A STUDY OF SOME TASMANIAN ONISCOIDEA (CRUSTACEA, ISOPODA).

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Abstract.

The occurrence in Tasmania of seven of the eight species previously recorded is confirmed. It is recognized that *Armadillidium vulgare* (Latreille) has been recorded under a synonym. Six known species, *Styloniscus thomsoni* (Chilton), *St. phormianus* (Chilton), *Notoniscus australis* (Chilton), *Deto marina* (Chilton), *Actaecia pallida* Nicholls and Barnes, and *Eluma caelatum* (Miers), are recorded from Tasmania for the first time. Additional information on the known species is given. The position of *Ligia australiensis* Dana is clarified. *Chiltonella tasmanica* (Chilton) is transferred to genus *Notoniscus* Chilton. Ten new species are established; one of these includes specimens which formerly have been wrongly assigned to *Oniscus punctatus* Thomson. The position of the following genera; *Styloniscus* Dana, *Notoniscus* Chilton, *Chiltonella* Vandel, *Plymophiloscia* Wahrberg, *Cubaris* Brandt, s.str. after Verhoeff, and *Sphaerillo* Verhoeff, is reviewed.

Introduction.

The earliest record of the occurrence of Oniscoidea in Tasmania is given by Haswell (1882). He (p. 280) describes *Porcellio graniger* Miers 1876, and (p. 279) a new species, *Armadillidium subdentatum*, and includes Tasmania in the distribution of both.

Budde-Lund (1885, p. 285) describes a new species, *Armadillo misellus*, from a specimen collected in Tasmania.

Three previously established species are recorded from Tasmania for the first time by Thomson (1893). He describes two of these, *Actaecia euchroa* Dana 1853, (see pp. 56-57, pl. 2, figs. 1-8), from specimens collected at Eaglehawk Neck, and *Oniscus punctatus* Thomson 1879, (see pp. 54-55, pl. 1, figs. 6-13), from specimens collected on Mt. Wellington. He (p. 55) records *Ligia australiensis* Dana 1853 from the neighbourhood of Hobart. Thomson (pp. 72-73) also publishes an English translation of Budde-Lund's (1885) description of *Armadillo misellus*.

Chilton (1901, pp. 134-135) realizes that Thomson's (1893) specimens of *Oniscus punctatus* from Mt. Wellington differ from those found in New Zealand, and suggests that the former should perhaps be placed in genus *Philoscia* Latreille 1804. He (pp. 139, 140) recognizes *Porcellio graniger* Miers to be a synonym of *Porcellio scaber* Latreille 1804, and notes that *P. scaber* has thus been recorded from Tasmania.

Budde-Lund (1904, p. 93) transfers *Armadillo misellus* to genus *Spherillo* Dana 1852, and places it in his own section XIII of that genus.

He (p. 87) includes Spherillo misellus in a key to some of the species in this section.

Chilton (1909, pp. 661, 662) mentions that he has an undescribed species of genus Haplophthalmus Schöbl 1860 from Tasmania.

Chilton (1911, pp. 568-569) states that he has specimens from Hobart which he considers to be Ligia australiensis Dana.

Chilton (1915 a, p. 424, pl. 37, fig. 23) describes a new species, Haplophthalmus tasmanicus, from a specimen collected at Fern Tree Gully, Hobart. He notes, however, that this species differs in some characters from the definition of genus Haplophthalmus given by Sars (1899). Arcangeli (1923, p.314) considers that these differences are sufficient to distinguish H. tasmanicus as the type of a new genus, which he names Chiltonia. He (pp. 314-315) gives an Italian translation of Chilton's (1915 a) description of Ch. tasmanica.

Jackson (1941, p. 3) proposes that Sphaerillo Verhoeff 1926 (non Spherillo Dana 1852) be retained as the generic name for the species included in Budde-Lund's (1904) section XIII of Spherillo; this implies the transference of Spherillo misellus to genus Sphaerillo Verhoeff.

Vandel (1945, p. 236) notes the occurrence in Tasmania of a species, Chiltonella tasmanica (Chilton). In a later paper, he (Vandel, 1952, p. 96) states that Arcangeli (1923, p. 314) establishes genus Chiltonella for Haplophthalmus tasmanicus Chilton 1915. Vandel (1952, pp. 30-36, figs. 21-28) describes a new species, Styloniscus nichollsi, from specimens collected at Guide River Falls, near Burnie.

Guiler (1952, pp. 24-25), in a list of the Crustacea of Tasmania, includes the following species of Oniscoidea :- Oniscus punctatus, Ligia australiensis, Porcellio graniger (which is misspelled as "granifer"), Armadillidium subdentatum and Actaecia euchroa.

In the present paper the occurrence in Tasmania of seven of the eight species previously recorded is confirmed, Armadillidium subdentatum Haswell 1882 being regarded as a synonym of the cosmopolitan species Armadillidium vulgare (Latreille 1804). The one species not represented in my collection is Sphaerillo misellus (Budde-Lund 1885). Fifteen species are recorded from Tasmania for the first time. Five of these; Styloniscus thomsoni (Chilton 1885), St. phormianus (Chilton 1901), Notoniscus australis (Chilton 1909), Deto marina (Chilton 1884) and Actaecia pallida Nicholls and Barnes 1927, have been recorded from the mainland of Australia, New Zealand, or Subantarctic islands, or from more than one of these places. Eluma caelatum (Miers 1877) occurs in western Europe and has probably been introduced into Tasmania. Ten species are believed to be new. One of these, Plymophiloscia thomsoni n.sp., includes the specimens which Thomson (1893) wrongly assigns to Oniscus punctatus Thomson 1879.

The position of six of the genera represented; Styloniscus Dana 1852, Chiltonella Vandel 1952 (= Chiltonia Arcangeli 1923), Notoniscus Chilton 1915, Plymophiloscia Wahrberg 1922, Cubaris Brandt 1833, st.str. after Verhoeff 1926, and Sphaerillo Verhoeff 1926 (non Spherillo Dana 1852), is investigated. The validity of Vandel's (1952) use of the name Styloniscus is discussed. The confusion regarding the names Chiltonia Arcangeli and Chiltonella Vandel is pointed out. Chiltonella Vandel is classed as a synonym of Notoniscus Chilton, and the latter genus is rediagnosed accordingly. Verhoeff's (1926) limits of Plymophiloscia are widened slightly to include species which are closest to this genus. The status of Plymophiloscia in relation to Philoscia Latreille 1804 and some of its subdivisions is considered. The position of Cubaris s.str. is discussed, and an attempt is made to determine which of the species placed in Cubaris s.lat. may remain in Cubaris s.str. The limits and synonymy of Sphaerillo Verhoeff are reviewed. Sphaerillo pygmaeus Verhoeff 1926 is nominated as the type species of genus Sphaerillo.

The position of Ligia australiensis Dana, which is regarded as uncertain by some authors, is clarified by a comparison of this species with Ligia novae-zealandiae Dana 1853.

Detailed descriptions are given of all new species and of the following established species :- Ligia australiensis Dana, Styloniscus nichollsi Vandel, Notoniscus australis (Chilton) N. tasmanicus (Chilton), Actaecia euchroa Dana, A. pallida Nicholls and Barnes. Briefer accounts are given of the remaining species.

A list of the species of Oniscoidea now known to be represented in Tasmania is as follows :-

Ligia australiensis Dana 1853.

Styloniscus thomsoni (Chilton 1885) Vandel 1952.

Styloniscus phormianus (Chilton 1901) Vandel 1952.

Styloniscus nichollsi Vandel 1952.

Styloniscus maculosus n.sp.

Styloniscus squarrosus n.sp.

Notoniscus australis (Chilton 1909) Chilton 1915.

Notoniscus tasmanicus (Chilton 1915).

Deto marina (Chilton 1884) Budde-Lund 1906.

Actaecia euchroa Dana 1853.

Actaecia pallida Nicholls and Barnes 1927.

Plymophiloscia thomsoni n.sp.

Plymophiloscia tasmaniensis n.sp.

Plymophiloscia notleyensis n.sp.

Plymophiloscia ulverstonensis n.sp.

Porcellio scaber Latreille 1804.

Armadillidium vulgare (Latreille 1804) Milne-Edwards 1840.

Eluma caelatum (Miers 1877) Collinge 1917.

Cubaris hickmani n.sp.

Cubaris tasmaniensis n.sp.

Cubaris sulcifrons n.sp.

Cubaris tamarensis n.sp.

Sphaerillo misellus (Budde-Lund 1885) Jackson 1941.

Type specimens.

Holotype male and allotype female of all new species, together with paratype material, some of which is in the form of slides, are, at the time of writing, lodged in the Zoology Department of the University of Tasmania.

Material and Methods.

Specimens used in this study have been found in a variety of habitats including mountain regions, rain forest, drier eucalypt forest, grassland, gardens in populated areas, situations immediately inland from the sea shore, and the shore itself. Collection of specimens has been carried out mainly in the middle region of northern Tasmania, in the south-eastern part of the state, and in some areas of central Tasmania.

Specimens are preserved in 80% alcohol. Structures examined microscopically have been further dehydrated in absolute alcohol and mounted in euparal.

The descriptions of species are each based on a small number of specimens selected for detailed examination from among examples of the species collected in one locality. The factors which have been taken into account in this selection are largest size, most common coloration, and absence of mutilation.

Length of specimens is measured along the mid-line of the body from the anterior border of the cephalon to the posterior border of the terminal segment; breadth is measured across the 4th segment of the pereion. Measurements of the length of structures which bear terminal processes or tufts of setae, i.e. the terminal article of the flagellum of the 2nd antenna and the rami of the uropod, do not include the length of such processes or setae.

In all cases where the sex of the animal is not specifically stated, drawings illustrate structures taken from male specimens.

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Key to families of Oniscoidea known to be represented in Tasmania.

1. Flagellum of 2nd antenna composed of numerous articles, (more than 10); male organ double - - - - - - - - Ligiidae.

   Flagellum of 2nd antenna composed of fewer articles, (not more than 10); male organ single - - - - - - - - - - - - - 2.

2. Mandible with a triturating molar process; inner lobe of 1st maxilla with 3 setose processes; male organ expanded distally - Styloniscidae.

   Mandible with molar process represented by a tuft of setae; inner lobe of 1st maxilla with 2 setose processes; male organ not expanded distally - - - - - - - - - - - - - - - - - - - 3.

3. Littoral species; flagellum of 2nd antenna, in species known to occur in Tasmania, composed of 4 articles; endopodite of maxilliped well-developed, markedly larger than endite - Scyphacidae.

   Inland species; flagellum of 2nd antenna composed of 3 or fewer articles; endopodite of maxilliped reduced, not markedly larger than endite - 4.

4. Flagellum of 2nd antenna composed of 3 articles; exopodites of all pleopods without pseudotracheae - - - - - - Oniscidae.

   Flagellum of 2nd antenna composed of 2 articles; exopodites of at least 1st and 2nd pairs of pleopods with pseudotracheae - 5.

5. Species known to occur in Tasmania not able to enroll; exopodite of uropod projecting far beyond posterior border of terminal segment - - - - - - - - - - - - Porcellionidae.

Species able to enroll; exopodite of uropod not, or scarcely, projecting beyond posterior border of terminal segment - 6.

6. Pseudotracheae present only in exopodites of 1st and 2nd pairs of pleopods; exopodite of uropod broad and laminar, occupying space between terminal segment and 5th pleuron of pleon - Armadillidiidae.

Pseudotracheae present in exopodites of 1st to 4th pairs or all pairs of pleopods; exopodite of uropod reduced, space between terminal segment and 5th pleuron of pleon being occupied by protopodite of uropod - - - - - - Armadillidae.

Family Ligiidae.

Synonymy. Ligydidae, Richardson 1905.

The characters of the family are defined by Sars (1899, p. 155) as follows:-

"Body oval, more or less convex above, with the lateral parts of the segments lamellar. Cephalon without any lateral lobes, frontal part rounded and not distinctly defined from the epistome. Eyes well developed or wanting. Antennulae with the last joint very small and without distinctly developed sensory filaments. Antennae well developed, with multiarticulate flagellum. Buccal mass rather prominent. Mandibles with the molar expansion large and broad, exhibiting a finely-fluted, triturating surface. Inner masticatory lobe of the anterior maxillae with 3 thick, hairy bristles. Posterior maxillae with 2 similar bristles inside. Maxillipeds with the terminal part distinctly 5-articulate, masticatory lobe truncate at the tip, epignath rather short. External sexual appendages in male double. Inner ramus of 1st pair of pleopoda of a similar structure in the 2 sexes, that of 2nd pair in male terminating in a long stylet, slightly dilated at the tip; opercular plate of pleopoda without air-chambers. Uropoda freely projecting behind, both rami styliform."

The following comments on this diagnosis should be noted.

Chilton (1901, p. 106) points out that Ligia novae-zealandiae Dana 1853 differs from the characters of the family in that the two hairy bristles are absent from the second maxilla, and the terminal part of the maxilliped, although showing evidence of five articles, has the middle three articles fused together, with the sutures between them only partially indicated. He notes that in these points _L. australiensis_ Dana 1853 closely resembles _L. novae-zealandiae_; however he considers that these species are nevertheless true _Ligiae_.

Wahrberg (1922, p. 67) states that sensory setae are present on the antennulae in the Ligiidae, but they are so small that they are apparent only under strong magnification.

Jackson (1927, p. 133) notes that, in the genus _Ligia_, it is the most common condition for the second maxilla to lack the two setose bristles.

Genus *Ligia* Fabricius 1798.

Synonymy. *Ligyda* Rafinesque 1814.

The name *Ligia* Fabricius 1798, given to a genus of Isopods, is predated by *Ligia* Weber 1795, which is used for a Decapod genus. Consequently some authors, e.g. Richardson (1905), apply the name *Ligyda* Rafinesque 1814 to the Isopod genus. However the generic name *Ligia* Weber is suppressed and that of *Ligia* Fabricius validated according to Opinion 330 of the International Commission on Zoological Nomenclature (see Hemming 1955).

A part of the definition of genus *Ligia* given by Sars (1899, pp. 155-156) is amended by Jackson (1927, p. 133) as follows:-

"Body regularly oval or oblong-oval, moderately convex above, metasome confluent with mesosome or abruptly contracted. Head with occipital groove not obscured above by occiput, supra-antennal and frontal lines both present. Eyes large and convex. Antennulae small, last segment small or vestigial. Antennae strong, elongated. Mandible with a setose plume behind the lacinia mobilis and usually numerous pencilli between it and the molar process. Maxillipedes comparatively short and stout, endopodite large, five distinct or indicated segments, endite large, epipodite rounded."

The remainder of the definition, as given by Sars, is as follows:-

"Legs gradually increasing in length posteriorly, dactylus distinctly bi-unguiculate. Opercular plate of uropoda sub-branchial. Uropoda more or less elongated, basal part not produced inside, rami narrow, styliform, sub-equal, each with a single apical spine."

Presumably Sars' reference to the "opercular plate of the uropoda" is meant to apply to the pleopoda.

Ligia australiensis Dana 1853.

(Figs. 1-14).

The original description of *Ligia australiensis* given by Dana (1853, p. 740, pl. 49, fig. 3) is brief and is based on a mutilated specimen, which was collected in New South Wales. Descriptions of South Australian examples of the species given by Hale (1927, pp. 320-321, fig. 7), (1929, p. 340, fig. 341) are also brief. The following account of Tasmanian material which I assign to *L. australiensis* is therefore given.

Male.

Length of largest specimen: 19 mm., breadth: 8 mm.

Colour. Live specimen is yellowish-green, densely spotted with dark brown chromatophores. Overall colour of animal varies according to degree of expansion of chromatophores.

Cephalon (fig. 1). Maxillipedal somite is marked off from rest of cephalon by an occipital groove. Antennary tubercles are small, not visible in dorsal view. Eyes are compound and sub-quadrangular, with the inner border forming a right angle. As seen in dorsal view of cephalon, eyes are separated by more than twice width of each eye; distance between inner angles of eyes: 2.5 mm., transverse width of eye from inner angle to outer edge of cephalon: 0.9 mm. Posterior to inner angles of eyes, vertex is indented by 2 post-orbital pits.

First antenna (fig. 2). Triarticulate, with 3rd article very small. On outer side, 2nd article projects beyond base of 3rd, and this protuberance bears 3 long, fine setae. On dorsal surface of 3rd article there are 3 coarse sensory setae, together with a long fine seta situated below and to inner side of coarse setae.

Second antenna (fig. 1). When attached, antenna reaches back approximately to base of 2nd segment of pleon. Length of peduncle: 9.3 mm., length of flagellum: 7.5 mm. Peduncle and flagellum are set with short spines, each of which consists of an outer sheath, split at the top into 2 points, and a central seta, clubbed at its apex. Flagellum is composed of 20 articles; these vary slightly in length but are all longer than broad. Terminal article ends in a tuft of short setae.

Mandibles. Left mandible:- Incisor process has 4 teeth. Lacinia mobilis ends in 3 teeth. Behind base of lacinia mobilis is a rounded lobe, apex of which is covered with fine setae, while its under surface bears about 9 slender pencils of setae. Molar process is well developed and densely setose. Right mandible (fig. 3):- Apical border of lacinia mobilis is serrated on ventral side, while on dorsal side it is produced into a blunt point; there is a constriction in width of lacinia mobilis behind its apical region. In other respects, right mandible is similar to left.

First maxilla. Outer lobe (fig. 4) ends in 11 teeth and 2 setose processes. The 5 outer teeth are large and simple. Of the 6 smaller inner teeth, the outermost and innermost are simple, the rest have small lateral points. The outer setose process is slender and feathery, the inner one is broader and more tooth-like. Near distal end, outer margin of lobe is fringed with setae. Apex of inner lobe is rounded and setose; apical region is not marked off by a suture from remainder of lobe. On inner side of lobe there are 3 setose processes, the distal one being short and the other 2 progressively longer.

Second maxilla (fig. 5). A division into 2 lobes is indicated by an indentation in distal margin of maxilla and a suture line on ventral surface. Inner lobe is about 3 times as wide as outer lobe. Apex of outer lobe bears fine setae. Apex of inner lobe is densely covered with short setae; most of these are directed inwards, but on dorsal surface there is a conspicuous oblique band of upright setae. On inner side of lobe there is a dense brush of long simple setae, but there are no setose processes. There is a U-shaped band of chitin on dorsal surface of inner lobe.

Maxilliped (fig. 6). Epipodite is small and sub-triangular. Two articles of endopodite, ischion and dactylos, are distinct; divisions separating meros, carpos and propodos are distinct on inner side, but towards outer side of endopodite these articles are delimited from each other by suture lines which are apparent only on ventral surface. Two spines occur on outer border of endopodite, one below each of these lines. Dactylos is small and rounded. Numerous short, spiny setae are present on inner marginal region of meros, carpos and propodos, and on apex of dactylos. Endite is sub-quadrangular with its outer margin curved outwards and its apical margin straight. Apical region and inner surface of endite have a covering of fine setae. Two stout spines occur on dorsal surface near apical border; one is situated on inner corner, the other towards centre of endite. Near inner spine there is a small setose process.

Pereion. First segment is slightly produced forwards on each side to flank cephalon. Epimera of 1st and 2nd segments are nearly transverse with posterior angles right-angled, those of 3rd segment slope slightly backwards with angles sub-acute, those of 4th to 7th segments slope increasingly further backwards and have angles progressively more acute. Definite coxal grooves are not present. Dorsal surface of pereion is finely granulate. Each granule bears a scale-seta (fig. 7) having a long, narrow scale portion and a seta clubbed at its apex. Several broad, strongly chitinized, overlapping scales cover base of scale-seta. Between granules, tergites have a covering of small, simple scales. Scattered scale-setae are present along lateral borders of segments.

Pereiopods. First leg:- Carpos is swollen and oval in shape; propodos and dactylos are bent under it to form a subchelate hand (fig. 8). Opposing faces of carpos and propodos are finely striated. To outer side of striated region, under surface of these articles is indented. There is no distinctive process on propodos. Spines on leg each consist of an outer sheath, split at the end into 2 points, and a central seta, clubbed at the apex. Dactylos (fig. 9) ends in a large terminal claw, below which is a much narrower accessory claw. On outer side there are 2 spines against base of terminal claw. "Dactylar seta" is long and narrow, almost uniform in width and not clubbed at the apex.

Second leg is similar to 1st. Third leg is also subchelate, but carpos is less swollen than in 1st leg. In 4th to 7th legs carpos is sub-cylindrical, and propodos and dactylos are not bent under to form a subchelate hand. Second to 5th legs each have single "dactylar seta" as in 1st leg. On 6th and 7th legs there is a group of numerous such long, narrow setae on upper surface of dactylos near base of terminal claw. (Dactylos of 7th leg is figured, fig. 10).

Male organs (fig. 11). A pair of long, narrow structures which extend backwards almost to posterior angle of exopodite of 5th pleopod. The two male organs are fused at the base but their ducts remain separate. Organs are slightly sinuous; their apices are bluntly rounded and curve inwards. Areas covered with fine setae occur near apex of each organ. On dorsal surface, towards base of organ, there is a wide, curved band of chitin. Posteriorly this is continuous with a narrow ridge which extends down middle third of organ and which is ornamented along its outer side with small, oblique strips of chitin. Towards inner side, another ridge runs parallel to first ridge for most of its length and extends beyond it distally; this second ridge bears fine setae. A ridge down outer side of ventral surface of organ is not ornamented.

Pleon. Not abruptly narrower than pereion. Pleura of 3rd to 5th segments are well developed, are directed backwards and have acute posterior angles.

Terminal segment (fig. 12):- Postero-lateral angles are short and sub-acute; they do not extend back as far as does centre of segment. Outer accessory processes are absent, inner accessory processes are bluntly rounded. Posterior border between inner accessory processes forms a very obtuse median angle. Jackson (1922, p. 686) recognizes among species of *Ligia* two main types of terminal segment, "triangulate", in which this border has a median process, and "arcuate", in which it is evenly rounded. Because of its slight median angle the terminal segment of L. australiensis may be classed as triangulate; however the angle is so obtuse that it very nearly approaches the arcuate type.

Dorsal surface of pleon is finely granulate. Arrangement of scales and scale-setae is similar to that on pereion.

Pleopods. First pleopod:- Outer side of protopodite bears a lobe which is twisted and irregular in shape and lacks setae. Exopodite is sub-oval; its inner and posterior borders are fringed with plumose setae. Conspicuous large blood vessels ramify through exopodite. Endopodite is sub-triangular but very short. It is branchial in nature, not sexually differentiated; it encloses blood lacunae instead of large blood vessels.

Second pleopod (fig. 13):- Outer side of protopodite bears a narrow sub-triangular lobe whose free margins are fringed with setae. Exopodite is sub-quadrangular; plumose setae fringe its posterior and lateral margins. Conspicuous blood vessels ramify through exopodite, however, these are omitted from fig. 13 so that the underlying portion of the endopodite may be more clearly shown. Endopodite is biarticulate; length of articles: 1st 1.12 mm., 2nd 5.10 mm. First article lies transversely, 2nd article is at right angles to 1st. Second article tapers to an acute apex which is permanently twisted; its apical region is ornamented with very fine setae. There is a wide groove down ventral surface of article. Outer wall of this groove, along its middle third, is set with blunt spines. Beyond this spinose portion, article twists and groove opens on outer side of endopodite. When in position on the animal, male organ fits into this ventral groove in 2nd article. Where groove opens outwards, endopodite twists to inner side of male organ, across its ventral surface, and finally its apical point curves round outer side of apex of male organ.

Third pleopod:- Inner posterior corner of protopodite is produced to form a lobe fringed with plumose setae. Exopodite (fig. 14) is sub-quadrangular; its posterior and lateral margins are fringed with plumose setae. The pattern of blood vessels varies in small details in different exopodites, but that shown in fig. 14 respresents their general arrangement in the 3rd pleopod and is similar to that found in other pleopods. Endopodite is sub-quadrangular with its posterior margin indented. Fourth and 5th pleopods are similar to 3rd except that their rami are more triangular.

Uropod. Protopodite is sub-cylindrical with its inner surface convex and bearing spines; its outer posterior corner is prolonged a little beyond base of exopodite. Rami are long and styliform. Endopodite has a long terminal spine; exopodite ends in a tuft of short setae. Length of articles: protopodite 2.3 mm., endopodite 3.7 mm., exopodite 3.4 mm. Maximum width of protopodite: 1.0 mm.

Female.

Length of largest specimen: 18 mm., breadth: 8 mm.

Female differs from male in the following structures:-

Second antenna:- When attached, 2nd antenna reaches back approximately to base of 7th segment of pereion. Length of peduncle: 7.5 mm.; length of flagellum: 6.6 mm.

Pereiopods:- First to 3rd legs are not subchelate but are of the same form as remaining legs, which are similar to corresponding pairs in male.

Second pleopod:- Endopodite is sub-triangular and branchial.

Uropod:- Proportions of lengths of articles of uropod, relative to each other and to length of body, are slightly different to those in male.

Lengths: protopodite 1.9 mm., endopodite 2.8 mm., exopodite 2.7 mm. Maximum width of protopodite: 0.9 mm.

Habitat.

This description is based on specimens collected on 19th April, 1956, from under stones and seaweed near high tide level on a rocky shore at Pirates' Bay, Eaglehawk Neck; 72 males and 131 females were obtained.

Other specimens were found under similar conditions at Ulverstone, Devonport, Hawley and Low Head, East Tamar, in northern Tasmania, and at South Arm, Tinderbox and Adventure Bay, Bruny Island, in the south-east. Examples were also found under stones and debris on the shore of the Tamar River at Sandy Beach and Gravelly Beach, and the Derwent River at Hobart and East Risdon. However the animals were not as numerous along these estuaries as on the nearby sea coast at Low Head and Eaglehawk Neck respectively.

Ligia australiensis is recorded from the neighbourhood of Hobart by Thomson (1893, p. 55) and Chilton (1911, pp. 568-569).

Variation.

The usual number of articles in the flagellum of the 2nd antenna appears to be 20, but it is observed to vary from 18 to 22 in specimens collected at Eaglehawk Neck.

Remarks.

As the Tasmanian specimens of Ligia which I have collected agree with the original descritpion of Ligia australiensis Dana 1853, I assign them to this species. (It is noted that Dana spells the generic name as Lygia). However, Dana's description is brief and is based on a mutilated specimen. Consequently the position of L. australiensis is regarded by some authors as uncertain. Jackson (1922, p. 701) includes L. australiensis in a list of species of Ligia which are insufficiently described or of doubtful validity. Vandel (1945, p. 229) precedes this species with a question mark.

Reference to Jackson's (1922) descriptions of adequately known species in his revision of genus Ligia, and to descriptions of species of Ligia given in the following later works:- Verhoeff (1926), Edmondson (1931), Barnard (1932), Jackson (1933 b), Van Name (1936), Jackson (1938), Collinge (1946), Vandel (1948); indicates that L. australiensis has the most characters in common with L. novae-zealandiae Dana 1853. Chilton (1911, pp. 568-569) states that he has specimens from Victoria and Hobart which he has considered to be L. australiensis and which differ from L. novae-zealandiae in a few details in the appendages.

A comparison of characters of my Tasmanian specimens of L. australiensis with those of L. novae-zealandiae Dana, as described by Chilton (1901, pp. 107-114, pl. 11), shows that constant differences do occur between the two species. These differences are given in the following table:-

Ligia australiensis Dana.	*Ligia novae-zealandiae* Dana.
Second maxilla with division into 2 lobes indicated by a suture line.	Second maxilla with no indication of division into 2 lobes.
First to 5th pereiopods each with a single "dactylar seta", uniform in width; 6th and 7th pereiopods with many such setae on dactylos.	First to 7th pereiopods each with a single "dactylar seta", clubbed at the end.
Male organs curved inwards at the end, with apices bluntly rounded.	Male organs, (according to figs. I plp. 1 ♂ , I plp. 1 ♂ *), curved outwards at the end, with apices acute.
Pleon not abruptly narrower than pereion.	Pleon abruptly narrower than pereion.
Posterior border of terminal segment produced into a very obtuse median angle.	Posterior border of terminal segment evenly curved in the centre.
Distal region of endopodite of 2nd male pleopod permanently twisted.	Endopodite of 2nd male pleopod, (according to figs. I plp. 2 ♂ , I plp. 2 ♂ *), not twisted.

I therefore regard *L. australiensis* Dana as a distinct and valid species.

Chilton (1901, p. 113, pl.11. figs. I plp. 1 ♂, I plp. 1 ♂ *)

describes and figures the male organs of L. novae-zealandiae as being adherent to the 1st male pleopods and grooved on the dorsal surface. If this is so, L. australiensis also differs from L. novae-zealandiae in this regard, as the male organs of the former are not attached to the 1st pleopods, nor are they so grooved down the dorsal surface. However, Barnard (1932, pp. 185-186) queries these observations of Chilton's. Also when seen under very low magnification, the two ridges on the dorsal surface of each male organ in L. australiensis might appear to form the walls of a groove, although examination under higher magnification shows that surface of the organ between these ridges is not indented.

Verhoeff (1926, pp. 347-348) divides Ligia Fabricius 1798 into five genera, and denotes L. novae-zealandiae, which he attributes to Chilton instead of Dana, as the type species of one of his new genera, Nesoligia. Use of Verhoeff's key to these genera indicates that L. australiensis can also be included in Nesoligia. However, Verhoeff's sub-divisions are criticised by Jackson (1938, p. 175). Nesoligia is regarded as a sub-genus of Ligia Fabricius by Van Name (1936) and Jackson (1941). In the present paper, L. australiensis is therefore retained in Ligia Fabricius.

Tasmanian specimens of L. australiensis differ in the relative length of the 2nd antennae from the South Australian examples described by Hale (1927, 1929). In describing a male specimen, Hale (1927, p. 320) states that the 2nd antennae are distinctly longer than the body, exclusive of the uropods. In the Tasmanian specimens, the 2nd antennae of both sexes are shorter than the body.

Barnard (1932, p. 186) refers to a South Australian species of Ligia which he states is distinct from L. novae-zealandiae as shown by the stylet on 2nd pleopod. The male organs of this species, which he figures (fig. 1 c) in outline, are the same shape as those of *L. australiensis*, which has been recorded from South Australia. Thus it is probable that this unidentified species of *Ligia* mentioned by Barnard is *L. australiensis*.

McNeill (1948) publishes photographs of *L. australiensis* and *Porcellio scaber*, but the captions applied to them have been reversed. Specimens in his photograph on p. 261, the caption below which reads "Garden Woodlice (*Porcellio scaber*)", belong to genus *Ligia*, whereas specimens in his photograph on p. 259, which are labelled as *L. australiensis*, appear to be belong to genus *Porcellio* Latreille.

Ligia australiensis Dana.

Fig. 1. Cephalon, 2nd antennae and 1st segment of pereion of male, dorsal view.

Fig. 2. Distal part of left 1st antenna, dorsal view.

Fig. 3. Distal part of right mandible, ventral view.

Fig. 4. Distal part of outer lobe of right 1st maxilla, ventral view.

Fig. 5. Distal part of left 2nd maxilla, ventral view.

Fig. 6. Distal part of left maxilliped, ventral view.

Fig. 7. Scale-seta on a granule on 5th tergite of pereion, dorsal view.

Fig. 8. Sub-chelate part of left 1st leg of male, anterior view.

Fig. 9. Dactylos of right 1st leg, anterior view.

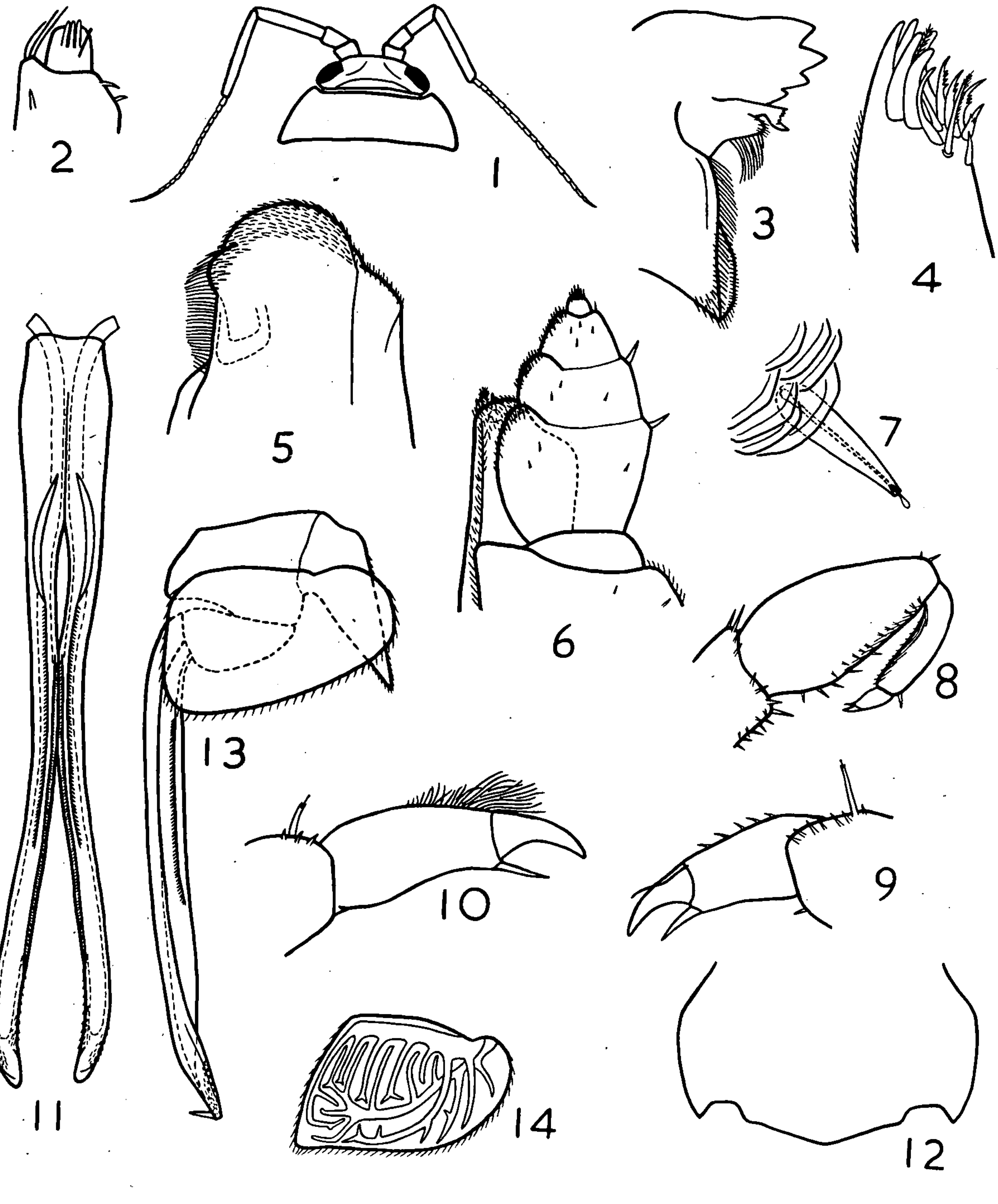
Fig. 10. Dactylos of left 7th leg, anterior view.

Fig. 11. Male organs, dorsal view.

Fig. 12. Terminal segment, dorsal view.

Fig. 13. Left 2nd pleopod of male, ventral view. (Blood vessels in exopodite are not shown).

Fig. 14. Exopodite of left 3rd pleopod of male, ventral view.



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Family Styloniscidae.

Synonymy. Patagoniscidae, Verhoeff 1939.

Verhoeff (1939, pp. 302-305) realizes that species found in South America, New Zealand and Australia which were formerly referred to genus Trichoniscus Brandt 1833, namely Tr. magellanicus (Dana), Tr. murrayi Dollfus, Tr. phormianus Chilton and Tr. thomsoni (Chilton), do not even belong in the family Trichoniscidae. He erects a new family, Patagoniscidae, and new genus, Patagoniscus, in which he places these species, and on p. 306 he notes the characters in which Patagoniscus differs from the Trichoniscidae. Actually Verhoeff states (p. 305) that he has already erected Patagoniscus in an essay on Oniscoidea from South America which is being published in Stockholm, but this paper was not published until 1951.

Vandel (1952, p. 14) considers Patagoniscus Verhoeff to be a synonym of an earlier genus, Styloniscus Dana 1852, and on p. 94 he states that the family which possesses as its type the genus Styloniscus should bear the name Styloniscidae. Also (p. 15) he considers that the family Patagoniscidae is not solidly established, and criticises Verhoeff's interpretation of the characters on which he diagnoses Patagoniscus.

In Chapter I of his paper, Vandel discusses in detail one of the characters, namely the musculature of the pleon, which distinguish the Styloniscidae from the Trichoniscidae. The following statement on p. 12 illustrates a feature of this distinction:-

"Il est légitime de considérer comme inverses et en quelque sorte complémentaires, les dispotifs musculaires propres au genre Trichoniscus d'une part, aux Trichoniscides de l'hémisphère austral, d'autre part. Le premier pléopode de Trichoniscus possède des muscles extenseur et fléchisseur de l'appendice relativement faibles, mais la musculature du protopodite est puissamment développée. Chez les Trichoniscides de l'hémisphère austral, la musculature générale atteint un volume exceptionnel, tandis que celle du protopodite est faible ou même nulle."

Vandel (1952, pp. 94-95) defines family Styloniscidae as follows:-

"Cette famille est essentiellement caractérisée par la structure du premier pléopode mâle et des dispotifs musculaires qui en commandent les mouvements. Ils ont été décrits en détail dans le Chapitre I de ce mémoire.

Ajoutons comme critères de moindre valeur: tête de type trichoniscien. Mandibule droite avec un, mandibule gauche avec deux pénicilles: très généralement, il existe en plus un pénicille molaire. L'apophyse génitale est renflée à son extrémité et se termine par un petit appendice conique."

The two genera of family Styloniscidae represented in Tasmania may be distinguished as follows:-

Pereion without tubercles or with tubercles not arranged in longitudinal rows; 3rd to 5th pleura of pleon small and adpressed - Styloniscus Dana.

Pereion with tubercles arranged in longitudinal rows; 3rd to 5th, or 4th and 5th, pleura of pleon large and expanded laterally - Notoniscus Chilton.

Genus Styloniscus Dana 1852.

Synonymy. Megatrichoniscus Jackson 1938.

Patagoniscus Verhoeff 1939.

Antarctoniscus Paulian de Félice 1940.

? Oligoniscus Dollfus 1890 b.

Dana (1852, p. 302) defines a new genus, Styloniscus, which he includes in his new sub-family, Scyphacinae, of family Oniscidae, but he makes no reference to its species. In another paper (Dana 1853) he places in this genus two new species, Styloniscus magellanicus (see pp. 736-737, pl. 48, fig. 7) from Tierra del Fuego, and St. longistylis (see pp. 737-738, pl. 48, fig. 8) from Tongatabu, Friendly Is. Dana (1854, p. 176) later establishes a third species, St. gracilis, from California.

Sars (1899, p. 155) includes Styloniscus in family Ligiidae. Stebbing (1900a, p. 564) realises that St. magellanicus and St. longistylis are generically distinct. On the evidence of Dana's description, he transfers St. magellanicus to genus Trichoniscus Brandt 1833 in family Trichoniscidae, and he (p. 566) describes specimens from the Falkland Is. under the name Trichoniscus magellanicus (Dana). Stebbing retains St. longistylis and St. gracilis in Styloniscus, which he considers may still belong in the Ligiidae, but he states that the genus remains obscure, covering two species which are very doubtfully congeneric. Richardson (1905, p. 690) transfers St. gracilis to genus Ligidium Brandt 1833. Budde-Lund (1906, p. 83) ranks Styloniscus as a sub-genus of Trichoniscus, and retains in it Tr. (St.) magellanicus. He (p. 84) considers that St. longistylis is probably a Spherillo.

Jackson (1938, p. 176) includes Tr. magellanicus in Megatrichoniscus, a new sub-genus of Trichoniscus. Verhoeff (1939) realizes that four species from the southern hemisphere, which were formerly placed in Trichoniscus, do not even belong in the Trichoniscidae, and he erects a new family, Patagoniscidae, and new genus Patagoniscus, in which he places Tr. magellanicus.

Jackson (1941, p. 7), in a check-list of Isopoda of Oceania, designates St. longistylis, the only species then remaining in the genus, as the type species of Styloniscus, which he includes in family Ligiidae. In this paper he follows his earlier procedure in placing Tr. magellanicus in Trichoniscus (Megatrichoniscus); he makes no reference to Verhoeff's paper.

Vandel (1943, p. 116) states that Patagoniscus Verhoeff appears to be synonymous with Styloniscus Dana 1852. In another paper, (Vandel 1945, p. 234), he retains Patagoniscus and includes in it additional species from the southern hemisphere which were formerly placed in Trichoniscus; however he refers to the genus as "Patagoniscus Verhoeff, 1939 (= Styloniscus Dana, 1852 = Antarctoniscus Paulian de Félice, 1940)." Vandel (1952, p. 14) subsequently recognizes that Styloniscus Dana has priority over Patagoniscus. He includes Megatrichoniscus Jackson and Patagoniscus Verhoeff in the synonymy of Styloniscus; in this synonymy he precedes Antarctoniscus Paulian de Félice by a question mark. Vandel (p. 14) quotes St. magellanicus as the type species of Styloniscus, which he places in a new family, the Styloniscidae. He states that the position of St. longistylis remains obscure. Vandel notes Jackson's (1941) reference to this species but does not discuss his designation of

St. longistylis as the type of Styloniscus.

On p. 18, Vandel states that the Isopods from the Falkland Islands described by Stebbing (1900 a, p. 566) under the name Trichoniscus magellanicus correspond in fact to Deto marina (Chilton). I cannot support Vandel in this statement. Stebbing describes his specimens as having eyes with three visual elements, flagellum of 2nd antennae with 7-8 articles, mandibles with a molar process, and inner lobe of 1st maxillae with 3 plumose setae. These characters do not agree with those of Deto marina, but they are consistent with those of a species of Styloniscus. As the Falkland Islands are situated in the vicinity of the type locality of Tierra del Fuego, it seems reasonable to assume that Stebbing's specimens do indeed belong to St. magellanicus Dana.

Jackson (1941) appears to be the first author to designate a type species for Styloniscus. Therefore Vandel's later designation of St. magellanicus as the type species would appear to be a contravention of the Rules of Zoological Nomenclature, Article 30, II, g, (as reproduced in Schenk and McMasters, 1936, p. 35), which states that if an author, in publishing a genus with more than one valid species, fails to designate or indicate its type, any subsequent author may select the type, and such designation is not subject to change. It should be noted that Jackson's designation of St. longistylis as type is probably due to the fact that in 1941 this was the only species of Styloniscus which had not been placed in another genus. (Type by elimination; see Article 30, III, k; Schenk and McMasters, 1936, p. 35).

But the identity of St. longistylis is very uncertain. The original description given by Dana indicates that this species probably belongs to the Ligiidae, but it is not sufficiently detailed to confirm this. To my knowledge, the species has not been recorded since, nor has the original material been redescribed. On the other hand, St. magellicanus is recorded and described by several authors since Dana, including Dollfus (1891), Stebbing (1900 a), Giambiagi de Calabrese (1939), and Vandel (1952). The material examined by Vandel was collected from one locality in Argentina and four localities in Chile, one of which, Natales, is situated on the mainland adjacent to Tierra del Fuego.

Vandel includes in Styloniscus several species which were formerly placed in Trichoniscus. His study of members of the Trichoniscid group from the southern hemisphere is of value in clarifying the systematic position of these Isopods, and the genus Styloniscus, as he defines it, includes an assemblage of closely related species. Thus, although it would appear correct to follow Jackson in regarding St. longistylis as the type of Styloniscus, and so to rename the genus based on St. magellanicus as type, in my opinion this procedure would only cause further confusion. Therefore, in the present paper, I propose to follow Vandel in using the name Styloniscus for the genus whose type is St. magellanicus Dana.

Vandel (1952, p. 17) considers that Oligoniscus monocellatus (Dollfus 1890 a) Dollfus 1890 b probably belongs in Styloniscus. If this is so, as O. monocellatus is the only species in its genus, Oligoniscus Dollfus would become a synonym of Styloniscus Dana.

Generic diagnosis.

Vandel (1952) places Styloniscus in his new sub-family, the Styloniscinae, the characters of which are therefore exhibited by the genus. His (p. 95) definition of this sub-family is as follows:-

"Corps lisse ou tuberculé, mais jamais garni de côtes longitudinales. Néopleurons 1-5 étroits, appliqués, en sorte qu'un hiatus sépare le péréion du pléon."

The revised definition of genus Styloniscus given by Vandel (1952, pp. 15-16) is as follows:-

"1) Taille souvent grande (jusqu'à 14 mm): mais quelques espèces sont de petit taille (par exemple phormianus Chilton, mauritianus Barnard, affinis n.sp.).

2) Appareil oculaire formé de trois ommatidies nettement séparées (d'après Verhoeff, certaines espèces posséderaient une seule ommatidie);

3) Céphalon de type trichoniscien normal.

4) Mandibule droite avec un, mandibule gauche avec deux pénicilles. La mandibule droite porte un pénicille molaire chez toutes les espèces (etudiées par moi), à l'exception de mauritiensis (sous-genre Indoniscus).

5) Apophyse génitale élargie à son extrémité, et terminée par un petit appendice conique.

6) Pléopode 1 mâle: protopodite très allongé dans le sens transversal; exopodite simple, dépourvu de tige; endopodite cylindrique, terminé par une longue tige, non ciliée, immobile (car dépourvue de muscles). Les muscles extenseur et fléchisseur de l'appendice sont

extrêmement longs et forts et s'insèrent à la base de l'endopodite; ils sont soutenus par un apodème détaché du sternite."

There appear to be two errors in paragraph 1) of this diagnosis. The name mauritiensis Barnard (1936) is misspelled as mauritianus. Also Vandel mentions affinis n.sp., but no species of this name is described in his paper. This reference may be intended to apply to albidus, a new sub-species of St. mauritiensis, which he establishes on p. 61.

Vandel (1952, p.16) places definitely in Styloniscus the following eight species of which he has examined specimens:- St. magellanicus Dana 1853, St. thomsoni (Chilton 1885), St. phormianus (Chilton 1901), St. otakensis (Chilton 1901), St. spinosus (Patience 1907), St. tabulae (Barnard 1932), St. mauritiensis (Barnard 1936) and St. nichollsi Vandel 1952.

He states that, due to insufficiency of descriptions, the assignment of numerous species to this genus is uncertain. However, he considers that, according to the descriptions and figures given by their authors, the following nineteen species very probably belong in Styloniscus:- Trichoniscus verrucosus Budde-Lund 1906; Tr. hottentoti, Tr. natalensis, Tr. ventosus, Tr. capensis, Tr. moruliceps, Tr. austro-africanus, Tr. georgensis, Tr. horae, Tr. cestus, Tr. swellendami, Tr. riversdalei, Barnard 1932; Patagoniscus nordenskiöldi, P. pallidus, P. araucanicus, P. simrothi, P. iheringi, P. schwabei, Verhoeff 1939; Tr. (Antarctoniscus) jeanneli Paulian de Félice 1940. It should be noted that Verhoeff (1939) indicates that he has already established three of his species of Patagoniscus, P. nordenskiöldi, P. pallidus and P. iheringi, in an essay on Oniscoidea from South America which is being published in Stockholm, but this paper was not published until 1951.

Vandel states that the following four species possibly belong in Styloniscus:- Tr. australis, Tr. murrayi, Dollfus 1890 a; Oligoniscus monocellatus (Dollfus 1890 a) Dollfus 1890 b; Tr. kermadecensis Chilton 1911. He believes that Tr. commensalis Chilton 1910 a probably represents the type of a special genus. However I suggest that if Tr. kermadecensis is to be considered as possibly belonging in Styloniscus then Tr. commensalis, which has characters in common with this species, e.g. pleon not abruptly narrower than pereion, should also be considered here.

St. longistylis Dana 1853 probably does not belong in genus Styloniscus as defined by Vandel (1952); its position has already been discussed.

Thus altogether there are thirty-two established species which appear to belong in genus Styloniscus. Reference to descriptions given by Vandel (1952) and by the original authors of the species indicates that two of the five species of Styloniscus which I have collected in Tasmania can not be identified with any of these. Due to the brevity of some accounts, it is not possible to demonstrate the distinction of the two new species from all of the established species by means of a single key. Consequently the six species described by Verhoeff (1939, 1951) under the name Patagoniscus are omitted from a key dealing with the majority of the species in Styloniscus, key 1, and are considered separately in key 2.

Key 1.

1. Eye composed of one ocellus - - - - - - - - St.? monocellatus (Dollfus).

Eye composed of 3 ocelli - 2.

2. Pereion smooth - 3.

Pereion tuberculate or uneven - 6.

3. Ocelli of eye contiguous, or arranged in a line, or both.
- - - - - - - - - - - - - - St. tabulae, St. mauritiensis,
St. hottentoti, St. natalensis, St. austro-africanus, (Barnard).

Ocelli of eye separated and arranged in a triangle - - - - - - - - - 4.

4. Flagelliform process of endopodite of 1st male pleopod lacking
setae - - - - - - - - - St. magellanicus Dana, St. phormianus (Chilton).

Flagelliform process of endopodite of 1st male pleopod bearing
setae - 5.

5. Ischion of 7th leg without sexual differentiation - - - - - - - - -
- St. thomsoni (Chilton).

Ischion of 7th leg showing sexual differentiation - - - - - - - - -
- St. maculosus n.sp.

6. Pleon not abruptly narrower than pereion - - - - - - - - - - - - -
- - - - St.? commensalis, St.? kermadecensis, (Chilton).

Pleon abruptly narrower than pereion - - - - - - - - - - - - - - - - - 7.

7. Pleon with dorsal surface of all or majority of its segments
tuberculate or uneven - - - - - - - St. otakensis (Chilton);
St. spinosus (Patience); St. nichollsi Vandel; St. georgensis,
St. swellendami, St. riversdalei, (Barnard); St. jeanneli
(Paulian de Félice); St.? murrayi, St.? australis, (Dollfus).

Pleon with dorsal surface of all segments, or all but 3rd
segment, smooth - 8.

8. Ocelli of eye contiguous, or arranged in a line, or both - - - - - - - - St. ventosus, St. capensis, St. moruliceps, St. horae, St. costus, (Barnard).

Ocelli of eye separated and arranged in a triangle - - - - - - - - 9.

9. Dorsal surface of 3rd segment of pleon smooth - St. verrucosus (Budde-Lund).

Dorsal surface of 3rd segment of pleon with a row of tubercles - St. squarrosus n.sp.

Key 2.

1. Eye composed of one ocellus - - - - - St. *araucanicus*, St. *schwabei*, (Verhoeff).

   Eye composed of 3 ocelli - 2.

2. Terminal process of male organ in form of a blunt knob - - - - - - - - - St. *pallidus*, St. *iheringi*, St. *simrothi*, (Verhoeff).

   Terminal process of male organ in form of a cone - - - - - - - - - 3.

3. Exopodite of 1st male pleopod with its outer border not indented - St. *maculosus* n.sp.

   Exopodite of 1st male pleopod with its outer border indented - 4.

4. Ischion of 7th leg of male with its under surface incurved; terminal process of male organ provided with small teeth - St. *nordenskiöldi* (Verhoeff).

   Ischion of 7th leg of male with its under surface not incurved, so that its lower border is straight; terminal process of male organ without teeth - - - - - - - - - - - - - - - - - St. *squarrosus* n.sp.

Key to species of *Styloniscus* represented in Tasmania.

1. Second article of endopodite of 2nd male pleopod with inner side curved in abruptly at about 1/4 of its length from apex, so that its apical point is asymmentrical, continuous with outer half of endopodite - - - - - - - - - - - - *St. nichollsi* Vandel.

Second article of endopodite of 2nd male pleopod with inner side not curved in abruptly at a distance from apex; apical point is almost symmentrical with remainder of endopodite - - - - 2.

2. Cephalon and pereion with transverse rows of tubercles - *St. squarrosus* n.sp.

Cephalon and pereion not tuberculate - - - - - - - - - - - - - - - 3.

3. Cephalon and pereion set with numerous large setae; flagelliform process of endopodite of 1st male pleopod lacking setae - *St. phormianus* (Chilton).

Cephalon and pereion with few or no setae; flagelliform process of endopodite of 1st male pleopod bearing setae - - - - - - - - - - - 4.

4. Ischion of 7th leg without sexual differentiation; flagelliform process of endopodite of 1st male pleopod having setae restricted to a tuft at apex and lacking setose pencils - *St. thomsoni* (Chilton)

Ischion of 7th leg showing sexual differentiation; flagelliform process of endopodite of 1st male pleopod having its distal quarter setose and bearing 3 setose pencils at apex - *St. maculosus* n.sp.

