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Some New Zealand Pedicellinidae (Entoprocta), and a Species New to Europe

By J. S. RYLAND

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Abstract

AFTER an introduction to the genus *Pedicellina*, the characters used for systematic purposes are enumerated and discussed. Diagnoses and references are then given for previously described species; *P. australis* Ridley and *P. cernua* (Pallas) are also figured; *P. choanata* O'Donoghue is discussed and *P. ichikawai* Yamada is quoted as its synonym; a full description with illustration is given of *P. nutans* Dalyell; and *P. whiteleggii* Johnston & Walker is considered to be a synonym of *P. cernua*.

Illustrated accounts of four new species from the Otago Peninsula, New Zealand, follow a brief ecological outline of the localities at which they were found. A key for their separation is provided.

One of the species is recognized from European waters, where it has been confused with *P. cernua* and *P. nutans*. French and British specimens are described and illustrated and compared with those from New Zealand. A key to European species is given.

To facilitate identification of pedicellinids a generic synopsis is given, and selected characters of some rather similar species are tabulated.

INTRODUCTION

At the request of Dr E. J. Batham, Director of the Portobello Marine Biological Station, some samples of Entoprocta collected on the coast of the Otago Peninsula in 1953 were sent to me for determination. Some of the material was inconclusive and Dr Batham kindly made further collections in 1963. Examination showed that the samples comprised four distinct species, all referable to the genus *Pedicellina*.

There are two families of marine Entoprocta: the Loxosomatidae, which are non-stolonate forms usually of epizoic habit; and the Pedicellinidae, which are free-living, with stalked zoids arising at intervals from a creeping stolon. In the latter family a small number of genera are recognized, with the majority of species belonging to *Pedicellina* M. Sars and *Barentsia* Hincks. The two genera are distinguished by the structure of the stalk, which in *Pedicellina* is simple, muscular and flexible, and in *Barentsia* is composed of one or more rigid and chitinized segments united by muscular joints. One species, *Barentsia mutabilis* (Toriumi) has stalks of both kinds. The special genus *Pseudopedicellina*, created by Toriumi (1951), seems superfluous.

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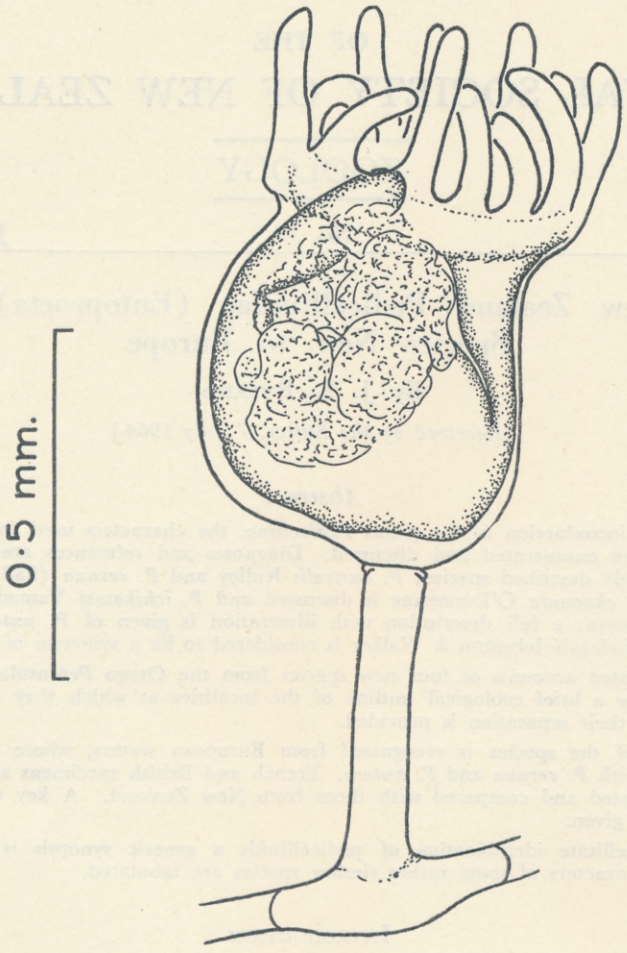

Fig. 1.—*Pedicellina australis* Ridley. Falkland Islands. Brit. Mus. (N.H.). 1935.3.16.11.

Pedicellina zoids arise at intervals from a stolon which frequently branches at their bases. The zoids are usually separated by septa in the stolon and there is often a barren stolon segment between two zoids. The stalk is provided with a sub-epidermal sheath of longitudinal muscle, the degree of development of which varies between species. Cuticular spines are often present. The bell-shaped calyx is separated from the top of the stalk by a septate constriction. A circular lophophore of tentacles surrounds an atrium and is considered morphologically as ventral. The tentacles are united at their bases by a velum which contains a circular band of muscle, contraction of which enables the calyx to be closed with the tentacles folded inside the atrium. Tentacles are ciliated on their inner surface, the tracts joining to produce a ciliated groove leading to the mouth. The U-shaped gut is situated in the median plane. The stomach is more or less globular, conspicuously filling most of the calyx. A short intestine leads to the rectum, which often projects as a papilla. Colonies appear unisexual, but may perhaps be protandrous hermaphrodites.

TAXONOMIC CRITERIA

Discrimination of species within the genus *Pedicellina* is exceptionally difficult on account of the lack of precise characters. Moreover, preserved specimens have all too frequently been fixed without narcotization and are consequently tightly closed, while mounted colonies often show shrinkage and distortion caused by dehydrating and clearing agents. The most useful taxonomic criteria are discussed below.

SIZE. Marked differences in absolute size are found between species, though even within any colony a considerable amount of variation must be expected. Sizes range from less than 1mm to 5mm overall height (in descriptions of species measurements of height normally exclude stolon width).

PROPORTIONS. The size of the calyx relative to the stalk length constitutes a valuable character, though some allowance must be made for variation. The calyx approximately equals stalk height in some species; in others the latter is three to four times as long.

