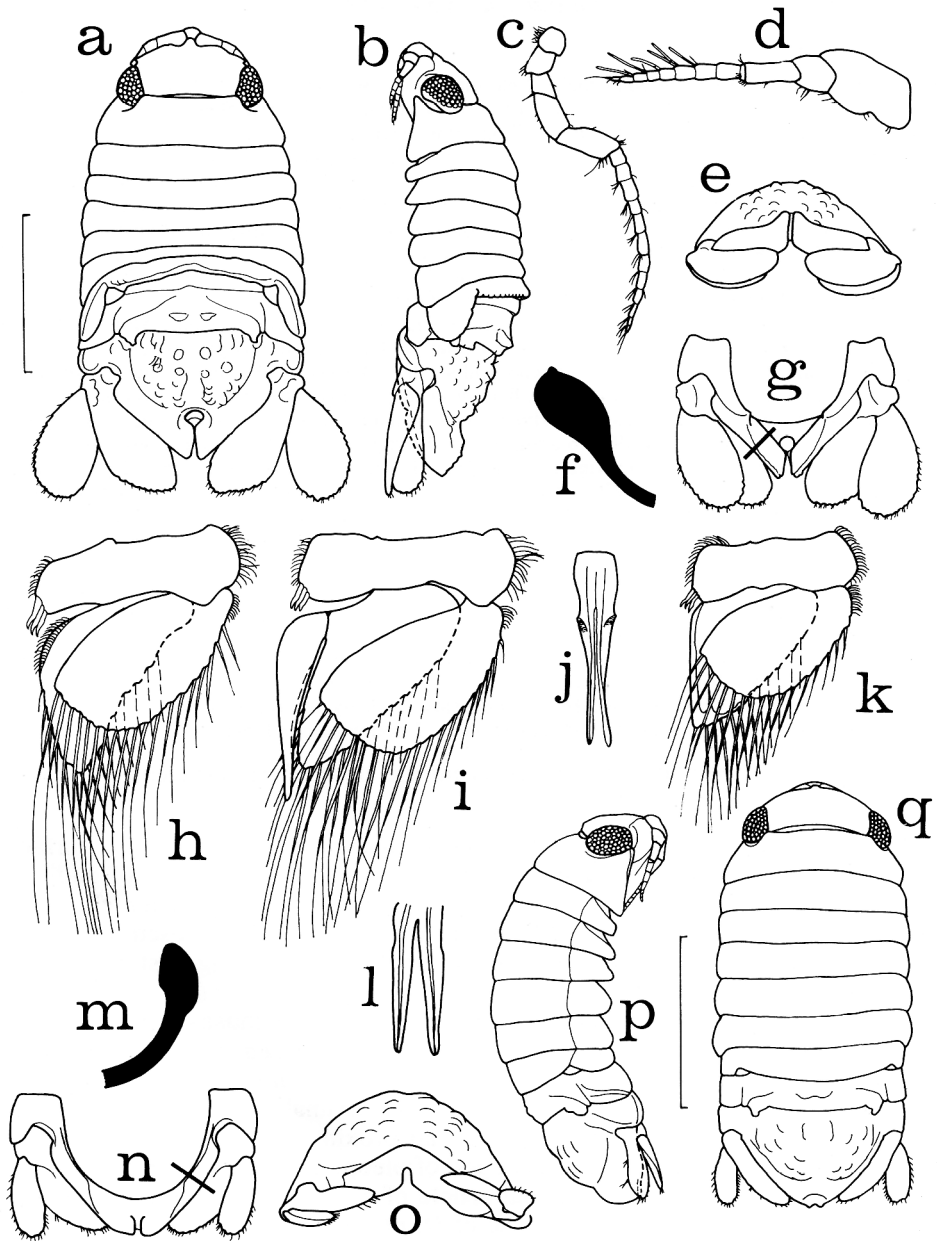


Fig. 4. *Dynamenella trachydermata*, new species. Adult male (a) dorsal, (b) lateral, (c) antenna, (d) antennule, (e) posterior, pleotelson, (f) T. S. through pleotelsonic margin at level of bar on 'g,' (g) ventral, pleotelson, (h) pleopod 1, (i) pleopod 2, (j) penes.—Subadult male (k) pleopod 2, (l) penes (not to scale with 'j').—Ovigerous female (m) T.S. through pleotelsonic margin at level of bar on 'n,' (n) ventral, pleotelson, (o) posterior, pleotelson, (p) lateral, (q) dorsal. Each scale line represents 1 mm.

Description of Subadult Male (Fig. 4k, l).—Resembling nonovigerous female, but with penes resembling those of subadult male of *D. liochroea*. Endopod of pleopod 2 with future appendix masculina visible through cuticle, but not free; apex bearing short seta but not extended.

Colour of Specimens in Alcohol.—Variable. From mottled dark grey over entire dorsal surface to sandy yellow with fine black chromatophores. Scattered chromatophores over ventral pereon but pereopods lacking chromatophores.

Distribution and Habitat.—Found at various mainland localities from Townsville north to Cairns, and at Hinchinbrook Island.

Found amongst filamentous red algae, wood and rock crevices from upper to midshore. Also amongst rock oysters and barnacles on upper and middle shore, and in sand around midshore rocks. All stages of life history found in cryptic habitats. Present on moderately sheltered and exposed rocky shores, usually where fine sand is present.

Remarks.—*D. trachydermata*, new species, most closely resembles *D. liochroea*, new species, but differs in having a tuberculate pleotelson; in having a relatively longer endopod to pleopod 1; and in the form of the female pleotelson.

Paradella, new genus

Diagnosis.—Eubranchiata Sphaeromatidae with antennular peduncle article 1 not extended anteriorly as a plate. Both sexes with dorsal pereon and pleon lacking processes. Both sexes with both rami of uropod lamellar; endopod greater than half length of exopod. All pereopods with accessory unguis simple, not bifid. Exopod of pleopod 3 with an articulation. Sexual dimorphism obvious.

Adult Male.—Penes long, tapering, fused at base. Appendix masculina narrow, lateral margins subparallel; arising from internoproximal angle of endopod of pleopod 2 and extending well beyond apex of endopod. Apex of pleotelson with dorsally directed foramen connected to apex by short, narrow slit. Ventral margins of pleotelson with broad, low, straight, outfolded ridges not meeting in posterior midline. Uropods broader than those of females and immature specimens.

Ovigerous Female.—Mouthparts not metamorphosed. Pleotelson apically extended, not broadly rounded. Uropods narrower than those of adult male. Brood pouch formed from two opposing pockets covering entire ventral pereon, and opening in midline between fourth pereopods. Each pereopod 4 bearing short oostegite, not reaching animal's midline.

Type-species.—*Paradella octaphymata*, new species

Etymology.—The generic name *Paradella* is a combination of the Greek *para* + *d'ella* (feminine), i.e., beside + contraction of '*Dynamenella*'.

Additional species:	Current name:	Recommendation based on examination of:
<i>P. acutitelson</i> (Menzies and Glynn, 1968), new combination	<i>Dynamenella acutitelson</i>	Literature
<i>P. bakeri</i> (Menzies, 1962b), new combination	<i>D. bakeri</i>	Types
<i>P. diana</i> (Menzies, 1962a), new combination	<i>D. diana</i>	Specimens

