

AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Robinson, E. S., 1965. Cestoda (Tetraphyllidea and Trypanorhyncha) from marine fishes of New South Wales. *Records of the Australian Museum* 26(15): 341–348. [3 March 1965].

doi:10.3853/j.0067-1975.26.1965.683

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

Australian Museum science is freely accessible online at
www.australianmuseum.net.au/publications/
6 College Street, Sydney NSW 2010, Australia



CESTODA (TETRAPHYLLIDEA AND TRYPANORHYNCHA) FROM MARINE FISHES OF NEW SOUTH WALES

By E. S. ROBINSON

School of Biological Sciences, University of New South Wales

Figs. 1-19

Manuscript received, March 23, 1964

ABSTRACT

Two new species of cestodes are described from marine fishes of New South Wales, viz., *Acanthobothrium australis* from *Squalus megalops* and *Dasyrhynchus pacificus* from *Sciaena antarctica*. In addition, *Phyllobothrium lactuca*, *Phyllobothrium dohrnii* and *Poecilancistrum caryophyllum* are recorded from Australian fishes for the first time.

INTRODUCTION

The helminth parasite fauna of Australian marine fishes is still very poorly known. This is particularly evident with regard to the cestodes, since no comprehensive taxonomic survey of these parasites has been carried out in Australian waters. References to marine fish cestodes of Australia include Haswell (1902), Johnston (1909, 1916), Drummond (1937), Crowcroft (1947), Hiscock (1954), and Williams (1962). Since the manuscript of this paper was submitted, Williams (1964) has recorded an additional six species from Australian elasmobranchs. More is known of the New Zealand cestode fauna of marine fishes as a result of the work of Robinson (1959 a, b) and Alexander (1963).

In the present report, five species (three tetraphyllideans and two trypanorhynchans) are recorded from fishes caught at various localities off the coast of southern New South Wales. One tetraphyllidean and one trypanorhynchan are described as new species and the remaining species have not been recorded previously from Australian waters.

Specimens were either collected by the author or provided by the staff of the Australian Museum. Drawings were made with the aid of a Zeiss camera lucida. All measurements are in millimetres. Type specimens are deposited in the Australian Museum collection, Sydney.

Order **Tetraphyllidea** van Beneden, 1849

Family **Phyllobothriidae** Braun, 1900

1. *Phyllobothrium lactuca* van Beneden, 1850 (Figs. 1 and 2). Host: *Mustelus antarcticus* Gunther. Locality: Kiama, N.S.W. Location: Spiral valve.

Discussion: *P. lactuca* is readily identified by the large scolex which consists of four sessile bothridia with highly convoluted margins. Proglottid anatomy, which is typical of the family, is shown in Fig. 2.

P. lactuca is the type species of the genus and one of the more familiar phyllobothriids. It has been recorded from the spiral valve of several species of *Mustelus* in European, American and Asian waters, and both Robinson (1959 a) and Alexander (1963) found this species in *M. lenticulatus* from New Zealand.

2. *Phyllobothrium dohrnii* (Oerley, 1885). (Figs. 3-5). Host: *Heptranchias dakini* Whitley. Locality: Palm Beach, N.S.W. Location: Spiral valve.

Discussion: *P. dohrnii* possesses distinctly pedunculated bothridia (Fig. 3). When worms are removed from the host and placed in physiological saline, the cup-shaped bothridia move very actively. The youngest proglottids are long and narrow with four conspicuous flaps around the posterior margin (Fig. 4). The flaps become less conspicuous in older and broader proglottids (Fig. 5).

P. dohrnii is a cosmopolitan species and is usually found in sharks belonging to the family Hexanchidae. Robinson (1959a) and Alexander (1963) recorded it from a hexanchid *Notorhynchus pectorosus* (Garman) of New Zealand and the host cited here also belongs to the Hexanchidae. It is not surprising to find *Phyllobothrium* species in primitive hosts, since Euzet (1957) regards the genus as being ancestral to many other tetraphyllideans.

Family **Onchobothriidae** Braun, 1900

3. *Acanthobothrium australis* n.sp. Host: *Squalus megalops* (Macleay). Locality: Eden, N.S.W. Location: Spiral valve.

