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Capsalids (Monogenea: Capsalidae) of Some Australian Fishes

Adrian R. Lawler

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CAPSALIDS (MONOCERI:CAPSALIDAE) OF SOME AUSTRALIAN FISHES

by

ADRIAN RUSSELL LAWLER

CORRECTIONS BY LAWLER, 1965

A THESIS
Submitted to the School of Marine Science of the College of William and Mary in partial fulfillment of the requirements for the degree of
MASTER OF ARTS
1964

APPROVED
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ABSTRACT

From March through July of 1962, 1909 specimens of 119 species of fish were collected from the marine waters of Australia. At present, a total of 1266 specimens representing 93 species have been examined for monogenetic trematodes. Of these, six host species were parasitized by ten capsulids (Monogenea: Capsalidae) and two different host species were parasitized by two species of monocotyliids (Monogenea: Monocotylidae).

Six capsulids from five host species are discussed herein. Five, Sprostonia loombillius n. sp., Allosprostonia taurinai n. gen., n. sp., Neobenedenia wilsonti n. sp., Benedeniella cystovacina n. sp., and Benedenia enteropulvi n. sp., are described for the first time. One species, Macrophyllida antarctica (Hughes, 1920) Johnston, 1929, is redescribed. Four new hosts for monogenetic trematodes are reported.

The subfamily Trochopodinae (Price, 1936) Sproston, 1946 is amended to accommodate the new genus Allosprostonia. The genus Sprostonia Bychovsky, 1957 is amended to accommodate the new species Sprostonia loombillius and the genus Macrophyllida Johnston, 1929 is amended in order to correct Yamaguti's (1965) diagnosis of the genus. The taxonomic relationships of the genera of the subfamilies Trochopodinae (Price, 1936) Sproston, 1946 and Benedeniinae Johnston, 1931 are discussed.
Comparisons of host-parasite relationships indicate a high degree of host-specificity. Of the six parasite species studied only one occurred on more than one host species in the collection.
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INTRODUCTION

This thesis is based on microscopic examinations and systematic considerations of monogenetic trematodes (Order Monogenea Corus, 1863) collected from the gills of certain marine fishes of Australia. These collections consisted of 1000 host individuals representing 110 species. A total of 1200 specimens representing 93 species have been examined by various members of the Parasitology Section for monogenetic trematodes. Of these, six host species were parasitized by ten species of capsididae (Monogenea:Capсидidae) and two different host species were parasitized by two species of monocotyliidae (Monogenea:Monocotyliidae). Thus, only 12 species of monogeneids belonging to the superfamily Cephaloidea Price, 1936 have been recovered from these marine fishes of Australia examined thus far.

Six species of capsididae from five host species are discussed herein, five of the parasite species being new to science (Table 3). The others mentioned above will be the subjects of later works.

Examination of the literature reveals that in comparison to the total number of hosts and monogeneids reported

*This research was supported by Grant No. 13353 from the United States Antarctic Research Program of the National Science Foundation.
little is known about the monogenaid fauna of the Australian area. MacCallum (1917), Johnston and Tiets (1922), Hughes (1926), Johnston (1929, 1930a, 1930b, 1931, 1934a, 1934b, 1937), Murray (1931), Woolcock (1933), and Sanders (1944, 1945, 1947) have described or reported monogenetic trematodes from fishes of Australian waters. Robinson (1961) noted that the majority of Monogenes known from the Southern Hemisphere were reported from Australia. Other works concerning Monogenes from the Southern Hemisphere are as follows: Drinkmann (1952) and Cordaro (1964) from Chile; Mantor and Prince (1953) and Laird (1953) from Fiji and the New Hebrides; and Blanchard (1947), Johnston (1931), Mantor (1955), Mantor and Walling (1958), Robinson (1961), and Dillon and Hargis (typescript) from New Zealand. Up to the present time a total of 47 species of monogenetic trematodes has been reported from Australian waters, 12 of these being reported by Johnston and Tiets (1922) from fresh water fishes. The parent collection from which the present specimens were drawn is probably more extensive in numbers of individual hosts and host species and the geographical area covered than any of the works of the Southern Hemisphere mentioned above.

The research reported herein is a continuation of a long range study of certain aspects of host-specificity, zoogeography, and phylogeny of monogenetic trematodes being conducted by members of the Parasitology Section of the Virginia Institute of Marine Science.
MATERIALS AND METHODS

Host collections were made near Gladstone, Queensland; Binalong, Tasmania; Port Lincoln, South Australia; and Carnarvon, Western Australia. The fish were procured from commercial fishery operations in which hand lines, trawls, gill nets, and Danish seines were used. Dr. William Stanley Wilson and Dr. William Saunders, the field collectors, accompanied the vessels and took the host specimens as they came on board. Collections were made from March through July of 1962.

Dr. Wilson identified the fish with the aid of experienced fishing vessel captains and using the keys and descriptions of Isaac (1920), Suttem (1956), Parrott (1957, 1958, 1959), and Toughley (1953). Since the vessel captains could help with or verify identifications, and since all species captured are relatively common, it is believed that host identifications are reliable. Scientific names of hosts are those given by Isaac (1920), Toughley (1953), and Parrott (1959).

In the locality descriptions given below, the nearest town or prominent geographical feature and its province are given first, followed by the approximate site of capture of the host. The place of capture is followed by the depth and bottom type in parentheses. Distance is in statute miles.
The monogenetic trematodes were collected using a procedure outlined by Hargis (1953). The use of this technique results in specimens which are believed to be more normal in external and internal morphology than those prepared by pressure-fixation techniques. This technique works best when the gill arches are separated from each other before immersion in the relaxant. However, according to Mr. Wilson, such separation was generally not possible because of trying shipboard conditions. As a result, relaxation of worms on internal gill surfaces not readily bathed by the Chloretone-sea water solution was somewhat variable. Such unevenness of relaxation probably also resulted from the varying physiological conditions of the worms themselves at the time of killing, since all hosts could not be processed at the same time. The trematodes were then killed, fixed, and preserved by adding AFA (aceto-formalin-alcohol). This technique has proven advantageous when collecting large numbers of hosts as it facilitates rapid handling.

The parasites were removed from the gill material and sediment with the aid of a stereomicroscope and stored in vials containing a solution of 5% glycerol in 70% ethanol.

For preparation of whole mounts the worms were removed from the preservative, hydrated, overstained, destained, dehydrated, cleared, and mounted. The parasites were stained with one of the following: (1) Reynolds' double stain (Delafield's hematoxylin plus alum cochineal); (2) alum
cochineal; (3) Harris' hematoxylin; and, (4) Harris' hematoxylin with either sodium bicarbonate for "bluing" or eosin as a counterstain. As many stains as possible were used on each species to study the various internal and external structures. The following results were obtained: (1) Reynolds' double stain was an excellent stain for the internal structures and glands. (2) Alum cochineal proved to be a good general stain, but sometimes was too diffuse and obscured some of the internal structure. (3) Harris' hematoxylin and Harris' hematoxylin plus sodium bicarbonate proved effective for reproductive structures. (4) Harris' hematoxylin with eosin as a counterstain proved good for reproductive structures and was especially useful on the septation of the posthaptor. If few worms were available, only alum cochineal and/or Reynolds' double stain were used.

The worms were overstained and immediately destained using a solution of two to four drops of concentrated HCl in 30% ethanol. This procedure afforded better control of the amount of stain retained by the specimen than progressive staining. After dehydration, the worms were cleared in deacidified beechwood creosote and mounted permanently in Piccolyte. Xylene proved to be a poor clearing agent as it made specimens brittle and hard to manipulate when mounting.
Only those specimens which were well-relaxed and possessed clear morphological characters were used for identification and study. Diagnoses and descriptions were based on adult individuals, sexual maturity being the criterion for adulthood. Sexual maturity was determined by either (1) the presence of an egg in utero, (2) attainment of the same approximate size and morphological condition as individuals with eggs, or (3) by the apparently mature condition of the gonads (especially the ovary) where no egg was observed.

All measurements were made with the use of a filar micrometer and are given in millimeters. In indicating these measurements the mean is given, followed by the range (minimum and maximum) in parentheses. In cases where more than five specimens were measured, the standard deviation (σ), standard error (SE), and the interval estimate at the 95% level (t.05SE) follow the range. For convenience the alphabetical symbols SE and CL are established for standard error (σ) and confidence limits or interval estimate at the 95% level (t.05SE), respectively. The number of measurements used in the calculations appears in parentheses before these data. Measurements of curved structures were across the lines subtending the greatest arc described by these structures. All egg measurements were taken of the main portion of the egg capsule, exclusive of the filament. The value of filament length as a taxonomic character is doubtful since great variation occurs within a species.
Measurements of soft parts, which are subject to contraction and expansion in life and shrinkage in death, can be considered of value for comparison only when specimens have been similarly treated or where differences between individuals or groups of individuals being compared are great. Measurements of hard parts are thought to be free of such vagaries and are considered more reliable as taxonomic characters. Camera lucida and microprojector drawings were used to facilitate identification and in the preparation of figures.

The taxonomic scheme employed is essentially that of Sproston (1946) and Yanaguti (1963). The work of Bychowsky (1957) has also been considered and his conclusions discussed where possible.

The morphological terminology used in the descriptions is that of Norman (1930), who compiled a list of useful terms from the works of Brien (1934-1943), Sproston (1945-1946), Baxas (1936), and his own studies.
RESULTS AND DISCUSSION

Order Monogenea Carus, 1863
Suborder Monopisthocotylea Cacquer, 1912
Superfamily Capsaloidea Price, 1936
Family Capsalidae Baird, 1853
Subfamily Trochopodinae (Price, 1936) Sproston, 1966 amend.

Synonyms: Trochopinae Price, 1936
Megalocowina Bychowsky, 1957

DIAGNOSIS: Capsalidae. Diagnosis the same as that of Yamaguti (1963) except as follows: (1) pharynx with or without constrictions; and, (2) common genital opening marginal or very close to margin behind left prohaptor.