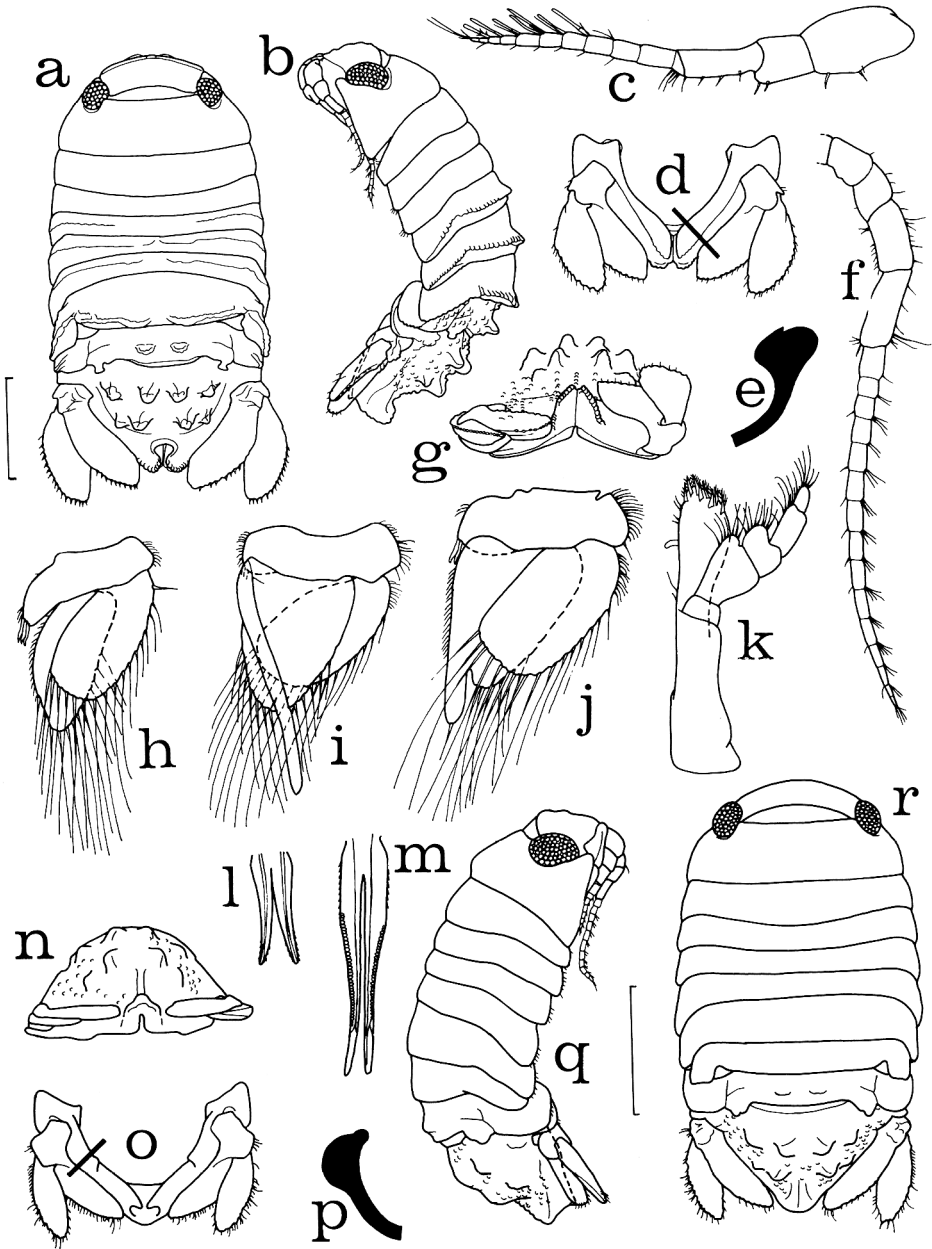


Fig. 5. *Paradella octaphymata*, new genus, new species. Adult male (a) dorsal, (b) lateral, (c) antennule, (d) ventral, pleotelson, (e) T.S. through pleotelsonic margin at level of bar on 'd,' (f) antenna, (g) posterior, pleotelson, (h) pleopod 1, (i) pleopod 2, (k) maxilliped, (m) penes.—Subadult male (j) pleopod 2 (not to scale with 'h' and 'i'), (l) penes.—Ovigerous female (n) posterior, pleotelson, (o) ventral, pleotelson, (p) T.S. through pleotelsonic margin at level of bar on 'o,' (q) lateral, (r) dorsal. Each scale line represents 1 mm.

Additional species:	Current name:	Recommendation based on examination of:
<i>P. plicatura</i> (Glynn, 1970), new combination	<i>D. plicatura</i>	Literature
<i>P. quadripunctata</i> (Menzies and Glynn, 1968), new combination	<i>D. quadripunctata</i>	Literature
<i>P. setosa</i> (Glynn, 1968b), new combination	<i>D. setosa</i>	Literature
<i>P. tumicauda</i> (Glynn, 1970), new combination	<i>D. tumicauda</i>	Literature

Remarks.—*Dynamenella acutitelson* appears to be based on females and subadult males of one or more species of *Paradella*, new genus. Adult males of *D. setosa* have never been illustrated, but figured specimens of this species appear to belong in *Paradella*, new genus. Most species referred above to *Paradella*, new genus, show greater similarity in dorsal view to one another than to species of *Dynamenella*. These species are: *Paradella octaphymata*, new species (see below), *P. bakeri*, *P. quadripunctata*, and *P. tumicauda*. The species *P. diana* and *P. plicatura* are, in dorsal view, more suggestive of *Dynamenella* species.

Species of *Paradella* are distinguished from species of *Dynamenella* most obviously by the presence in the former of small oostegites in ovigerous females and by the form of the ventral margins of the pleotelson in adult males. The appendix masculina in species of *Paradella* is long and narrow with the margins subparallel, and in subadult males the fused appendix masculina extends beyond the endopodal apex much further than in species of *Dynamenella*.

Paradella is known only from the Americas, where it occurs in both tropical and temperate regions, and from Australia and the Marshall Islands (Fig. 7c).

Paradella octaphymata, new species

Synonyms.—None.

Material Examined.—Holotype adult male, 4.14 mm (Q.M.: W.7925). Type-locality: West Point, Lizard Island, Queensland (14°14'S, 145°30'E). Among barnacles in rock crevice. Lower shore. Coll. D. M. Holdich, 13.vi.1976. Paratypes.—From type-locality. Collection details as above. 7 adult males (one supplying three microslides, Q.M.: W.7926), 2 subadult males (one as Q.M.: W.7927, the other supplying microslide, Q.M.: W.7928), 15 ovigerous females (one as Q.M.: W.7929), 7 nonovigerous females (one as Q.M.: W.7930), 6 juveniles;—Kapock Cove, Lizard Island. From rock scrapings below rock oyster zone. Intertidal. Coll. D. M. Holdich, 08.vi.1976. 1 adult male, 5 juveniles;—West Point, Lizard Island. In rock crevice on rock platform. Lower shore. Coll. D. M. Holdich, 09.vi.1976. 11 ovigerous females, 1 nonovigerous female;—South Casuarina Beach, Lizard Island. In crevice. Midshore. Coll. D. M. Holdich, 12.vi.1976. 1 ovigerous female;—West Point, Lizard Island. Among rock oysters. Intertidal. Coll. D. M. Holdich, 13.vi.1976. 1 immature male (supplying microslide, Q.M.: W.7931), 3 ovigerous females, 1 juvenile;—Between Research Point and Freshwater Beach, Lizard Island. On clumps of oysters. Intertidal (station 78 Liz-PBW-3). Coll. Weate, Oldfield, and Berents, 16.iv.1978. 1 adult male, 4 ovigerous females, 1 nonovigerous female (A.M.: P.27018);—Alma Bay, Magnetic Island, Townsville. In rock oyster zone and below. Intertidal. Coll. D. M. Holdich, 28.iv.1976. 2 adult males, 10 ovigerous females, 4 nonovigerous females.

Etymology.—The specific name *octaphymata* is derived from the Greek *octo* + *phyma*, i.e., eight + tubercle.

Description of Adult Male (Fig. 5a–i, k, m).—*Paradella* with posterior margins of pereonites 6 and 7 bearing transverse ridge with medial indentation. Pleon bearing prominent, transverse tubercle either side of midline. Each side of pos-

terior pleonal margin, lateral to point of articulation with pleotelson, bearing two suture lines merging in their posterior halves to produce a Y-shape with only one line reaching posterior margin. Pleotelson granulose with eight prominent tubercles arranged in two transverse rows of four. Subapical foramen subelliptical, connected to apex by slit which is open dorsally and widens posteriorly. Slit closed posteroventrally. Ventral margins of pleotelson on each side with broad, low, outcurved ridge extending to apex; ridges not touching in midline.

Appendages: Antennular peduncle articles 1 and 2 twice breadth of article 3; flagellum 10-articled. Antennal peduncle articles 1 to 5 increasing in length; 16-articled flagellum extending to level of pereonite 3. Mouthparts of usual sphaeromatid form; distal molar regions of mandibles lacking obvious projections/depressions; mandibular palps present; maxillipedal palp articles 2 to 4 with setose lobes. Pereopods 2 and 3 not as markedly slender as those of preceding species. Penes fused at base, proximal margins subparallel, distal margins tapering evenly to acute apex. Pleopod 1 with distal margin of endopod extended beyond exopod, narrowly rounded; internal margin bearing short, nonmarginal setae. Endopod of pleopod 2 with appendix masculina almost twice length of endopod, narrow, with margins subparallel and rounded apex. Bases of pleopods 1 to 3 each bearing three internal coupling hooks. Endopod of pleopod 4 with apex acutely tapering and internally deflected, with single apical spine. Exopod of pleopod 5 with subterminal articulation and three, finely toothed, internodistal bosses. Endopod of uropod just longer than exopod, extending just beyond apex of pleotelson, upcurved terminally; both rami with outer margins serrate, apices obtusely angled.

Description of Ovigerous Female (3.4 mm) (Fig. 5n-r).—*Paradella* with pleon bearing low tubercle either side of midline. Pleotelson granular with eight low tubercles arranged in two transverse rows of four; apex slightly extended with narrow notch reaching half way up overhanging posterior face. Ventral margins of pleotelson lacking outcurved ridges, not flattening terminally. Endopod of uropod reaching level of apex of pleotelson; exopod just shorter than endopod, with serrate external and distal margins; both rami acutely rounded apically.

