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AUSTRALIAN BRACKISH WATER SERPULIDS (ANNELIDA : POLYCHAETA)

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FIGURES 1-3

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SYNOPSIS

Evidence is presented to show that in the estuaries between Sydney and Brisbane there is a gradation from typical *Mercierella* to typical *Neopomatus* forms. On this evidence it is suggested that *Neopomatus* is synonymous with *Mercierella*, and *M. enigmatica* becomes the only brackish water serpulid known from Australia.

INTRODUCTION

Dew (1959) recorded only one species of brackish water serpulid (*M. enigmatica* Fauvel, 1922) from Australia, ranging from Townsville, Queensland, round the south of the continent to Carnarvon, Western Australia (fig. 1). She also states, "This species was first noted in Cooks River, Botany Bay, during 1910, when it was observed to have formed dense coral-like masses". Watson, McNeill, Johnson and Iredale (1936) commented on the presence of serpulids in the upper brackish reaches of the Brisbane River in 1929, but this material was neither identified nor preserved. Monro (1938) recorded *M. enigmatica* from the Swan River, Western Australia.

In Australia, *Mercierella* forms isolated populations in the brackish water regions of creeks and rivers. However, the species may be excluded from these areas by lack of a suitable substrate. A suitable substrate is one that provides a firm surface. Rocks, shells, vegetation, concrete, wood and glass are suitable while mud and sand are unsuitable. As many of the coastal creeks and rivers are very muddy, and lack rocks in their brackish areas, it is not surprising that distributional data gives a sparse and scattered picture.

Localities recorded by Dew (1959) are shown in fig. 1, though all her material has not been examined by the present author. The Australian Museum registered numbers and localities of Dew's material that has been examined are listed. Representative specimens from the author's collection have been placed in the Australian Museum, Sydney. The Australian Museum registered number is listed for each of these.

The material is listed commencing with the most northern locality, Ross River, Queensland, working south around the continent to Carnarvon, Western Australia. Material collected by others is acknowledged in the text. Where no acknowledgement is made, the material was collected by the author. The following abbreviations are used: R—river; Ck—creek; LWS—low water spring tide.

Rec. Aust. Mus. 27, page 139.

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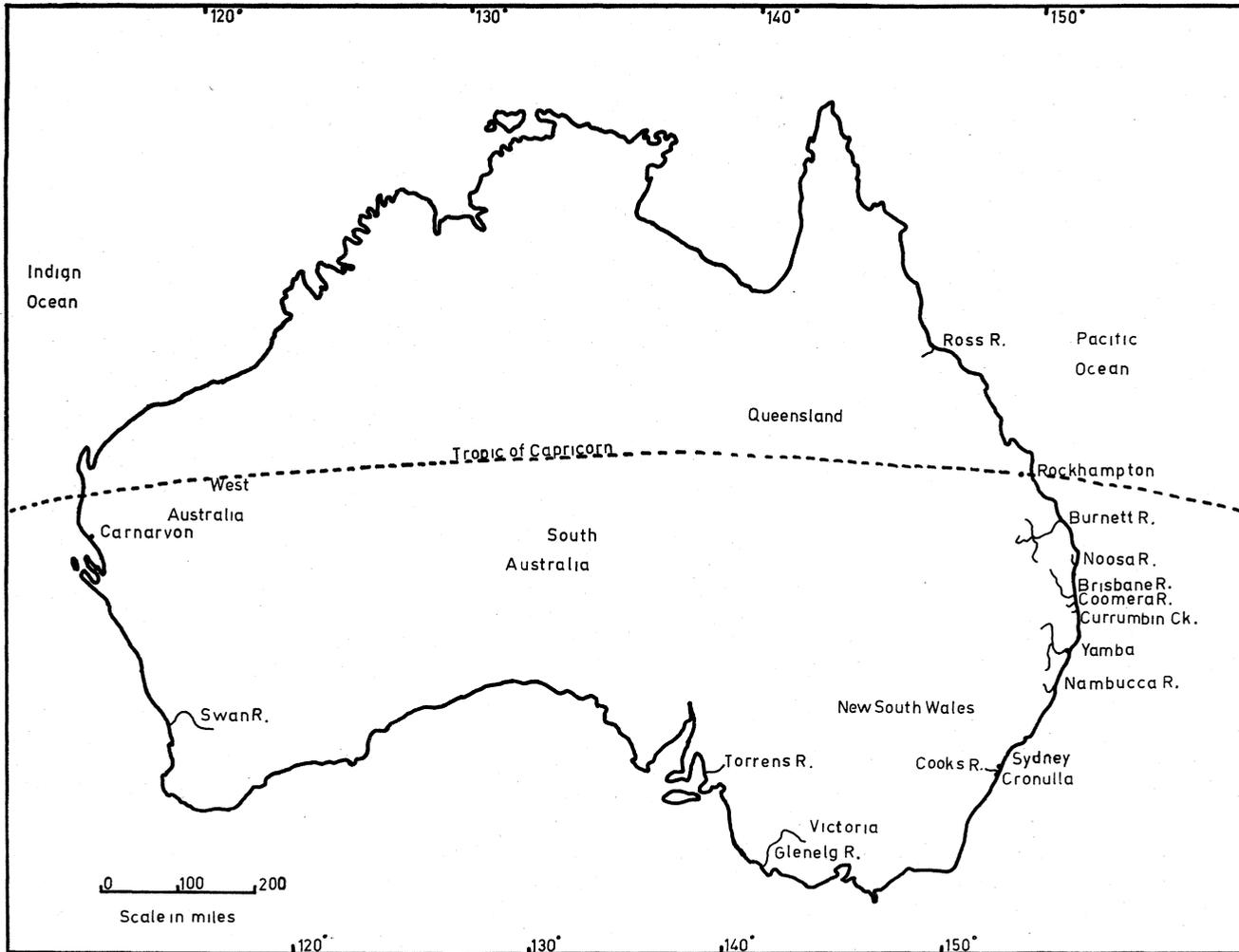