Styloniscus thomsoni (Chilton 1885) Vandel 1952.

(Figs. 15-17).

Synonymy. *Philougria Thomsoni* Chilton 1885.

= *Philygria Thomsoni* Chilton 1886.

Trichoniscus Thomsoni (Chilton 1885) Chilton 1901.

Trichoniscus (*Metatrichoniscus*) *thomsoni* (Chilton 1885) Jackson 1938.

Pataconiscus thomsoni (Chilton 1885) Verhoeff 1939.

The Tasmanian specimens assigned to *Styloniscus thomsoni* are not described in detail in the present paper, as the species is characterized in previous literature:- Chilton (1886, pp. 159-161, pl. 5, figs. 1-6), (1901, p. 118, pl. 13, fig. 1); Budde-Lund (1906, pl. 4, figs. 22-24); Jackson (1938, p. 176, fig. 3); Vandel (1952, pp. 36-42, figs. 29-34).

St. thomsoni may be distinguished from other species of *Styloniscus* represented in Tasmania on the following combination of characters:-

Length of largest male specimen: 6 mm.; breadth: 2.7 mm.

Length of largest female specimen: 6.4 mm.; breadth : 3.2 mm.

Background colour of live animals is variable; some specimens are light brown marked with patches of dark brown, some are orange with dark brown patches, others are red with the dark markings almost black. The unpigmented patches on cephalon and body are not conspicuous in live animals, but in most specimens there are numerous small, opaque, white spots scattered on dorsal surface.

Surface of body is smooth. Each eye is composed of 3 large ocelli which are very widely separated from one another and arranged in a triangle. Terminal segment is trapezoidal with its posterior border straight.

First male pleopod (fig. 15):- Exopodite is sub-triangular with its outer margin not indented. Endopodite terminates in a flagelliform process which bears at its apex (fig. 16) a wide tuft of setae; there are no other setae on process apart from this apical tuft. Second male pleopod (fig. 17):- Length of articles of endopodite: 1st 0.25 mm., 2nd 1.05 mm. Second article tapers to a narrow point which is scarcely bent outwards. On ventral surface, an oblique chitinous thickening is situated at about 2/5 of length of article behind apex. Halfway between this thickening and apex there is a constriction in width of endopodite. On dorsal surface, a groove with strongly chitinized walls extends obliquely down length of article. Groove widens suddenly in centre of its length, then narrows again. In apical region there are several longitudinal ridges of chitin. A few groups of setae occur on inner surface of article near its base. Fifth male pleopod:- Groove for reception of endopodite of 2nd pleopod extends down whole length of exopodite.

Second female pleopod:- Length of exopodite is approximately 2/3 that of endopodite; length (along inner border): exopodite 0.40 mm., endopodite 0.62 mm.

Habitat.

These observations are based on specimens found under decaying wood and in debris lying on the ground at altitudes of 1900-3900 ft. on

Mt. Wellington. Examples were collected on the following dates:- 15th May, 1956, 2 males, 9 females; 22nd October, 1956, 3 males, 9 females; 6th March, 1957, 8 males, 11 females; 28th May, 1957, 12 males, 42 females.

Specimens were also found in decaying wood and forest debris at Collinsvale and Tarraleah, and in Mt. Field National Park and the Florentine Valley.

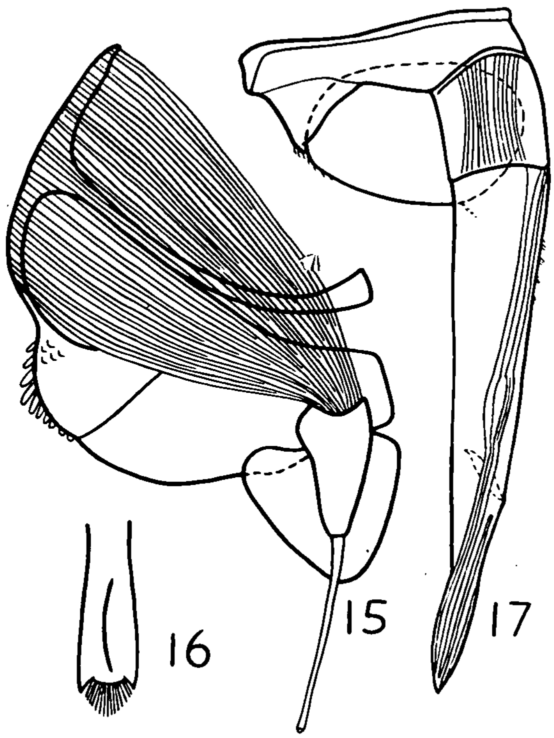
Styloniscus thomsoni has not previously been recorded from Tasmania.

Styloniscus thomsoni (Chilton).

Fig. 15. Left 1st pleopod of male, dorsal view.

Fig. 16. Distal part of endopodite of left 1st pleopod of male, dorsal view.

Fig. 17. Left 2nd pleopod of male, dorsal view.



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Styloniscus phormianus (Chilton 1901) Vandel 1952.

(Figs. 18-19).

Synonymy. *Philougria rosea* Chilton 1883 (in part) - non (Koch 1835-44).

= *Philygria rosea* Thomson and Chilton 1886 (in part).

Trichoniscus phormianus Chilton 1901.

Patagoniscus phormianus (Chilton 1901) Verhoeff 1939.

The Tasmanian specimens assigned to *Styloniscus phormianus* are not described in detail in the present paper, as the species is characterized in previous literature:- Chilton (1901, pp. 115-117, pl. 12, fig. 1); Vandel (1952, pp. 47-51, figs. 40-44)

St. phormianus may be distinguished from other species of *Styloniscus* represented in Tasmania on the following combination of characters:-

Length of largest male specimen (collected at Collinsvale): 2.0 mm.; breadth: 0.9 mm.

Length of largest female specimen (collected at Collinsvale): 2.5 mm.; breadth: 1.2 mm.

Dorsal surface of live specimens is purplish-brown in colour with numerous conspicuous unpigmented patches. A pigmented band extends down centre of pereion. Surface of body is smooth. Cephalon and pereion bear large scattered setae (see fig. 18), which are visible under a binocular dissecting microscope (X20). Eyes are each composed of 3 ocelli which are separated from each other and arranged in a triangle. Terminal segment is trapezoidal with its posterior angles slightly rounded.

First male pleopod:- Exopodite is sub-triangular with an indentation in its outer margin; its apex is slightly bent outwards. Endopodite terminates in a flagelliform process which is simply pointed at its apex, and lacks setae. Second male pleopod (fig. 19):- Length of articles of endopodite: 1st 0.1 mm., 2nd 0.33 mm. Width of 2nd article is almost uniform until just before apex, where it narrows to a blunt point which is slightly bent outwards. On dorsal surface, a groove with strongly chitinized walls extends obliquely down length of article. In middle third the walls of this groove bear small, backwardly-sloping chitinous ridges. At base of article, inner wall of groove is set with a row of blunt, setose processes. Fifth male pleopod:- Groove for reception of endopodite of 2nd pleopod occupies approximately half length of exopodite.

Second female pleopod:- Length of exopodite is approximately 3/5 that of endopodite; length (along inner border): exopodite 0.14 mm., endopodite 0.23 mm.

Habitat.

These observations are based on specimens collected on 19th June, 1957, from among debris lying on the ground in a myrtle gully at Collinsvale; 5 males and 13 females were obtained.

Other specimens were found in forest debris at Fern Tree and also higher up on Mt. Wellington at an altitude of about 1,900 ft., and at Tarraleah.

Styloniscus phormianus has not previously been recorded from Tasmania.

Remarks.

In one respect the specimens from Collinsvale differ from the New Zealand specimens described by Chilton and Vandel. According to Chilton (1901, p. 116) the pereiopods of the male are not specially modified, and Vandel (1952, p. 51) states that the 1st male pereiopod lacks sexual differentiation. In the male specimens from Collinsvale, the under surface of meros and carpos of the 1st and 2nd pereiopods bears hyaline scales, which are not present on the corresponding pereiopods in the female.

On 7th October, 1957, 15 males and 19 females were collected from debris lying on the ground in a forest of eucalypts and treeferns at Tarraleah. These specimens are considerably larger than those found at Collinsvale and on Mt. Wellington, and 4 of the males and 11 of the females are more extensively pigmented.

Length of largest male specimen from Tarraleah: 4.8 mm.; breadth: 2.4 mm.

Length of largest female specimen from Tarraleah: 7.2 mm.; breadth: 3.6 mm.

Chilton (1901, p. 116) gives the size of his specimens as "about 4 mm." Vandel (1952, p. 49) states the length of his specimens to be 2 mm. None of the female specimens from Collinsvale is carrying embryos, but among specimens from Mt. Wellington there are 3 ovigerous females, of which one is 2.1 mm. long, the other two are each 2 mm. long. It is therefore likely that the specimens from Collinsvale are at least mature, even if not fully grown.

However, in spite of the difference in size between animals from the two localities, I can find no morphological distinction between the large specimens from Tarraleah and the small specimens from Collinsvale. Thus I assign the former also to Styloniscus phormianus.

Stylonisous phormianus (Chilton).

Fig. 18. Left epimera of 1st and 2nd segments of pereion, dorsal view.

Fig. 19. Left 2nd pleopod of male, dorsal view.

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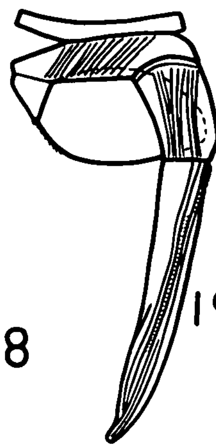

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Styloniscus nichollsi Vandel 1952.

(Figs. 20-22).

As the description of this species given by Vandel (1952, pp. 30-36, figs. 21-28) is not readily available in Australia, the following description, based on further Tasmanian material assigned to the species, is given for the benefit of local students.

Male.

Length of largest specimen: 3.1 mm.; breadth: 1.5 mm.

Colour. In live specimen, dorsal surface is dark brown, with conspicuous unpigmented patches on cephalon, pereion and pleon. These patches are especially large on 1st to 4th pereial tergites and at bases of pereial epimera.

Cephalon. Dorsal surface of vertex is slightly roughened. Antennary tubercles are right-angled and prominent in dorsal view. Eyes are each composed of 3 ocelli which are separated from each other and arranged in a triangle.

First antenna. Apex of 3rd article bears 5 large sensory setae, which are of different lengths.

Second antenna. Length of peduncle: 1.23 mm.; length of flagellum: 0.38 mm. There are two long spines on distal border of 4th article of peduncle and one spine on each of 3rd and 5th articles. Apex of outer sheath of each spine is divided into several fine points surrounding a coarser central seta. On anterior border of 5th article are tubercles arranged in 2 rows, 6 in ventral row, 2 in dorsal row; each tubercle bears a large hyaline scale. Flagellum has 4 articles, and ends in a very long pencil of setae.

Mandibles. Left mandible:- Incisor process consists of one bifid tooth and 2 simple teeth. Lacinia mobilis ends in 3 teeth; behind its base there are 2 pencils of setae. Molar process has no pencil of setae. Right mandible:- Incisor process consists of 3 simple teeth. Lacinia mobilis is club-shaped with a ring of tooth-like processes at its apex; there is one pencil of setae behind its base. Molar process has a pencil of setae.

First maxilla. Outer lobe bears 11 simple teeth and 2 long, narrow processes. The latter are set at an angle to long axis of lobe and their distal regions bear spinules. Groups of setae occur on dorsal surface of lobe near its outer border. Inner lobe bears 3 conical setose processes; the two more distal ones are sub-equal in length, the third is longer.

Second maxilla. Apical region is bilobed. Apex of outer lobe bears 3 coarse setae; outer margin of lobe is fringed with fine setae. Apex and inner marginal region of inner lobe bear several coarse setae and numerous fine setae.

Maxilliped. Epipodite tapers to an acute apex. Outer side of basis projects beyond base of endopodite as a rounded lobe fringed with long setae. In endopodite, ischion is the only article distinct; there are 2 short spines on its ventral surface. Remainder of endopodite is sub-conical, with its inner side near apex showing indications of division into 3 lobes. These lobes bear setae of approximately equal thickness. Inner margin of endopodite bears comb-like groups of setae; on outer margin are 2 large setae, with a pencil of fine setae in the angle of the lower one. Endite is sub-conical with its inner and outer sides setose. It terminates in a conical setose process, below base of which are 3 spines.

Pereion. First segment is produced forwards on each side to flank cephalon. Posterior borders of 1st to 3rd segments are nearly straight, those of 4th to 7th segments are produced progressively further backwards. Epimera are broad. Coxal suture lines are evident on 2nd to 7th segments, but are inconspicuous. Dorsal surface of tergites is slightly roughened but is not conspicuously tuberculate. Tergites have a covering of ovoid, striated scales (fig. 20). Scale-setae are present on dorsal surface of all tergites; scattered simple setae also occur, but these are not visible under a binocular dissecting microscope. Lateral margins of segments are bordered with small, triangular scale-setae.

Pereiopods. First leg:- Spines on under surface of articles each have apex of outer sheath divided into several fine points surrounding a coarser central seta. Dactylos terminates in a simple claw. "Dactylar seta" divides into 2 rami, one of which sub-divides dichotomously while the other has branches arising from a main axis. Large hyaline scales are present on under surface of carpos.

Hyaline scales are also present on under surface of carpos of 2nd leg but are absent from this position in remaining legs. Outer margin of propodos on 6th and 7th legs has a fringe of elongated scales. Seventh leg shows no sexual differentiation.

Male organ. Distal region is broadened and rounded, and is terminated by a small conical process with folded walls. On ventral surface there is a V-shaped ridge at base of rounded portion. The two ducts which enter male organ unite inside it to form one.

Pleon. Abruptly narrower than pereion. Pleura of 3rd to 5th segments are small and adpressed but visible in dorsal view. Terminal segment is trapezoidal with its postero-lateral borders incurved and its posterior border straight. Dorsal surface of pleon is slightly roughened. Ornamentation of tergites is similar to that of pereion.

Pleopods. First pleopod (fig. 21):- Protopodite is broad; its outer marginal region bears hyaline scales. Exopodite is sub-triangular with an indentation in its outer border; its apex is slightly crenate. Endopodite is sub-cylindrical and terminates in a long flagelliform process which is simply pointed at its apex and lacks setae. Well-developed muscles are inserted at base of endopodite.

Second pleopod (fig. 22):- Outer side of protopodite is produced into a sub-triangular lobe with its apex setose. Exopodite is sub-rectangular and has a fringe of setae on its outer posterior angle. Endopodite is biarticulate; length of articles: 1st 0.18 mm., 2nd 0.63 mm. Inner side of 2nd article curves inwards abruptly at about 1/4 of its length from apex, so that the apical point is asymmetrical, continuous with outer half of endopodite. A groove with strongly chitinised walls extends obliquely down dorsal surface of 2nd article. Near base of article, inner border of this groove is set with a row of blunt, toothlike processes.

Third pleopod:- Exopodite is sub-quadrangular, with posterior margin indented; its lateral margins are setose, there is a large plumose seta on apical angle, and a few long, simple setae on ventral surface near posterior margin. Endopodite is sub-triangular, much smaller than exopodite. Fourth pleopod is similar to third.

Fifth pleopod:- Exopodite is sub-triangular, with comb-like groups of setae on lateral borders, a large plumose seta at apex, and a few long, simple setae on ventral surface near outer border. A groove for reception of endopodite of 2nd pleopod extends down whole length of exopodite. Region in which this groove lies is heavily pigmented. Endopodite is larger in comparison to exopodite than in 3rd and 4th pleopods.

Uropod. Protopodite is sub-triangular; its posterior border is level with that of terminal segment. Both rami are conical, covered with scales, and have a few long terminal setae. Length of rami: exopodite 0.47 mm., endopodite 0.3 mm.

Female.

Length of largest specimen: 4.6 mm.; breadth: 2.3 mm.

Female differs from male in the following structures:-

Pereiopods:- Large hyaline scales are not present on under surface of carpos of 1st and 2nd pereiopods.

First pleopod:- Exopodite is small and triangular, with its outer border nearly straight; endopodite is rounded and much smaller than exopodite. There are no well-developed muscles attached to endopodite.

Second pleopod:- Exopodite is quadrangular; endopodite is elongated and conical; its distal half bears comb-like groups of setae. Length of exopodite is approximately ½ that of endopodite; length (along inner border): exopodite 0.22 mm., endopodite 0.43 mm.

Fifth pleopod:- Inner side of exopodite has no groove and is not heavily pigmented.

Habitat.

This description is based on specimens collected on 26th June, 1957, from leaf litter and decaying wood lying on the ground at an altitude of about 1,900 ft. on Mt. Wellington; 8 males and 11 females were obtained.

Other specimens were found in grass tussocks on Queen's Domain, Hobart, under stones in the University Park, Sandy Bay, Hobart, in forest debris in Mt. Field National Park and at Tarraleah, in damp eucalypt leaves at Prospect, near Launceston, and under pieces of wood lying on the ground near a beach at West Ulverstone.

Vandel (1952, p. 30) states that his specimens were collected in mosses, along a stream, at Guide R. Falls, ten miles from Burnie, in the north-west of Tasmania.

Variations.

The specimens from Sandy Bay are a lighter and more reddish brown than those from Mt. Wellington.

The small elevations on the dorsal surface of the cephalon and pereion in the specimens from West Ulverstone are more pronounced than those of the specimens from Mt. Wellington; cephalon and pereion of the former thus appear finely granulate.

Remarks.

Vandel (p. 32, fig. 24, c) describes and figures the outer lobe of the 1st maxilla as having 10 teeth as well as 2 setose processes. In the specimens from Mt. Wellington this structure has 11 teeth, 10 corresponding to those figured by Vandel, and one other small tooth situated towards the outer side of the lobe.

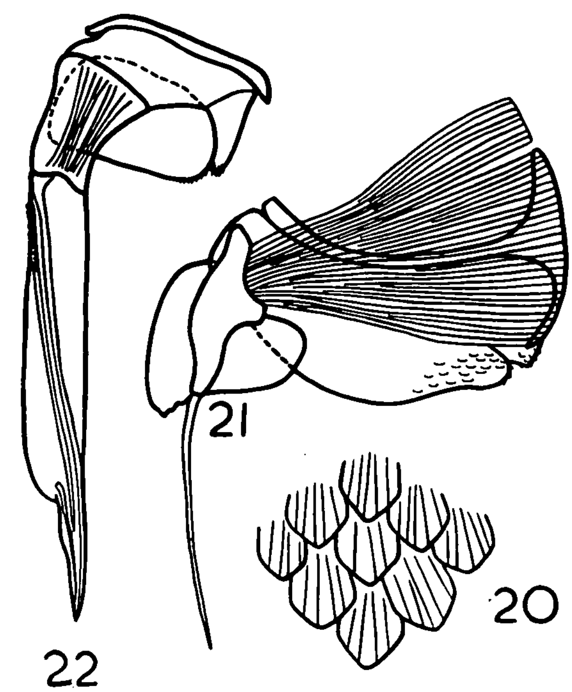
Vandel (p. 30) states that the scales on the carapace of his specimens are not striated, and (p. 31) indicates that scale-setae are absent from the 3rd to 7th pereial tergites. In the specimens from Mt. Wellington, scale-setae occur on all pereial tergites, and striations are apparent on the ovoid scales which cover the dorsal surface of the pereion. However, due to the agreement of other characters, especially those of the 1st and 2nd male pleopods, of the specimens from Mt. Wellington with Vandel's description of specimens from Guide River Falls, I have no hesitation in assigning my specimens to <u>Styloniscus nichollsi</u>.

Styloniscus nichollsi Vandel.

Fig. 20. Scales on dorsal surface of 7th tergite of pereion, dorsal view.

Fig. 21. Right 1st pleopod of male, dorsal view.

Fig. 22. Right 2nd pleopod of male, dorsal view.



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<u>Styloniscus maculosus</u> n.sp.

(Figs. 23-41).

<u>Male</u>.

Length of largest specimen: 4.9 mm.; breadth: 2.25 mm.

<u>Colour</u>. Background colour of dorsal surface in live animal is dark brown. Conspicuous unpigmented patches are present on cephalon, pereion and 1st to 3rd segments of pleon. On all pereial tergites there is a large unpigmented patch on each side near base of epimeron, with an area of smaller patches between this and centre of tergite. A V-shaped unpigmented patch occurs in mid-line of anterior region of 2nd to 7th pereial tergites and 1st tergite of pleon. These patches together form a conspicuous row down mid-line, while the patches at base of epimera form a similar row on each side. Distribution of unpigmented areas on 4th and 5th pereial tergites is figured (fig. 23).

<u>Cephalon</u>. Surface of vertex is smooth. Frontal line is not developed. Supra-antennal line curves downwards in centre. Antennary tubercles are obtuse-angled when seen in dorsal view of cephalon. Eyes are each composed of 3 ocelli which are distinctly separated from each other and arranged in a triangle.

<u>First antenna</u> (fig. 24). Triarticulate and unevenly tapering, with 2nd and 3rd articles each abruptly narrower than preceding article. Third article is spatulate; its apical border bears 6 long sensory setae and another such seta is set on its inner border.

<u>Second antenna</u> (fig. 25). Length of peduncle: 1.78 mm.; length of flagellum : 0.60 mm. Long spines occur on distal borders of

articles of peduncle; 2 each on 3rd and 4th articles, one each on 2nd and 5th articles. Each spine is formed of an outer sheath, split at the apex into several fine points, which surrounds a coarser central seta. All articles of peduncle bear a covering of scales. Anterior surface of 5th article is undulating. It bears groups of hyaline scale-setae which form 2 series, a dorsal row of 5 groups and a ventral row of 4. Flagellum is evenly tapering and composed of 6 articles, all of which have a covering of scales. On anterior surface, one or 2 long sensory setae are present on distal borders of each of 2nd to 5th articles. Terminal article has an apical tuft of long setae.

Mandibles. Left mandible (fig. 26):- Incisor process consists of an outermost bifid tooth and 2 simple teeth. Lacinia mobilis ends in 3 teeth; at its base there is a tuft of simple setae, behind which are 2 pencils of setae. Molar process has a ridged triturating surface bordered with a fringe of simple setae; there is no molar pencil. Right mandible (fig. 27):- Incisor process consists of 3 simple teeth. Lacinia mobilis is club-shaped with a ring of tooth-like processes at its apex; one pencil of setaeoccurs behind the base of lacinia mobilis. There is a pencil of setae on molar process.

First maxilla. Outer lobe (fig. 28) ends in 11 simple teeth and 2 slender processes; the latter are inserted at an angle to long axis of lobe and their distal ends are set with short setae. Comb-like groups of setae, present down outer side of dorsal surface of lobe, project beyond outer border . Inner border bears 3 conical setose processes on its inner surface near apex; the 2 more distal processes are sub-equal in length, the 3rd is longer.

Second maxilla (fig. 29). Apical region is divided into 2 rounded lobes, outer lobe being about half width of inner lobe. Three spines occur on apex of outer lobe, and fine setae fringe its outer margin. Apex and inner marginal region of inner lobe bear several coarse setae and numerous fine setae. A suture line extends from angle between lobes for a short distance down ventral surface of maxilla. An area around termination of this line is covered with long setae.

Maxilliped (fig. 30). Epipodite tapers to a sharply rounded apex; its outer margin at its base is curved outwards. Inner region of basis is thicker than outer region, thicker part being delimited by a ridge on dorsal surface. Comb-like groups of setae occur on lateral borders of basis. Outer side of basis is produced beyond base of endopodite as a rounded lobe fringed with long setae. Ischion is the only article of endopodite which is distinct; there are 2 short spines on its ventral surface. Remainder of endopodite is sub-conical in outline and lacks suture lines. Its inner side near apex shows indications of division into 3 lobes. These lobes bear long setae which differ in thickness. Inner margin of endopodite bears comb-like groups of setae. Two long setae occur on outer margin; there is a large pencil of fine setae in angle of the lower one. Endite is sub-conical, continuous with thicker part of basis; its inner and outer surfaces are setose. Endite terminates in a conical, setose process, below base of which are 3 spines.

Pereion. First segment is slightly produced forwards on each side to flank cephalon. Posterior borders of 1st to 3rd segments are nearly transverse with posterior angles of epimera bluntly rounded.

Epimera of 4th segment are slightly produced backwards with posterior angles right-angled. Epimera of 5th to 7th segments are more markedly produced backwards with angles sub-acute. Coxal suture lines are evident on 3rd to 7th segments but are inconspicuous. Dorsal surface of pereion is smooth. Tergites have a covering of pointed scales, which do not appear to be striated, and also bear scale-setae (fig. 31) each of which has a narrow, pointed scale portion. Large simple setae are not present.

Pereiopods. First leg:- Majority of spines on leg are each composed of an outer sheath, split at its apex into several fine points, and surrounding a coarser central seta. A covering of hyaline scales is present on under surface of meros and under and inner surfaces of carpos. Propodos has short simple spines on under surface as well as hyaline scales on inner surface. Dactylos bears long curved scales and a few long setae; it terminates in a simple claw with a long seta set below it. The "dactylar seta" bifurcates, and one ramus continues to sub-divide dichotomously while the other has branches arising from a main axis. (Dactylos of 4th leg is figured, fig. 32).

Simple spines are absent from propodos of 2nd to 7th legs. Distribution of hyaline scales on 2nd leg is similar to that on 1st. Such scales are present on under surface of meros and carpos of 3rd leg and meros of 4th leg, but are absent from under surface of remaining legs. Outer surface of propodos in 6th and 7th legs has a fringe of elongated scales.

Seventh leg shows sexual differentiation; lower region of ischion (fig. 33) forms a lobe which projects forwards below meros, and as a result, under surface of ischion is shallowly indented. Thus it differs from ischion of 1st to 6th legs in which lower part of its distal border slopes back towards basis and its under surface is not indented.

Male organ. (fig. 34). Distal region is broadened and rounded; it terminates in a median conical process with folded walls. A slight ridge crosses ventral surface at base of rounded portion. The two ducts which enter base of organ unite inside it to form one.

Pleon. Abruptly narrower than pereion. Pleura of 3rd to 5th segments are small, acute and adpressed but visible in dorsal view. Terminal segment is trapezoidal with postero-lateral borders incurved and posterior border very slightly curved outwards. Surface of pleon is smooth. Tergites bear scales and scale-setae like those on pereion.

Pleopods. First pleopod (fig. 35):- Protopodite is broad; its outer surface is rounded and bears hyaline scales. Exopodite is small and sub-triangular, with apex bluntly rounded and slightly crenate, and outer border not indented. There are a few comb-like groups of small setae down its inner margin. Endopodite is sub-cylindrical; it terminates in a long flagelliform process. Distal quarter of this process (fig. 36) is densely setose; its apex is sharply rounded and has 3 sparsely setose pencils projecting beyond it. Well-developed muscles, supported by a prolongation of 1st sternite of pleon, are inserted at base of endopodite.

Second pleopod (fig. 37):- Outer side of protopodite is produced into a sub-triangular lobe with apex setose. Exopodite is sub-quadrangular; it bears setae along inner margin and on outer posterior angle. Endopodite is biarticulate; length of articles; 1st 0.27 mm., 2nd 1.24 mm. First article is sub-cylindrical and has well-developed longitudinal muscles; there is a broad chitinous thickening on its inner surface. Second article tapers to a narrow point, and is slightly curved outwards. At base of 2nd article, on inner surface, there is a broad chitinous thickening which is corrugated on margin. Groups of setae occur on inner surface of article beyond this thickening. There is a narrow, oblique chitinous thickening on ventral surface of article at about 2/5 of its length behind apex. A groove with strongly chitinized walls extends obliquely down dorsal surface; groove widens suddenly in centre of its length, then narrows again. Apical region of article is ornamented with several longitudinal ridges of chitin.

Third pleopod:- Inner posterior corner of protopodite is produced into a sub-triangular setose lobe. Exopodite is sub-quadrangular with apex sharply rounded and posterior border slightly indented. Comb-like groups of setae occur on and near inner margin and around outer posterior angle. There is a large plumose seta on inner posterior angle and a few long, simple setae on ventral surface near posterior border. Endopodite is sub-triangular, much smaller than exopodite. Fourth pleopod is similar to 3rd, except that its apex is more drawn out.

Fifth pleopod:- Setose lobe on protopodite is long and narrow. Exopodite (fig. 38) is sub-triangular, with comb-like groups of setae on lateral borders, a large plumose seta at apex, and a few long, simple setae on ventral surface near outer border. On dorsal surface, a setose groove for reception of endopodite of 2nd pleopod extends down inner side of exopodite for almost its whole length. Region occupied by groove is heavily pigmented. Endopodite is larger in comparison with exopodite than in 3rd and 4th pleopods.

Uropod. Posterior border of protopodite is level with that of terminal segment. Both rami are conical, have a covering of scales, and terminate in a few long setae. Length of rami: exopodite 0.88 mm., endopodite 0.70 mm.

Female.

Length of largest specimen: 6.4 mm.; breadth: 2.6 mm.

Female differs from male in the following structures:-

Pereiopods:- Hyaline scales are not present on under surface of 1st to 4th legs. Under surface of ischion of 7th leg (fig. 39) is not indented, and lower part of its distal border slopes back towards basis. Ischion of 7th leg of female is therefore similar to those of 1st to 6th legs in both sexes and different to that of 7th leg of male.

First pleopod (fig. 40):- Exopodite is small and sub-triangular with outer border scarcely indented. Endopodite is sub-triangular, much smaller than exopodite. There are no well-developed muscles attached to endopodite.

Second pleopod (fig. 41):- Exopodite is sub-quadrangular. Endopodite is narrow and conical; its distal half bears comb-like groups of setae. Length of exopodite is approximately 2/3 that of endopodite; length (along inner border): exopodite 0.42 mm., endopodite 0.61 mm.

Fifth pleopod:- Exopodite has no groove and is not heavily pigmented.

Habitat.

Type locality:- This desdription is based on specimens found in debris collected on 7th October, 1957, from the ground under eucalypts and treeferns in forest at Tarraleah; 19 males and 26 females were obtained.

Other localities:- Specimens were found in forest debris near the Lake Highway at Golden Valley, at Notley Gorge (west of the Tamar River), on Mt. Barrow and in Mt. Field National Park, as well as in a decaying eucalypt log at Collinsvale.

Variations. Background colour of some specimens from Tarraleah is purplish-brown instead of a true brown.

The number of articles in the flagellum of the 2nd antenna is not constant but appears to have some relation to the size of the animal. The following table shows a comparison between number of articles in flagellum and length of body (to nearest 0.1 mm.) in 18 male specimens from Tarraleah.

No. of articles in flagellum.	Corresponding body lengths in mm.(with no. of specimens in parentheses)
6	4.9 (1), 4.8 (5), 4.7 (2).
5	4.8 (1), 4.6 (2), 4.5 (1), 4.4 (3)
4	4.3 (1), 4.1 (1), 4.0 (1).

Stylloniscus maculosus n.sp.

Fig. 23. Fourth and 5th tergites of pereion, showing distribution of unpigmented areas.

Fig. 24. Right 1st antenna, ventral view.

Fig. 25. Left 2nd antenna, ventral view.

Fig. 26. Distal part of left mandible, dorsal view.

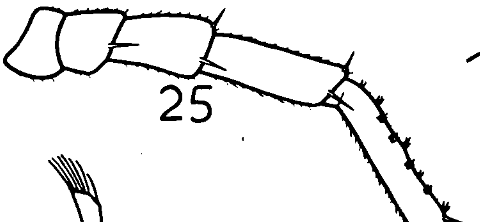
Fig. 27. Distal part of right mandible, dorsal view.

Fig. 28. Distal part of outer lobe of left 1st maxilla, ventral view.

Fig. 29. Distal part of right 2nd maxilla, ventral view.

Fig. 30. Distal part of right maxilliped, ventral view.

Fig. 31. Scale-seta from lateral border of 1st segment of pereion, dorsal view.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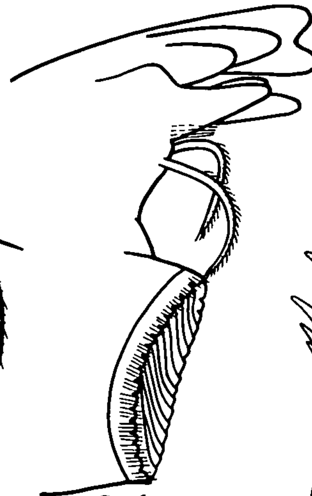
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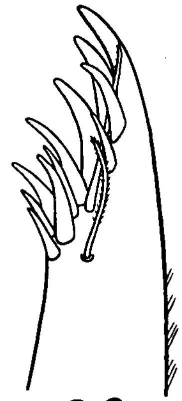
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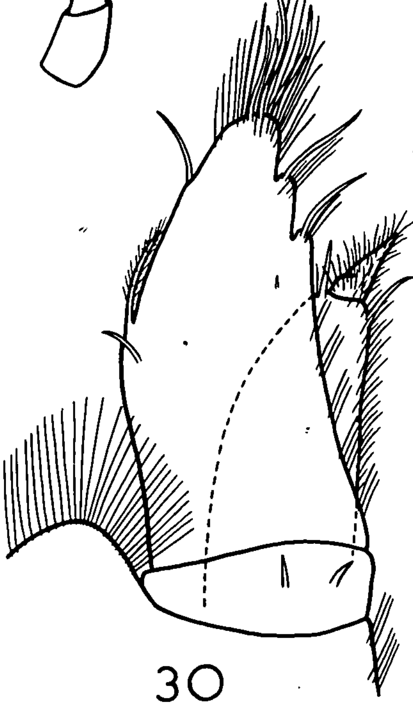
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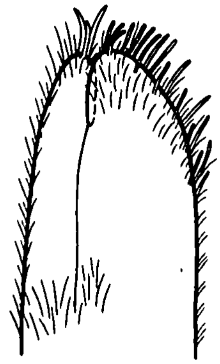
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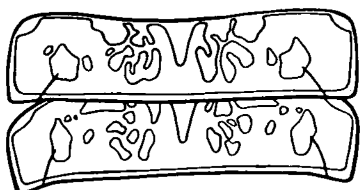
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Styloniscus maculosus n.sp.

Fig. 32. Dactylos of right 4th leg, anterior view.

Fig. 33. Meros and ischion of right 7th leg of male, anterior view.

Fig. 34. Male organ, ventral view.

Fig. 35. Left 1st pleopod of male, dorsal view.

Fig. 36. Distal part of endopodite of right 1st pleopod of male, dorsal view.

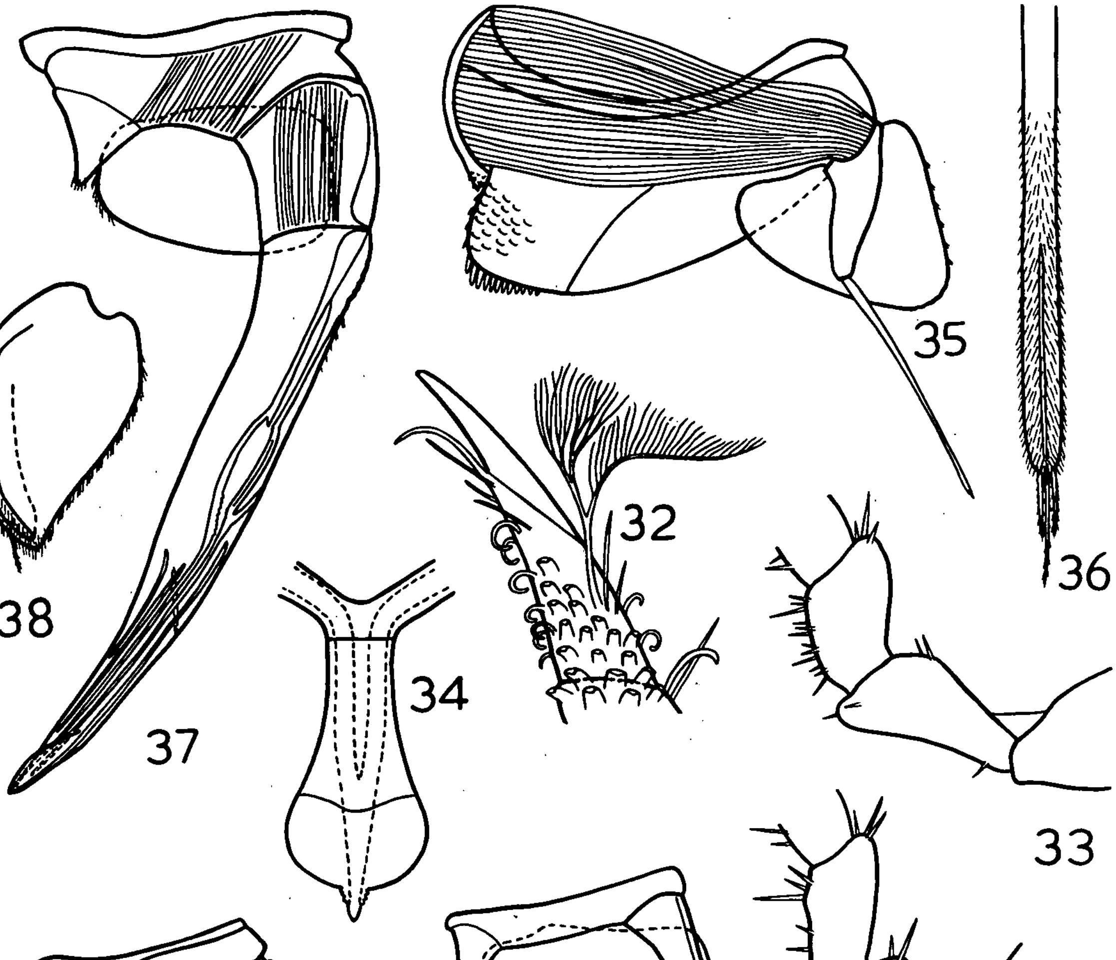
Fig. 37. Left 2nd pleopod of male, dorsal view.

Fig. 38. Exopodite of right 5th pleopod of male, dorsal view.

Fig. 39. Meros and ischion of right 7th leg of female, anterior view.

Fig. 40. Right 1st pleopod of female, ventral view.

Fig. 41. Left 2nd pleopod of female, dorsal view.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Styloniscus squarrosus n.sp.

(Figs. 42-51).

Male (fig. 42).

Length of largest specimen: 5.1 mm.; breadth: 2.4 mm.

Colour. Background colour of dorsal surface in live animal is purplish-brown. Conspicuous unpigmented patches are present on cephalon, pereion and 1st to 3rd segments of pleon. On pereion there is a large patch at base of each epimeron, and other patches occur between this and mid-line; a pigmented band extends down centre of pereion.

Cephalon. Vertex has 4 transverse rows of prominent rounded tubercles. Each tubercle is set with a large hyaline scale-seta. Antennary tubercles are right-angled, prominent in dorsal view. Eyes are each composed of 3 ocelli which are separated from each other and arranged in a triangle.

First antenna. Appendage tapers unevenly, 2nd and 3rd articles each being abruptly narrower than the preceding article. Third article is spatulate; at its apex it bears 9 long sensory setae.

Second antenna. Length of peduncle: 2.1 mm.; length of flagellum: 0.75 mm. Spines occur on distal borders of articles of peduncle, 2 on 3rd article, one each on 2nd, 4th and 5th articles. These spines each have apex of outer sheath split into several fine points surrounding a coarser central seta. All articles of antenna have a dense covering of long scales. Anterior surface of 5th article of peduncle is raised into 7 prominences which form two series, 5 in a dorsal row, 2 in a ventral row. Each prominence is set with a group of large hyaline scale-setae. Flagellum is evenly tapering and composed of 7 articles; terminal articel has an apical tuft of long setae.

Mandibles. Left mandible (fig. 43):- Incisor process consists of an outermost bifid tooth and 2 simple teeth. Lacinia mobilis ends in 3 simple teeth. At its base there is a tuft of long, simple setae, behind which are 2 pencils of setae. Molar process is triturating; there is a slender, sparsely setose pencil on its inner side. Right mandible (fig. 44):- Incisor process consists of 3 simple teeth. Lacinia mobilis is club-shaped; its apex is encircled by a ring of small, tooth-like processes. Behind base of lacinia mobilis there is one pencil of setae; there is no tuft of simple setae. On inner side of molar process is a pencil of setae which is longer and more densely setose than that on molar process of left mandible.

First maxilla. Outer lobe bears at its apex 11 simple teeth, and 2 long, narrow processes. These processes are inserted at an angle to long axis of lobe; their distal regions are set with spinules. Comb-like groups of setae, situated near outer edge of dorsal surface of lobe, extend beyond its outer margin. On inner side of apical region of inner lobe there are 3 conical setose processes; the two more distal ones are sub-equal in length, the third is longer.

Second maxilla. Apical region is divided into 2 lobes, outer lobe being about half width of inner lobe. Apex of outer lobe is sharply rounded and bears 3 coarse setae; its outer margin is fringed with fine setae. Inner lobe is more bluntly rounded; its apex and inner marginal region bear several coarse setae and numerous fine setae. Long fine setae occur on ventral surface of maxilla in an area below base of lobes.

Maxilliped. Epipodite tapers to an acute apex; at its base the outer margin is produced into a rounded lobe. Inner side of basis is thicker than outer side, thicker region being delimited by a ridge on dorsal surface. Lateral margins of basis bear comb-like groups of setae. Outer side of basis projects beyond base of endopodite as a rounded lobe fringed with very long setae. In endopodite, ischion is the only article distinctly separated; on its ventral surface there are 2 short spines. Remainder of endopodite is sub-conical in outline and without suture lines; its inner side near apex shows indications of division into 3 lobes which bear numerous long setae of differing thicknesses. Inner margin below lobes bears comb-like groups of fine setae. On outer margin there are 2 long setae, with a pencil of fine setae in the angle of the lower one. Endite is sub-conical, continuous with thicker half of basis. Its inner and outer surfaces are setose and it terminates in a conical setose process, below which are 3 spines.

Pereion. First segment is markedly produced forwards on each side to flank cephalon. Posterior borders of 1st to 3rd segments are nearly straight, with posterior angles bluntly rounded. Epimera of 4th segment are slightly produced backwards, with posterior angles more right-angled; epimera of 5th to 7th segments are more markedly directed backwards with posterior angles sub-acute. Epimera of 2nd to 7th segments are each marked off by an oblique tuberculate ridge extending forwards and inwards from posterior margin. Dorsal surface of pereion between epimera bears numerous prominent rounded tubercles, which are arranged in transverse rows; 5 rows on 1st segment, 4 rows on 2nd, 3 rows on 3rd, and 2 rows each on 4th to 7th segments. Set on each tubercle is a large hyaline scale seta (fig. 45), the scale part of which is finely striated, while the seta is slightly expanded at the end. Tergites have a dense covering of pointed, striated scales.

Pereiopods. First leg:- Majority of spines situated on under surface of leg, each have the apex of the outer sheath divided into several fine points surrounding a coarser central seta. Hyaline scales are present on under surface of meros and carpos. There is a dense covering of short, simple spines on inner surface of propodos. Dactylos terminates in a simple claw and has a covering of elongated scales and long setae. The "dactylar seta" bifurcates, and one ramus sub-divides dichotomously while the other has branches arising from one main axis.

Simple spines are absent from propodos of 2nd to 7th legs. Distribution of hyaline scales on 2nd and 3rd legs is similar to that on 1st leg. A covering of hyaline scales is found only on under surface of carpos on 4th leg, and is absent from 5th to 7th legs. Outer surface of propodos of 6th and 7th legs is fringed with very long scales. Seventh leg exhibits no sexual differentiation; lower border of ischion (fig. 46) is straight.

Male organ (fig. 47). Apex is rounded and terminates in a small conical process with folded walls. Behind rounded portion, ventral surface is crossed by a V-shaped ridge. The two ducts which enter base of organ unite inside it to form one.

Pleon. Abruptly narrower than pereion. Pleura of 3rd to 5th segments are small, acute and adpressed, but visible in dorsal view. Terminal segment is trapezoidal, with postero-lateral borders incurved and posterior border straight. There is a row of 4 tubercles across 3rd tergite; each tubercle bears a large scale-seta. Remainder of pleon is smooth. Pleon segments have a covering of pointed, striated scales.

Pleopods. First pleopod (fig. 48):- Protopodite is broad; its outer side forms a rounded lobe covered with hyaline scales. Exopodite is sub-triangular with an indentation in outer border near apex. Endopodite is sub-cylindrical and is terminated by a long flagelliform process which is simply pointed at its apex and lacks setae. Well-developed muscles are inserted at base of endopodite.

Second pleopod (fig. 49):- Outer side of protopodite is produced into a sub-triangular lobe with its apex setose. Exopodite is sub-quadrangular with comb-like groups of setae on both of its posterior angles. Endopodite is biarticulate; length of articles: 1st 0.30 mm., 2nd 0.85 mm. First article is sub-cylindrical and has well-developed longitudinal muscles; comb-like groups of setae are present on distal region of its outer surface. Second article tapers evenly to a bluntly pointed apex which is slightly bent outwards at the tip. On dorsal surface a groove with strongly chitinized walls extends obliquely down length of 2nd article. At base of article, inner wall of this groove is ornamented with blunt, tooth-like processes. In middle third, walls of groove are set with small, backwardly-sloping, chitinous ridges.

Third pleopod:- Inner posterior corner of protopodite is produced into a rounded, setose lobe. Exopodite is sub-quadrangular with its apex sharply rounded and its posterior margin indented. Its inner margin is set with comb-like groups of setae; its outer angle is fringed with groups of setae. There is a large plumose seta on apical angle, and a few long simple setae are present on ventral surface, near posterior margin. Endopodite is sub-triangular, much smaller than exopodite. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Lobe on protopodite is narrow and acute. Exopodite (fig. 50) is sub-triangular. Both of its lateral margins bear comb-like groups of setae, and in apical region these setae extend onto dorsal surface. There is a large plumose seta at apex, and a few long, simple setae on ventral surface near outer margin. On inner side of dorsal surface there is a setose groove for reception of endopodite of 2nd pleopod. This groove occupies about 1/2 length of exopodite. Endopodite is larger in relation to exopodite than it is in 3rd and 4th pleopods.

Uropod. Posterior border of protopodite is level with that of terminal segment; inner surface is indented and covered with long scales. Both rami are conical, covered with pointed scales, and each has a few long apical setae. Length of rami: exopodite 1.00 mm., endopodite 0.70 mm.

Female:

Length of largest specimen: 6.2 mm.; breadth: 3.1 mm.
Female differs from male in the following structures:-

Pereiopods:- There is no dense covering of hyaline scales on under surface of meros and carpos of anterior pereiopods.

First pleopod:- Exopodite is sub-triangular with its outer margin scarcely indented. Endopodite is sub-triangular with apex rounded, and is much smaller than exopodite. There are no well-developed muscles attached to endopodite.

Second pleopod (fig. 51):- Exopodite is sub-quadrangular. Endopodite is conical; its distal half bears comb-like groups of setae. Length of exopodite is approximately 4/5 that of endopodite; length (along inner border): exopodite 0.35 mm., endopodite 0.44 mm.

Fifth pleopod:- Exopodite is not grooved.

Habitat.

Type locality:- This description is based on specimens found under decaying wood and in debris lying on the ground at altitudes of 1,500-3,000 ft. on Mt. Wellington. Examples were collected on the following dates:- 15th May, 1956, 2 males, 8 females; 22nd October, 1956, 6 males, 5 females; 6th March, 1957, one male; 28th May, 1957, 4 males, 3 females.

Other localities:- Other specimens were found in a decaying eucalypt log at Collinsvale, and in forest debris in the Arve Forest, near Geeveston.

Variations.

Background colour of some specimens is a light reddish-brown. Some smaller specimens are dark brown, with unpigmented patches less conspicuous than in the larger specimens.

The number of articles in the flagellum of the 2nd antenna is not constant but appears to have some relation to the size of the animal. The following table shows a comparison of number of articles in flagellum and length of body (to nearest 0.1 mm.) in 10 male specimens from Mt. Wellington.

No. of articles	Corresponding body lengths in mm.
7	5.1, 4.8, 4.4, 4.3, 4.0.
6	3.9, 3.9.
5	3.6, 3.4.
4	1.8.

Styloniscus squarrosus n.sp.

Fig. 42. Male specimen, dorsal view.

Fig. 43. Distal part of left mandible, dorsal view.

Fig. 44. Distal part of right mandible, dorsal view.

Fig. 45. Scale-seta on a tubercle on 5th tergite of pereion, dorsal view.

Fig. 46. Meros and ischion of right 7th leg of male, anterior view.

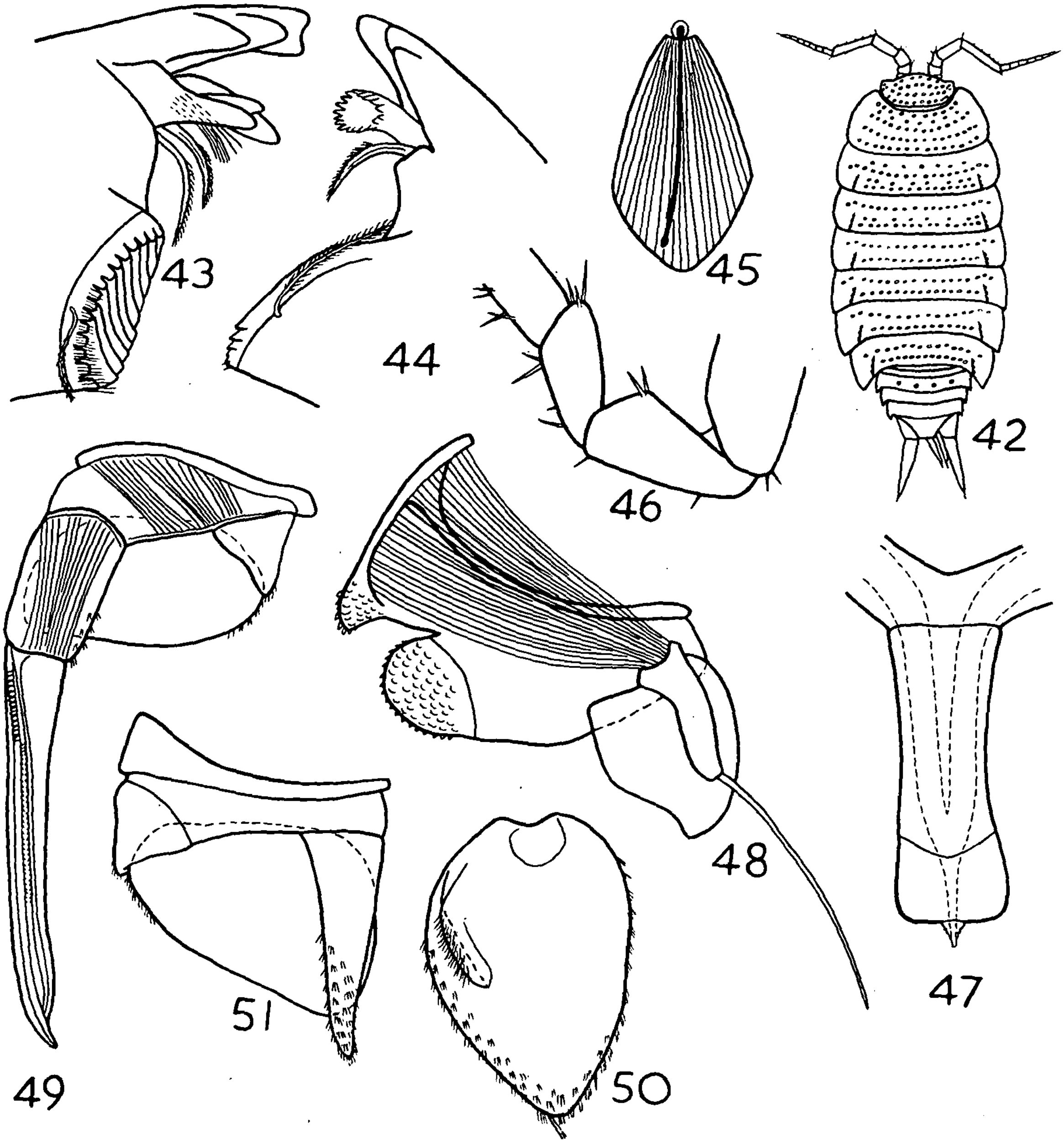
Fig. 47. Male organ, ventral view.

Fig. 48. Left 1st pleopod of male, dorsal view.

Fig. 49. Right 2nd pleopod of male, dorsal view.

Fig. 50. Exopodite of right 5th pleopod of male, dorsal view.

Fig. 51. Left 2nd pleopod of female, dorsal view.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Genus Notoniscus Chilton 1915.