TYPE GENUS: Trochopus Diesing, 1850

DISCUSSION: The above emendation is made to accommodate Allosprostonia sauvigniae n. gen., n. sp. In addition, the figure of Sprostonia aquatimac (MacCallum, 1921) Bichowsky, 1957 as illustrated by MacCallum (1921) shows definite constrictions of the pharynx, which Yamaguti (1963) did not take into account in his diagnosis of the subfamily Trochopodinae.

Price (1936) proposed as a new subfamily in the Capsalidae the group Trochopinae for the genera Trochopus Diesing, 1850 and Macrophyllida Johnston, 1929, and suppressed
Megalocotyle Felda, 1923 as a synonym of Trochonus Diesing, 1850. Upon re-examination of the large number of species of Trochonus, Price (1939c) decided that they fall into two groups and therefore reinstituted the genus Megalocotyle Felda, 1923.

Dr. Baylis, in personal communication with Sproston (Sproston, 1946), pointed out that the correct spelling of the subfamily name was Trochopodinae. Sproston (1946) then amended the subfamily and corrected the name according to Dr. Baylis' suggestion.

Pychowsky (1957) split the subfamily Trochopodinae (Price, 1936) Sproston, 1946 into two subfamilies: (1) Megalocotylinae Pychowsky, 1957, with Megalocotyle Felda, 1923 as the type genus, and (2) Trochopodinae (Price, 1936) Sproston, 1946, with Trochoconus Diesing, 1850, as the type genus. He did this on the basis of whether there were an unequal or equal number, in the former and latter respectively, of peripheral depressions separated by septa on the postheptopter.

Yamaguti (1963) considered Megalocotylinae Pychowsky, 1957 as a synonym of Trochopodinae (Price, 1936) Sproston, 1946, combining the two. He also proposed two new genera, Allomegalocotyle and Pseudomegalocotyle.

After careful study of generic characters (Table 1) which may be considered taxonomically significant (type of proheptopter, number of septa, position of prostate reservoir)
within the subfamily Trochopodinae (Price, 1936) Sproston, 1946, the author accepts, with the amendments previously made and to follow, the rearrangement as proposed by Yamaguti (1963).
### TABLE 1.
Comparison of the major taxonomic characters separating the genera
of the subfamily Trochoidea

<table>
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<th></th>
<th>Trochopus (type genus)</th>
<th>Megalomycyte</th>
<th>Pseudomegalocotyle</th>
<th>Allogegalocotyle</th>
<th>Macrophylida</th>
<th>Sprostonia</th>
<th>Allosprostonia n. gen.</th>
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<tr>
<td><strong>Type of proboscis</strong></td>
<td>paired suckers</td>
<td>paired suckers</td>
<td>paired suckers</td>
<td>paired suckers</td>
<td>fan-like glandular areas</td>
<td>paired suckers united by common head</td>
<td>paired suckers united by common head</td>
</tr>
<tr>
<td><strong>Number of septa</strong></td>
<td>8-12</td>
<td>7</td>
<td>9; 4 lateral bifurcated</td>
<td>7</td>
<td>5</td>
<td>7; posterior lateral trifid or bifid, 4 or 6 incomplete septa</td>
<td>5</td>
</tr>
<tr>
<td><strong>Position of prostate reservoir in respect to cirrus pouch</strong></td>
<td>inside</td>
<td>inside</td>
<td>inside</td>
<td>outside</td>
<td>inside</td>
<td>outside</td>
<td>outside</td>
</tr>
</tbody>
</table>
Genus Sorostronia Dyckovský, 1957 gen. nov.

DIAGNOSIS: Capialidae, Trochoplacinae. Diagnosis the same as that of Yanaguti (1963) except as follows: Posteriorly divided by seven primary (connected to central loculus) septa, of which the posterolaterals are either (1) trilobate or (2) bilobed, and having either (1) four or (2) six secondary (incomplete) septa. Pharynx notched marginally into eight lobes. Vagina opening close to genital pore. Facetite on echaenoderm and telostom.

TYPE SPECIES: Sorostronia squintina (McCullum, 1921) Dyckovský, 1957.

DISCUSSION: The above amendment is made to accommodate Sorostronia longinellus n. sp. In addition, though not mentioned by Dyckovský (1957), the pharynx of S. squintina (McCullum, 1921) Dyckovský, 1957, as figured by McCullum (1921) is notched marginally into eight lobes, as is the pharynx of S. longinellus. Yanaguti (1963) wrote that the vagina opened "close to, or together with, genital pore." The phrase, "or together with," should not be included in the diagnosis, as Price (1957b) stated that the vagina had its opening "immediately posterior to genital aperture," and all specimens of S. longinellus have vaginal openings close to, and posterior to, genital pore.

The genus Sorostronia Dyckovský, 1957 includes one previously described species, Sorostronia squintina (McCullum, 19-
(21) Hydovsky, 1957, which was originally described by MacCollum (1921) as *Acroposthia aquaticum* from the host *Acanthias aquaticus* (Linn.) from Singapore. Price (1937b) redescribed it from specimens that MacCollum (1921) used for his original description, recording it as *Acanthias aquaticus*. Later he (Price, 1932a) transferred it to the genus *Mecolognyx* Fonda, 1926. Brinckman (1912), apparently in ignorance of Price's work (1936, 1937b, 1932a), concluded also that its place was in *Mecolognyx* Fonda, 1926. Sproston (1946) considered its inclusion in the genus *Mecolognyx* Fonda, 1926 as "very doubtful."

Hydovsky (1957) isolated this species into the new genus *Sprostonia*. Hydovsky, 1957, on the basis of incomplete sexes and more complex nature of the postcheptrum and paired antero-lateral suckers united antero-medially by a common hood.

*Sprostonia longinphallus* n. sp.

*(PLATE 1, Figs. 1-6)*

**HOST:** *Epinephelus tauvina* (Parscale), Greasy Cod or Estuary Rock-Cod; family *Epinephelidae*.

**LOCALITY:** Gladstone, Queensland; 36 statute miles ENE of Gladstone (9 fathoms, coral).

**GEAR USED:** Hand line.

**LOCATION:** Cilla.

**NUMBER STUDIED:** 83.

**NUMBER MEASURED:** 19.

**Holotype:** USNM Holm. Coll. No.

**VUK Coll. No. M-536-1.**
Paratypes: USNM Heim, Coll. Nos.
      W-543-21.

DESCRIPTION: Body elliptical, flattened dorsoventrally, (19)
3.65 (2.91 - 4.93), s=0.494, SE=0.113, CL=0.238 long by (19)
1.31 (1.06 - 1.60), s=0.135, SE=0.0310, CL=0.0651 wide. Cuticle
fairly thin and smooth. Prohaptor a pair of ventrolateral
suckers, united anterdorsally by a common hood; left sucker
(15) 0.143 (0.124 - 0.163), s=0.0124, SE=0.00320, CL=0.00637
long by (15) 0.102 (0.156 - 0.231), s=0.0205, SE=0.00530,
CL=0.0118 wide and right sucker (13) 0.141 (0.116 - 0.160),
s=0.00953, SE=0.00266, CL=0.00579 long by (13) 0.184 (0.161 -
0.222), s=0.0163, SE=0.00452, CL=0.00986 wide. Region anterior
to brain glandular. Posthaptor a subsaccular, concavo-convex,
ovoid sucker, opening ventrally, (19) 0.626 (0.516 - 0.629),
s=0.0849, SE=0.0195, CL=0.0409 long by (19) 0.790 (0.626 -
0.994), s=0.115, SE=0.0264, CL=0.0554 wide, divided by seven
primary (connected to central loculus) septa, the posterolateral
bifid, with two secondary (incomplete) septa extending inward
from muscular rim subdividing posterior marginal loculi, with
a secondary septum dividing each of the anterior and antero-
lateral marginal loculi; margin of posthaptor a strong muscular
rim, surrounded by a delicate, scalloped marginal membrane,
(19) 0.0525 (0.0380 - 0.0669), s=0.00850, SE=0.00195, CL=0.00410
wide; armed with three pairs of dissimilar anchors and 14
marginal hooks. Anteriormost anchor large, robust, left one
(15) 0.136 (0.108 - 0.165), s=0.0174, SE=0.00449, CL=0.00964
long and right one (16) 0.142 (0.117 - 0.174), s=0.0145, 
SD=0.00362, CI=0.00771 long, with pointed external tips and 
blunt internal tips and enlarged in the middle; second pair of 
anchors elongate, left one (16) 0.0509 (0.0439 - 0.0610), 
s=0.00529, SD=0.00164, CI=0.00311 long, more robust than third 
pair with slightly recurved blunt tips; third pair of anchors 
elongate, left one (16) 0.0554 (0.0469 - 0.0762), s=0.00710, 
SD=0.00120, CI=0.00410 long, tips recurved and pointed. 
(Second and third pairs of anchors lie side by side, arising 
at about the same level on the posthaptor, and are sometimes 
hard to distinguish one from the other.) Posthaptoral hooks 
(19) 0.00601 (0.00449 - 0.00716), s=0.000991, SD=0.000227, 
CI=0.000470 long. Small, round disc-like sclerites sometimes 
on posthaptor near first pair of anchors.

Pharynx muscular, (19) 0.279 (0.227 - 0.367), s=0.0353, 
SD=0.00021, CI=0.0172 long by (19) 0.236 (0.184 - 0.281), 
s=0.0299, SD=0.00535, CI=0.0164 wide, constricted into eight 
distinct lobes. Youth subterminal, ventral, immediately 
 anterior to pharynx. Esophagus very short; gut bifurcated, 
cut with radial and lateral dendritic branching, not con-
fluent posteriorly.