Description of Nonovigerous Female.—As above but lacking brood pouch.

Description of Subadult Male (Fig. 5j, l).—Resembling nonovigerous female but with penes half length of adult penes, fused at base, and tapering evenly to narrowly rounded apices. Endopod of pleopod 2 bearing appendix masculina slightly longer than ramus but appendix free only for short distance proximal and distal to apex of endopod, otherwise fused completely with ramus. Tip of appendix masculina with short seta.

Description of Immature Male (i.e., stage before subadult male).—Resembling small nonovigerous female but bearing penes. Penes short, separate to base, each twice as long as wide. No indication of appendix masculina present.

Colour of Specimens in Alcohol.—Mottled dark reddish brown over dorsal surface. Ventral pereon and pereopods lacking chromatophores. Chromatophores absent dorsally from regions of muscle attachment.

Distribution and Habitat.—Found on the continental islands, Lizard Island and Magnetic Island.

Found on the mid to lower shore amongst barnacles and rock oysters, and in rock crevices. Associated with stable, moderately exposed, rocky shores. All stages of the life history found in cryptic habitats.

Remarks.—*Paradella octaphymata*, new species, most closely resembles *P. bakeri* but differs in having a circular, not a transverse, pleotelsonic foramen; in having Y-shaped, not V-shaped, sutures on the posterior margin of the pleon; and in having eight large tubercles on the pleotelson. (Specimens of *P. bakeri* have a small tubercle between the lateral pair of large tubercles.)

Paradella diana (Menzies, 1962), new combination

Dynamenopsis diana Menzies, 1962a: 341. Glynn, 1968a: 573, 575, 583, 584, 591, 622. Schultz, 1969: 123.

Dynamenella diana: Menzies and Glynn, 1968: 63, 113. Glynn, 1970: 18, 20, 22, 22–26. Iverson, 1974: 166. Pires, 1980b: 133–140.

Material Examined.—Pallarenda, Townsville, Queensland. Among pink barnacles on wooden pier pile. Midshore. Coll. D. M. Holdich, 14.v.1976. 2 adult males (one as Q.M.: W.7938), 1 subadult male (Q.M.: W.7938), 1 ovigerous female (Q.M.: W.7938), 1 ovigerous female with penes of subadult male form;—Pallarenda, Townsville. From pink striped barnacles and small rock oysters on rocks below splash zone. Upper shore. Coll. D. M. Holdich, 14.v.1976. 1 subadult male;—Jetty of "James Kirby," Townsville Harbour, Townsville. In barnacle tests from scrapings from steps, and concrete and copper sheathing on piles. Intertidal. Coll. D. M. Holdich, 01.vii.1976. 1 nonovigerous female (Q.M.: W.7938), 1 juvenile;—Jetty of "James Kirby," Townsville Harbour. In scrapings of barnacles from steps and piles. Lower tide level. Coll. D. M. Holdich, 11.viii.1976. 1 subadult male, 3 ovigerous females, 2 ovigerous females with penes of subadult male form, 14 nonovigerous females, 6 juveniles;—Dunwich, North Stradbroke Island, Brisbane. Under rock. Coll. N. L. Bruce, 19.vii.1978. 1 adult male, 2 subadult males;—Dunwich, North Stradbroke Island, Brisbane. Coll. J. Cowger, ?x.1971. 1 ovigerous female (no brood) (Q.M.: W.3746);—Goat Island. From rocks. Coll. N. L. Bruce, 21.vii.1978. 1 juvenile;—Fremantle Bridge, Swan River, Western Australia (32°06'S, 115°50'E). Under stones. Coll. N. L. Bruce, 10.vi.1980. 19 adult males, 44 ovigerous females, 11 nonovigerous females, 1 subadult male, 3 immature males, 101 juveniles;—Mayaguez, Puerto Rico. Sea wall at north end of bay. Intertidal. Coll. P. Glynn, 18.i.1966. 1 adult male, 1 ovigerous female, 1 half moulted female (U.S.N.M. 269486).

Description of Adult Male (4.88 mm) (Fig. 6a–h, j, k).—*Paradella* with pleon bearing prominent tubercle either side of midline. Each side of posterior pleonal margin, lateral to point of articulation with pleotelson, bearing two suture lines merging in their posterior halves to produce a Y-shape with only one line reaching posterior margin. Pleotelson granulose, especially obvious in lateral view, with dome bearing anterior, longitudinal tubercle and posterior, elongate, oblique tubercle either side of midline. Subapical foramen V-shaped, directed dorsally, with anteromedial tooth bearing longitudinal ridge. Foramen closed posteriorly. Ventral margins of pleotelson on each side with low outcurved ridge extending to apex; ridges not touching in midline.

Appendages: Antennule as in *P. octaphymata* but flagellum with 12 articles. Antenna as in *P. octaphymata* but flagellum with 13 articles, extending to level of pereonite 4. Mouthparts of usual sphaeromatid form; distal molar regions of mandibles lacking obvious projections/depressions; maxillipedal palp articles 2–4 with setose lobes. Pereopod 1 robust; 2 and 3 slender; 4 robust; 5–7 becoming slender and increasing in length. Merus, carpus, and propodus of pereopods with inferior setae. Penes fused at base, with proximal margins subparallel; distally tapering to acute apices. Pleopod 1 with distal margin of endopod extended beyond exopod, acute; internal margin bearing short nonmarginal setae. Endopod of pleopod 2 with appendix masculina twice length of endopod, narrow, with margins subparallel, tapering abruptly to narrowly rounded, externally deflected apex. Bases of pleopods 1 to 3 each bearing three internal coupling hooks. Endopod of pleopod 4 with apex extended, acute, internally deflected, with single apical spine. Exopod of pleopod 5 with subterminal articulation and three, finely