Description: (Based on three adult specimens, one of which is mature). The entire mature specimen is 96.0 long with a maximum width of 1.1. The scolex (Figs. 6 and 7), 1.45 to 2.1 long by 1.8 to 2.6 wide, consists of four distinct, muscular, boat-shaped bothridia, each divided into 3 loculi by two muscular septa, the anterior loculus being the largest. Anteriorly, each bothridium bears a pair of hooks (Fig. 8). Each hook consists of a handle and an inner and outer prong. Anteriorly the handles overlap. The total length of the hooks varies between 0.28 and 0.30. The inner and outer prongs are of approximately equal length, i.e., about 0.140. The junction between the handle and the prongs is difficult to determine accurately. The inner prong possesses a pronounced tubercle at its base. Anterior to each pair of hooks, and forming the anterior margin of the bothridium, is a flattened, muscular accessory sucker.

The neck is short and conspicuously narrower than the scolex, with a maximum width of 0.9. Throughout the neck and strobila in stained whole mounts, the cortical, longitudinal muscle fibre bundles are particularly prominent. In the mature specimen there are about 230 proglottids. The youngest proglottids are many times broader than long, but throughout the strobila there is a gradual increase in length relative to width, so that towards the posterior end, the proglottids are slightly longer than broad. All proglottids are acraspedote.

In a mature proglottid (Fig. 9), the testes, which are arranged in two fields medial to the nerve trunks and excretory canals, number between 84 and 97 (av: 90). They are oval to rounded in shape, with a maximum diameter of 0.06. The vas deferens arises in the antero-medial region of the proglottid and coils first posteriorly then laterally to enter the cirrus pouch. Inside the cirrus pouch, the vas deferens forms a coiled ejaculatory duct which gives rise to a spined cirrus. The invaginated cirrus opens into the lateral genital atrium.

The ovary is lobulated and consists of two lateral "wings" extending anteriorly and joined posteriorly by a median narrow isthmus. Posterior to the isthmus is the shell gland from which extends the vagina, first antero-laterally, then ventral and anterior to the cirrus pouch to open into the genital atrium. The genital atrium opens marginally, in the posterior fourth of the proglottid and alternates irregularly from left to right lateral margins in succeeding proglottids. The vitellaria are small, closely packed, and arranged in two fields which are lateral to the testicular fields.

Discussion: *A. australis* is allied to other species which have been reported from sharks. It most closely resembles *A. heterodonti* Drummond, 1937, but differs from the latter in having (1) stouter hooks, each with a more strongly recurved outer prong and thicker and more irregular handle wall, (2) fewer and smaller testes, (3) more posteriorly situated genital pore.

The author wishes to thank Mr. R. McLaughlin for providing specimens of *A. heterodonti*.

Order **Trypanorhyncha** Diesing, 1863

Family **Otobothriidae** Dollfus, 1942

4. *Poecilancistrum caryophyllum* (Diesing, 1850) (Figs. 10-14). Host: *Sciaena antarctica* Castelnau. Localities: McKenzie Bay (near Bondi), N.S.W., and Richmond River, N.S.W. Location: encysted in flesh.

Description: The larval stage consists of a dense, white, globular blastocyst which contains the scolex, and a long, narrow caudal extension up to 200.0 in length. The entire larva is surrounded by a tough membrane, on the outside of which are frequently found scattered deposits of melanin. This leads to a blackened mottled appearance of the parasite. The outer membrane in several specimens undergoes branching in the musculature of the host which might be mistaken for branching of the larval tail. On removal of this outer covering membrane, however, it was observed that more than one parasite may be found within this outer cyst wall and the caudal extension of the parasite did not branch.

The scolex is released when the blastocyst is punctured. It is acraspedote, and 4.1 to 5.0 long. The bothridia are patelliform with rounded margins and strongly inclined anteriorly, i.e., the anterior margins of the two bothridia approach one another while the posterior margins are some distance apart (Fig. 10). A pair of sensory pits is present near the postero-lateral margin of each bothridium (Fig. 11).