Two testes, juxtaposed, entire, fenestrated, oval in 
outline, left one (19) 0.328 (0.263 - 0.451), s=0.0536, 
SD=0.0120, CI=0.0299 long by (19) 0.206 (0.217 - 0.370), 
s=0.0446, SD=0.0102, CI=0.0215 wide, and right one (19) 
0.327 (0.247 - 0.441), s=0.0506, SD=0.0116, CI=0.0264 long.
by (19) 0.233 (0.216 - 0.365), S=0.0412, SE=0.00945, CI=0.0199 wide, postequatorial in position. Vasa efferentia entering in midline to form vas deferens, running anteriorly between vagina and base of cirrus pouch to level of distal end of ootype, then turning right and extending posteriorly parallel to cirrus pouch, and running ventral to proximal end of cirrus and across posterior end of prostate reservoir (which it is assumed to enter). Cirrus pouch very long, its proximal end lying to the left of median line and directed anteriorly, extending diagonally across body to right of median line as far as every, then turning anteriorly. Cirrus very long and slender, curveable, coiled in cirrus pouch. Prostate reservoir lying in median field, to right of proximal end of cirrus, and connected to this end by a duct which continues throughout the length of the cirrus as the ejaculatory duct. Prostatic cells around prostate reservoir except for the left side. Cirrus pouch joins uterus near margin to form genital atrium opening to outside via the common marginal genital pore on left at anterior level of brain. Clouds of Coto, irregular in outline, on each side of midline posterior to testes.

Ovary immediately postequatorial, oval, entire, median, (19) 0.170 (0.124 - 0.203), S=0.0222, SE=0.00592, CI=0.0107 long by (19) 0.233 (0.167 - 0.270), S=0.0296, SE=0.00670, CI=0.0143 wide, having internal chamber (=seminal receptacle of Rese, 1928) containing mature ova; oviduct passing from chamber dorsal to right arm of vitelline reservoir and ventral to vas deferens on left until proximal end of cirrus, then
passing dorsal to vas deferens on to coelom. Coelom obliquely situated between cirrus and vagina, surrounded by Kohlia's gland collic; uterus very long, opening into genital atrium.

Vagina muscular, very long, very near its distal end, its base at level of posterior end of prostate reservoir, opening marginally just posterior to common genital pore; connected by small duct to right side of vitelline reservoir.

Vitelline follicles, extending from level of anterior part of pharynx to near posterior end of body proper. Transverse vitelloducts fusing to left of median line to form vitelline reservoir immediately anterolaterally to ovary. Vitelloducts confluent post-pharyngally and post-testicularly.

For an empty polyhedral, (2) 0.105 long by 0.0740 (0.0635 - 0.0794) wide, with a convoluted basal filament.

"Brain" anterior to pharynx; three pairs of nerves passing into procephaloral region. Four granular eyespots located dorsal to brain, the first pair smaller and closer together than the posterior pair. Excretory pores at level of anterior end of coelom, opening dorsolaterally.

DISCUSSION: The present species is very similar to Euschantina squamata (MacCallum, 1921) Sychowsky, 1957, from the gills of Squantina squamata (Linn.), but differs in the following respects: (1) glands of Coto present; (2) vitelloducts confluent post-pharyngally and post-testicularly; (3) testes faceted; (4) postero-lateral cephalic bifid instead of trifid; (5) second and third pairs of anchorae larger (Table 2); (6) procephaloral
suckers larger (Table 2); (7) egg smaller (Table 2); (8) vas deferens passing dorsal to left arm of vitelline reservoir and also ventral to prostate reservoir, which it apparently enters; (9) proximal end of vagina more anterior and also connected by a small duct to the right side of the vitelline reservoir; and, (10) host.

The septation of the postchaptor is very close to that described by Price (1937b) for Sprostonia squatinae (MacCallum, 1921) Bychowsky, 1957. The major difference is that the posterolateral septa are bifid instead of trifid. This observation was facilitated by the use of eosin as a counterstain on several specimens. It is possible that Price (1937b) observed atrophied rays deprived of special musculature passing from the anterolateral secondary septa to the posterolateral bifid septa. Such rays were observed on several of the specimens in our sample.

The anchors of Sprostonia squatinae (MacCallum, 1921) Bychowsky, 1957, which were designated by Price (1937b) as the second and third pairs, appear to be the third and second pairs, respectively. An arrangement similar to that mentioned by Price (1937b) was found in Sprostonia longiphallus n. sp., i.e., a blunt-tipped and a sharp-tipped anchor lying side by side. Since the general arrangement of anchors in the Trochopodinae appears to be that of a coarser, blunt-tipped second anchor and a third anchor with a recurved sharp tip, it seems safe to conclude that this is the case in Sprostonia squatinae as
redescribed by Price (1937b). The arrangement of the posterior two pairs of anchors in Sprostonia Bychowsky, 1957 can best be explained by a migration backward of the second anchor pair or a migration forward of the third anchor pair, resulting in their lying side by side.

This description increases the number of species in the genus Sprostonia Bychowsky, 1957 to two. These species are: S. squatinæ (MacCallum, 1921) Bychowsky, 1957 (type species) from Squatina squatinæ (Linn.) (Singapore, Malaysia); and S. lenocephalix n. sp. from Epinephelus tauvina (Forskal) (Gladstone, Queensland, Australia). This non-rigid host supra-specificity (Hargis, 1957) of Sprostonia Bychowsky, 1957 could possibly represent paleoecological or neoeccological relationships between the hosts.

A total of 83 parasites were recovered from seven host specimens (Table 3).

Genus Allosprostonia n. gen.

Allosprostonia tauvinae n. gen., n. sp.

(PLATE II, Figs. 7-10)

HOST: Epinephelus tauvina (Forskal), Creasy Cod or Estuary Rock-Cod; family Epinephelidae.

LOCALITY: Gladstone, Queensland; 36 statute miles ENE of Gladstone (9 fathoms, coral).

GEAR USED: Hand line.

LOCATION: Gillis.

NUMBER STUDIED AND MEASURED: 2.
<table>
<thead>
<tr>
<th></th>
<th>S. squatinus</th>
<th>S. squatinus</th>
<th>S. lococephalus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MacCollum (1921)</td>
<td>Price (1937b)</td>
<td>n. sp.</td>
</tr>
<tr>
<td>Entire body (1)</td>
<td>4.50</td>
<td>2.9-3.5</td>
<td>2.91-4.93</td>
</tr>
<tr>
<td></td>
<td>(w) 1.60</td>
<td>1.3-1.5</td>
<td>1.06-1.60</td>
</tr>
<tr>
<td>Postheptor</td>
<td>1.00 (dia)</td>
<td>0.544-0.599</td>
<td>(1) 0.514-0.629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(dia)</td>
<td>(w) 0.626-0.994</td>
</tr>
<tr>
<td>Marginal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>membrane</td>
<td>(v) ----</td>
<td>0.047-0.057</td>
<td>0.0382-0.0669</td>
</tr>
<tr>
<td>Anchor 1</td>
<td>(1) 0.140</td>
<td>0.143-0.148</td>
<td>L 0.108-0.165</td>
</tr>
<tr>
<td>Anchor 2</td>
<td>(1) ----</td>
<td>0.024-0.033</td>
<td>R 0.117-0.176</td>
</tr>
<tr>
<td>Anchor 3</td>
<td>(1) ----</td>
<td>0.042</td>
<td>L 0.0469-0.0702</td>
</tr>
<tr>
<td>Hooks</td>
<td>(1) ----</td>
<td></td>
<td>0.00449-0.00816</td>
</tr>
<tr>
<td>Proheptoral</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>suckers</td>
<td></td>
<td>(1) 0.095</td>
<td>L(1) 0.124-0.163</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 0.172</td>
<td>(w) 0.156-0.231</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R(1) 0.116-0.160</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(w) 0.161-0.222</td>
</tr>
<tr>
<td>Pharynx</td>
<td>0.800</td>
<td>0.266 (dia)</td>
<td>(1) 0.227-0.367</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(w) 0.186-0.281</td>
</tr>
<tr>
<td>Testes</td>
<td>1.12</td>
<td>L(1) 0.400</td>
<td>L(1) 0.263-0.451</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 0.340</td>
<td>(w) 0.217-0.370</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R-dia 0.340</td>
<td>R(1) 0.267-0.461</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(v) 0.216-0.365</td>
</tr>
<tr>
<td>Cervix</td>
<td>0.480</td>
<td>0.190 (dia)</td>
<td>(1) 0.128-0.203</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(w) 0.107-0.278</td>
</tr>
<tr>
<td>Egg</td>
<td>0.140</td>
<td>(v) 0.120</td>
<td>(1) 0.195</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(w) 0.0655-0.0734</td>
</tr>
</tbody>
</table>

(1) = length  
(w) = width  
L = left  
R = right  
(dia) = diameter
Holotype: UMIT Holm, Coll. No. 
Paratype: UMIT Holm, Coll. No. 

DESCRIPTION: Body elliptical, flattened dorsoventrally, 2.86 (2.62 - 3.10) long by 1.25 (1.14 - 1.36) wide. Cuticle fairly thin and smooth. Protoprora a pair of ventrolateral suckers, united anterodorsally by a common hood; left sucker 0.142 (0.125 - 0.159) long by 0.161 (0.151 - 0.172) wide and right sucker 0.140 (0.136 - 0.161) long by 0.164 (0.156 - 0.175) wide. Head glands in three major areas; in body between protororal suckers and postoralateral to each sucker. Postprora a subsessile, concavo-convex, oval sucker, opening ventrally, 0.607 (0.510 - 0.636) long by 0.722 (0.712 - 0.851) wide, divided by five septa into one central and five peripheral depressions (loculi); margin of postprora a strong muscular rim, surrounded by a delicate, scalloped marginal membrane 0.049 (0.0466 - 0.0510) wide; armed with three pairs of dissimilar anchors and 16 marginal hooks. Anteriormost anchors large, robust, left one of larger specimen 0.123 long and right one of larger specimen 0.122 long, with pointed external tips and blunt internal tips and enlarged in the middle; second pair of anchors elongate, left one of larger worm 0.0751 long and right one of smaller worm 0.0653 long, more robust than third pair with slightly recurved blunt tips; third pair of anchors elongate, left one of larger worm 0.0618 long and right one of smaller worm 0.0700 long, tips recurved and pointed. (Second and third pairs of anchors lie
side by side, arising at about the same level on the post-
haptor, and are sometimes hard to distinguish one from the
other.) Posthaptoral hooks 0.00612 long. Small, round, disc-
like sclerites on posthaptor near first pair of anchors.