Synonymy. Chiltonia Arcangeli 1923, (non Stebbing 1899).
Chiltonella Vandel 1945, nom.nud.
Chiltonella Vandel 1952.
? Paranotoniscus Barnard 1932.

Chilton (1915a, p. 418) erects genus Notoniscus for two species, N. helmsii (Chilton 1901) from New Zealand and N. australis (Chilton 1909) from Campbell Island, which he previously places in genus Haplophthalmus Schöbl 1860. He notes that Notoniscus differs from Haplophthalmus in the character of the eyes, i.e. in Notoniscus each eye is composed of 3 ocelli instead of one as in Haplophthalmus, and in the fact that the first three instead of the first two segments of the pleon have the pleura very small or absent.

In this same paper, Chilton (1915a, p. 424, pl. 37, fig. 23) erects a new species, Haplophthalmus tasmanicus, from Tasmania. This species differs from Notoniscus and agrees with Haplophthalmus in having large pleural expansions on the 3rd pleon segment as well as on the 4th and 5th segments. However Chilton states that it differs from the description of Haplophthalmus given by Sars (1899) in having the eyes not simple but composed of 3 ocelli and the segments of the pereion not discontiguous laterally. Arcangeli (1923, p. 314) considers that these characters are sufficient to separate H. tasmanicus from genus Haplophthalmus, and he designates it as the type of a new genus which he names Chiltonia.

Barnard (1932, p. 202) erects a new genus, Paranotoniscus which he distinguishes from Notoniscus on the fact that it has better developed pleura on the 3rd segment of the pleon. Barnard's diagnosis of Paranotoniscus does not distinguish it from Chiltonia Arcangeli; however he makes no reference to this genus.

Jackson (1941, p. 8) nominates N. holmsii Chilton as the type species of Notoniscus.

Vandel (1945, p. 236) notes the occurrence in Tasmania of a species, Chiltonella tasmanica (Chilton). In a later paper, Vandel (1952, p. 94) places in his new sub-family Notoniscinae of family Styloniscidae, a genus which he lists as "Chiltonella Arcangeli". On p. 96 of this (1952) paper he states:- "Arcangeli (1923, p. 314) a créé le genre Chiltonella pour y ranger Haplophthalmus tasmanicus Chilton, 1915, espèce dont on ne connaît jusqu'ici qu'un seul exemplaire. Chiltonella diffère de Notoniscus par la présence de néopleurons bien développés au troisième pléonite." But the reference to Arcangeli (1923) listed by Vandel (1952) in his bibliography is that in which Arcangeli names his genus Chiltonia.

Reference to Neave (1939, vol. 1, p. 694) shows that the name Chiltonia was preoccupied in 1923, having been used for a genus of Amphipods by Stebbing (1899, pp. 397, 408). However, as Vandel gives no indication that his replacement of Arcangeli's name is due to knowledge of its preoccupation, it would appear that his crediting of the name Chiltonella to Arcangeli is done in error. Chiltonella is not included in the list of generic names given by Neave (1939-40, 1950), nor does it appear in the Zoological Record for the years 1923-1954. The earliest published reference to Chiltonella appears to be that given by

Vandel in 1945, and as it is not accompanied by any diagnosis or description, this reference should be regarded as a nomen nudum. In 1952, Vandel characterises Chiltonella by referring to it Haplophthalmus tasmanicus Chilton and by noting its distinction from Notoniscus. Chiltonia Arcangeli and Chiltonella Vandel are absolute synonyms, as both have been given to the one genus which contains H. tasmanicus as the type and only species. As Chiltonia is unavailable, I propose to refer to this genus by the name Chiltonella, regardless of whether or not Vandel publishes this name in error.

Vandel (1952, p. 96) subsequently notes that, although the sexual characters of Ch. tasmanica are not known, it is probable that Chiltonella belongs in his sub-family Notoniscinae. I have collected and examined specimens which agree with Chilton's (1915a) description of H. tasmanicus. The characters of these specimens, including male sexual characters, agree with Vandel's (1952, pp. 94-95, 96) diagnoses of family Styloniscidae and sub-family Notoniscinae. His inclusion of Chiltonella in these divisions is therefore confirmed.

In addition, I have collected in Tasmania specimens which I assign to Notoniscus australis, after a comparison of their characters with Chilton's (1915a) description of this species. On comparing the Tasmanian examples of N. australis and Ch. tasmanica, I find, apart from the differing development of pleura on the 3rd segment of pleon, only two major differences between them, namely (1) the arrangement of tubercles on cephalon and pereion and (2) certain characters of those pleopods which show sexual differentiation. A comparison of specimens of Ch. tasmanica with Chilton's (1915a) description of N. helmsii indicates that *Ch. tasmanica* differs from this, the type species of *Notoniscus*, in the same respects as it differs from *N. australis*. I consider these differences in tuberculation and sexual characters of pleopods to be only of specific value. Such differences are regarded as specific within the allied genus *Styloniscus* Dana 1852; also reference to Chilton's (1915a) description and figures (pl. 36, figs. 1,9) of *N. helmsii* and *N. australis* show that differences in arrangement of tubercles distinguish these two species.

In comparing characters of *H. tasmanicus* with generic characters of *Haplophthalmus*, Chilton (1915a, p. 424) claims that the segments of the pereion in this species are not discontiguous laterally, but in his actual description of the species he states that they are nearly contiguous. In my specimens of *Ch. tasmanica* the pereial epimera are slightly discontiguous; therefore the species does not differ from *Notoniscus* in this regard.

There remains only the difference in the 3rd segment of pleon to distinguish *Chiltonella* from *Notoniscus* on a generic level; i.e. in *Chiltonella* the pleura of the 3rd segment are as well developed as those of the 4th and 5th segments, while in *Notoniscus* the 3rd pleura are smaller than the 4th and 5th pleura. As their species are basically similar in other respects, I do not consider that a separation of the monotypic genus *Chiltonella*, due to this one distinctive character, is warranted. In support of this view I refer to Chilton's (1909) paper in which he (p. 662) considers erecting a new genus for the New Zealand species included in *Haplophthalmus*, but prefers instead to widen the generic characters of the latter, stating that he has an undescribed species from Tasmania (presumably _H. tasmanicus_) which has only the first two segments of the pleon without expansions, while _H. australis_ is to some extent intermediate as regards charactors of tho pleon. Thus in this paper he considers the three species concerned to be congeneric.

I therefore propose to extend the limits of _Notoniscus_ to include species in which the pleura of the 3rd segment of pleon are well developed, and to transfer _Ch. tasmanica_ to this genus. As _Ch. tasmanica_ is the type and only species of _Chiltonella_ Vandel, this name becomes a synonym of _Notoniscus_ Chilton. Although Chilton uses the character of the pleon in distinguishing _Notoniscus_ from _Haplophthalmus_, with the limits of _Notoniscus_ so extended these two genera still remain clearly distinct, as they are classified by Vandel (1952) in different families, the Styloniscidae and Trichoniscidae respectively, and are therefore distinguished by the characters which separate these families.

In his diagnosis of _Notoniscus_, Chilton (1915_a_) describes the eyes as having more than one visual element, but does not limit the number. However, eyes composed of 3 ocelli are exhibited by all three species now included in _Notoniscus_.

Chilton states that antennules, antennae, mouth parts and dactylar seta of pereiopods are as in _Trichoniscus_. It seems likely that he is comparing these structures in _Notoniscus_ with those of New Zealand species which he places in _Trichoniscus_, and which are transferred by Vandel (1952) to _Styloniscus_ Dana 1852. In the species of _Notoniscus_ and _Styloniscus_ represented in Tasmania, these structures are very alike. Therefore, as _Trichoniscus_ and _Notoniscus_ are now placed in different families, in diagnosing Notoniscus I propose to note its similarities with Styloniscus rather than with Trichoniscus. As well as the structures listed by Chilton, the male organ and male and female pleopods in Notoniscus are of a similar kind to those found in Styloniscus.

I therefore propose the following diagnosis of Notoniscus, which is amended from that given by Chilton (1915a, p. 418) in the points just discussed.

Generic diagnosis.

Body oblong, central portion moderately convex, dorsal surface sculptured and bearing ridges or tubercles. Cephalon with the front triangularly produced, antennary tubercles directed downwards, rather small, with extremity subacute. Epimera lamellarly expanded, projecting almost horizontally, discontiguous. Pleon not abruptly contracted; pleura of 3rd segment either small or well developed, those of 4th and 5th segments well developed, lamellar; terminal segment trapezoidal with truncate posterior margin. Eyes each composed of 3 ocelli. Antennules, antennae and mouth parts as in Styloniscus Dana 1852. Legs rather short, not increasing much in length posteriorly; dactylar seta as in Styloniscus. Male organ and pleopods of both sexes of the same kind as in Styloniscus. Uropoda with rami rather widely separated, subequal.

Genotype. Notoniscus helmsii (Chilton 1901) Chilton 1915.

According to the generic diagnosis given by Barnard (1932, p.202), his genus Paranotoniscus is distinguished from Notoniscus, as defined by

Chilton, only on the fact that the pleura of the 3rd segment of the pleon are expanded. Consequently, his diagnosis does not differentiate *Paranotoniscus* from *Notoniscus* as I define it. Barnard's diagnosis does not even distinguish *Paranotoniscus* from *Chiltonella*; Vandel (1952, p. 96), in including both *Chiltonella* and *Paranotoniscus* as separate genera in the Notoniscinae, makes no comparison between them. Barnard's (1932, fig. 6, a, e) figures of his species *P. capensis* and *P. montanus* show that, although the pleura of the 3rd segment of pleon are expanded, they are narrower and more acute than those of the 4th and 5th segments. Hence the 3rd pleura of the pleon in these species are intermediate between those of *N. helmsii* and *N. australis* on one hand and those of *N. tasmanicus* on the other. Thus it appears likely that *Paranotoniscus* Barnard should also be regarded as a synonym of *Notoniscus* Chilton. However, as Barnard's descriptions of four of his five species are brief, I should hesitate to consider this synonymy as definite without having had the opportunity to examine specimens assigned to *Paranotoniscus*.

The two species of genus *Notoniscus* represented in Tasmania may be distinguished as follows :-

Tubercles on pereion forming 4 rows in male, 5 rows in female; 3rd pleura of pleon small compared with 4th and 5th pleura - - - - - - - - - - - - *N. australis* (Chilton).

Tubercles on pereion forming 6 rows in both sexes; 3rd pleura of pleon as large as 4th and 5th pleura - *N. tasmanicus* (Chilton).

<u>Notoniscus australis</u> (Chilton 1909) Chilton 1915.

(Figs. 52-56).

<u>Synonymy</u>. <u>Haplophthalmus australis</u> Chilton 1909.

The descriptions of examples of this species from Campbell Island given by Chilton (1909, pp. 662-664, fig. 17), (1915a, pp. 421-444, pl. 36, figs. 9-16, pl. 37, figs. 17-22), are based on female specimens. As Chilton (1915a, p. 423) himself points out, the appendage which he (1909, p. 664, fig. 17e) describes and figures as the 2nd pleopod of a male is actually that of a female; Chilton then states that he has not found a male specimen. The following description of both male and female specimens of Tasmanian material assigned to <u>N. australis</u> is therefore given.

<u>Male</u> (fig. 52).

Length of largest specimen: 3.0 mm.; breadth: 1.5 mm.

<u>Colour</u>. Dorsal surface of live specimen is dark brown in colour.

<u>Cephalon</u>. Centre of vertex is occupied by a large pyramidal tubercle; small tubercles occur on remainder of vertex. Anterior region of cephalon is produced forwards as an acute triangular process. Antennary tubercles are acute-angled and prominent in dorsal view. Eyes are each composed of 3 ocelli set on a rounded prominence; the ocelli of each eye are clearly separated from one another and arranged in a triangle.

<u>First antenna</u>. Unevenly tapering and composed of 3 articles. Apex of 3rd article is oblique, with one side produced to a sharp point; this oblique edge bears 3 large sensory setae.

Second antenna. Length of peduncle: 0.71 mm.; length of flagellum: 0.22 mm. Spines, each of which has apex of its outer sheath divided into numerous fine points surrounding a coarser central seta, occur on distal borders of articles of peduncle, 2 each on 3rd and 4th articles, one each on 2nd and 5th. All articles of antenna have a covering of scales, but prominent groups of large hyaline scales do not occur on anterior borders of 4th and 5th articles of peduncle. Flagellum is composed of 4 articles; terminal article has an apical tuft of long setae.

Mandibles. Left mandible:- Incisor process is composed of an outermost bifid tooth and 2 simple teeth. Lacinia mobilis ends in 3 teeth; behind its base there are 2 pencils of setae. Molar process has no molar pencil. Right mandible:- Incisor process consists of 3 simple teeth. Lacinia mobilis is club-shaped and has a ring of tooth-like processes at its apex; behind its base there is one pencil of setae. A slender pencil of setae is present on molar process.

First maxilla. Apex of outer lobe has 11 simple teeth and 2 long, narrow processes; distal regions of these processes are set with spinules. Comb-like groups of setae, present on outer side of dorsal surface of lobe, project beyond its outer margin. Apical region of inner lobe has 3 conical, setose processes; the two more distal ones are sub-equal in length, the third is longer.

Second maxilla. Apical region is divided into 2 rounded lobes; width of outer lobe is about half that of inner lobe. Apex of outer lobe bears 3 coarse setae, and outer margin of lobe is fringed with fine setae. Apex and inner marginal region of inner lobe bear several coarse setae and numerous finer setae. Long, fine setae are present on ventral surface of maxilla below base of lobes.

Maxilliped. Epipodite is widest at its base and tapers to a sub-acute apex. Lateral borders of basis are fringed with setae. On outer side, basis projects beyond base of endopodite as a rounded lobe with very long marginal setae. Ischion is the only article of endopodite which is distinct; there are 2 short spines on its ventral surface. Remainder of endopodite is sub-conical in outline; its inner margin near apex shows indications of division into 3 lobes. These lobes bear numerous setae which are of differing thicknesses. Inner margin below base of lobes bears comb-like groups of setae. On outer margin of endopodite are 2 large setae, with a pencil of fine seta in the angle of the lower one. Endite is sub-conical and setose. It terminates in a conical, setose process, below base of which are 3 spines.

Pereion. Dorsal surface between epimera is strongly convex. Epimera are large, sub-rectangular and slightly discontiguous laterally. Anterior border of 1st segment is produced forwards on each side to flank cephalon. Epimera of 1st segment are nearly transverse, those of 2nd segment slope slightly backwards, those of 3rd to 7th segments slope increasingly further backwards. Dorsal surface of each tergite bears 4 rounded tubercles which together form 4 longitudinal rows down pereion. The 2 inner rows are made up of large tubercles, while those forming the 2 outer rows are smaller and less conspicuous. There is no row of prominent tubercles down mid-line of pereion. Dorsal surface of tergites bears scattered scale-setae and a covering of rounded scales. Lateral borders of segments are bordered with triangular scales.

Pereiopods. First leg:- Majority of spines on under surface of leg each have apex of outer sheath divided into numerous fine points surrounding a coarser central seta. There is no covering of hyaline scales on under surface of meros and carpos. An area on inner surface of propodos is covered with simple spines. Dactylos bears several long setae and elongated scales; it terminates in a simple claw. The "dactylar seta" bifurcates, and one ramus continues to sub-divide dichotomously while the other has branches arising from a main axis.

There is no spinose area on inner surface of propodos of 2nd to 7th legs. Distal half of outer surface of propodos on 6th and 7th legs has a fringe of long setae. Seventh leg shows no sexual differentiation.

Male organ. Apical region is broadened and rounded, and is terminated by a median conical process with folded walls. Ventral surface behind rounded portion is crossed by a V-shaped ridge. The two ducts which enter organ at its base unite inside it to form one.

Pleon. Not abruptly narrower than pereion and not tuberculate. Pleura are developed on 3rd segment, but they are narrow and acute, and do not extend outwards as far as the general outline of the body. Pleura of 4th and 5th segments are large, semi-crescentic and sharply directed backwards; they form a part of general outline of body. Terminal segment is trapezoidal with its postero-lateral borders incurved, and its posterior border straight.

Tergites of pleon bear scattered scale-setae and a covering of rounded scales; their lateral margins are bordered with triangular scales.

Pleopods. First pleopod (fig. 53):- Protopodite is broad; its outer side is rounded and bears hyaline scales. Exopodite is sub-triangular with an indentation in its outer margin; its apex is not crenate. Endopodite is sub-cylindrical; it terminates in a long flagelliform process which is simply pointed at its apex and lacks setae. Well-developed muscles, which are supported by a prolongation of 1st sternite of pleon, are inserted at base of endopodite.

Second pleopod (fig. 54):- Outer side of protopodite is produced into a sub-triangular lobe with its apex setose. Exopodite is sub-rectangular and has a fringe of setae on its outer posterior angle. Endopodite is biarticulate; length of articles: 1st 0.16 mm., 2nd 0.58 mm. First article is sub-cylindrical. Inner side of 2nd article curves inwards abruptly at about 2/7 of its length from apex, so that the latter is asymmetrical, continuous with outer side of endopodite; apical region tapers to a sharp point. Just behind this point there is a rounded chitinuous prominence on its outer side. A groove with strongly chitinised walls extends obliquely down dorsal surface of article. Near its basal end, inner wall of this groove is set with blunt, tooth-like processes.

Third pleopod:- Inner posterior angle of protopodite is produced into a lobe, apex of which is rounded and setose. Exopodite is sub-quadrangular with its posterior border indented. There is a large plumose seta on apical angle and a few long, simple setae occur on ventral surface near posterior margin. Outer margin is fringed with fine setae; inner marginal region bears comb-like groups of setae. Endopodite is sub-triangular, much smaller than exopodite. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Lobe on protopodite is long and narrow. Exopodite (fig. 55) is sub-triangular. Its lateral borders bear comb-like groups of setae, there is a large plumose seta at apex and a few long, simple setae on ventral surface near outer margin. On inner side of its dorsal surface, a groove for reception of endopodite of 2nd pleopod extends down whole length of exopodite; inner border of this groove is setose. Area occupied by groove is heavily pigmented. Endopodite is larger in relation to exopodite than it is in 3rd and 4th pleopods.

Uropod. Protopodite is sub-triangular; its outer border is fringed with long scales, its posterior border is level with that of terminal segment. Exopodite is terminal in position on protopodite. Outer region of protopodite forms a narrow, flattened expansion which is delimited on dorsal surface by a ridge in line with outer edge of exopodite. Endopodite is inserted on ventral surface of protopodite, near its posterior margin. Both rami are conical, covered in elongated scales, and have a terminal tuft of long setae. Length of rami: exopodite 0.15 mm., endopodite 0.19 mm.

Female (fig. 56).

Length of largest specimen: 4.6 mm.; breadth: 2.3 mm.

Female differs from male in the following structures:-

Tubercles on pereion:- Dorsal surface of each pereial tergite bears 5 rounded tubercles which together form 5 longitudinal rows down pereion. Tubercles forming the outermost row on each side are more conspicuous than in the male. The median row of tubercles is not present in male specimens.

First pleopod:- Exopodite is small and sub-triangular with its outer margin not indented. Endopodite is rounded, much smaller than exopodite. Well-developed muscles are not present.

Second pleopod:- Exopodite is sub-rectangular. Endopodite is conical and elongated; its distal region bears comb-like groups of setae. Length of exopodite is approximately 1/3 that of endopodite; length (along inner border): exopodite 0.13 mm., endopodite 0.38 mm.

Fifth pleopod:- Exopodite is not grooved.

Habitat.

This description is based on specimens found in debris lying on the ground in a myrtle gully at Collinsvale. Sixty males and 114 females were obtained from samples of debris collected on 12th June, 1957, and 19th June, 1957, and another 60 males and 84 females were obtained from a sample collected on 13th November, 1957.

Only two female specimens were found elsewhere; one in forest debris at Tarraleah, the other in debris in the Arve Forest, near Geeveston.

Notoniscus australis has not previously been recorded from Tasmania.

Variation.

In small female specimens, approximately less than 2.3 mm. long, the median row of tubercles on the pereion is less conspicuous than the inner lateral rows. The tuberculation of these young females thus approaches the condition found in the males.

Remarks.

It is noted that the description given by Chilton (1909, p. 663) of the left mandible applies to the right mandible, and vice versa.

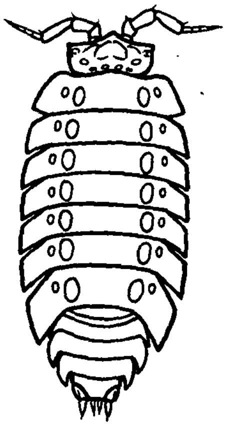
Chilton (1909, p. 663) describes the outer lobe of the 1st maxilla as ending in about a dozen setae, while he (1915a, pp. 422-423) later states that it bears about eight or nine teeth. His figure of the 1st maxilla (1915a, pl. 37, fig. 17) does not specify this number. In the Tasmanian specimens this structure has 11 teeth and 2 long processes.

Chilton (1915a, p. 423, pl. 37, fig. 18) describes and figures the maxilliped as having the epipodite rounded at its extremity and slightly narrower near its base, and the endopodite formed of a single article. In the Tasmanian specimens the epipodite of the maxilliped is widest at its base and its apex is sub-acute; also the ischion is distinct from the remainder of the endopodite.

Chilton (1909, p. 662), with regard to specimens from Campbell Island, states:- "The animal runs with great rapidity." However the speed of walking of the specimens of N. australis from Collinsvale, Tasmania, is rather slow when compared for example with that of specimens of Styloniscus thomsoni (Chilton) which were found in the same samples of debris.

__*Notoniscus australis*__ (Chilton).

Fig. 52.	Male specimen, dorsal view.
Fig. 53.	Left 1st pleopod of male, dorsal view.
Fig. 54.	Left 2nd pleopod of male, dorsal view.
Fig. 55.	Exopodite of left 5th pleopod of male, dorsal view.
Fig. 56.	Female specimen, dorsal view.



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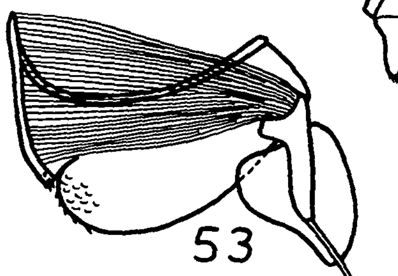

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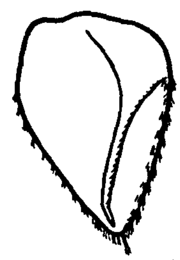

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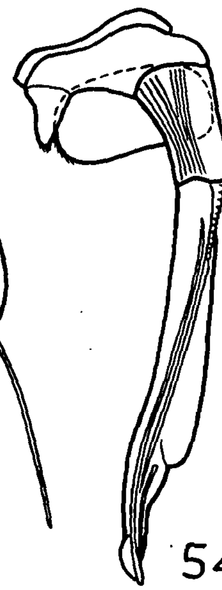

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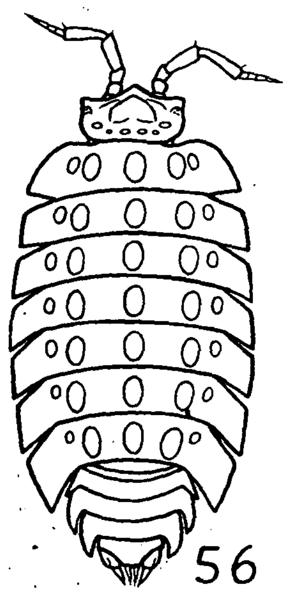

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<u>Notoniscus</u> <u>tasmanicus</u> (Chilton 1915).

(Figs. 57-72).

<u>Synonymy</u>. <u>Haplophthalmus</u> <u>tasmanicus</u> (Chilton 1915).

<u>Chiltonia</u> <u>tasmanica</u> (Chilton 1915) Arcangeli 1923.

<u>Chiltonella</u> <u>tasmanica</u> (Chilton 1915) Vandel 1945, <u>non</u>. <u>nud</u>.

<u>Chiltonella</u> <u>tasmanica</u> (Chilton 1915) Vandel 1952.

As Chilton had only one example of this species, his description (1915<u>a</u>, p. 424, pl. 37, fig. 23) is based on characters which could be observed without dissecting the animal. The following augmented description of further Tasmanian material assigned to the species is therefore given.

<u>Male</u> (fig. 57).

Length of largest specimen: 4.5 mm.; breadth: 2.25 mm.

<u>Colour</u>. Dorsal surface of live specimen is dark brown in colour.

<u>Cehpalon</u>. Vertex is conspicuously tuberculate. Near its posterior margin there are two large rounded tubercles with a pair of smaller tubercles between them. In front of these is a large, median, bituberculate prominence with a small tubercle situated on each side of it. Anterior region of cephalon is produced forwards as an acute triangular process. Antennary tubercles are large and right-angled. Eyes are each composed of 3 ocelli set on a rounded prominence, the ocelli of each eye being clearly separated from each other and arranged in a triangle.

<u>First antenna</u> (fig. 58). Unevenly tapering and composed of 3

articles. Third article is narrow and at its apex bears 3 long sensory setae.

Second antenna (fig. 59). Length of peduncle: 1.43 mm.; length of flagellum: 0.37 mm. Slender spines, each with apex of its outer sheath split into many fine points surrounding a coarser central seta, are present on distal borders of 2nd to 5th articles of peduncle; 2 each on 3rd and 4th articles, and one each on 2nd and 5th articles. Peduncle has a covering of scales. Groups of larger hyaline scales are present on 4th and 5th articles, but these are not raised on tubercles. Flagellum has 4 articles which are covered with elongated scales. Fourth article bears a terminal pencil of long setae.

Mandible. Left mandible (fig. 60):— Incisor process consists of 3 teeth of which outermost is bifid, inner 2 are simple. Lacinia mobilis ends in 3 teeth; behind its base there are 2 pencils of setae. Molar process has a ridged triturating surface; it has no molar pencil. Right mandible (fig. 61):— Incisor process is composed of 3 simple teeth. Lacinia mobilis is club-shaped with a ring of tooth-like processes at its apex; there is one pencil of seta behind its base. Molar process bears a slender pencil of setae.

First maxilla. Outer lobe (fig. 62) terminates in 11 simple teeth. Two slender processes, differing in length, are inserted on ventral surface behind teeth at an angle to long axis of lobe. Distal regions of these processes bear spinules. Comb-like groups of setae, arising on outer side of dorsal surface of lobe, project beyond its outer margin. Inner lobe at its apex bears 3 conical setose processes; the two more distal ones are sub-equal in length, the third is considerably longer.

Second maxilla (fig. 63). Apical region is bilobed, with outer lobe about half width of inner lobe; apices of both lobes are rounded. Outer lobe bears 3 large apical setae and its outer margin is fringed with fine setae. Apex and inner marginal region of inner lobe bear several coarse sensory setae and numerous finer setae. Scattered setae occur on ventral surface below base of lobes.

Maxilliped (fig. 64). Epipodite tapers to an acute apex. Inner side of basis is thicker than outer side, thicker region being delimited by a ridge on dorsal surface. Lateral borders of basis are fringed with groups of setae. Distally, outer side of basis projects beyond base of endopodite as a rounded lobe with very long marginal setae. Ischion is the only article of endopodite which is distinctly separated; there are 2 small spines on its ventral surface. Remainder of endopodite is sub-conical, with its inner margin near apex showing slight indications of division into 3 lobes. These lobes bear long setae which are of differing thicknesses. Inner margin below lobes bears comb-like groups of setae. On outer margin are 2 large setae, with a pencil of fine setae in angle of lower one. Endite is sub-conical, continuous with thicker part of basis. Its inner and outer surfaces are setose, and it terminates in a conical setose process. Below base of this process are 3 spines.

Pereion. Dorsal surface between epimera is strongly convex. Epimera are large, sub-rectangular, very slightly discontiguous laterally. Anterior border of 1st segment is rounded on each side and produced forwards to flank cephalon. Epimera of 1st segment are nearly transverse, those of 2nd segment are slightly directed backwards, those of 3rd to 7th segments slope increasingly further backwards. Dorsal surface of each segment is set with 6 prominent oval tubercles, which together form 6 longitudinal rows down pereion. The 4 inner rows are made up of large tubercles which occupy greater part of length of tergites. Tubercles forming outermost row on each side are slightly oblique and smaller than those forming inner rows. Small tubercles are present between those of the main rows. Dorsal surface of tergites bears scattered scale-setae and a covering of small rounded scales. Lateral borders of tergites have a dense fringe of long pointed scales.

Pereiopods. First leg:- Majority of spines, which are present on under surface of leg, each have apex of outer sheath split into many fine points surrounding a coarser central seta. Large hyaline scales occur on under surface of meros and carpos. An area on inner surface of propodos is set with simple spines. Outer margin of propodos bears groups of hyaline scales, and at distal end, a few long setae. Dactylos is covered with long, flattened setae, and it terminates in a simple claw. The "dactylar seta", bifurcates and one ramus sub-divides dichotomously, while the other has branches arising from one main axis. (Dactylos of 7th pereiopod is figured, fig. 65).

A few hyaline scales occur on under surface of meros and carpos on 2nd leg, but they are absent from this position on remaining legs. Simple spines are not found on inner surface of propodos on 2nd to 7th legs. Long setae on distal part of propodos are more numerous on 6th and 7th legs than on preceding legs. Seventh leg shows no sexual differentiation.

Male organ (fig. 66). Apical region is broadened and rounded, and terminates in a small conical process with folded walls. On ventral surface, apical region is crossed by a ridge. The two ducts which enter base of organ unite inside it to form one.

Pleon. Not abruptly narrower than pereion, and not tuberculate. Pleura of 3rd to 5th segments are large, laterally contiguous, and stand out almost horizontally. They are similar to each other in shape, being semi-crescentic and sharply directed backwards, and all three form part of outline of body. Terminal segment is trapezoidal, with postero-lateral borders incurved and posterior border straight. Dorsal surface of pleon tergites bears scattered scale-setae and a covering of small rounded scales. Lateral borders of segments have a dense fringe of long pointed scales.

Pleopods. First pleopod (fig. 67):- Protopodite is very broad; its outer marginal region bears hyaline scales. Exopodite is sub-triangular with an indentation in its outer margin; its apex is slightly crenate. Endopodite is sub-cylindrical and terminates in a long flagelliform process which is simply pointed at its apex and lacks setae. Well-developed muscles, which are supported by a prolongation of 1st sternite of pleon, are inserted at base of endopodite.

Second pleopod (fig. 68):- Outer side of protopodite is produced into a triangular lobe with its apex setose. Exopodite is sub-rectangular, with setae on margin at outer posterior angle. Endopodite is biarticulate; length of articles: 1st 0.25 mm.; 2nd 0.75 mm. First article is sub-cylindrical and has well-developed longitudinal muscles. A few comb-like groups of setae are present on inner surface at distal end of article. Second article tapers evenly to a bluntly pointed apex which is slightly bent outwards. On dorsal surface, a groove with strongly chitinised walls extends obliquely down its whole length. Near basal end of article, inner border of this groove is set with a row of tooth-like processes. In middle third, both walls of groove bear small, backwardly-sloping, chitinous ridges.

Third pleopod:- Inner posterior angle of protopodite is produced into a lobe, apex of which is rounded and setose. Exopodite is sub-quadrangular with an indentation in posterior margin. Its inner marginal region bears comb-like groups of setae. There is a large plumose seta on apical angle. A few long, simple setae occur on ventral surface near posterior margin, which is fringed with finer setae. Endopodite is sub-triangular, smaller than exopodite. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Apex of lobe protopodite is very acute. Exopodite (fig. 69) is sub-triangular. Both of its lateral borders bear comb-like groups of setae, and on dorsal surface such setae extend across apical region of exopodite. There is a large plumose seta at apex and a few long simple setae are present on ventral surface near apex. On dorsal surface, towards inner side of exopodite, there is a setose groove for reception of endopodite of 2nd pleopod; this groove occupies approximately ½ length of exopodite. Endopodite is larger in comparison to exopodite than in 3rd and 4th pleopods.

<u>Uropod</u> (fig. 70). Protopodite is sub-triangular; its posterior border is level with that of terminal segment. Exopodite is

inserted terminally on protopodite. Outer region of protopodite forms a flattened expansion which is delimited on dorsal surface by a ridge in line with outer edge of exopodite. Outer border of protopodite has a dense fringe of pointed scales. Endopodite is inserted on ventral surface of protopodite near its posterior margin. Both rami are conical, have a covering of scales, and terminate in a few long setae. Length of rami: exopodite 0.23 mm.; endopodite 0.32 mm.

Female.

Length of largest specimen: 4.7 mm.; breadth: 2.4 mm.

Female differs from male in the following structures:-

Pereiopods:- Large hyaline scales are not present on under surface of meros and carpos on 1st and 2nd pereiopods.

First pleopod (fig. 71):- Exopodite is sub-triangular with no indentation in its outer margin. Endopodite is rounded, much smaller than exopodite. Well-developed muscles are not present.

Second pleopod (fig. 72):- Endopodite is conical and elongated; its distal region bears comb-like groups of setae. Length of exopodite is approximately 1/2 that of endopodite: length (along inner border): exopodite 0.27 mm., endopodite 0.55 mm.

Fifth pleopod:- Exopodite is not grooved.

Habitat.

This description is based on specimens found among debris lying on the ground in a myrtle gully at Collinsvale. Samples of debris were collected on 12th June, 1957, and 19th June, 1957; 16 males and 26 females were obtained.

Three female specimens were collected by Professor Hickman on 1st December, 1955, from moss in the Arve forest, near Geeveston.

The specimen described by Chilton (1915a) was found "Under rotten logs, Fern Tree Gully, Hobart, Tasmania."

Variation.

The bodies of some specimens exhibit unpigmented areas, which are particularly frequent on and near the 5th segment of the pereion.

Remarks.

Chilton (1909, pp. 661, 662) mentions an undescribed species of *Haplophthalmus* from Tasmania; this species is presumably *H. tasmanicus*.

The synonymy of this species, and its position in *Notoniscus*, is discussed in the section on the genus.

Notoniscus tasmanicus (Chilton).

Fig. 57. Male specimen, dorsal view.

Fig. 58. Left 1st antenna, ventral view.

Fig. 59. Left 2nd antenna, ventral view.

Fig. 60. Distal part of left mandible, dorsal view.

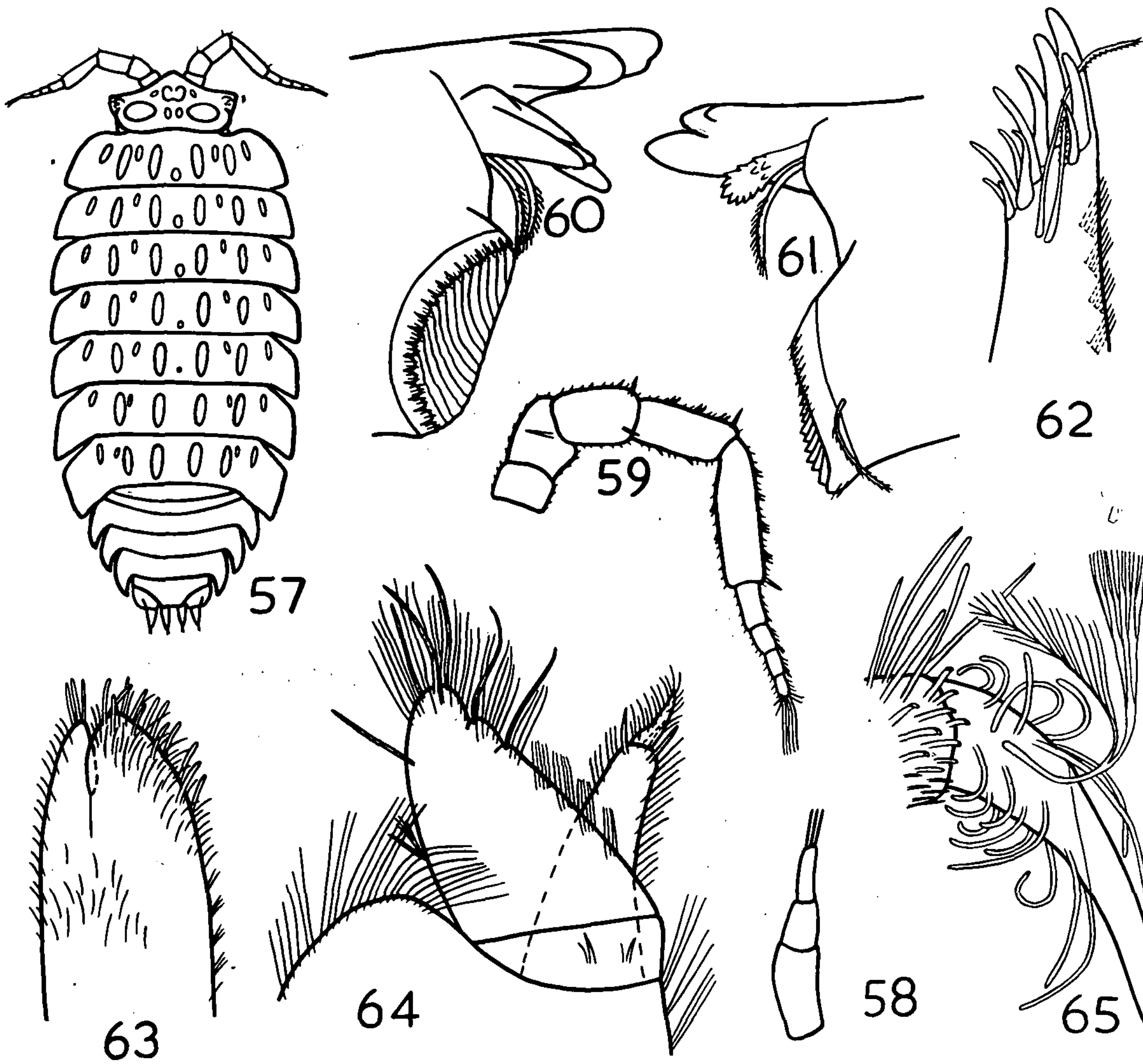
Fig. 61. Distal part of right mandible, dorsal view.

Fig. 62. Distal part of outer lobe of left 1st maxilla, ventral view.

Fig. 63. Distal part of right 2nd maxilla, ventral view.

Fig. 64. Distal part of right maxilliped, ventral view.

Fig. 65. Dactylos of left 7th leg, anterior view.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Notoniscus tasmanicus (Chilton).

Fig. 66. Male organ, ventral view.

Fig. 67. Left 1st pleopod of male, dorsal view.

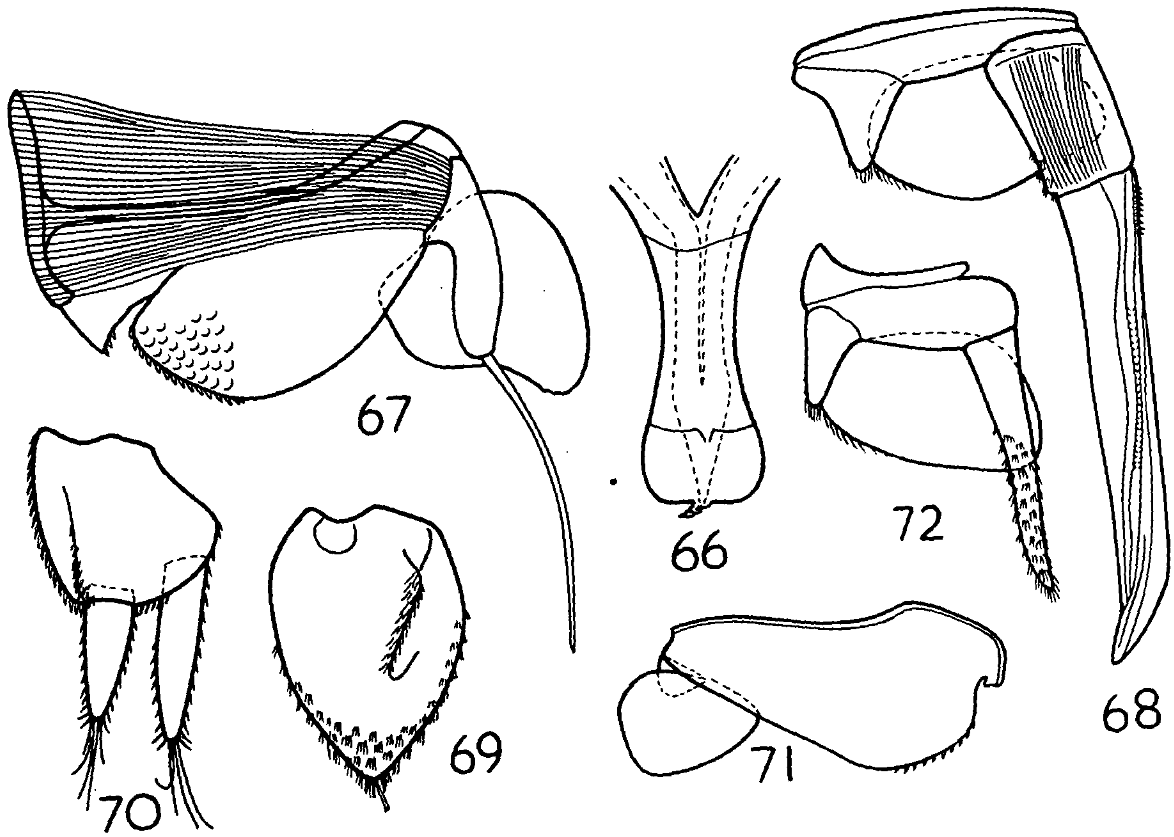
Fig. 68. Left 2nd pleopod of male, dorsal view.

Fig. 69. Exopodite of left 5th pleopod of male, dorsal view.

Fig. 70. Left uropod, dorsal view.

Fig. 71. Left 1st pleopod of female, ventral view.

Fig. 72. Left 2nd pleopod of female, dorsal view.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Family Scyphacidae.

= Scyphacinae, Dana 1852 (in part).

= Armadilloniscinae, Scyphacinae and Detoninae, Budde-Lund 1904.

The characters of the family are defined by Chilton (1901, p. 121) as follows:-

"Mandibles without molar tubercle, its place being taken by a tuft of long stiff setae or bristles; inner lobe of first maxilla with two plumose bristles; maxillipedes with the terminal joints fairly well developed, lamellar, longer than the masticatory lobe; external male organ single."

The following additional distinctions also apply to members of family Scyphacidae:-

Littoral species. Flagellum of 2nd antenna composed of 3 or 4 articles. Exopodites of pleopods without pseudotracheae.

The two genera of family Scyphacidae represented in Tasmania may be distinguished as follows:-

Animals not able to enroll; dorsal surface of body shallowly convex - - - - - - - - - - - - - - - - - - Deto Guérin.

Animals able to enroll; dorsal surface of body strongly convex - Actaecia Dana.

Genus Deto Guérin 1836.

The characters of the genus are defined by Chilton (1915b, p. 438) as follows:-

"General shape of body oblong-oval, somewhat depressed; animal not capable of rolling itself into a ball; epimera lamellarly expanded; dorsal surface usually with spines or tubercles which are better developed in the male than in the female; pleon not abruptly narrower than peraeon; epimera of third, fourth and fifth segments well developed. Head with lateral processes forming broad lobes.

Eyes of moderate size, with many ocelli.

Antennae with flagellum four-jointed.

Mandibles with one pencil behind the cutting-edge.

Maxillipedes with palp longer than masticatory lobe, and showing indications of being formed of three or four joints.

Exopoda of the pleopoda opercular, and containing no special branchial organ.

Uropoda produced, reaching considerably beyond the terminal segment."

Deto marina (Chilton 1884) Budde-Lund 1906.

(Figs. 73-74).

Synonymy. *Philougria marina* Chilton 1884.

= *Philygria marina* Chilton 1886.

The Tasmanian specimens of *Deto marina* are not described in detail in the present paper as the species is characterized in previous literature:- Chilton (1884, pp. 464-466, pl. 11); Budde-Lund (1906, p. 85, pl. 4, figs. 39-41); Chilton (1915b, pp. 444-445, pl. 39, figs. 19-23), (1917a, pp. 401-403, figs. 15-21); Wahrberg (1922, pp. 11-12, 25, 44-45, 54, 81-86, figs. 4, 6.14, 6.15, 10, 19.2, 33, 34).

The following description of characters which may be observed without dissecting the animal, is given here to enable *Deto marina* to be distinguished from other Oniscoidea found on the sea shore in Tasmania. Reference to descriptions given by Chilton (1915b) shows that on these characters, *D. marina* may also be distinguished from other species in the genus *Deto*.

Length of largest male specimen: 11 mm.; breadth: 5.5 mm.

Length of largest female specimen: 10 mm.; breadth: 5 mm.

Live specimen is greenish-yellow, densely spotted with black chromatophores. On dorsal surface, conspicuous yellow patches occur down mid-line of body and at bases of pereial epimera. Animal is not able to enroll.

Vertex of cephalon (fig. 73) is covered with scale-bearing tubercles. Antennary lobes are large, square in outline, dorso-ventrally flattened, and stand out obliquely from cephalon. Eyes are compound. Flagellum of 2nd antenna (fig. 73) has 4 articles.

First segment of pereion (fig. 73) is markedly produced forwards on each side. Posterior borders of epimera on all pereial segments slope backwards at an angle to border of central part of segment; posterior angles of epimera are sharply rounded. An oblique, tuberculate ridge extends inwards and forwards from above posterior angle of each epimeron. Dorsal surface of pereion exhibits numerous large scale-bearing tubercles, but no long spines are present.

Pleon is not abruptly narrower than pereion. Pleura of 3rd to 5th segments are large and directed backwards, with their posterior angles sub-acute. Terminal segment (fig. 74) is triangular with its sides slightly indented and its apex acute. Dorsal surface of pleon is granulate. Exopodites of pleopods have no conspicuous blood vessels and no pseudotracheae.

Protopodite of uropod (fig. 74) is quadrangular, flattened on outer side, and marked by a longitudinal ridge down dorsal surface. Inner borders of the two protopodites do not meet in the mid-line. Exopodite is broad and lanceolate, terminal in position on protopodite. Endopodite is narrow and conical, shorter than exopodite; it is inserted anteriorly on ventral surface of protopodite, near its inner margin. In female, exopodite of uropod is shorter in relation to protopodite and endopodite than in male. Lengths in a male specimen: protopodite 1.2 mm., exopodite 1.2 mm., endopodite 0.60 mm. Lengths in a female specimen: protopodite 0.9 mm., exopodite 0.68 mm., endopodite 0.45 mm.

Habitat.

These observations are based on specimens found under stones near high tide level on a rocky shore at Roaring Beach, South Arm. Examples were collected on the following dates:- 28th February, 1957, 7 males, 11 females; 8th March, 1957, 12 males, 16 females; 22nd March, 1957, 14 males, 9 females.

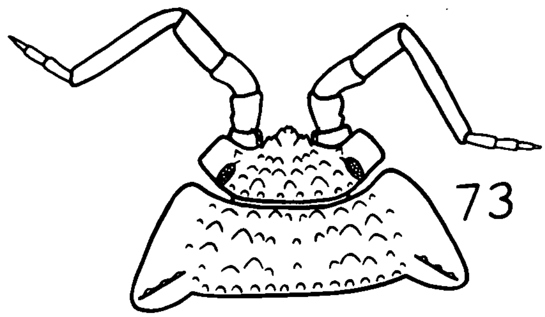
Other specimens were found under similar conditions at Tinderbox and on the southern shore of Ralph's Bay in south-eastern Tasmania, and at Hawley and Low Head, East Tamar in the north of the state.

Deto marina has not previously been recorded from Tasmania.

Deto marina (Chilton).

Fig. 73. Cephalon, 2nd antennae and 1st segment of pereion, dorsal view.

Fig. 74. Fifth and terminal segments of pleon and uropods of male, dorsal view.



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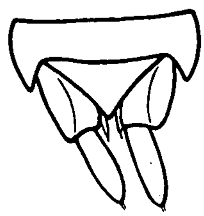

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Genus _Actaecia_ Dana 1853.

Synonymy. _Cylloma_ Budde-Lund 1885.

The characters of the genus are defined by Chilton (1901, p. 130) as follows:-

"Body convex, capable of rolling into a ball, surface spiny. Metasome not abruptly contracted, terminal segment very short. Flagellum of antennae 4-jointed. Eyes very large and prominent, on oval elevations along the sides of the head. Maxillipedes with the terminal portion large, lamellar. Legs rather short, not increasing much in length posteriorly. None of the opercular plates of the pleopoda with air-cavities. Uropoda short, not projecting much beyond the outline of the body; base broad and flattened, outer portion produced, outer ramus short, inserted at the end of the base near the inner margin; inner ramus slender."

Chilton considers _Cylloma_ Budde-Lund 1885 to be synonymous with _Actaecia_.

Thomson's (1893, p. 57) suggestion that _Actoniscus_ Harger 1878 must evidently be relegated to _Actaecia_ Dana is not supported, as _Actoniscus_ is classed as a synonym of _Armadilloniscus_ Uljanin 1875 by other authors, e.g. Budde-Lund (1885), Van Name (1936).

The two species of genus Actaecia represented in Tasmania may be distinguished as follows:-

Fourth and 5th pleura of pleon with postero-lateral borders rounded; protopodite of uropod, to outer side of exopodite, rounded posteriorly - - - - - - - - - - - - - - - A. euchroa Dana.

Fourth and 5th pleura of pleon with postero-lateral borders straight; protopodite of uropod, to outer side of exopodite, straight posteriorly - - - - - A. pallida Nicholls and Barnes.

Actaecia euchroa Dana 1853.

(Figs. 75-90).

Synonymy. Armadilloniscus euchroa Budde-Lund 1885.

A description given by Thomson (1893, pp. 56-57, pl. 2, figs. 1-8) of Tasmanian examples of Actaecia euchroa from Eaglehawk Neck, is incomplete and contains some errors. The most comprehensive description of New Zealand examples of A. euchroa, that given by Chilton (1901, pp. 130-132, pl. 15, fig. 3), gives only a brief account of the mouth parts and pleopods. My Tasmanian specimens differ in an important character from these New Zealand examples. The following account of further material from Eaglehawk Neck is therefore given.

Male.

Length of largest specimen: 5.6 mm.; breadth: 2.7 mm.

Colour. Dorsal surface of live animal is white, marked with irregular groups of black and orange-brown chromatophores.

Cephalon. Maxillipedal somite is marked off from rest of cephalon. Surface of vertex is smooth. Frontal line forms a sharp, curved ridge, slightly flattened in the centre, and bordered with spines. A supra-antennal line is/not clearly defined. Antennary tubercles are not developed. Eyes (fig. 75) are oval, compound, and raised above surface of cephalon; each is composed of 14 ocelli.

First antenna. Evenly tapering and composed of 3 articles. Third article bears 3 apical spines.

Second antenna. Length of peduncle: 2.51 mm.; length of flagellum: 0.55 mm. Peduncle and flagellum are set with spines.

Each spine consists of an outer sheath, split near the end into several short points, and surrounding a central seta, clubbed at its apex; there is a large scale against base of spine. Flagellum (fig. 76) is composed of 4 articles. Second and 3rd articles each have an indentation in outer surface in which is set a group of simple spines. Fourth article is much smaller than the others; it ends in a tuft of short setae. Length of 4th article is less than twice its greatest breadth; length (excluding apical setae): 0.065 mm.; breadth: 0.036 mm.

<u>Mandibles</u>. Left mandible:- Incisor process consists of one bifid tooth and 2 simple teeth. Lacinia mobilis ends in 3 teeth. Below lacinia mobilis is a lobe bearing coarse, simple setae. At base of lobe there are 2 pencils of finer setae, and a third pencil is set further back on mandible. Molar process is represented by a short prominence bearing a large tuft of plumose setae. Right mandible (fig. 77):- Incisor process consists of 4 simple teeth. Lacinia mobilis divides into 2 processes which bear small, tooth-like projections. Setose lobe below lacinia mobilis has one pencil of setae at its base, and there is another pencil further back on mandible. Molar portion is similar to that of left mandible.

<u>First maxilla</u>. Outer lobe (fig. 78) ends in 11 teeth of which the outer 5 and the second innermost one are simple, the other 5 are bifid. There is also a long, slender process set among the teeth, and a short spine on ventral surface near bases of bifid teeth. Outer region of dorsal surface of lobe bears groups of fine setae which project beyond its outer margin. Outer apical corner of inner lobe ends in a sharp

spine; to inner side of this, apex of inner lobe bears 2 large setose processes.

Second maxilla (fig. 79). Division into 2 lobes is indicated by a suture line extending obliquely inwards and backwards from an indentation in outer margin of maxilla; this suture line is apparent for a greater length on dorsal surface than it is on ventral surface. Apex of outer lobe bears 3 spines. Inner lobe is bluntly rounded; its apex and inner margin bear numerous coarse setae and a fringe of fine setae; fine setae also extend over dorsal surface of lobe.