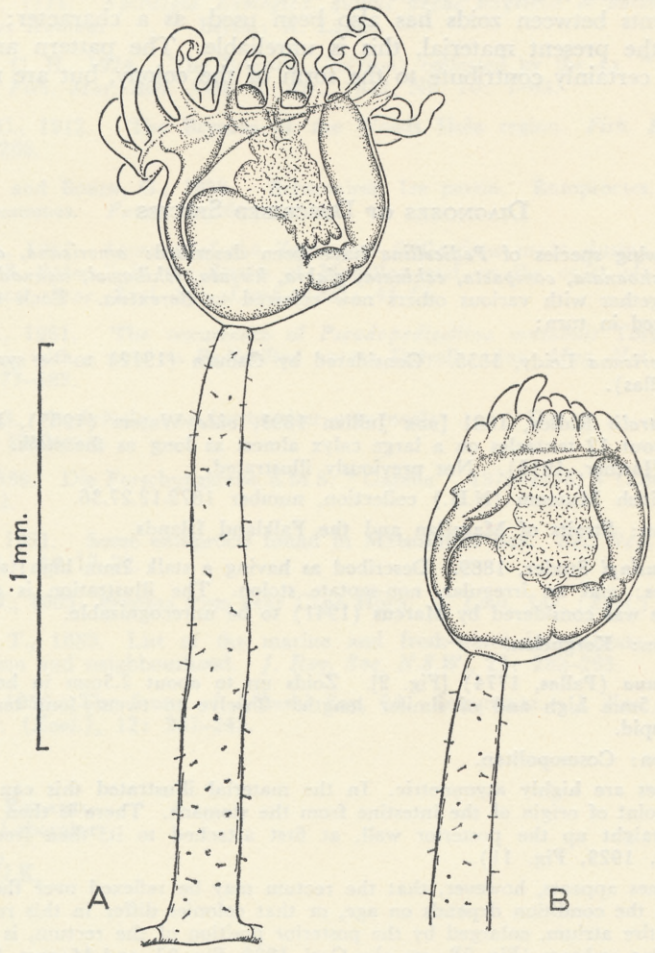

FIG. 2.—*Pedicellina cernua* (Pallas). Two zoids of a female colony from Milford Haven, August. (Brit. Mus. N.H. 1964.2.8.16/17).

Tentacle Number. The adult number varies from 10 to 36, and is reasonably constant within a species. The number found in developing calyces is normally less than in the adult, so any colony will contain a range of tentacle numbers. Minimum number is possibly as important as maximum, but less easy to determine. Narcotization of calyces in an expanded condition is essential.

Gut Structure. Though used in the Loxosomatidae, the characters of the alimentary canal have not yet been considered in *Pedicellina*. The four New Zealand species here described appear to show individually characteristic gut configurations. The position of the rectum seems a potentially useful character which is unaffected by the degree of contraction of the calyx; but further study is needed (see remarks under *P. cernua*, p. 192). The form of the gut determines the extent of sagittal asymmetry of the calyx, which is another useful character.

Cuticular Spines. The presence or absence of spines sometimes provides a useful character, although a great deal of variation apparently occurs in *P. cernua*.

Stolon. The form and size of the stolon varies a good deal. Though usually slender and septate, it may be wider and non-septate. The presence or absence of barren segments between zoids has also been used as a character; but on the evidence of the present material, this is unreliable. The pattern and frequency of branching certainly contribute to the form of the colony, but are most difficult to study.

Diagnoses of Described Species

The following species of *Pedicellina* have been described: *americana, australis, breusingi, cernua, choanata, compacta, echinata, glabra, hirsuta, ichikawai, nannoda, nutans* and *whiteleggii*, together with various others now referred to *Barentsia*. Each species is now briefly considered in turn:

1. *P. americana* Leidy, 1855. Considered by Osburn (1912) to be synonymous with *P. cernua* (Pallas).

2. *P. australis* Ridley, 1881 [*non* Jullien 1891, *vide* Waters (1905). Fig. 1]. Very distinctive. About 12 tentacles on a large calyx almost as long as the stalk. Up to 2.5mm total height (Harmer, 1915). Not previously illustrated.

Type: British Museum (N.H.) collection, number 1879.12.27.36.

Distribution: Straits of Magellan and the Falkland Islands.

3. *P. breusingi* Studer, 1889. Described as having a stalk 2mm high; smooth calyces; 16–18 tentacles; and an irregular, non-septate stolon. The illustration is extremely bad, and the species was considered by Marcus (1941) to be unrecognizable.

Distribution: Kerguelen.

4. *P. cernua* (Pallas, 1774) [Fig. 2]. Zoids up to about 2.5mm in height. Calyces large, about 0.5mm high and of similar length. Twelve to twenty-four tentacles. Stalks glabrous or hispid.

Distribution: Cosmopolitan.

The calyces are highly asymmetric. In the material illustrated this can be related to the very low point of origin of the intestine from the stomach. There is then a long rectum which runs straight up the posterior wall, at first attached to it, then free as a papilla (see also Cori, 1929, Fig. 11).

It sometimes appears, however, that the rectum may be reflexed over the stomach. It is possible that the condition depends on age, or that colonies differ in this respect. In ripe females the entire atrium, enlarged by the posterior position of the rectum, is fully occupied by the developing embryos (Fig. 2B; see also Cori, 1929, Fig. 27, and Marcus, 1939, Fig. 53), so this position may be characteristic of female zoids only (cf. Marcus, 1939, Fig. 52) or of mature zoids of both sexes. Further observations are required.

5. *P. choanata* O'Donoghue, 1924. Zoids up to 5mm high, glabrous, arising from a non-septate stolon. 15–20 tentacles partially enclosed by a membranous fold (extension of the velum).

Type: British Museum (N.H.) collection, number 1923.7.26.23.

Distribution: South Africa, Japan.

O'Donoghue gave a full description, but omitted to state the size; only that it was "relatively large" His very indifferent figure was marked "x 75", which would have made the species a small one. However, examination of specimens has shown that this must have been a misprint for x 7.5: the species is very large.

Yamada (1956), overlooking O'Donoghue's account, has redescribed the species as *P. ichikawai*: his illustrations are excellent.

6. *P. compacta* Harmer, 1915. A very small species of 600–700μ total height; stalk and calyx glabrous; tentacles about 12. Not unlike *P. australis*, but very much smaller.

Paratype: British Museum (N.H.) collection, numbers 1916.8.23.33/34.

Distribution: Aru Islands.