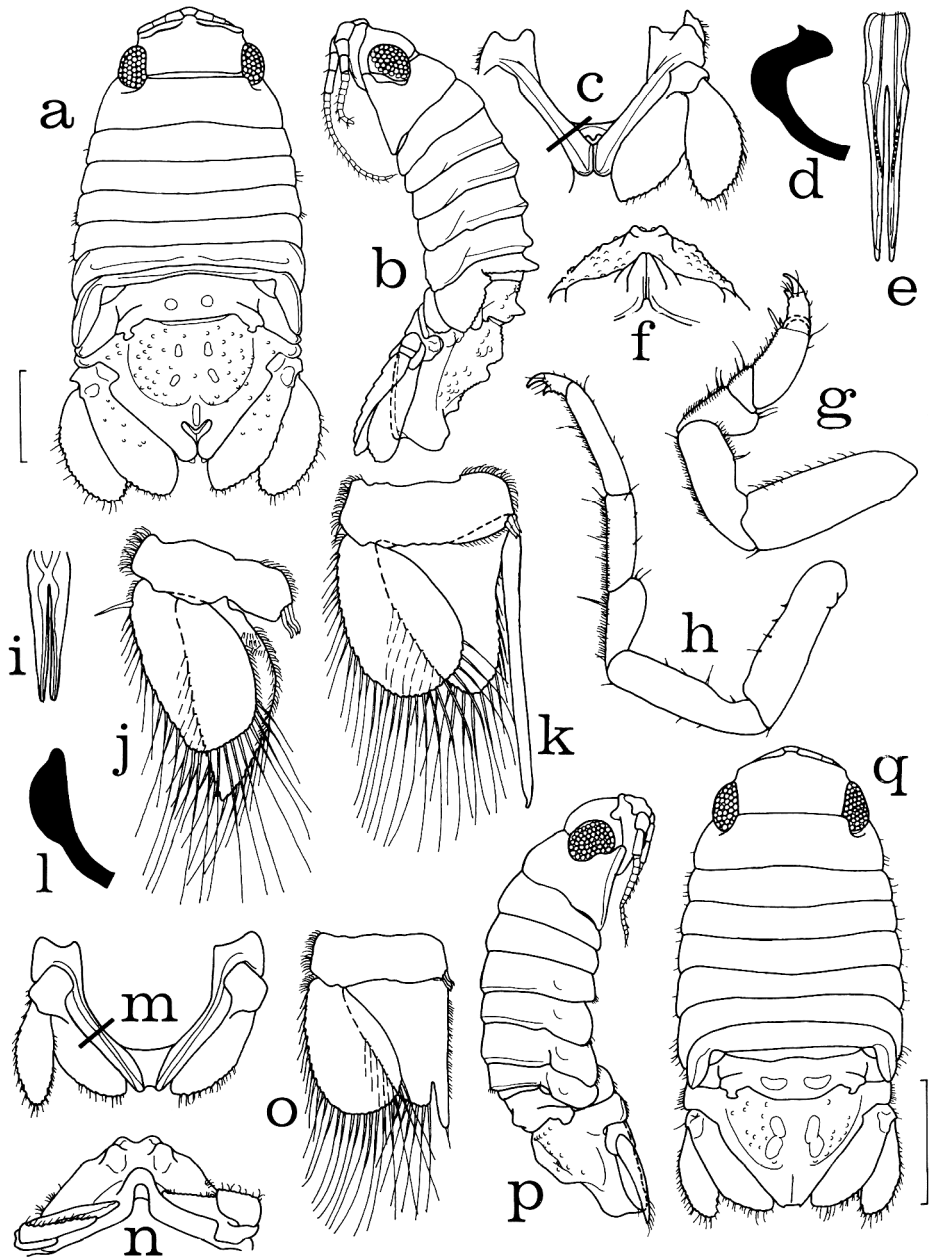


Fig. 6. *Paradella diana* (Menzies), new combination. Adult male (a) dorsal, (b) lateral, (c) ventral, pleotelson, (d) T.S. through pleotelsonic margin at level of bar on 'c,' (e) penes, (f) posterior, pleotelson, (g) pereopod 1, (h) pereopod 2, (j) pleopod 1, (k) pleopod 2.—Subadult male (i) penes, (o) pleopod 2.—Ovigerous female (l) T.S. through pleotelsonic margin at level of bar on 'm,' (m) ventral, pleotelson, (n) posterior, pleotelson, (p) lateral, (q) dorsal. Each scale line represents 1 mm.

toothed internodistal bosses. Endopod of uropod extending beyond apex of pleotelson, dorsally concave with several small tubercles; exopod just shorter than endopod; both rami serrate in distal half.

Description of Ovigerous Female (3.68 mm) (Fig. 6l–n, p, q).—*Paradella* with pleon bearing low tubercle either side of midline. Pleotelson granulose with two elongate tubercles fused as oblique ridge either side of midline; apex slightly extended, opening as wide channel not visible in dorsal view. Ventral margins of pleotelson lacking outcurved ridges, not flattening terminally. Endopod of uropod extending to level of apex of pleotelson; exopod just shorter than endopod; both rami acutely rounded terminally with obvious marginal setae. Oostegites relatively smaller than those of *P. octaphymata*.

Description of Nonovigerous Female.—As above but lacking oostegites.

Description of Subadult Male (Fig. 6i, o).—Resembling nonovigerous female, but with penes and endopod of pleopod 2 resembling those of *P. octaphymata*.

Colour of Specimens in Alcohol.—Pale, with fine grey chromatophores. Chromatophores absent from ventral pereon and pereopods.

Distribution and Habitat.—Found on North Stradbroke Island, near Brisbane; in Townsville Harbour; at Pallarenda, just north of Townsville; and in Western Australia. This species has also been recorded from Baja California (Menzies, 1962a); Puerto Rico (Menzies and Glynn, 1968; Glynn, 1968a), Marshall Islands (Glynn, 1970), California (Iverson, 1974), and Brazil (Pires, 1980b). It is noteworthy that in Australia it has been found only near international ports, often amongst sessile organisms belonging to groups commonly found attached to ships' hulls.

This isopod is found amongst barnacles, bryozoans, and rock oysters on rocks and man-made structures from upper to lower shore, and tends to be associated with relatively stable rocky shores in moderately sheltered localities. All stages of the life history were found in cryptic habitats.

This species has a wide geographical distribution and elsewhere has been found amongst intertidal green algae, empty polychaete tubes, and barnacle tests on both exposed and sheltered shores in Brazil (Pires, 1980b); under stones, in empty barnacle tests, on rocks with algae, and under *Chiton tuberculatus* Linnaeus in Puerto Rico (Glynn, 1968a; Menzies and Glynn, 1968); washings from rocks on lagoon side of Fred Island, Marshall Islands (Glynn, 1970). Pires mentions that this species can live in polluted water, basing her assumption on the fact that one site of Menzies and Glynn was near a polluted bay. It would appear that this species tolerates a wide variety of conditions, as Townsville Harbour is mildly polluted and the water in Pallarenda Bay can be of relatively low salinity.

Dynamenopsis Baker, 1908

Diagnosis.—Eubranchiata Sphaeromatidae with antennular article 1 not extended anteriorly as plate. Both sexes with pereon and pleon lacking dorsal processes. Coxal plates prominent, obvious; those of pereonite 6 with rounded posterior margins always overlapping those of pereonite 7. Apex of pleotelson with lateral margins curved ventrally and medially to meet, or almost meet, in midline producing either enclosed, posterodorsally directed foramen, or posterodorsally directed groove. Mandibles aberrant, robust; incisor processes stout, smoothly rounded; lacinia mobilis and setal rows absent; molar processes expanded as

broad, ridged crushing plates. Pereopods subequal, stout, with accessory unguis short, smoothly rounded. Exopod of pleopod 3 with articulation.

Adult Male.—Penes short, stout, separate to base. Appendix masculina arising from internoproximal angle of endopod of pleopod 2 and extending beyond apex of endopod. Posterior margin of pereonite 7 markedly bilobed in dorsal view.

Ovigerous Female.—Inadequately known.

Type-species.—*Dynamenopsis obtusa* Baker, 1908.

Additional species:	Current name:	Recommendation based on examination of:
<i>D. varicolor</i> Hurley and Jansen, 1971	<i>Dynamenopsis varicolor</i>	Type

Remarks.—Originally described from South Australia, *D. obtusa* is here recorded from Western Australia (see Appendix). In addition, a female *Dynamenopsis* sp. is illustrated (Fig. 8k–o). This female differs in dorsal view from males of both *D. obtusa* and *D. varicolor* but as little is known about the degree of sexual dimorphism shown by species of *Dynamenopsis*, and since the female was not found with males, specific identification remains undetermined. At the base of each of pereopods 2 to 4 this female bears a short, narrow, rigid oostegite, with indications of four pairs of apertures beneath the ventral cuticle between these structures. This specimen is apparently nonovigerous.

Of the other species currently placed in the genus *Dynamenopsis*, *D. dumerilii* and *D. platyura* have been placed in *Dynamenella* above; *D. angolensis* Kensley, 1971, cannot be placed in any of the five genera considered here and its correct generic placement is unknown.

Species of the genus *Dynamenopsis* are known only from New Zealand and South and Western Australia.

Cymodocella Pfeffer, 1887

Diagnosis.—Eubranchiate Sphaeromatidae with antennular peduncle article 1 not extended anteriorly as plate. Both sexes with pereon and pleon lacking dorsal processes. Both sexes with rami of uropod lamellar; endopod greater than half length of exopod. Apex of pleotelson with lateral margins curving ventrally and meeting in midline producing cylindrical, posteriorly directed aperture. All pereopods with simple accessory unguis, not markedly bifid. Exopod of pleopod 3 without articulation. Sexual dimorphism not pronounced.

Adult Male.—Penes short, stout, separate to base. Appendix masculina arising from internoproximal angle of endopod of pleopod 2 and extending beyond apex of endopod. Exopod of uropod usually relatively longer than that of female.

Ovigerous Female.—Mouthparts not metamorphosed. Exopod of uropod usually shorter than that of male. Brood pouch formed posteriorly as pocket, opening anteriorly at level of pereopod 4; and anteriorly as three pairs of large oostegites arising from pereopods 2 to 4 and overlapping well in midline. Brood not incubated in pouch thus formed, but in invaginations of ventral body wall.

Type-species.—*Cymodocella tubicauda* Pfeffer, 1887.

Additional species:	Current name:	Recommendation based on examination of:
<i>C. algoensis</i> (Stebbing, 1875)	<i>Cymodocella algoensis</i>	Literature
<i>C. bicolor</i> (Barnard, 1914) new combination	<i>Dynamenella bicolor</i>	Type
<i>C. cancellata</i> Barnard, 1920	<i>Cymodocella cancellata</i>	Type
<i>C. capra</i> Hurley and Jansen, 1977	<i>Cymodocella capra</i>	Type
<i>C. diateichos</i> Barnard, 1959	<i>Cymodocella diateichos</i>	Type
<i>C. egregia</i> (Chilton, 1892)	<i>Cymodocella egregia</i>	Specimens
<i>C. eutylos</i> Barnard, 1954	<i>Cymodocella eutylos</i>	Types
<i>C. foveolata</i> Menzies, 1962b	<i>Cymodocella foveolata</i>	Types
<i>C. guarapariensis</i> Silva, 1965	<i>Cymodocella guarapariensis</i>	Literature
<i>C. magna</i> Barnard, 1954	<i>Cymodocella magna</i>	Types
<i>C. pustulosa</i> Barnard, 1914	<i>Cymodocella pustulosa</i>	Types
<i>C. sublaevis</i> Barnard, 1914	<i>Cymodocella sublaevis</i>	Types

Remarks.—*C. bicolor*, new combination, resembles *C. pustulosa* but the pleotelson is relatively broader and the posterior margin of pereonite 7 is not bilobed. In the subadult male examined the posterior margins of the pleotelson curved ventrally and produced a posteriorly directed foramen, but did not meet in the midline, being separated by a narrow slit.

