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NOTES ON THREE SPECIES OF TASMANIAN SEA CUCUMBERS
INCLUDING ONE SPECIES THAT BROODS ITS YOUNG IN THE
COELOME. (HOLOTHURIOIDEA: PHYLLOPHORIDAE, CAUDINIDAE)

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(with 44 text-figures and one plate)

ABSTRACT

Two specimens of *Neoamphicyclus lividus* Hickman out of 135 dissected and examined were found to contain young in the coelome. *Neothyonidium dearmatum* (Dendy and Hindle), previously found on the coasts of New Zealand and Victoria is recorded from Tasmania for the first time. *Paracaudina luticola* Hickman, formerly known only from the caudal region of its body, is now described from two complete specimens.

Family PHYLLOPHORIDAE

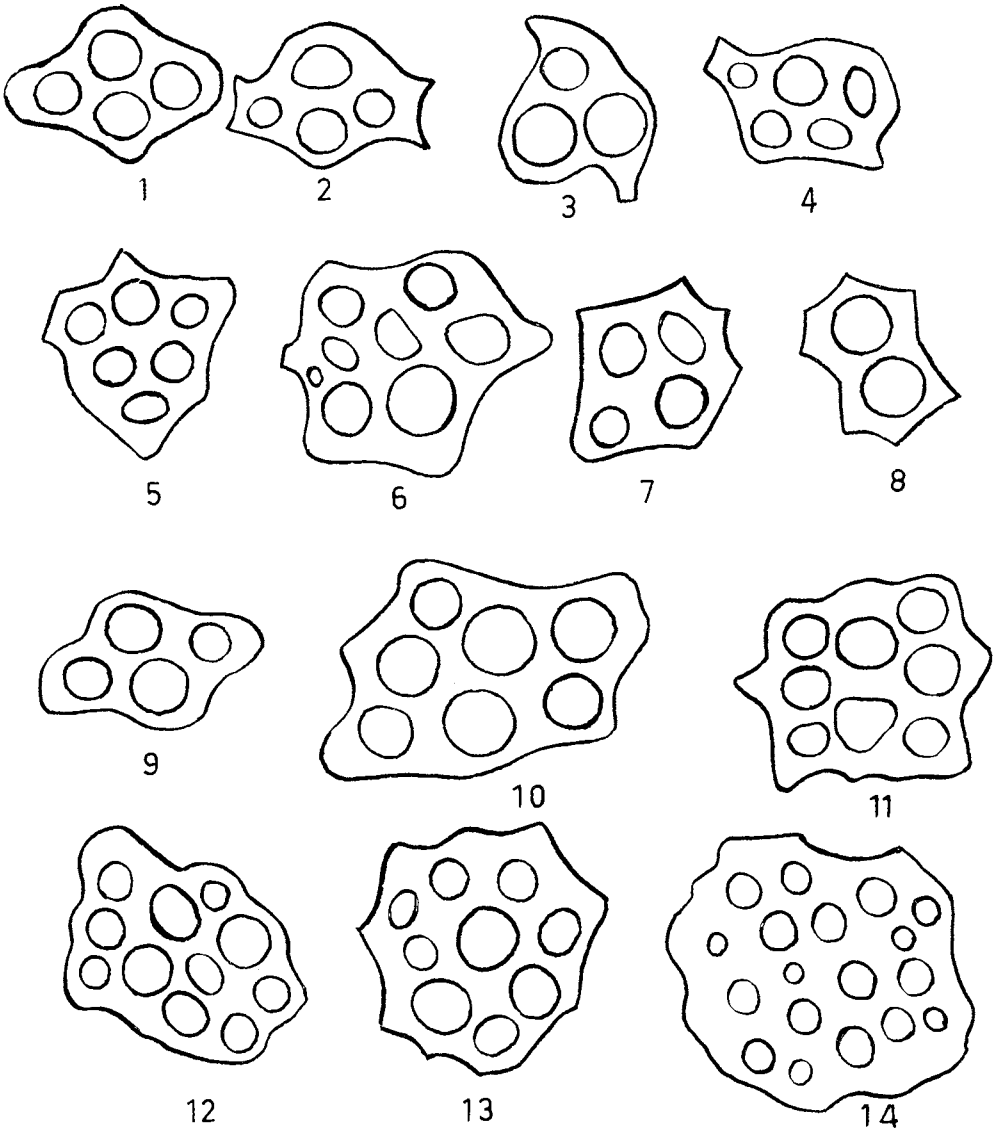
Neoamphicyclus lividus Hickman
with young in the coelome.

