

A NEW GENUS IN THE HOLOTHURIAN FAMILY SYNAPTIDAE, WITH A NEW SPECIES FROM TASMANIA

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(With 15 figures.)

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Late in 1964, one of us (D.L.P.) received from Professor V. V. Hickman in Tasmania a specimen of a new synaptid holothurian from that island. Professor Hickman had prepared permanent mounts of representative calcareous deposits of the specimen, and very kindly offered all of his material of the species to D.L.P. for inclusion in a report on the apodous holothurians of the Australian Museum which was then in preparation. Early in 1966 F.W.E.R. received from the Oslo Museum six specimens and a fragment of the same species. Quite by accident we discovered that we were in the process of describing this new species independently. This joint contribution comprises the sum total of our investigations.

We would like to thank Professor V. V. Hickman for making the holotype available to D.L.P., and Dr. T. Soot-Ryen for giving F.W.E.R. the opportunity of examining specimens from the Oslo Museum. We are grateful to Miss Ailsa M. Clark of the British Museum (Natural History) for her help and encouragement during the preparation of certain parts of this paper.

The distinctive characters of the new species from Tasmania and some other species formerly referred to the genus *Protankyra* Oestergren, 1898 led F.W.E.R. to the suggestion that the genus *Protankyra sensu lato* comprises two discrete groups of species. One group, which includes the type species of the genus, has oval to circular anchor plates with many perforations while the other, which includes the new species described here, has anchor plates which are more or less elongated and have few perforations. This latter group is here referred to a new genus which, for the reasons given below, seem to be intermediate between *Protankyra* restricted and *Labidoplax* Oestergren, 1898. The new genus embraces all of the species found in group D of the key given by H. L. Clark (1907; 98) together with some others described or redescribed since the publication of Clark's key. For the purposes of convenience a key to the species referred to the new genus is given below.

Order APODIDA Brandt, 1835

Family Synaptidae Burmeister, 1837

Rynkatorpa n.g.

...*Diagnosis*: Tentacles 12. Anchors and anchor plates all of one kind, but varying in size. Anchors not conspicuously asymmetrical. Anchor plates more or less elongate and irregular in outline, with few (25-50) perforations, of which two near center of plate are usually conspicuously larger than the rest (except in *R. uncinata*). Perforations with smooth or spinous margins. Polian vesicles usually one to three (except in *R. uncinata* which has four to five).

Type-species: *Rynkatorpa hickmani* n. sp.

Also included in the genus: *Synapta challengeri* Theel, 1886; *Protankyra duodactyla* H. L. Clark, 1907; *P. bicornis* Sluiter, 1901; *P. sluiteri* Fisher, 1907 (nom. nov. for *P. sibogae* Sluiter, 1901); *P. timida* Koehler and Vaney, 1905; *P. bisperforata* H. L. Clark, 1938. Whether *Synapta uncinata* Hutton, 1872, should be included in this genus is debatable. It would appear, with its 4-5 polian vesicles and plates which lack the two characteristic large centrally placed perforations, that this species is an intermediate link between the new genus and *Protankyra*.

Etymology: The generic name is of feminine gender, and is an anagram of *Protankyra* into which genus the included species were placed by H. L. Clark, 1907.

Remarks: The new species is selected as the type of this genus in preference to older species because it is now the best-known, and is described here from a good size range of specimens.

This genus seems to be intermediate between *Labidoplax* and *Protankyra* restricted, for in several species the anchor plates approach the condition found in *Labidoplax*, in which latter genus they have a characteristic "handle". *Protankyra* species generally have more Polian vesicles than those in *Rynkatorpa* while species of *Labidoplax* usually have only one Polian vesicle.

Future investigations may show that this new genus can be further subdivided for although *R. uncinata* (Hutton) has all of the diagnostic characters given here for the genus, it differs from

all other species in the genus in possessing 4-5 Polian vesicles, while the rest have 1-3. This character must be treated cautiously, however, for it is well known that the number of Polian vesicles can increase with growth. In possessing two digits on each tentacle *R. duodactyla* (H. L. Clark) and *R. bicornis* (Sluiter) may be distinguished easily from all other species in the genera *Rynkatorpa* and *Protankyra*. The latter species as described by Sluiter (1901; 131, pl. 10 fig. 15) has calcareous deposits which are unique among the synaptids. The anchors (if correctly represented by Sluiter) with grains on the vertex and no serrations on the arms indicate a possible affinity with the genus *Synaptula* Oersted 1849, but the anchor plates are of the type found in *Rynkatorpa*. This species was placed in group D of his key by Clark (1907; 98), and it is included in the key below; a re-examination of the type material of *R. bicornis* should establish with certainty the systematic position of the species.