Some species of *Cymodocella* (e.g., *C. pustulosa* and *C. eutylos*) have the coxal plates of pereonite 6 acute and deflected posteriorly, overlapping those of pereonite 7. Such overlapping has been held in the past to be a distinguishing generic character of *Dynamenopsis*. Since this overlapping occurs in species of *Cymodocella* its importance as a generic character must be weakened, but in all specimens seen the genus *Dynamenopsis* shows this character in an extreme form. Species of *Dynamenopsis* have the posterior margins of the coxal plates of pereonite 6 broadly rounded, not acute, completely covering the lateral margins of pereonite 7.

Of the other species currently placed in the genus *Cymodocella*, *C. marginata* and *C. nipponica* have been transferred to *Dynamenella*; and *C. sapmeri*, *C. eatoni*, *C. huttoni*, and *C. ovalis* have been transferred to *Ischyromene* (see above).

Species of the genus *Cymodocella* occur mainly in the Antarctic and southern temperate regions; only *C. guarapariensis* and *C. foveolata*, from South America, are known from the tropics. No species are known from Australia (Fig. 7D).

KEY TO ADULT SPECIMENS OF THE GENERA CONSIDERED ABOVE

1. Apex of pleotelson with a posteriorly directed, ventrally closed (or almost closed) tubular foramen *Cymodocella* Pfeffer
- Apex of pleotelson with a simple channel or indentation, or a dorsally or posterodorsally directed foramen 2
2. Coxal plates of pereonite 6 twice length of tergite, covering coxal plates of pereonite 7. Incisor processes of mandibles smoothly rounded *Dynamenopsis* Baker
- Coxal plates of pereonite 6 subequal in length to tergite. Coxal plates of pereonite 7 exposed. Incisor process of mandibles dentate 3
3. Endopod of pleopod 1 thickened in internal half *Ischyromene* Racovitza
- Endopod of pleopod 1 not thickened 4

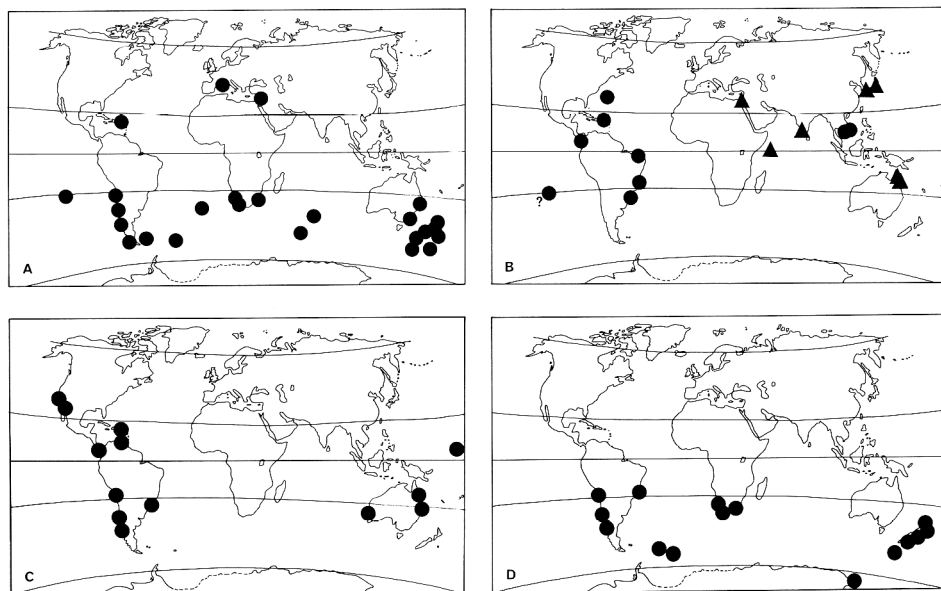


Fig. 7. Known distribution of genera worldwide. (A) *Ischyromene*, (B) *Dynamenella*, ▲ = exopod of pleopod 3 lacking articulation, ● = exopod of pleopod 3 with articulation, (C) *Paradella*, (D) *Cymodocella*.

- 4. Ventral margins of pleotelson of adult male bearing outcurved ridges which do not meet in posterior midline. Ovigerous female with a short oostegite at the base of pleopod 4 *Paradella*, new genus
- Ventral margins of pleotelson of adult male either bearing outcurved ridges which meet in posterior midline, or lacking outcurved ridges. Ovigerous female lacking oostegites *Dynamenella* Hansen

Sources of Error in Sphaeromatid Systematics.—Since Hansen (1905) very few workers have mentioned the brood pouch when describing new taxa. Many species of *Dynamenella*, *Ischyromene*, and *Paradella* (until now considered species of *Dynamenella*) could have been separated long ago if greater attention had been paid to this structure. The present authors consider the morphology of the brood pouch to be one of the single most important generic characters within the family Sphaeromatidae, and it should be described in detail whenever possible.

The form of the penes of the adult male is also an important generic character. With males, confusion has arisen because workers have assumed that the presence of penes indicated the specimen was an adult male. This is not so. The new species from Australia described here confirm that not only can subadult males have penes (and often a very different dorsal morphology when compared to the adult male), but also that penes can be obvious in immature males. This has led in the past to descriptions based on immature specimens (e.g., *Dynamenella acutitelson* and *Dynamenella tropica*), a situation which could have been avoided by ensuring that the specimens to be described had the appendix masculina free and not partially or completely fused with the endopod of the pleopod.

Even less desirable than describing species based on immature males, in a

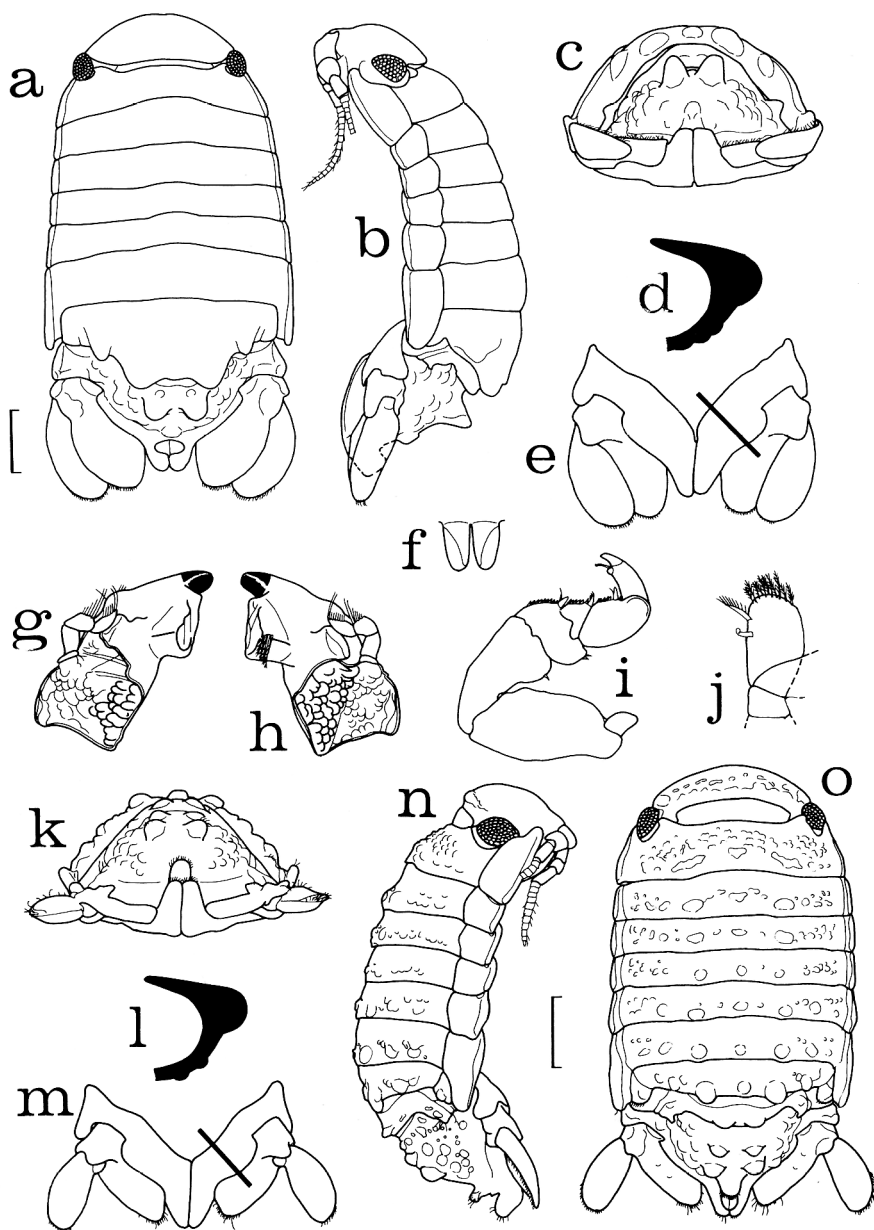


Fig. 8. *Dynamenopsis obtusa* Baker. Adult male (W.A.M.: 56-80) (a) dorsal, (b) lateral, (c) posterior, pleotelson, (d) T.S. through pleotelsonic margin at level of bar on 'e,' (e) ventral, pleotelson, (f) penes, (g) left mandible, anterior view, (h) right mandible, anterior view.—Adult male holotype (S.Aust.M.: C.359) (i) pereopod 1, (j) maxillipedal endite. *Dynamenopsis* sp. Nonovigerous female (W.A.M.: 57-80) (k) posterior, pleotelson, (l) T.S. through pleotelsonic margin at level of bar on 'm,' (m) ventral, pleotelson, (n) lateral, (o) dorsal. Each scale line represents 1 mm.

family where sexual dimorphism is common, is the description of species based on females (at any stage of development). In some cases it is difficult, if not impossible, to place females in the correct genus. The genus *Sergiella* Pires, 1980a, was founded on females and the fact that they appear to be females of a species of *Paracerceis* serves to demonstrate the undesirability of such descriptions.