The proboscids, up to 0.9 long, are covered with hooks. The arrangement of the hooks is heteroacanthous, in which there are rows of large hooks ascending obliquely from the mid-line of the internal surface and numerous rows of smaller hooks on the external surface (Fig. 13). Of the large hooks, hook 1 is thick with a broad base, 0.094-0.112 long; hook 2 is thinner and less curved, with a narrow base, and is 0.096 to 0.110 long. Hooks 3, 4 and 5 are progressively smaller, from 0.075 to 0.050 long. An additional hook is present between the rows of large hooks and posterior to hook 5. Small hooks covering the external surface vary in length with a maximum of 0.030.

The proboscid sheaths are weakly sinuous with a distinct loop before entering the muscular proboscid bulbs. The bulbs are 1.3 to 1.8 long by up to 0.44 wide. Posterior to the bulbs, the scolex is constricted and behind this constriction is an elongated, flattened appendix which is joined to the blastocyst by a short narrow isthmus.

Discussion: A satisfactory systematic analysis of the trypanorhynchs is hindered by many quite inadequate early descriptions, which have led frequently to extensive synonymies and many *species inquirendae*. Four species have been described and included in the genus *Poecilancistrum* by various authors, but specific differences have been concerned largely with scolex morphology. Dollfus (1942, p. 262) includes a table of measurements from various descriptions of these species which emphasises the overlapping and unsatisfactory nature of these data. Goldstein (1963) considered *Poecilancistrum caryophyllum* (Diesing, 1850) the only species in the genus reducing *P. gangeticum* (Shiple and Hornell, 1906) and *P. robustum* (Chandler, 1935) to synonymy and transferring *P. ilisha* (Southwell and Prashad, 1918) to the genus *Otobothrium* Linton, 1890.

Examination of an adult specimen of *P. caryophyllum* kindly provided by Dr. R. J. Goldstein from the lemon shark *Negaprion brevirostris* of the Gulf of Mexico, confirmed the conspecific nature of the Australian material. The dimensions of the

scolex are larger in the Australian specimens, but this does not warrant specific separation, particularly in view of Goldstein's effort to clarify the taxonomy of the genus.

The intermediate host reported here belongs to the family Sciaenidae which is consistent with previous reports from elsewhere. The known range of *P. caryophyllum* now includes Australia in addition to the Indian Ocean, the Gulf of Mexico and the Western Atlantic.

The author wishes to thank Dr. A. K. O'Gower, of the University of N.S.W., for providing specimens of *Sciaena* for examination; Mr. P. Doyle, market inspector, for collecting specimens from Richmond River, and Miss Elizabeth Pope and Dr. J. C. Yaldwyn, of the Australian Museum, for making these specimens available for study.

Family **Dasyrhynchidae** Dollfus, 1935

5. *Dasyrhynchus pacificus* n.sp. Host: *Sciaena antarctica* Castelnau. Locality: McKenzie Bay (near Bondi), N.S.W. Location: Encysted among viscera.

Description: (Based on two larval specimens). The larvae consist of a white, oval blastocyst, inside which is located the scolex, and a long, slender, whitish caudal extension (Fig. 19). Investing the larva is a tough membranous cyst wall. The scolex, 11.5 long by 1.0 wide, is weakly craspedote and only slightly enlarged in the postbulbar region. The bothridia are reversed cordiform in shape, with a distinct posterior notch.

The proboscids, up to 1.8 long by 0.15 wide, are poecilocanthous, i.e., there is a row or "chainette" of characteristic hooks on the middle of the external surface, with oblique rows of larger hooks extending around the remainder of the proboscid on each side of the chainette. The chainette begins in the metabasal region (Fig. 17). The hooks are at first very small but increase in size rapidly as the chainette curves to the middle of the external surface of the proboscid. Midway along the length of the proboscid (Fig. 16), the hooks are almost contiguous. They have a somewhat rectangular base, rounded at the corners, and a short, sharp point. In the anterior region of the proboscid, the chainette hooks are smaller. The chainette extends along the greater part of the proboscid, and includes more than 100 hooks.

There are 10 hooks in the main oblique rows (Fig. 16). The stoutest hooks are located on the internal surface and successive hooks are thinner towards the chainette. Hook 1 is 0.080 long, hook 10 about 0.030 long. Between any two main rows there is a secondary oblique row of 6 hooks which are shorter and thinner than the hooks of the main rows.