Maxilliped (fig. 80). Endite is elongated, reaching almost to distal border of basis; it tapers to an acute apex. Ventral surface of basis bears several spines; its lateral margins are bordered with fine setae. Ischion is the only article of endopodite which is distinct; there are 2 short spines on its ventral surface; its outer border is fringed with fine setae. Remainder of endopodite is sub-triangular in outline with divisions between its 4 articles indicated by lobes on inner margin and by oblique suture lines between these. Each lobe bears a tuft of coarse setae. Two spines are present on outer margin of endopodite. Suture line between meros and carpos is short, but the two lines separating carpos, propodos and dactylos extend across most of ventral surface of endopodite, each directed towards one of spines on outer margin. Endite is sub-conical with a blunt apex; its inner surface bears long setae. On apex of endite there is a large, conical, setose process and a short spine which is set to outer side of the process. With setose process excluded, endite does not extend beyond basal lobe of endopodite.

Pereion. Sides of 1st segment are strongly produced forwards to flank cephalon. Epimera of 1st to 3rd segments slope slightly backwards and their posterior angles are sharply rounded. Posterior margin of 4th segment is straight with its angles rounded. Epimera of 5th segment are directed slightly backwards and have their posterior borders curved outwards and posterior angles sub-acute. Epimera of 6th and 7th segments are directed more sharply backwards, also with posterior angles sub-acute. On ventral surface, epimera of 1st to 3rd segments (fig. 81) each exhibit a thick ridge. Such ridges are absent from remaining segments. Lateral margins of segments are bordered with short spines (fig. 82), each of which consists of an outer sheath, split at the end into several short points, and surrounding a central seta, clubbed at its apex. Such spines also occur on dorsal surface of epimera, but there are no spines on central region of segments. Dorsal surface of tergites has a covering of rounded scales and also bears small, scattered scale-setae.

Pereiopods. First leg:- Outer surface of meros is markedly convex. Portion of leg which is distal to meros is curved downwards. Majority of spines on leg each consist of an outer sheath, split at distal end into several points, which surrounds a central seta, clubbed at its apex. These spines are of two types; larger spines in which almost half length of outer sheath is split, and smaller spines in which splits begin only near apex of sheath. Short, simple spines occur on under surface of propodos. Dactylos bears numerous long, flattened setae and ends in a simple claw. Basal third of "dactylar seta" is sub-cylindrical and lacks secondary setae. Remainder of "dactylar seta"is broader than basal part, and is slightly flattened, has a sharply rounded apex, and is densely covered with fine setae. (Dactylos of 2nd leg is figured, fig. 83).

In 2nd to 7th legs, outer surface of meros is progressively less convex and distal region of leg is less curved. Simple spines are not present on propodos of 2nd to 7th legs; spines on these legs are similar to other spines on 1st leg. Seventh leg is well developed but slightly shorter than remainder; length: 1st leg 2.5 mm.; 6th leg 2.6 mm.; 7th leg 2.3 mm.

<u>Male organ</u> (fig. 84). Basal three-quarters of male organ are expanded to form a sub-oval region, beyond which projects a narrower distal quarter having straight sides and a truncate apex. In dorsal view, centre of oval region is seen to be thicker than sides, limits of this thicker portion being continuous with lateral margins of distal quarter. The two ducts which enter base of organ remain distinct and open separately into a hollow in its apex.

<u>Pleon</u> (fig. 85). Pleon is semicircular with its lateral borders continuous with those of pereion. Epimera of 7th segment of pereion are sharply directed backwards to cover sides of 1st and 2nd segments of pleon and lie to outer side of 3rd segment. Pleura of 3rd to 5th segments are bent sharply backwards; those of 3rd segment are narrow and acute with a few spines at apex; those of 4th and 5th segments are large with their postero-lateral margins rounded and bordered with spines. A few spines are also present on both surfaces of these pleura but no spines occur on central region of segments. Spines on pleon are similar to those on lateral margins of pereion.

Terminal segment is sub-triangular with apex very sharply rounded; it lacks marginal spines. Dorsal surface of tergites bears scales and scale-setae similar to those on pereion.

Pleopods. First pleopod (fig. 86):- Protopodite is a narrow bar; on outer side it is produced into a small lobe. Exopodite is sub-oval, with anterior margin indented towards its outer side and posterior margin less deeply indented towards its inner side. Outer region of exopodite articulates with outer side of protopodite. On dorsal surface this outer region of exopodite is thickened and has 2 bands of thickening extending from it; a curved band following part of anterior margin and a horizontal band across middle of exopodite. Endopodite is styliform and is suspended from inner region of protopodite. It is grooved along its length, with groove beginning on inner surface at base of endopodite and twisting onto its dorsal surface nearer apex; edges of distal half of groove are ornamented with short setae.

Second pleopod (fig. 87):- Protopodite is a narrow bar with its outer side produced into a small lobe. Exopodite is irregularly four-sided, with anterior border nearly straight, lateral borders curved outwards, and posterior border indented on inner side while towards outer side it forms an outward curve continuous with outer border; inner posterior angle is bluntly rounded. There is a prominent seta on indented part of posterior margin. An oblique band of thickening on dorsal surface begins at outer anterior angle where exopodite articulates with outer side of protopodite. Endopodite is suspended from inner region of protopodite; it is styliform and curved outwards, much narrower than 1st endopodite; there is a chitinous thickening down the greater part of its inner surface. Endopodite is not divided into 2 articles, although such a division is indicated by a faint, incomplete suture line at a point where there is a sudden decrease in width of endopodite. Ventral surface of basal region is raised into a curved ridge, area to inner side of this ridge being indented.

Third pleopod (fig. 88):- Inner region of protopodite forms a broad, rounded lobe, inner surface of which bears comb-like groups of setae. Shape of exopodite is similar to that of 2nd pleopod, in particular its inner posterior angle is bluntly rounded. Band of thickening on dorsal surface of exopodite is curved. Short setae occur down inner margin of exopodite; there is a larger seta on its inner posterior angle and another on indented part of posterior margin. Endopodite is sub-triangular and is attached along most of length of protopodite. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Exopodite differs a little in shape from those of 2nd to 4th pleopods; its lateral margins are almost straight and its inner posterior angle is sub-acute. Band of thickening on its dorsal surface extends to posterior margin which is indented at this point.

Uropod (figs. 85,89). Protopodite projects beyond terminal segment; its inner margin lies adjacent to that of opposite uropod. Outer region of protopodite is produced backwards into a broad lobe which forms part of general outline of body. Margin of this lobe is rounded, slightly crenate, and bears spines similar to those on lateral borders of pereion; such spines are also scattered over both surfaces of lobe. Inner margin of protopodite is incised near its base. Exopodite is inserted on dorsal surface of protopodite, near its posterior margin, to inner side of lobe, beyond which it projects for a short distance. It is sub-cylindrical, bears several spines, and ends in an acentric tuft consisting of 3 long setae and several shorter setae. Endopodite is inserted on ventral surface of protopodite at its inner basal corner. It is narrowly conical, bears several spines and a covering of pointed scales, and has a long terminal seta. On ventral surface, region of protopodite to inner side of insertion of exopodite is deeply indented down its whole length to form a groove to receive endopodite. Protopodite is longer than it is broad. Maximum length of protopodite: 0.62 mm.; breadth of protopodite: 0.43 mm.; length of rami: exopodite 0.27 mm., endopodite 0.48 mm.

Female.

Length of largest specimen: 5.6 mm.; breadth: 2.8 mm.

Female differs from male in the following structures:-

First pleopod:- Protopodite and exopodite are similar to those of 1st pleopod of male; endopodite is not developed.

Second pleopod (fig. 90):- Protopodite and exopodite are similar to those of 2nd pleopod of male; endopodite is conical with apex bluntly rounded and is almost the same length as exopodite.

Habitat.

This description is based on specimens found on 3rd May, 1957, enrolled in small burrows in the sand, under pieces of seaweed lying on the beach, or walking on the open beach near the edge of the incoming tide, at Pirates Bay, Eaglehawk Neck; 33 males and 38 females were collected.

Specimens were also found under similar conditions in other localities; many examples being collected at Clifton Beach (23 males, 66 females) while a few specimens were found elsewhere; at Marion Bay (1 male), Seven Mile Beach (1 female) and Roaring Beach, South Arm (1 female), all in south-eastern Tasmania, and at Hawley (1 male, 1 female) in northern Tasmania.

Actaecia euchroa is recorded from Eaglehawk Neck by Thomson (1893, p. 56).

Variations.

Some specimens from Clifton Beach have reached a larger size than the maximum noted from Eaglehawk Neck. Length of largest male specimen from Clifton Beach: 7 mm.; length of largest female; 7.3 mm. In these large specimens the 7th leg is still slightly shorter than the 6th leg.

In one male specimen from Eaglehawk Neck the outer lobe of each 1st maxilla has only one bifid tooth, this being the second innermost tooth on the left appendage and the fifth innermost tooth on the right appendage.

Remarks.

Dana (1853, p. 735) states that the flagellum of the 2nd antenna of A. euchroa is indistinctly five or six-jointed (he figures (pl. 48, fig. 6 e) it with 6 articles), whereas later authors (Thomson 1893, p. 56), (Chilton 1901, p. 131) recognize that it has only 4 articles. This may be explained by the fact that there is an indentation in the outer surface of both the 2nd and the 3rd article of the flagellum which superficially might appear to indicate a division between articles.

The description of specimens of A. euchroa from Eaglehawk Neck given by Thomson (1893, pp. 56-57, pl. 2, figs. 1-8), contains some minor errors. His drawing of the whole animal in dorsal view (fig. 1) omits 1st, 2nd and terminal segments of pleon. He describes and figures (fig. 3) the 1st antenna as having 2 articles instead of 3, however the distal articulation in this appendage might easily be overlooked. His description and figure (fig. 5) of "the mandibles" applies only to the left mandible. As is noted by Chilton (1901, p. 131), the structure which Thomson describes and figures (fig. 6) as the inner lobe of the 1st maxilla is actually the 2nd maxilla. Thomson states that the lateral portions of the 3rd, 4th and 5th segments of the pleon have their margins rounded; this is true of the 4th and 5th segments, but the pleura of the 3rd segment are acute. The apex of the terminal segment is more sharply rounded than Thomson figures it (fig. 8).

Chilton (1901, p. 132) states that the endopodite of the 2nd male pleopod of A. euchroa is 2-jointed, whereas in my specimens it is not distinctly divided into 2 articles, but from his drawing (pl. 15, fig. 3 plp. ^{2}♂) of this structure it appears that he considers the protopodite as one article.

The ocelli of the eye in my specimens are not "very numerous" as is noted by Chilton (p. 131) in his description of New Zealand examples of A. euchroa. Also the eyes themselves are smaller and more rounded than those figured for A. euchroa by Chilton (pl. 15, fig. 3) and Jackson (1928, fig. 10). However the eyes are comparable in size and shape to those of a specimen from Eaglehawk Neck figured by Thomson (1893, pl. 2, fig. 1). Chilton (p. 130) makes use of such a difference in the size of the eyes in distinguishing A. opihensis

Chilton 1901 from A. euchroa. From this it might appear that the Tasmanian specimens in question should also be considered as specifically distinct from the New Zealand examples of A. euchroa. However Chilton (p. 101) notes that A. euchroa Dana occurs in Tasmania, and he (p. 130) includes a reference to Thomson's (1893) description in his bibliography of this species; hence it is evident that he accepts Thomson's identification of his specimens from Eaglehawk Neck as A. euchroa. As Chilton (p. 99) states that he has the whole of Mr. G.M.Thomson's collection it is possible that he has had the opportunity to actually examine these specimens. My Tasmanian specimens agree with those from New Zealand described by Chilton in characters other than those of the eyes. In this paper I therefore follow Thomson (1893) in identifying specimens of Actaecia from Eaglehawk Neck as A. euchroa Dana, but note that the Tasmanian representatives of this species probably constitute a distinct variant of the New Zealand form.

Actaecia euchroa Dana.

Fig. 75. Cephalon, dorso-lateral view, showing right eye.

Fig. 76. Flagellum of right 2nd antenna, dorsal view.

Fig. 77. Distal part of right mandible, dorsal view.

Fig. 78. Distal part of outer lobe of right 1st maxilla, ventral view.

Fig. 79. Distal part of right 2nd maxilla, ventral view.

Fig. 80. Distal part of left maxilliped, ventral view.

Fig. 81. Left epimera of 1st to 5th segments of pereion, ventral view, showing ridges on 1st to 3rd epimera.

Fig. 82. Spine on lateral border of 1st segment of pereion, dorsal view.

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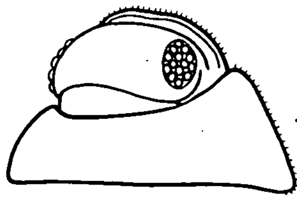

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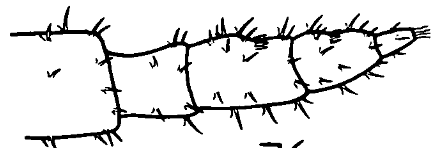

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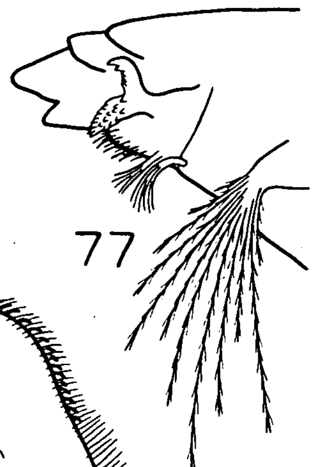

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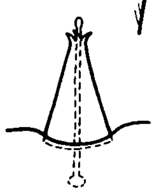

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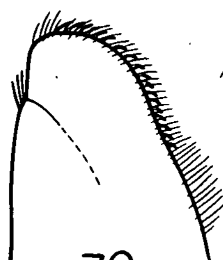

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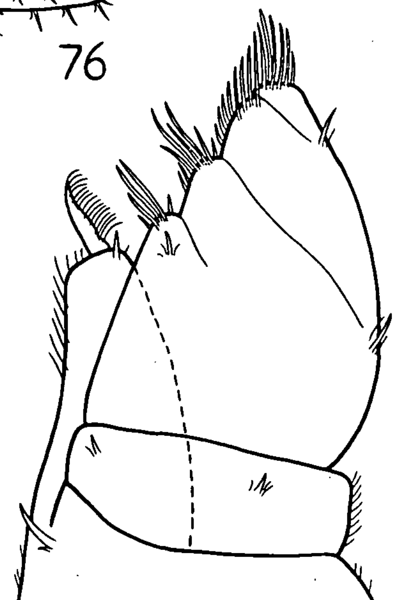

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Actaecia euchroa Dana.

Fig. 83. Dactylos of left 2nd leg, anterior view.

Fig. 84. Male organ, ventral view.

Fig. 85. Seventh segment of pereion, pleon and uropods, dorsal view.

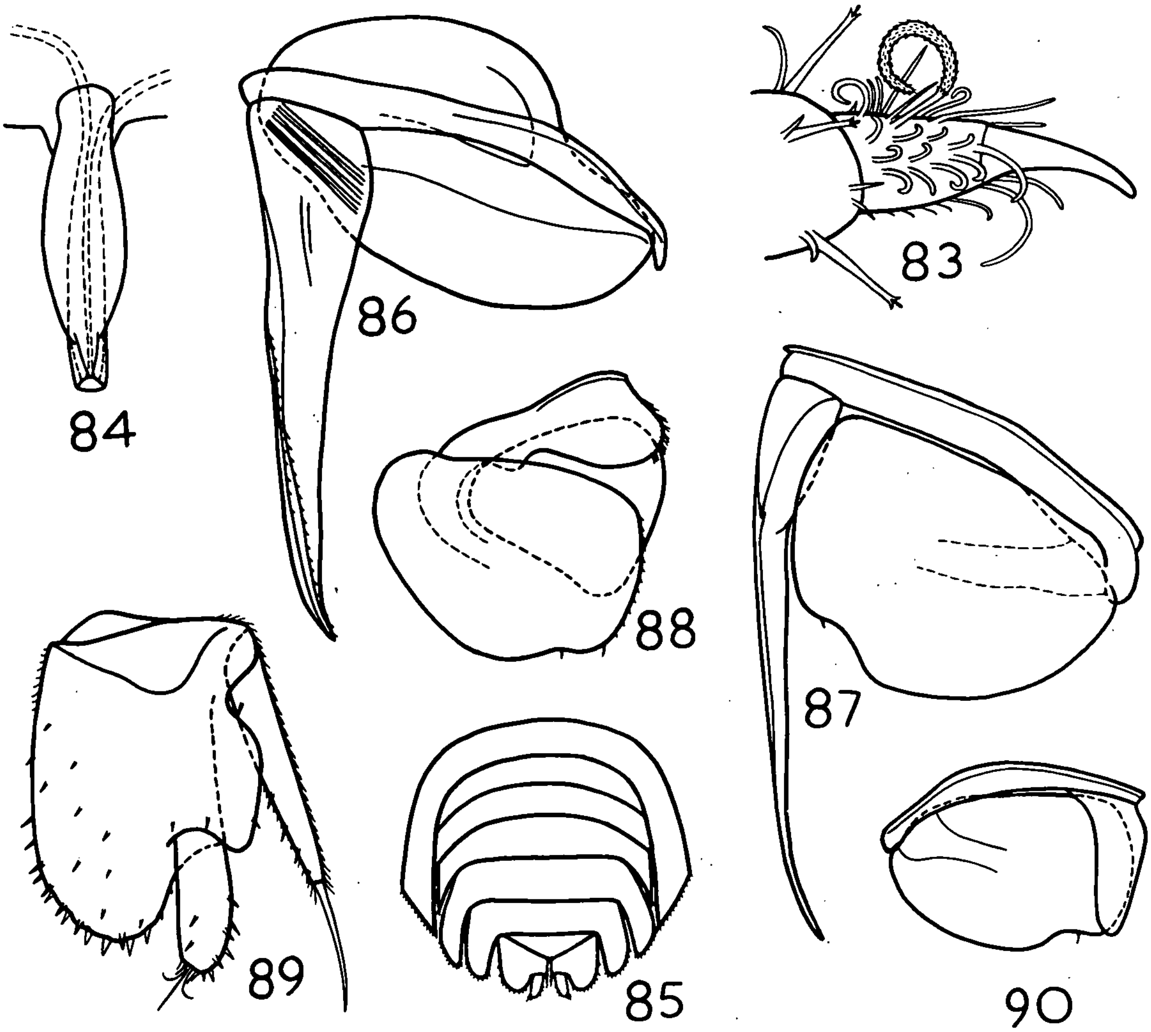
Fig. 86. Right 1st pleopod of male, dorsal view.

Fig. 87. Left 2nd pleopod of male, ventral view.

Fig. 88. Right 3rd pleopod of male, ventral view.

Fig. 89. Left uropod, dorsal view.

Fig. 90. Left 2nd pleopod of female, dorsal view.



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Actaecia pallida Nicholls and Barnes 1927.

(Figs. 91-100).

Nicholls and Barnes (1927, pp. 154-158, text fig. 2, pl. 20) give a comprehensive account of West Australian male examples of A. pallida. However Tasmanian specimens which I consider may be assigned to this species differ in a few details from the description of Nicholls and Barnes. The following description of Tasmanian material is therefore given for comparison.

Male.

Length of largest specimen: 4.4 mm.; breadth: 2.2 mm.

Colour. Dorsal surface of live animal is white, marked with groups of black and orange-brown chromatophores.

Cepahlon. Maxillipedal somite is marked off from rest of cephalon. Vertex bears scattered simple spines. Frontal line forms a sharp ridge, slightly depressed in centre, and edged with spines. A V-shaped ridge on frons possibly represents supra-antennal line. Antennary tubercles are not developed. Eyes are oval, compound, and raised above surface of cephalon; each is composed of 14-18 ocelli.

First antenna. Triarticulate; 3rd article bears 2 apical spines.

Second antenna. Length of peduncle: 1.70 mm.; length of flagellum: 0.33 mm. Peduncle and flagellum are set with spines. Each spine consists of an outer sheath, split near the end into several points, and surrounding a seta, clubbed at its apex; there is a large scale against base of spine. Flagellum is composed of 4 articles.

In outer surface of both 2nd and 3rd articles there is an indentation in which is set a group of simple spines. First three articles are sub-equal in length. Fourth article (fig. 91) is shorter and tapering; it ends in a tuft of setae. Length of 4th article is not more than twice its greatest breadth; length: 0.0525 mm.; breadth: 0.030 mm.

Mandibles. Left mandible:- Incisor process consists of 2 simple teeth and one bifid tooth. Lacinia mobilis ends in 3 teeth. Behind lacinia mobilis is a lobe which bears coarse simple setae and has 2 pencils of finer setae at its base. A third such pencil occurs further back on mandible. Molar portion is represented by a sub-cylindrical process which bears a large tuft of plumose setae. Right mandible (fig. 92):- Incisor process consists of 4 simple teeth. Lacinia mobilis ends in a mushroom-shaped structure bearing numerous small tooth-like processes. Setose lobe behind lacinia mobilis has one pencil of setae at its base and there is another pencil further back on mandible. Molar portion is similar to that of left mandible.

First maxilla. Outer lobe ends in 11 teeth of which the outer 5 and the second innermost one are simple, the remaining 5 are bifid. There is a long, slender process set among outer teeth, and a short spine on ventral surface near bases of inner teeth. Groups of setae on outer side of dorsal surface of lobe project beyond its outer margin. Outer distal corner of inner lobe ends in a sharp spine; to inner side of this, apex of inner lobe bears 2 large setose processes.

Second maxilla. Division into 2 lobes is indicated by a suture line extending obliquely inwards and backwards from an indentation in outer margin of maxilla. Apex of outer lobe bears several setae. There is a group of long setae on ventral surface of maxilla below base of outer lobe. Apex and inner marginal region of inner lobe bear several coarse setae and a dense fringe of finer setae; fine setae are also present on dorsal surface of inner lobe.

Maxilliped (fig. 93). Epipodite is elongated, reaching almost to distal border of basis; it has an acute apex. Ischion is the only article of endopodite which is distinct; there are 2 short spines on its ventral surface and its outer margin has a fringe of long setae. Remainder of endopodite is sub-triangular in outline, with divisions between its 4 articles indicated by lobes on its inner margin and by oblique suture lines between these. Each lobe bears a tuft of coarse setae. On ventral surface of meros near its inner margin, and belâw the coarse setae, there is a dense tuft of fine setae. There are 2 spines on outer margin of endopodite. The two suture lines separating carpos, propodos and dactylos extend across most of ventral surface, each directed towards one of these spines; suture line between meros and carpos is shorter in comparison. Endite is sub-conical with a bluntly tapered apex, on which is set a sub-conical setose process; there is a curved spine on endite to outer side of this process. Inner surface of endite bears long setae. With setose process excluded, endite scarcely extends beyond basal lobe of endopodite.

Pereion. Sides of 1st segment are sharply produced forwards to flank cephalon. Posterior borders of 1st to 4th segments are nearly straight with posterior angles sharply rounded. Epimera of 5th segment are slightly produced backwards with their posterior borders curved outwards and angles sharply rounded. Epimera of 6th and 7th segments are more markedly produced backwards with their posterior angles sub-acute. Epimera of 1st to 3rd segments each have a thick ridge on ventral surface. Such ridges are absent from remaining segments. Lateral margins of segments are bordered with short spines, each of which consists of an outer sheath, split near the end into several short points, and surrounding a seta, clubbed at its apex. Narrower simple spines are scattered over the whole of dorsal surface of pereion, which also has a covering of rounded scales.

Pereiopods. First leg:- Outer surface of meros is convex. Portion of leg distal to meros is curved downwards. Majority of spines on leg each consist of a partially split outer sheath and a central clubbed seta. These spines are of two types (see fig. 94); large spines in which distal half of the outer sheath is split into several pieces, and smaller spines in which sheath is split only near its apex. Small simple spines are present on under surface of propodos. Dactylos (fig. 94) bears numerous long, flattened setae and ends in a simple claw. Basal third of "dactylar seta" lacks secondary setae. Its distal two-thirds are broader than basal third and slightly flattened, and have a dense covering of short setae; a long, fine seta is set on anterior side at base of broader setose portion. Apex of "dactylar seta" is sharply rounded.

In 2nd to 7th legs, outer surface of meros is progressively less convex, and distal region of leg is less curved. Simple spines are absent from propodos of 2nd to 7th legs. Spines on these legs are similar to other spines on 1st leg. Seventh leg is well developed but slightly shorter than 6th leg; length: 1st leg 1.80 mm.; 6th leg 1.93 mm; 7th leg 1.78 mm.

Male organ. Basal three-quarters of male organ form a broad oval expansion, beyond which projects a narrower distal quarter having straight sides and a truncate apex. On dorsal surface, centre of oval region is raised above its sides, limits of this thicker portion being continuous with lateral margins of distal quarter. The two ducts which enter base of organ remain distinct and open separately into a hollow in its apex.

Pleon (fig. 95). Pleon is semicircular with its lateral borders continuous with those of pereion. Epimera of 7th segment of pereion are sharply curved backwards to cover sides of 1st and 2nd segments, and lie to outer side of 3rd segment. Pleura of 3rd to 5th segments are sharply curved backwards, those of 3rd segment are narrow and acute, those of 4th and 5th segments are sub-rectangular with postero-lateral margins straight. Terminal segment is triangular with its apex sharply rounded. Compound spines, like those on lateral borders of pereion, are present on apices of 3rd pleura and along postero-lateral borders of 4th and 5th pleura. Dorsal surface of segments bears scales and simple spines similar to those on pereion.

Pleopods. First pleopod (fig. 96):- Protopodite is a narrow bar; on its outer side it is produced to form a small lobe. Exopodite is sub-oval, with an indentation in its anterior margin towards outer side, and another in its posterior margin towards inner side. It articulates at its outer angle with outer side of protopodite. On its dorsal surface, a thickened band begins near this point of articulation and extends across centre of exopodite. Endopodite is styliform, and suspended from inner region of protopodite. It is grooved along its length, with groove beginning on its inner surface and twisting onto its dorsal surface. Near apex, outer edge of this groove is bordered with setae.

Second pleopod (fig. 97):- Protopodite is a narrow bar; its outer side is produced into a small lobe. Exopodite is sub-rectangular with its posterior margin indented; its inner posterior angle forms a rounded right angle. An oblique band of thickening on dorsal surface of exopodite begins at its outer anterior angle, where it articulates with outer side of protopodite. A long seta is set on indented portion of posterior margin of exopodite. Endopodite is suspended from inner region of protopodite; it is styliform, much narrower than that of 1st pleopod; there is a chitinous thickening down greater part of its inner surface. Endopodite is not divided into 2 articles, but there is a sudden decrease in its width near its base which probably indicates that 2 articles are represented. Ventral surface of basal region is raised into a curved ridge.

Third pleopod (fig. 98):- Inner region of protopodite forms a broad lobe fringed with groups of setae. Exopodite is sub-rectangular with posterior border indented; its inner posterior angle is sub-acute and bears a long seta, and there is another such seta on indented part of posterior margin. Inner margin is fringed with short setae. Band of thickening on dorsal surface of exopodite is curved. Endopodite is sub-triangular. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Thickened band on dorsal surface of exopodite extends to its posterior margin.

Uropod (fig. 95, 99). Protopodite projects beyond terminal segment and forms part of general outline of body. It is sub-rectangular; its posterior border, to outer side of exopodite, is nearly straight except for slight crenulations, and forms a distinct angle with outer margin. Its inner margin is incised. Its posterior margin is bordered with compound spines, and a few simple spines are scattered on both surfaces of protopodite. Exopodite is inserted on dorsal surface of protopodite, near its inner posterior angle; it projects a little beyond protopodite. It is sub-cylindrical and ends in a tuft composed of 3 long setae and several shorter setae. Endopodite is inserted on ventral surface of protopodite at its inner anterior corner. It is narrowly conical, bears several compound spines and a covering of pointed scales, and has a long, terminal seta. To inner side of insertion of exopodite, ventral surface of protopodite is deeply indented longitudinally to form a groove to receive endopodite. Protopodite is a little broader than it is long. Maximum length of protopodite: 0.30 mm.; breadth of protopodite: 0.32 mm.; length of rami: exopodite 0.12 mm., endopodite 0.23 mm.

Female.

Length of largest specimen: 4.8 mm.; breadth: 2.4 mm.

Female differs from male in the following structures:-

First pleopod:- Protopodite and exopodite are similar to those of 1st pleopod of male; endopodite is not developed.

Second pleopod (fig. 100):- Protopodite is similar to that of 2nd pleopod of male. Exopodite is sub-rectangular with posterior border indented, bearing a long seta, and inner posterior angle sub-acute, also bearing a seta. Endopodite is conical with its apex sharply rounded; it is a little longer than exopodite.

Habitat.

This description is based on specimens collected on 19th February, 1958, from under pieces of seaweed lying on the beach at Hawley, near Port Sorell, in the north of Tasmania; 69 males and 67 females were obtained.

Specimens were also found on beaches in south-eastern Tasmania. Many examples were collected at Dodges Ferry (30 males, 22 females), Roaring Beach, South Arm (7 males, 48 females), and Adventure Bay, Bruny Island (11 males, 44 females), and a few were found at Eaglehawk Neck (6 males, 1 female), Seven Mile Beach (4 females), and Clifton Beach (2 females).

Actaecia pallida has not previously been recorded from Tasmania.

Remarks.

Nicholls and Barnes (p. 155, pl. 20, fig. 2) describe and draw the terminal article of the flagellum of the 2nd antenna in *A. pallida* as being more than twice as long as it is broad. In my specimens, if the apical tuft of setae is not included in the measurement, the length of this article is just twice its greatest breadth, or less. The ratio of length to breadth of the terminal article is subject to slight variation . In the left 2nd antennae of 10 male specimens from Hawley this ratio was found to vary from 1.75 (length 0.0525 mm.; breadth 0.0300 mm.) to 2.00 (length 0.0550 mm.; breadth 0.0275 mm.), measurements being made using a 10X micrometer eyepiece and a 65X objective lens.

The molar portion of the mandible is described (p. 155) and figured (pl. 20, figs. 13 , 14) as consisting of a very long bushy seta. In my specimens the distal end of the molar tubercle is prolonged to form an axis on which plumose setae are set at different levels, but the pencil so formed is less compact than those figured by Nicholls and Barnes.

Nicholls and Barnes (pl. 20, fig. 1) show the pleura of the 3rd segment of pleon as being sub-rectangular, like those of the 4th and 5th segments, whereas in my specimens the 3rd pleura are triangular and acute.

The endopodite of the 2nd pleopod in my male specimens is not clearly divided into 2 articles; however it would appear from the description (p. 157) and figure (text fig. 2 b) of the 2nd male pleopod given by Nicholls and Barnes that they consider the protopodite as one article. They state that there are no setae present on margins of exopodites of pleopods. In my specimens the 2nd to 5th exopodites exhibit setae, although these might be easily overlooked.

However, as in other respects, particularly with regard to the shape of the uropods, the characters of my specimens from Hawley are in close agreement with those described for <u>A. pallida</u> by Nicholls and Barnes, I am satisfied that the Tasmanian specimens should be assigned to this species.

Nicholls and Barnes compare <u>A. pallida</u> with the other two species in <u>Actaecia</u>; <u>A. euchroa</u> Dana 1853 and <u>A. opihensis</u> Chilton 1901. On p. 155 they state that <u>A. pallida</u> is readily distinguished from those two species by the considerable development of coxopodites on the first three segments of the pereion, but the ridges on the ventral surface of the 1st to 3rd pereial segments in my specimens of A. *pallida* are very similar to those exhibited by the specimens which I assign to A. *euchroa*. On p. 158 they state that the 4th article of the flagellum of the 2nd antenna in A. *pallida* is longer and more slender than in A. *euchroa*, but my examples of these two species show no marked distinction in this regard.

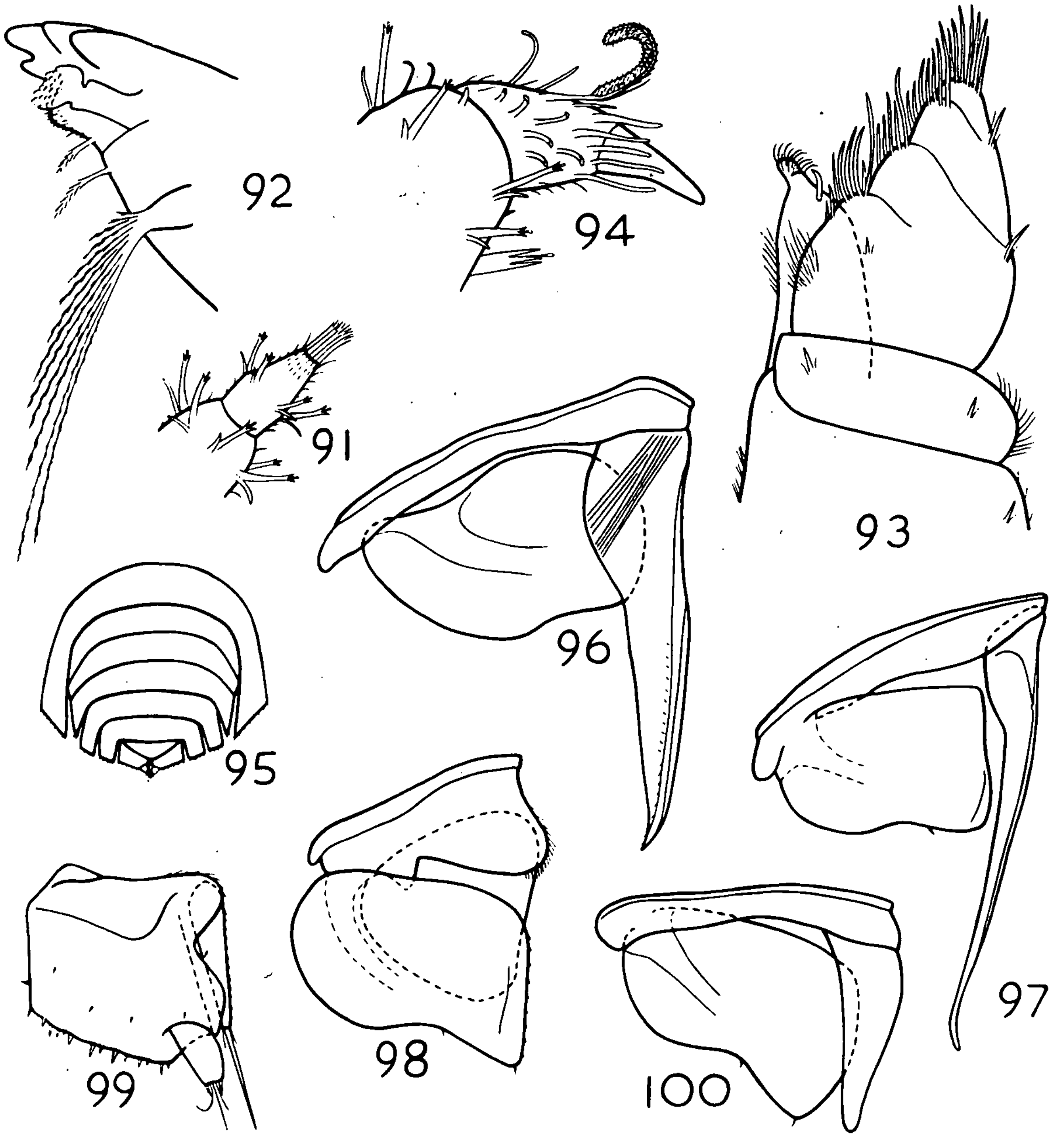
Nicholls and Barnes (p. 155) note that there are differences between A. *pallida* and both A. *euchroa* and A. *opihensis* in the mandibles, maxillipeds and pleopods, and (p. 158) that the dactylar seta of A. *pallida* is distinctive in shape. But there are more obvious distinctions in the shape of the 4th and 5th pleura of the pleon and the uropods, between A. *pallida* and A. *euchroa*, to which they do not draw attention. These differences are apparent from a comparison of Nicholls and Barnes' (pl. 20, figs. 1 and 5) figures of A. *pallida* with Chilton's (pl. 15, figs. 3 and 3 urp.) figures of A. *euchroa*, as well as from a comparison of my examples of these two species. They are set down in the following table.

Actaecia pallida Nicholls and Barnes.	*Actaecia euchroa* Dana.
Fourth and 5th pleura of pleon (fig. 95) with postero-lateral borders straight.	Fourth and 5th pleura of pleon (fig. 85) with postero-lateral borders rounded.
Protopodite of uropod (fig. 99) slightly broader than long. Posterior border of protopodite, to outer side of exopodite, straight, forming a definite angle with outer border.	Protopodite of uropod (fig. 89) longer than broad. Region of protopodite to outer side of exopodite produced posteriorly into a rounded lobe, with its posterior border forming a continuous curve with outer border.

Reference to Chilton's (1901, p. 132, pl. 15 fig. 4, pl. 16 fig. 1) account of *A. opihensis* shows that *A. pallida* differs from this species in the shape of the 4th and 5th pleura and terminal segment of pleon, and in the form of the endopodite of the 1st male pleopod.

Actaecia pallida Nicholls and Barnes.

Fig. 91.	Terminal article of flagellum of left 2nd antenna, ventral view.
Fig. 92.	Distal part of right mandible, dorsal view.
Fig. 93.	Distal part of left maxilliped, ventral view.
Fig. 94.	Dactylos of left 1st leg, anterior view.
Fig. 95.	Seventh segment of pereion, pleon and uropods, dorsal view.
Fig. 96.	Left 1st pleopod of male, dorsal view.
Fig. 97.	Right 2nd pleopod of male, ventral view.
Fig. 98.	Right 3rd pleopod of male, ventral view.
Fig. 99.	Left uropod, dorsal view.
Fig.100.	Left 2nd pleopod of female, dorsal view.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Family Oniscidae.

Members of family Oniscidae exhibit the following characters:-

Frontal line of cephalon present, even if incomplete. Eyes usually compound. Flagellum of 2nd antenna composed of 3 articles. Endopodite of maxilliped poorly developed, formed of not more than 3 articles. Exopodites of pleopods without pseudotracheae.

Genus Plymophiloscia Wahrberg 1922.

Wahrberg (1922) establishes Plymophiloscia as a sub-genus of Philoscia Latreille 1804. He places in it two new species, Ph. (Pl.) maxima and Ph. (Pl.) guttata, both collected in Queensland. Wahrberg's (p. 101) provisional definition of Plymophiloscia, which is based entirely on characters of the mouth parts, is as follows:-

"Mandibeln: Linke Mandibel: Penicilla 1 + 2. - Rechte Mandibel: Penicilla 1 + 1. - Seta inferior mit kurzer Radix und vielen Hauptästen, robust.

Erstes Maxillenpaar: Zähne 4 + 6. Die inneren Zähne sind 2 - spitzig, mit Ausnahme des 5., der einspitzig und kürzer als die übrigen ist. Lacinia interior: 2 lange Penicilla.

Zweites Maxillenpaar: Der innere Lappen von äusseren wohl abgesetzt und etwas höher, jedoch schmäler. Innerer Lappen dicht mit ziemlich groben Borsten besetzt. Innenseite des äusseren Lappens mit besonders feinen Haarborsten, die in Gruppen stehen.

Pedes maxillares: Endit mit langer Spina und 2 kleinen Zähnen an äusseren, oberen Rand. In der inneren Ecke ein kleines Penicillum. Oberer Teil des Enditen dicht mit feinen Borsten besetzt, die in Gruppen zu 2 oder 3 stehen. Endopodit länger als Endit. Nur das Basalglied ist deutlich abgesetzt und mit 2 kräftigen Borsten bewaffnet. Der übrige Teil mit 3 vorspringenden Borstenansammlungen, die 3 verschmolzene Glieder andeuten. In der Spitzengruppe dieser Borstenansammlungen und den am nächsten darunter sitzenden sind die Borsten der Anzahl nach viele. In der untersten Gruppe dagegen finden sich nur 2, eine kräftigere und eine schwächere. - Distaler Teil des Basipoditen abgerundet, mit langen, feinen Haarborsten, die in Gruppen stehen."

This definition separates Plymophiloscia from Philoscia Latreille 1804, Verhoeff 1908, s.str., in which the endite of the maxilliped has no setae or setose conical process ("penicillum").

Wahrberg (1922) does not definitely designate a type for his sub-genus Plymophiloscia. However in describing Ph. (Pl.) guttata, he makes use of several comparative references to characters of Ph. (Pl.) maxima, which has page precedence, and it therefore seems likely that he regards Ph. (Pl.) maxima as typical of the sub-genus.

Verhoeff (1926) classes Plymophiloscia as a genus. He (pp. 323-325) distinguishes it from other genera of Oniscidae from the Australian region by means of a key in which he introduces other characters beside those of the mouth parts. The characters which Verhoeff attributes to Plymophiloscia in this key are as follows:-

Frontal line of cephalon is absent. Inner teeth on outer lobe of 1st maxilla are curved inwards and mostly (usually 5 of 6) split at the end so that an additional point is formed; there are no middle teeth on outer lobe of 1st maxilla. Endite of maxilliped is setose and has a cone at its apex and 2 small teeth on its outer angle. First to 3rd tergites have their posterior borders rounded or transverse, with posterior angles not drawn out into lobes, or, if a slight indication of lateral excavations does occur, it is shallow and is confined to posterior borders of epimera. Posterior border of 4th tergite is bent out on each side, with posterior angles projecting as short triangles. Epimeral glands open in a row along lateral borders of epimera. Dorsal surface is not tuberculate and lacks seta-scales ("Borstenschuppen"); it may exhibit scale structure ("Schuppenstruktur") but this is absent from lateral borders of segments. If scale-setae ("Schuppenborsten") occur they do not take the form of oval clubs or short stalks. Pleura of 3rd to 5th segments of pleon are well developed, not or only slightly bent downwards, and thus completely visible in dorsal view.

Verhoeff (1926, p. 334) places in Plymophiloscia a new species, Pl. montana, from New Caledonia.

I have collected in Tasmania examples of four species which belong in Philoscia Latreille according to the diagnosis given by Sars (1899, pp. 172-173). These may be further placed in Plymophiloscia according to the definition of the mouth parts given by Wahrberg. However they do not conform in all respects to Verhoeff's (1926) characterization of Plymophiloscia.

Verhoeff states that the frontal line of the cephalon is absent. In all of my species this line is indeed absent in the middle region of the cephalon, but it is represented on each side by a ridge in front of the eye.

Verhoeff indicates that there are no middle teeth on the outer lobe of the 1st maxilla, whereas in all of my species this structure does exhibit 2 tooth-like spines near the base of the 4th large tooth. However, these spines are not very conspicuous and might easily be overlooked. The posterior angles of the 4th segment of the pereion are angular and very slightly drawn backwards in one of the Tasmanian species (*Pl. notlevensis*), but in the other three they form rounded right angles and the posterior border of the 4th segment is more nearly transverse.

In sections G and H of his key, Verhoeff uses the characters of the 4th segment of the pereion, and also those of the 3rd to 5th pleura of the pleon, as a contrast between *Wahrbergia* Verhoeff 1926 and *Plymophiloscia* on one hand and *Laevophiloscia* Wahrberg 1922 and *Heroldia* Verhoeff 1926 on the other hand. In *Laevophiloscia* and *Heroldia* the posterior border of the 4th segment is transverse with the posterior angles rounded, and the 3rd to 5th pleura of the pleon are poorly developed and more or less strongly bent downwards, so that they are either not visible from above or only their terminal points are still visible. Thus, while all of my species agree with *Wahrbergia* and *Plymophiloscia* in having the 3rd to 5th pleura of the pleon completely visible, three of the four species agree with *Laevophiloscia* and *Heroldia* in the form of the 4th segment of the pereion.

Within section G the Tasmanian species are excluded from *Wahrbergia* and agree with *Plymophiloscia* as they have a non-tuberculate dorsal surface, exhibit epimeral gland pores, and have 2 small teeth on the outer angle of the endite of the maxilliped. Within section H they are excluded from *Laevophiloscia* and agree with *Heroldia* as the endite of the maxilliped is setose, indented at the apex, and has a small setose cone on the inner side; also the endopodite of the maxilliped has a pencil-like group of setae ("Nebengriffel") instead of a few individual setae on its inner border. Verhoeff (1928*a*, p. 218) later identifies *Laevophiloscia* as a synonym of *Chaetophiloscia* Verhoeff

1908, to which the same distinction applies. Thus, according to Verhoeff's (1926) key, one of my species belongs in *Plymophiloscia* while the other three occupy a position between *Plymophiloscia* and *Heroldia*.

But the difference in the form of the 4th segment in the one species (*Pl. notlevensis*) from that in the other three species is only one of degree. Also the former species is closer to two of the others (*Pl. thomsoni* and *Pl. tasmaniensis*) on other characters, such as the number of epimeral gland pores, the ornamentation of the 1st to 3rd legs of the male, and the shape of the endopodite of the 1st pleopod of the male, than is the remaining species in which the angles of the 4th segment are rounded (*Pl. ulverstonensis*). I therefore assign all four species to *Plymophiloscia*, regardless of Verhoeff's restriction on the 4th segment of the pereion. With this character excluded from the limits of the genus, *Heroldia* is still narrowly separated from *Plymophiloscia*, according to Verhoeff's (1926) key, on the form of the pleon. The Tasmanian species are also distinguished from the six established species of *Heroldia* on individual specific characters, in addition to the relative difference in the 3rd to 5th pleura.

Status of *Plymophiloscia*.

Van Name (1936, p. 112) considers that, in many cases, the treatment of sections of *Philoscia* Latreille as full genera "involves losing sight of important resemblances and relationships in the effort to emphasize small differences." He therefore regards such sections as sub-genera of *Philoscia* s.lat., Jackson (1941, p. 2) agrees with Van Name. He (p. 12) returns *Plymophiloscia* to the status of a sub-genus of *Philoscia* Latreille and likewise classes *Chaetophiloscia*, *Heroldia* and *Wahrbergia* as sub-genera of *Philoscia*.

I consider that the limits of many of the sub-divisions of *Philoscia* s. lat. are too narrow; the position of the Tasmanian species is an example of this. However, as is noted by Van Name (1936, p. 111), *Philoscia* s.lat. is one of the largest genera of terrestrial Isopods, and I feel that some division into smaller genera is desirable. I therefore do not propose to follow Jackson in regarding *Plymophiloscia* as a sub-genus of *Philoscia* Latreille.

Verhoeff (1926, p. 333) suggests that *Plymophiloscia* and *Wahrbergia* should perhaps be combined as sub-genera of one genus. The position of the Tasmanian species indicates that *Heroldia* should probably be united with *Plymophiloscia*. Verhoeff (1928a, pp. 218-219) recognizes *Laevophiloscia* as a synonym of *Chaetophiloscia* and suggests that *Heroldia* should perhaps be regarded as a sub-genus of *Chaetophiloscia*. According to Herold (1931, pp. 374-375), *Leptophiloscia* Herold 1931 belongs between *Laevophiloscia* and *Heroldia*.

It seems likely that the present systems of classification of species in the *Philoscia* group might be improved if some of these, and perhaps other related sections, were to be combined to form well-defined genera intermediate in size between *Philoscia* s.lat. and its present sub-divisions. However I am not prepared to undertake such a step without having the opportunity to study examples of the sections concerned. In the present paper I therefore accept the limits of *Plymophiloscia* imposed by Wahrberg and Verhoeff except as regards those characters of the cephalon, 1st maxilla and 4th segment of the pereion which have already been discussed.

My species are distinct from the three established species already placed in Plymophiloscia. A check on species from the Pacific region which are simply placed in Philoscia s.lat. shows that these are either excluded from Plymophiloscia on characters of the mouth parts, or are too inadequately described to be assigned to a sub-division of the Philoscia group. The Tasmanian species are therefore regarded as new. Their distinction from the established species of Plymophiloscia is demonstrated in the following key:-

1. Body narrow, ratio of its length: breadth at least 3.3: 1. - Pl. guttata (Wahrberg 1922).

   Body broader, ratio of its length: breadth less than 2.5: 1. - 2.

2. Outer lobe of 1st maxilla with 9 teeth; pereion with scales restricted to epimera - - - - - - - - - - - Pl. montana Verhoeff 192

   Outer lobe of 1st maxilla with 10 teeth; pereion with scales over its entire dorsal surface - - - - - - - - - - - - - - - 3.

3. Endopodite and exopodite of uropod articulated at about the same level on protopodite - - - - - - - - - Pl. maxima (Wahrberg 1922).

   Endopodite of uropod articulated on protopodite distinctly anterior to exopodite - - - - - - - - Pl. thomsoni, Pl. tasmaniensis Pl. notleyensis, Pl. ulverstonensis, n.spp.

Key to species of Plymophiloscia represented in Tasmania.

1. Number of gland pores on each epimeron of pereion small (3-6); endopodite of 1st pleopod of male styliform and evenly tapering to a straight, pointed apex - Pl. ulverstonensis n.sp.

Number of gland pores on each epimeron of pereion larger (13 or more); endopodite of 1st pleopod of male club-shaped and not evenly tapering, with its apical region not forming a straight point - - - - - - - - - - - - - - - - - - 2.

2. Posterior angle of 4th segment of pereion forming a definite right angle; 1st leg of male with propodos sub-cylindrical, not broadened dorso-ventrally; endopodite of 1st pleopod of male with its apical region forming an outwardly-directed, triangular lobe - - - - - - - - - - - - Pl. notlevensis n.sp.

Posterior angle of 4th segment of pereion forming a rounded right angle; 1st leg of male with propodos broadened dorso-ventrally and oval in outline; endopodite of 1st pleopod of male with its apical region not formed of such a lobe - 3.

3. Exopodite of 1st pleopod of male with its outer border curved outwards; endopodite of 1st pleopod of male exhibiting on its outer side a protuberance covered with elongated conical processes; exopodite of 1st pleopod of female with its outer border scarcely incurved and its apex bluntly rounded - <u>Pl.</u> <u>tasmaniensis</u> n.sp.

Exopodite of 1st pleopod of male with its outer border curved <u>inwards</u>; apical region of endopodite of 1st pleopod of male exhibiting short papillate processes; exopodite of 1st pleopod of female with its outer border distinctly incurved and its apex sharply rounded - <u>Pl.</u> <u>thomsoni</u> n.sp.

Plymophiloscia thomsoni n.sp.

(Figs. 101-118).

Synonymy. Oniscus punctatus Thomson 1893, (non Thomson 1879).

Male.

Length of largest specimen: 6.5 mm.; breadth: 3.1 mm.

Colour. In live specimen, background colour of dorsal surface is a medium brown except for 3 longitudinal bands of dark brown on pereion, one in mid-line and one on each side above bases of epimera, and for a band of dark brown down each side of pleon. Each dark band on pereion is marked by a row of unpigmented patches. Large unpigmented patches on epimera together form another row of spots down each side of pereion. Cephalon and areas between dark bands on pereion are mottled with irregular unpigmented patches. There is a line of small unpigmented patches down mid-line of pleon, with other spots on each side of it.

Cephalon. Surface of vertex is smooth. Frontal line is not developed across middle of cephalon, but at the sides it is evident as a ridge in front of each eye. Supra-antennal line is present. Antennary tubercles are small, not visible in dorsal view. Eyes are oval, compound, each composed of 20-23 ocelli.

First antenna. Triarticulate; 3rd article is conical and has a group of coarse setae on its inner surface and 2 long, coarse setae on its apex.

Second antenna. Length of peduncle: 3.20 mm.; length of 5th article of peduncle: 1.27 mm.; length of articles of flagellum:

1st 0.40 mm.; 2nd 0.32 mm.; 3rd 0.47 mm. On posterior surface of antenna a groove extends along length of 3rd to 5th articles of peduncle and all articles of flagellum. On distal border of each of 2nd to 5th articles of peduncle there is a large spine formed of a central seta and an outer sheath, which is divided towards the end into several points. All articles of antenna bear rows of shorter spines. Third article of flagellum ends in a long process formed of partly fused setae.

Mandibles. Left mandible (fig. 101):- Incisor process consists of a large bifid tooth and a smaller simple tooth; the latter is situated above the former and connected to it by a ridge. Lacinia mobilis ends in 3 teeth. Behind lacinia mobilis is a lobe densely covered with simple setae and bearing 2 pencils of setae. One other pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible (fig. 102):- Incisor process consists of a large bifid tooth and 2 simple teeth situated above it. Apex of lacinia mobilis has a pointed process on each side and uneven ridges between the two processes. There is one pencil of setae on setose lobe and another behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe (fig. 103) ends in 10 teeth forming an outer group of 4 simple teeth and an inner group of 6 teeth, of which the 5th is simple and the remainder are bifid. On ventral surface there are 2 spines near base of 4th simple tooth. Outer border of lobe is bent out in a curve; apex of curve and margin distal to it bear groups of setae. Inner lobe bears 2 thick setose processes. Apex of lobe is rounded; there is a small spine on its outer side.