It is to be recommended, therefore, that descriptions of new species be based on adult males. They should also include not only a full description of the male, but descriptions of ovigerous females and other stages of the life cycle whenever possible. Descriptions of the adult male penes and appendices masculinae, and the brood pouch and mouthparts of the ovigerous female, should be made to prevent species from being referred to incorrect genera. Thorough re-examination of existing species should also be undertaken to facilitate much needed revision of this family of isopods.

LIFE HISTORY AND ECOLOGY

Until the present study the only Australian eubranchiate sphaeromatid about which details of the ecology are known was *Dynamene curalii* Holdich and Harrison (1980c). Members of this genus are more commonly found in mid to lower shore cryptic habitats and algae in tidal localities of northwestern Europe, and similar habitats in the sublittoral region of the Mediterranean Sea (Holdich, 1970). In addition, *Dynamene ramuscula* Baker has been recorded from sponges in South Australia (Baker, 1908). In subtropical and tropical latitudes *Dynamene* appears to be absent from rocky shores and is replaced by *Dynamenella*-like sphaeromatids (e.g., Menzies and Glynn, 1968; Glynn, 1970). However, *Dynamene curalii* is one of the dominant eubranchiates associated with the intertidal coral reef on Heron Island, Queensland. On Heron Island another, as yet undescribed, eubranchiate sphaeromatid which resembles *Dynamene* is also abundant on the reef. *Dynamene* species have a biphasic life history; juveniles feed on and inhabit intertidal algae and adults occupy cryptic habitats (e.g., crevices and empty barnacle tests) where they reproduce (Holdich, 1976). This change of habitat is no doubt correlated with the degenerate state of the ovigerous females when they are brooding. The species of *Dynamenella* and *Paradella* studied here occupy similar habitats to species of *Dynamene* on the coasts of northwestern Europe, but the *Dynamenella* in particular live higher up the shore and also inhabit sand. None of the species of *Dynamenella* and *Paradella* examined appear to have a biphasic life history, as all stages of development are present in any one habitat. However, workers in other countries have found *Dynamenella*-like sphaeromatids on intertidal algae. The females of the species examined do not become degenerate at the ovigerous moult and perhaps develop more than one brood. Usually the sex ratio strongly favours females (see below). The food source appears to be from the algal/bacterial film on the surface of the rocks, from filamentous green and red algae, and in the case of sand dwellers from dead and dying peracarid crustaceans.

As there is some overlap in the habitat preferences of the species under consideration, the species are examined together under each locality. However, *Ischyromene polytyla* is known from only a single record in southeastern Queensland and details of its ecology are not yet known, except that it was from wood on the shore.

Island Sites

Heron Island.—Besides the coral reef and surrounding cay, areas of beach rock (formed from lithified coral sand) occur on the upper part of the south and north shores (Plate Ia). As described by Endean *et al.* (1956b) the beach rock is inhospitable with high surface temperatures and desiccating conditions at low tide. Only periwinkles such as *Nodilittorina pyramidalis* Quoy and Gaimard and *Melalapha* spp., and the chiton, *Acanthozostera gemmata* (Blainville), appear able to cope with such conditions. Few workers have apparently bothered to examine crevices within the beach rock. Although these are out of the water for most of the day they are moist and contain a surprising variety of life. Most notable is *Dynamenella ptychura*. Many hundreds of individuals of all stages of the life cycle were found clustered in the crevices (Plate Ib). In two populations 15 and 24 adult males, 15 and 14 subadult males, 177 and 70 ovigerous females, 31 and 20 nonovigerous females, and 74 and 240 juveniles were found. All individuals were bright green which was perhaps because they were feeding on the film of green algae which was growing in the outer illuminated part of the crevice. No other food appeared to be available in the crevices at low tide except for the perithecia of marine lichens. (Specimens of *D. ptychura* were kept alive for a number of months in an aquarium containing beach rock and its associated microflora.) When the beach rock occasionally became covered in water at high tide some individuals were seen to swim from the crevices and crawl on the surface of the submerged beach rock before entering another crevice. This activity could explain why one specimen was found on algae lower down on the reef. Besides *D. ptychura* only one other sphaeromatid was found in beach rock crevices and this appears to belong to an undescribed genus. Other occupants included terrestrial isopods and *Ligia* sp., periwinkles, lithophage barnacles, and an actinian. [No sphaeromatids were found under the chitons as was reported by Glynn (1968a) from Puerto Rico.]

Magnetic Island.—Although a wide variety of habitats were examined on this granitic island only *Dynamenella liochroea* and *Paradella octaphymata* were recorded. *D. liochroea* was found in semipermanent wood in the upper zone of a moderately flat shore containing a mixture of rock and muddy sand. The wood appears to provide a refuge for many peracarid crustaceans; amongst the isopod species, *Gnathia falcipenis* Holdich and Harrison, *Gnathia meticola* Holdich and Harrison, *Cirolana cranchii* Leach var. *australiensis* Hale, *Corallana nodosa* Schioedte and Meinert, *Sphaeromopsis serriguberna* Holdich and Harrison, were found along with species of *Limnoria* Leach.

Paradella octaphymata was observed at Alma Bay on the mid to lower shore of a moderately exposed rock face sloping at 45° into the water (Plate IIa). As shown by Endean *et al.* (1956b) corals occur in patches on the rocky shores of Magnetic Island around the low water spring tide level and below. At Alma Bay brown seaweeds, *Sargassum* spp., occur in this zone with the corals; above this, and up to the high water neap tide level, barnacles, including *Tetralicta rosea* (Krauss), and rock oysters, *Crassostrea amasa* (Iredale), commonly occur. Between the high water neap and high water spring levels various barnacle and periwinkle species predominate. Observations were made in April on a spring tide as it flowed over the rock oyster zone. This zone also contained a mat of filamentous green and red algae with trapped silt. As the swash covered the rocks and then started to drain away numerous *P. octaphymata* and amphipods were seen moving over the surface of the algae and rocks. As soon as the water drained

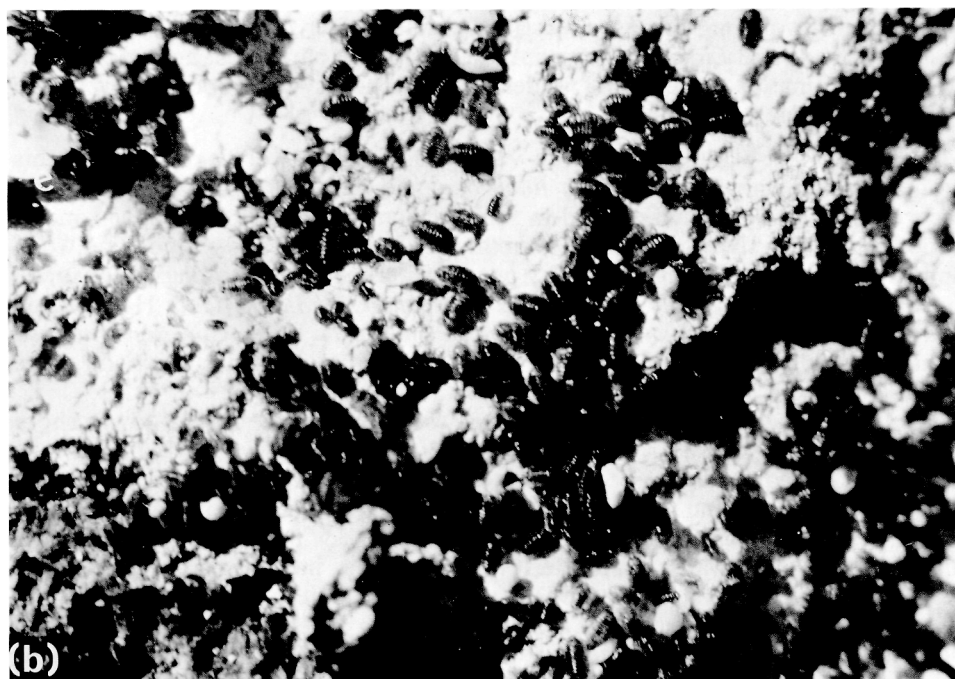


Plate Ia. Upper shore on Heron Is. showing the zone of beach rock above the reef flat and below the sand of the cay.