The basal armature is distinct (Fig. 18). On the internal surface there are several stout hooks, the most posterior being the largest, up to 0.075 long, with a characteristic shape because of the fluting of the shaft near the base. Posterior to these larger hooks are two rows of narrow, smaller hooks. On the external surface of the proboscid there is an area covered with minute hooks. They are so crowded that they form an almost continuous cover. Posterior to this region there are larger more scattered hooks which, like those at the base of the opposite surface, are rounded at the tip.

The sheaths of the proboscids are distinctly coiled. No frontal glands are visible in this region of the scolex. The muscular bulbs are elongated, up to 4.9 long by 0.03 wide. The scolex is attached to the blastocyst by a thin appendix.

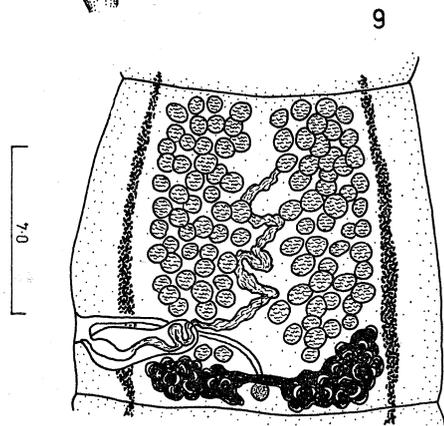
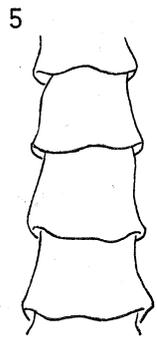
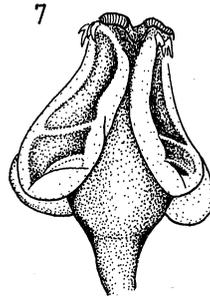
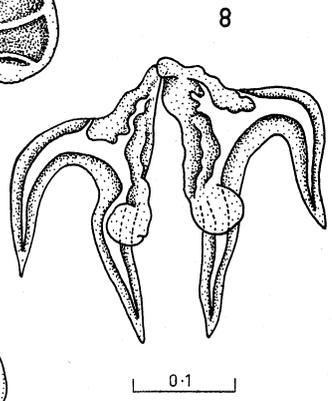
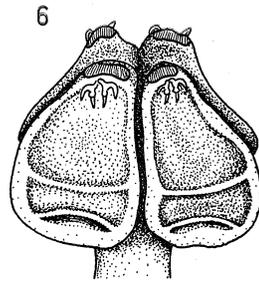
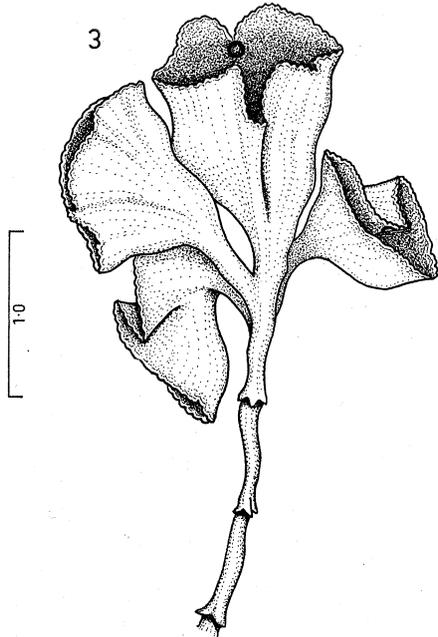
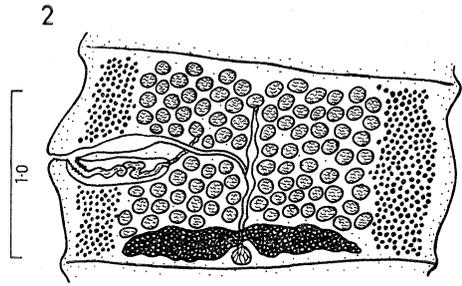
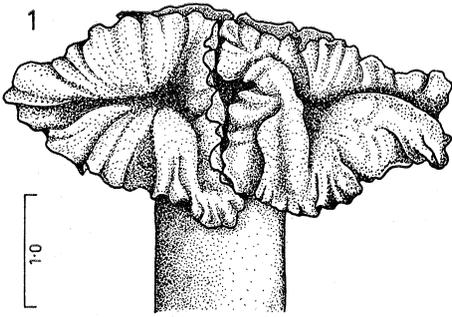
Discussion: *D. pacificus* differs from other species in the genus except *D. talismani* in possessing a chainette of a single rather than a double row of hooks. It differs from *D. talismani* in that the chainette extends for at least 35 rows of main hooks and includes over 100 hooks, compared with a distance equivalent to 7 rows of main hooks and only composed of about 20 hooks in *D. talismani*. The characteristic stout hooks and matted region of small hooks are not figured by Dollfus (1942) for *D. talismani*.