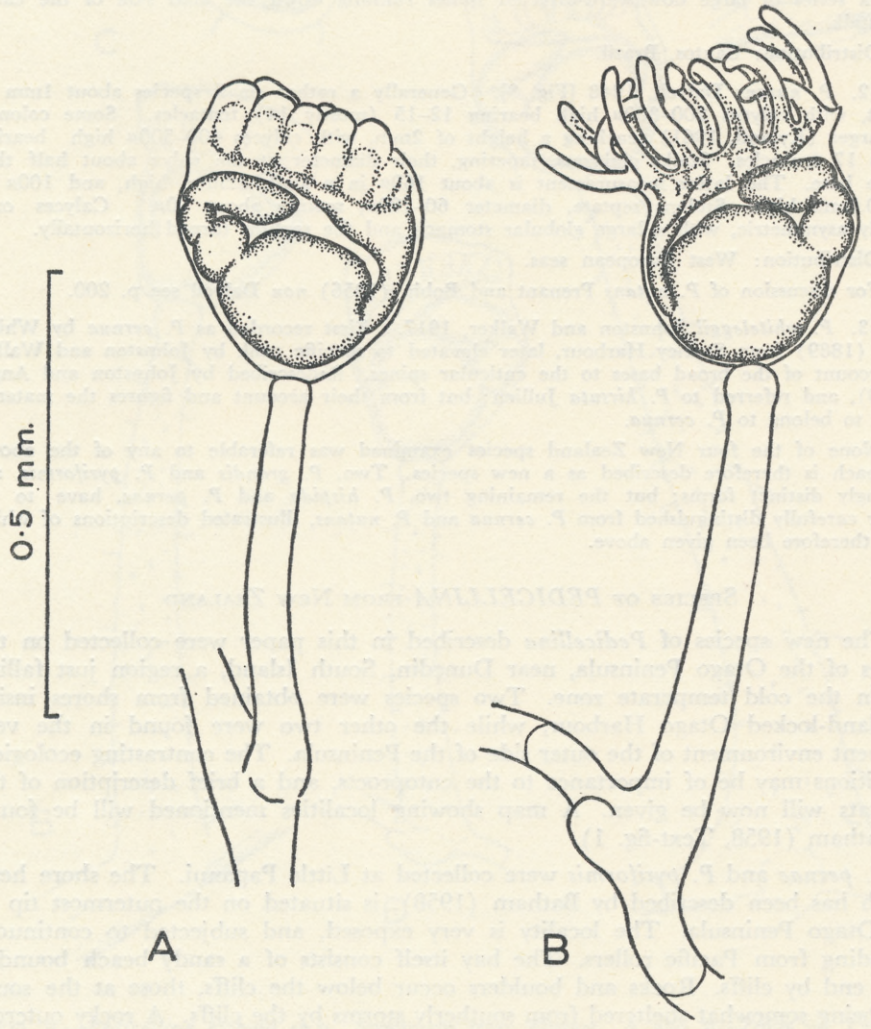

FIG. 3.—*Pedicellina nutans* Dalyell. Two zoids of a colony from Aberffraw, Anglesey; June. (Brit. Mus. N.H. 1964.2.8.12/13).

7. *P. echinata* M. Sars, 1835. Synonym of *P. cernua* (see Hincks, 1880).

8. *P. glabra* Dalyell, 1848. Considered to be a glabrous form of *P. cernua* (see Hincks, 1880).

9. *P. hirsuta* Jullien, 1891. Little information is given in Jullien's description other than that both stalk and calyx are hispid and that tentacles number 24–36.

Distribution: Tierra del Fuego.

Marcus (1941) considered that some specimens from Brazil could be referred to this species. They had 24 tentacles (as in *cernua*), but the colony was characterized by its compact growth and the absence of interzoidal segments in the stolon. Its conspecificity with Jullien's *hirsuta* seems dubious.

Johnston and Angel (1940) described some material from Sydney as *P. hirsuta*, quoting *P. whiteleggii* Johnston and Walker (1917) as a synonym (see *P. whiteleggii*).

10. *P. ichikawai* Yamada, 1956. Synonym of *P. choanata* O'Donoghue (see above).

11. *P. nannoda* Marcus, 1937. Small species of 600–650μ in height; 8–10 tentacles; with a series of large downward-directed spines running down the anal side of the calyx and stalk.

Distribution: Santos, Brazil.

12. *P. nutans* Dalyell, 1848 [Fig. 3]. Generally a rather small species about 1mm in height, with calyces 200–300μ high bearing 12–15 (mostly 14) tentacles. Some colonies are larger (Ryland, 1961) reaching a height of 2mm, with calyces 400–500μ high bearing up to 17 tentacles. Stalks glabrous, tapering, their diameter at the calyx about half that at the base. The latter measurement is about 160μ in a stalk 1.5mm high, and 100μ in one 0.6mm high. Stolons septate, diameter 60–100μ, mainly about 70μ. Calyces only slightly asymmetric, with a large globular stomach and the rectum turned horizontally.

Distribution: West European seas.

For discussion of *P. nutans* Prenant and Bobin (1956) *non* Dalyell see p. 200.

13. *P. whiteleggii* Johnston and Walker, 1917. First recorded as *P. cernua* by Whitelegge (1889) from Sydney Harbour, later elevated to specific rank by Johnston and Walker on account of the broad bases to the cuticular spines. Redescribed by Johnston and Angel (1940), and referred to *P. hirsuta* Jullien; but from their account and figures the material seems to belong to *P. cernua*.

None of the four New Zealand species examined was referable to any of the above, and each is therefore described as a new species. Two, *P. grandis* and *P. pyriformis*, are strikingly distinct forms; but the remaining two, *P. hispida* and *P. pernae*, have to be rather carefully distinguished from *P. cernua* and *P. nutans*, illustrated descriptions of which have therefore been given above.

SPECIES OF *PEDICELLINA* FROM NEW ZEALAND

The new species of *Pedicellina* described in this paper were collected on the shores of the Otago Peninsula, near Dunedin, South Island, a region just falling within the cold temperate zone. Two species were obtained from shores inside the land-locked Otago Harbour, while the other two were found in the very different environment of the outer side of the Peninsula. The contrasting ecological conditions may be of importance to the entoprocts, and a brief description of the habitats will now be given. A map showing localities mentioned will be found in Batham (1958, Text-fig. 1).

P. pernae and *P. pyriformis* were collected at Little Papanui. The shore here, which has been described by Batham (1958), is situated on the outermost tip of the Otago Peninsula. The locality is very exposed, and subjected to continuous pounding from Pacific rollers. The bay itself consists of a sandy beach bounded each end by cliffs. Rocks and boulders occur below the cliffs, those at the south end being somewhat sheltered from southerly storms by the cliffs. A rocky outcrop, the Northern Reef, extends to below low water mark at the north end of the beach (Batham, 1958, Text-fig. 2).

On the Northern Reef and the north end rocks the infra-littoral fringe is dominated by kelps. *Durvillea* spp., and a large, green-shelled mussel *Perna canalicula* which lives among the holdfasts of *D. antarctica*. One of the pedicellinids, of which several colonies were obtained, has been found only on the shells of this mussel. It has accordingly been called *P. pernae*. Although it may subsequently be found on other substrata, the association with *Perna* is evidently highly characteristic.

Where wave exposure at Little Papanui is somewhat less, *Durvillea* and *Perna* are replaced as dominants by red algae. Two colonies of *P. pyriformis* were found on the south end rocks, one growing on the polyzoan *Elzerina blainvillii*, a characteristic species of exposed rock faces, while the second covered the shell plates of an unidentified chiton.

The two remaining species were collected in the sheltered waters of Otago Harbour. *P. grandis* was found under a stone at Lateral Reef, Aquarium Point, Portobello (Batham, 1956, Text-fig. 5), while *P. hispida* was living on brachiopods obtained from Cemetery Bay, Quarantine Island: this island lying just off Aquarium Point.

Batham (1956) has described the shore at Aquarium Point. There are rocky reefs which merge into firm clay with scattered stones and boulders. The shore is sheltered from the Pacific swell, though wind may cause some wave action and there are considerable tidal currents. Rocks in the lower mid-littoral are well covered with various algae, and the flora and fauna become rich below low water of neap tides. Kelp, *Macrocystis pyrifera*, dominates the infra-littoral fringe, but *Perna canalicula*, it should be noted, is absent. *P. grandis* was found near low water.