During low tide on 19th March, 1954, seventy specimens of *Neoamphicyclus lividus* Hickman (1962) were collected from under stones at Pirates Bay, Eaglehawk Neck, Tasmania. In the two preceding months 105 specimens of the holothurian had been taken from the same locality making the total collected 175. Of these 121 were dissected and examined in searching for endoparasitic Turbellaria. One of the holothurians dissected was found to contain another of the same species within its coelome. The latter specimen was relatively large, being more than half the length of the one containing it. The occurrence of such a large specimen in the body of another and the fact that no young had been found in the other 120 specimens dissected caused the writer to think that the case was one of teratogeny. It was described as such in a paper submitted for publication. The reviewer of the manuscript suggested that the occurrence might be a case of coelomic incubation. Further specimens were therefore examined, ten from the original locality and four from the shore of Recherche Bay, Catamaran. The latter specimens had been collected on 3rd December, 1952, but not examined. One was now found to be brooding 23 young in its coelome. The reviewer of the manuscript was thus proved to be quite correct in his suggestion.

The brooding adult collected at Pirates Bay on 19th March, 1954, had the usual characters of the species. It measured 45.0 mm long and 10.0 mm in greatest width. Calcareous particles (text-figs 1-8) in the skin of the body were in the form of irregular flat plates without towers. They measured 33 μ m - 57 μ m in greatest diameter and had two to eight holes, the most frequent number being four. The ring vessel had three long Polian vesicles and a madreporic canal. The ovary was small with about 22 tubules, some containing ova.

The single young one in the coelome of the adult measured 28.0 mm long and 5.0 mm in greatest width. It was lying longitudinally in the body-cavity but was not free. Its narrow posterior part, about 4.0 mm in length, was firmly embedded amongst the numerous muscle fibres extending from the cloaca to the wall of the coelome. The anal extremity lay in a small depression amongst the muscle fibres near the posterior end. In most features the young one resembled the adult. However it had only 11 tentacles in the outer ring. Calcareous particles (text-figs 9-14) in the skin of its body were flat plates 51 μ m - 75 μ m in greatest diameter. They had 4-18 holes and were larger than

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FIGS 1 - 14 - *Neomphicyclus lividus* Hickman; Calcareous particles. 1 - 8 of adult, 9 - 14 of young one from coelome of adult.

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the particles of the adult. The calcareous ring was normal. The gut was narrow, without colour and the usual contortions. It contained no grit, but was filled with coagulated body fluids. Respiratory trees were small and only about one quarter the length of the body-cavity. The ring vessel had one large Polian vesicle and a madreporic canal. No gonads were present.

The brooding female found at Recherche Bay on 3rd December 1952, was strongly contracted, the introvert and tentacles being withdrawn. It measured 31.0 mm long and 10.0 mm in greatest width. The ovary was small with only twelve tubules, six on each side of the dorsal mesentery. Some of the tubules contained one or two eggs, 370 μ m. in diameter, that showed no signs of segmentation. Twenty-three young were present in the coelome. They varied in size, the smallest being 3.5 mm long and 1.8 mm wide, while the largest were 7.0 mm long and 2.1 mm wide. Most of them were colourless, a few of the largest being pale slaty-blue. In all the pedicels of the three ventral ambulacral zones were strongly developed, those of the two dorsal zones being scarcely visible. In the largest specimens the tentacles were well formed and the ring vessel had one Polian vesicle. The intestine was large and had the usual contortions. The respiratory trees consisted of a pair of short unbranched tubes opening into the cloaca. In all juvenile stages calcareous particles were numerous in the skin and resembled those of adults. In a young stage only 3.5 mm long the particles measured 51 μ m. - 84 μ m. in diameter and had 2 - 14 holes. As in adults plates with four holes were the most numerous.

Remarks: Booloottian (1966) lists seven holothurians that brood their young in the coelome. Three belong to the Phyllophoridae, the others are apodous species. *Neomphicyclus lividus* appears to be the first Australian holothurian to be recorded as practising coelomic incubation.