Fig. 1: Map of Australia, showing localities mentioned in text.

Genus **Mercierella** Fauvel, 1922

Type species: *Mercierella enigmatica* Fauvel, 1922.

Mercierella Fauvel, 1922, p. 424-30.

Neopomatus Pillai, 1960, p. 27-28.

Diagnostic features:

1. Operculum vesicular, armed with chitinous hooks, stalk smooth.
2. Collar setae of two kinds (1) simple, (2) deeply serrated; thoracic setae capillary; abdominal setae geniculate.
3. Uncini with few teeth, the last one being stouter and gouged.

Pillai (1960), working in Ceylon, described a new brackish water genus of serpulid, *Neopomatus*, containing two new species, *N. uschakovi* and *N. similis*, the latter also containing a variety, *rugosus*. Table 1, taken from Pillai (1960), gives the main characters of both genera as defined by Pillai. Specimens of brackish water serpulids collected in Queensland fit the description of this genus, while those collected from Sydney south around the continent to Carnarvon are referable to *Mercierella*.

1. *Operculum*. Pillai (Table 1) does not successfully differentiate between the form of the operculum in the two genera as it is possible for a vesicular operculum to be non-calcareous and vice versa. Fauvel (1922) stated that *Mercierella* has a vesicular operculum; Queensland specimens have such operculae while, in those from Sydney, the upper part becomes white and leathery with age. In material collected from the Nambucca River, approximately half-way between Brisbane and Sydney, the operculum is vesicular on living material but often becomes white and leathery externally after alcohol preservation. Dew (1959, p. 31) described the operculum as being "non-calcareous, cone shaped; somewhat vesicular, top slightly depressed". In the Queensland and Nambucca River specimens the top is either flat or slightly convex. Fauvel (1923) states that it is slightly concave on top.

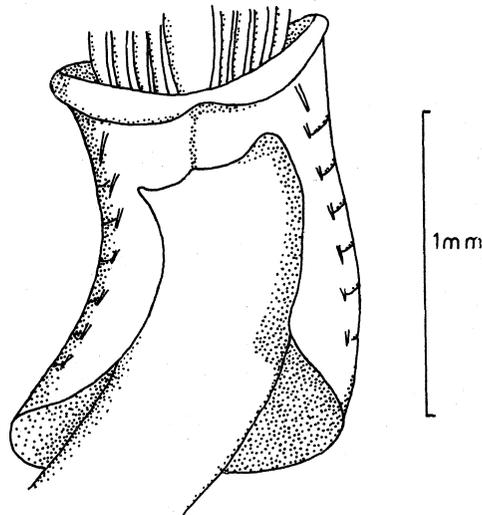


Fig. 2: Dorsal view of the thoracic region of *M. enigmatica* specimen from the Nambucca River with the thoracic membrane joined for the anterior third only.