The shore at Cemetery Bay has not been described, though its general environment is of course similar to that of Aquarium Point. All the colonies of *P. hispida* are from this shore, and each was living on *Terebratella inconspicua*.

The four species may be separated using the following key:

1.	Zoids 2mm or more in height; calyces exceeding 0.5mm	2
	Zoids less than or scarcely exceeding 2mm in height; calyces less than 0.5mm	3
2.	Zoids up to 4mm in height; stalk:calyx ratio about 4:1; 14–20 tentacles; stalks hispid; stolons slender, septate	*grandis*, p. 195
	Zoids up to 3mm; stalk:calyx ratio not more than 3:1; 12–16 tentacles; stalks glabrous; stolons as wide as the stalks, non-septate	*pyriformis*, p. 200
3.	Zoids with 14–20 tentacles; rectum oblique, not reflexed closely over the stomach; stalk:calyx 2.5–3:1	*hispida*, p. 197
	Zoids with 10–16 tentacles; rectum bent sharply back over the stomach; stalk:calyx 1.5–3:1	*pernae*, p. 197

Pedicellina grandis sp. n. Fig. 4

SPECIMENS. One colony (Holotype) found attached to under surface of stone at Lateral Reef, Aquarium Point, Otago Harbour (Type locality) on 3 May 1953. Colony divided between British Museum (Natural History) 1964.2.8.23* and Portobello Marine Biological Station. Slides of illustrated specimens have been deposited at the British Museum, and another slide at the Otago Museum.

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* British Museum (Natural History) specimens have a four-component reference number, the first component indicating the year of registration.

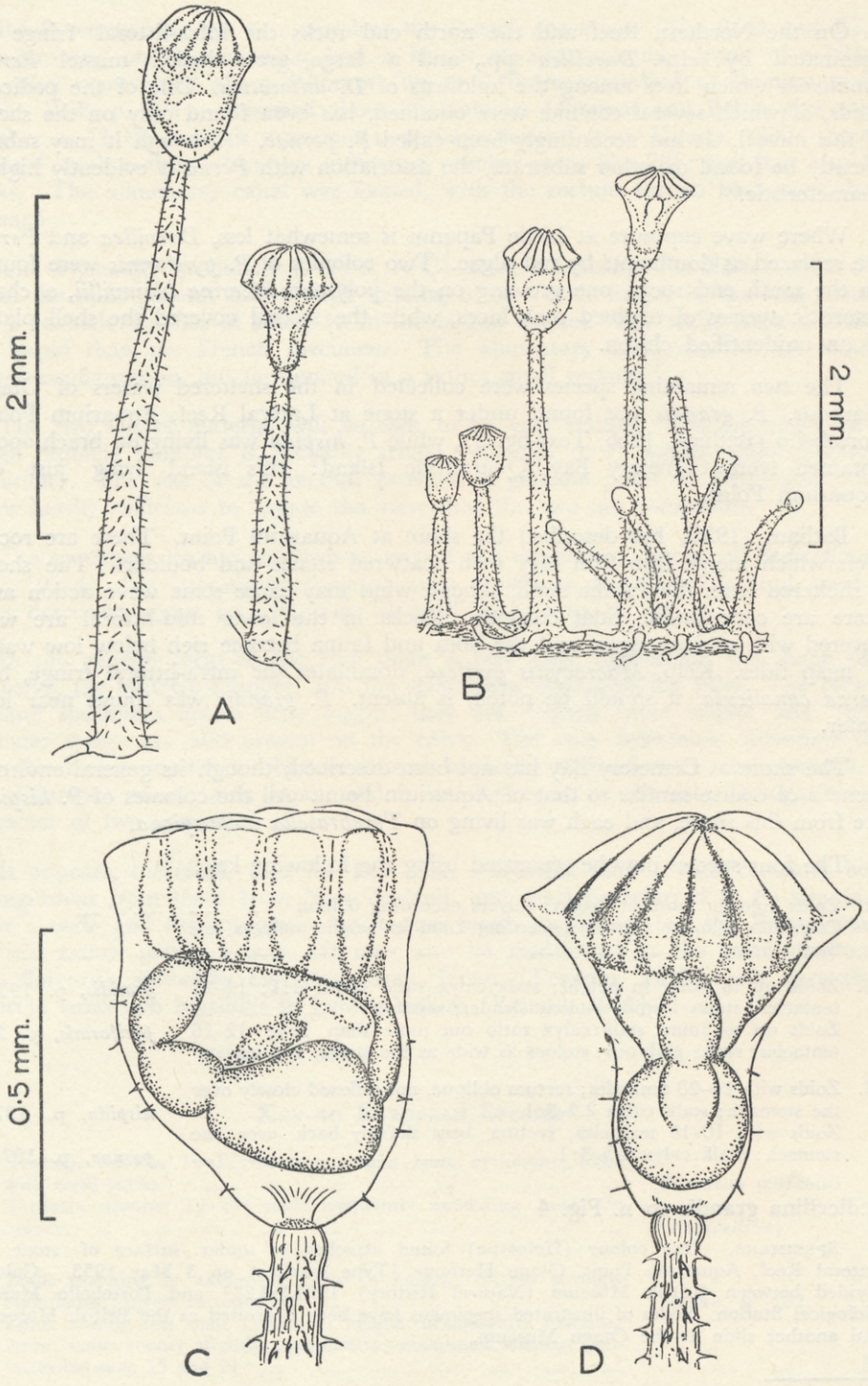

Fig. 4.—*Pedicellina grandis* sp. n. A—Two zoids. B—Part of colony (Brit. Mus. N.H. 1964.2.3.1). C—Lateral view of calyx (1964.2.8.2). D—Anal view of calyx (specimen as B).

DESCRIPTION. A tall species reaching 4mm in height. Zoids arising at intervals of less than 0.5mm along the stolon. The latter septate, 50–80μ in diameter, branching in a cruciform manner at most zoid bases, thereby forming a densely clustered colony. Stalks reaching or just exceeding 3mm in height, tapering from a width of 200–300μ at the base to 100μ at the calyx; about four times the calyx length; longitudinal muscle conspicuous; hispid. Calyx 600–700μ in height (closed), asymmetric, laterally compressed; somewhat hispid; rectum oblique; tentacles numbering about 20 (maximum observed 21), with 14 in young calyces; long, forming a conical cap in the semi-contracted state.

HABITAT. See p. 195.

Its large size and characteristic appearance render this species quite distinct from any other.

Pedicellina hispida sp. n. Fig. 5

SPECIMENS. Three colonies have been seen, all on the brachiopod *Terebratella inconspicua* (Sowerby) from Cemetery Bay, Quarantine Island, Otago Harbour (Type locality).

Holotype, collected 4 May 1961, deposited at Portobello Marine Biological Station, with a slide at the British Museum (N.H.), 1964.2.8.5.