Key to the species in Rynkatorpa n.g.

- 1 (4) Tentacles with two digits.
- 2 (3) Accessory calcareous deposits present as perforated plates up to 0.35 mm. in diameter; one Polian vesicle
bicornis (Sluiter)
- 3 (2) Accessory calcareous deposits absent; two Polian vesicles *duodactyla* (H. L. Clark)
- 4 (1) Tentacles with four digits.
- 5 (6) Anchor stock branched; anchors up to 0.6 mm. long *sluiteri* (Fisher)
- 6 (5) Anchor stock unbranched; anchors usually less than 0.5 mm long.
- 7 (8) Perforations of anchor plates with slightly spinous margins
timida (Koehler and Vaney)
- 8 (7) Perforations of anchor plates with smooth margins.
- 9 (14) Anchor plates with two central perforations conspicuously larger than the rest.
- 10 (13) Anchor plate with rudimentary bridge and with posterior end often narrowed to form a rudimentary "handle"; one or two Polian vesicles.
- 11 (12) Anchors 0.24-0.35 mm long, anchor plates 0.20-0.27 mm long; two Polian vesicles
challengeri (Theel)
- 12 (11) Anchors 0.09-0.23 mm long, anchor plates 0.09-0.17 mm long; one Polian vesicle
hickmani n. sp.
- 13 (10) Anchor plate without a rudimentary bridge or "handle"; three Polian vesicles
bisperforata (H. L. Clark)
- 14 (9) Anchor plates with perforations of varying size; no two central perforations consistently and conspicuously larger than the rest *uncinata* (Hutton)

(Note: F.W.E.R. examined the type specimens of the species *Synapta challengeri* Theel, 1886, and found that the perforations of the anchor plates were perfectly smooth, as Theel (1886) represented them. This character is regarded as diagnostic in

the key above. If the illustration given by Koehler and Vaney (1905, pl. XV, figs. 33-35) of the anchor plate of their *Protankyra timida* is accurate then it would appear that *P. timida*, formerly regarded as a synonym of *S. challengeri*, is a valid species, distinguishable from *S. challengeri* on the basis of the spinous margins of its anchor plate perforations).

Rynkatorpa hickmani n. sp.

(Fig. 1-15)