<u>Second maxilla</u> (fig. 104). Apex of maxilla is divided into 2 sub-rectangular lobes. Base of inner lobe is defined by a suture line. Distal region of inner lobe has a dense covering of setae; that of outer lobe, with the exception of a clear area in its inner apical angle, is covered with finer setae. Four long, coarse setae project into notch between lobes.

<u>Maxilliped</u> (fig. 105). Epipodite is long and narrow but shorter than basis; its apex is sub-acute. Ventral surface of basis bears short scattered spines. Outer side of basis is produced beyond base of endopodite as a rounded lobe which has comb-like groups of setae on its margin. Ischion is only article of endopodite which is distinct; there are 2 very long spines on its ventral surface. A division of remainder of endopodite into 2 articles is indicated by a faint suture line. There are 2 groups of setae on inner border of first of these articles; basal set consists of one large and one smaller seta, distal set of one large seta and 5-7 smaller setae. Three setae occur singly on outer border of endopodite; one on 1st article, set near base of pencil which itself lacks setae, and 2 on 2nd article. Endopodite ends in a tuft of setae. Endite is sub-quadrangular and has a transverse indentation in ventral surface near its apex. There is a spine on inner side of endite, behind this indentation. Two small teeth occur on outer apical corner. A small conical process, bearing a few coarse setae, is set in an indentation in dorsal surface near inner apical corner. Apical region of endite bears very short, scattered setae.

<u>Pereion</u>. First epimera are rounded anteriorly and scarcely

produced forwards. Posterior borders of 1st to 4th segments are almost straight; posterior angles of 1st to 3rd segments are bluntly rounded, those of 4th segment are right-angled and rounded. (Epimera of 3rd to 5th segments are figured, fig. 106). Epimera of 5th to 7th segments are directed backwards and their posterior angles are sub-acute. Seventh pereial epimera do not extend back beyond 4th segment of pleon.

Dorsal surface of pereion is smooth, except for a longitudinal groove near lateral border of each epimeron. Number of gland pores opening into each groove lies between 20 and 29. These pores are more numerous in anterior third, fewer in middle third, and absent from posterior third of groove. There is a row of spines above inner edge of groove. (Epimeron of 4th segment is figured, fig. 107). On dorsal surface, tergites have a covering of scales and also bear long, scattered spines. One such spine (fig. 108) consists of a central seta surrounded by a sheath, basal part of which is expanded on each side. Scale-setae are present on lower edge of lateral borders of segments. Scale portion of one of these scale-setae (fig. 109) is broad and sub-triangular with its sides curved out and its apex sharply pointed.

Pereiopods. First leg (fig. 110):- Carpos and propodos are broadened dorso-ventrally; as a result, lower border of carpos is curved outwards and propodos is oval in outline. Most of spines on leg consist of a sheath containing a central seta. In all but one of the large spines on under surface, apex of sheath is divided into 3 or 4 points. The spine situated nearest distal end of carpos (fig. 111) differs in having its sheath divided into a greater number of points, at least 12 altogether; these are placed symmetrically on each side of its central seta. Spines on under surface of meros and carpos are too scattered to appear as a brush. Spatulate scales occur on under surface of carpos, near its distal end, and an area on anterior surface above them is covered with long setae. Short simple spines are present along proximal part of under surface of propodos. Anterior surface of carpos, (with exception of setose area), and that of propodos exhibit a covering of large, projecting, backwardly-sloping scales. A smaller area of such scales occurs on under surface of meros. Dactylos bears several long setae, and ends in a broad terminal claw, below which is a much narrower accessory claw.

Carpos and propodos of 2nd leg are less markedly broadened than those of 1st leg. In 3rd to 7th legs these articles are narrower, and their upper and lower borders are not curved. The multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and the simple spines on under surface of propodos, are not repeated on 2nd to 7th legs. Areas covered by large backwardly-sloping scales occur on meros, carpos and propodos of 2nd leg and on carpos of 3rd leg, but are absent from 4th to 7th legs.

Male organ. Conical in outline with its apex sub-acute. Its two ducts remain separate and open under a flap on its dorsal surface.

Pleon. Length (along mid-line): 1.50 mm.; breadth (across 3rd segment): 1.65 mm. Pleon is abruptly narrower than pereion. Pleura of 3rd to 5th segments are very small, acute, and produced backwards; they are visible in dorsal view (see fig. 112). Terminal segment (fig. 112) is triangular with its lateral borders not incurved and its apex bluntly rounded. Surface of pleon is smooth. Tergites bear scales and spines like those on pereion, but do not have scale-setae on their lateral borders.

Pleopods. First pleopod (fig. 113):- Outer side of protopodite is produced to form a large oval lobe. Exopodite is sub-triangular with its apex sharply rounded and its outer border shallowly indented; its anterior border exhibits a fold near outer angle. Endopodite is club-shaped with its distal third bent outwards. Its basal half is broad and provided with conspicuous oblique muscles. Dorsal surface of endopodite exhibits irregular ridges, some of which are ornamented with scales and setae. A broad, oval, chitinous thickening is formed on both inner and outer border of distal third. Apex of endopodite (fig. 114) is folded and irregular in shape, with its inner angle rounded and its outer angle acute. Its dorsal surface is raised into papillate processes. On ventral surface, inner side of apex is rounded and papillate, while its outer side forms a trapezoidal lobe which, due to folding of endopodite, lies ventral to the rounded inner part. Ventral surface of this outer lobe exhibits ridges but lacks papillae; posterior border of lobe bears a row of spines.

Second pleopod (fig. 115):- Exopodite is triangular with its apex sharply rounded and its outer border almost straight. Comb-like groups of setae are present down its inner border and on ridges near border. A few spines occur on outer border near apex. Endopodite is biarticulate; length of articles: 1st 0.43 mm., 2nd 0.93 mm. First article is quadrangular in outline and has a rounded triangular lobe on its ventral surface. Second article is styliform; there is a broad chitinous thickening on inner border of its basal 3/4, beyond which endopodite becomes very narrow and flagelliform. Length of flagelliform portion: 0.25 mm.

Third pleopod:- Inner posterior corner of protopodite is produced backwards as a long, narrow lobe. Exopodite is sub-quadrangular with its apical angle sharply rounded and its posterior border almost straight. Comb-like groups of setae occur on, and near, inner border and there are a few spines on posterior border.

Fourth pleopod:- Lobe on protopodite is much shorter than in 3rd pleopod. Exopodite is sub-quadrangular.

Fifth pleopod:- Lobe on protopodite is very small. Exopodite is sub-triangular with its apex sharply rounded. Comb-like groups of setae are present along both lateral borders and also occur in a band across dorsal surface near apex. There are a few spines on outer border.

Uropod (fig. 112). Protopodite extends beyond apex of terminal segment for about 1/5 of its own length; there is a longitudinal groove down its outer surface. Insertion of endopodite is anterior to that of exopodite; distance separating insertions of exopodite and endopodite: 0.15 mm. Both rami are conical, both bear scattered spines and have a terminal tuft of long setae. There is a longitudinal groove down outer surface of exopodite and another down inner surface of endopodite. Greatest length of protopodite: 0.55 mm.; length of rami: exopodite 0.98 mm.; endopodite 0.52 mm.

Female.

Length of largest specimen: 8.4 mm.; breadth: 3.7 mm.

Female differs from male in the following structures:-

Pereiopods:- Carpos and propodos of 1st and 2nd legs are not broadened dorso-ventrally. On 1st leg (fig. 116) the multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and the simple spines on under surface of propodos, are present as in 1st leg of male, but there are no areas of large projecting scales on meros, carpos and propodos. Such scales are also absent from 2nd and 3rd legs.

First pleopod (fig. 117):- Exopodite is sub-triangular with its outer border shallowly indented, although indentation is more pronounced than in 1st exopodite of male, and its apex sharply rounded; its anterior border exhibits a fold near outer angle. Endopodite is not developed.

Second pleopod (fig. 118):- Exopodite is triangular with its outer border straight and its apex more bluntly rounded than that of 2nd exopodite of male. There are comb-like groups of setae on its inner margin, and a few spines on its outer margin. A rounded, sub-triangular lobe, projecting back from inner posterior corner of protopodite, possibly represents an endopodite.

Third and fourth pleopods:- Apices of exopodites are more bluntly rounded than in corresponding pleopods of male.

Habitat.

Type locality:- This description is based on specimens found among plant debris and under logs and stones lying on the ground between altitudes of approximately 2,700 - 4,100 feet on Mt. Wellington. Examples were collected on the following dates:- 15th May, 1956, 31 specimens; 17th October, 1956, 6 specimens; 22nd October, 1956, 8 specimens

28th May, 1957, 20 specimens. A total of 23 males and 42 females was present in the collection.

Other localities:- Other specimens were found in debris and under logs in a forest of eucalypts and treeferns at Tarraleah.

Variations.

The intensity of brown pigmentation varies, so that in some specimens the background colour of the dorsal surface is almost uniformly dark.

Some specimens exhibit orange-brown pigmentation which replaces the true brown on the dorsal surface completely, or everywhere except for the dark brown bands on pereion and pleon, or only on the epimera of pereion and pleura of pleon.

Remarks.

Thomson (1893, pp. 54-55, pl. 1, fig. 6-13) describes specimens collected on the slopes of Mt. Wellington and assigns them to Oniscus punctatus Thomson 1879, a species established on material from Dunedin, New Zealand. Chilton (1901, pp. 134-135) notes that these Tasmanian specimens differ from New Zealand specimens of O. punctatus in having the 3rd to 5th pleura of the pleon much smaller, and suggests that the former should perhaps be placed in Philoscia Latreille 1804.

Thomson (1893, p. 55, pl. 1, fig. 9) describes and figures the inner lobe of the 1st maxilla in O. punctatus as ending in 5 teeth. I think he must be mistaken here as it is usual in the Oniscoidea for this structure to bear setose processes instead. With this character excluded, Thomson's (1893) description itself might be based on examples of any one of the four species belonging to *Plymophiloscia* which I have collected in Tasmania. However his specimens can be identified by the locality, as one of these species is common on Mt. Wellington while none of the other three has been found there at all.

Budde-Lund (1908, p. 296) places *O. punctatus* Thomson in a new genus, *Phalloniscus*. My specimens from Mt. Wellington are excluded even from this genus, according to the generic diagnosis given by Bowley (1935, p. 49), in having the pleon abruptly narrower than the pereion. Their distinction from Thomson's New Zealand specimens of *O. punctatus* (= *Phalloniscus punctatus* (Thomson)) is therefore confirmed.

As the name *Oniscus punctatus* Thomson 1893 is a homonym of *Oniscus punctatus* Thomson 1879, the specific name *punctatus* can not be retained by the Tasmanian specimens. I therefore establish a new species, based on my specimens from Mt. Wellington, which replaces *O. punctatus* Thomson 1893, and name this species *Plymophiloscia thomsoni* after the author of the latter.

Plymophiloscia thomsoni n.sp.

Fig. 101. Distal part of left mandible, dorsal view.

Fig. 102. Distal part of right mandible, dorsal view.

Fig. 103. Distal part of outer lobe of left 1st maxilla, ventral view.

Fig. 104. Distal part of left 2nd maxilla, ventral view.

Fig. 105. Distal part of right maxilliped, ventral view.

Fig. 106. Left epimera of 3rd to 5th segments of pereion, dorso-lateral view.

Fig. 107. Right epimeron of 4th segment of pereion, dorsal view, showing gland pores.

Fig. 108. Spine on posterior border of 1st segment of pereion, dorsal view.

Fig. 109. Scale-seta on lateral border of 1st segment of pereion, dorsal view.


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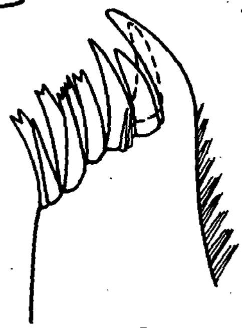
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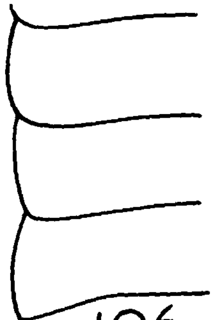
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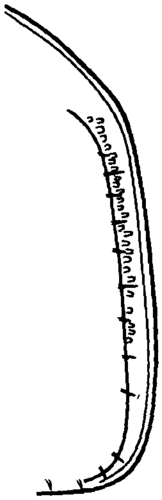
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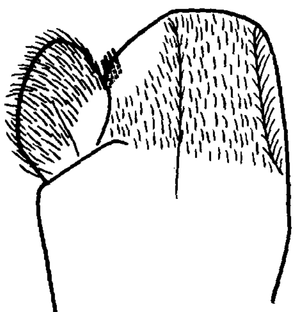
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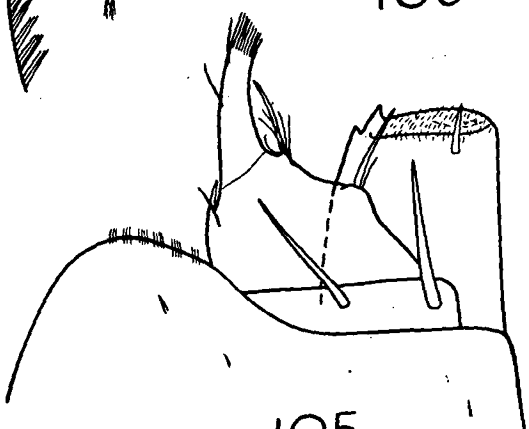
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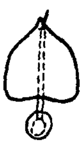
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Plymophiloscia thomsoni n.sp.

Fig. 110. Distal part of left 1st leg of male, anterior view.

Fig. 111. Distal part of spine on under surface, nearest distal end of carpos, of left 1st leg of male, anterior view.

Fig. 112. Fourth, 5th and terminal segments of pleon and uropods, dorsal view.

Fig. 113. Right 1st pleopod of male, dorsal view.

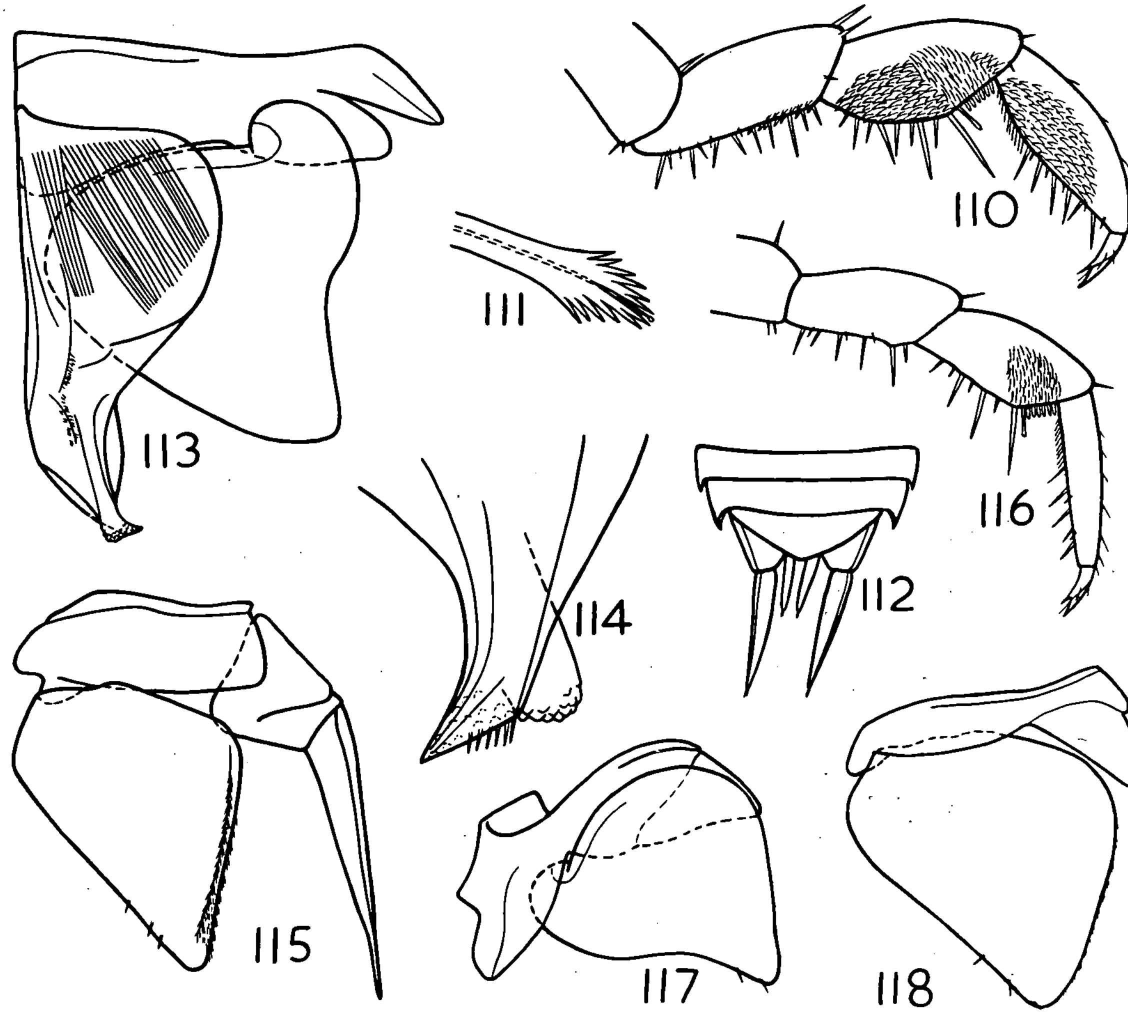
Fig. 114. Distal part of endopodite of right 1st pleopod of male, ventral view. (Position of papillae on dorsal surface is indicated by dots).

Fig. 115. Right 2nd pleopod of male, ventral view.

Fig. 116. Distal part of left 1st leg of female, anterior view.

Fig. 117. Right 1st pleopod of female, ventral view.

Fig. 118. Right 2nd pleopod of female, ventral view.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Plymophiloscia tasmaniensis n.sp.

(Figs. 119-124).

Male.

Length of largest specimen: 6.3 mm.; breadth: 3.0 mm.

Colour. In live specimen, background colour of dorsal surface is a medium brown except for 3 bands of dark brown on pereion, one in mid-line and one on each side above bases of epimera, and for a band of dark brown on each side of pleon. Each dark band on pereion is marked by a row of unpigmented patches. Large unpigmented patches on epimera together form another row of spots down each side of pereion. Cephalon and areas between dark bands on pereion are mottled with irregular unpigmented patches. There is a row of small unpigmented patches down mid-line of pleon, with other spots on each side of it.

Cephalon. Surface of vertex is smooth. Frontal line is not developed across middle of cephalon, but at the sides it is evident as a ridge in front of each eye. Supra-antennal line is present. Antennary tubercles are small, not visible in dorsal view. Eyes are oval, compound, each composed of 19 ocelli.

First antenna. Triarticulate; 3rd article is conical and has several coarse setae on its inner surface and 2 long, coarse setae on its apex.

Second antenna. Length of peduncle: 3.12 mm.; length of 5th article of peduncle: 1.17 mm.; length of articles of flagellum: 1st 0.32 mm., 2nd 0.27 mm., 3rd 0.43 mm. On posterior surface of antenna, a groove extends along length of 3rd to 5th articles of peduncle and all articles of flagellum. On distal broder of each of 2nd to 5th articles of peduncle there is a large spine, formed of a central seta and an outer sheath which is split near the end into several points. All articles of antenna bear rows of shorter spines. Third article of flagellum ends in a long process formed of partly fused setae.

Mandibles. Left mandible:- Incisor process consists of a large tooth with a smaller simple tooth above it and connected to it by a ridge. Lacinia mobilis ends in 3 teeth. Behind lacinia mobilis is a lobe densely covered with simple setae and bearing 2 pencils of setae. One other pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible:- Incisor process consists of a large bifid tooth with 2 simple teeth situated above it. Apex of lacinia mobilis has a pointed process on each side with uneven ridges between the two processes. There is one pencil of setae on setose lobe and one pencil behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe ends in 10 teeth forming an outer group of 4 simple teeth and an inner group of 6 teeth, of which the 5th is simple and the rest are bifid. On ventral surface there are 2 spines near base of 4th simple tooth. Outer border of lobe is bent out in a curve; apex of curve and margin distal to it bear groups of setae. Inner lobe bears 2 thick setose processes. Apex of lobe is rounded; there is a small spine on its outer side.

Second maxilla. Apex of maxilla is divided into 2 sub-rectangular lobes. Base of inner lobe is defined by a suture line. Apex of inner lobe has a dense covering of setae; that of outer lobe, except for a clear area in inner apical corner, is covered with finer setae. Three coarse setae project into notch between lobes.

Maxilliped (fig. 119). Epipodite is long and narrow but shorter than basis; its apex is sub-acute. Scattered spines occur on ventral surface of basis. Outer side of basis is produced beyond base of endopodite to form a rounded lobe bearing comb-like groups of setae on its margin. Ischion is only article of endopodite which is distinct; there are 2 very long spines on its ventral surface. Division of remainder of endopodite into 2 articles is indicated by an indistinct suture line. There are 2 groups of setae on inner border of first of these articles; basal set consists of one large and one smaller seta, distal set of one large seta and 6 or 7 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, situated near base of a pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular and has a transverse indentation in ventral surface near its apex. There is a spine on inner side of endite behind this indentation. Two small teeth are present on outer apical corner. A small conical process, bearing a few coarse setae, is set in an indentation in dorsal surface, near inner apical corner. Apical region of endite bears very short, scattered setae.

Pereion. First epimera are rounded anteriorly and scarcely produced forwards. Posterior borders of 1st to 4th segments are almost straight; posterior angles of 1st to 3rd segments are bluntly rounded, those of 4th segment are right-angled and rounded. Epimera of 5th to 7th segments are directed backwards and their posterior angles are sub-acute. Seventh pereial epimera do not extend back beyond 4th segment of pleon.

Dorsal surface of pereion is smooth except for a longitudinal groove near lateral border of each epimeron. Number of gland pores opening into each groove lies between 13 and 23. Pores are more numerous in anterior third, fewer in middle third, and absent from posterior third of groove. There is a row of spines above inner edge of groove. (Epimeron of 4th segment is figured, fig. 120). On dorsal surfaco, tergites have a covering of scales and also bear scattered spines. One such spine consists of a central seta surrounded by a sheath, basal part of which is expanded on each side. Scale-setae are present on lower edge of lateral borders of segments. Scale part of one of these scale-setae is broad and sub-triangular with its sides curved out and its apex sharply pointed.

Pereiopods. Firstleg (fig. 121):- Carpos and propodos are broadened dorso-ventrally; as a result, lower border of carpos is curved outwards and propodos is oval in outline. Most of spines on leg are each formed of an outer sheath surrounding a central seta. In all but one of the large spines on under surface of leg, apex of sheath is divided into 3 or 4 points. The spine situated nearest distal end of carpos differs in having its sheath divided into a greater number of points, at least 12 altogether, which are arranged symmentrically on each side of its central seta. Spines on under surface of meros and carpos are too scattered to appear as a brush. Spatulate scales occur on under surface of carpos, near its distal end; an area on anterior surface above them is covered with long setae. Simple spines are present along proximal part of under surface of propodos. Anterior surface of carpos, (with exception of setose area), and that of propodos possess a covering of large, projecting, backwardly-sloping scales. A smaller area of such scales occurs on under surface of meros. Dactylos bears several long setae and ends in a broad terminal claw, below which is a much narrower accessory claw.

Carpos and propodos of 2nd leg are broadened, but to a lesser degree than those of 1st leg. In 3rd to 7th legs these articles are narrower and their upper and lower borders are not curved. The multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and the simple spines on under surface of propodos, are not repeated on 2nd to 7th legs. Large, backwardly-sloping scales are present on meros, carpos and propodos of 2nd leg and on carpos of 3rd leg but are absent from 4th to 7th legs.

Male organ. Concial in outline with its apex sub-acute. Its two ducts remain separate and open under a flap on its dorsal surface.

Pleon. Length (along mid-line): 1.60 mm.; breadth (across 3rd segment) 1.65 mm. Pleon is abruptly narrower than pereion. Pleura of 3rd to 5th segments are very small, acute, and produced backwards; they are visible in dorsal view. Terminal segment is triangular with its lateral borders not incurved and its apex bluntly rounded. Dorsal surface of pleon is smooth. Tergites bear scales and spines like those on pereion, but do not have scale-setae along their lateral borders.

Pleopods. First pleopod (fig. 122):- Outer side of protopodite is produced to form a large oval lobe. Exopodite is sub-quadrangular, its outer border being bent outwards in a blunt curve; its apical angle is bluntly rounded; its anterior border exhibits a fold near outer angle. Inner anterior angle of exopodite is markedly produced forwards to form a bluntly rounded lobe. Endopodite is club-shaped with its distal third bent outwards. Its basal half is broad and provided with conspicuous oblique muscles. Dorsal surface of endopodite exhibits irregular ridges, some of which are ornamented with setae. There is a broad, oval, chitinous thickening on both inner and outer border of distal third. Apex of endopodite (fig. 123) ends in a sharp, curved point which is ridged on its ventral surface, and ornamented with conical processes on its dorsal surface; there is a row of slender spines along its incurved inner margin. On outer side of dorsal surface, below base of the curved apical point, there is an outwardly-directed protuberance which is densely and completely covered with conical processes of varying lengths.

Second pleopod:- Exopodite is sub-triangular with its outer border straight and its apex sharply rounded. Comb-like groups of setae are present down its inner border and on ridges near border. There are a few spines on outer border near apex. Endopodite is biarticulate; length of articles: 1st 0.40 mm; 2nd 1.10 mm. First article is quadrangular in outline and has a rounded triangular lobe on its ventral surface. Second article is styliform; there is a broad chitinous thickening on inner border of its basal 3/4, beyond which endopodite becomes very narrow and flagelliform. Length of flagelliform portion: 0.28 mm.

Third pleopod:- Inner posterior corner of protopodite is produced backwards as a long, narrow lobe. Exopodite is sub-quadrangular with its apical angle sharply rounded and its posterior border straight. Comb-like groups of setae are present on and near inner border. There are a few spines on posterior border.

Fourth pleopod:- Lobe on protopodite is much shorter than in 3rd pleopod. Exopodite is sub-quadrangular.

Fifth pleopod:- Lobe on protopodite is very small. Exopodite is sub-triangular with its apex sharply rounded. Comb-like groups of setae are present on both lateral borders and there is a band of such setae across dorsal surface near apex. A few spines occur on outer border.

Uropod. Protopodite extends beyond apex of terminal segment for about 1/5 of its own length; there is a longitudinal groove down its outer surface. Insertion of endopodite is anterior to that of exopodite; distance separating insertions of exopodite and endopodite: 0.16 mm. Both rami are conical, both bear spines and have a terminal tuft of long setae. There is a longitudinal groove down outer surface of exopodite and another down inner surface of endopodite. Greatest length of protopodite: 0.55 mm.; length of rami: exopodite 0.88 mm., endopodite 0.51 mm.

Female.

Length of largest specimen: 7.8 mm.; breadth: 3.5 mm.

Female differs from male in the following structures:-

Pereiopods:- Carpos and propodos of 1st and 2nd legs are not broadened dorso-ventrally. On 1st leg, multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and simple spines on under surface of propodos, are present as in 1st leg of male, but there are no areas of large backwardly-sloping scales on meros, carpos and propodos. Such scales are also absent from 2nd and 3rd legs.

First pleopod (fig. 124):- Exopodite is sub-triangular with its outer border very slightly incurved and its apex rather bluntly rounded; its anterior border exhibits a fold near outer angle. Endopodite is not developed.

Second pleopod:- Exopodite is sub-triangular with its outer border straight and its apex more bluntly rounded than that of 2nd exopodite of male. There are comb-like groups of setae on its inner border and a few spines on its outer border. A rounded, sub-triangular lobe, projecting back from inner posterior corner of protopodite, possibly represents an endopodite.

Third and fourth pleopods:- Apices of exopodites are more bluntly rounded than in corresponding pleopods of male.

<u>Habitat</u>.

<u>Type locality</u>:- This description is based on specimens collected on 25th March, 1957, from among debris lying on ledges of a cliff above high tide level on the shore at Tinderbox; 24 males and 24 females were obtained.

<u>Other localities</u>:- Specimens were also found under stones on a damp hillside densely covered with dogwood, on Mt. Dromedary.

<u>Variations</u>.

In some specimens from Tinderbox, the true brown pigmentation on the dorsal surface is replaced by orange-brown on the epimera of pereion, and over all of the pleon except for the band of dark brown on each side. In other specimens, the background colour of the dorsal surface is completely orange-brown except for a broad band of dark brown down middle of body.

In one male specimen from Tinderbox, carpos and propodos of 1st and 2nd legs are broadened as in other male specimens, but there are no areas of large, backwardly-sloping scales on 1st to 3rd legs.

Plymophiloscia tasmaniensis n.sp.

Fig. 119. Distal part of left maxilliped, ventral view.

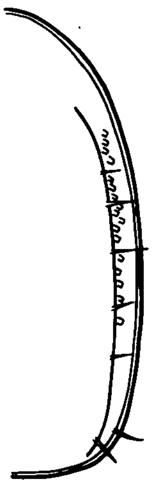
Fig. 120. Right epimeron of 4th segment of pereion, dorsal view, showing gland pores.

Fig. 121. Distal part of left 1st leg of male, anterior view.

Fig. 122. Right 1st pleopod of male, dorsal view.

Fig. 123. Distal part of endopodite of left 1st pleopod of male, ventral view.

Fig. 124. Right 1st pleopod of female, ventral view.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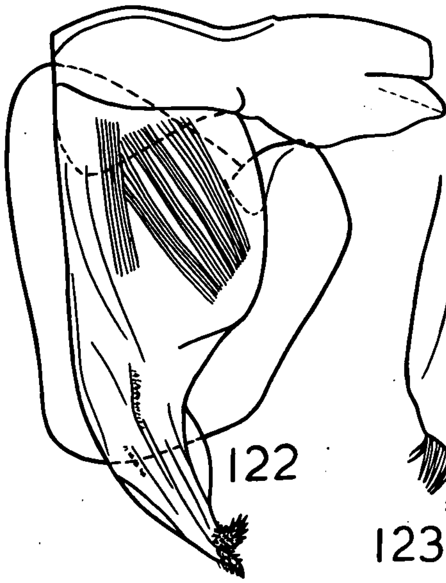
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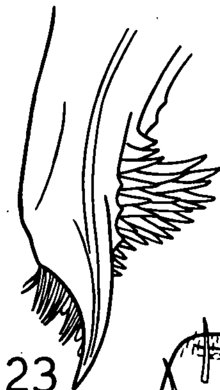
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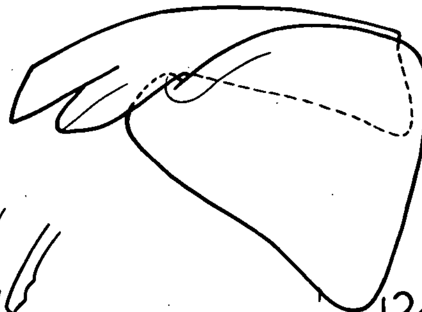
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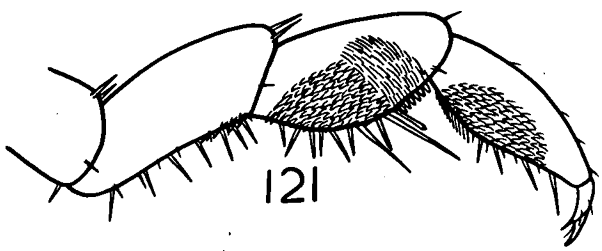
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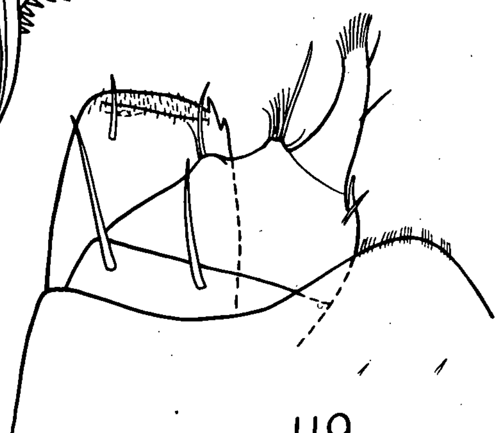
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Plymophiloscia notleyensis n.sp.

(Figs. 125-131).

Male.

Length of largest specimen: 7.1 mm.; breadth: 3.5 mm.

Colour. In live specimen, background colour of cephalon and pereion is a medium brown with 3 longitudinal bands of dark brown on pereion, one in mid-line and one on each side above bases of epimera; background colour of pleon is dark brown. Each dark band on pereion is marked by a row of large, unpigmented patches, and other patches on epimera together form another row of spots down each side of pereion. Cephalon and areas between dark bands on pereion are mottled with irregular unpigmented patches. There is a row of small unpigmented patches down mid-line of pleon, with a few other spots on each side of it.

Cephalon. Surface of vertex is smooth. Frontal line is not developed across middle of cephalon, but it is evident at the sides as a ridge in front of each eye. Supra-antennal line is present. Antennary tubercles are small, not visible in dorsal view. Eyes are oval, compound, each composed of 19-21 ocelli.

First antenna. Triarticulate; 3rd article is conical and has several coarse setae on its inner surface and 2 long, coarse setae on its apex.

Second antenna. Length of peduncle: 3.07 mm.; length of 5th article of peduncle: 1.17 mm.; length of articles of flagellum: 1st 0.38 mm., 2nd 0.30 mm., 3rd 0.49 mm. On posterior surface of antenna a groove extends along length of 3rd to 5th articles of peduncle and all articles of flagellum. On distal border of each of 2nd to 5th articles of peduncle there is a large spine formed of a central seta and an outer sheath, split at the end into several points. All articles of antenna bear rows of shorter spines. Third article of flagellum ends in a long process formed of partly fused setae.

<u>Mandibles</u>. Left mandible:- Incisor process consists of a large bifid tooth with a smaller simple tooth situated above it. Lacinia mobilis has a dense covering of simple setae and also bears 2 pencils of setae; one other pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible:- Incisor process consists of a large bifid tooth with 2 smaller simple teeth situated above it. Apex of lacinia mobilis has a pointed process on each side, and uneven ridges between the two processes. Setose lobe bears one pencil of setae and there is one other pencil behind lobe. Molar portion is like that of left mandible.

<u>First maxilla</u>. Outer lobe ends in 10 teeth forming an outer group of 4 large bifid teeth and an inner group of 6 teeth, of which the 5th is simple and rest are bifid. On ventral surface there are 2 spines near base of 4th simple tooth. Outer margin of lobe is bent out in a curve; curved portion, together with margin distal to it, is fringed with groups of setae. Inner lobe bears 2 thick setose processes; there is a spine on outer apical corner of lobe.

<u>Second maxilla</u>. Apex of maxilla is divided into 2 sub-rectangular lobes. Base of inner lobe is defined by a suture line. Distal region of inner lobe has a dense covering of setae; that of outer lobe, with exception of a clear area in inner apical angle, has a sparser

covering of shorter setae. Three coarse setae project into notch between lobes.

Maxilliped (fig. 125). Epipodite is long and narrow but shorter than basis; its apex is sub-acute. Scattered spines occur on ventral surface of basis. Outer side of basis is produced beyond base of endopodite to form a rounded lobe which bears comb-like groups of setae on its margin. Ischion is only article of endopodite which is distinct; there are 2 very long spines on its ventral surface. Division of remainder of endopodite into 2 articles is indicated by a faint suture line. There are 2 groups of setae on inner border of first of these articles; basal set consists of one large and one smaller seta , distal set of one large seta and 6 or 7 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, placed near base of a pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular and has a transverse indentation across its ventral surface near apex. There is a spine on inner side of endite behind this indentation. Two small teeth occur on outer apical corner. A small conical process, bearing a few coarse setae, is set in an indentation in dorsal surface near inner apical corner. Apical region of endite bears very short, scattered setae.

Pereion. First epimera are rounded anteriorly and only slightly produced forwards. Posterior borders of 1st to 3rd segments are almost straight and their posterior angles are bluntly rounded. Epimera of 4th segment are very slightly produced backwards, their posterior angles are distinctly right-angled. (Epimera of 3rd to 5th segments are figured, fig. 126). Epimera of 5th to 7th segments are more markedly directed backwards with their posterior angles sub-acute. Seventh pereial epimera do not extend back beyond 4th segment of pleon.

Dorsal surface of pereion is smooth except for a longitudinal groove near lateral border of each epimeron. Number of gland pores opening into each groove lies between 23 and 32. Pores are more numerous in anterior half, fewer in third quarter, and absent from posterior quarter of groove. There is a row of spines above inner edge of groove. (Epimeron of 4th segment of pereion is figured, fig. 127). On dorsal surface, tergites have a covering of scales and also bear scattered spines. One of these spines consists of a central seta surrounded by a sheath, basal part of which is expanded on each side. Scale-setae are present on lower edge of lateral borders of segments. Scale part of one of these scale-setae is broad and sub-triangular, with sides curved out and apex sharply pointed.

Pereiopods. First leg (fig. 128):- Carpos is broadened dorso-ventrally so that its lower border is curved outwards. Propodos is not broadened; its upper and lower borders are almost straight. Most of spines on leg each consist of an outer sheath and a central seta. In all but one of the large spines along under surface of leg, apex of sheath is divided into 4 points. Spine nearest distal end of carpos differs in having its sheath divided into a greater number of points, at least 14 altogether, which are arranged symmetrically on each side of its central seta. Spines on under surface of meros and carpos are too scattered to appear as a brush. Spatulate scales occur on under surface of carpos, near its distal end, and an area on anterior surface above them is covered with long setae. Simple spines occur on proximal part of under surface of propodos. Anterior surface of carpos, (with exception of setose area), and that of propodos, exhibit a covering of large, projecting, backwardly-sloping scales. A smaller area of such scales occurs on under surface of meros. Dactylos bears several long setae, and ends in a broad terminal claw with a much narrower accessory claw below it.

Carpos of 2nd leg is only slightly broadened dorso-ventrally. In 3rd to 7th legs, carpos is not broadened, hence its upper and lower borders are not curved. The multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and the simple spines on under surface of propodos, are not repeated on 2nd to 7th legs. Areas of large, backwardly-sloping scales occur on meros, carpos and propodos of 2nd leg and on carpos of 3rd leg, but are absent from 4th to 7th legs.

Male organ. Concial in outline with its apex sub-acute. Its two ducts remain distinct and open under a flap on its dorsal surface.

Pleon. Length (along mid-line): 1.70 mm.; breadth (across 3rd segment): 1.80 mm. Pleon is abruptly narrower than pereion. Pleura of 3rd to 5th segments are very small, acute, and produced backwards; they are visible in dorsal view. Terminal segment is triangular with its lateral borders not incurved and its apex bluntly rounded. Dorsal surface of pleon is smooth. Tergites bear scales and spines like those on pereion, but scale-setae are not present along their lateral borders.

Pleopods. First pleopod (fig. 129):- Outer side of protopodite is produced to form a large oval lobe. Exopodite is sub-triangular with its outer border vey shallowly incurved and its apex bluntly rounded; its anterior border exhibits a fold near outer angle. One or 2 spines occur on outer border near apex. Endopodite is club-shaped, with its distal ~~basal~~ third tapering and bent outwards. Basal half is provided with conspicuous oblique muscles. Dorsal surface of endopodite is raised into ridges, some of which are ornamented with scales or setae. There is a long, spindle-shaped, chitinous thickening on both inner and outer border of distal third. Apex of endopodite (fig. 130) ends in a sharply-pointed, triangular lobe which is bent outwards at an angle to rest of distal third. Inner border of this lobe is curved out and bears a row of spines. Ventral surface of lobe is raised into ridges, while its dorsal surface is ornamented with papillate processes; no papillae are visible in ventral view of endopodite.

Second pleopod:- Exopodite is sub-triangular with its outer border slightly incurved and its apex rather elongated posteriorly and sharply rounded. Comb-like groups of setae are present down inner border and on ridges near border. There are a few spines on outer border near apex. Endopodite is biarticulate; length of articles: 1st 0.34 mm., 2nd 0.98 mm. First article is quadrangular in outline and has a rounded triangular lobe on its ventral surface. Second article is styliform; there is a chitinous thickening on inner border of its basal 3/4, beyond which endopodite becomes very narrow and flagelliform. Length of flagelliform portion: 0.23 mm.

Third pleopod:- Inner posterior corner of protopodite is produced to form a long, narrow lobe. Exopodite is sub-quadrangular with its posterior border slightly incurved and its apical angle sharply rounded. Comb-like groups of setae occur on and near inner border, and there are a few spines on posterior border.

Fourth pleopod:- Lobe on protopodite is much shorter than in 3rd pleopod. Exopodite is sub-quadrangular.

Fifth pleopod:- Lobe on protopodite is very small. Exopodite is sub-triangular with its apex sharply rounded. Comb-like groups of setae occur on both lateral borders and also form a band of setae across dorsal surface near apex. There are a few spines on outer border.

Uropod. Protopodite extends beyond apex of terminal segment for about 1/5 of its own length; there is longitudinal groove down its outer surface. Insertion of endopodite is anterior to that of exopodite; distance separating insertions of exopodite and endopodite: 0.15 mm. Both rami are conical, both bear scattered spines and end in a tuft of long setae. There is a longitudinal groove down outer surface of exopodite and another down inner surface of endopodite. Greatest length of protopodite: 0.55 mm.; length of rami: exopodite 1.02 mm., endopodite 0.54 mm.

Female.

Length of largest specimen: 10.0 mm.; breadth: 4.8 mm.

Female differs from male in the following structures:-

Pereiopods:- Carpos of 1st and 2nd legs is not broadened dorso-ventrally. On 1st leg, multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and simple spines on propodos, are present as in 1st leg of male, but there are no areas of large backwardly-sloping scales on meros, carpos and propodos. Such scales are also absent from 2nd and 3rd legs.

First pleopod (fig. 131):- Exopodite is sub-triangular with its outer border shallowly incurved, although the inward curvature is more pronounced than in 1st exopodite of male, and its apex sharply rounded. Its anterior border exhibits a fold near outer angle. One or 2 spines occur on outer border near apex. Endopodite is not developed.

Second pleopod:- Exopodite is sub-triangular with its outer border almost straight and its apex more bluntly rounded than that of 2nd exopodite of male. Comb-like groups of setae occur along its inner border and there are a few spines on outer border near apex. A sub-triangular lobe, projecting back from inner posterior corner of protopodite, possibly represents an endopodite.

Third and fourth pleopods:- Posterior borders of exopodites are almost straight and their apical angles are more bluntly rounded than those of corresponding exopodites of male.

Habitat.

Type locality:- This description is based on specimens found under stones and among fallen leaves, mostly of eucalypt and dogwood, on a damp hillside at Notley Gorge, west of the Tamar River. Specimens were collected on the following dates:- 26th May, 1956, 4 males, 3 females; 26th December, 1956, 3 females; 16th June, 1957, 1 male, 5 females; 9th August, 1957, 42 males, 57 females.

Other localities:- Other specimens were found among damp fallen leaves around the base of a eucalypt at Prospect, near Launceston.

Variations.

The intensity of pigmentation varies so that in some specimens the background colour of the dorsal surface is almost uniformly dark. In some specimens the true brown coloration on the dorsal surface is replaced by orange-brown on the epimera of the pereion and the pleura and terminal segment of the pleon. In others the background colour of the dorsal surface is entirely orange-brown.

Plymophiloscia notleyensis n.sp.

Fig. 125. Distal part of right maxilliped, ventral view.

Fig. 126. Left epimera of 3rd to 5th segments of pereion, dorso-lateral view.

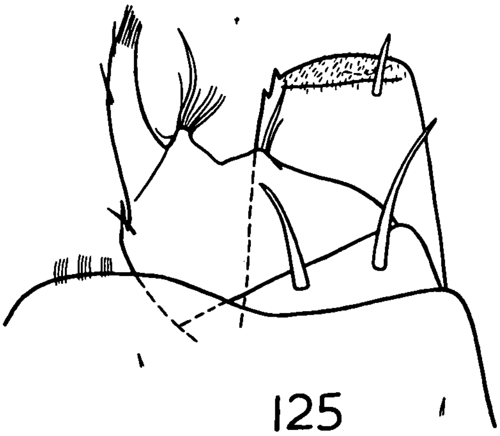
Fig. 127. Left epimeron of 4th segment of pereion, dorsal view, showing gland pores.

Fig. 128. Distal part of left 1st leg of male, anterior view.

Fig. 129. Right 1st pleopod of male, dorsal view.

Fig. 130. Distal part of endopodite of right 1st pleopod of male, ventral view. (Position of papillae on dorsal surface is indicated by dots).

Fig. 131. Right 1st pleopod of female, ventral view.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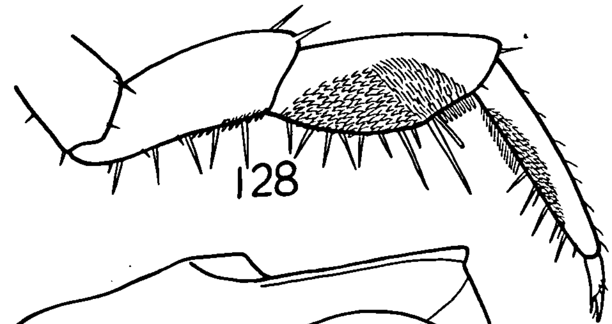
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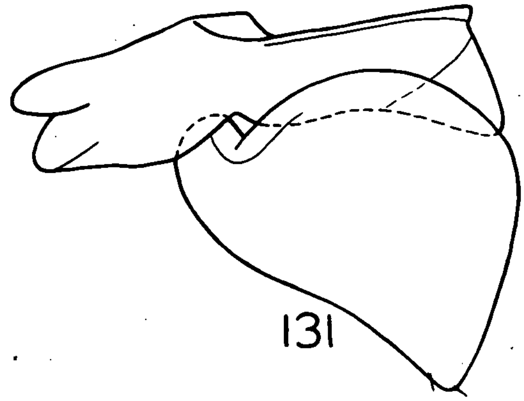
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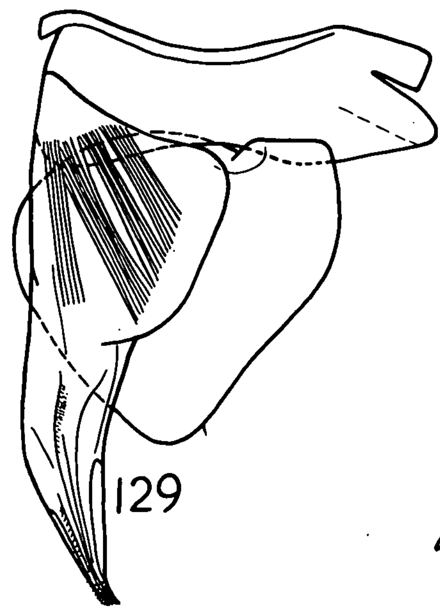
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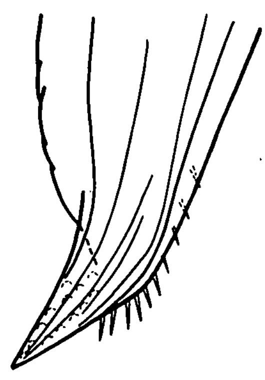
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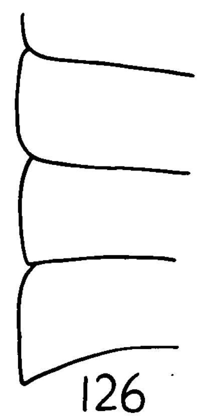
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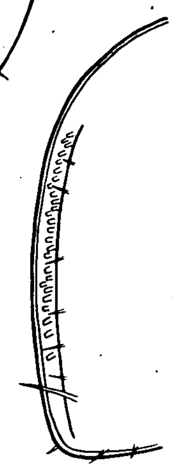
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Plymophiloscia ulverstonensis n.sp.

(Figs. 132-139).

Male.

Length of largest specimen: 6.6 mm.; breadth: 3.1 mm.

Colour. Background colour of dorsal surface in live animal is light brown except for 3 longitudinal bands of dark brown on pereion, one in mid-line and one on each side above bases of epimera, and for a band of dark brown on each side of pleon. Dark band down mid-line of pereion is marked by small unpigmented patches. There is a line of larger unpigmented patches down each of the two lateral dark bands, and other larger patches on epimera together form another row of spots down each side of pereion. Cephalon, areas between dark bands on pereion, and middle region of pleon, are mottled with irregular, unpigmented patches.

Cephalon. Surface of vertex is smooth. Frontal line is not developed across middle of cephalon, but at the sides it is evident as a ridge in front of each eye. Supra-antennal line is present. Antennary tubercles are small, not visible in dorsal view. Eyes are oval, compound, each composed of 19-22 ocelli.

First antenna. Triarticulate; 3rd article is conical and has several coarse setae on its inner surface and 2 long, coarse setae on its apex.

Second antenna. Length of peduncle: 3.85 mm.; length of 5th article of peduncle: 1.50 mm.; length of articles of flagellum: 1st 0.55 mm., 2nd 0.40 mm., 3rd 0.53 mm. On posterior surface of antenna, a longitudinal groove extends along length of 3rd to 5th articles of peduncle and all articles of flagellum. On distal border of each of 2nd to 5th articles of peduncle there is a large spine formed of a central seta and an outer sheath, split at the end into several points. All articles of antenna bear rows of shorter spines. Third article of flagellum ends in a long process formed of partly fused setae.

Mandibles. Left mandible:- Incisor process consists of a large bifid tooth with 2 simple teeth placed above it. Lacinia mobilis ends in 3 teeth. Lobe behind lacinia mobilis has a dense covering of simple setae and also bears 2 pencils of setae. One other pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible:- Incisor process consists of a large bifid tooth with 2 simple teeth situated above it. Apex of lacinia mobilis exhibits a pointed process on each side with uneven ridges between the two processes. There is one pencil of setae on setose lobe and one pencil behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe ends in 10 teeth forming an outer group of 4 simple teeth and inner group of 6 teeth, of which the 5th is simple and the rest are bifid. On ventral surface there are 2 spines below base of 4th simple tooth. Outer border of lobe is curved outwards; curved portion and margin distal to it are fringed with groups of setae. Inner lobe bears 2 thick setose processes; there is a short spine on its outer apical angle.

Second maxilla. Apex of maxilla is divided into 2 sub-rectangular lobes. Base of inner lobe is defined by a suture line. Apical region of inner lobe has a dense covering of setae; that of outer lobe, except for a clear area in inner apical angle, has a sparser covering of finer setae. Three long, coarse setae project into notch between lobes.

Maxilliped (fig. 132). Epipodite is long and narrow but shorter than basis; its apex is sub-acute. Short spines occur on ventral surface of basis. Outer side of basis is produced beyond base of endopodite to form a rounded lobe which bears comb-like groups of setae on its margin. Ischion is only article of endopodite which is distinct; there are 2 long spines on its ventral surface. Division of remainder of endopodite into 2 articles is indicated by a faint suture line. There are 2 groups of setae on inner border of first of these articles, basal set consisting of one large and one smaller seta, distal set of one large seta and 8-10 smaller setae. Three long setae occur singly on outer border of endopodite, one on 1st article, situated near base of pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular. There is a transverse indentation across its ventral surface near apex. There is a spine on inner side of endite behind this indentation. Two small teeth are present on outer apical corner. A small conical process, bearing a few coarse setae, is set in an indentation in dorsal surface near inner apical corner. Apical region of endite bears moderately long, scattered setae.

Pereion. First epimera are rounded anteriorly and only slightly produced forwards. Posterior borders of 1st to 4th tergites are almost straight; posterior angles of 1st to 3rd segments are bluntly rounded, those of 4th segment are right-angled and rounded. Epimera of 5th to 7th segments are directed backwards and their posterior angles are bluntly pointed. Seventh epimera do not extend back beyond 4th segment of pleon.

Dorsal surface of pereion is smooth except for a longitudinal groove near lateral border of each epimeron. Number of gland pores opening into each groove lies between 3 and 6. Pores occupy anterior third of groove and are absent from its posterior two-thirds. There is a row of spines above inner edge of groove. (Epimeron of 4th tergite is figured, fig. 133). Dorsal surface of tergites has a dense covering of scales and also bears scattered spines. One such spine consists of a central seta and an outer sheath, basal part of which is expanded on each side. Scale-setae occur on lower edge of lateral borders of segments. Scale part of one such seta (fig. 134) is sub-triangular, not especially broad, and has its sides curved out and its apex sharply pointed.