Paratype, collected 4 May 1961, deposited at British Museum (N.H.) 1964.2.8.25.

Paratype, collected 10 December 1962, deposited at Otago Museum, with a slide at British Museum (N.H.), 1964.2.8.6.

DESCRIPTION. Species of small-medium size, with zoids 1–2mm in height, sometimes a little more, arising at irregular intervals of about 0.3–1.0mm along the slender stolon. The latter septate (inconspicuous), about 60μ in diameter, and aften branching in cruciform manner at zoid bases. Stalks 1–1.5mm in height, tapering from a basal width of about 200μ to 80–100μ at the calyx; two and a-half to three times the calyx length; hispid. Calyx 0.5mm high or a little less, somewhat asymmetric; slightly hispid. Tentacles numbering about 20 in well developed calyces, united basally by a rather deep velum. Stomach relatively large, filling the lower part of the calyx; rectum oblique. Colonies apparently unisexual.

HABITAT. Three colonies have been seen, all on brachiopod *Terebratella inconspicua* from a rocky shore; see also p. 195.

DISTRIBUTION. Recorded from Europe (see p. 200).

Differs from *P. nutans* (p. 194), which it roughly resembles in size and form, by having a greater number of tentacles and by the hispid stalk. Very much smaller than *P. grandis*. For differences from *P. pernae* see p. 199.

Pedicellina pernae sp. n. Fig. 6

SPECIMENS. A number of colonies have been found, all on valves of the mussel *Perna canalicula* (Gmelin) from Little Papanui (Type locality) on the exposed site of the Otago Peninsula.

Holotype. Colony on part of shell collected on 5 February 1963, deposited at the British Museum (N.H.), 1964.2.8.26, together with two slides, 1964.2.8.8/9; the remainder of the shell retained at Portobello Marine Biological Station.

Paratypes. Additional shell material of *Perna* with colonies *in situ* collected at Little Papanui on 20 October 1953 and 4 February 1963, has been deposited at the British Museum (N.H.), 1964.2.8.27/28, Portobello and at the Otago Museum.

DESCRIPTION. A rather small species, less than 2mm in height. Zoids arising at intervals from a stolon of 40–60μ in diameter. Stalks usually somewhat less than 1mm in height, rarely a little more, the largest having a basal diameter of about 170μ tapering to 100μ at the calyx; one and a-half to three times the length of the calyx; sparsely hispid. Calyx up to about 400μ in height, moderately asymmetric, glabrous or almost so. Rectum turned sharply back over the stomach. 10–16 tentacles.

HABITAT. All the colonies seen have been found on valves of *Perna canalicula* —a species supporting a rich shell fauna—from an exposed shore (p. 195).

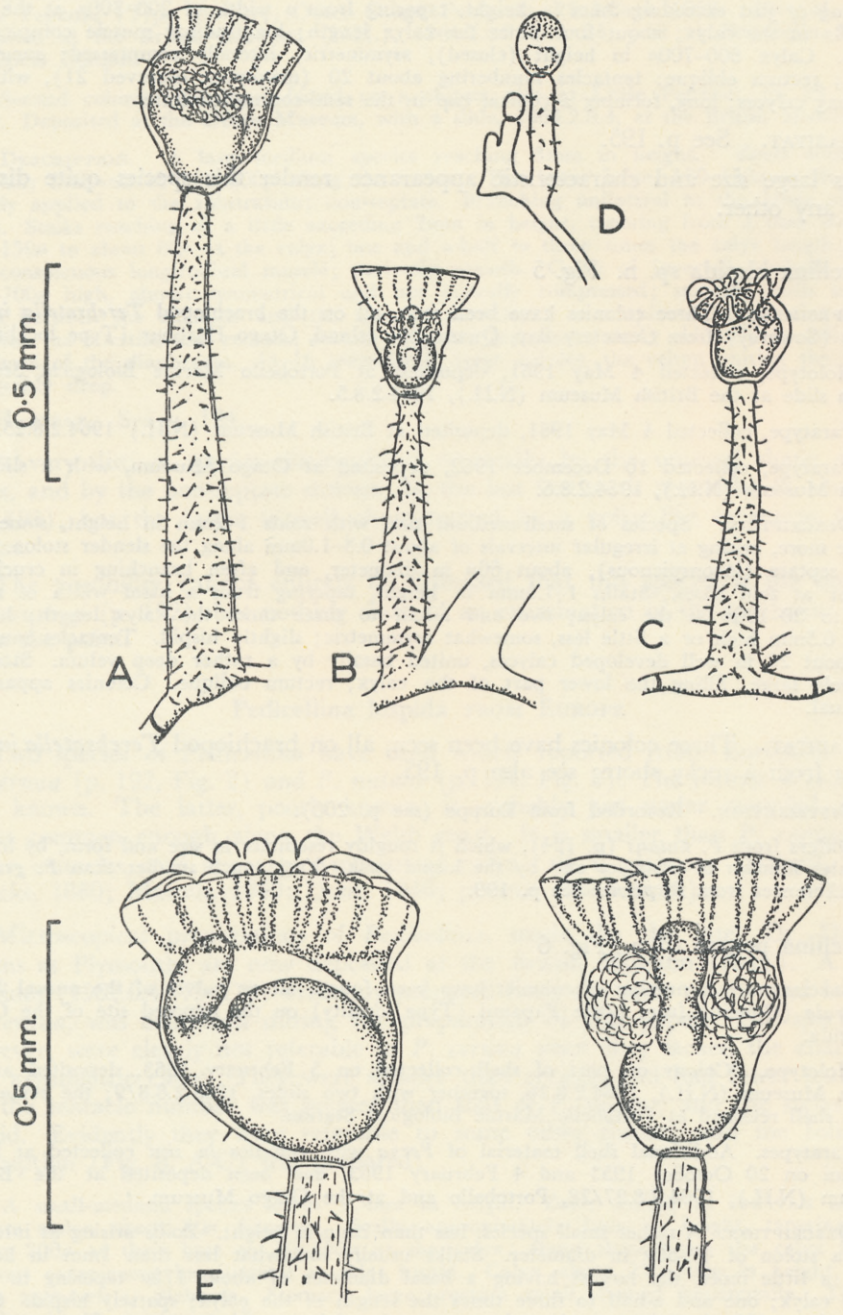

Fig. 5.—*Pedicellina hispida* sp. n. A-D, F—From holotype (Brit. Mus. N.H. 1964.2.8.5) male colony; E—From paratype (1964.2.8.6). A-C—Zoids. D—Young zoids at growing point of colony. E—Lateral view of calyx. F—Anal view of calyx.

A nondescript species lacking distinctive features. Its general form is that of *P. cernua*, from which it is distinguished by its smaller size and fewer tentacles. It differs from *P. nutans* in its more asymmetric calyces and hispid stalks. Its calyces are also more asymmetric than those of *P. hispida*, it has fewer tentacles and the stalk tends to be proportionally shorter than in that species.