REFERENCES

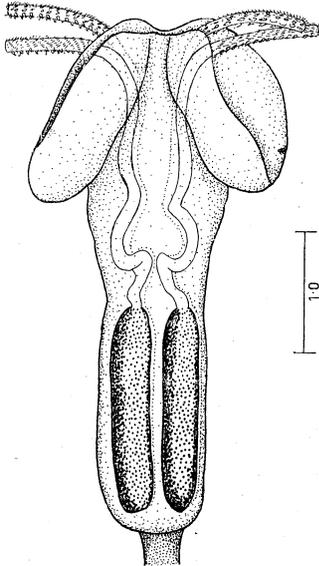
- Alexander, C. G. (1963). Tetrphyllidean and Diphyllidean Cestodes of New Zealand Selachians. *Trans. Roy. Soc. N.Z. (Zoology)*. 3 (12): 117-142.
- Crowcroft, P. W. (1947). Note on *Anthobothrium hickmani*, a new cestode from the Tasmanian electric ray (*Narcine tasmaniensis* Richardson). *Pap. Roy. Soc. Tasm.* 1946. 80: 1-4.
- Dollfus, R. Ph. (1942). Études critiques sur les Tétrarhynques du Muséum de Paris. *Arch. Mus. Nat. Hist. Nat. (Paris)*. 19: 1-466.
- Drummond, F. H. (1937). Cestoda. In Lady Julia Percy Island Reports of the Expedition of the McCoy Society for Field Investigations and Research. *Proc. Roy. Soc. Vict.* 49: 401-404.
- Euzet, L. (1957). Cestodes de Selaciens. In Premier Symposium sur la specificite parasitaire des parasites de Vertebres. Univ. Neuchatel. pp. 259-269.
- Goldstein, R. J. (1963). A Note on the genus *Poecilancistrum* Dollfus, 1929 (Cestoda: Trypanorhyncha). *J. Parasit.* 49 (2): 301-304.
- Haswell, W. A. (1902). On a cestode from *Cestracion*. *Quart. J. micr. Sci.* 46 (3): 399-415.
- Hiscock, I. D. (1954). A new species of *Otobothrium* (Cestoda, Trypanorhyncha) from Australian fishes. *Parasitology*. 44 (1-2): 65-70.
- Johnston, T. H. (1900). Notes on Australian Entozoa. No. 1. *Rec. Aust. Mus.* 7: 329-344.
- (1916). A census of the endoparasites recorded as occurring in Queensland arranged under their hosts. *Proc. Roy. Soc. Qd.* 28: 31-79.
- Robinson, E. S. (1959a). Records of Cestodes from Marine Fishes of New Zealand. *Trans. Roy. Soc. N.Z.* 86 (1/2): 143-153.
- (1959b). Some New Cestodes from New Zealand Marine Fishes. *Ibid.* 86 (3/4): 381-392.
- Williams, H. H., 1962. *Acanthobothrium* sp.nov. (Cestoda: Tetrphyllidea) and a comment on the order Biporophyllidea. *Parasitology* 52: 67-76.
- 1964. Some new and little known cestodes from Australian elasmobranchs with a brief discussion on their possible use in problems of host taxonomy. *Parasitology* 54: 737-748.