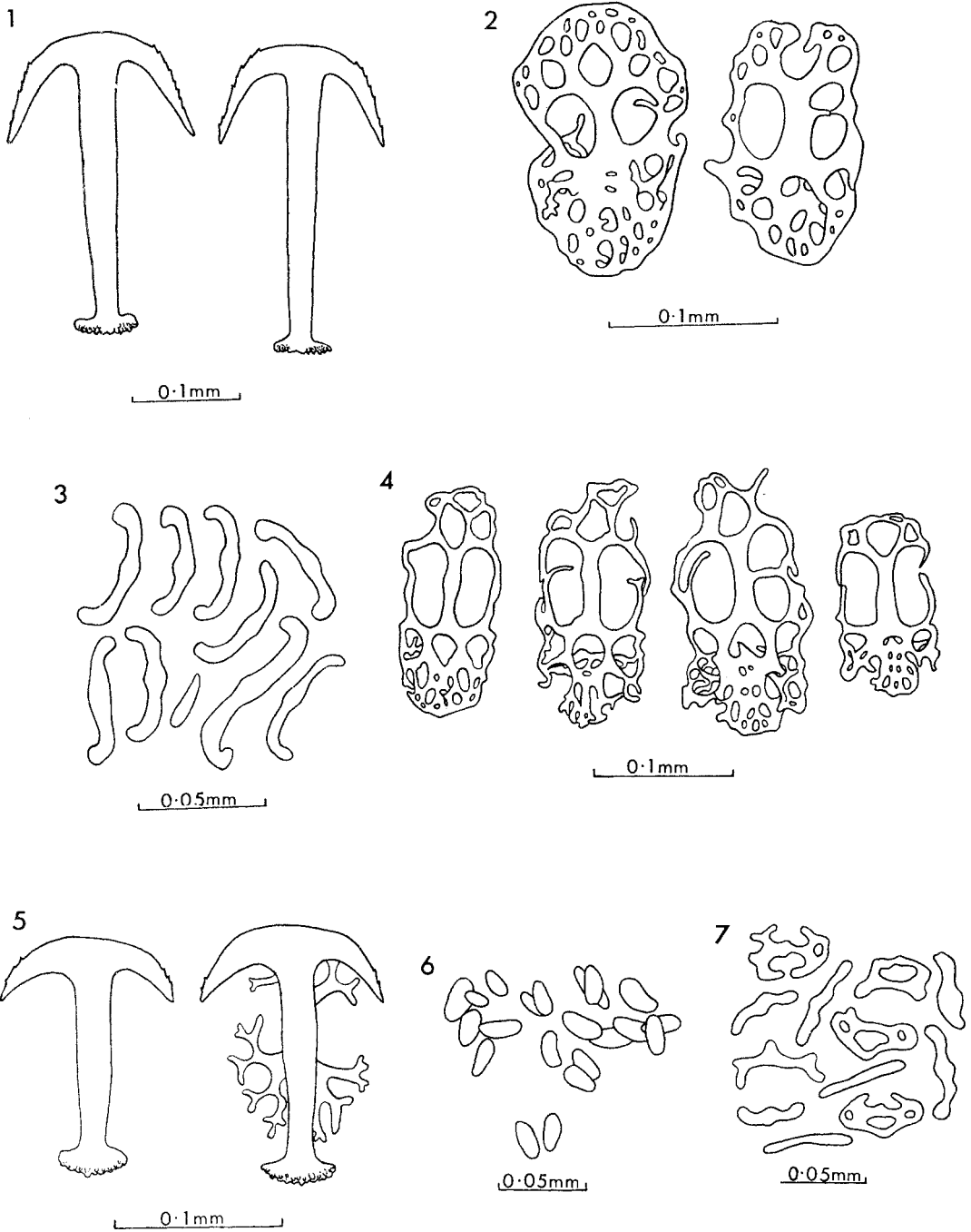
Diagnosis: Tentacles with four digits. Anchors 0.09-0.23 mm long, stock unbranched. Anchor plates 0.09-0.17 mm long, with two central perforations conspicuously larger than the rest; plates with rudimentary bridge and with posterior end narrowed to form a rudimentary "handle". One Polian vesicle.

Description of Holotype: Specimen in two pieces, anterior portion 30 mm long, posterior portion 70 mm long. Diameter of body about 7 mm. Skin thin, translucent. Tentacles twelve, decreasing in length from dorsal to ventral side, median ventral pair being shortest. Tentacle stem terminates distally in small conical knob. On each side of knob are two slender digits, of which outer pair are larger. Numerous sensory cups on each side of basal half of oral surface of tentacles.