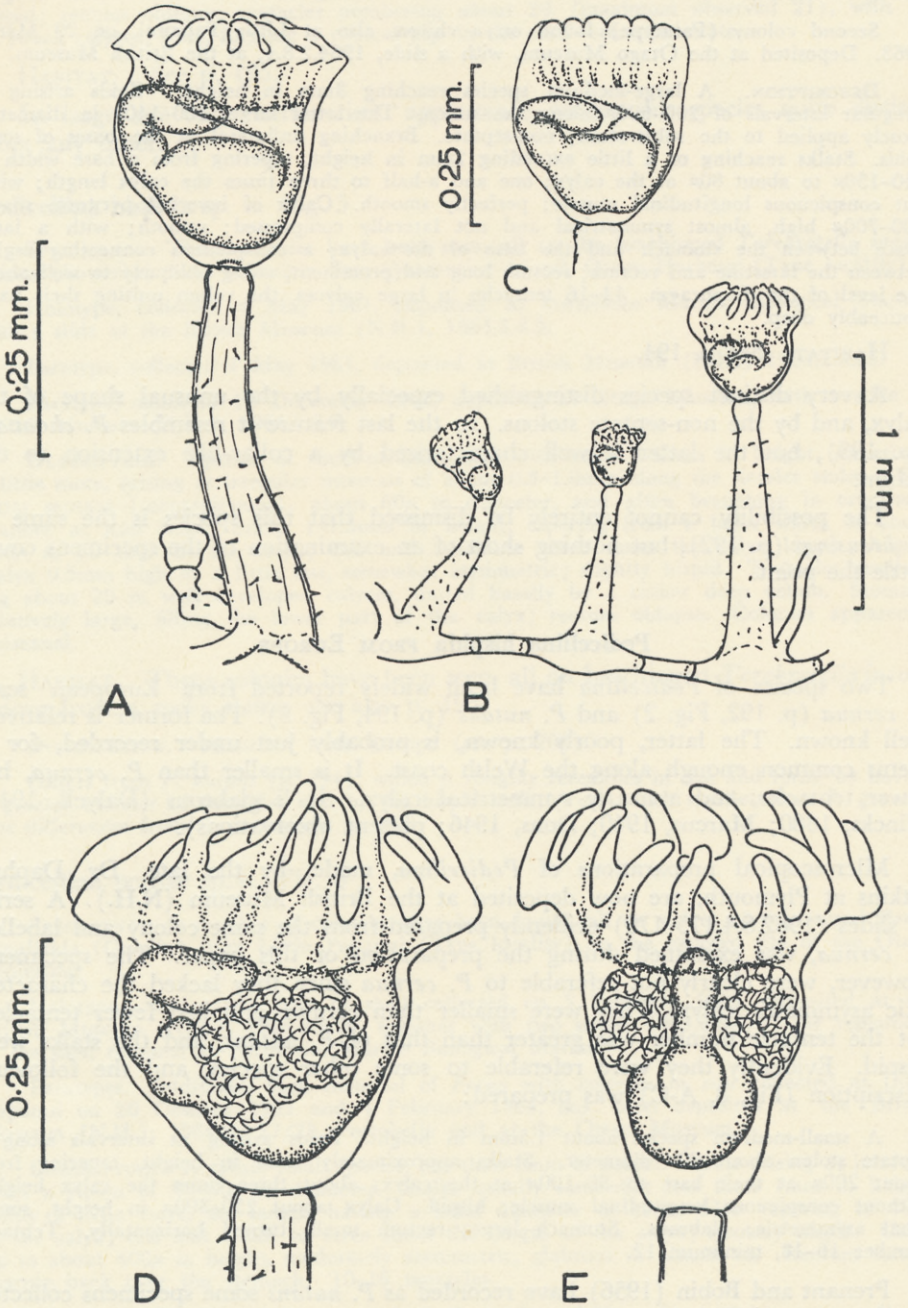

FIG. 6.—*Pedicellina pernae* sp. n. A—Complete zoid (Brit. Mus. N.H. 1964.2.8.10). B—Part of colony (Type: 1964.2.8.8). C—Lateral view of contracted calyx (1964.2.8.11). D—Lateral view of calyx (1964.2.8.8). E—Anal view of calyx (1964.2.8.11).

Pedicellina pyriformis sp. n. Fig. 7

SPECIMENS. Holotype: Colony found on the polyzoan *Elzerina blainvillii* Lamx., at Little Papanui (Type locality), Outer Otago Peninsula, 29 March 1963. Part of colony deposited at the British Museum (N.H.), 1964.2.8.3 and 24, part at Portobello Marine Biological Station.

Second colony (Paratype) found on a chiton, also at Little Papanui, on 29 March 1963. Deposited at the Otago Museum, with a slide, 1964.2.8.4, at the British Museum.

DESCRIPTION. A large-medium species reaching 3mm in height. Zoids arising at irregular intervals of 200–600μ along the stolon. The latter large, 100–140μ in diameter, loosely applied to the substratum; non-septate. Branching unilateral at the bases of some zoids. Stalks reaching or a little exceeding 2mm in height, tapering from a base width of 140–150μ to about 80μ at the calyx; one and a-half to three times the calyx length; without conspicuous longitudinal muscle; perfectly smooth. Calyx of inverted pyriform shape, 600–700μ high, almost symmetrical and not laterally compressed; smooth; with a large space between the stomach and the base of the calyx; a conspicuous connecting region between the intestine and rectum; rectum long and prominent, rising obliquely to well above the level of the diaphragm. 14–16 tentacles in large calyces, the velum uniting their bases noticeably deep.

HABITAT. See p. 194.

A very distinct species distinguished especially by the unusual shape of the calyx, and by the non-septate stolons. In the last feature it resembles *P. choanata* (p. 193), but the latter is well characterized by a collar-like extension to the velum.

The possibility cannot entirely be dismissed that this species is the same as *P. breusingi* (p. 192), but nothing short of an examination of the specimens could settle the point.

Pedicellina hispida FROM EUROPE

Two species of *Pedicellina* have been widely reported from European seas; *P. cernua* (p. 192, Fig. 2) and *P. nutans* (p. 194, Fig. 3). The former is relatively well known. The latter, poorly known, is probably just under recorded, for it seems common enough along the Welsh coast. It is smaller than *P. cernua*, has fewer tentacles, and a nearly symmetrical calyx. It is glabrous (Dalyell, 1948; Hincks, 1880; Marcus, 1940; Dons, 1946; present observations).