The typical *Mercierella* operculum bears movable, inwardly directed hooks, while that of *Neopomatus* bears outwardly directed spines which are projections from the surface of the operculum and are not movable. Both types of projections are arranged in concentric rings. Rioja (1924, 1943) figures the typical *Mercierella* hooks, describing them in detail, and in describing specimens from the Argentina coast (1943) he says that in the interior of the opercular crown some of the spines are "soldered" and continuous with the opercular plate. It appears from this that Rioja had some specimens bearing both hooks and spines.

2. *Collar and thoracic membrane.* Pillai (pers. com.) regards the dorsal joining of the lateral lobes of the collar and thoracic membrane (Pillai, 1960, fig. 12a) as being the most important character separating *Neopomatus* from all other genera and has "not come across one specimen with a free thoracic membrane". Sydney specimens have a free thoracic membrane and collar, while both are joined dorsally in Queensland specimens. This character is variable among specimens collected from the Nambucca River. In some, collar and thoracic membrane are completely joined dorsally, while in others they are partially joined dorsally and varying lengths of the posterior thoracic membrane are free (fig. 2). In yet others there is no dorsal joining. This variation seems independent of specimen size (table 2).

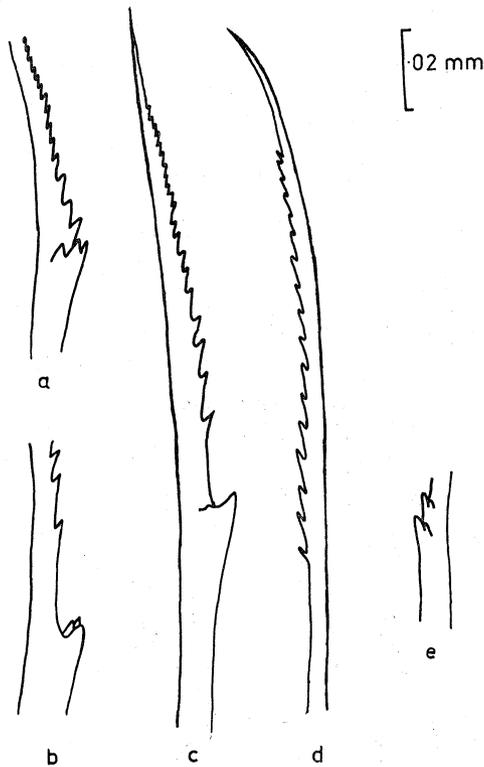


Fig. 3: Collar setae from specimens from different localities—(a) Cooks River, (b) and (c) Nambucca River, (d) and (e) Brisbane River.

3. *Collar setae.* The types of collar setae serration recorded at the Cooks River (Sydney), Nambucca River, and Brisbane River are shown in table 3 with the different basal modifications illustrated in fig. 3. Fig. 3a, b, e illustrate setae with the number of basal teeth increased, fig. 3c shows setae with a smooth portion of

the shaft near the base, while fig. 3d shows collar setae with a single row of teeth. Modifications of the basal (= Pillai proximal) serrations have been recorded at all three stations. A few specimens from Sydney had two rows of serrations on the collar setae basally, with a reduction to one row towards the tip.

Fauvel (1922) stated there are two rows of sharp teeth on the collar setae, while in 1932, p. 249, "strongly serrated setae with two longitudinal rows of teeth, a few transverse rows at the base and without an intervening smooth part of the shaft." Dew (1959) also records two rows of teeth.

Rioja (1924) describes *Mercierella* specimens with large teeth and smaller ones laterally. He also states that the lower part of the shaft may have two or three rows of bristles which become reduced to one row in the upper part. Fauvel (1927, fig. 123g, h) figures collar setae with three lateral teeth at the base. The proximal teeth in *N. uschakovi* are modified in that they have a jagged or serrated edge and one large tooth is thus modified to form three (Pillai, 1960). Hence collar setae serration is variable in both *Mercierella* and *Neopomatus* with an overlap between both groups.

4. *Uncini*. Both genera have a similar number of uncinial teeth, *Neopomatus* with six and *Mercierella* with five to nine. The uncini of both have a basal bifid process, not as well defined in *Mercierella* but illustrated by Fauvel, 1922. Both have the lowest tooth gouged, although in *Neopomatus* not to the same extent as in *Mercierella*. Therefore both types of uncini are basically similar.

5. *Tubes*. Coloration is the main difference, but *Mercierella* tubes often become an "orange brown" as they are exposed to fresh water. Specimens from Queensland and the Nambucca River have a wide variety of forms in a sparse population—round or rectangular, with or without one-three longitudinal ridges, with or without peristomes—but in dense populations they are round with peristomes.