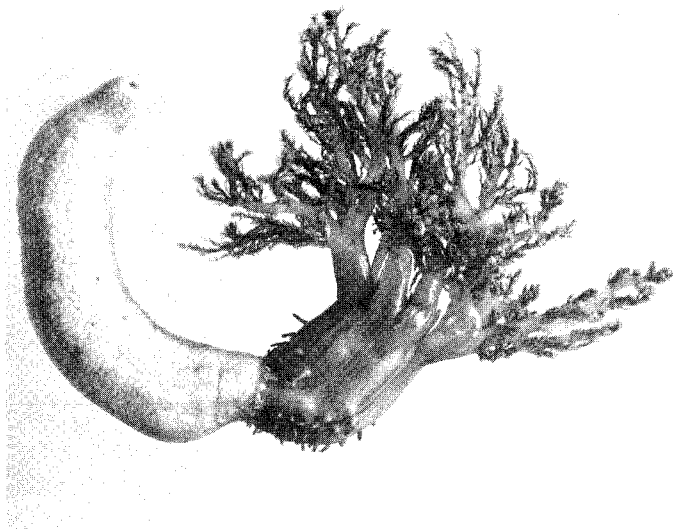


PLATE 1. - *Neothyonidium dearmatum* (Dendy and Hindle) extended.

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- Neothyonidium dearmatum* (Dendy and Hindle)
Phyllophorus dearmatus Dendy and Hindle 1907
Phyllophorus dearmatus Joshua 1914
Phyllophorus dearmatus Mortensen 1925
Phyllophorus dearmatus Clark 1938
Lipotrabeza darmatus Clark 1946
Lipotrabeza dearmatus Dawbin 1950
Neothyonidium dearmatum Hedding and Panning 1954
Neothyonidium dearmatum Pawson 1963
Neothyonidium dearmatum Pawson 1970

When preserved in 70 percent alcohol the Tasmanian specimen has dark brown tentacles, a light brown introvert and a greyish white body. When fully extended the body is fusiform and slightly curved (plate 1). It measures 105 mm long and 16.0 mm in greatest width. The introvert is large and somewhat bulbous. There are 20 tentacles disposed in two rings, an outer ring of 10 large tentacles and an inner ring of 10 small ones. In both rings the tentacles are arranged in pairs. Pedicels occur on the posterior half of the introvert, where they are confined to the ambulacra. On the rest of the body the pedicels are present in both the ambulacral and interambulacral zones. The anus is surrounded by ten small papillae.

Calcareous particles occur in the skin of the introvert and anal papillae but are absent from the rest of the body including the tentacles and cloaca. However, a perforated plate is found at the end of each pedicel. The calcareous particles of the introvert (text-figs 15-20) are widely scattered. They have the form of more or less rounded plates 75µm. - 100µm. in diameter and perforated by 8 - 22 holes. Many of the plates have a low tower with two columns (text-fig. 20). In the skin of the anal papillae the calcareous particles are mainly branched rods (text-figs 21 - 24). They are about 51µm. - 105µm. long, and some are perforated with a few holes. The particles appear to unite forming a kind of basketwork in the skin surrounding the papilla.

Locality: The single specimen on which the above description is based was collected by A.J. Dartnall and T. Sward on 29th March, 1977. It was taken off Kettering in D'Entrecasteaux Channel, 147°16'E, 43°8'S, at a depth of about nine metres and occurred on a bottom of muddy sand and broken shells.