Pharynx muscular, 0.168 (0.163 - 0.172) long by 0.215
(0.204 - 0.220) wide, constricted (or notched) into five dis-
tinct lobes, papillated internally. Mouth subterminal,
ventral, immediately anterior to pharynx. Esophagus very
short; gut bifurcated, crura with medial and lateral dendritic
branching, not confluent posteriorly.

Two testes, juxtaposed, entire, fornecrated, oval in
outline, left one slightly larger, 0.483 (0.471 - 0.494) long
by 0.324 (0.319 - 0.330) wide and right one 0.468 (0.454 -
0.482) long by 0.301 (0.293 - 0.309) wide, equatorial in
position. Vasa efferentia anastomosing in midline to form
vas deferens, proceeding anteriorly dorsal to left margin of
ovary and left arm of vitelline reservoir and vagina whence
it turns right and passes dorsal to cirrus pouch, entering it
near the proximal end. Vas deferens convoluted from level of
ovary to proximal end of vagina, where it straightens out.
Seminal vesicle a continuation of the vas deferens on the
ventral side of the cirrus. Cirrus obliquely situated just
posterior to pharynx, 0.293 (0.281 - 0.304) long by 0.0707
(0.0700 - 0.0714) wide. Cirrus complex consisting of cirrus
and seminal vesicle in cirrus pouch. Prostate reservoir
separate from cirrus complex, on right side of body extending
longitudinally between proximal end of cirrus pouch and ovary, containing strongly developed prostatic cells; duct passing from anterior end of prostate reservoir around proximal end of cirrus and continuing ventrally on cirrus. Prostatic cells around prostate reservoir except for left side. Uterus connecting to cirrus pouch immediately at distal end of cirrus forming a genital atrium opening outside via the common sub-marginal genital pore on left above level of pharynx. Glands of Coto on each side of the midline immediately posterior to testes.

Ovary prostaticular, oval, entire, median, 0.173 (0.153 - 0.192) long by 0.196 (0.163 - 0.229) wide, having internal chambers (=seminal receptacle of Reserve, 1930) containing mature ova; oviduct passing from internal chambers dorsal to right arm of vitelline reservoir and connecting to duct coming from right side of reservoir, proceeding anteriorly to ootype. Ootype obliquely situated between cirrus and vagina, surrounded by Mehlis' gland cells; uterus short, opening into genital atrium. Vagina in two distinct parts, muscular portion passing anteriorly to distal end of ootype, where after turning left and forming a bulb directly posterior to common genital pore it continues to submarginal pore as a small wavy duct; probably connected via a small duct to anterior end of vitelline reservoir.

Vitellaria follicular, extending from level of anterior pair of eyecups to near posterior end of body proper.
Transverse vitelloducts fusing medially to form vitelline reservoir immediately anterolateral to ovary. Transverse vitelloduct separating ovary from testes. Egg polyhedral, 0.136 long by 0.125 wide, with a convoluted basal filament in utero.

"Brain" anterior to pharynx; three pairs of nerves passing into prehepatochal region. Four granular eyespots located dorsal to brain, the first pair smaller and closer together than the posterior pair. Excretory pores posterior to level of proximal end of vagina, opening dorsolaterally.

**Genus Allospironia n. gen.**

**DIAGNOSIS:** Trochosominae. Body elliptical, flattened dorso-ventrally. Prohepato a pair of anterolateral suckers united anterodorsally by a common hood. Posthepato subsessile, with scalloped marginal membrane; its ventral surface divided by five septa into central loculus and five peripheral loculi. Three pairs of dissimilar anchors (posterior two pairs lying side by side) and 14 marginal hooks. Two pairs of eyes present. Pharynx constricted (or notched) into five distinct lobes. Intestinal ceca with medial and lateral dendritic branches, not confluent posteriorly. Testes fenestrated, juxtaposed. Vas deferens winding forward and then slightly backward to join seminal vesicle in cirrus pouch, which is medium in length. Prostomial reservoir strongly developed, outside of and connected to cirrus pouch. Cirrus short. Genital atrium opening very close to left margin of body below left pro-
hapter. Oval, oval, median, protostodular, separated from testes by a transverse vitelloduct. Cotyope surrounded pro-
minally by Mohlic gland cells; uterine egg with a single,
convoluted polar filament. Vagina fairly long, tubular,
slightly swollen proximally, narrowed to small duct distally,
and united with vitelline reservoir by a narrow duct; opening
close to genital pore submarginally. Vitellaria co-extensive
with intestinal branches; vitelline reservoir large, immediately
antero lateral to ovary. Parasitic on marine teleostei.

TYPE SPECIES: Allosprostonia taurina n. sp.

DISCUSSION: Allosprostonia n. gen. varies from every other
group of the family Trochopodinae (Price, 1936) Sproston, 1946
in characters that are presently regarded as generic in rank.
These characters are as follows: (1) the postheptan is divided
by five septa into one central and five peripheral loculi.
the three pairs of anchors being located on the posterior
two septa; (2) the preheptan consists of a pair of antero-
lateral suckers united anterodorsally by a common hood;
(3) the genital openings are slightly submargarinal; and,
(4) the pharynx is constricted into five lobes.

Allosprostonia taurina n. sp. is apparently related
to Sprostonia Bychovsky, 1957 in that it also possesses:
(1) a pair of anterolateral suckers united anterodorsally by
a common hood; (2) strongly developed prostate reservoir
lying longitudinally between the cirrus and the ovary; and,
(3) three pairs of dissimilar anchors similar in shape and
location (the posterior two pairs lying side by side). It is also of significance to note that *Allosprostonia tauvinae* n. sp. was found on the same host as *Sprostonia longisphallus* n. sp.

Although *Macrophyllida antennaria* (Hughes, 1920) Johnston, 1920 has five septa, its septa are more weakly developed (see redescription below) and the postcesophageal septa do not possess anchors, the anchors being located in the posterior loculus on atrophied rays deprived of special musculature (Johnston, 1920). The five septa of *Allosprostonia tauvinae* n. sp. are considered homologous to the five septations of *Sprostonia Dychowsky*, 1957 which originate from around the central loculus. Due to the previously mentioned similarities between *Sprostonia Dychowsky*, 1957 and the present species and their apparent close relationship, the new *Allosprostonia tauvinae* n. gen., n. sp. is proposed.

A total of two parasites were collected from seven host specimens (Table 8).

**Genus Macrophyllida Johnston, 1920** second.

**Synonym:** *Macrophylle* Hughes, 1920

**DIAGNOSIS:** Trochopodineae. Diagnosis the same as that of *Yamazuti* (1953) except as follows: (1) postchactor bearing three pairs of anchors, of which the anterior is on the junction of the posterior septa with that surrounding the central loculus, and the posterior pairs of anchors in large posterior loculus; (2) vasa efferentia coming from anterior margin of right testis and posterior margin of left testis;
(3) Glands of Coto present, to left and posterior to right testis; (4) cirrus, uterus, and vagina opening close together into marginal depression on left at posterior level of pharynx; and, (5) vagina opening separately from, but close to, common genital pore.

**TYPE SPECIES:** *Macrophyllida antarctica* (Hughes, 1928) Johnston, 1929.

**DISCUSSION:** The above examination of Mustelus antarcticus to correct the generic diagnosis of Macrophyllida Johnston, 1929, as given by Yanaguti (1963).

Hughes (1928) described a new genus and species, Macrophylla antarctica, from the gills of the Gummy Shark, *Mustelus antarcticus*, from Phillip Bay, Victoria, Australia. She found this species on only two host specimens of about one hundred examined. As the generic name was found to be preoccupied, *Macrophyllida* was proposed in its place by Johnston (1929), who (Johnston, 1930a) redescribed and figured the species from specimens sent to him by Dr. G. C. Macrophyllida antarctica

*Macrophyllida antarctica* (Hughes, 1928) Johnston, 1929

(PLATE III, FIGS. 11-15)

**Synonym:** *Macrophylla antarctica* Hughes, 1928

**Host:** *Mustelus antarcticus* Gunther, Gummy Shark; family Gobiosomatidae.
LOCALITY:  Busselton, Australia, 30 statute miles NNE of Hobart (15 fathoms, wood/mud).

PREVIOUSLY REPORTED HOST AND LOCALITY:  *Hystrix antarctica*

Geelwijk: Port Phillip Bay, Victoria, Australia.

GEAR USED:  Danish seine.

LOCATION:  Gills.

NUMBER STUDIED:  2.

NUMBER MEASURED:  1.


DESCRIPTION:  Body elongate, flattened dorsoventrally, 5.51 long by 1.25 wide. Cuticle fairly thin and smooth. Anterior end broadly rounded, separated from rest of body by constrictions on each side at level of midpoint of pharynx, bearing a pair of extensive glandular areas almost meeting in front, extending backwards around pharynx to near its posterior margin, containing numerous ducts; greatest width of prehaptoral region 1.22. Posthaptoral a subsessile, concavo-convex, nearly circular sucker, opening ventrally, 0.962 in diameter, divided by five weakly developed septa into one central and five peripheral loculi; margin of posthaptoral a weak muscular rim, surrounded by a marginal membrane up to 0.111 wide; armed with three pairs of dissimilar anchors, the first pair located at junction of posterolateral septa with that surrounding central loculus, and the second and third pairs of anchors located in the large posterior loculus; and 16 marginal hooks. Anteriormost anchors very small, left
one 0.00959 long, with blunt external tips and bifid internal tips; second pair of anchors elongate, slender, left one 0.0020 long and right one 0.0794 long, with slightly recurved blunt tips; third pair of anchors elongate, wider than second pair, right one 0.0618 long, with recurved sharp tips. (Large cell between second and third anchors on postheptor.) Postheptoral hooks 0.0163 long, each with a dorsum.