EXPLANATION OF FIGURES

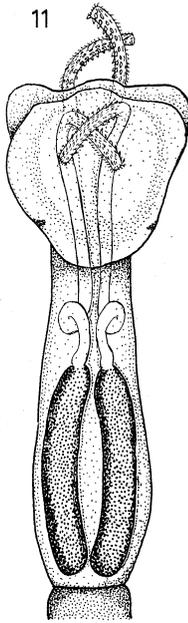
- Figs. 1 and 2—*Phyllobothrium lactuca*: 1, scolex. 2, mature proglottid anatomy.
- Figs. 3-5—*Phyllobothrium dohrnii*: 3, scolex. 4, young proglottids. 5, mature proglottids.
- Figs. 6-9—*Acanthobothrium australis* n. sp.: scolex, bothridial view. 7, scolex, lateral view. 8, hooks. 9, mature proglottid anatomy.
- Figs. 10-14—*Poecilancistrum caryophyllum*: 10, scolex, lateral view. 11, scolex, bothridial view. 12, entire larva. 13, proboscoid armature. 14, large hooks.
- Figs. 15-19—*Dasyrhynchus pacificus* n. sp.: 15, scolex. 16, distal proboscoid armature. 17, metabasal armature. 18, basal armature. 19, entire larva.



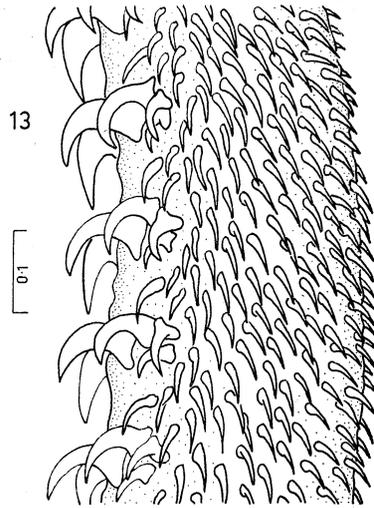
10



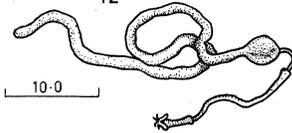
11



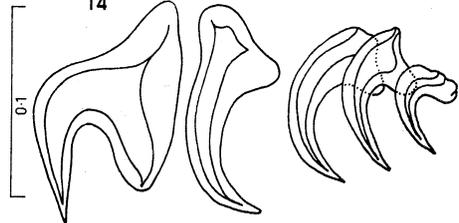
13



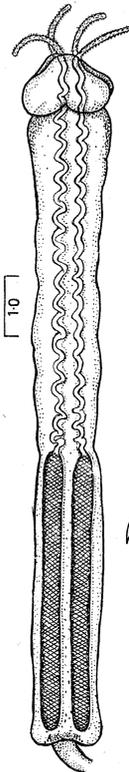
12



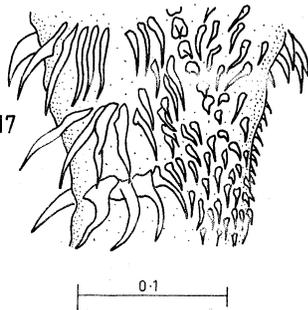
14



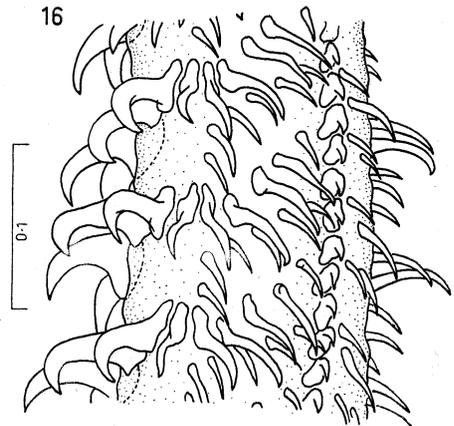
15



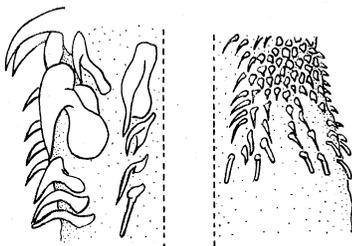
17



16



18



19