Pereiopods. First leg (fig. 135):- Carpos and propodos are not broadened dorso-ventrally, hence their upper and lower borders are scarcely curved. Majority of spines on leg each consist of a central seta surrounded by an outer sheath. In all but one of large spines on under surface of leg, apex of sheath is divided into 4 points. Spine nearest distal end of carpos differs in having its sheath divided into a greater number of points, at least 8 altogether, which are arranged symmetrically on each side of its central seta. Spines on under surface of meros and carpos are too scattered to appear as a brush. Large spatulate scales occur on under surface of carpos, near its distal end, and there is an area covered by long setae on anterior surface above them; simple spines occur on under surface of proximal part of propodos. Areas of smaller, projecting, hyaline scales are present on under surface of meros, under and anterior surfaces of carpos, and anterior surface of propodos; these spines slope slightly forwards towards distal end of article. Dactylos bears several long setae, and ends in a broad terminal claw with a much narrower accessory claw below it.

Carpos and propodos of 2nd and 3rd legs are not broadened dorso-ventrally. Multi-pointed spine, spatulate scales and area of setae at distal end of carpos, and simple spines on under surface of propodos, are not repeated on 2nd to 7th legs. Areas covered by projecting hyaline scales occur on meros, carpos and propodos of 2nd leg, on meros and carpos of 3rd leg, and on meros of 4th leg, but are absent from 5th to 7th legs.

Male organ. Conical with its apex sub-acute. Its two ducts remain distinct and open under a flap on its dorsal surface .

Pleon. Length (along mid-line): 1.60 mm.; breadth (across 3rd segment): 1.65 mm. Pleon is abruptly narrower than pereion. Pleura of 3rd to 5th segments are very small, acute and produced backwards; they are visible in dorsal view. Terminal segment is triangular with its lateral borders not incurved and its apex forming an obtuse angle. Dorsal surface of pleon bears scales and spines like those on pereion, but scale-setae are not present on lateral borders of segments.

Pleopods. First pleopod (fig. 136):- Outer side of protopodite is produced to form a large oval lobe. Exopodite is sub-triangular with its outer border deeply incurved and its apex sub-acute; its anterior border exhibits a fold near outer angle.

Endopodite is styliform and curved outwards, and tapers evenly to a sharp apical point. Its basal third is provided with conspicuous oblique muscles. Dorsal surface of endopodite is raised into ridges; one ridge down centre is ornamented with scales. With exception of a small, inwardly-directed, chitinous point at its extreme tip, apical region (fig. 137) is not bent at an angle to rest of distal third. There is an indentation in inner surface, a little above apical point; a row of spines is situated along this indented portion. Ventral surface of apical region is ridged; on dorsal surface there is a row of papillate processes near outer border. No papillae are visible in ventral view of endopodite.

Second pleopod (fig. 138):- Exopodite is sub-triangular with its outer border shallowly but distinctly incurved, and its apex markedly elongated posteriorly and sub-acute. Comb-like groups of setae are present on inner border and on ridges near border. There are a few spines on outer border near apex. Endopodite is biarticulate; length of articles: 1st 0.36 mm.; 2nd 1.32 mm. First article is quadrangular in outline; there is a rounded triangular lobe on its ventral surface. Second article is styliform; there is a chitinous thickening down outer edge of its basal 2/3, beyond which article becomes very narrow and flagelliform. Length of flagelliform portion: 0.43 mm.

Third pleopod:- Inner posterior corner of protopodite is produced backwards to form a long, narrow lobe. Exopodite is sub-quadrangular with its posterior border shallowly but distinctly incurved and its apical angle elongated posteriorly and sharply rounded.

Comb-like groups of setae are present on and near inner border, and spines occur along posterior border.

Fourth pleopod:- Lobe at inner posterior corner of protopodite is very short. Exopodite is sub-quadrangular.

Fifth pleopod:- Inner posterior corner of protopodite is scarcely drawn out to form a lobe. Exopodite is sub-triangular with its apex sub-acute. Comb-like groups of setae occur on both lateral borders of exopodite and are also present on an area of its dorsal surface near apex. There are a few spines on outer border.

Uropod. Protopodite projects beyond apex of terminal segment for about 1/5 of its own length; there is a longitudinal groove down its outer surface. Insertion of endopodite is anterior to that of exopodite; distance separating insertions of exopodite and endopodite: 0.1 mm. Both rami are conical, both bear spines and have a terminal tuft of long setae. There is a longitudinal groove down outer surface of exopodite and another down inner surface of endopodite. Greatest length of protopodite: 0.56 mm.; length of rami: exopodite 1.00 mm., endopodite 0.53 mm.

Female.

Length of largest specimen: 7.6 mm.; breadth: 3.6 mm.

Female differs from male in the following structures:-

Pereiopods:- On 1st leg, multi-pointed spine, large spatulate scales and area of setae at distal end of carpos, and simple spines on under surface of propodos, are present as in 1st leg of male, but there are no areas of smaller projecting, hyaline scales on meros, carpos and propodos. Such scales are also absent from 2nd to 4th legs.

First pleopod (fig. 139):- Exopodite is sub-triangular with its outer border deeply incurved and its apex sharply rounded; its anterior border exhibits a fold near outer angle. There are a few spines in outer border near apex. Endopodite is not developed.

Second pleopod:- Exopodite is sub-triangular with its outer border slightly incurved and its apex sharply rounded but not markedly elongated. Comb-like groups of setae occur on its inner border and there are a few spines on its outer border. A rounded, sub-triangular lobe, projecting backwards from inner posterior corner of protopodite, possibly represents an endopodite.

Third and fourth pleopods:- Exopodites have their posterior borders only slightly incurved, and their apical angles are less elongated posteriorly and less sharply rounded than those of corresponding exopodites of male.

Habitat.

Type locality:- This description is based on specimens found under stones and among plant debris on the ground immediately inland from a beach at West Ulverstone. Specimens were collected on the following dates:- 30th May, 1956, 37 males, 59 females; 26th January, 1958, 25 males, 53 females.

Other localities:- Other specimens were found under trailing plants growing on a bank above the shore at Roaring Beach, South Arm, in south-eastern Tasmania.

Variations. Background colour of dorsal surface in some specimens is a moderately dark brown, but the three bands on the pereion remain distinctly darker. In some specimens many of the unpigmented patches on the lighter brown regions are confluent so that the unpigmented areas are very extensive. In some specimens the true brown pigmentation of the dorsal surface is replaced by orange-brown on the epimera of the pereion and on the pleura and apical part of the terminal segment of the pleon.

Plymophiloscia ulverstonensis n.sp.

Fig. 132. Distal part of left maxilliped, ventral view.

Fig. 133. Right epimeron of 4th segment of pereion, dorsal view, showing gland pores.

Fig. 134. Scale-seta on lateral border of 1st segment of pereion, dorsal view.

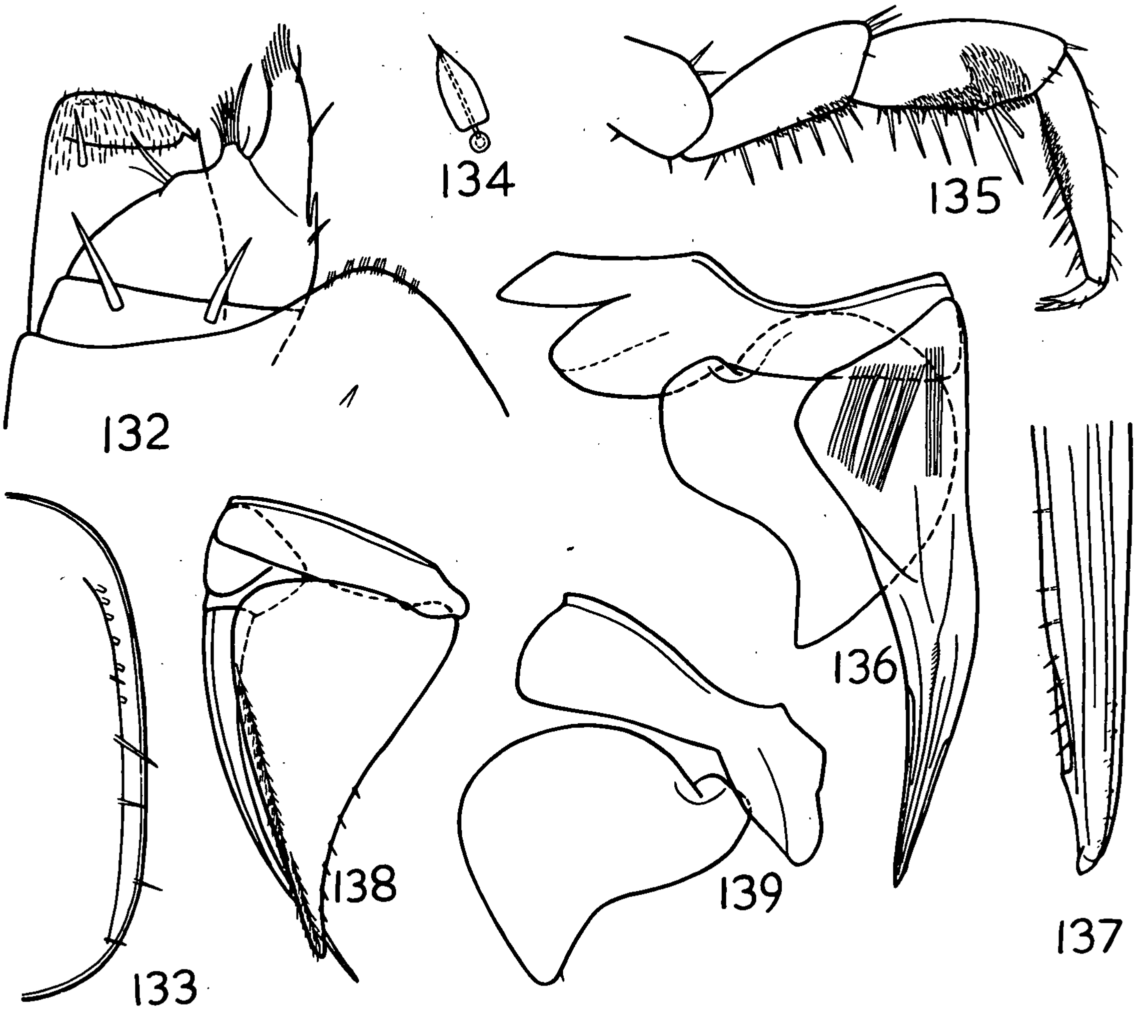
Fig. 135. Distal part of left 1st leg of male, anterior view.

Fig. 136. Left 1st pleopod of male, dorsal view.

Fig. 137. Distal part of endopodite of left 1st pleopod of male, ventral view. (Position of papillae on dorsal surface is indicated by dots).

Fig. 138. Left 2nd pleopod of male, ventral view.

Fig. 139. Left 1st pleopod of female, ventral view.



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Family *Porcellionidae*.

The characters of the family are defined by Edney (1953, p. 76) as follows:-

"Large animals with compound eyes and pseudotracheae. Epimera very well developed and often expanded laterally and posteriorly. Flagellum always with two distinct segments, head often with well-developed lateral and frontal lobes. Rami of the uropods usually visible from above, though the endopodites may be nearly totally concealed by the telson, which is often strongly produced- - - - -; the exopodites very different in shape from the endopodites. Animals adapted to live in drier conditions than the Oniscidae or Trichoniscidae."

Genus Porcellio Latreille 1804.

The characters of the genus are defined by Sars (1899, p. 176) as follows:-

"Body oval, more or less depressed, with the lateral parts lamellarly expanded. Cephalon partly flanked by the side-plates of the 1st segment of mesosome, lateral lobes well developed, frontal lobe more or less projecting, and distinctly defined from the epistome. Metasome not abruptly contracted, epimeral plates of 3rd to 5th segments prominent and recurved; last segment conically produced. Eyes, as a rule, well developed, subdorsal. Antennae moderately slender, with the flagellum composed of 2 articulations only. Oral parts normal. Legs gradually increasing in length posteriorly, last pair in male sometimes differing from that in female. Opercular plates of the 2 anterior pairs of pleopoda, and sometimes also of the 3 succeeding pairs, provided with distinct air-cavities. Copulative organs of male of a similar structure to that in Oniscus. Uropoda distinctly projecting, outer ramus lanceolate, inner much smaller, linear, and originating far in front of the former."

It is noted that Verhoeff (1917, p. 213) restricts genus Porcellio to species having pseudotracheae present only in the 1st and 2nd pleopods. Verhoeff's subdivisions of Porcellio Latreille are retained as distinct genera by Vandel (1945), but are ranked as sub-genera by Edney (1953). As genus Porcellio is not native to Tasmania, I do not propose to try to assess these differences of opinion, but prefer in the present paper to recognise the genus in its wider sense, as it is defined by Sars.

<u>Porcellio</u> <u>scaber</u> Latreille 1804.

(Figs. 140-141).

<u>Synonymy</u>. <u>Porcellio</u> <u>graniger</u> Miers 1876.

Further synonymy is given by Budde-Lund (1885, pp. 129-130) and Richardson (1905, pp. 621-622).

<u>Porcellio</u> <u>scaber</u> is a cosmopolitan species which has presumably been introduced into Tasmania. Tasmanian specimens are therefore not described in detail in the present paper. Descriptions of <u>P</u>. <u>scaber</u> are given in previous literature, e.g. Budde-Lund (1885, pp. 129-131), Sars (1899, pp. 176-177, pl. 77), Richardson (1905, pp. 621-624).

The following account of characters which may be examined without dissecting the animal, is given here to enable <u>P</u>. <u>scaber</u> to be distinguished from other species of Oniscoidea represented in Tasmania.

Length of largest male specimen: 13 mm.; breadth: 6 mm.

Length of largest female specimen: 12.5 mm.; breadth: 6 mm.

Dorsal surface of live animal is dark grey except for lighter grey epimera of pereion and pleura of pleon. Animla is not able to enroll.

Frontal line of cephalon (fig. 140) is produced into median and lateral lobes. Median lobe is sub-triangular with its apex bluntly rounded; lateral lobes are sub-quadrangular with corners rounded. Vertex is covered with large irregular tubercles. Eyes are compound. Second article of peduncle of 2nd antenna (fig. 140) is markedly dilated on inner side. Flagellum is biarticulate;

length of articles: 1st 0.63 mm., 2nd 0.67 mm.

Epimera of pereion are large and lamellar. Posterior borders of each of 1st to 3rd epimera exhibit a deep, curved indentation; those of 4th to 7th epimera are not deeply indented but slope backwards in a shallow curve. Posterior angles of all segments are sub-acute. Dorsal surface of pereion bears numerous large, irregular tubercles.

Pleon is not abruptly narrower than pereion. Pleura of 3rd to 5th segments of pleon are large, lamellar, and directed backwards; those of 3rd segment are sub-crescentic in shape, those of 4th and 5th segments are sub-rectangular. Terminal segment (fig. 141) is sub-triangular with its lateral borders deeply incurved and apex sub-acute. Its dorsal surface has a shallow, longitudinal indentation. All segments of pleon bear tubercles which are smaller than those on cephalon and pereion.

Pseudotracheae are present in exopodites of 1st and 2nd pleopods. Exopodite of uropod (fig. 141) is lanceolate, terminal in its position on protopodite. Endopodite is sub-cylindrical and is inserted on inner side of protopodite near its base. In female, rami of uropod are shorter in relation to protopodite than in male. Lengths in a male specimen: protopodite (along inner border), 0.75 mm., exopodite 1.57 mm., endopodite 0.75 mm. Lengths in a female specimen: protopodite (along inner border), 0.71 mm., exopodite 1.00 mm., endopodite 0.68 mm.

Habitat.

These observations are based on specimens collected on 22nd March, 1956, from under pieces of crumbling sandstone on the face of a cliff above the shore, and from clumps of rushes on the top of the cliff, at Dodge's Ferry. Thirty-three males and 22 females were obtained.

Numerous examples of P. scaber were collected in and near populated areas, where they occur in such situations as among decaying vegetation and below objects lying on the ground. Specimens were found under these conditions in the following localities, which represent widely separated parts of Tasmania:- Cooee, Natone, Ulverstone, Sheffield, (north-west); Sandy Beach (West Tamar), Launceston, Longford, Cressy, (north-east); Hobart, Collinsvale, Huonville, Dunalley, (south-east); and Trial Harbour, (west).

Specimens were also collected from among debris lying a little above high tide level near the sea shore in the following localities:- Eaglehawk Neck, South Arm, Tinderbox and Barnes Bay, Bruny Island.

Variations.

The following variations in the colour of live adult animals were noted:- Dorsal surface grey except for orange epimera and pleura; completely orange; or mottled in dark and light brown, dark and light grey, or dark grey and orange.

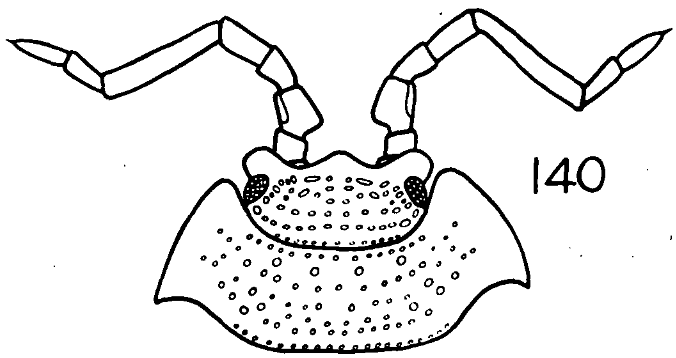
Remarks.

Haswell (1882, p. 280) includes Tasmania in the distribution of Porcellio graniger Miers 1876. Budde-Lund (1885, p. 149) suggests that P. graniger probably does not differ from P. laevis Latreille 1804. Chilton (1901, p. 140) disagrees with Budde-Lund's suggestion, and recognizes P. graniger to be synonymous with P. scaber Latreille 1804. He therefore states that P. scaber has been recorded from Tasmania.

Porcellio scaber Latreille.

Fig. 140. Cephalon, 2nd antennae and 1st segment of peraeon, dorsal view.

Fig. 141. Fifth and terminal segments of pleon and uropods of male, dorsal view.



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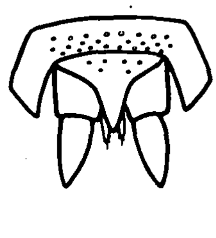

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Family Armadillidiidae.

The characters of the family are defined by Edney (1953, p. 88) as follows:-

"Body strongly convex, integument usually smooth; capable of rolling into a ball. Frontal lobe or scutellum of head very strongly developed. Frontal and postscutellar carinae present either singly or together. Antennae short, the flagellum of two segments. Anterior margin of the endopodite of the maxilliped non-ciliated, with a number of stout, dentiform processes. Epimera well-developed but not expanded laterally at all, those of the 1st segment strongly produced anteriorly as far as the anterior margin of the head. Outline of the pleon continuous with that of the pereion. Uropods short, not projecting beyond the telson, their endopodites greatly expanded laterally so that they and the telson form a convex covering round the posterior end of the animal, continuous laterally with the epimera; the endopodites slightly expanded, usually completely hidden from above by the telson.- - - . Legs rather short, 1st two pairs of pleopods with pseudotracheae. Male genitalia not very different from those of the Oniscidae, though the endopodites of the 1st pair are often strongly divergent posteriorly, or the tips are bent outwards.- - - -."

Presumably the statement "their endopodites greatly expanded laterally" etc., applies instead to the exopodites of the uropods.

The two genera of family Armadillidiidae represented in Tasmania may be distinguished as follows:-

Eyes compound; posterior angle of 1st segment of pereion entire, not cleft - - - - - - - - - - - <u>Armadillidium</u> Brandt.

Eyes simple; posterior angle of 1st segment of pereion cleft - - - - - - - - - - - - - - - - - - <u>Eluma</u> Budde-Lund.

Genus Armadillidium Brandt 1833.

The characters of the genus are defined by Sars (1899, p. 188) as follows:-

"Body oblong or elliptical in form, very convex, and capable of being rolled up into a perfect ball. Cephalon with the front distinctly marginate, lateral lobes rounded, and sharply defined at the base. Epistome vertical, forming above a triangular shield, advancing more or less beyond the frontal edge. Side-plates of 1st segment of mesosome large, securiform, not incised behind. Metasome semicircular, with the edges continuous throughout; last segment lamellar, quadrangular or triangular in form, not extending beyond the limits of the epimeral plates of the penultimate segment. Eyes distinct, lateral. Antennulae with the terminal joint but little produced. Antennae, as a rule, not attaining half the length of the body, penultimate peduncular joint scarcely longer than the 2nd; flagellum biarticulate. Opercular plates of only the first 2 pairs of pleopoda with air-cavities. Uropoda very short, with the basal part broad, lamellar, outer ramus spatulate, inner narrow, cylindric."

It is noted that Edney (1953, p. 88), in defining genus Armadillidium, states: "Eyes compound."

Armadillidium vulgare (Latreille 1804) Milne-Edwards 1840.

(Figs. 142-143).

Synonymy. *Armadillo vulgaris* Latreille 1804.

Armadillidium subdentatum Haswell 1882.

Further synonymy is given by Budde-Lund (1885, pp. 67-68).

Armadillidium vulgare is a cosmopolitan species which has presumably been introduced into Tasmania. Tasmanian specimens are therefore not described in detail in the present paper. Descriptions of *A. vulgare* are given in previous literature, e.g. Budde-Lund (1885, pp. 66-68), Sars (1899, pp. 189-190, pl. 82), Richardson (1905, pp. 666-668).

The following account of characters which may be examined without dissecting the animal, is given here to enable *A. vulgare* to be distinguished from other species of Oniscoidea represented in Tasmania:-

Length of largest male specimen: 13 mm.; breadth: 6 mm.

Length of largest female specimen: 15 mm.; breadth: 7 mm.

There is a sexual difference in colour of mature animals. Dorsal surface of live male specimen is black, that of live female specimen is mottled in dark and light brown.

Body is strongly convex dorsally, and animal is able to enroll. Dorsal surface of cephalon and body is not setose.

Vertex of cephalon (fig. 142) is broad and flattened. Frontal line is produced into small, right-angled, lateral lobes. Antennary lobe on each side is raised into a ridge which is visible in dorsal view of cephalon. There is a raised triangular shield on frons; upper border of its anterior surface forms a ridge which projects beyond frontal line and curves back over it. Eyes are compound. Flagellum of 2nd antenna (fig. 142) is biarticulate; length of articles: 1st 0.56 mm., 2nd 0.76 mm.

Epimera of 1st segment of pereion (fig. 142) are produced backwards; their posterior angles are sub-acute and entire, not cleft. Epimera of 2nd to 5th segments are trapezoidal with posterior angles bluntly rounded, those of 6th and 7th segments are sub-rectangular with posterior angles right-angled. Posterior borders of 2nd and 3rd epimera are markedly directed backwards, those of 4th to 7th epimera are more nearly transverse.

Pleon is semi-circular with its lateral borders continuous with those of pereion. Pleura of 3rd to 5th segments are sub-rectangular and curved backwards. Terminal segment (fig. 143) is quadrangular, narrowing posteriorly, with lateral and posterior borders straight.

Pseudotracheae are present in exopodites of 1st and 2nd pleopods. Exopodite of uropod (fig. 143) occupies the space between terminal segment and pleuron of 5th segment of pleon. It is flattened and sub-quadrangular, with posterior margin straight, and is terminal in its position on protopodite. Endopodite is sub-cylindrical, slightly constricted at basal end; it is inserted on inner side of protopodite near base of the latter.

Habitat.

These observations are based on specimens collected on 9th April, 1956, from a heap of decaying vegetation in a garden in Hobart;

10 males and 5 females were obtained.

Other specimens were found in gardens in Launceston, under stones on Queen's Domain and in the University Park, Hobart, and in debris on ledges of a cliff above the shore at Tinderbox.

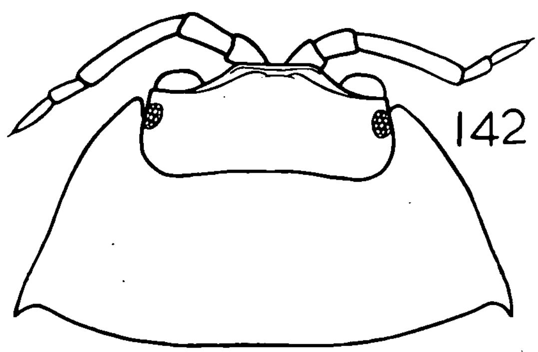
Remarks.

Haswell (1882, p. 279) includes Tasmania in the distribution of his new species, *Armadillidium subdentatum*. His description of this species is brief and is not accompanied by figures. However, as the only species of *Armadillidium* which I have found in Tasmania is *A. vulgare*, and the characters of this species agree with the information on *A. subdentatum* given by Haswell, I consider it very probable that *A. subdentatum* Haswell is a synonym of *A. vulgare* (Latreille).

Armadillidium vulgare (Latreille).

Fig. 142. Cephalon, 2nd antennae and 1st segment of pereion, dorsal view.

Fig. 143. Fifth and terminal segments of pleon and uropods, dorsal view.



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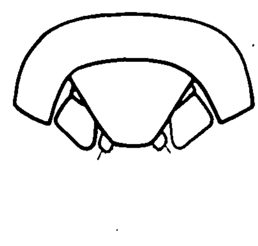

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Genus Eluma Budde-Lund 1885.

Synonymy. Eluma Budde-Lund 1879, nom.nud.

The characters of the genus are defined by Collinge (1922, pp. 103-104) as follows:-

"Body oblong-ovate, strongly convex, setose, and closely and minutely punctured. Cephalon strongly marginate, with median and lateral lobes; epistome with sloping dorsal portion and keeled. Eyes simple, very small. Antennulae small, 3-jointed, terminal joint conical. Antennae somewhat short, flagellum bi-articulate. Pleural plates of mesosomatic segments 2-7 slightly excavate anteriorly, ventral margin indentate on segments 2-4, trucate on 6-7. Coxopodite of first segment separated from the pleuron and forming a notch on the posterior margin. Telson triangular, width greater than the length, not extending beyond the uropoda. Uropoda short, extending slightly beyond the telson; basipodite robust, thickened, antero-dorsal surface expanded, articulating ventro-anteriorly; exopodite flattened, expanded, laminate; endopodite styliform, elongated."

Eluma caelatum (Miers 1877) Collinge 1917.

(Figs. 144-146).

Synonymy. *Armadillidium caelatum* Miers 1877.

Eluma purpurascens Budde-Lund 1879, *nom.nud.*

Eluma purpurascens Budde-Lund 1885.

According to Collinge (1922, pp. 105-106), the distribution of *Eluma caelatum* includes French Guiana, some Western European countries, Algeria, certain Atlantic islands and the Nicobar Islands. I have seen no record of the species from the Australian region. As my Tasmanian specimens of *E. caelatum* were found in or near populated areas, it seems likely that the species has been introduced into Tasmania. Tasmanian specimens are therefore not described in detail in the present paper. Descriptions of *E. caelatum* are given in previous literature, e.g. Budde-Lund (1885, pp. 48-49), Collinge (1922, pp. 104-106, pl. 8), Edney, (1953, pp. 94-95, figs. 161-164).

The following account of characters which may be examined without dissecting the animal, is given here to enable *E. caelatum* to be distinguished from other species of Oniscoidea represented in Tasmania.

Length of largest male specimen: 9 mm.; breadth: 4 mm.

Length of largest female specimen: 10.5 mm.; breadth: 4.5 mm.

Dorsal surface of live animal is dark pinkish-brown except for lighter pink epimera of pereion and pleura of pleon. Body is strongly convex dorsally and animal is able to enroll. Dorsal surface of cephalon and body has a dense covering of setae.

Vertex of cephalon (fig. 144) is broad and flattened. Frontal line is produced into small, right-angled lateral lobes. Antennary lobe on each side is raised into a ridge which is visible in dorsal view of cephalon. There is a raised triangular shield on frons; upper border of its anterior surface forms a ridge which meets frontal line. Eyes are simple, each consisting of one large ocellus. Flagellum of 2nd antenna (fig. 144) is biarticulate; length of articles: 1st 0.27 mm., 2nd 0.60 mm.

Epimera of 1st segment of pereion are produced backwards; there is a low ridge down dorsal surface of 1st epimeron, near its lateral border, and posterior angle of epimeron is deeply cleft (fig. 145). Epimera of 2nd to 5th segments are trapezoidal with posterior angles bluntly rounded, those of 6th and 7th segments are sub-rectangular with posterior angles right-angled. Posterior borders of 2nd and 3rd epimera are markedly directed backwards, those of 4th to 7th epimera are more nearly transverse.

Pleon is semi-circular with its lateral borders continuous with those of pereion. Pleura of 3rd to 5th segments are sub-rectangular and curved backwards. Terminal segment (fig. 146) is sub-triangular with its lateral borders slightly curved outwards and apex sharply rounded.

Pseudotracheae are present in exopodites of 1st and 2nd pleopods. Exopodite of uropod (fig. 146) occupies the space between the terminal segment and pleuron of 5th segment of pleon. It is flattened and sub-quadrangular with posterior margin straight, and is terminal in position on protopodite. Endopodite is sub-cylindrical, slightly constricted at its basal end, and is inserted on inner side of protopodite near base of the latter.

Habitat.

These observations are based on specimens found under stones on Queen's Domain, Hobart. Examples were collected on 4th June, 1956, and 19th July, 1956; a total of 12 males and 12 females being obtained.

Other specimens were found among decaying vegetation in gardens in Launceston and Hobart, under stones in the University Park, Hobart, and at Collinsvale, and in debris on ledges of a cliff above the shore at Tinderbox.

Eluma caelatum has not previously been recorded from Tasmania.

Remarks.

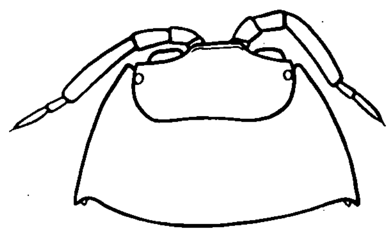
Budde-Lund (1885, p. 49) suggests that his species, *Eluma purpurascens*, is perhaps not different from *Armadillidium caelatum* Miers 1877, but he is not prepared to consider the synonymy of these two speces as definite. This synonymy is confirmed by Collinge (1917*a*, p. 115), (1922).

<u>*Eluma caelatum*</u> (Miers).

Fig. 144. Cephalon, 2nd antennae and 1st segment of pereion, dorsal view.

Fig. 145. Left epimeron of 1st segment of pereion, dorso-lateral view.

Fig. 146. Fifth and terminal segments of pleon and uropods, dorsal view.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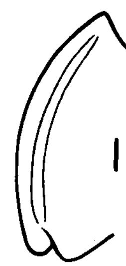
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Family Armadillidae.

Members of family Armadillidae exhibit the following characters:-

Body capable of being enrolled. Cephalon very short and broad. Flagellum of 2nd antenna biarticulate. Pseudotracheae present in exopodites of first four pairs of all five pairs of pleopods. Terminal segment sub-quadrangular with its lateral borders incurved. Interval between terminal segment and 5th pleuron of pleon on each side occupied by a lobe of protopodite of uropod. Exopodite of uropod reduced in size and situated on, or towards inner side of, lobe of protopodite.

The two genera of family Armadillidae represented in Tasmania may be distinguished as follows:-

Posterior angle of 1st epimeron of pereion entire, not cleft; lobe on under surface of 1st epimeron completely separated from epimeral border - - - - - - Cubaris Brandt, s.str. after Verhoeff.

Posterior angle of 1st epimeron of pereion cleft; inner lobe, formed by cleft, continuous with lateral border of epimeron - - - - - - - - - - - - - - - - - - Sphaerillo Verhoeff.

Genus Cubaris Brandt 1833, s.str. after Verhoeff 1926.

Synonymy. Nesodillo Verhoeff 1926.

Armadillo, section VI, Budde-Lund 1904.

? Spherillo, section VIII, Budde-Lund 1904 (in part).

Budde-Lund (1904) groups species of Armadillidae in two genera, Spherillo Dana 1852 and Armadillo Brandt 1833; at the same time he alters the limits of both. He divides Spherillo into thirteen sections and Armadillo into seven sections. He refers to each one of sections II, VI and VII of Armadillo as Cubaris Brandt (in part). He (p. 97) designates "Armadillo murinus Br." (= C. murina Brandt 1833) as the type species of section VI of Armadillo.

Verhoeff (1926, pp. 251, 259) considers that Spherillo and Armadillo can not be clearly separated on the characters which Budde-Lund (1904) uses to distinguish them. In keys to genera of Armadillidae from New Caledonia (pp. 252-258) he restricts Armadillo, Spherillo (which he (p. 250) prefers to spell as Sphaerillo) and Merulana Budde-Lund 1913, and establishes nine new genera. He states (p. 259) that all of these genera except Emydodillo Verhoeff 1926 belong in the group which he refers to as "Armadillo + Sphaerillo B.L." He suggests (p. 256) that three of his new genera, Nesodillo, Hawaiodillo and Merulanella, should possibly be grouped as sub-genera of Merulana in the wider sense.

Verhoeff (pp. 275-276) compares his new genus Nesodillo with Budde-Lund's (1904) sections of Spherillo, and refers it to section VIII. Of the nine species comprising this section he places four in other new genera; Sph. bifrons (Budde-Lund 1885) in Australiodillo Verhoeff 1926 (p. 274), and Sph. sharpi, Sph. perkinsi (Dollfus 1900);

and _Sph. frontalis_ Budde-Lund 1904 in _Hawaiodillo_ Verhoeff 1926 (p. 256). He states that the remainder, i.e. _Sph. speciosus_ (Dana 1853); _Sph. monolinus_, _Sph. vitiensis_, Dana 1853; _Sph. aucklandicus_ (Budde-Lund 1885) and _Sph. tarangensis_ Budde-Lund 1904, probably, but do not definitely, belong in _Nesodillo_. Verhoeff considers that of the nine species of _Spherillo_ established by Wahrberg (1922), only two, _Sph. marmoratus_ and _Sph. rufoniger_, can possibly be included in _Nesodillo_. Verhoeff assigns to _Nesodillo_ nine species which he designates as new.

Herold (1931, p. 319) states that _Cubaris murina_ Brandt must be included in _Nesodillo_ Verhoeff, and he names it as _Nesodillo murinus_ (Brdt.).

Jackson (1933_a_, p. 90), (1933_b_, pp. 157-159) identifies _Nesodillo medius_ Verhoeff 1926 with _Cubaris murina_ Brandt and (p. 159) states that the genus _Nesodillo_ must therefore be abandoned in favour of _Cubaris_ Brandt. This is necessary as _C. murina_ is the type species of the only one of Budde-Lund's sections of _Armadillo_ which is still associated with _Cubaris_.

Verhoeff (1938 p. 12) at first accepts Jackson's synonymy, although he incorrectly retains the generic name _Nesodillo_, and refers to _C. murina_ as _N. murinus_. However, in a postscript to this same paper, he (pp. 13-14) rejects the synonymy of the two species and retains _N. medius_ as distinct from _N. murinus_.

Jackson (1941, p. 3) states that as _Nesodillo_, by Verhoeff's (1938) admission, contains _C. murina_, then _Nesodillo_ and _Cubaris_ are synonyms, and adds that genus _Cubaris_ is thus clearly defined by both

Brandt and Verhoeff and must be used only in this restricted sense. Referring to Verhoeff's claim that *C. murina* and *C. medius* are distinct, Jackson (pp. 16-17) states that an examination of numerous specimens of the former in the British Museum suggests that Verhoeff's points of difference are not sufficiently constant to justify separation of the species. He therefore retains his earlier synonymy.

Vandel (1945, p. 254) refers to genus *Cubaris* as "*Cubaris* *s.str.* (= *Nesodillo* Verhoeff)", but adds that the genera *Merulana* Budde-Lund and *Merulanella* Verhoeff may perhaps be joined with this genus. I propose to follow Jackson (1941) in classing *Merulana* and *Merulanella*, and also *Hawaiodillo* Verhoeff, as genera distinct from *Cubaris* s.str.

Verhoeff (1926) defines *Nesodillo* by means of two keys to genera of Armadillidae. In order to set down the generic characters in a more compact form I propose the following diagnosis of *Cubaris* s.str. (= *Nesodillo*) which is based on information on *Nesodillo* given by Verhoeff in his key *a* (pp. 252-256), key *b* (pp. 256-258), key to sub-families of Armadillidae (pp. 263-264) and remarks on the genus (pp. 275-277).

Generic Diagnosis.

Frontal line of cephalon forms only a low ridge which is straight or curved, but is neither drawn out into protuberances (cf. *Hawaiodillo* Verhoeff 1926) nor longitudinally furrowed in the mid-line (cf. *Merulana* Budde-Lund 1913, Verhoeff 1926 s.str.). Second antennae are slenderly built with their greater part projecting out from cephalon. Dorsal surface of animal is smooth, rugose or tuberculate, but lacks spines. Posterior borders of 1st to 6th segments of peraeon are more or less deeply incurved on each side, that of 7th segment is straight or shallowly incurved on each side. Posterior angle of 1st epimeron is entire, not cleft. If a small lobe or tooth is present on under surface of 1st epimeron it is not visible from the outer side, and it does not form a continuation of epimeral border, but is distinctly removed from border. If a small lobe or tooth is present on under surface of 2nd epimeron it does not project beyond epimeral border. Pronotum is broad, attaining 1/5 to 1/4 of length of entire tergite. Terminal segment is either constricted in the middle or not constricted. Dorsal surface of terminal segment is not keeled (cf. Merulanella Verhoeff 1926). Posterior border of terminal segment is bluntly rounded or straight or shallowly incurved in the centre, but is not deeply incised in the mid-line (cf. Schismadillo Verhoeff 1926 and Australiodillo bifrons (Budde-Lund 1885) Verhoeff 1926). Pleopods occupy considerably more than 1/3 of breadth of pleon. Exopodites of all pleopods possess pseudotracheae. Exopodites are not divided into layers (cf. Buddelundia Michaelsen 1912). Breadth of anterior border of protopodite of uropod, if greater than length of outer border of protopodite, is not more than 5/4 times the latter (cf. Ochotodillo Verhoeff 1926). Length of basal surface of protopodite occupies not more than 1/3 length of entire protopodite. Inner border of protopodite is incurved, but not angularly indented near insertion of exopodite (cf. Merulana). Outer side of protopodite is not produced outwards to form a triangular lobe (cf. Emydodillo Verhoeff 1926). Exopodite of uropod varies in length, but if it is very short (less than half breadth of lobe of protopodite), then the free lobe of protopodite, measured on its inner border up as far as lateral indentation of terminal segment, is longer than it is broad across the middle (cf. Armadillo Brandt 1833, Verhoeff 1926 s.str.). Exopodite is inserted on dorsal surface of protopodite and is distinctly removed from inner border of latter. Surface of protopodite is not elevated posterior to exopodite. (cf. Acanthodillo Verhoeff 1926).

Genotype. Cubaris murina Brandt 1833.

When Verhoeff states that the terminal segment is not keeled, I interpret a keel as being a sharply defined ridge, such as he (1926, fig. 74) figures for Merulanella wahrbergi Verhoeff 1926, and not a broad, blunt elevation, extending down only a part of the length of the segment, such as occurs in the Tasmanian species which I assign to Cubaris s.str.

All species assigned to Nesodillo by Verhoeff (1926, 1928a. 1936, 1938, 1942b, 1946), Jackson (1930, 1931) and Herold (1931) are automatically included in Cubaris s.str. It is noted that Verhoeff (1946) designates as new N. burmanus, N. tenasserimus and N. schellenbergi sub. sp. malaisei. However these are already established in 1946, as a key which distinguishes N. burmanus and N. tenasserimus from other species assigned to Nesodillo, and a comparison of N. schellenbergi sub. sp. malaisei with N. schellenbergi Verhoeff 1928a, are published in an earlier paper (Verhoeff 1942b).

The species of Spherillo which Verhoeff (1926) suggests may belong in Nesodillo must also be considered here. Chilton (1910b, p. 290) lists Sph. aucklandicus (Budde-Lund) as a synonym of Sph. monolimus Dana.

Information given in the original descriptions of Sph. monolimus, Sph. speciosus (Dana) and Sph. tarangensis Budde-Lund is not sufficient to justify the transference of these species to Cubaris. Sph. vitiensis Dana (1853, p. 721, pl. 47, fig. 4d) is described and figured as having a rectangular notch in the inner border of the protopodite of the uropod, and is therefore excluded from Cubaris s.str. I agree with Verhoeff's suggestion that Sph. marmoratus Wahrberg and Sph. rufoniger Wahrberg may possibly be included in Nesodillo, and consequently in Cubaris s.str.

Besides species originally placed in Nesodillo, Jackson (1941, pp. 16-17) includes in Cubaris s.str. the following species :- C. galbineus (Eschscholtz 1823), C. javanensis (Dollfus 1889) and C. lifuensis Stebbing 1900b. The synonymy of C. lifuensis and C. sarasini (Verhoeff 1926), doubtfully suggested by Verhoeff (1926, p. 357), appears unlikely, and Jackson keeps these two species distinct. Jackson also groups with species of Cubaris s.str. C. lundi Stebbing 1900b, C. suteri Chilton 1915a and C. milleri Chilton 1917c, but states in a footnote that these three species do not belong in Cubaris s.str. but are related to Sphaerillo Verhoeff 1926. Reference to original descriptions shows that in each of these species the posterior angle of the 1st epimeron is cleft.

I have collected examples of four Tasmanian species which I assign to Cubaris s.str. These can not be identified with species included in the restricted genus by previous authors, but before they can be regarded as new it is necessary also to compare them with the other established species assigned to Cubaris s.lat. which may remain in Cubaris s.str. The number of species in Cubaris s.lat. is considerable, especially since, as is pointed out by Jackson (1933*b*, p. 149), some authors use this name to replace *Armadillo*. I have seen no reference to any comprehensive attempt to determine which of these species may be retained in *Cubaris* s.str. Jackson's (1941) attempt covers only species found in Oceania. Verhoeff (1938, 1942*b*, 1946) persists in using the name *Nesodillo*, although *Cubaris* has priority.

I have traced species of *Cubaris* by consulting Budde-Lund's (1904) revision and the Zoological Records for the years 1901-1954. I have then obtained information on the species from revisions by Budde-Lund (1885, 1904), Barnard (1932) and Van Name (1936, 1942), and from the original descriptions of species not included in these works.

Budde-Lund (1904) refers to each of his sections II, VI and VII of *Armadillo* as *Cubaris* Brandt (in part). In a later paper (Budde-Lund, 1909, p. 54) he classes these sections as sub-genera of *Armadillo*. He names section II as *Diploexochus* Brandt and section VII as *Bethalus* (new sub-genus). He retains in sub-genus *Cubaris* Brandt, which has *C. murina* Brandt as its type, only the species in his (1904) section VI and one other species, *A. emunitus* Budde-Lund 1904, which he originally places in section VII.

Barnard (1932) classes *Diploexochus*, *Bethalus* and *Cubaris* as genera. He excludes from *Bethalus* two species, *Armadillo tenuipunctatus* and *A. depressus*, Dollfus 1896*a*, which are placed in section VII by Budde-Lund (1904).

Van Name (1936) extends *Cubaris* to completely replace *Armadillo* s.lat. He divides the species which he includes in genus *Cubaris* into five groups. He assigns his groups I and II to sub-genus

Venezillo Verhoeff 1928b, which has as its type C. (V.) clausus (Budde-Lund 1885), a species which is included in Budde-Lund's section II of Armadillo. Venezillo is classed as a genus by Verhoeff (1933, p. 101). Van Name regards the species in his group III as doubtful members of Venezillo. As the species in this last group all bear spines or spine-like tubercles on the dorsal surface and, according to figures, have the lobes on the 1st and 2nd epimera projecting beyond the epimeral border, they are in any case excluded from Cubaris s.str. Of five species of Cubaris dealt with by Van Name (1942) in a supplement to his earlier work, two belong in his group I and three in his group II; therefore they may also be assigned to Venezillo.

Other species which have been removed from Cubaris to other genera are:-

Species.	Genus.	According to :-
C. dollfusi Stebbing 1900b	Merulanella Verhoeff 1926	Verhoeff 1926, p. 357.
C. zebricolor Stebbing 1900b	Sphaerillo Verhoeff 1926 (non Spherillo Dana 1852)	Verhoeff 1926, p. 296.
C. warreni Collinge 1917b	Bethalus Budde-Lund 1909	Barnard 1932, p. 315.
C. barnardi Collinge 1920	Bethalus Budde-Lund 1909	Barnard 1932, p. 317.
C. secutor Jackson 1924	Bethalus Budde-Lund 1909	Barnard 1932, p. 316.
C. ovamboensis Barnard 1924	Diploexochus Brandt 1833	Barnard 1932, p. 328.

Chilton (1910b, pp. 289-290) uses the name Cubaris for the New Zealand species which Budde-Lund (1904) includes in Spherillo. Those belonging in section VIII, Sph. speciosus, Sph. monolinus and Sph. tarangensis, have already been discussed. The remainder belong in other sections of Spherillo from which Verhoeff (1926, pp. 275-276) dissociates Nesodillo.

Species of Cubaris suppressed due to synonymy are:-

Species.	Synonym of:-	According to:-
C. brunnea Brandt 1833	C. murina Brandt 1833	Richardson 1905, p. 645.
C. cubensis de Saussure 1857	C. murina Brandt 1833	Budde-Lund 1885, p. 28.
C. affinis Miers 1877, non (Dana 1854)	C. murina Brandt 1833	Budde-Lund 1885, p. 28.
C. javanensis (Dollfus 1889)	C. murina Brandt 1833	Budde-Lund 1894, p. 603.
C. borellii (Dollfus 1894)	C. murina Brandt 1833	Van Name 1936, p. 387.
C. medius (Verhoeff 1926)	C. murina Brandt 1833	Jackson 1933a, 1933b, 1941.
C. akermani Collinge 1920	C. barnardi Collinge 1917b	Barnard 1932, p. 377.
C. griseus Collinge 1920	C. barnardi Collinge 1917b	Barnard 1932, p. 377.
C. kashmiri Jackson 1935	C. ignota Arcangeli 1934	Vandel 1945, p. 252.
C. officinalis Stebbing 1900b, non (Desmarest 1825)	Armadillo purpurascens (Budde-Lund 1912b)	Jackson 1941, p.15.
C. reticulatus Collinge 1917b	Bethalus nigrinus (Budde-Lund 1885)	Barnard 1932, p. 308.
C. longicauda Collinge 1917b	Bethalus nigrinus (Budde-Lund 1885)	Barnard 1932, p. 308.
C. trilobata Collinge 1917b	Diploexochus flavescens (Brandt 1833)	Barnard 1932, p. 343.

In addition Budde-Lund (1904, p. 120) includes in a list species which are close to C. murina, and which my be identical with it, another three species, C. cinerea Brandt 1833, C. galbineus (Eschscholtz 1823), and C. flavobrunneus (Dollfus 1896b).

Budde-Lund (1885, p. 28) lists Armadillo conglobator Budde-Lund 1879 as a synonym of C. murina. However, in 1904 he does not list A. conglobator as being close to C. murina, also he (p. 125) describes the former species as having a carina on the under surface of the 1st epimeron, a character which distinguishes it from C. murina which has no such carina.

Descriptions of the remaining species in Cubaris s.lat. have been examined and compared with the generic characters of Cubaris s.str.

None of the species in Budde-Lund's (1904) section VI of Armadillo, nor A. emunitus Budde-Lund, can be excluded on any character from Cubaris s.str. The other two species in section VII which do not belong in Bethalus, A. tenuipunctatus and A. depressus, Dollfus, likewise can not be excluded.

Among the species of Cubaris from India and islands in the Indian Ocean established by Collinge (1914a, 1914b, 1914c, 1915, 1916a, 1916b), two, C. marmoratus Collinge 1916a and C. albolateralis Collinge 1916b, are probably excluded from Cubaris s.str., as in the figures of the 1st pereial epimera of these species (Collinge, 1916a, pl. 50, figs. 4, 5), (1916b, pl. 18, fig. 8) the lobe on the under side of the 1st epimeron appears to be connected with the epimeral border. The other species can not be rejected from Cubaris s.str. I am doubtful as to whether C. nacrum Collinge 1915 should belong here as the form of the uropods in this species (see Collinge 1915, pl. 11, fig. 10) is rather different from that exhibited by other members of the genus, but Verhoeff's limits do not exclude it on this character.

Barnard (1932, p. 377) describes C. burnupi Collinge 1917b as having the margin of the 1st epimeron grooved. However his figures (fig. 76a) show that the ridge forming the ventral edge of the groove is a continuation of the lobe on the under surface of the epimeron and it does not meet the lateral epimeral margin. Barnard (pp. 378-379) notes that C. burnupi resembles C. miser (Budde-Lund 1904) and other species in section VI of Armadillo as regards the condition of the 1st epimeron. Thus C. burnupi should evidently be included in Cubaris s.str. Presumably the same applies to C. pangolae Barnard 1937, specimens of which are previously regarded by Barnard (1932, p. 378) as a variant of C. burnupi.

Of the species which Van Name (1936) places in his group IV of Cubaris, only one, C. cinchonae Van Name 1936, is not included in Budde-Lund's section VI of Armadillo; this species is not excluded from Cubaris s.str. Van Name's group V of Cubaris comprises C. tenuipunctatus and C. depressus, (Dollfus), which have already been discussed. Van Name lists four species, C. granaria (Nicolet 1849), C. affinis (Dana 1854), C. cacahuamilipensis (Bilimek 1867) and C. californica (Budde-Lund 1885), which are insufficiently described to be placed in one of his groups. The identity of these species is uncertain.

The remaining species in Cubaris s.lat. are excluded from Cubaris s.str. on the following characters:-

Frontal line of cephalon incised in the centre:-

C. *cinctutus* (Kinahan 1859) Stebbing 1900b, C. *helmsianus* Chilton 1916, C. *spenceri* Barnes 1934.

Lateral margin of 1st epimeron thick; posterior margins of anterior segments almost transverse:- C. *anomala* Gerstaecker 1873.

First epimeron with its posterior angle cleft:- C. *commensalis*, C. *minuta*, Baker 1913; C. *claytonensis* Chilton 1917b, C. *natalensis* Collinge 1917b, C. *truncatus* Collinge 1920, C. *insularis* Searle 1922, C. *gurjanovi* Collinge 1942.

Pronotum narrow, occupying 1/9 - 1/10 of length of segment:- C. *harsadiensis*, C. *oxyzonus*, Barnard 1940.

Terminal segment cleft posteriorly:- C. *spenceri* Barnes 1934.

Body provided with spines; basal surface of protopodite of uropod occupying considerably more than 1/3 of length of protopodite; free lobe of protopodite broader than long:- C. *wilsmorei* Nicholls and Barnes 1927.

I have not yet seen a description of C. *ignota* Arcangeli 1934.

Barnard (1932, p. 318) suggests that C. *wilsmorei* should probably be transferred to genus *Akermania* Collinge 1919. A comparison of Barnes' (1934) description of C. *spenceri* with Budde-Lund's (1885, p. 38), (1904, pl. 8, figs. 1-8) description and figures of the type species, *Australiodillo bifrons* (Budde-Lund 1885), indicates that C. *spenceri* probably belongs in genus *Australiodillo* Verhoeff 1926. Other species of *Cubaris* which do not belong in *Cubaris* s.str. must remain in *Cubaris* s.lat. until they can be re-examined and placed elsewhere.

Thus, as far as I can determine from the examination of literature, *Cubaris* s.str. may contain the following established species:-

Species placed in *Cubaris* s.str. or *Nesodillo* by previous authors:- *C. murina* Brandt 1833 (type species); *C. galbineus* (Eschscholtz 1823); *C. lifuensis* Stebbing 1900*b*; *C. sarasini*, *C. canalensis*, *C. longicornis*, *C. incisus*, *C. pacificus*, *C. lacustris*, *C. pronyensis*, *C. plasticus*, (Verhoeff 1926); *C. schellenbergi*, *C. arcangelii*, (Verhoeff 1928*a*); *C. papuae*, *C. silvestris*, *C. enoensis*, (Jackson 1930); *C. verhoeffi* (Herold 1931); *C. ionesii* (Verhoeff 1936); *C. bocki*, *C. fritschei*, (Verhoeff 1938); *C. burmanus*, *C. tenasserimus*, (Verhoeff 1942*b*); *C.*? *marmoratus* (Wahrberg 1922), (non Collinge 1916*a*), *C.*? *rufoniger* (Wahrberg 1922).