Pharynx muscular, 0.329 long by 0.403 wide, with a partially constricted margin and containing long, slender cells internally. Mouth subterminal, ventral, immediately anterior to pharynx. Esophagus short; gut bifurcated, crura with lateral but no medial dendritic branching, not confluent posteriorly. Two testes, oval, entire, obliquely tandem, left one smaller, 0.210 long by 0.214 wide, diagonally anterior to right one, 0.210 long by 0.223 wide, pro-equatorial in position. Vasa efferentia emerging from anteromedial margin of right testis and posterior margin of left testis fusing to right of left testis at its posteromedial margin, to form vas deferens. Vas deferens running to left of ovary, dorsal to vagina, dorsal to distal end of oötype, then turning right to pass dorsally and then ventrally to cirrus (entrance of vas deferens on cirrus not observed). Cirrus somewhat obliquely situated between right crus of intestine and oötype. Cirrus complex consisting of a sclerotized cirrus, and a prostate reservoir at the proximal end of cirrus, in cirrus pouch. Four large prostatic cells outside cirrus pouch, connected by small ducts to prostate reservoir. Storus connecting to
Circus pouch very near to left margin forming a genital atrium opening outside via the common marginal genital pore on left at level of posterior margin of pharynx. Clumps of Coto, oval, large, containing cellular material, immediately to left and posterior of right esophagus and partially dorsal to those parts of right esophagus.

Every prostaticular, entire, nearly circular except for anterior expansion, 0.309 long, by 0.287 wide, having internal chamber (seminal receptacle of Meserve, 1930) containing mature ova; convoluted everted passing from internal chamber to proximal end of ootype. Ootype obliquely situated between cirrus and vagina, surrounded by Mehlis' gland cells; uterus thick-walled, tapering distally, opening into genital atrium. Vagina long, slender, looped immediately anterolateral to ovary, containing small duct with constriction at level of distal end of ootype, opening separate from, but close to, genital pore into a common ventral marginal depression having a muscular vaginal lip.

Vitellaria follicular, extending from near posterior level of pharynx to almost end of body proper, being smaller in interocellar field than in extraceral field. Vitelline reservoir(s) not observed. Egg not observed.

"Brain" anterior to pharynx. Four granular oocytes located dorsal to brain, the first pair smaller and closer together than the posterior pair. Excretory pores opening dorso-laterally near margin at posterior level of pharynx.
DISCUSSION: The present study reveals that the worms in this collection are probably conspecific with *Macrophyllida antarctica* (Hughes, 1928) Johnston, 1929.

Though smaller than those in the original description (Table 3), the worm used for the redescriptions measurements is considered mature due to the presence of mature ova in the ovary. The worms in the present collection differ from Hughes' (1928) description in the following: (1) presence of large glands of Goto; (2) possession of a small anterior pair of anchors on the postheptan; (3) vas efferens from left testis coming from the posterior margin instead of the anterior margin; and, (4) the presence of 14 marginal hooks, each having a domus (Litton, 1963). Hughes (1928) also illustrated Leucos' canals near the posterior end of the body proper in his figure. These, in reality, are lateral branches of the gut and not Leucos' canals, which are found in dioecistic trematodes. Johnston (1930a) mentioned the obvious mistake by Hughes (1928), who called the uterus the vagina and vice versa. In his redescriptions, Johnston (1930a) also failed to mention the following: (1) the glands of Goto; (2) the occurrence of a small anterior pair of anchors on the postheptan; and, (3) the presence of 14 marginal hooks, each with a domus.

Both Hughes (1928) and Johnston (1930a) mentioned that the vas efferens emerges from the anterior margin of the left testis. In our specimens it comes from the posterior margin. The connection of the vas efferens to the left testis in this fashion can best be explained by a rotation of this testis.
100 degrees to the right, which results in the tendon arrangement of the testes. This is further evidenced by the left gland of Coto moving forward to lie next to the right testis and posterior to the left testis.

The nature of the genital openings as described by Johnston (1930a) and Yamaguti (1936) is not clear. According to Johnston (1930a) there are three sex apertures. Yamaguti (1963) wrote that "cyrus, uterus and vagina opening close together into muscular common genital atrium which in turn opens on the left margin." In the two worms of the present collection the genital atrium is formed by the junction of the cyrus pouch and the uterus close to the left margin. The vagina opens close to, but posterior to, the genital pore in the depression. In other words, both sex apertures open separately, the common genital pore being directed somewhat posteriorly and the vaginal pore directed anteriorly. A single vaginal lip (Johnston, 1930a stated that two such lips occurred in his sample) is situated on the anterolateral edge of this depression.

The presence of the large cell between the posterior two pairs of anchors as mentioned by Johnston (1930a) is verified in this study. Johnston (1930a) stated that this cell was probably a multipolar nerve cell. Its actual function is unknown. The long gland cells of the pharynx, mentioned by Johnston (1930a) as resembling those described by Heath (1902) as occurring in Entophila squamata (Heath, 1902) Johnston,
1929, were also observed. They have a large nucleus and proto-plasm which is granular and stains well.

Sproston (1946) mentioned "the two posterior radii of typical Capsaulidae being virtually suppressed" in referring to those radii on which the posterior two pairs of anchors are located. Johnston (1930a) wrote that the disc of *M. antarctica* (Hughes, 1928) Johnston, 1929, has five peripheral depressions and that the "posterior depression is large and is bisected by two atrophied rays deprived of special musculature." Rychowsky (1957) considered these rays to represent the disappearing posterior octa of the rest of *Megalocoelidae* which is substantiated by the presence of middle anchors in them. The writer accepts Rychowsky's theory.

A total of two parasites were recovered from 17 host specimens (Table 8). The only known species of *Megalocellidae, M. antarctica* (Hughes, 1928) Johnston, 1929, occurs on *Australus antarcticus* of the family Calocerinidae.

**Subfamily Donodeniinae Johnston, 1931**

**Synonym:** Donodeniinae Rychowsky, 1957

**DISCUSSION:** Donodeniinae was defined as a subfamily in *Capsaulidae Baird, 1853* by Johnston (1931), who included the genera *Donodellia* Blainville in Lamarck, 1818, *Donodina* Dissing, 1853, *Pseudodonodina* Johnston, 1931, and several subgenera. Johnston (1929) had previously given an analysis of the Donodeniid genera and their taxonomy, although the subfamily
### Table 3.
Comparison of measurements of *C. ophiomaculata* *a*nterctica
(Hughes, 1928) Johnston, 1929

|                | Hughes (1928) | Johnston (1930a) | Percentage
|----------------|---------------|------------------|-------------
| Entire body    | 13.15         | 14.8             | 5.51
|                | 1.3-2.5       | 2.0              | 1.25
| Postchaetae    |               | 2.0              | 0.962 (dia)
| Terminal       |               |                  | 0.111
| membrane       |               |                  | 0.00959
| Anchor 1       |               | 0.005            | 0.0020
| Anchor 2       |               | 0.005            | 0.0020
| Anchor 3       |               |                  | 0.9510
| Hooks          |               |                  | 0.9100
| Prochæstral    |               |                  | 1.22
| region         |               |                  | 0.329
| Pharynx        | 0.7           |                  | 0.329
|                | 0.05          |                  | 0.403
| Testes         | 0.6           |                  | 0.219
|                | 0.36          |                  | 0.216
|                | 0.6           |                  | 0.219
|                | 0.45          |                  | 0.223
| Gullet         | 0.6 (dia)     |                  | 0.299
|                | 0.239         |                  | 0.297
| Egg            | 0.229         |                  | 0.677
|                | 0.107         |                  | 0.677

(1) = length  
(2) = width  
L = left  
R = right  
(dia) = diameter
was not then defined. Earlier, Monticelli (1902) had placed Entobdella Blainville in Lamarck, 1818, and Ancyrocotyle Parona and Monticelli, 1903, under a new subfamily Ancyrocotylineae. Johnston (1931) wrote that "the subfamily, Ancyrocotyleineae, should be restricted to contain forms like Ancyrocotyle." Price (1934b), however, placed Ancyrocotyle in the subfamily Benedeniinae, and Novevco (1938) retained Ancyrocotyle in the subfamily and ignored the subgenera of Johnston (1931).

Price (1939a) gave a redefinition of Benedeniinae and included Encystyllabe Diesing, 1850, and Ancyrocotyle Parona and Monticelli, 1903.

Bychowsky (1957) proposed the following: (1) Benedeniinae Johnston, 1931 (part) in the subfamily Trochopodinae (Price, 1936) Sproston, 1946, including the genera Trochosoma Diesing, 1850, Benedenia Diesing, 1858, and Pseudobenedenia Johnston, 1931; (2) Benedeniinae Johnston, 1931 (part) in the new subfamily Entobdellinae Bychowsky, 1957, including the genus Entobdella Blainville in Lamarck, 1818; (3) genus Encystyllabe Diesing, 1850 in the subfamily Encystyllabinae Monticelli, 1882; and, (4) Ancyrocotyle Parona and Monticelli, 1903 in the subfamily Mitzschiniinae Johnston, 1931.

In his rearrangement, Yanaguti (1963) included Entobdellinae Bychowsky, 1957 as a synonym of Benedeniinae Johnston, 1931, and included the genera Benedenia Diesing, 1858, Ancyrocotyle Parona and Monticelli, 1903, Entobdella Blainville in Lamarck, 1818, Pseudobenedenia Johnston, 1931,
and *Matabenedeniella* Yanaguti, 1958. He further raised the *Matabenedeniella* subgenus *Benedeniella* Johnston, 1931 to generic rank, and added the new genera *Neobenedenia*, *Aliobenedenia*, *Neoabenedeniella*, and *Pseudoeutobicellia*.