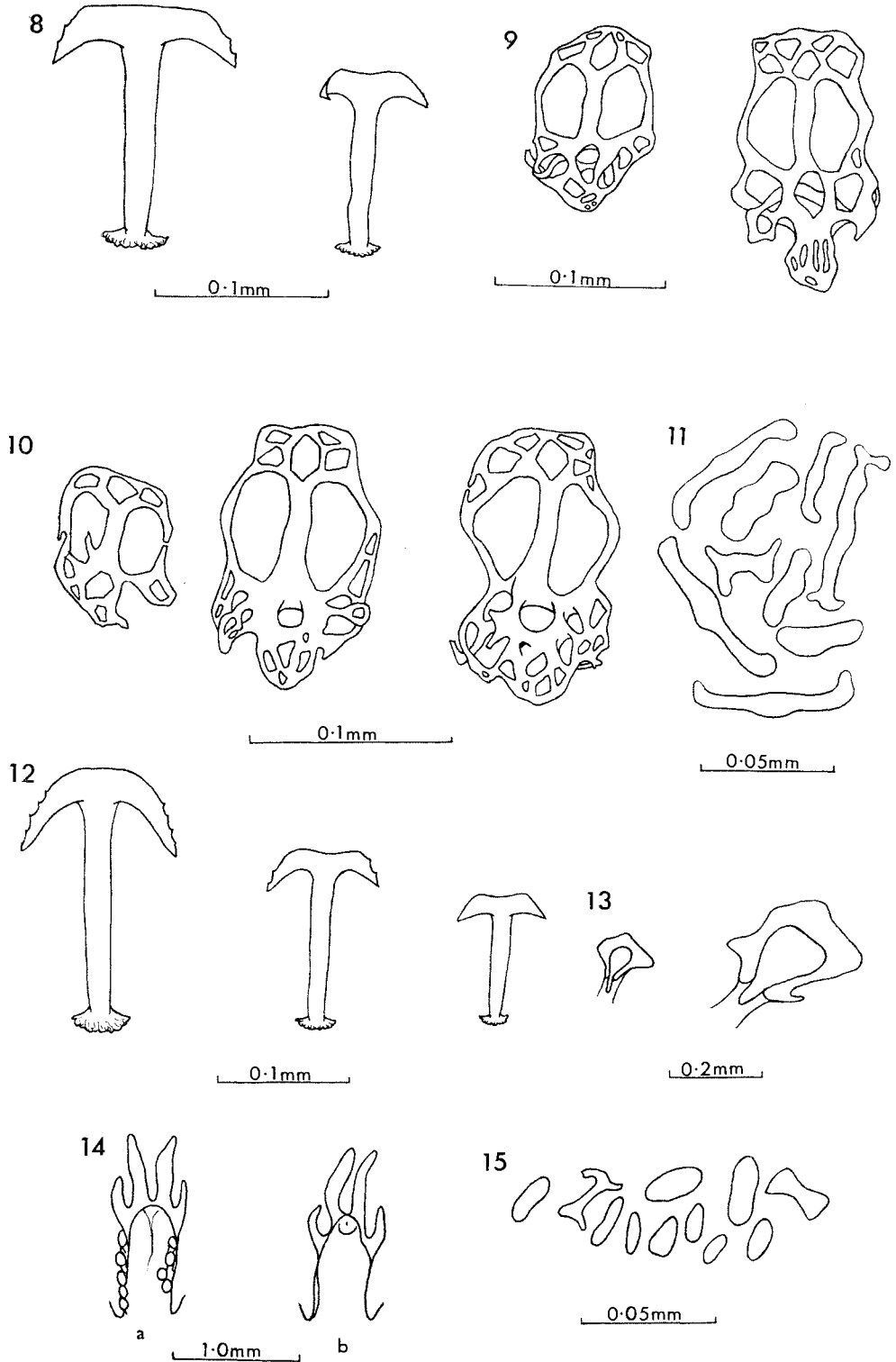
Anterior and posterior regions of body with markedly different calcareous deposits. Anterior anchors and plates smaller and less numerous than posterior anchors and plates. Anchors from anterior end 0.135-0.159 mm long, average length 0.144 mm; width across arms 0.095-0.108 mm, average width 0.100 mm. Arms with two to three teeth or occasionally none. Stock of anchor unbranched, with coarse denticulations (Fig. 5). Anchors associated with anchor plates, the latter often incomplete or in process of formation; many anchors without plates. Complete plates with two large angular perforations. In front of these are several smaller perforations of which central one is largest. Behind two large central perforations are numerous smaller holes and some projections which form rudimentary bridge for support of anchor (Fig. 2). Anterior anchor plates 0.132-0.153 mm long, average length 0.142 mm and 0.084-0.100 mm broad, average breadth 0.091 mm. In posterior region of body anchors 0.147-0.226 mm long, average length 0.200 mm, and 0.111-0.150 mm wide, average width 0.129 mm. Arms with two to seven teeth (Fig. 1). Anchor plates 0.137-0.168 mm long, average length 0.153 mm and 0.095-0.111 mm broad, average breadth 0.101 mm. Plates in various stages of development (Fig. 4). Complete plates have fewer perforations in front of large central perforations than those from anterior end of body.

Anterior body wall with numerous curved or straight accessory rods approximately 0.050 mm in length, swollen near middle; some with swollen or branched extremities. Associated with rods are small plates with one to four perforations (Fig. 7). In body wall above radial muscles themselves are numerous miliary granules (Fig. 6). In muscles granules arranged into two densely packed rows, but also scattered between rows. Accessory rods and plates, miliary granules, found only in anterior body wall.

Tentacles with curved and straight rods averaging 0.045 mm in length (Fig. 3). Toward base of



FIGS. 1-7.—*Rynkatorpa hickmani* n. sp. Holotype. Fig. 1, anchors from posterior body wall; fig. 2, anchor plates from anterior body wall; fig. 3, tentacle deposits; fig. 4, anchor plates from posterior body wall; fig. 5, anchors from anterior body wall (one with associated developing plate); fig. 6, military granules from radial muscles; fig. 7, accessory rods and plates.