Other species:- *C. cinerea* Brandt 1833; *C. collinus*, *C. glomerulus*, (Budde-Lund 1894); *C. tenuipunctatus*, *C. depressus*, (Dollfus 1896*a*); *C. flavobrunneus* (Dollfus 1896*b*); *C. albipes*, *C. arcuatus*, (Dollfus 1898); *C. infuscatus*, *C. pallidus*, (Budde-Lund 1902); *C. miser*, *C. proximatus*, *C. immotus*, *C. egens*, *C. conglobator*, *C. intermixtus*, *C. nigromarginatus*, *C. omnitra*, (Budde-Lund 1904); *C. caeruleus*, *C. robusta*, Collinge 1914*a*; *C. fragilis* Collinge 1914*b*; *C. annandalei* Collinge 1914*c*; *C. solidulus*, *C. nacrum*, *C. granulatus*, Collinge 1915; *C. gravelii*, *C. expansus*, *C. dilectum*, *C. pusillus*, *C. brunneocaudatus*, *C. chiltoni*, *C. cavernosus*, *C. lobatus*, Collinge 1916*b*; *C. burnupi* Collinge 1917*b*; *C. cinchonae* Van Name 1936; *C. pongolae* Barnard 1937.

I can not be certain that all of these species definitely belong here as the descriptions of some do not give information on all of the characters mentioned in the generic diagnosis, but I have found no reason to exclude any of them. It is also possible that some species may prove to be synonymous, particularly as the authors of those originally placed in Nesodillo do not compare them with the older species in Cubaris.

Three species in the list, C. cinerea, C. galbineus and C. flavobrunneus, are close to and possibly synonymous with, C. murina. The original descriptions of two species, C. infuscatus and C. pallidus, (Budde-Lund 1902), are too brief to characterize them satisfactorily. Budde-Lund (1904, p.125) states that detailed descriptions of these two species will be given in the Proceedings of the Zoological Society of London, but I have not been able to trace these descriptions.

None of my four Tasmanian species of Cubaris s.str. can be indentified with any of the other species in the list and are therefore considered to be new. Although most authors use similar combinations of characters to distinguish their species of Cubaris, gaps in the information on some prevent the differentiation of these new Tasmanian examples by means of a single key. For convenience, they are therefore distinguished from other species in Cubaris s.str. by means of three keys. Key 1 deals with species which are assigned to Cubaris s.str. or to Nesodillo by previous authors, key 2 deals with species established by Budde-Lund, Dollfus and Van Name, and key 3 deals with species established by Collinge and Barnard.

Key I.

1. Posterior border of terminal segment incurved in the middle - - - - - - - - - - C. incisus, C. provensis, C. plasticus, C. burmanus, (Verhoeff).

Posterior border of terminal segment straight or curved outwards - 2.

2. Terminal segment not constricted, its breadth being constant or decreasing posterior to its central incurvature - - - - - 3.

Terminal segment constricted so that its breadth increases posterior to its central incurvature - - - - - - - - - - - - 5.

3. Pereion lacking tubercles - - - - - - - - C. lifuensis Stebbing; C. sarasini, C. longicornis, (Verhoeff); C. silvestris (Jackson).

Pereion tuberculate -4.

4. Exopodite of uropod reaching posterior border of protopodite - C.? rufoniger (Wahrberg).

Exopodite of uropod not reaching posterior border of protopodite - - - - - - - - - - - - - C. hickmani n.sp.

5. Segments of pereion each with a transverse row of tubercles or swellings on each side of the mid-line - C. murina Brandt; C. schellenbergi, C. fritschei, (Verhoeff).

Segments of pereion without such an arrangement of tubercles or swellings - 6.

(I am uncertain of the position of C. jonesii (Verhoeff) here, as Verhoeff (1936, p. 102) states that only indications of the swellings exhibited by C. schellenbergi are apparent in this species. I assign it to the second alternative in order to demonstrate its distinction from the Tasmanian species on other characters).

6. Ventral surface of 1st epimeron exhibiting a ridge in front of lobe - 7.

Ventral surface of 1st epimeron with no ridge in front of lobe - 8.

7. Length of 2nd article of flagellum of 2nd antenna less than twice length of 1st article - - - - - - - - - <u>C. canalensis</u> (Verhoeff), <u>C.? marmoratus</u> (Wahrberg) (non Collinge).

Length of 2nd article of flagellum of 2nd antenna three times length of 1st article - - - - - - - - - - <u>C. tamarensis</u> n.sp.

8. Segments of pereion each with a transverse row of small holes in front of posterior border - - - - - - - - <u>C. lacustris</u> (Verhoeff).

Segments of pereion without small holes - - - - - - - - - - - - -9.

9. Exopodite of uropod reaching posterior border of protopodite - <u>C. papuae</u> (Jackson).

Exopodite of uropod not reaching posterior border of protopodite - 10.

10. Second epimeron with no lobe on its ventral surface - <u>C. pacificus</u> (Verhoeff).

Second epimeron with a lobe on its ventral surface - - - - - - - 11.

11. Lobe on ventral surface of 2nd epimeron connected with epimeral border - <u>C. bocki</u> (Verhoeff).

Lobe on ventral surface of 2nd epimeron not connected with epimeral border - 12.

12. Frontal line of cephalon not raised on a ridge - <u>C. verhoeffi</u> (Herold).

Frontal line raised on a ridge, at least at sides of cephalon -13.

13. Frontal line depressed in the middle - - - - - - - - - - - - - 14.

Frontal line not depressed in the middle - - - - - - - - - - - 15.

14. Segments of pereion smooth - - - - - - - - - - - *C. arcangelii* (Verhoeff), *C. enoensis* (Jackson)

Segments of pereion each with a low tubercle on each side above base of epimeron - - - - - - - - - *C. tasmaniensis* n.sp.

15. Endopodite of uropod narrowing distally with its apex sharply rounded - - - - - - *C. jonesii*, *C. tenasserimus*, (Verhoeff).

Endopodite of uropod broadening distally with its apex bluntly rounded - - - - - - - - - - - - *C. sulcifrons* n.sp.

Key 2.

1. Second epimeron with no lobe on its ventral surface - - - - - - - *C. egens* (Budde-Lund; *C. tenuipunctatus*, *C. depressus*, (Dollfus).

   Second epimeron with a lobe on its ventral surface - - - - - 2.

2. Ventral surface of 1st epimeron exhibiting a ridge in front of lobe - 3.

   Ventral surface of 1st epimeron with no ridge in front of lobe - 5.

3. Lobe on 1st epimeron with its apex acute - - - - - - - - - - - - *C. miser*, *C. proximatus*, *C. intermixtus*, (Budde-Lund).

   Lobe on 1st epimeron with its apex blunt - - - - - - - - - - 4.

4. Lateral processes of clypeus oval; eye composed of 22 or more ocelli - - - - - - - - - - *C. immotus*, *C. conglobator*, (Budde-Lund).

   Lateral processes of clypeus sub-triangular; eye composed of 15 ocelli - - - - - - - - - - - - - - *C. tamarensis* n.sp.

5. Exopodite of uropod reaching, or almost reaching, posterior border of protopodite - - - - - - - - - - - - *C. collimus*, *C. nigromarginatus*, (Budde-Lund).

   Exopodite of uropod terminating distinctly in front of posterior border of protopodite - - - - - - - - - - - - - - 6.

6. Pereion with a series of prominent tubercles extending across each segment - 7.

   Pereion without such a series of prominent tubercles - - - - - 8.

7. Second to 7th segments of pereion with two tubercles on each epimeron - - - - - - - - - - - - - - - - - *C. cinchonae* Van Name.

   Second to 7th segments of pereion with one tubercle on each epimeron - - - - - - - - - - - - - - - - *C. hickmani* n.sp.

8. Second epimeron deeply cleft almost into two parts - - - -
- - - - - - - C. glomerulus (Budde-Lund), C. albipes (Dollfus).

Second epimeron not so deeply cleft, only with a small lobe on its ventral surface - 9.

9. Length of 2nd article of flagellum of 2nd antenna twice length of 1st article - - - - - - - - - - - - - C. emmitus (Budde-Lund).

Length of 2nd article of flagellum of 2nd antenna 5/2 times or more than 5/2 times length of 1st article - - - - - - - - - 10.

10. Segments of pereion each with a low tubercle on each side above base of epimeron - - - - - - - - C. tasmaniensis n.sp.

Segments of pereion without such tubercles - - - - - - - - - 11.

11. Frontal line of cephalon depressed in the middle - - - - - C. arcuatus (Dollfus

Frontal line not depressed in the middle - - - - - - - -
- C. sulcifrons n.sp.

Key 3.

1. Posterior border of terminal segment (according to Collinge, 1914c, pl. 35, fig. 10) incurved in the middle - *C. annandalei* Collinge.

   Posterior border of terminal segment straight or curved outwards - 2.

2. Exopodite of uropod reaching posterior border of protopodite - - - - - - *C. caeruleus*, *C. dilectum*, *C. cavernosus*, Collinge.

   Exopodite of uropod not reaching posterior border of protopodite - 3.

3. Length of 2nd article of flagellum of 2nd antenna twice or less than twice length of 1st article - - - - - - - *C. solidulus*, *C. macrum*, *C. gravelii*, *C. expansus*, *C. pusillus*, Collinge.

   Length of 2nd article of flagellum of 2nd antenna 5/2 times or more than 5/2 times length of 1st article - - - - - - - - - 4.

4. Terminal segment not constricted, its breadth being constant posterior to its central incurvature - - - - *C. hickmani* n.sp.

   Terminal segment constricted so that its breadth increases posterior to its central incurvature - - - - - - - - - - - - - 5.

5. Segments of pereion each with several tubercles on each side of the mid-line - - - - - - *C. robusta*, *C. fragilis*, Collinge.

   Segments of pereion without such an arrangement of tubercles - 6.

6. Ventral surface of 1st epimeron exhibiting a ridge in front of lobe - 7.

   Ventral surface of 1st epimeron with no ridge in front of lobe - 8.

7. Dorsal surface of body granulate - - - - - - - *C. granulatus*, *C. burnupi*, Collinge; *C. pongolae* Barnard.

Dorsal surface of body not granulate - - - - *C. tamarensis* n.sp.

8. Endopodite of uropod narrowing distally with its apex sharply rounded - - - - - - - - *C. brunneocaudatus*, *C. chiltoni*, *C. lobatus*, Collinge.

Endopodite of uropod broadening distally with its apex bluntly rounded - - - - - - - *C. tasmaniensis*, *C. sulcifrons* n.spp.

Key to species of *Cubaris* s.str. represented in Tasmania.

1. Ventral surface of 1st epimeron exhibiting a ridge in front of lobe - - - - - - - - - - - - - - - - - *C. tamarensis* n.sp.

   Ventral surface of 1st epimeron with no ridge in front of lobe - 2.

2. Pereion with a row of prominent tubercles across each tergite; breadth of terminal segment constant posterior to its central incurvature - - - - - - - - - - - - - - - *C. hickmani* n.sp.

   Pereion with tergites smooth except for a low tubercle and/or slight rugosity on each side above epimera; breadth of terminal segment increasing again posterior to its central incurvature - 3.

3. Frons of cephalon with a deep, transverse groove below and parallel to frontal line; lateral processes of clypeus (in adult) produced upwards to form acute, triangular lobes - *C. sulcifrons* n.sp.

   Frons of cephalon with no deep transverse groove; lateral processes of clypeus almost right-angled and scarcely produced upwards - - - - - - - - - - - - - - - - - - *C. tasmaniensis* n.sp.

Cubaris hickmani n.sp.

(Figs. 147-161)

Male (fig. 147).

Length of largest specimen: 6.0 mm.; breadth: 2.9 mm.

Colour. Dorsal surface of live animal is mottled with dark brown, orange-brown and yellow.

Cephalon (fig. 148). Surface of vertex is uneven. In the centre it is crossed by two transverse ridges; there is a curved ridge to inner side of each eye, and behind this ridge, on each side of vertex, there is an oval tubercle. Vertex bears scales and scale-setae like those which are described from pereion. Frontal line forms an uninterrupted ridge which is curved backwards towards vertex and which ends in a blunt angle on each side of cephalon. Surface of frons is shallowly depressed on each side to receive 2nd antennae; there is no deep groove anterior to these depressions. Lateral processes of clypeus appear right-angled in anterior view and are scarcely produced upwards. Eyes are rounded and compound, each composed of 11-13 ocelli.

First antenna. Triarticulate; 3rd article has a group of coarse setae near its apex.

Second antenna. Length of peduncle: 1.95 mm.; length of articles of flagellum: 1st, 0.1 mm., 2nd 0.41 mm. On distal border of each of 2nd to 5th articles of peduncle there is a large seta which has its apex split into several fine points. All articles of antenna bear numerous sharply pointed setae. Second article of flagellum ends in a long, narrow process which appears to be formed of partly fused setae.

Mandibles. Left mandible (fig. 149):– Incisor process ends in 3 teeth, central tooth being weakly bifid and lateral teeth simple. Lacinia mobilis ends in 2 teeth. Behind lacinia mobilis there is a rounded lobe covered with fine setae. This lobe also bears 2 pencils of setae, and a third pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible (fig. 150):– Incisor process consists of one bifid tooth and one simple tooth. Lacinia mobilis is irregular in shape. Setose lobe at base of lacinia mobilis bears one pencil of setae, and there is one other pencil behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe (fig. 151) bears 10 simple teeth, made up of an outer group of 4 large teeth and inner group of 6 more slender teeth. On ventral surface there is a short spine at base of 4th large tooth. Outer margin of lobe is bent outwards in a blunt curve, which, together with the part of margin distal to it, is fringed with comb-like groups of setae. Inner lobe (fig. 152) bears 2 short, thick, blunt setose processes. Apex of lobe to outer side of these processes is rounded.

Second maxilla. Distal region of maxilla is divided into 2 sub-rectangular lobes, with outer lobe approximately twice as wide as inner lobe. These lobes are distinctly separated at apex of maxilla, and further back the division between them is indicated by a suture line. Distal region of inner lobe is densely covered with setae; that of outer lobe has a sparser covering of shorter, finer setae. Two coarse setae, set on dorsal surface of outer lobe, project into the notch between lobes.

Maxilliped (fig. 153). Epipodite is narrow, shorter than basis, and has an acute apex. Basis has spiny setae scattered on its ventral surface and fine setae present along its inner margin. It is broad compared with endopodite, which occupies only the inner half of distal border of basis. Ischion is the only article of endopodite which is distinct; there are 2 large spines on its ventral surface. Remainder of endopodite is sub-conical in outline; a division into 2 articles is indicated by an oblique suture line across ventral surface, beyond which endopodite becomes abruptly narrower. There are 2 sets of setae on inner border of first of these articles, basal set consisting of one large and one smaller seta, distal set consisting of one large seta and 3 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, situated in the angle of a pencil which is itself free from setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular in outline; its apex is shallowly indented. Two large spines are placed to ventral side of this indentation, and there is a small spine on each side of apical region. A few spinules occur down outer border of endite.

Pereion. First epimera are sharply rounded anteriorly and produced forwards past eyes so that cephalon is sunk into a depression in 1st segment. Outer side of 1st epimeron is revolute, so that dorsal surface of epimeron is concave; its lateral margin is simple, lacking a marginal furrow. Posterior angle of 1st epimeron is sharply rounded and not cleft. On ventral surface of epimeron, in front of posterior angle, there is a small, rounded lobe which has no connection with lateral margin (see fig. 154). Surface anterior to lobe is not grooved or ridged. Posterior angle of 2nd epimeron is rounded and not cleft. On ventral surface of 2nd epimeron there is a small, rounded lobe, blunter than that on 1st epimeron, situated well in front of posterior angle and not connected with epimeral margin (see fig. 154). Ventral surface of 3rd epimeron is slightly thickened near its anterior border. Epimera of 3rd and 4th segments are trapezoidal and rounded posteriorly, those of 5th to 7th segments are quadrangular with their posterior angles sub-acute. Epimera of all segments are directed backwards at an angle to posterior border of middle region of their respective tergites. This middle part of posterior border is almost straight in 1st to 4th segments, in 5th and 6th segments it is produced into a median point, in 7th segment it has a large median point with a smaller point on each side of it.

Ratio of length of pronotum to length of entire tergite (measured in the mid-line) is 1: 4.4 in 2nd segment, and approximately 1: 4.0 in 3rd to 7th segments. Lengths in 2nd segment: pronotum 0.20 mm.; entire tergite 0.88 mm.; lengths in 3rd segment: pronotum: 0.24 mm., entire tergite 0.94 mm.

Dorsal surface is tuberculate. Four pairs of large tubercles on each segment together form 8 longitudinal rows down pereion. On 1st segment there is a median eminence in front of the central pair of tubercles. On each side of pereion a small rounded tubercle is present to inner side of 2nd large tubercle on all segments, and 2 narrow tubercles occur between 2nd and 3rd large tubercles on 1st to 6th segments, with one such tubercle in this position on 7th segment. Tubercles forming the outermost pair are not very pronounced on 4th segment; on 6th and 7th segments they project beyond posterior border of tergite.

Dorsal surface of tergites has a covering of rounded scales and also bears numerous scale-setae. Scale-seta (fig. 155) has a broad, V-shaped scale portion, apex of which is produced to form a narrow fold into which a short seta projects.

Pereiopods. First leg:- Each of the large spines on under surface of leg ends in a small number of points which divide off from spine at different levels. Spines on under surface of meros and carpos are too sparse to appear as a brush. Leg also bears numerous simple, sharply pointed setae. An area on anterior surface at distal end of carpos has a dense covering of fine setae. Short, simple spines occur along under surface of basal half of propodos. Dactylos has a broad, blunt terminal claw, below which there is a slender, pointed accessory claw. A long, simple seta is set in angle between bases of claws.

The area of setae on carpos and the simple spines on propodos are not repeated on 2nd to 7th legs.

Male organ. Conical in outline. Its two ducts remain distinct and open separately under a flap on dorsal surface of organ.

Pleon. Outline of pleon is semicircular, continuous with that of pereion. Pleura of 3rd to 5th segments are large, expanded laterally, and strongly curved backwards. They are sub-rectangular in shape, with 4th and 5th pairs successively narrower and more rounded than the preceding pair. Posterior border of each of 1st to 4th tergites forms a blunt median angle which is progressively more obtuse in each succeeding segment; middle of posterior border of 5th tergite is nearly straight. No tubercles are present on 1st to 5th segments.

There are no lobes on ventral surface of 3rd to 5th pleura.

Terminal segment (fig. 156) curves inwards on both sides at about the middle of its length. Posterior half of segment is subquadrangular with its posterior border straight and corners bluntly rounded; its breadth is constant at 0.49 mm., not increasing posteriorly. There is a pair of oval tubercles on dorsal surface in centre of broader basal half of segment; surface behind tubercles is raised into a wide, convex, median, longitudinal ridge, which, however, does not extend to posterior border of segment.

Dorsal surface of tergites bears scales and scale-setae similar to those on pereion.

Pleopods. First pleopod (fig. 157):- Protopodite is produced on its outer side to form a large oval lobe. Exopodite is pear-shaped. It is divided into an inner laminar part and a somewhat smaller, outer tracheal part. A few spines occur on ventral surface near posterior border of laminar part. Endopodite is styliform, with its distal half curved outwards. Its basal half is provided with oblique muscles. There is a narrow chitinous thickening down outer edge of its distal half. On dorsal surface, a ridge, ornamented with small scales, extends down centre of distal part of endopodite; this ridge is directed inwards and surface to inner side of it is indented, thus forming a groove. A row of spinules is situated between ridge and inner border of endopodite.

Second pleopod (fig. 158):- Exopodite is sub-triangular, very narrow and elongated posteriorly, with its apex sharply rounded; its outer margin is indented. Tracheal part occupies outer anterior region of exopodite and is limited posteriorly by this indentation. Inner margin of exopodite is bordered with short setae. There are a few spines on ventral surface of laminar part, near its outer margin. An area covered with fine setae begins at apex and extends forwards for some distance on ventral surface of exopodite. Endopodite is biarticulate; length of articles: 1st 0.22 mm., 2nd 0.95 mm. First article is quadrangular in outline; there is a curved ridge on its ventral surface. Second article is narrow and elongated. It exhibits a chitinous thickening down inner edge of its basal 5/8, beyond which article becomes very narrow and flagelliform. Length of flagelliform portion: 0.37 mm.

Third pleopod:- Exopodite is sub-triangular with its outer margin indented; its distal region is elongated but to a lesser degree than that of 2nd exopodite. Tracheal part occupies a position similar to that of 2nd pleopod. On ventral surface of exopodite there are a few spines near outer margin of laminar part, and comb-like groups of setae occur on and near inner margin. On dorsal surface, a short, scale-covered ridge extends backwards from inner anterior angle. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Exopodite differs in shape from that of 3rd pleopod, being a more regular triangle with its outer margin scarcely indented. Both of its lateral margins bear comb-like groups of setae. Tracheal part occupies an area in its outer angle.

Uropod (figs. 156, 159). Basal surface of protopodite is broad and oblique, visible in dorsal view of uropod, in which view it occupies approximately 1/3 of length of entire protopodite. Its breadth is less than length of protopodite. Length of basal surface; 0.22 mm.; breadth of basal surface: 0.47 mm.; length of entire protopodite: 0.62 mm. Beyond basal surface, inner border of protopodite is deeply and evenly incurved so that free lobe of protopodite becomes suddenly narrower posteriorly. Posterior margin of lobe is obliquely rounded. Greatest length of lobe: 0.50 mm.; length of posterior margin: 0.14 mm. Area of protopodite visible to outer side of terminal segment, when uropod is attached, is longer on its inner side than it is broad; length (along inner edge as far as indentation of terminal segment): 0.30 mm.; breadth (in a line across insertion of exopodite): 0.22 mm. Exopodite is inserted on dorsal surface of lobe, a little removed from its inner margin. It does not reach to posterior border of lobe. Above base of exopodite, protopodite is raised into a sub-triangular prominence, the sharply rounded inner angle of which overlaps inner margin of lobe. Exopodite is sub-cylindrical, bears a few spiny setae, and ends in a tuft of long setae. Endopodite is inserted on ventral surface, near inner border, at base of protopodite. It is sub-cylindrical, convex on outer side and narrowing distally with its apex sharply rounded; it bears numerous sharply pointed setae and ends in 3 long setae. Endopodite does reach to posterior border of terminal segment. Length of rami: exopodite 0.12 mm., endopodite 0.32 mm.

__Female.__

Length of largest specimen: 6.0 mm.; breadth: 3.0 mm. Female differs from male in the following structures:-

First pleopod (fig. 160):- Exopodite is sub-oval, very short and broad. It is divided obliquely into an inner laminar part and an outer tracheal part, the two being sub-equal in area. Endopodite is not developed.

Second pleopod (fig. 161):- Exopodite is sub-triangular, very short and broad, with its outer margin indented and its apex sharply rounded but not markedly elongated. Tracheal part occupies an area in its outer angle. There are a few spines on ventral surface of apical region of exopodite, and comb-like groups of setae occur down its inner margin. Endopodite is not developed.

Third pleopod:- Exopodite is similar in shape to that of 2nd pleopod of female, and thus has the apical region less elongated than in 3rd exopodite of male; there is no scaly ridge on its dorsal surface. Fourth pleopod agrees with 3rd.

Fifth pleopod:- Exopodite is similar in shape to that of 5th pleopod of male, but there is no scaly ridge on its dorsal surface.

Habitat.

Type locality:- This description is based on specimens found on 7th October, 1957, under logs and among debris lying on the ground in a forest of eucalypts and treeferns at Tarraleah; 51 males and 29 females were obtained.

Specimens were previously collected from this locality by Professor V.V.Hickman in January 1954 and January 1957.

Other localities:- Two female specimens were found under a eucalypt log at Wayatinah.

Remarks.

This species is named after Professor V.V.Hickman, who presented me with the examples from his collection and thereby drew my attention to the species.

Cubaris hickmani n.sp.

Fig. 147. Male specimen, dorsal view. (Cephalon and pleon are foreshortened due to curvature of animal).

Fig. 148. Cephalon, anterior view. (Antennae and mouth parts have been removed).

Fig. 149. Distal part of left mandible, dorsal view.

Fig. 150. Distal part of right mandible, dorsal view.

Fig. 151. Distal part of outer lobe of right 1st maxilla, ventral view.

Fig. 152. Distal part of inner lobe of right 1st maxilla, ventral view.

Fig. 153. Distal part of left maxilliped, ventral view.

Fig. 154. Right epimera of 1st and 2nd segments of pereion, ventro-lateral view.

Fig. 155. Scale-seta on dorsal surface of 1st segment of pereion, dorsal view.

Fig. 156. Terminal segment and uropods, dorsal view.

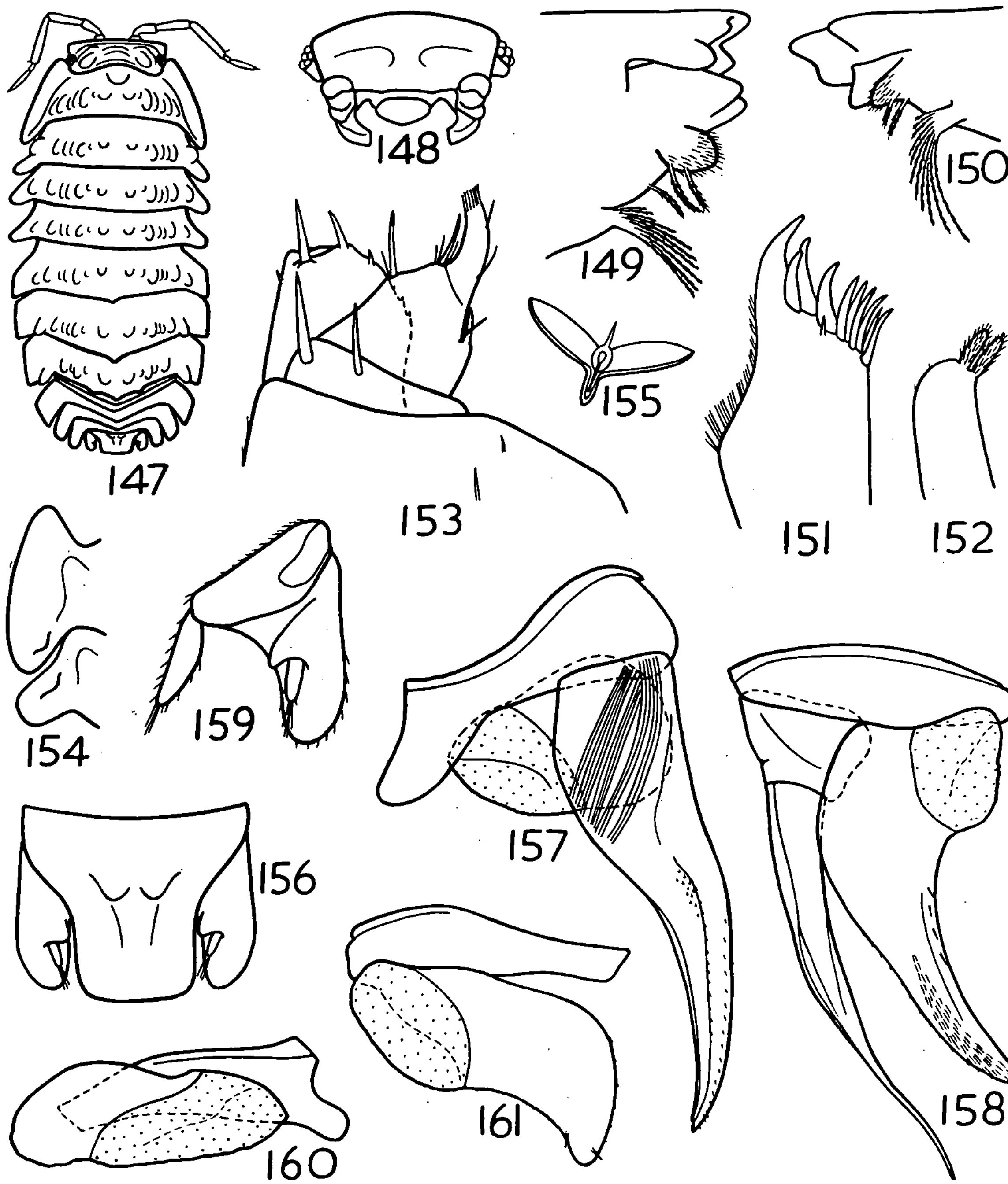
Fig. 157. Left 1st pleopod of male, dorsal view.

Fig. 158. Left 2nd pleopod of male, ventral view.

Fig. 159. Right uropod, dorsal view.

Fig. 160. Left 1st pleopod of female, ventral view.

Fig. 161. Right 2nd pleopod of female, ventral view.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Cubaris tasmaniensis n.sp.

(Figs. 162-171).

Male (fig. 162).

Length of largest specimen: 6.3 mm.; breadth: 3.1 mm.

Colour. Background colour of dorsal surface in live animal is purplish-brown. Cephalon and pereion exhibit unpigmented patches which represent muscular insertions. Protopodites of uropods are orange.

Cephalon (fig. 163). Surface of vertex is smooth except for a pair of very low tubercles situated immediately behind frontal ridge. Frontal line forms a ridge which is curved backwards towards vertex and is also shallowly depressed in the mid-line; ridge ends in a blunt angle on each side of cephalon. Frons does not exhibit a transverse groove below frontal ridge; it is indented by two shallow depressions for 2nd antennae. Lateral processes of clypeus appear right-angled in anterior view and are scarcely produced upwards. Eyes are rounded, compound, each composed of 12-14 ocelli.

First antenna. Triarticulate, with articles rather short and broad. Third article bears a group of coarse setae near apex.

Second antenna. Length of peduncle: 2.15 mm.; length of articles of flagellum: 1st 0.15 mm., 2nd 0.45 mm. On distal border of each of 2nd to 5th articles of peduncle there is a large seta, divided towards the end into several points. All articles of antenna bear spiny setae. Second article of flagellum ends in a process formed by partly fused setae.

Mandibles. Left mandible:- Incisor process is 3-pointed, being formed by one simple tooth and one strongly bifid tooth. Lacinia mobilis ends in 2 widely separated teeth. Lobe behind lacinia mobilis has a dense covering of setae and also bears 2 pencils of setae; one other pencil occurs behind lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible:- Incisor process consists of one simple tooth and one more weakly bifid tooth. Lacinia mobilis is irregular in shape. There is one pencil of setae on setose lobe, and one other pencil behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe ends in 10 simple teeth, made up of an outer group of 4 large teeth and an inner group of 6 more slender teeth. There is a small spinule on ventral surface below base of 4th large tooth. Outer margin of lobe is bent out in a blunt curve which, together with margin distal to it, is fringed with groups of setae. Inner lobe (fig. 164) bears 2 moderately long, blunt setose processes. Apex of lobe to outer side of processes is rounded and bears a few short setae.

Second maxilla. Distal region of maxilla is divided into 2 sub-rectangular lobes, with outer lobe approximately twice as wide as inner lobe. Lobes are separated by a notch at apex of maxilla, and further back the division between them is indicated by a suture line. Distal region of inner lobe has a dense covering of setae; that of outer lobe has a sparser covering of shorter, finer setae.

Maxilliped (fig. 165). Epipodite is narrow, shorter than basis, and has a sharply rounded apex. Basis is much broader than endopodite; it has spiny setae on its ventral surface and fine setae down its inner margin. Ischion is only article of endopodite which is distinct; there are 2 large spines on its ventral surface. A division of remainder of endopodite into 2 articles is indicated by an oblique suture line on its ventral surface and by a sudden decrease in its width above this line. There are 2 groups of setae on inner border of first of these articles, a basal set of one large and one smaller seta, and a distal set of one large seta and 4 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, situated near base of a pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular. Its apical region is uneven and bears 3 spines which decrease in size from innermost one outwards. At inner apical corner there is a small depression in which is set a short, blunt spine.

Pereion. First epimera are sub-acute anteriorly and produced forwards past eyes so that cephalon is sunk in a depression in 1st segment. Outer side of 1st epimeron is revolute, so that dorsal surface of epimeron is concave. Its lateral margin is simple, lacking a marginal furrow; its posterior angle is sharply rounded and not cleft. On ventral surface of 1st epimeron, in front of posterior angle, there is a broad, bluntly rounded lobe which is not connected with lateral margin (see fig. 166). Surface anterior to lobe is not grooved or ridged. Posterior angle of 2nd epimeron is rounded and not cleft. On ventral surface of 2nd epimeron there is an elongated, blunt lobe, situated well in front of posterior angle and not connected with epimeral margin (see fig. 166). Ventral surface of 3rd epimeron is slightly thickened near its anterior margin. Epimera of 3rd and 4th segments are trapezoidal and rounded posteriorly; those of 5th to 7th segments are quadrangular with posterior angles almost right-angled. Epimera of all segments are directed backwards at an angle to middle region of segments. Across middle of body, posterior borders all tergites run straight.

Ratio of length of pronotum to length of entire tergite (measured in the mid-line) is 1: 5.4 in 2nd segment and approximately 1: 4.5 in 3rd to 7th segments. Lengths in 2nd segment: pronotum 0.20 mm., entire tergite 1.08 mm.; lengths in 3rd segment: pronotum 0.25 mm., entire tergite 1.13 mm.

There is a shallow, semi-circular groove in middle region of anterior half of 1st tergite. On all segments there is a very low oval tubercle on each side above bases of epimera ; these tubercles together form a line down each side of pereion. There is a slightly rugose area situated to the inner side of each tubercle; otherwise remainder of dorsal surface is smooth. Tergites have a covering of rounded scales and also bear scattered scale-setae. Scale-seta (fig. 167) has a short, broad scale portion which is produced posteriorly in the centre to form a club-shaped fold into which a short seta projects.

<u>Pereiopods</u>. First leg:- Each of the large spines on leg has its apex divided into several points. Numerous such spines are set close together to form a brush on under surface of both meros and carpos. Simple, spiny setae occur on all articles. An area at distal end of anterior surface of carpos is covered with long, fine setae. There is a line of short, simple spines on under surface of

propodos. Dactylos has a broad terminal claw, below which is a narrower, sharper accessory claw. A long seta is set in angle between claws.

The area of fine setae on carpos and line of simple spines on propodos are not repeated on 2nd to 7th legs. Large spines on under surface of meros become progressively less numerous.

Male organ. Conical in outline. Its two ducts remain distinct and open separately under a flap on its dorsal surface.

Pleon. Outline of pleon is semicircular, continuous with that of pereion. Pleura of 3rd to 5th segments are large, expanded laterally, and strongly curved backwards; they are sub-rectangular in shape with 4th and 5th pairs each narrower than preceding pair. First to 5th segments are smooth dorsally; between pleura their posterior borders are evenly curved. There are no lobes on ventral surface of 3rd to 5th pleura.

Terminal segment (fig. 168) curves inwards on both sides at about middle of its length; beyond this narrowing its breadth increases again considerably. Breadth across central constriction: 0.52 mm.; maximum breadth of posterior part: 0.68 mm. Posterior border of segment is almost straight with its corners bluntly rounded. Dorsal surface of terminal segment is raised into a broad, blunt, median, longitudinal ridge, which, however, does not extend to posterior border of segment.

Tergites of pleon bear scales and scale-setae similar to those on pereion.

Pleopods. First pleopod (fig. 169):- Protopodite is produced on its outer side to form a large oval lobe. Exopodite is sub-triangular with its apex bluntly rounded; spines occur on its ventral surface near apex. Tracheal part occupies approximately the outer half of exopodite. Endopodite is styliform with its distal half curved outwards; apical tip of latter is still further curved outwards at a slight angle to the rest. Basal half of endopodite is provided with oblique muscles. There is a narrow chitinous thickening on outer edge of distal half. A ridge, which is directed inwards and ornamented with small scales, extends down centre of dorsal surface of distal half. Surface to inner side of this ridge is indented, the groove so formed being limited on its inner side by another, less prominent ridge. There is a row of spinules on dorsal surface of distal half of endopodite, near its inner border.

Second pleopod:- Exopodite is sub-triangular with its outer margin incurved and its apical region greatly elongated. Tracheal part occupies the outer lobe of exopodite which is limited by outer arm of this incurvature. On ventral surface, spines are present near outer margin of laminar part, and an area covered with fine setae extends forwards for some distance from apex. Inner margin of exopodite bears short setae. Endopodite is biarticulate; length of articles: 1st 0.28 mm., 2nd 1.23 mm. First article is quadrangular in outline; there is a curved ridge on its ventral surface. Second article is narrow and elongated; there is a chitinous thickening down outer edge of its basal 5/8, beyond which endopodite becomes very narrow and flagelliform. Length of flagelliform portion: 0.46 mm.

Third pleopod:- Exopodite is sub-triangular with its outer border indented. Its apical part is elongated but to a lesser extent than that of 2nd exopodite. Tracheal part occupies most of the outer lobe limited by outer arm of the incurvature. On ventral surface spines occur near outer margin of laminar part and comb-like groups of setae are present across apex and on inner margin. On dorsal surface a short, scaly ridge extends backwards from inner anterior angle. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Exopodite is more regularly triangular than that of 3rd pleopod, as its outer margin is scarcely indented; both of its lateral margins bear comb-like groups of setae.

Uropod (figs. 168, 170). Basal surface of protopodite is broad and oblique, visible in dorsal view of uropod, in which view it occupies approximately 1/3 of length of entire protopodite. Its breadth is less than length of protopodite. Length of basal surface: 0.22 mm.; breadth of basal surface: 0.52 mm.; length of entire protopodite: 0.67 mm. Beyond basal surface, inner border of protopodite is shallowly and obliquely incurved so that free lobe of protopodite gradually become considerably narrower posteriorly. Its posterior margin is obliquely rounded. Greatest length of lobe: 0.55 mm.; length of posterior margin: 0.09 mm. Area of lobe visible to outer side of terminal segment, when uropod is attached, is longer on its inner side than it is broad; length (along inner edge as far as indentation of terminal segment): 0.35 mm.; breadth (in a line across insertion of exopodite): 0.22 mm. Exopodite is sub-cylindrical and has an apical tuft of setae; it terminates considerably in front of posterior border of protopodite. Exopodite is inserted on dorsal surface of protopodite, away from inner border of latter. Anterior to base of exopodite, surface of protopodite is raised into a sub-triangular prominence. When uropod is attached, the sharp inner angle of this prominence overlaps lateral border of terminal segment. Endopodite is inserted on ventral surface, near inner border, at base of protopodite. It is sub-cylindrical, broadening distally, with its apex bluntly rounded; it bears numerous spiny setae and one apical spine. Endopodite terminates far in front of posterior border of terminal segment. Length of rami: exopodite 0.12 mm., endopodite 0.24 mm.

Female.

Length of largest specimen: 6.8 mm.; breadth: 3.4 mm.

Female differs from male in the following structures:-

Pereiopods:- Large spines on under surface of meros and carpos are less numerous than on corresponding legs of male.

First pleopod (fig. 171):- Exopodite is sub-rectangular, very short and broad. Its inner laminar part is almost as large as its outer tracheal part. Spines are present on ventral surface of laminar part, near its posterior margin. Endopodite is not developed.

Second pleopod:- Exopodite is sub-triangular, very short and broad, with its outer margin incurved, and its apex sharply rounded but not greatly elongated. Tracheal part occupies outer angle of exopodite. Spines occur on ventral surface near posterior margin of laminar part, and there are short setae on inner margin. A conical process, which projects back from inner side of protopodite, probably represents an endopodite.

Third pleopod:- Exopodite is similar in shape to that of 2nd pleopod of female and is therefore less elongated posteriorly than 3rd exopodite of male. There is no scaly ridge on its dorsal surface. Fourth exopodite is similar to 3rd.

Fifth pleopod:- Exopodite is similar in shape to that of 5th pleopod of male. There is no scaly ridge on its dorsal surface.

Habitat.

Type locality:- This description is based on specimens found among debris on ledges of a cliff above the shore at Tinderbox. Collections were made on the following dates:- 25th March, 27th May, 4th August, 19th November, 1957. A total of 11 males and 25 females was obtained.

Other localities:- Other specimens were found under stones at East Risdon.

Variations.

In some specimens, pereion and pleon are mottled with additional unpigmented patches which do not represent muscular insertions. Protopodites of uropods of some specimens are coloured purplish-brown like the rest of the dorsal surface.

Cubaris tasmaniensis n.sp.

Fig. 162. Male specimen, dorsal view. (Cephalon and pleon are foreshortened due to curvature of animal).

Fig. 163. Cephalon, anterior view. (Antennae and mouth parts have been removed).

Fig. 164. Distal part of inner lobe of right 1st maxilla, ventral view.

Fig. 165. Distal part of right maxilliped, ventral view.

Fig. 166. Right epimera of 1st and 2nd segments of pereion, ventro-lateral view.

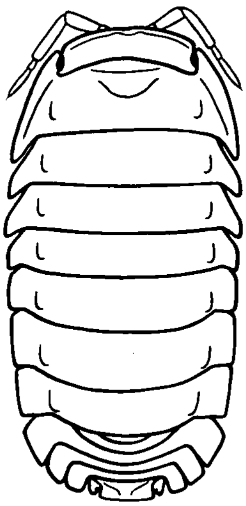
Fig. 167. Scale-seta on dorsal surface of 1st segment of pereion, dorsal view.

Fig. 168. Terminal segment and uropods, dorsal view.

Fig. 169. Left 1st pleopod of male, dorsal view.

Fig. 170. Right uropod, dorsal view.

Fig. 171. Left 1st pleopod of female, ventral view.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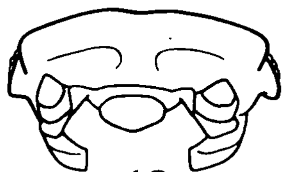
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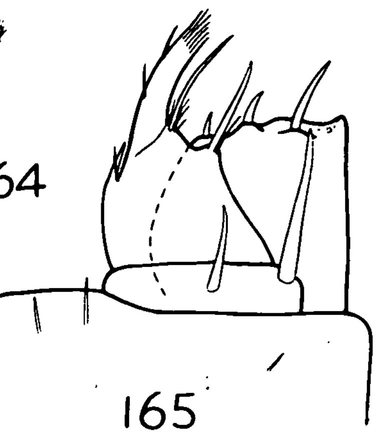
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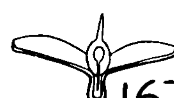
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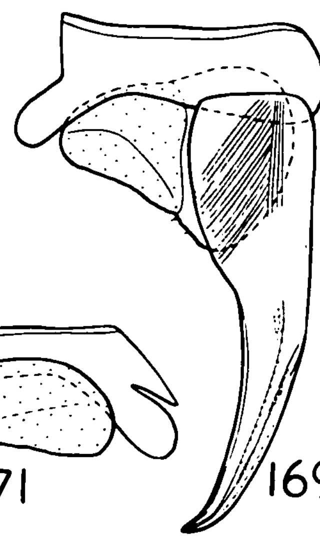
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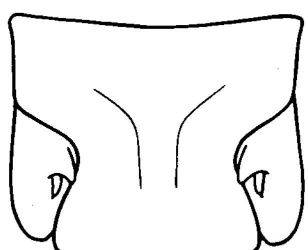
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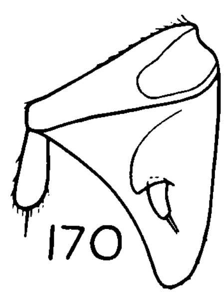
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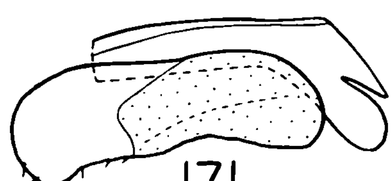
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Cubaris sulcifrons n.sp.

(Figs. 172-180).

Male.

Length of largest specimen: 9.0 mm.; breadth: 4.5 mm.

Colour. Dorsal surface of live specimen is greyish-brown mottled with unpigmented patches, of which only some represent muscular insertions. Protopodites of uropods are orange.

Cephalon. (fig. 172). Surface of vertex is smooth except for a pair of very low tubercles situated immediately behind frontal ridge. Frontal line forms an uninterrupted ridge which is only slightly curved backwards and which terminates in a blunt angle on each side of cephalon. Frons is indented by a deep groove running parallel to frontal ridge. Region of frons lying between this groove and depressions for 2nd antennae forms a sub-triangular prominence. Lateral processes of clypeus are produced upwards to form large, acute, triangular lobes. Eyes are rounded and compound, each composed of 12-14 ocelli.

First antenna. Triarticulate; 3rd article has a group of coarse setae near its apex.

Second antenna. Length of peduncle: 2.92 mm.; length of articles of flagellum: 1st 0.21 mm., 2nd 0.53 mm. On distal border of each of 2nd to 5th articles of peduncle there is a large seta, split at the end into several fine points. All articles of antenna bear numerous sharply pointed setae. Second article of flagellum terminates in a process formed of partly fused setae.

Mandibles. Left mandible:- Incisor process consists of

3 simple teeth, the central tooth being larger than the others. Lacinia mobilis ends in 2 widely separated teeth. A lobe behind lacinia mobilis has a dense covering of long, simple setae and also bears 2 pencils of setae. One other pencil occurs further back on mandible. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible:- Incisor process consists of a large bifid tooth and a smaller simple tooth. Lacinia mobilis is irregular in shape. There is one pencil of setae on setose lobe and one other pencil behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe ends in 10 simple teeth, made up of an outer group of 4 large teeth and an inner group of 6 more slender teeth. On ventral surface there is a small spine below base of 4th large tooth. Outer margin of lobe is bent outwards in a blunt curve, which, together with margin distal to it, is fringed with groups of setae. Inner lobe (fig. 173) bears 2 moderately long, sharply pointed setose processes. Apex of lobe to outer side of these processes is rounded and bears groups of short setae.

Second maxilla. Apical part of maxilla is divided into 2 sub-rectangular lobes, with outer lobe approximately twice as wide as inner lobe. On dorsal surface of maxilla, base of inner lobe exhibits a V-shaped band of chitin. Distal region of inner lobe is densely covered with setae, that of outer lobe bears shorter, finer setae. Two coarse setae are set on dorsal surface of outer lobe near the angle of notch between lobes.

Maxilliped (fig. 174). Epipodite is narrow, shorter than basis, and has a sharply rounded apex. Basis is much broader than endopodite; on its ventral surface it bears sharply pointed setae. Ischion is the only article of endopodite which is distinct; there are 2 large spines on its ventral surface. A division of remainder of endopodite into 2 articles is indicated by a faint, oblique suture line across its ventral surface, and by a sudden decrease in its width above this line. On inner border of first of these articles there are 2 groups of setae, basal set consisting of one large seta and one smaller seta, and distal set of one large seta and 4 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, situated near base of a pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular with its outer distal corner rounded off. There are 3 spines on its ventral surface near apex, the inner most one being larger than the others. Inner corner of apex exhibits a small indentation in which is set a short, blunt spine.

Pereion. First epimera are sharply rounded anteriorly and produced forwards past eyes so that cephalon is sunk in a depression in 1st segment. Outer side of 1st epimeron is revolute, making dorsal surface of epimeron concave; its lateral margin is simple, lacking a marginal furrow. Posterior angle of 1st epimeron is sharply rounded and not cleft. On ventral surface of epimeron, in front of posterior angle, there is a small, rounded lobe which has no connection with lateral margin (see fig. 175). Surface anterior to lobe is not grooved or ridged. Posterior angle of 2nd epimeron is rounded and not cleft. On ventral surface of 2nd epimeron there is a small, rounded lobe, blunter than that on 1st epimeron, situated well in front of posterior angle, and not connected with epimeral margin (see fig. 175). Ventral surface of 3rd epimeron is slightly thickened near its anterior margin. Epimera of 3rd and 4th segments are trapezoidal and rounded posteriorly; those of 5th to 7th segments are quadrangular, with posterior angles almost right-angled on 5th and 6th and sub-acute on 7th. Epimera of all segments are directed backwards at an angle to middle region of segments. Between epimera, posterior borders of all tergites run straight.

Ratio of length of pronotum to length of entire tergite (measured in the mid-line) is 1: 4.2 in 2nd segment and approximately 1: 3.6 in 3rd to 7th segments. Lengths in 2nd segment: pronotum 0.33 mm., entire tergite 1.40 mm.; lengths in 3rd segment: pronotum 0.41 mm., entire tergite 1.50 mm.

There is a shallow semicircular groove in middle region of anterior half of 1st tergite, otherwise dorsal surface of pereion is almost smooth, tergites being only slightly rugose on each side above bases of epimera. Tergites have a covering of rounded scales and also bear scattered scale-setae. Scale-seta (fig. 176) has a short, broad scale portion which is produced posteriorly in the centre to form a club-shaped fold into which a short seta projects.

<u>Pereiopods</u>. First legs- Each of the large spines on leg has its apex divided into several points. Numerous such spines are set close together to form a brush on under surface of both meros and carpos. Simple, spiny setae occur on all articles. An area at distal end of anterior surface of carpos is covered with long, fine setae. There is a line of short, simple spines on under surface of propodos.

Dactylos has a broad terminal claw, below which is a narrower, sharper accessory claw. A long seta is set in angle between claws.

The area of fine setae on carpos and line of simple spines on propodos are not repeated on 2nd to 7th legs. Large spines on under surface of meros become progressively less numerous.

Male organ. Conical in outline. Its two ducts remain distinct and open separately under a flap on its dorsal surface.

Pleon. Outline of pleon is semicircular, continuous with that of pereion. Pleura of 3rd to 5th segments are large, expanded laterally, and strongly curved backwards; they are sub-rectangular in shape with 4th and 5th pairs each successively narrower than preceding pair. First to 5th segments are smooth dorsally; between pleura their posterior borders are evenly curved. There are no lobes on ventral surface of 3rd to 5th pleura.

Terminal segment (fig. 177) curves inwards on both sides at about middle of its length. Beyond this central narrowing, breadth of segment increases again slightly. Breadth across central constriction: 0.70 mm.; maximum breadth of posterior part: 0.78 mm. Posterior border of segment is straight, with its corners bluntly rounded. Dorsal surface of terminal segment is raised into a broad, blunt, median, longitudinal ridge, which, however, does not extend to posterior border of segment.

Tergites of pleon bear scales and scale-setae similar to those on pereion.

Pleopods. First pleopod (fig. 178):- Protopodite is produced on its outer side to form a large, oval lobe. Exopodite is sub-triangular with its apex bluntly rounded; there are a few spines on its ventral surface near apex. Tracheal part occupies outer half of exopodite. Endopodite is styliform. Its basal half is provided with oblique muscles. Distal half is curved outwards and has a narrow chitinous thickening down its outer border. A ridge, which is ornamented near its basal end with spines and more distally with scales, extends down middle of dorsal surface of distal half of endopodite. This ridge is directed inwards, and surface to inner side of it is indented, thus forming a groove. Near apex there is a shorter ridge on each side of central ridge. There is a row of spinules on dorsal surface near inner border of endopodite.

Second pleopod:- Exopodite is sub-triangular, with its apical region greatly elongated, and its outer margin incurved. Tracheal part occupies area of exopodite situated anterior to outer arm of this incurvature. Spines occur on ventral surface near outer edge of elongated laminar part. Also on ventral surface, an area covered with fine setae begins at apex and extends forwards for some distance. Endopodite is biarticulate; length of articles: 1st 0.33 mm., 2nd 1.32 mm. First article is quadrangular in outline; there is a curved ridge on its ventral surface. Second article is narrow and elongated; there is a chitinous thickening down inner edge of its basal 5/8, beyond which endopodite becomes very narrow and flagelliform. Length of flagelliform portion: 0.46 mm.

Third pleopod:- Exopodite is sub-triangular with its outer border indented; it is elongated posteriorly but to a lesser extent than 2nd exopodite. Tracheal part occupies an area in outer angle of exopodite. On ventral surface, spines occur near outer edge of laminar part, and comb-like groups of setae are present across apex and on inner margin. On dorsal surface, a short, scaly ridge extends backwards from inner anterior angle. Fourth pleopod is similar to 3rd.

Fifth pleopod:- Exopodite is more regularly triangular than that of 3rd pleopod, as its outer margin is scarcely indented. Both of its lateral margins bear comb-like groups of setae.