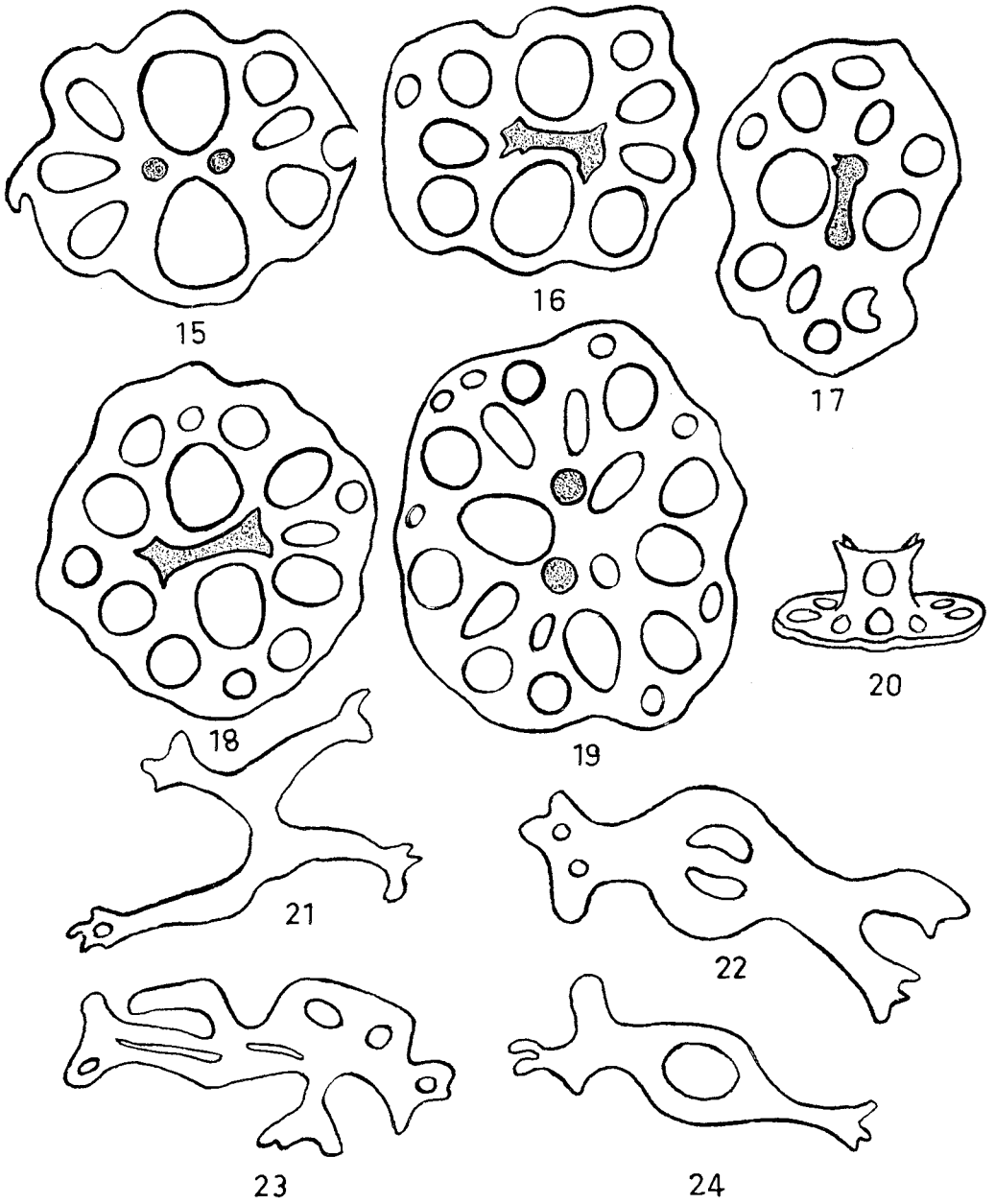
Remarks: In specimens of *N. dearmatum* from New Zealand Mortensen (1925) and Pawson (1970) found calcareous particles at anterior and posterior ends of the body. Mortensen also found them in the tentacles. The single Tasmanian specimen examined had no calcareous particles in the tentacles or at the posterior end of the body, except those in the anal papillae. Until a much larger number of specimens is examined, it does not seem advisable to regard the Tasmanian holothurian as a different species.

Family CAUD IN IDAE

- Paracaudina luticola* Hickman, 1962
Paracaudina luticola Pawson, 1977

The original record of *Paracaudina luticola* Hickman (1962) was based on seven caudal extremities or "tails" dredged in Ralphs Bay, Derwent Estuary, on 30th June, 1959. The following description is based on two complete specimens from the same locality.

The body (plate 2) is elongate, fusiform and slightly curved. When fully extended it measures 160 mm long and 15 mm in greatest width. The introvert is about 19.0 mm long and 9.0 mm in width. Posteriorly the body tapers into a long slender caudal extremity, which forms about 7/16 of the total length. In the living specimen the body



FIGS 15 - 24. - *Neothyonidium dearmatum* (Dendy and Hindle); calcareous particles.
 15 - 20 from the introvert, 21 - 24 from anal papillae.