In the beginning the author was somewhat skeptical of Yanaguti's (1963) rearrangement of the subfamily *Benedeniinae* Johnston, 1931. However, upon considering these characters which may be of taxonomic significance (Table 4) it has been concluded that such an arrangement is justifiable. The shape and arrangement of the prehaptoral region, the status of the gut, the shape and size of the cirrus, the presence or absence of a vagina, and the presence of the prostate reservoir inside or outside of the cirrus pouch are all regarded as taxonomically significant characters.

The detailed shape of the pharynx is a questionable character taxonomically because it may vary within a species due to: (1) the physiological state of the worm at the time of killing; (2) the state of relaxation that the parasite exhibits (contracted or expanded); and, (3) the method of mounting, e.g., pressure-fixation and pressure-mounting may distort the pharynx. It is further noted that both the type genus, *Benedenia* Diesing, 1858, and *Neoabenedenia* Yanaguti, 1963, as they are now understood, contain members in which the pharynx is lobulate or globular (Table 4).
Certain problems exist with the long-curved versus the short-straight cirrus as a criterion. For example, the genus *Pseudobenedenia* Johnston, 1931, which has only two species, contains one (*P. notottheniae* Johnston, 1931) that has a short-straight cirrus and one (*P. nobloi* Menzies, 1946) Yamaguti, 1963) that has a long-curved cirrus. Since the size and shape of the cirrus were used in Table 4 in order to examine Yamaguti's (1963) taxonomic rearrangement of the genus, it appears likely that some change should be made in order to follow the same scheme of separating the genera. It should be further noted that *Pseudobenedenia nobloi* (Menzies, 1946) Yamaguti, 1963 has a different arrangement of the prothororal region than *Pseudobenedenia notottheniae* Johnston, 1931, a distinct procoral lobe being lacking in *P. nobloi*.

The author accepts Yamaguti's (1963) rearrangement of the subfamily Benedeniinae Johnston, 1931 and provisionally accepts his addition of *Pseudobenedenia nobloi* (Menzies, 1946) Yamaguti, 1963 to the genus *Pseudobenedenia* Johnston, 1931, on the reasoning that without careful examination of the species of this genus a change is not justifiable at this time.

**Genus Neobenedenia** Yamaguti, 1963

**Discussion:** Johnston (1929) grouped the species of *Benedenia* Diase, 1928 into three subgenera: *Benedenia*, *Benodeniella*, and *Parabenedenia*. In *Parabenedenia* he included *Neobenedenia melloni* (Macklan, 1927) Yamaguti, 1963 (*Benedenia* (*Parabenedenia*) *melloni*). Price (1939a) stated that in addition
TABLE 4.
Comparison of the major taxonomic characters separating the genera of the subfamily Benedeniinae

<table>
<thead>
<tr>
<th>Prothorax type</th>
<th>Cut</th>
<th>Pharynx</th>
<th>Cirrus</th>
<th>Vagina</th>
<th>Position of the prostate reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benedenia</td>
<td>cup-like, not on a lobe</td>
<td>branched, not joined</td>
<td>lobulate or globular</td>
<td>short-straight</td>
<td>present</td>
</tr>
<tr>
<td>(type genus)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allobenedenia</td>
<td>neddled hood</td>
<td>0</td>
<td>globular</td>
<td>long-curved</td>
<td>0</td>
</tr>
<tr>
<td>Pseudobenedenia</td>
<td>0</td>
<td>0</td>
<td>lobulate</td>
<td>short-straight / long curved</td>
<td>0</td>
</tr>
<tr>
<td>Benocheleon</td>
<td>cup-like, not on a lobe</td>
<td>0</td>
<td>lobulate or globular</td>
<td>short-abornt</td>
<td>0</td>
</tr>
<tr>
<td>Benochelella</td>
<td>cup-like, not on a lobe; anterior part glandular</td>
<td>0</td>
<td>lobulate</td>
<td>long-curved</td>
<td>present</td>
</tr>
<tr>
<td>Species</td>
<td>Prostate type</td>
<td>Cut</td>
<td>Tharyn</td>
<td>Cirrus</td>
<td>Vagina</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>-------</td>
<td>--------</td>
<td>---------</td>
<td>--------------</td>
</tr>
<tr>
<td>Specimen</td>
<td>cup-like,</td>
<td></td>
<td>lobulate</td>
<td>short-straight</td>
<td></td>
</tr>
<tr>
<td>Morphology</td>
<td>not on a lobe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notochordoniella</td>
<td>n</td>
<td></td>
<td>lobulate</td>
<td>long-curved</td>
<td></td>
</tr>
<tr>
<td>Specimen</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entobdella</td>
<td>glandular areas</td>
<td>branched, joined</td>
<td>globular</td>
<td>short-straight</td>
<td></td>
</tr>
<tr>
<td>Specimen</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudentobdella</td>
<td>glandular areas</td>
<td>branched, not joined</td>
<td>globular</td>
<td>short-straight</td>
<td></td>
</tr>
<tr>
<td>Specimen</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acontostyla</td>
<td>cup-like,</td>
<td>not branched, not joined</td>
<td>globular</td>
<td>short-straight</td>
<td></td>
</tr>
<tr>
<td>Specimen</td>
<td>on a lobe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
to the absence of vaginae, the haptoral hooks of four species
(molloni, smitha, isabellae, scollari) are so similar that these
two characters considered together might be adequate for the
creation of a separate genus. Harrig (1955), in his discussion
of Rohenadenia scollari (Harrig, 1955) Yanaguti, 1963, agreed
that some taxonomic separation of these oviginate species from
the other species of the genus Rohenadenia Diesing, 1858 was justi-
fiable. Harrig (1955) also stated that if a subgenus were named
after them, then Johnston's (1929) subgenera should be considered
and integrated. Yanaguti (1963) proposed a new genus, Rho-
henadenia, for the five species of oviginate benedonidids, with
Rohenadenia molloni (MacCallum, 1927) Yanaguti, 1963 as the
type species.

Rohenadenia wilsoni n. sp.

(PLATE IV, Figs. 16-20)

HOST: Micrura brunia (Bloch and Schneider); Family Siganidae.
LOCALITY: Carnarvon, Western Australia; 6 statute miles NE of
Cape Arco (9 fathoms, sand/shell).

GASTEROID: Tricol.
LOCATION: Cells.
NUMBER STUDIED: 5.
NUMBER MEASURED: 4.

Holotype: USNM Holm Coll. No.


Paratype: USNM Holm Coll. No.

DESCRIPTION: Body elliptical, flattened dorsoventrally, somewhat rounded anteriorly and posteriorly, (4) 1.61 (1.40 - 1.96) long by (4) 0.521 (0.426 - 0.690) wide. Cuticle fairly thin and smooth. Prostomia a pair of ventrolateral suckers; left sucker (4) 0.143 (0.132 - 0.154) long by (4) 0.142 (0.133 - 0.162) wide, and right sucker (3) 0.145 (0.131 - 0.150) long by (3) 0.147 (0.136 - 0.160) wide. Poststomia a subsessile, aceptate, concavo-convex, circular sucker, opening ventrally, (4) 0.329 (0.257 - 0.330) long by (4) 0.332 (0.303 - 0.390) wide; margin of poststomia surrounded by a marginal membrane (4) 0.0234 (0.0204 - 0.0251) wide; armed with three pairs of dissimilar anchors and 14 marginal hooks. Anteriormost anchor stout, left one (3) 0.0560 (0.0516 - 0.0590) long and right one (3) 0.0532 (0.0480 - 0.0569) long, with small pointed knobs on external tips and blunt internal tips; second pair of anchors elongate, robust, left one (2) 0.0761 (0.0729 - 0.0870) long and right one (3) 0.0767 (0.0559 - 0.0867) long, with thick recurved sharp tips; third pair of anchors elongate, left one (2) 0.0466 (0.0435 - 0.0563) long and right one (3) 0.0496 (0.0396 - 0.0522) long, with thin recurved sharp tips. Poststomial hooks (4) 0.00746 (0.00632 - 0.00816) long.

Pharynx muscular, (4) 0.179 (0.161 - 0.236) long by (4) 0.152 (0.129 - 0.192) wide, with more or less indented outline. Mouth subterminal, immediately cefaco-ventral to pharynx. Esophagus short; gut bifurcated, ceca with lateral and medial dendritic branching, not confluent posteriorly.
Two small testes, side by side but not touching, entire, oval in outline, left one (4) 0.0729 (0.0700 - 0.0796) long by (4) 0.0660 (0.0551 - 0.0765) wide and right one (4) 0.0740 (0.0712 - 0.0775) long by (4) 0.0636 (0.0575 - 0.0765) wide, equatorial in position. Vasa efferentia and vas deferens not observed. Circus obliquely situated immediately posterior to pharynx, contained in cirrus pouch. Prostate reservoir apparently enclosed in cirrus pouch. Uterus connecting to cirrus pouch at level of posterior margin of pharynx to form genital atrium opening outside via the common submarginal genital pore on left at level of anterior end of pharynx. Glands of testo almost as large as testes, on each side of the midline posterior to testes.

Ovary immediately protosticular, nearly circular, entire, median, (4) 0.121 (0.107 - 0.153) long by (4) 0.117 (0.106 - 0.147) wide, having internal chamber (spermal receptacle of Reserve, 1930) containing mature ova; evident convoluted, passing from internal chamber dorsal to vitelline reservoir, entering dorally on ootype. Ootype large, obliquely situated, surrounded by Michelle's gland cells at its proximal end; uterus short, opening into genital atrium. Vagina absent.