FIGS. 8-15.—*Rynkatorpa hickmani* n. sp. Paratypes. Fig. 8, anchors from anterior body wall; fig. 9, anchor plates from posterior body wall; fig. 10, anchor plates from anterior body wall; fig. 11, tentacle deposits; fig. 12, anchors from posterior body wall; fig. 13, ciliated funnels; fig. 14, tentacles—*a*, inner (oral) aspect, *b*, outer aspect; fig. 15, miliary granules from radial muscles.

tentacle rods become shorter, thicker, resembling miliary granules.

Description of Paratypes: Most expanded specimens (on which description mainly based) 27 mm long. Other specimens contracted, with bulbous anterior end and posterior "tail". Total length ranges from 10-25 mm. One fragment (anterior end only) also present. Radial muscles and intestinal tract visible through transparent skin. Twelve tentacles each with four digits and four to seven sensory cups on each side of oral surface (Fig. 14a, 14b). Two ventral tentacles smallest, adjacent one on each side slightly longer, remainder longest but these latter of equal length. "C"-shaped rods and small granules present in tentacles (Fig. 11). Twelve eye spots present on disc.

Calcareous ring small, stout, with three ventral radial plates each with a perforation (as in Heding, 1928; 249, fig. 45, 12 & 13). Polian vesicle single; stone canal single but with three branches. Intestine not looped but attached along its length to body wall by membranous dorsal mesentary. No gonads found. Ciliated funnels (Fig. 13) present only along mid-line of left dorso-lateral inter-radius.

Calcareous deposits in anterior part of body slightly smaller than those in posterior region. Anchors and plates in both areas vary in size. Posterior anchors 0.2 x 0.12 mm (length x breadth), 0.13 x 0.08 mm, and 0.10 x 0.06 mm (Fig. 12). Anterior anchors 0.13 x 0.09 mm and 0.09 x 0.05 mm (Fig. 8). Larger anchors usually with four small teeth on each arm; arms of smaller anchors faintly dentate, generally with only two small teeth. Shaft smooth, stock unbranched but with coarse denticulations. Anchor plates posteriorly 0.10 x 0.07 mm (length x breadth) and 0.16 x 0.09 mm (Fig. 9); anteriorly 0.14 x 0.09 mm, 0.10 x 0.07 mm, and 0.09 x 0.07 mm (Fig. 10). Plates approximately rectangular, with two large centrally placed ovoid to reniform perforations. At distal end of plate are many small holes which may extend into a short reduced "handle". Some twisting of plate also occurs here, forming a weak bridge. Proximal part of plate with five to six regularly arranged angular perforations. Usually middle perforation slightly larger than those lying on each side of it. All perforations with smooth margins. Miliary granules present in anterior end of body; shape ovoid, length 0.01-0.03 mm (Fig. 15). No small quadrilocular plates.

Holotype: Australian Museum, Sydney. Derwent Estuary, Tasmania. Dredged by Dr. E. R. Guiler, 18th April, 1963, depth ca. 7 fathoms; mud, sand and grit.

Paratypes: Burnie Harbour, N.W. Tasmania, collected by Vigeland, 30th May 1959. Six specimens and a fragment. Deposited at the Zoological Museum, Oslo.

Growth changes: Some changes in the calcareous deposits occur with growth of this species. The holotype has larger anchors and plates than the paratypes. In the posterior end of the body the anchors of the holotype tend to have a larger number of serrations on the flukes and the anchor plates tend to be more irregular in shape. Accessory calcareous deposits are numerous in the anterior end of the holotype but were not found in the paratypes. It is of some interest that the largest paratype of total length 27 mm had no trace of gonads. This species must attain a considerable size before reaching sexual maturity.

Remarks: The species is named in honour of Professor V. V. Hickman, Professor Emeritus of Zoology, University of Tasmania, who has contributed so much to our knowledge of the holothurians of Tasmania. It is the second synaptid recorded from Tasmania. *Leptosynapta dolabrifera* (Stimpson) was found there by H. L. Clark (1938) and again by Hickman (1962).

Rynkatorpa hickmani may readily be distinguished from its congeners on the basis of the distinctive characters shown in the key above. Its closest relative seems to be *R. challengerii* (Theel) which is so far known from the East Indies, Fiji, and Hawaii in depth of 252-1788 m (H. L. Clark, 1907; 100). *R. bisperforata* (Clark), which occurs at Broome, Western Australia, has anchor plates of a different type from those of *R. hickmani*.

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