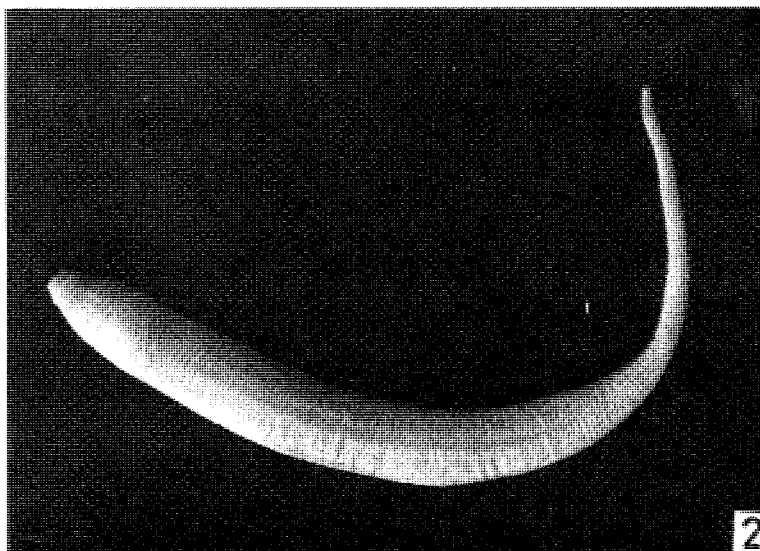
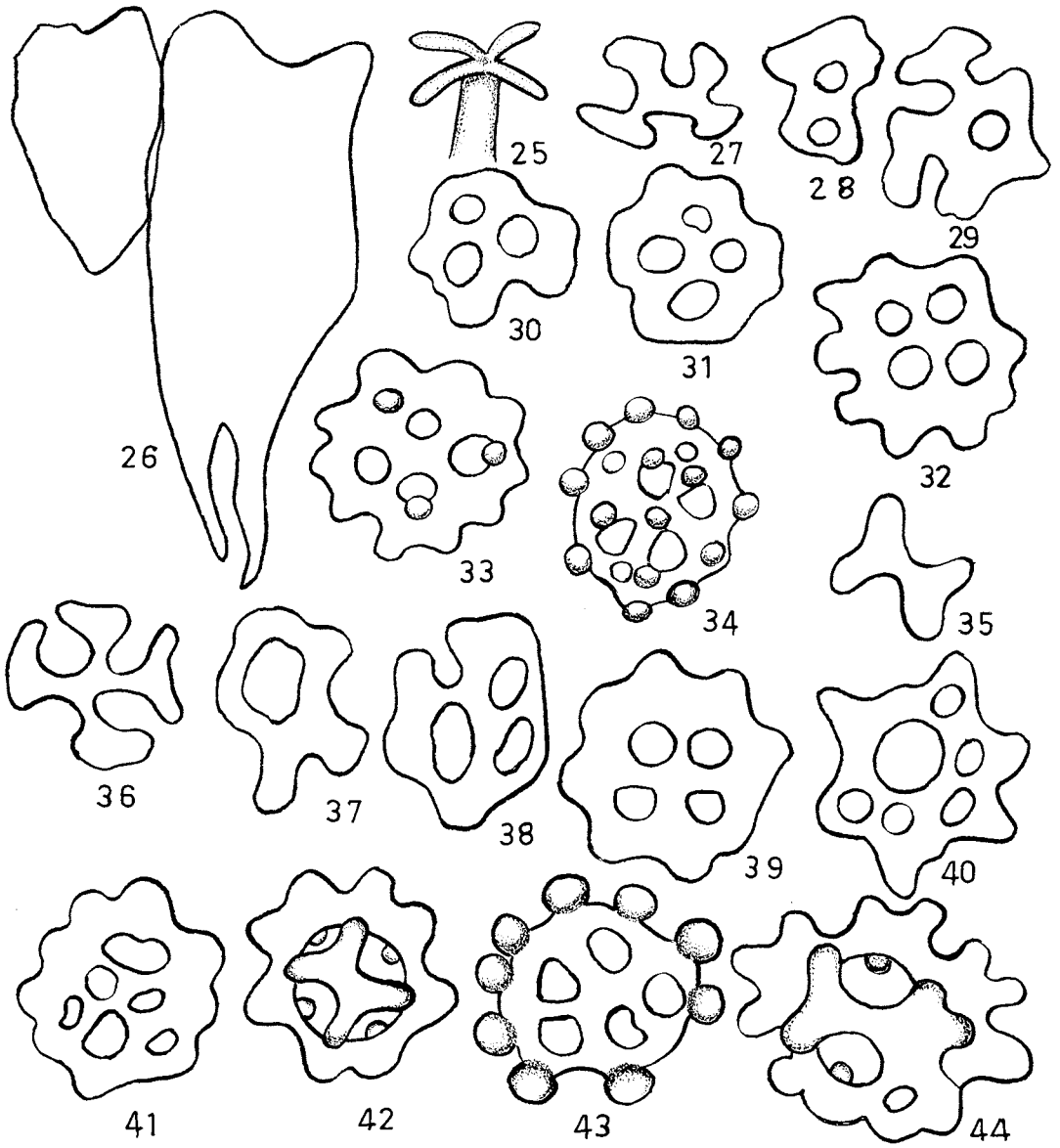