Vitellaria follicular, extending from anterior level of pharynx to very close to the end of body proper. Transverse vitellocute fusing medially to form large vitelline reservoir immediately anterior to ovary. Egg not observed.
"Brain" entocentral to anterior part of pharynx.
Four gillar spots located dorsal to brain, the first pair smaller and closer together than the posterior pair.
Excretory pores on same level as ootype, opening dorso-laterally.

DISCUSSION: The present species is apparently closely related to Neobranchia muelleri (Neserov, 1938) Yanaguti, 1963 from the gills of Ctenopus acutissimi Steindachner in that it has:
(1) testes entire, equatorial; (2) glands of Goto; (3) nearly circular protoparosoral suckers; and, (4) a somewhat globular pharynx. However, it differs from N. muelleri (Neserov, 1938) Yanaguti, 1963 in the following respects (Table 5): (1) smaller body size; (2) smaller anchors; (3) smaller testes which are more widely separated; and, (4) host.

This description increases the number of species in the genus Neobranchia Yanaguti, 1963 to six. These are:
N. muelleri (Neserov, 1927) Yanaguti, 1963 (type species);
N. acutissimi (Neserov, 1930) Yanaguti, 1963; N. nicolai
(Neserov, 1935) Yanaguti, 1963; N. acutissimii (Neserov, 1933)
Yanaguti, 1963; N. muelleri (Neserov, 1930) Yanaguti, 1963;
and N. wilsoni n. sp.

N. wilsoni n. sp. is named after Mr. William Stanley Wilson of the Virginia Institute of Marine Science, who made the collections from Australia.

A total of five parasites were found on 12 host specimens (Table 5).
TABLE 5.
Comparison of measurements of *Eubranchiopsis muelleri* (Reserve, 1933) Yamaguti, 1963 and *Eubranchiopsis villosa* n. sp.

<table>
<thead>
<tr>
<th></th>
<th><em>E. muelleri</em></th>
<th><em>E. villosa</em> n. sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reserve (1933)</td>
<td></td>
</tr>
<tr>
<td>Entire body</td>
<td>4.116</td>
<td>1.49-1.96</td>
</tr>
<tr>
<td></td>
<td>1.603</td>
<td>0.623-0.688</td>
</tr>
<tr>
<td>Footpathets</td>
<td>1.033 (dia)</td>
<td>1)0.297-0.330</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.393-0.399</td>
</tr>
<tr>
<td>Marginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>membrane</td>
<td></td>
<td>0.2206-0.2251</td>
</tr>
<tr>
<td>Anchor 1</td>
<td>0.176</td>
<td>L 0.0516-0.0550</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R 0.0460-0.0560</td>
</tr>
<tr>
<td>Anchor 2</td>
<td>0.53</td>
<td>L 0.0660-0.0873</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R 0.0890-0.0867</td>
</tr>
<tr>
<td>Anchor 3</td>
<td>0.100</td>
<td>L 0.0400-0.0509</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R 0.0390-0.0502</td>
</tr>
<tr>
<td>Hooks</td>
<td>0.020</td>
<td>0.00650-0.00010</td>
</tr>
<tr>
<td>Prehaptoral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>suckers</td>
<td>(1)0.596</td>
<td>l(1) 0.132-0.154</td>
</tr>
<tr>
<td></td>
<td>(v)0.640</td>
<td>l(v) 0.133-0.162</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R(1) 0.131-0.196</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R(v) 0.133-0.163</td>
</tr>
<tr>
<td>Pharynx</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1(1) 0.161-0.236</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(v) 0.129-0.192</td>
</tr>
<tr>
<td>Testes</td>
<td>(1)0.339</td>
<td>L(1) 0.0703-0.0796</td>
</tr>
<tr>
<td></td>
<td>(v)0.225</td>
<td>L(v) 0.0551-0.0745</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R(1) 0.0712-0.0775</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R(v) 0.0575-0.0765</td>
</tr>
<tr>
<td>Ovary</td>
<td>(1) 0.395</td>
<td>0.107-0.153</td>
</tr>
<tr>
<td></td>
<td>(v) 0.359</td>
<td>0.103-0.167</td>
</tr>
</tbody>
</table>

(1) = length  L = left  (dia) = diameter  
(v) = width  R = right
Genus Lophodiniella (Johnston, 1929) Yamaguti, 1963

DISCUSSION: Johnston (1929) proposed a new subgenus Lophodiniella with Lophodina (Lophodiniella) maccollae (Lécoq, 1906) as the type species. Sprunt (1946) included Lophodiniella as a subgenus along with the other subgenera of Johnston (1929) in her key to the genera and subgenera of Lophodiniacee Johnston, 1931. Yamaguti (1963) raised Lophodiniella from subgeneric rank to generic rank, with L. maccollae (Lécoq, 1906) Johnston, 1929 as the type species.

Lophodiniella cyatovarina n. sp.

(PLATE V, Figs. 21-27)

HOST: Lophodina cyatovarina Richardson; Sweet-lip Emperor; Family Lophodinidae.

LOCALITY: Gladstone, Queensland; 36 statute miles E of Gladstone (9 fathoms, coral).

COLL. NO.: Hand line.

LOCATION: Cilico.

NUMBER STUDIED: 4.

NUMBER PARASITE: 3.

Holotype: USNM Coll. Coll. No.


DESCRIPTION: Body elliptical, flattened dorsoventrally, somewhat rounded anteriorly and posteriorly, (3) 1.76 (1.29 - 2.46) long by (3) 0.759 (0.454 - 1.10) wide. Cuticle fairly
thin and smooth. Proboscis a pair of antecostalateral suckers, having a glandular area anteriorly and a small sucker posteriorly, left proboscis (3) 0.133 (0.0987 - 0.103) long by (3) 0.106 (0.150 - 0.252) wide and right proboscis (3) 0.129 (0.102 - 0.170) long by (3) 0.166 (0.161 - 0.256) wide. Postheptad a subecdyle, accepts, anteced-convex sucker, opening ventrally, (3) 0.251 (0.254 - 0.506) long by (3) 0.462 (0.279 - 0.596) wide; margin of postheptad surrounded by a marginal membrane (3) 0.0207 (0.0214 - 0.0463) wide; armed with three pairs of dissimilar anchors and 16 marginal hooks. Anteriormost anchor stout, left one (2) 0.0514 (0.0502 - 0.0526) long and right one (2) 0.0600 (0.0557 - 0.0704) long, with rounded, slightly pointed external tips and blunt internal tips; second pair of anchors elongate, left one (2) 0.0392 (0.0361 - 0.0422) long and right one (2) 0.0395 (0.0361 - 0.0426) long, with thick recurved sharp tips; third pair of anchors elongate, left one (3) 0.0350 (0.0214 - 0.0322) long and right one (2) 0.0321 (0.0318 - 0.0324) long, with thin recurved sharp tips. Postheptad oral hooks (3) 0.00816 (0.00612 - 0.00916) long.

Pharynx muscular, (3) 0.161 (0.114 - 0.247) long by (3) 0.131 (0.130 - 0.264) wide, with more or less indented outline. Youth subterminal, ventral to pharynx. Esophagus short; gut bifurcated,粗結 with lateral and medial dendritic branching, not confluent posteriorly.
The testes, juxtaposed, constricted, entire, oval in outline, left one (3) 0.199 (0.165 - 0.247) long by (3) 0.169 (0.127 - 0.239) wide and right one (3) 0.196 (0.170 - 0.232) long by (3) 0.166 (0.151 - 0.220) wide, everted in position. Vas deferens and vas deferens not observed posterior to bulbous swelling of vas deferens just posterior to ovary. Vas deferens passing ventral to left margin of ovary, dorsal to left arm of vitelline reservoir, proximal end of vagina, distal end of oötype, and cirrus, forming a dilation dorsal to cirrus.

Cirrus long, sclerotized, with base on right side of median line, contained in cirrus pouch. Prostate reservoir apparently enclosed in cirrus pouch. Uterus connecting to cirrus pouch at level of posterior margin of pharynx to form genital atrium opening outside via the common marginal genital pore on genital pad on left just posterior to left proctopter. Glands of Cote small, oval, on each side of median posterior to testes.

Ovary proterticular, nearly circular, entire, median, (3) 0.118 (0.0937 - 0.173) long by (3) 0.123 (0.0889 - 0.163) wide, having internal chamber (seminal receptacle of Reserve, 1938) containing mature ova; oviduct passing from internal chamber dorsal to right arm of vitelline reservoir, entering proximal arm of oötype. Oötype obliquely situated between cirrus and vagina, surrounded by Schliës' gland cells; uterine short, opening into genital atrium. Vagina long, with bulbous swelling at proximal end, passing forward to left and turning slightly posteriorly to open on left margin posterior to genital pore.
Vitellarine follicles, extending from anterior end of pharynx to near posterior end of body proper. Transverse vitelloducts facing radially to form vitelline reservoir immediately anterolateral and partly ventral to ovary. Size in utero polyhedral, (2) 0.121 (0.120 - 0.122) long by (2) 0.103 (0.102 - 0.113) wide.

"Brain" anterodorsal to pharynx. Four granular eye-spots located dorsal to brain, the first pair smaller and closer together than the posterior pair. Excretory pores on same level as uterus, opening dorsolaterally.

DISCUSSION: The present species is apparently related to Hapalodesmella marcellina (Löhe, 1906) Johnston, 1929 in that it has: (1) prothoraxal areas with the anterior part glandular and the posterior part bearing suckers; (2) a vitelline reservoir that is transversely elongated; (3) a vaginal duct that is long and opens on the margin; (4) a long, thin cirrus; and, (5) the testes reservoir enclosed in the cirrus pouch. However, it differs from H. marcellina (Löhe, 1906) Johnston, 1929 in the following respects (Table 6): (1) much smaller body size; (2) much smaller suckers; (3) vagina, without posterior loop, opening on margin at greater distance from genital pore; (4) vas deferens passing forward to uterus and turning posteriorly to enter dorsal to cirrus pouch; and, (5) host class.