Uropod (figs. 177, 179). Basal surface of protopodite is broad and oblique, visible in dorsal view of uropod, in which view it occupies approximately 1/3 of length of entire protopodite. Its breadth is less than length of protopodite. Length of basal surface: 0.31 mm.; breadth of basal surface: 0.65 mm.; length of entire protopodite: 0.90 mm. Beyond basal surface, inner border of protopodite is very shallowly incurved so that free lobe of protopodite gradually becomes narrower posteriorly. Its posterior margin is obliquely truncate with its corners bluntly rounded. Greatest length of lobe: 0.70 mm.; length of posterior margin: 0.25 mm. Area of protopodite visible to outer side of terminal segment, when uropod is attached, is longer on its inner side than it is broad; length (along inner edge as far as indentation of terminal segment): 0.53 mm.; breadth (in a line across insertion of exopodite): 0.33 mm. Exopodite is sub-conical and very short, and ends in a tuft of setae. It is inserted on dorsal surface of protopodite, away from inner border of latter. Anterior to insertion of exopodite, surface of protopodite is raised into a sub-triangular prominence which covers base of exopodite. When uropod is attached, the sharp inner angle of this prominence overlaps lateral border of terminal segment. Endopodite is inserted on ventral surface, near inner border, at base of protopodite. It is sub-cylindrical, broadening distally, with its apex very bluntly rounded; it bears numerous sharply pointed setae and one apical spine. Endopodite terminates far in front of posterior border of terminal segment. Length of rami: exopodite 0.09 mm., endopodite 0.35 mm.

Female.

Length of largest specimen: 8.4 mm.; breadth: 4.2 mm.

Female differs from male in the following structures:-

Pereiopods:- Large spines on under surface of meros and carpos are less numerous than on corresponding legs of male.

First pleopod (fig. 180):- Exopodite is sub-rectangular, very short and broad. It is divided into an inner laminar part and an outer tracheal part, the two being sub-equal in area. There are a few spines on ventral surface of laminar part, near its posterior margin. Endopodite is not developed.

Second pleopod:- Exopodite is sub-triangular, very short and broad, with its outer margin shallowly incurved, and its apex sharply rounded but not markedly elongated. Tracheal part occupies an area in outer angle of exopodite. On ventral surface of laminar part, spines are present near outer border and on apex. A narrow, conical process, which projects backwards from inner side of protopodite, probably represents an endopodite.

Third pleopod:- Exopodite is similar in shape to that of 2nd pleopod of female and thus has its apical region less elongated than 3rd exopodite of male; there is no scaly ridge on its dorsal surface. Fourth exopodite is similar to 3rd.

Fifth pleopod:- Exopodite is similar in shape to that of 5th pleopod of male; there is no scaly ridge on its dorsal surface.

Habitat.

Type locality:- This description is based on specimens found on 8th March, 1957, enrolled and buried in damp, sandy soil at the base of a cliff above high tide level on the shore at Roaring Beach, South Arm; 74 males and 63 females were obtained.

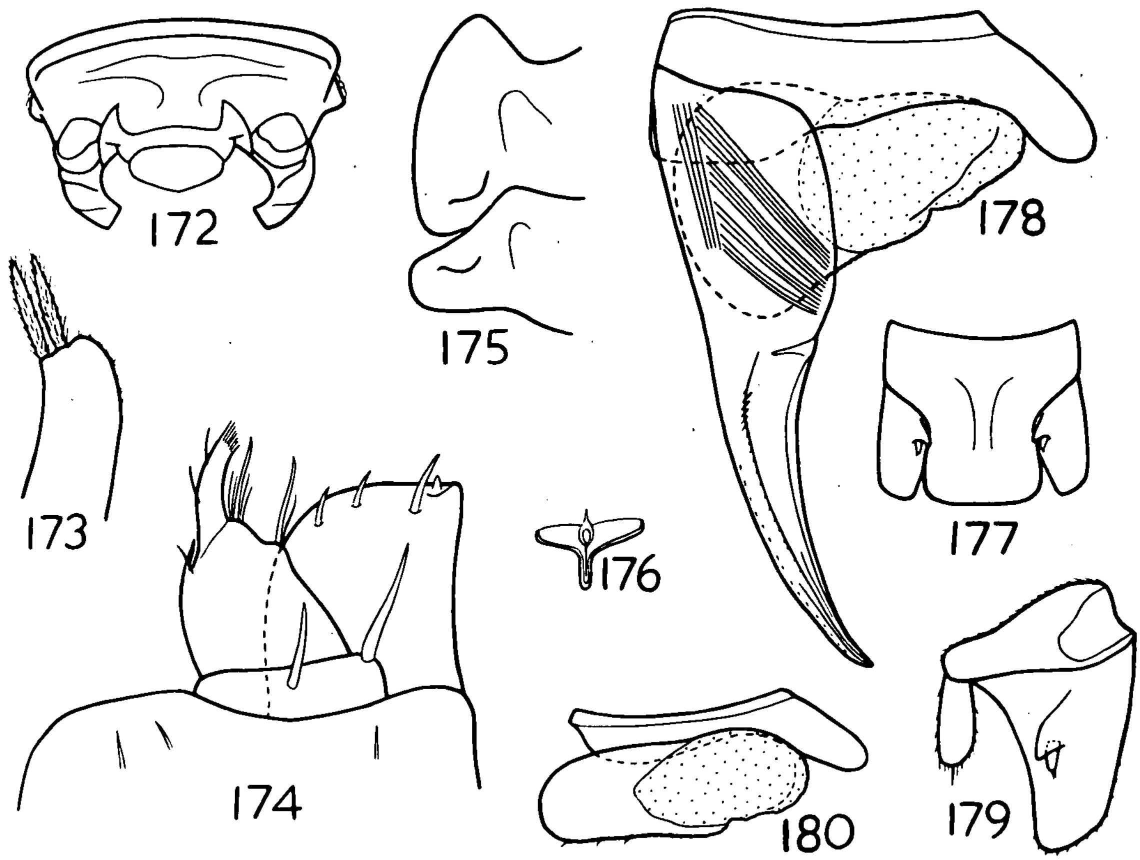
Other localities:- Specimens were found in debris on ledges of a cliff above the shore at Tinderbox.

Variations.

In small specimens, the lateral processes of the clypeus are relatively shorter and blunter than those of mature specimens, however the cephalon of the former is still distinct due to the transverse groove on the frons. The slight rugosity on the sides of the pereial tergites is a little more pronounced on smaller specimens.

Cubaris sulcifrons n.sp.

Fig. 172.	Cephalon, anterior view. (Antennae and mouth parts have been removed).
Fig. 173.	Distal part of inner lobe of left 1st maxilla, ventral view.
Fig. 174.	Distal part of right maxilliped, ventral view.
Fig. 175.	Right epimera of 1st and 2nd segments of pereion, ventro-lateral view.
Fig. 176.	Scale-seta on dorsal surface of 1st segment of pereion, dorsal view.
Fig. 177.	Terminal segment and uropods, dorsal view.
Fig. 178.	Right 1st pleopod of male, dorsal view.
Fig. 179.	Right uropod, dorsal view.
Fig. 180.	Left 1st pleopod of female, ventral view.



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Cubaris tamarensis n.sp.

(Figs. 181-192).

Male.

Length of largest specimen: 10.0 mm.; breadth: 4.5 mm.

Colour. Background colour of dorsal surface in live animal is dark grey. Cephalon and pereion exhibit unpigmented patches which represent insertions of muscles. Protopodites of uropods are orange-brown at the base, shading to dark grey at the posterior end.

Cephalon (fig. 181). Surface of vertex is slightly uneven but not tuberculate; it bears scales and scale-setae like those described from pereion. Frontal line forms an uninterrupted, curved ridge which is bent back towards vertex and which ends in a blunt angle on each side of cephalon. Surface of frons has a shallow depression on each side to receive 2nd antennae. Above these depressions frons is pressed backwards. There is no deep groove across surface of frons. Lateral lobes of clypeus appear right-angled in anterior view and are scarcely produced upwards. Eyes are rounded and compound, each composed of 15 ocelli.

First antenna. Triarticulate; 3rd article has a group of coarse setae near its apex.

Second antenna. Length of peduncle: 3.00 mm.; length of articles of flagellum: 1st 0.17 mm., 2nd 0.55 mm. On distal border of each of 2nd to 5th articles of peduncle there is a large spine, divided towards its apex into several points. All articles of antenna bear numerous spiny setae. Second article of flagellum ends in a process formed of partly fused setae.

Mandibles. Left mandible (fig. 182):- Incisor process is 3-pointed, being formed of a large, strongly bifid tooth with a smaller simple tooth situated above it. Both apical angles of lacinia mobilis are produced to form a blunt tooth. Lobe behind lacinia mobilis has a dense covering of simple setae and also bears 2 pencils of setae. Another 2 pencils of setae occur behind base of lobe. Molar portion is represented by a tuft of plumose setae set on a common basal process. Right mandible (fig. 183):- Incisor process is 3-pointed, being formed of a large, more weakly bifid tooth with a smaller simple tooth situated above it. Lacinia mobilis is irregular in shape. Setose lobe behind lacinia mobilis bears one pencil of setae and there are 3 other pencils of setae behind lobe. Molar portion is like that of left mandible.

First maxilla. Outer lobe ends in 10 simple teeth, forming an outer group of 4 large teeth and an inner group of 6 more slender teeth. On ventral surface there are 2 short spines placed apart from each other below base of 4th large tooth. Outer margin of lobe is curved outwards; apex of curve and margin distal to it are fringed with groups of setae. Inner lobe (fig. 184) bears 2 fairly short, thick, blunt setose processes. Apex of lobe to outer side of these processes is rounded.

Second maxilla. Distal region of maxilla is divided into 2 sub-rectangular lobes, with outer lobe approximately twice width of inner lobe. These lobes are distinctly separated at apex of maxilla, and further back the division between them is indicated by a suture line. On dorsal surface there is a V-shaped band of chitin at base of inner lobe. Distal region of inner lobe has a dense covering of setae; that of outer lobe has a sparser covering of finer setae.

Maxilliped (fig. 185). Epipodite is long and narrow but shorter than basis; its apex is sharply rounded. Basis is much broader than endopodite. On its ventral surface basis exhibits scattered spiny setae. Ischion is only article of endopodite which is distinct; there are 2 long spines on its ventral surface. Remainder of endopodite is sub-conical in outline; a division into 2 articles is indicated by a faint, oblique suture line. There are 2 groups of setae on inner border of first of these articles, basal set consisting of one large and one smaller seta and distal set of one large seta and 4 smaller setae. Three setae occur singly on outer border of endopodite, one on 1st article, situated near base of a pencil which itself lacks setae, and 2 on 2nd article. Apex of endopodite ends in a tuft of setae. Endite is sub-quadrangular with its outer apical angle rounded off. On its ventral surface near apex there are 3 large spines which decrease in length from innermost one outwards. A short, blunt spine is set in a depression at inner apical angle.

Pereion. First epimera each form an acute anterior angle and are strongly produced forwards past eyes so that cephalon is sunk in depression in 1st segment. Outer side of 1st epimeron is revolute so that dorsal surface of epimeron is concave. Actual lateral border of epimeron is moderately sharp. Posterior angle of 1st epimeron is rounded; its borders are entire, not interrupted by a cleft. On ventral surface of epimeron (fig. 186) there is a prominent, sharply rounded lobe which terminates a little in front of posterior border of segment and results in the formation of a moderately deep fissure on under side of epimeron. The sharp outer edge of this lobe is continuous with a low ridge which extends forwards on under surface of epimeron and which gradually becomes obliterated in anterior third of segment. Ridge is not connected with outer border of epimeron. Second epimeron is trapezoidal; its posterior angle is rounded. On ventral surface of 2nd epimeron (fig. 186), well in front of posterior angle, there is an oblique, sharply rounded lobe which results in the formation of a moderately deep fissure on under side of epimeron. Anterior edge of this lobe is connected with anterior border of epimeron by a ridge. Lobe does not project beyond borders of epimeron. Under surface of 3rd epimeron is slightly thickened near its anterior border. Third and 4th epimera are trapezoidal and rounded posteriorly. Fifth to 7th epimera are quadrangular with their posterior angles forming rounded right angles. Epimera of all segments are directed backwards at an angle to middle region of their respective segments. Across middle of body, posterior borders of all tergites run straight.

Ratio of length of pronotum to length of entire tergite (measured in the mid-line) is 1: 4.1 in 2nd segment and approximately 1: 3.7 in 3rd to 7th segments. Lengths in 2nd segment: pronotum 0.38 mm., entire tergite 1.58 mm.; lengths in 3rd segment: pronotum 0.44 mm., entire tergite 1.65 mm.

There is a very shallow, semicircular groove in middle of anterior half of 1st tergite, and on all tergites there is a slightly rugose area on each side above bases of epimera; remainder of dorsal surface of pereion is smooth. Tergites have a covering of rounded scales and also bear numerous scattered scale-setae. Scale-seta (fig. 187) has a broad basal scale part which is curved backwards on each side and is joined in the middle to a long sheath, pointed at its apex; a seta projects into base of sheath.

Pereiopods. First leg:- Each of the large spines on leg is divided near its apex into several points which separate off at different levels. Numerous such spines are set close together to form a brush on under surface of both meros and carpos. Simple, spiny setae are present on all articles. An area on anterior surface at distal end of carpos is covered with long, fine setae. Short, simple spines occur along under surface of basal part of propodos. Dactylos has a broad terminal claw, below which is a much narrower accessory claw; a long seta is set in angle between claws.

The area of setae at distal end of carpos and line of simple spines on under surface of propodos are not repeated on 2nd to 7th legs. Large spines on under surface of meros and carpos become progressively sparser.

Male organ. Conical in outline; its two ducts remain distinct and open separately under a flap on its dorsal surface.

Pleon. Outline of pleon is semicircular, continuous with that of pereion. Pleura of 3rd to 5th segments are large, expanded laterally and curved backwards; they are sub-rectangular in shape with 4th and 5th pairs each narrower than preceding pair. Posterior borders of 1st and 2nd segments are evenly curved; between pleura, those of 3rd to 5th segments run straight. Dorsal surface of 1st to 5th segments is smooth. There are no lobes on ventral surface of 3rd to 5th pleura.

Terminal segment (fig. 188)curves inwards on both sides at about middle of its length; beyond this narrowing its breadth increases again considerably. Breadth across central constriction: 0.90 mm.; maximum breadth of posterior part: 1.12 mm. Posterior border is straight with its corners bluntly rounded. Dorsal surface of basal part of terminal segment is slightly raised into a broad median eminence.

Tergites of pleon bear scales and scale-setae like those on pereion.

<u>Pleopods</u>. First pleopod (fig. 189):- Outer side of protopodite is produced to form a large oval lobe. Exopodite is sub-triangular with its apex bluntly rounded and its outer border incurved. It is divided into an inner laminar part and a somewhat smaller, outer tracheal part. Spines occur on ventral surface of apical angle. Endopodite is styliform with its distal half curved outwards. Its basal half is provided with oblique muscles. There is a narrow chitinous thickening down outer edge of distal half. On dorsal surface a ridge, which is ornamented with scales, extends down centre of distal part of endopodite. This ridge is directed inwards and surface to inner side of it is indented, thus forming a groove. There is a shorter, less prominent ridge to outer side of central ridge. A row of spinules is present on dorsal surface near inner border of endopodite.

Second pleopod:- Exopodite is sub-triangular, very narrow and elongated posteriorly, with its apex sharply rounded; its outer border is deeply incurved. Tracheal part occupies the outer lobe of exopodite which is bordered by outer arm of this incurvature. An area covered with fine setae extends from apex forwards for some distance on ventral surface of exopodite. Spines occur on ventral surface near outer border of laminar part. Endopodite is biarticulate; length of articles: 1st 0.52 mm.; 2nd 1.52 mm. First article is quadrangular in outline; there is a curved ridge on its ventral surface. Second article is narrow and elongated. There is a chitinous thickening down outer side of its basal 5/8, beyond which article becomes very narrow and flagelliform. Length of flagelliform portion: 0.54 mm.

Third pleopod:- Exopodite is sub-triangular and elongated posteriorly but to a lesser degree than 2nd exopodite; its apex is sharply rounded and its outer border is deeply incurved. Tracheal part occupies the outer lobe situated in front of outer arm of this incurvature. On ventral surface, comb-like groups of setae occur on and near inner margin, and spines are present near outer margin of laminar part. On dorsal surface a short, scale-covered ridge extends backwards from near inner anterior angle.

Fourth pleopod:- Exopodite is less elongated posteriorly than 3rd exopodite; otherwise 4th pleopod is similar to 3rd.

Fifth pleopod:- Exopodite differs in shape from that of 3rd pleopod in being more regularly triangular with its outer border only slightly indented. Comb-like groups of setae are present on both lateral borders of exopodite.

Uropod (figs. 188, 190). Basal surface of protopodite is broad and oblique, visible in dorsal view of uropod, in which view it occupies approximately 1/3 length of entire protopodite. Its breadth is less than length of protopodite. Length of basal surfce: 0.31 mm.; breadth of basal surface: 0.65 mm.; length of entire protopodite: 0.85 mm. Beyond basal surface, inner border is shallowly incurved so that free lobe of protopodite gradually becomes narrower posteriorly. Its posterior margin is straight, slightly oblique, and has its corners bluntly rounded. Greatest length of lobe: 0.62 mm.; length of posterior margin: 0.21 mm. Area of protopodite visible to outer side of terminal segment, when uropod is attached, is longer on its inner side than it is broad; length (along inner edge as far as indentation of posterior segment): 0.57 mm.; breadth (in a line across insertion of exopodite): 0.40 mm. Exopodite is very short, sub-conical, and ends in a tuft of setae. It is inserted on dorsal surface of protopodite away from inner border of latter. Anterior to insertion of exopodite, surface of protopodite is raised into a sub-triangular prominence which covers base of exopodite. When uropod is attached, the sharply rounded inner angle of this prominence overlaps lateral border of terminal segment. Endopodite is inserted on ventral surface, near inner border, at base of protopodite. It is sub-cylindrical, broadening at first, then slightly narrowing again posteriorly, with its apex moderately sharply rounded. Endopodite bears spiny setae and one apical spine. It terminates distinctly in front of posterior border of terminal segment. Length of rami: exopodite 0.11 mm.; endopodite 0.38 mm.

Female.

Length of largest specimen: 11.5 mm.; breadth: 5.0 mm.

Female differs from male in the following structures:-

Pereiopods:- Spines on under surface of meros and carpos are less numerous than on corresponding legs of male.

First pleopod (fig. 191):- Exopodite is sub-rectangular, very short and broad. Its inner, laminar part is almost as large as its outer, tracheal part. Spines occur on ventral surface of laminar part, near its posterior margin. Endopodite is not developed.

Second pleopod (fig. 192):- Exopodite is sub-triangular, very short and broad, with its outer border incurved and its apex rather bluntly rounded; it is not markedly elongated posteriorly. Tracheal part occupies an area in outer angle of exopodite. On ventral surface, spines occur near outer border of laminar part and on apical angle. A conical process, projecting backwards from inner side of protopodite, probably represents an endopodite.

Third pleopod:- Exopodite is similar in shape to that of 2nd pleopod of female, and its apical region is therefore much less elongated posteriorly than that of 3rd exopodite of male; there is no scaly ridge on its dorsal surface.

Fourth pleopod:- Apex of exopodite is more sharply rounded than in 3rd exopodite of female; otherwise 4th pleopod is similar to 3rd.

Fifth pleopod:- Exopodite is similar in shape to that of 5th pleopod of male; there is no scaly ridge on its dorsal surface.

Habitat.

Type locality:- This description is based on specimens collected on 27th December, 1957, from among debris under grass tussocks growing immediately inland from the shore of the Tamar River at Swan Point, West Tamar; 7 males and 21 females were obtained.

<u>Other localities</u>:- Other specimens were found under stones and plant debris on the ground immediately inland from a beach at West Ulverstone.

<u>Variations</u>.

In some specimens, cephalon, pereion and pleon are mottled with additional unpigmented patches, distinct from those representing insertions of muscles.

In one specimen the outer lobe of the left 1st maxilla exhibits only 5 inner teeth, whilst that of the right 1st maxilla has 7 inner teeth.

Cubaris tamarensis n.sp.

Fig. 181. Cephalon, anterior view. (Antennae and mouth parts have been removed).

Fig. 182. Distal part of left mandible, dorsal view.

Fig. 183. Distal part of right mandible, dorsal view.

Fig. 184. Distal part of inner lobe of right 1st maxilla, ventral view.

Fig. 185. Distal part of left maxilliped, ventral view.

Fig. 186. Right epimera of 1st and 2nd segments of pereion, ventro-lateral view.

Fig. 187. Scale-seta on dorsal surface of 1st segment of pereion, dorsal view.

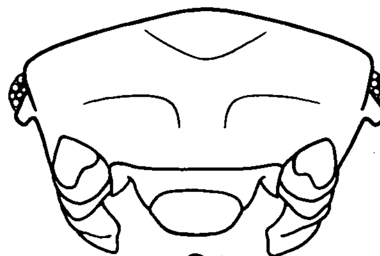
Fig. 188. Terminal segment and uropods, dorsal view.

Fig. 189. Left 1st pleopod of male, dorsal view.

Fig. 190. Right uropod, dorsal view.

Fig. 191. Right 1st pleopod of female, ventral view.

Fig. 192. Right 2nd pleopod of female, ventral view.



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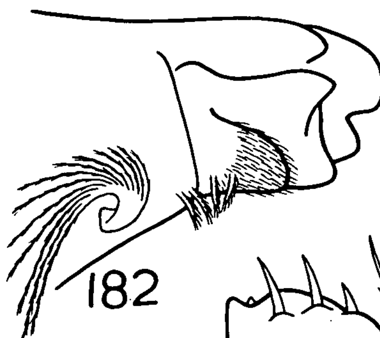

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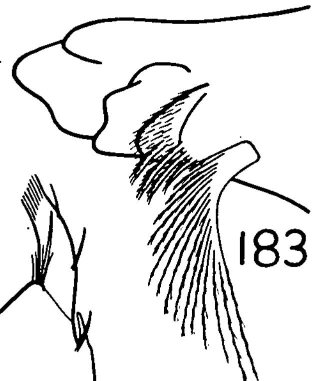

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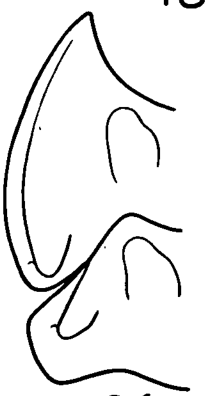

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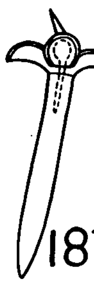

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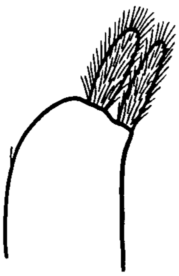

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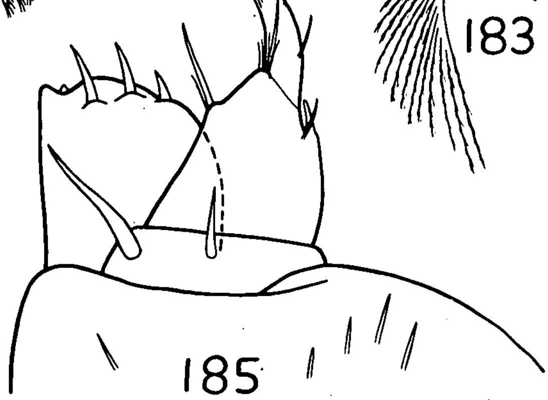

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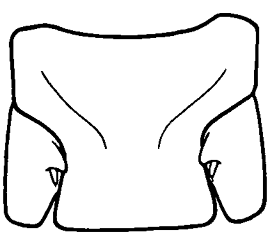

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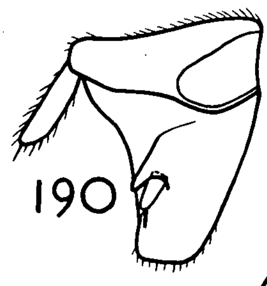

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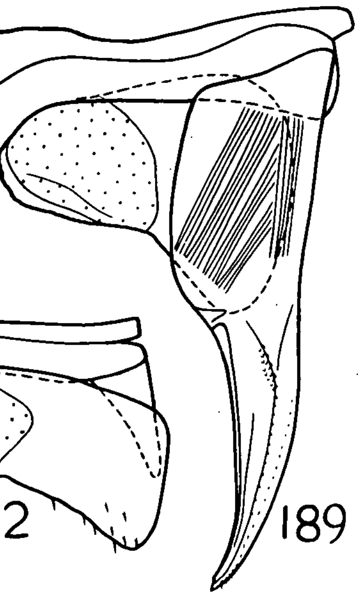

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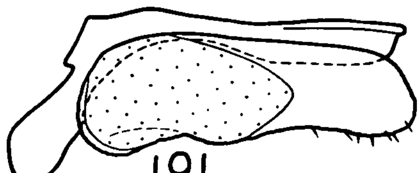

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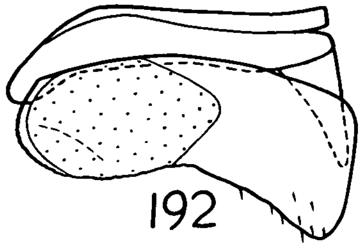

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Genus Sphaerillo Verhoeff 1926.

(non Spherillo Dana 1852).

Synonymy. Dryadillo Herold 1931.

Chelomadillo Herold 1931.

Riudillo Verhoeff 1937.

Spherillo, section XIII, Budde-Lund 1904 (in part).

Dana (1852, p. 301; 1853, pp. 715, 719) gives very brief definitions of his genus Spherillo. In 1853 he describes four new species of Spherillo, Sph. monolinus, Sph. vitiensis, Sph. hawaiensis and Sph. spinosus, but does not designate any one of them as the type. In a later paper (Dana 1854), he establishes another species, Sph. affinis.

Budde-Lund (1904) extends the limits of Spherillo to include sixty-five species. He groups these into thirteen sections within the genus and nominates a type for each section. He transfers Sph. affinis Dana to his section II of Armadillo, but retains all four of Dana's original species in Spherillo.

Verhoeff (1926, p. 250) considers that Spherillo, as it is treated by Budde-Lund, is an unnatural genus. He prefers to spell the name of the genus as Sphaerillo. In keys to genera of Armadillidae, Verhoeff (pp. 252-258) restricts Spherillo; he (p. 295) names the restricted genus as "Sphaerillo (Dana) s.str." But none of Dana's original species of Spherillo belong in Sphaerillo as it is limited by Verhoeff.

Jackson (1941, p. 2) considers that Verhoeff's Sphaerillo contains the species placed by Budde-Lund in his section XIII of Spherillo; this section does not include any of Dana's species. He notes that, according to Article 35 of the International Rules of Zoological Nomenclature, Sphaerillo Verhoeff is a homonym of Spherillo Dana. However he (p. 3) is of the opinion that workers on Spherillo have so consistently neglected to apply the International Rules of Nomenclature that it is now too late to do more than protest formally, and, in the interest of clarity, to accept the status quo. He suggests that, on these grounds, Sphaerillo Verhoeff should be retained as the generic name for the forms included under Budde-Lund's section XIII, and that Spherillo should be allowed to die out as its species are absorbed into new or existing genera. In his check-list Jackson (pp. 19-23) groups all species of Spherillo in the wide sense under the heading of Spherillo Dana, but distinguishes the species which he assigns to Sphaerillo Verhoeff from others included in Spherillo by using for each the appropriate spelling of the generic name. In addition to Verhoeff's species and those in section XIII, Jackson thus places in Sphaerillo the following species:- Sphaerillo (Xestodillo) marquesarum (Jackson 1933a) and Sphaerillo societatis (Maccagno 1932).

Vandel (1945, p. 254) recognizes "Sphaerillo Verhoeff (nec Spherillo Dana)."

One of the species in Budde-Lund's section XIII, Spherillo misellus (Budde-Lund 1885) Budde-Lund 1904, is recorded from Tasmania by its author. If Jackson's proposal is followed, this species should be placed in Sphaerillo Verhoeff. However it is noted that Verhoeff alters his concept of Sphaerillo in different papers, mostly without explaining his reasons for doing so. I therefore feel obliged to examine the matter more closely before I accept Jackson's assignment of section XIII of Spherillo, and consequently of Sph. misellus, to this genus. The following account of Verhoeff's work on Sphaerillo explains the situation.

Summary of previous work on genus Sphaerillo Verhoeff.

Verhoeff (1926, pp. 254-255) in his key a, sections L and M, keys Sphaerillo and other genera opposite Armadillo, Brandt 1833, Verhoeff 1926 s.str. He claims that in Armadillo s.str. the groove which is a continuation of the cleft in the posterior angle of the 1st epimeron, is prolonged forwards to the anterior angle of the epimeron, whereas in Sphaerillo and others, if such a groove occurs, it does not reach the anterior angle of the epimeron. In section N he states that the inner lobe of the 1st epimeron in Sphaerillo forms a continuation of the epimeral border and is visible from the outer side of the epimeron. In this paper Verhoeff places no restriction on the backward extent of the inner lobe of the 1st epimeron in relation to that of the outer posterior angle, the connection or otherwise of the lobe on the 2nd epimeron with the epimeral border, or the presence or absence of lobes on the under surface of the 7th epimera of the pereion and the pleura of the pleon in Sphaerillo. Verhoeff divides genus Sphaerillo into two new sub-genera, Sphaerillo and Xestodillo. He places in sub-genus Sphaerillo three new species, Sph. (Sph.) pygmaeus, Sph. (Sph.) hebridarum and Sph. (Sph.) fissus, and assigns to Xestodillo, Sph. (X.). zebricolor (Stebbing 1900b) and two new species, Sph. (X.) lifouensis and Sph. (X.) politus. It is noted that Verhoeff (pp. 258, 296, 301-303) makes several references to a species by the name of "*vittatus*", but no species is described under this name. On p. 302 he states:- "Die Uropoden besitzen (im Vergleich mit denen des *vittatus*, Fig. 65) - - - - -"; Verhoeff's fig. 65 is labelled as a drawing of the uropod of *Sph. zebricolor* (Stebbing). On p. 357 he states "*Cubaris zebricolor* Stebb. = *Sphaerillo vittatus* Verh. in Litt." Thus all references to "*vittatus*" should be applied to *Sph. zebricolor*. Verhoeff (p. 303) states that in *Sph.* (*X.*) *politus* the groove from the cleft in the 1st epimeron extends forwards to the anterior angle of the epimeron. This contradicts the limit for *Sphaerillo* set in his key *a* to genera.

Verhoeff (1928*a*, p. 209) establishes another new species of *Sphaerillo*, *Sph.* (*Sph.*) *opacus*.

Herold (1931, p. 321) transfers *Sph. hebridarum* Verhoeff 1926 to his new genus *Lobodillo*, noting that he has found that this species possesses lobes on the under side of the pleura of the pleon; the presence of such lobes is a character of the genus. In the same paper Herold erects another two genera, *Dryadillo* and *Chelomadillo*, in both of which lobes are absent from the under side of the 7th epimera of the pereion and the pleura of the pleon. Herold (pp. 316, 335) states that in *Dryadillo* the inner lobe of the 1st epimeron is short and does not reach the posterior border of the outer lobe, but remains considerably removed from it, whereas in *Chelomadillo* (see pp. 316, 349) the inner lobe of the 1st epimeron is long, reaching about to the posterior border of the outer lobe. In his generic diagnosis of *Chelomadillo* he (p. 349) states that the cleft in the

1st epimeron is continuous with a groove which reaches to the anterior angle of the epimeron.

Verhoeff (1937) establishes a new genus, Riudillo, for one new species, R. takakuwai. In his remarks on the genus he (p. 419) claims that the posterior angle of the 1st epimeron is simply rounded and that the inner lobe therefore does not form a continuation of the epimeral border. However, in his description of R. takakuwai, he (p. 420) states that the inner lobe of the 1st epimeron passes over in a curve into the lateral border, and in his figure (fig. 14) of this structure the inner lobe is shown as being continuous with the lateral border. The inner lobe of the 1st epimeron in R. takakuwai terminates considerably in front of the posterior border of the epimeron.

Verhoeff (1938, p. 3) confirms the presence of ventral lobes on the pleura of Lobodillo hebridarum (Verhoeff 1926), but considers that this species is wrongly placed in Lobodillo and transfers it to a new genus, Melanesillo. In a key to genera, he (p. 7, sections a and b) keys Sphaerillo and other genera opposite Lobodillo and Melanesillo, stipulating that lobes ("Phylacomeren") are absent from the under side of the 7th epimera of the pereion and the 3rd to 5th pleura of the pleon in Sphaerillo and the others. In section g of this key he further limits Sphaerillo by stating that the inner lobe of the 1st epimeron reaches, or projects beyond, the posterior border of the epimeron, and that the inner lobe on the 2nd epimeron is connected with the epimeral border. He refers to the genus as "Sphaerillo Verh. (= Chelomadillo Herold)." On p. 6 he notes that Chelomadillo agrees with Sphaerillo in having the inner lobe of the 1st epimeron long, reaching to the posterior border of the outer lobe, and adds that in these two genera the cleft in the epimeron continues as a groove which always becomes weaker anteriorly and which, e.g. as in Sph. nebricolor, reaches about to the middle of the lateral border of the epimeron. But Herold (1931, p. 349) states that this groove in Cholomadillo extends to the anterior angle of the epimeron. In this (1938) key to genera Verhoeff regards Dryadillo Herold as a separate genus, distinct from Sphaerillo.

Verhoeff (1942a, p. 96) places in Sphaerillo a species which he names as "Sphaerillo (Sphaerillo) montivagus n.sp." It can be assumed from this that Verhoeff's species is not the same as Spherillo montivagus (Budde-Lund 1885) Budde-Lund 1904, which belongs in section XIII of Spherillo, and which is named by Jackson (1941, p. 21) as "Sphaerillo (Sphaerillo) montivagus (Budde-Lund)." Vandel (1945, p. 252) refers to "Sphaerillo montivagus Verhoeff (nec montivagus B-L.)." A comparison of the characters of Verhoeff's species with those of Budde-Lund's species, as described by Budde-Lund (1885, p. 35), confirms that those two species are distinct.

Verhoeff (1942b, p. 165) states that he now interprets Cholomadillo, Dryadillo and Riudillo as sub-genera of Sphaerillo. In a key to the sub-genera he refers to Sphaerillo as "sub-genus Sphaerillo Verh. (= Dryadillo Her.)." He now classes Cholomadillo Herold as a sub-genus distinct from sub-genus Sphaerillo. Verhoeff claims that the inner lobe of the 1st epimeron remains far in front of the posterior border of the epimeron in the sub-genera Sphaerillo and Riudillo, whilst in contrast it almost or exactly reaches, or even extends beyond, the posterior border in _Cheloradillo_ and _Xestodillo_. In contrasting _Riudillo_ to sub-genus _Sphaerillo_ he notes that the outer border of the 1st epimeron in _Riudillo_ is thickened and similar to that of _Xestodillo_, whereas in _Sphaerillo_ this border is narrow and sharp-edged. According to Verhoeff (1942b, p. 168), sub-genus _Sphaerillo_ now includes, in addition to Herold's (1931) nine species of _Dryadillo_, the following species:- _Sph. pygmaeus_, _Sph. fissus_, _Sph. opacus_, _Sph. montivagus_ Verhoeff, and a new species, _Sph. insularum_. But according to his original descriptions of the species, the inner lobe of the 1st epimeron in _Sph. pygmaeus_ and _Sph. opacus_ projects backwards as far as the outer posterior angle of the epimeron, (at least when it is viewed from the outer side of the epimeron). These species therefore do not comply with the limits of sub-genus _Sphaerillo_ which Verhoeff sets down on p. 165 of this same paper. _Sph. montivagus_ Verhoeff and _Sph. insularum_ both conflict with Verhoeff's (1938) limit on the lobe of the 2nd epimeron in having this lobe completely separated from the epimeral border.

It is apparent from this account of genus _Sphaerillo_ _Verhoeff_ 1926 that Verhoeff causes a great deal of confusion regarding the limits and synonymy of the genus. He (1926) misinterprets the relationship of his _Sphaerillo_ with _Spherillo_ Dana. He gives no true diagnosis of _Sphaerillo_ but always defines its limits by means of keys. In 1926 he restricts the extent of the groove continuous with the cleft in the 1st epimeron for the genus as a whole; then, in the same paper, he includes in the genus a species which belongs outside this restriction. He (1938) later synonymises with

Sphaerillo a genus which likewise falls outside this restriction. His limit on the backward extent of the inner lobe of the 1st epimeron in relation to that of the outer posterior angle, as set down for genus Sphaerillo in 1938, is in direct opposition to that set down for the typical sub-genus Sphaerillo in 1942b. The same applies to the synonymy or distinction of Chelomadillo and Dryadillo which is dependant on this character. In 1942b he retains in sub-genus Sphaerillo two species which conflict with its limits as he defines them in that paper. Having restricted the character of the lobe on the 2nd epimeron in 1938 he subsequently places in Sphaerillo two species which do not comply with this restriction. Probably this complicated situation partly results from the fact that a satisfactory type species has not been designated for genus Sphaerillo.

Type species.

Verhoeff (1926) naturally does not nominate one of his species as the type of Sphaerillo as he does not regard the genus be be new.

Jackson (1941, pp. 2-3) considers that if a type is sought for section XIII of Spherillo, it appears that Spherillo danae Heller 1868 must be nominated; he (p. 19) later names Spherillo danae as the type species of Sphaerillo Verhoeff. This procedure is contrary to several sections of Article 30 of the Rules of Zoological Nomenclature (as reproduced in Schenk and McMasters (1936, pp. 34-35)). Budde-Lund (1904, p. 53) designates Sph. montivagus (Budde-Lund 1885) as the type of his section XIII, and such designation should not be subject to change, (see section I, a, p. 34). In any case, Sph. danae should be excluded from consideration as the type of section XIII, as it is doubtfully placed in this section by Budde-Lund (1904, p. 93), (see section II, e, y, p.34). Sph. danae is not referred to Sphaerillo by Verhoeff (1926), i.e. it is not included under the generic name at the time of its original publication, and is therefore excluded from consideration as the type of this genus, (see section II, e, ⅆ, p. 34). Therefore Jackson's designation of Sph. danae as the type of Sphaerillo should not be sustained. Sph. montivagus (Budde-Lund) can not be regarded as the type of Sphaerillo for the same reason. Thus the genus to date has no satisfactory type species.

Of the six species placed in genus Sphaerillo by Verhoeff (1926), three belong in sub-genus Xestodillo. One of the three originally included in sub-genus Sphaerillo, Sph. hebridarum, is now placed in another genus. Sph. fissus is not typical as it possesses uropods of a kind characteristic of Armadillo s.str. rather than of Sphaerillo, (see Verhoeff 1926, p. 258). The remaining species, Sph. pygmaeus, which also has page precedence over the others, is thus the obvious choice for a type. I therefore designate Sphaerillo pygmaeus Verhoeff 1926 as the type species of genus Sphaerillo Verhoeff 1926.

As previously noted, Verhoeff (1926, p. 296), in his original description of Sph. pygmaeus, states that the inner lobe of the 1st epimeron in this species projects backwards as far as the outer posterior angle of the epimeron. Thus this character in the type species complies with Verhoeff's (1938) restriction on the inner lobe of the 1st epimeron for genus Sphaerillo and contradicts his (1942b) later characterisation of sub-genus Sphaerillo. Even if Verhoeff's (1938) restriction for the genus as a whole is rejected, if sub-genera are to be distinguished on this feature of the 1st epimeron, the typical sub-genus Sphaerillo must be characterised by the condition exhibited by the type species, and should therefore include only those species in which the inner lobe of the 1st epimeron projects backwards approximately as far as, or further than, the outer posterior angle. Thus Verhoeff's (1942b) synonymy of Dryadillo with sub-genus Sphaerillo can not be upheld. Also Verhoeff's (1942a, fig. 19), (1942b, fig. 1) figures of the 1st epimeron in Sph. montivagus Verhoeff and Sph. insularum both show the inner lobe terminating far in front of the posterior angle. These species can no longer be included in sub-genus Sphaerillo.

The question now arises as to whether it is preferable to accept Verhoeff's (1938) restriction on the inner lobe of the 1st epimeron and to reinstate Dryadillo and Riudillo to their original rank of genera distinct from Sphaerillo, or to formally remove this restriction so that the species having the inner lobe terminating considerably in front of the posterior angle, which are included in Sphaerillo by Verhoeff (1942b), need not be removed from the genus because of this character. Verhoeff (1928a, p. 209), in listing characters common to Sph. pygmaeus and Sph. spacus, notes that the inner lobe of the 1st epimeron in these species does indeed project backwards as far as the outer posterior angle when the epimeron is viewed from the outer side, but adds that when it is seen from the inner side the inner lobe terminates a little in front of the outer angle. He illustrates the inner view in his figure (fig. 8) of Sph. opacus. Certainly the distance by which the inner lobe falls short of the posterior angle, as shown in this figure, is not considerable; unlike the condition shown in Herold's (1931, fig. 85) figure of the 1st epimeron in Dryadillo herbersri which he (p. 345) notes as being characteristic of genus Dryadillo, and Verhoeff's (1937, fig. 14) figure of this structure in Biudillo takakuwai. Thus the distinction between sub-genus Sphaerillo and Dryadillo remains. However, in view of this later qualification of Verhoeff's original description of Sph. pygmaeus, I prefer not to accept the (1938) restriction of the genus on this character of the 1st epimeron without having an opportunity to examine specimens of the type species.

With regard to the other characters in doubt, the original description of Sph. pygmaeus is not of any assistance, as their condition in this species is not noted. However Verhoeff (1928a, p. 209) states that Sph. pygmaeus is very closely related to Sph. opacus, but in a comparison of the two species he does not mention the extent of the groove continuous with the cleft in the 1st epimeron, or the connection or otherwise of the lobe on the 2nd epimeron with the epimeral border. It therefore seems reasonable to assume that Sph. pygmaeus resembles Sph. opacus in these characters. According to Verhoeff's (1928a, fig. 8, 9) drawings of Sph. opacus, this groove in the 1st epimeron terminates a considerable distance behind the anterior angle of the epimeron, and the lobe on the 2nd epimeron is connected with the epimeral border. This supports Verhoeff's (1926) restriction on the former character and his (1938) restriction on the latter.

However I am not convinced that it is advisable to confine Sphaerillo to these narrower limits. With the discrepancy regarding the typical state of the inner lobe of the 1st epimeron settled, the chief cause of confusion is removed, and it would result in fewer complications regarding the position of individual species to employ the wider limits on these two characters as well.

I therefore recognise the limits of genus Sphaerillo as given by Verhoeff (1926, pp. 252-258), (1938, p. 7) with the exceptions that the groove continuing forwards from the cleft in the 1st epimeron may extend to the anterior angle of the epimeron, the inner lobe of the 1st epimeron may terminate considerably in front of the outer posterior angle of the epimeron, and the lobe on the 2nd epimeron may be separated from the epimeral border. This allows species originally placed in Dryadillo, Chelomadillo and Riudillo to remain in Sphaerillo.

In his (1938) key to genera, Verhoeff uses his restriction on the lobe of the 2nd epimeron in Sphaerillo to distinguish this genus from Microdillo Verhoeff 1933, in which this lobe is separated from the epimeral border. However, in an earlier comparison of the two genera, he (1933, p. 98) notes that Microdillo also differs from Sphaerillo in that the inner lobe of the 1st epimeron in the former is not visible from the outer side of the epimeron, and the form of the uropods differs. Thus, with the restriction on the 2nd epimeron in

Sphaerillo removed, this genus is still distinct from Microdillo.

As Verhoeff's definitions are entirely given as portions of keys, I propose the following diagnosis of genus Sphaerillo Verhoeff 1926, based on the information on the genus given by Verhoeff (1926, pp. 252-258, 263-264, 295), (1938, p. 7), but amended on the points discussed.

Generic diagnosis.

Dorsal surface of animal is smooth, rugose or tuberculate, but lacks spines. Second antennae are slenderly built with their greater part projecting out from cephalon. First tergite of pereion does not exhibit a well-developed central eminence (cf. Orodillo Verhoeff 1926). Posterior borders of 2nd to 4th pereial tergites are either not incurved or only slightly incurved on each side. Lateral border of 1st epimeron is either narrow and sharp-edged or thickened underneath. Posterior angle of 1st epimeron exhibits a deep cleft resulting in the formation of an inner lobe which is continuous with lateral epimeral border and is visible from outer side of epimeron. Inner lobe may project backwards approximately as far as, or further than, outer posterior angle of epimeron, or it may terminate considerably in front of posterior angle. If a groove continues forwards from cleft in posterior angle, it may extend to anterior angle of epimeron or may terminate before reaching this angle. Lobe on 2nd epimeron may be connected with, or separated from, epimeral border. No lobes ("Phylacomeren" of Verhoeff 1938) are present on under surface of 7th epimera of pereion or 3rd to 5th pleura of pleon. Dorsal surface of terminal segment is not keeled (cf. Merulanella Verhoeff 1926).

Posterior border of terminal segment is not deeply incised in the mid-line (cf. Schismadillo Verhoeff 1926 and Australiodillo bifrons (Budde-Lund 1885) Verhoeff 1926). Pleopods occupy considerably more than 1/3 breadth of pleon. Exopodites of all pleopods possess pseudotracheae. Exopodites are not divided into layers (cf. Buddelundia Michaelsen 1912). Breadth of anterior border of protopodite of uropod, if greater than length of outer border of protopodite, is not more than 5/4 times the latter. (cf. Ochetodillo Verhoeff 1926). Basal surface of protopodite attains not more than 1/3 length of entire protopodite. Inner border of protopodite is incurved, but not angularly indented near insertion of exopodite (cf. Merulana Budde-Lund 1913, Verhoeff 1926 s.str.). Outer side of protopodite is not produced outwards to form a triangular lobe (cf. Emydodillo Verhoeff 1926). Exopodite of uropod varies in length, but if it is very short (1/4 or less than 1/4 breadth of lobe of protopodite), then the free lobe of protopodite, measured on its inner border up as far as lateral indentation of terminal segment, is longer than it is broad across the middle, (cf. Armadillo Brandt 1833, Verhoeff 1926 s.str.). In the exceptional case, e.g. Sph. fissus Verhoeff 1926, where exopodite is very short and free lobe of protopodite is not broader than long, lateral border of 1st epimeron is narrow and sharp-edged underneath, thus distinguishing the species from Armadillo s.str. Surface of protopodite is not elevated posterior to exopodite (cf. Acanthodillo Verhoeff 1926).

Genotype. Sphaerillo pygmaeus Verhoeff 1926.

Due to previous differences in the limits of the genus it seems advisable to compare the characters of all species assigned to it with this diagnosis to determine whether any of them must now be removed. The original descriptions of these species have been examined accordingly.

Verhoeff (1942a, p. 97) states that the last pleuron of the pleon in Sph. montivagus Verhoeff has a lobe on its under surface. This excludes the species from Sphaerillo according to the limits which I recognise. However, as Verhoeff's description is brief, an attempt to place the species elsewhere on this alone appears inadvisable. The position of Sph. montivagus Verhoeff therefore remains in doubt.

Four of the species included by Budde-Lund (1904) in his section XIII of Spherillo; Spherillo parvus (Budde-Lund 1885); Sph. lentus, Sph. ingens, Sph. caligans, Budde-Lund 1904; exhibit lobes on the under surface of the 3rd to 5th pleura of the pleon, (according to Budde-Lund (1908, p. 271) in the case of Sph. parvus). These species are therefore excluded from Sphaerillo; they may possibly belong in Lobodillo or Melanesillo.

The terminal segment of Sph. brevis Budde-Lund 1904 is slightly keeled on its dorsal surface. The exopodite of the uropod in Sph. coecus (Dollfus 1898) is completely atrophied. The protopodite of the uropod in Sph. brevicauda (Dollfus 1898) is very short and broad. Thus these species may be wrongly placed in Sphaerillo. The original description of Sph. pictus Heller 1868 is very inadequate and makes no mention of characters of 1st epimeron.

Wahrberg (1922, p. 233) states that two of his new species, Spherillo tuberosus and Sph. telsogrossus, belong in Budde-Lund's section XIII of Spherillo. Sph. tuberosus is excluded from Sphaerillo on the form of the uropods. Verhoeff (1926, p. 270) recognises that the characters of this species agree with those of his new genus Acanthodillo. According to Wahrberg (p. 249) an inner duplicature is represented as a thickening on the 5th to 7th epimera of the pereion in Sph. telsogrossus. As lobes are absent from the under side of the 7th epimera in Sphaerillo, the position of Sph. telsogrossus in this genus is doubtful.

As far as can be ascertained from the information given in the original descriptions, the characters of the remaining species assigned to Sphaerillo, including those of Sph. misellus (Budde-Lund), do not conflict with the diagnosis of the genus proposed in the present paper.

As far as sub-genera are concerned, I am not certain of the relationship of Chelomadillo with sub-genus Sphaerillo. With the latter restricted to species having the inner lobe of the 1st epimeron projecting backwards as far as, or further than, the outer posterior angle, as I suggest, Herold's species of Chelomadillo agree with it in this regard. However Herold (1931) does not note the condition of the lateral border of the 1st epimeron in these species; i.e. whether it is narrow and sharp-edged as in sub-genus Sphaerillo, or thickened as in Xestodillo. I therefore recognise the species originally placed in Chelomadillo as belonging in genus Sphaerillo, but do not classify them further into a sub-genus.

Genus Sphaerillo Verhoeff 1926 therefore appears to contain the following species:-

Species not included in Budde-Lund's section XIII of Spherillo:- Sphaerillo (Sphaerillo) pygmaeus Verhoeff 1926 (type species); Sph. (Sph.) fissus Verhoeff 1926; Sph. (Sph.) opacus Verhoeff 1928a; Sph. (Xestodillo) zebricolor (Stebbing 1900b); Sph. (X.) lifouensis, Sph. (X.) politus, Verhoeff 1926; Sph. (X.) marquesarum (Jackson 1933a); Sph. (Dryadillo) feuerborni, Sph. (Dr.) bedaliensis, Sph. (Dr.) baliensis, Sph. (Dr.) arcangelii, Sph. (Dr.) schellenbergii, Sph. (Dr.) montanus, Sph. (Dr.) hobereri, Sph. (Dr.) magnificus, Sph. (Dr.) sexlineatus, (Herold 1931); Sph. (Riudillo) takakuwai (Verhoeff 1937); Sph. setosus, Sph. tuberifrons, Sph. pustulosus, Sph. nitens, (Herold 1931); Sph. societatis (Maccagno 1932); Sph. insularum Verhoeff 1942b.

Species included in Budde-Lund's section XIII of Spherillo:- Sph. danae (Heller 1868); Sph. montivagus, Sph. misellus, Sph. obscurus, (Budde-Lund 1885); Sph. melanurus (Dollfus 1886); Sph. floresianus, Sph. velutinus, Sph. weberi, (Dollfus 1898); Sph. setaceus, Sph. nobilis, (Budde-Lund 1904).

The following additional species of section XIII of Spherillo may belong in Sphaerillo, but their descriptions give rise to some doubt regarding this:- Sph.? pictus (Heller 1868); Sph.? coecus, Sph.? brevicauda, (Dollfus 1898); Sph.? brevis (Budde-Lund 1904); Sph.? telsogrossus (Wahrberg 1922).

Sph. montivagus Verhoeff 1942a does not correctly belong in Sphaerillo, but an alternative position for this species can not be suggested.

Thus the species content of genus Sphaerillo Verhoeff is not greatly altered by my investigations. However it is hoped that these may assist in stabilizing the position of the genus as a whole.

<u>Sphaerillo misellus</u> (Budde-Lund 1885) Jackson 1941.

<u>Synonymy</u>: <u>Armadillo misellus</u> Budde-Lund 1885.

<u>Spherillo misellus</u> (Budde-Lund 1885) Budde-Lund 1904.

The position of <u>Sph. misellus</u> in genus <u>Sphaerillo</u> Verhoeff is considered in the preceding discussion on the genus.

It is noted that an English translation of Budde-Lund's (1885, p. 285) description given by Thomson (1893, pp. 72-73) contains some errors. Thomson translates "truncus utrinque manifesto tuberculatus" as "body everywhere distinctly tubercled." Budde-Lund's "truncus" obviously refers to the pereion as distinct from his "caudae" which refers to the pleon. This phrase should read:- pereion distinctly tubercled on each side. Thomson translates "flagellum scapi articulo quinto brevius; flagelli articulus prior altero triplo vel magis brevior" as "flagellum 5-articulate, shorter than the peduncle; first articulation of the flagellum rather shorter than the next three." This should read:- flagellum shorter than 5th article of peduncle; first article of flagellum three times or distinctly shorter than the other.

Budde-Lund (1885, p. 285), (1904, p. 93) records <u>Sphaerillo misellus</u> from Tasmania. (In his 1885 paper he calls Tasmania by its earlier name, Van Diemen's Land). Unfortunately he does not record the locality or conditions in which his specimen was found.

I have not so far collected specimens which can be assigned to <u>Sphaerillo misellus</u> (Budde-Lund).

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