The characters of the operculum, thoracic membrane, and collar setae of *Mercierella* as described by Dew (1959) from Sydney, and of specimens from Cooks River, Nambucca River, and Brisbane River are compared in table 4. The type of uncini and tubes are basically the same in both groups, with a greater variety of the former in *Mercierella* and of the latter in *Neopomatus*.

Therefore there is a continuous south to north cline between Sydney and Brisbane in the characters used to separate *Mercierella* from *Neopomatus*. This cline is continuous between isolated populations, suggesting that it may be temperature controlled. It is possible that a similar cline occurs in the northern hemisphere, because while *Mercierella* is recorded from Ennur Bachwater, India (Fauvel, 1932), *Neopomatus* occurs in Ceylon (Pillai, 1960). *Neopomatus* material has also been collected from British North Borneo.

***Mercierella enigmatica* Fauvel, 1922**

Mercierella enigmatica Fauvel, 1922, p. 424, fig. 1; Monro, 1924, p. 155, fig. A-E; Rioja, 1924, p. 160, fig. 1-30, pl. 5, fig. 1-3; Fauvel, 1927, p. 360, fig. 123; Fauvel, 1931, p. 1067; Fauvel, 1932, p. 249; Fauvel, 1933, p. 185; Monro, 1938, p. 624; Mensil and Fauvel, 1939, p. 37; Rioja, 1943, p. 547, 2 figs; Dew, 1959, p. 31, fig. 22.

Neopomatus uschakovi Pillai, 1960, p. 28, figs. 11, 12.

N. similis Pillai, 1960, p. 32, fig. 12.

N. similis rugosus Pillai, 1960, p. 33.

Diagnostic features: As for genus.

Material examined. Numbers prefixed by "W." refer to registered numbers in the Australian Museum.

AUSTRALIA

Queensland: Ross R., Townsville, W.4144, railway bridge pylons, zone 2 feet 6 inches wide extending up from L.W.S., abundant, Aug. 4, 1964; Ross R., W.4133, rocks on downriver side of first weir, zone 6 inches wide below L.W.S., common, Aug. 4, 1964; Townsville, W.3778, c. 6 specimens. B. Dew, Mar. 1, 1951; Townsville, W.3781, B. Dew, 1950; Rockhampton, rocks at the Causeway, tubes containing dead animals, zone 1 foot wide extending up from L.W.S., common, Nov. 29, 1963; Burnett R., W.4136, rocks on river bank near wharf, zone 2 feet 6 inches wide extending up from L.W.S., abundant, Oct. 2, 1963; Noosa R., W.4135, rocks 2 miles upriver zone 6 inches wide below L.W.S. common Jan. 17, 1961, Dec. 14, 1962; Noosa R., rocks in L. Cooroibar, zone 6 inches wide below L.W.S., present, Jan. 16, 1961; Noosa R., rocks in L. Cootharaba, zone 6 inches wide below L.W.S., present, Jan. 16, 1961; Noosa, W.3777, c. 8 specimens, B. Dew, Dec. 26, 1950; Pine R., rocks at mouth, L.W.S., present, Oct. 1960; Pine R., 4 miles upriver, rocks in shallows below L.W.S., common, Oct., 1960; Pine R., Petrie, rocks in shallows from L.W.S. down 1 foot, common, Oct., 1960, Dec., 1961; Brisbane R., 8 miles upriver, wharf piles and rocks, from 2 feet above to 2 feet below L.W.S., varying common to abundant between Feb., 1960 and Oct., 1964; Brisbane R., W.4141, 14 miles upriver, wharf piles and rocks, from 3 feet above to 5 feet below L.W.S., varying common to abundant between Feb., 1960 and Oct., 1964; Brisbane R., 20 miles upriver, rocks, zone 3 feet wide around L.W.S., varying common to very common between Feb., 1960 and Oct., 1964; Brisbane R., 28 miles upriver, rocks, zone 6 inches wide around L.W.S., present between Feb., 1960 and Oct., 1964; Coomera R., rocks below weir, zone 6 inches wide below L.W.S., common, Oct., 1960, absent, May, 1961; Nerang R., W.4140, Southport, rocks, zone 6 inches wide below L.W.S., present, June, 1960; Tallebudgera Ck, 2 miles upstream, rocks, zone 6 inches wide below L.W.S., common, July, 1960; Currumbin Ck, 3 miles upstream, rocks in shallows, zone 6 inches wide below L.W.S., common, July, 1960.