Microscopical preparations of *Pedicellina*, made by the late Dr Daphne Atkins at Plymouth, are now deposited at the British Museum (N.H.). A series of slides (1962.6.4.175–179) evidently prepared from the same colony and labelled *P. cernua*, was examined during the preparation of this paper. The specimens, however, were clearly not referable to *P. cernua* since they lacked the characteristic asymmetric calyx. They were smaller than *cernua*, and had fewer tentacles; yet the tentacle number was greater than that of *P. nutans*, and the stalks were hispid. Evidently they were referable to some other species, and the following description (Fig. 8, A-C) was prepared:

A small-medium species about 1.5mm in height. Zoids arising at intervals along a septate stolon about 60μ diameter. Stalks approximately 1mm in height, tapering from about 200μ at their base to 80–100μ at the calyx; about three times the calyx height; without conspicuous longitudinal muscle; hispid. Calyx about 250–300μ in height, somewhat asymmetric; glabrous. Stomach large; rectum small, turned horizontally. Tentacle number 16–18, minimum 12.

Prenant and Bobin (1956) have recorded as *P. nutans* some specimens collected on the coast of Finistère. Though described as generally conforming to published accounts of *P. nutans*, the specimens were hispid. It seemed likely that the

Pedicellina from Finestère might prove to be identical with the Plymouth species and, at my request, Mlle. Bobin kindly sent a sample from the former locality: though the illustrated specimens (Prenant and Bobin, 1956, Fig. 51), it appears, are no longer in existence.

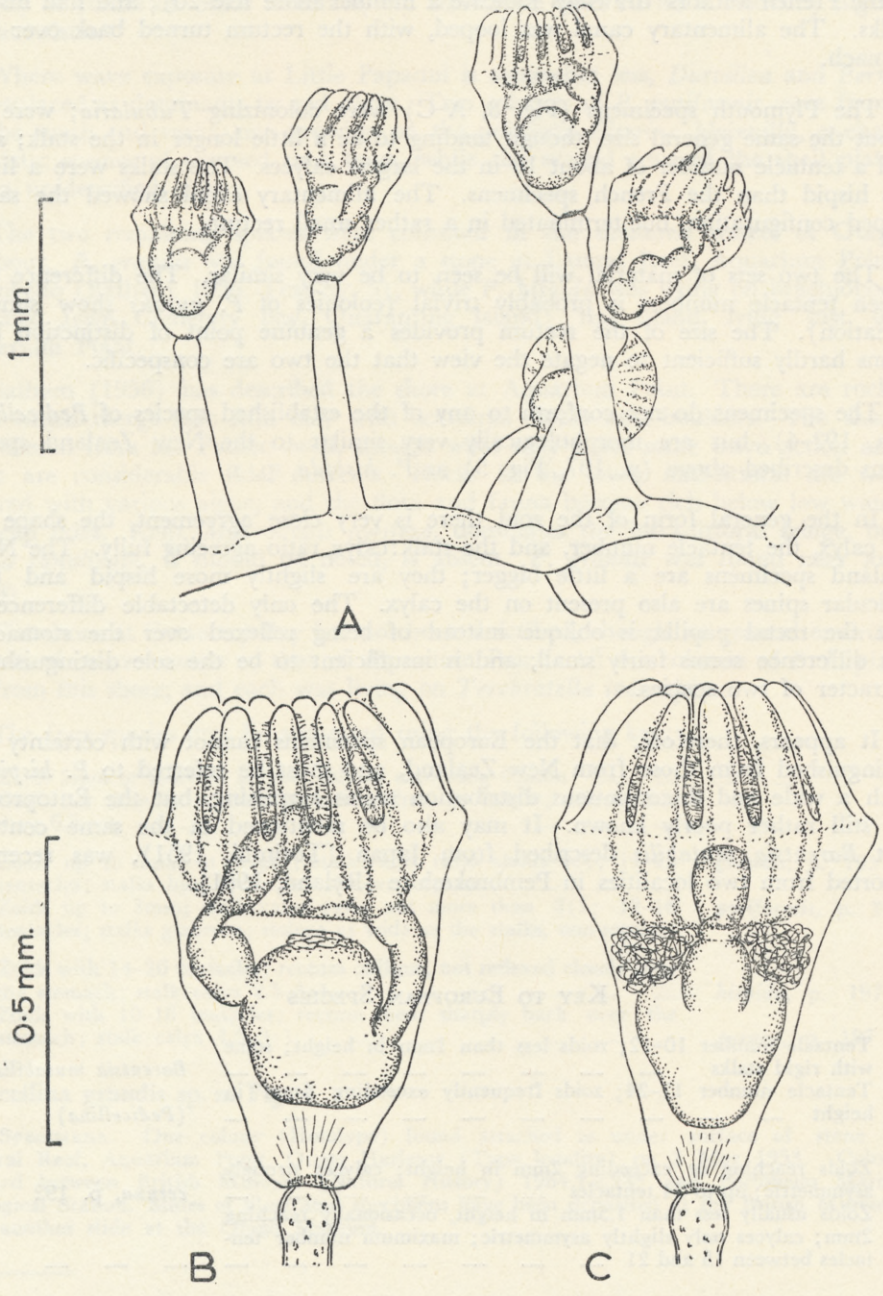

FIG. 7.—*Pedicellina pyriformis* sp. n. A—Part of colony (Brit. Mus. N.H. 1964.2.8.3). B—Lateral view of calyx. C—Anal view of calyx.

Briefly comparing the two samples: the French specimens (Fig. 8, D and E), were growing on *Bowerbankia*; had a height of approximately 1mm, of which the calyx contributed about 0.25mm (up to 0.45mm according to Prenant and Bobin, 1956, p. 104); possessed about 20 tentacles (Prenant and Bobin give the number as 12–16, but this statement is perhaps derived from Hincks, 1880: some of the French authors' drawings indicate a number more like 20); and had hispid stalks. The alimentary canal was looped, with the rectum turned back over the stomach.

The Plymouth specimens (Fig. 8, A–C) were colonizing *Tubularia*; were of about the same general size, though tending to be a little longer in the stalk; and had a tentacle number of about 18 in the largest calyces. The stalks were a little less hispid than the French specimens. The alimentary canal showed the same looped configuration, but terminated in a rather small rectum.

The two sets of material will be seen to be very similar. The difference between tentacle numbers is probably trivial (colonies of *P. nutans* show similar variation). The size of the rectum provides a genuine point of distinction but seems hardly sufficient to negate the view that the two are conspecific.

The specimens do not conform to any of the established species of *Pedicellina* (pp. 192–4), but are morphologically very similar to the New Zealand specimens described above (p. 197, Fig. 5) as *P. hispida* sp. n.

In the general form of the zoid there is very close agreement, the shape of the calyx, the tentacle number, and the stalk:calyx ratio agreeing fully. The New Zealand specimens are a little bigger; they are slightly more hispid and the cuticular spines are also present on the calyx. The only detectable difference is that the rectal papilla is oblique instead of being reflexed over the stomach: this difference seems fairly small, and is insufficient to be the sole distinguishing character of two species.

It appears, therefore, that the European specimens cannot with certainty be distinguished from those from New Zealand, and must be referred to *P. hispida*. Such a wide and discontinuous distribution seems surprising, but the Entoprocta are still rather poorly known. It may also be mentioned in the same context that *Barentsia mutabilis* described from Japan (Toriumi, 1951), was recently reported from two localities in Pembrokeshire (Ryland, 1961).