PLATE 2. - *Paracaudina luticola* Hickman extended.

does not taper abruptly to form the tail. When contracted the holothurian measures 68 mm long and 18 mm wide.

In life the colour is greyish but fades to white in preserved specimens. Muscle bands show faintly through the skin. The mouth is surrounded by 15 short tentacles, each having four finger-like lobes (text-fig. 25). Internally the tentacles form large elongate ampullae. The calcareous ring has five radial and five interradial ossicles of the form shown in text-fig. 26. The radials are fused with the interradials and slightly more than twice their length. Radial muscles form ten longitudinal bands arranged in five pairs. The retractor muscles are short, their posterior ends being attached a little way behind the ring vessel. Respiratory trees are extensive but Cuvierian organs are absent. The gonad has about 120 tubules arising from the branched posterior end of the oviduct and situated in the anterior third of the body cavity. The tubules form two groups of about 60, one group on each side of the dorsal mesentery. The genital aperture is situated dorsally on a small conical papilla close behind the ring of tentacles.

Calcareous particles are numerous in the skin of the whole body, except that of the peristome and tentacles, from which they are absent. The form of the particles in the skin of the introvert (text figs 27-34) varies from small irregular plates to large somewhat circular discs about 50 μ m. in width and having four holes and nine marginal knobs. Other knobs are sometimes present on the surface of the disc. The maximum number of holes is six and of marginal knobs eleven. In the mid-body region the particles have the forms shown in text-figs 35-44. They reach a maximum size of 60 μ m. in width and do not differ very much from those of the introvert. The most numerous forms are about 57 μ m. in width, more or less circular, with four holes and ten marginal



FIGS 25 - 44. - *Paracaudina luticola* Hickman; 25 tentacle, 26 a radial and an inter-radial ossicle; 27-34 calcareous particles from introvert, 35-44 from mid-body region.

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knobs. Many crossed-cups (text-fig. 42) are also present. Calcareous particles of the caudal region have been described in a previous paper (Hickman 1962).

Locality: Ralphs Bay, Derwent Estuary, 147°27'E, 42°55'S, Tasmania. Two complete specimens collected at a depth of about 3.6 metres by R. Mawbey on 23rd April, 1975. The specimens were found while diving at night using a Hookah compressed air unit and an underwater light source. From observations made by the collector the holothurian lives in a sandy substrate, which is about 80 mm in depth and below which the sand is mingled with black organic material. In the case of one specimen only the "tail" was projecting from the sand, but in the other both "tail" and tentacles were showing, the rest of the body being hidden in the sand. An area of about 30-45 square metres was dug to a depth of about 150 mm without further specimens being found. The bottom was covered with scattered clusters of oysters. Other marine animals seen included sea-stars, flounders, flatheads and small transparent ascidians. Some red seaweed was floating in the water.

Remarks: *Paracaudina luticola* has some resemblance to *P. chilensis* (Muller). Pawson (1963) examined more than 400 specimens of the latter species from New Zealand waters and has given a full description of its features. *P. luticola* seems to differ in the following characters and habitat:-

- (1) Its body does not taper "abruptly" as described by Pawson in the case of *P. chilensis*.
- (2) The crossed-cup particles in its skin differ in not having a square plate on the inner side of the central hole and in possessing rounded knobs on surface and margin.
- (3) It lives in a sheltered and shallow habitat at a depth of 3.6 - 13.0 metres, whereas *P. chilensis* occurs in more open and exposed situations at depths of 28-730 metres.

One of the two specimens of *P. luticola* found is lodged in the Australian Museum, Sydney.

AC KNOWLEDGEMENTS

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