New South Wales: Yamba, W.3779, 2 specimens, B. Dew, Sept. 1, 1950; Nambucca R., W.4137, Macksville, rocks, zone 1 foot wide below L.W.S., common, Aug., 1962, very common, Jan., 1964; Cooks R., W.4139, Tempe, Reef structure visible at L.W.S., abundant, Wisely, 1960, Jan., 1964; Cronulla, Shell Pt., W.3775, 15 specimens, B. Dew, July 1, 1950.

Western Australia: Swan R., W.4134, Crawley, fouling plates, very common; J. Lucas, Feb., 1964; Swan R., Chidly Pt., W.3776, 4 specimens, B. Dew, Mar. 9, 1951; Perth, W.3780, 1 specimen, B. Dew; Carnarvon, W.3774, 100 specimens, G. Chittleborough, Oct. 8, 1951.

BRUNEI

Submerged *Agnathis alba* planks, common, Hancock and Gore, 1962.

CEYLON

Negombo Lagoon, W.4138, 50 specimens, T. G. Pillai, Apr. 10, 1964.

U.S.A.

Aquatic Park Lane, Berkeley, California, abundant, Ralph I. Smith, Jan., 1961, J. Nelson, 1964.

CONCLUSION

As there is a continuous cline between isolated populations between Sydney, where the brackish water serpulids are typical of *Mercierella*, and Brisbane, where the brackish water serpulids are typical of *Neopomatus*, *Neopomatus* Pillai, 1960, has been synonymized with *Mercierella* Fauvel, 1922. *Neopomatus uschakovi* Pillai, 1960 and *Neopomatus similis* Pillai, 1960, have both been synonymized with *Mercierella enigmatica* Fauvel, 1922.

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TABLE 1

<i>Neopomatus</i>	<i>Mercierella</i>
1. Operculum vesicular, with or without one or more rows of small outwardly directed denticulations.	Operculum non-calcareous, crowned with concentric rows of somewhat long, inwardly directed spines.
2. Collar and thoracic membrane of the two sides are fused to form a continuous membrane between the setigerous fascicles of the two sides over the dorsal thoracic wall.	Collar and thoracic membrane of the two sides with free dorsal edges.
3. Collar setae with a single row of stout teeth, a few of the proximal ones being usually modified.	Collar setae with two rows of sharp teeth.
4. Uncini with relatively few teeth and a basal bifid process.	Uncini with the lowest tooth gouged.
5. Tubes white or coloured orange or red, with or without remnants of successive peristomes. Found in more or less dense groups or masses. One or three ridges may be present.	Tubes white, circular in cross-section, with collar-like remnants of successive peristomes, and growing in masses.

Table 1—Part of table 1 (Pillai, 1960) comparing the main diagnostic features of *Neopomatus* and *Mercierella*.

TABLE 2

Length of animal	Length of thorax	State of thoracic membrane
3.5	1.0	Joined throughout dorsally.
6.0	1.5	Both sides free dorsally.
5.0	1.2	Both sides joined for anterior $\frac{1}{3}$ dorsally.
5.0	1.3	Both sides joined for anterior $\frac{2}{3}$ dorsally.
6.0	1.5	Both sides joined for anterior $\frac{1}{2}$ dorsally.
5.0	1.3	Both sides free dorsally.
4.0	0.8	Both sides joined for anterior $\frac{2}{3}$ dorsally.

Table 2—A comparison of the total length and length of the thorax with the state of the thoracic membrane on *M. enigmatica* collected from the Nambucca River (N.S.W.). All measurements are given in mm.

TABLE 3

Locality	2 rows of teeth	Basally 2-3 teeth 1 row above	Smooth shaft between basal and upper teeth. 1 row teeth	1 row teeth
Sydney	+	+		
Nambucca R.		+	+	+
Brisbane R.		+		+

Table 3—A comparison of the type of collar setae found at three Australian localities.

TABLE 4

Locality	Operculum	Thoracic membrane	Collar setae
Sydney (B. Dew)	M	M	M
Cooks R.	M	M	MN
Nambucca R.	N	MN	N
Brisbane R.	N	N	N

Table 4—A comparison of *Mercierella* and *Neopomatus* characters (as defined by Pillai, 1960) of specimens collected from Sydney north to Brisbane. M and N indicate that the characters are as described for *Mercierella* and *Neopomatus* respectively. On two occasions (MN) characters of both types are present.