Key to European Species

1.	Tentacle number 10–12; zoids less than 1mm in height; some with rigid stalks	*Barentsia mutabilis*
	Tentacle number 12–24; zoids frequently exceeding 1mm in height	(*Pedicellina*) 2
2.	Zoids reaching or exceeding 2mm in height; calyces strongly asymmetric; up to 24 tentacles	*cernua*, p. 192
	Zoids usually less than 1.5mm in height, occasionally reaching 2mm; calyces only slightly asymmetric; maximum number tentacles between 15 and 21	 3
3.	Stalk glabrous; adult tentacle number 14–16, rarely 17	*nutans*, p. 194
	Stalk hispid; adult tentacle number 16–21	*hispida*, p. 200

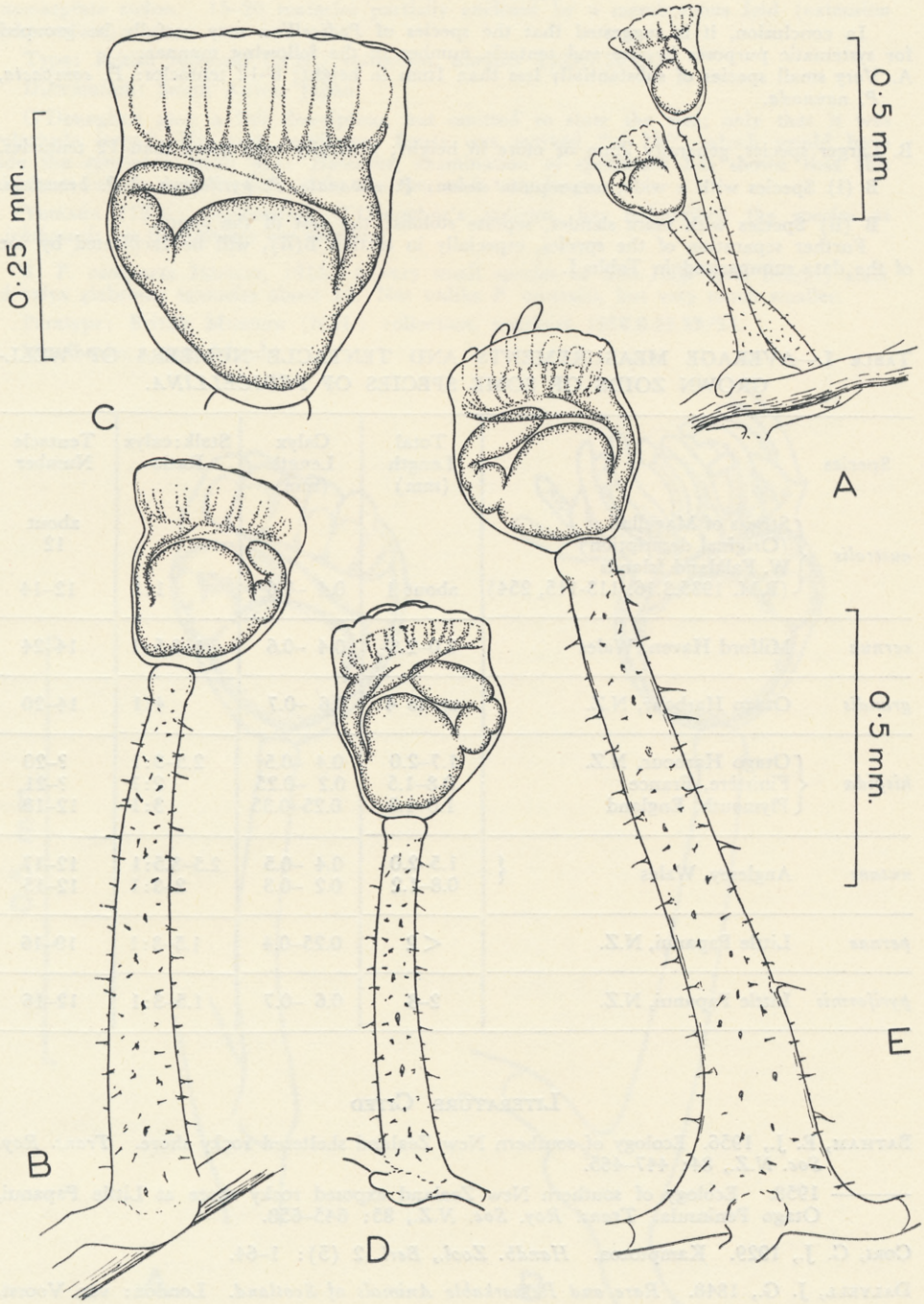

FIG. 8.—*Pedicellina hispida* sp.n. Specimens from Europe. A and B—Zoids on *Tubularia*; Plymouth; (Brit. Mus. N.H. 1962.6.14.175). C—Lateral view of calyx (1962.6.14.176). D and E—Two zoids from Finistère (1964.2.8.7).

Generic Synopsis

In conclusion, it is suggested that the species of *Pedicellina* may usefully be grouped for systematic purposes by size and tentacle number in the following manner:

A. Very small species of substantially less than 1mm in height; 8–12 tentacles: *P. compacta, P. nannoda.*

B. Larger species, generally 2mm or more in height; generally with more than 12 tentacles.

B (i) Species with a wide, non-septate stolon: *P. choanata, P. pyriformis, ? P. breusingi.*

B (ii) Species with more slender, septate stolons: the rest of the genus.

Further separation of the species, especially in section B(ii), will be facilitated by use of the data summarized in Table I.

Table I.—AVERAGE MEASUREMENTS AND TENTACLE NUMBERS OF WELL-GROWN ZOIDS OF SOME SPECIES OF *PEDICELLINA*.

Species		Total Length (mm)	Calyx Length (mm)	Stalk:calyx Ratio	Tentacle Number
australis	Straits of Magellan (Original description)				about 12
	W. Falkland Islands (B.M. 1935.3.16. 113-115, 254)	about 1	0.4 –0.6	1:1	12–14
cernua	Milford Haven, Wales	2.0–2.3	0.4 –0.6	1–3.5:1	14–24
grandis	Otago Harbour, N.Z.	up to 4	0.6 –0.7	4:1	14–20
hispida	Otago Harbour, N.Z.	1.7–2.0	0.4 –0.5	2.5–3:1	?–20
	Finistère, France	0.8–1.5	0.2 –0.25	2:1	?–21
	Plymouth, England	1.0–1.5	0.25–0.35	3:1	12–18
nutans	Anglesey, Wales	1.5–2.0	0.4 –0.5	2.5–3.5:1	12–17
		0.8–1.2	0.2 –0.3	2–3:1	12–15
pernae	Little Papanui, N.Z.	< 2	0.25–0.4	1.5–3:1	10–16
pyriformis	Little Papanui, N.Z.	2–3	0.6 –0.7	1.5–3:1	12–16

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