Plate Ib. The inside of a beach rock crevice on Heron Is. showing the large number of *Dynamenella ptychura* present.



(a) Plate IIa. The littoral zone at Alma Bay, Magnetic Island. The arrow marks the zone of amphipods and isopods. a, zone of corals and brown algae; b, red and green filamentous algae, and rock oysters; c, rock oysters and barnacles; d, barnacles and periwinkles.

(b) Plate IIb. The lower part of a wooden pier pile at low tide at Pallarenda, Townsville. Note the profusion of epizoonts, especially bryozoans.

away they ceased to move until the rock surface was moistened again. When further observations were made in August, amphipods, but no isopods, were seen performing the same activity pattern. In addition to *P. octaphymata* a species of *Dynoidella* Pillai was found in the same zone but mainly associated with barnacles.

Lizard Island.—On this granitic island four sphaeromatid species considered here were found. As on Heron Island, *Dynamenella ptychura* lived in crevices of beach rock, but *D. liochroea* and *Zuzara* sp. were also found here. *D. liochroea*, and more commonly, *D. trachydermata* were found in granitic rock crevices of the upper shore. *D. liochroea* was also found in sand around the lower levels of beach rock along with *Sphaeromopsis serriguberna*. *Paradella octaphymata* occupied a similar zone to that on Magnetic Island, i.e., amongst mid to lower shore rock oysters, barnacles, and filamentous algae. As on Magnetic Island *Dynoidella* sp. was also recorded from this habitat. At West Point, where slabs of granite slope into the sea, *P. octaphymata* occupied the lower half of the rock oyster and barnacle zone down to low water; *D. trachydermata* occurred in the upper half of the rock oyster zone and extended to the crevices of the upper shore where *D. liochroea* also occurred. Although only *D. liochroea* was found inhabiting sand both *D. trachydermata* and *D. ptychura* have been recorded from that habitat on Hinchinbrook Island (situated between Townsville and Cairns).

Mainland Sites (Working Northwards)

Townsville Harbour.—Large vessels frequently enter and leave this international harbour. It is very sheltered in the inner parts and all the concrete, metal, and wooden man-made structures are covered by algae and sessile animals. A number of isopod species were collected from the inner harbour but, of the sphaeromatids considered here, only *Paradella diana*e was found. It occurred with *Gnathia biorbis* Holdich and Harrison, *Gnathia meticola*, and *Sphaeroma walkeri* Stebbing among barnacles attached to pier piles near low water. *S. walkeri* was a common inhabitant of the harbour especially in summer. *P. diana*e also occurs further south than Townsville and has been recorded from Goat Island, and North Stradbroke Island near Brisbane, from under intertidal rocks.

Kissing Point.—This promontory of red granite is exposed to much wave action and a wide variety of microhabitats are present. Crevices on the upper shore often contained both *Dynamenella trachydermata* and *D. liochroea*. Both were also found under stones on sand, and, in more sheltered places, in sand near midshore rocks. Adults were more common in crevices than sand. Individuals in sand tended to be paler than those in crevices. Those from crevices were mostly green. The colour variation probably results from diet, as algal food can lead to a change in subcuticular pigmentation in sphaeromatids (Holdich, 1969).

Pallarenda (Just North of Townsville).—Collections were made from the piles of a decaying wooden pier and from rocky outcrops in the mid and upper shore (no rocks were present on the lower shore). Both habitats contained *Paradella diana*e, *Dynamenella liochroea*, and *D. trachydermata*. The lower parts of the pier piles were thickly covered by epizoonts—mainly bryozoans, sponges, barnacles, and hydroids (Plate IIB). The three isopods were found mainly under this growth amongst the barnacles. The rocks of the mid and upper shore were covered with rock oysters and pink barnacles (*Tetralicta rosea*) and all three isopods were found amongst them. *Sphaeroma walkeri* was also collected on the mid and upper shore.

Kurrimine and District.—Most of the shores sampled in this area were sandy with either outcrops of soft red rock, or boulders scattered on sand, on the mid and upper shore. *Dynamenella trachydermata* was found on both mid and upper shores in crevices and amongst filamentous red algae associated with the red rock. *D. liochroea* was found amongst the red algae on the midshore only, but it was also relatively common under stones on fine sand or in the sand itself on the midshore, especially where there was freshwater running across the shore or an estuary nearby. *Sphaeromopsis serriguberna*, however, was much more abundant than *D. liochroea* under the stones (Holdich and Harrison, 1981b).

Cairns and District.—At the headland of Palm Beach only *Dynamenella trachydermata* was found in the rock oyster zone and above. It occurred in crevices containing lithophage barnacles and green algae just like *D. ptychura* on Heron Island and Lizard Island. On the midshore at Yorkey's Knob both *D. liochroea* and *D. trachydermata* were associated with *Teredo*-bored wood. *D. liochroea* was also found around midshore rocks in fine sand, and *D. trachydermata* was found in crevices just below the rock oyster zone.

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APPENDIX

Additional Material Examined

- Ischyromene lacazei* Racovitza, 1908—Banyuls-sur-mer, France. Pres. G. Racovitza. 3 specimens (Syntypes. B.M.N.H.: 1910.1.10.21-23).—Lagune du Brus, France. On *Cystoseira stricta*. Coll. M. L. Roman, 13.ii.1978. 4 adult males, 14 subadult males, 2 ovigerous females, 2 nonovigerous females, 25 juveniles. (Fig. 10-s).

- Ischyromene bicarinata* Harrison, 1981—Palmachim, north of Ashdod, Israel. On *Hypnea* sp. Intertidal. Coll. L. Fishelson, 23.viii.1977. 1 adult male (Holotype. B.M.N.H.: 1980.222.1), 1 subadult male, 1 nonovigerous female, 3 juveniles (Paratypes. B.M.N.H.: 1980.223.5).
- Dynamenopsis obtusa* Baker, 1908—Denial Bay, South Australia. Coll. Verco and Torr. 1 adult male (Holotype. S.Aust.M.: C.359) (Fig. 8i, j)—North Point, Green Island, Rottneest Island, Western Australia. Amongst algae and rock on limestone reef platform. Depth 0.3 m. Coll. L. M. Joll, 08–10.vi.1972. 1 adult male (W.A.M.: 56–80) (Fig. 8a–h).
- Dynamenopsis dumerilii* (Audouin, 1826)—Bir Suer, Red Sea. On weed. Coll. L. Fishelson, 06.xi.1976. 1 subadult male.
- Dynamenopsis platyura* (Nobili, 1906)—I. Gambier. Coll. Dr. Seurat, 1903. 8 specimens. (Syntypes. M.d'H.N.).
- Dynamenopsis varicolor* Hurley and Jansen, 1971—New Zealand. 1 adult male. (Holotype. C.M.).
- Dynamenopsis* sp.—Natural Jetty, Rottneest Island, Western Australia. Coll. R. W. George, 19.ii.1959. 1 nonovigerous female. (W.A.M.: 57–80) (Fig. 8k–o).
- Cymodocella tubicauda* Pfeffer, 1887—Hallett B., Antarctica. 7 specimens. (N.Z.O.I.: Z.1795).
- Cymodocella cancellata* Barnard, 1920—South Africa. Pres. S.Afr.M. 1 specimen. (Holotype. B.M.N.H.: 1937.11.10.82).—34°12.9'S, 18°49.1'E. Coll. University of Cape Town. 1 male (S.Afr.M.: A.14954).
- Cymodocella capra* Hurley and Jansen, 1977—New Zealand. 1 male (Paratype. N.Z.O.I.: E.977).
- Cymodocella diateichos* Barnard, 1959—Saldanha Bay, South Africa. Intertidal. Coll. University of Cape Town, 22.ix.1957. 1 specimen (Holotype. S.Afr.M.: A.13663).
- Cymodocella egregia* (Chilton, 1892)—Makorori Beach, New Zealand. Intertidal. Coll. N.Z.O.I., 20.ii.1968. 7 specimens (N.Z.O.I.: E.982).
- Cymodocella eutylos* Barnard, 1954—South Africa. 1 male, 1 ovigerous female. (Syntypes. S.Afr.M.: A.10409).
- Cymodocella foveolata* Menzies, 1962b—Estación de Biología Marina, Montemar, Chile (32°57'24"S, 71°33'25"W). Intertidal. Coll. Lund University Chile Expedition 1948–49, 15.x.1948. 1 specimen (Holotype. N.R.: ISOPODA 9453);—(Details as above) Coll. 15.vi.1949. 3 specimens (Paratypes. N.R.: ISOPODA 9454).
- Cymodocella magna* Barnard, 1954—South Africa. 3 specimens (Syntypes. S.Afr.M.: A.10408);—South Africa. Coll. R. W. Rand. 31 specimens (S.Afr.M.: A.10415).
- Cymodocella pustulata* Barnard, 1914—Mouille Pt., South Africa. Coll. K. H. Barnard, 15.iv.1913. 125 specimens (Syntypes. S.Afr.M.: A.2607);—South Africa. Coll. K. H. Barnard. 10 specimens (Syntypes. B.M.N.H.: 1927.5.31.99–108).
- Cymodocella sublevis* Barnard, 1914—Mouille Pt., South Africa. Coll. K. H. Barnard, 29.xi.1913. 18 specimens (Syntypes. S.Afr.M.: A.2623);—Sea Point, near Cape Town, South Africa. Coll. K. H. Barnard. 12 specimens (Syntypes. B.M.N.H.: 1927.5.31.109–118).
- Dynamenella perforata* (Moore, 1901)—Ensenada Honda, Culebra, Puerto Rico. Coll. U.S. Fish Commission (Steamer "Fish Hawk"), 11.ii.1899. 3 adult males, 1 subadult male, 1 ovigerous female (no brood), 1 nonovigerous female (Types. U.S.N.M.: 32649);—Puerto Rico. Coll. P. Glynn. 1 male, 2 ovigerous females, 9 nonovigerous females (U.S.N.M.: 259321).
- Dynamenella acuticauda* Menzies, 1962b—Estrecho de Magallanes, south of Punta Arenas (53°11'S, 70°55'W). Intertidal. Coll. Lund University Chile Expedition 1948–49, 03.v.1949. 1 nonovigerous female (Holotype. N.R.: ISOPODA 9450).
- Dynamenella angulata* (Richardson, 1901)—Florida, U.S.A. Coll. H. Hemphill. 11 subadult males (Types. U.S.N.M.: 23906).
- Dynamenella australis* Richardson, 1906—Cape Town, South Africa. Coll. K. H. Barnard. 2 adult males. (B.M.N.H.: 1927.5.31.127–128).
- Dynamenella australoides* Barnard, 1940—St. James, Cape Peninsula, South Africa. Pres. S.Afr.M. 2 ovigerous females (Syntypes. B.M.N.H.: 1938.4.27.6–7).
- Dynamenella bakeri* (Menzies, 1962b)—Iquique, Chile. (20°12'30"S, 70°10'19"W). The harbour. Tidal belt. Coll. Lund University Chile Expedition 1948–49 (station M.133), 02.vii.1949. 3 adult males, 2 ovigerous females, 1 juvenile (Types, N.R.: ISOPODA 9468).
- Dynamenella benedicti* Richardson, 1899—Monterey Bay, California, U.S.A. At the surface. Coll. H. Heath. 1 male, 1 ovigerous female (Types. U.S.N.M.: 22570).
- Dynamenella bicolor* Barnard, 1914—Sea Point, Near Cape Town, South Africa. Coll. K. H. Barnard. 1 subadult male (Syntype. B.M.N.H.: 1927.5.13.129).
- Dynamenella brunnea* Vanhöffen, 1914—St. Paul. Coll. Deutsche Südpolar Expedition 1901–03. 1 ovigerous female (Syntype. B.M.N.H.: 1924.7.19.34).
- Dynamenella codii* Nobili, 1906—Makapu. Coll. Dr. Seurat, 1905. 8 specimens. (Syntypes. M.d'H.N.).
- Dynamenella condita* Hurley and Jansen. 1977—New Zealand. 1 adult male. (Holotype. C.M.).
- Dynamenella cordiforaminalis* (Chilton, 1883)—Bethell's Beach, New Zealand. Intertidal. Coll. N.Z.O.I., 21.x.1968. 40 specimens (N.Z.O.I.: E.949).

- Dynamenella dioxus* Barnard, 1914—Cape Town, South Africa. Coll. K. H. Barnard. 1 male (Syntype. B.M.N.H.: 1927.5.31.119).
- Dynamenella eatoni* (Miers, 1875)—Swain's Bay, Kerguelen. Coll. A. E. Eaton. 1 female (Lectotype. B.M.N.H.: 1979.219.1), 2 specimens (Paralectotypes. B.M.N.H.: 1979.220.2) (Lectotype chosen by E. Gómez Simes);—Cumberland Bay, South Georgia. Coll. Barrett Hamilton Expedition. 2 subadult males (B.M.N.H.: 1921.12.15.30–31);—Puerto Deseado, Peninsula Foca, Santa Cruz. Pres. E. Gómez Simes, 08.vi.1976. 6 specimens (B.M.N.H.: 1979.335.6).
- Dynamenella fraudatrix* Kussakin, 1962—Petrov Island, Japanese Sea. Intertidal. Coll. ?ix.1934. Pres. Acad. Sci. Leningrad (As *Dynamene glabra*. Id. G. Gurjanova). Specimens including males and ovigerous females. (B.M.N.H.: 1936.3.18.19–26).
- Dynamenella hirsuta* Hurley and Jansen, 1971—New Zealand. 1 adult male. (Holotype. C.M.).
- Dynamenella hutoni* (Thomson, 1878)—Maunganui Bluff, New Zealand. Intertidal. Coll. N.Z.O.I., 22.x.1968. 13 specimens (N.Z.O.I.: E.952);—Lyttelton, New Zealand. Pres. C. Chilton. 5 specimens (B.M.N.H.: 1906.2.20.1–6);—Gough Island, South Atlantic. Coll. M. W. Holdgate. 10 specimens (B.M.N.H.: 1958.4.15.120–129);—Cape Town, South Africa. Pres. K. H. Barnard. 1 subadult male, 2 nonovigerous females (Syntypes of *Dynamenella kraussi* Barnard, 1914. B.M.N.H.: 1915.1.11.5–8);—West Coast, Cape Peninsula, South Africa. Coll. K. H. Barnard. 9 specimens (as *Dynamenella kraussi*) (B.M.N.H.: 1927.5.13.130–138).
- Dynamenella insulsa* Hurley and Jansen, 1977—New Zealand. 1 adult male. (Holotype. C.M.).
- Dynamenella macrocephala* (Krauss, 1843)—Cape Town, South Africa. Coll. K. H. Barnard. 5 specimens (B.M.N.H.: 1927.5.31.122–126).
- Dynamenella navicula* Barnard, 1940—Port Elizabeth, South Africa. Pres. S.Afr.M. 1 ovigerous female, 1 nonovigerous female (Syntypes. B.M.N.H.: 1937.11.10.246–247).
- Dynamenella ovalis* Barnard, 1914—St. James, False Bay, South Africa. Coll. K.H. Barnard. 1 adult male, 1 juvenile (B.M.N.H.: 1927.5.31.120–121);—Still Bay, South Africa. Coll. S.Afr.M. 8 specimens (B.M.N.H.: 1937.11.10.162–167).
- Dynamenella parva* Baker, 1929—Port Willunga Reef, South Australia. Coll. H. M. Hale. 11 specimens (Syntypes. S.Aust.M.: C.3723).
- Dynamenella rubida* Baker, 1926—Marouba, New South Wales, Australia. 1 adult male (Type. A.M.: P.9487).
- Dynamenella scabricula* (Heller, 1865)—Cape Town, South Africa. Pres. K. H. Barnard. 10 specimens (B.M.N.H.: 1916.11.20.43–52).
- Dynamenella taurus* Barnard, 1940—East London, South Africa. Pres. S.Afr.M. 1 subadult male, 1 nonovigerous female (Syntypes. B.M.N.H.: 1938.4.27.8–9).
- Dynamenella tuberculata* Menzies, 1962b—Punta Corona, Canal Chacao, Chile (41°47'S, 73°53'07"W). Intertidal. Coll. Lund University Chile Expedition 1948–49, 28.ii.1949. 1 adult male (Type. N.R.: ISOPODA 9445).
- Dynamenella* sp.—Grande Anse, Mahé, Seychelles. From algae. Coll. A. Harris, 27.ix.1976. 2 adult males, 4 immature specimens. (In general appearance these specimens resemble *Dynamenella trachydermata*, new species, the only major differences being that the endopod of pleopod 1 of the adult male does not extend beyond the exopod, and the pleotelsons of the immature specimens are smoother than those of *D. trachydermata*. These specimens have been desiccated and their condition is not sufficiently acceptable to allow their description as a new species) (Q.M.: W.7952).

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