This description increases the number of species in the genus Hapalodesmella (Johnston, 1929) to three. These are:
### TABLE 6.
Comparison of measurements of *Benedeniella* species

<table>
<thead>
<tr>
<th>Measure</th>
<th><em>B. macrocolpa</em> Lühe (1906)</th>
<th><em>B. posterocolpa</em> Harris (1955)</th>
<th><em>B. cystovarica</em> n. sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire body</td>
<td>(1) 9.0-10.0</td>
<td>7.4-13.9</td>
<td>1.29-2.46</td>
</tr>
<tr>
<td>Post-haptor</td>
<td>(1) 2.3-2.6</td>
<td>1.8-3.2</td>
<td>0.254-0.506</td>
</tr>
<tr>
<td>Marginal membrane (v)</td>
<td>-----------------------------</td>
<td>--------------------------------</td>
<td>0.0214-0.0463</td>
</tr>
<tr>
<td>Anchor 1 (1)</td>
<td>-----------------------------</td>
<td>0.471-0.701</td>
<td>L 0.0502-0.0526</td>
</tr>
<tr>
<td>Anchor 2 (1)</td>
<td>-----------------------------</td>
<td>0.675-1.070</td>
<td>R 0.0361-0.0422</td>
</tr>
<tr>
<td>Anchor 3 (1)</td>
<td>-----------------------------</td>
<td>0.057-0.089</td>
<td>L 0.0314-0.0392</td>
</tr>
<tr>
<td>Hooks (1)</td>
<td>-----------------------------</td>
<td>0.011-0.016</td>
<td>R 0.0316-0.0324</td>
</tr>
<tr>
<td>Pro-haptoral suckers (1.0)</td>
<td>(dia)</td>
<td>1.3-1.0 (dia)</td>
<td>L(1) 0.0007-0.183</td>
</tr>
<tr>
<td>Pharynx</td>
<td>-----------------------------</td>
<td>(1) 0.552-1.334</td>
<td>(v) 0.158-0.252</td>
</tr>
<tr>
<td>Testes</td>
<td>-----------------------------</td>
<td>0.783-1.229</td>
<td>(dia) 0.165-0.247</td>
</tr>
<tr>
<td>Ovary</td>
<td>-----------------------------</td>
<td>(v) 0.446-0.766</td>
<td>R(1) 0.102-0.176</td>
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<td>Egg</td>
<td>-----------------------------</td>
<td>(1) 0.166-0.185</td>
<td>(v) 0.0839-0.169</td>
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<td>(1) = length</td>
<td>L = left</td>
<td>(dia) = diameter</td>
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<td>(v) = width</td>
<td>R = right</td>
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B. macrocolus (Linc, 1906) Johnston, 1929 from Rhinoptera javanica
(Ceylon); B. postorocolus (Hargis, 1955) Yamaguti, 1963 from
postorocolus
postorocolus (Florida); and B. syrtoecina n. sp. from
Lethrinus chrysostomus (Australia). This non-rigid host-
specificity (Hargis, 1957) of Benedeniella (Johnston, 1929)
Yamaguti, 1963 could possibly represent palaeoecological or neo-
ecological relationships between the hosts.

A total of four parasites were recovered from 28 host
individuals (Table 8).

Genus Benedeniella Diesing, 1850

Synonym: Enhibellia Beneden, 1855, part
Euphino Chao, 1815, not Abildgaard, 1790, part
Tristina Cuvier, 1817, part

DISCUSSION: Since Sproston’s (1946) excellent account of the
genus Benedeniella Diesing, 1850, the species B. jaliocan Bravo-
Hollis, 1951 from Epinephelus labriiformis and B. syrtoecine
Yamaguti, 1953 from Synagris sp. have been added to the genus.

Benedeniella anteroevalvi n. sp.
(PLATE VI, Figs. 28-34)

HOSTS: (1) Lethrinus chrysostomus Richardson, Sweet-lip Emperor;
family Lethrinidae, and (2) Lutjanus cohae (Cuvier),
Red Emperor; family Lutianidae.

LOCALITY: (1) Gladstone, Queensland; 27 statute miles NE of
Gladstone (9-12 fathoms, coral/wood) and Gladstone,
Queensland; 36 statute miles NE of Gladstone (9 fathoms,
coral). (2) Gladstone, Queensland; 27 statute miles NE
of Gladstone (9-12 fathoms, coral/wood).

GEAR USED: Hand line.

LOCATION: Gills.

NUMBER STUDIED AND MEASURED: 4.

Holotype: USNM Holm. Coll. No.

VII3 Coll. No. U-509-1


DESCRIPTION: Body elliptical, flattened dorsoventrally,
(4) 2.54 (1.79 - 3.69) long by (4) 0.774 (0.592 - 0.983) wide.
Cuticle fairly thin and smooth; Prehepteral a pair of ventrolateral
suckers; left sucker (4) 0.163 (0.155 - 0.229) long by (4) 0.213
(0.188 - 0.252) wide and right sucker (3) 0.170 (0.144 - 0.211)
long by (3) 0.220 (0.201 - 0.255) wide. Prehepteral region
containing glandular areas. Posthepteral a subcylindrical, acute,
concave-convex, circular sucker, opening ventrally, (4) 0.463
(0.373 - 0.572) long by (3) 0.462 (0.407 - 0.548) wide;
surrounded by a marginal membrane (3) 0.0913 (0.0260 - 0.0350)
wide; armed with three pairs of dissimilar anchors and 16 marginal
hooks. Anteriormost anchors robust, left one (3) 0.121 (0.0890 -
0.137) long and right one (3) 0.118 (0.0790 - 0.139) long, with
slightly curved pointed external tips and broad bifid internal
tips; second pair of anchors elongate, robust, left one (2)
0.101 (0.0755 - 0.126) long and right one (3) 0.109 (0.0830 -
0.127) long, with thick recurved sharp tips; third pair of
anchors elongate, left one (2) 0.0901 (0.0875 - 0.0926) long and right one (3) 0.0811 (0.0530 - 0.102) long, with thin recurved sharp tips. Posthepteral hooks (2) 0.00736 (0.00673 - 0.00706) long.

Pharynx muscular, lobulato, (4) 0.178 (0.126 - 0.206) long by (4) 0.206 (0.137 - 0.309) wide. Mouth subterminal, anteroventral to pharynx. Esophagus short; not bifurcated, crura with lateral and medial dendritic branching, not confluent posteriorly.

The testes, juxtaposed, entire, oval in outline, left one (4) 0.201 (0.165 - 0.272) long by (4) 0.173 (0.135 - 0.233) wide and right one (4) 0.206 (0.163 - 0.294) long by (4) 0.185 (0.161 - 0.234) wide, pro-equatorial in position. Posterior end of vas deferens, including the vasa efferentia, not observed posterior to bulbous swelling of vas deferens immediately behind ovary. Vas deferens winding forward on left, forming three large dilatations: (1) dorsal to proximal end of uterus; (2) to right of cirrus; and, (3) dorsal to proximal end of cirrus pouch. Third dilatation opening into large seminal vesicle, which in turn continues forward and joins ejaculatory duct at proximal end of cirrus. Cirrus obliquely situated posterior to pharynx, contained in cirrus pouch. Prostate reservoir outside cirrus pouch, connected by small duct passing ventral to cirrus pouch and to ejaculatory duct of cirrus. Prostatic cells to left, anterior, and posterior to prostate reservoir. Uterus connecting to cirrus pouch at level of posterior margin of
pharynx to form genital atrium opening outside via the common submarginal genital pore on left just posterior to left anterior sucker. Vascular and sclerotised genital pad, which is connected by muscular fibers to two cuticularised rossette-shaped structures on dorsal side of left prehapter, present around genital pore.

Every protostomium, nearly circular, entire, median, (4) 0.152 (0.109 - 0.224) long by (4) 0.157 (0.107 - 0.220) wide, having internal chamber (seminal receptacle of Reserve, 1930) containing mature ova; oviduct passing from internal chamber dorso to vitelline reservoir, entering dorsally on cotype.
Cotype large, obliquely situated between cirrus and vagina, surrounded by utines' gland cells; uterus short, opening into genital atrium. Vagina long, with bulbous swelling at proximal end, opening submarginally on left postero-lateral to common genital pore.

Vitelline follicles, extending from level of brain to near posterior end of body proper. Transverse vitellocords facing medially to form vitelline reservoir immediately antero-lateral to ovary. Egg in uterus with convoluted basal filament (1) 0.116 long by (1) 0.0965 wide.

"Brain" antero-dorsal to pharynx, having three pairs of nerves passing forward to prehapteral region. Four granular cycads located dorsal to brain, the first pair smaller and closer together than the posterior pair. Premotor pair at level of posterior margin of pharynx, opening dorso-laterally.
DISCUSSION: The present species is apparently related to *Acanthocephalus undulatus* (Yamaguti, 1934) Price, 1939 from *S americanus* and *E. unimaculatus* in that it has: (1) submarginal genital openings; (2) bulbous swelling of vas deferens posterior to every; (3) similarly shaped pharynx; (4) anteriormost pair of anchors with bident internal tips. However, it differs from *E. undulatus* (Yamaguti, 1934) Price, 1939 in the following respects (Table 7): (1) smaller body size; (2) vas deferens with three large dilations; (3) smaller anchors; (4) genital pad around common genital pore, pad connected to two rosette-shaped structures (function unknown) on the dorsoventral surface of the left prechoria; (5) proximal end of vagina bulbous; and, (6) host.

This description increases the number of species in the genus *Acanthocephalus* Diesing, 1858 to 14. A summary of the other 13 species is given by Yamaguti (1963).

A single specimen of *A. antonovici* n. sp. was recovered from 15 specimens of *Ludicamia hexapoda* and three parasites were found on 20 specimens of *Ludicamia chinensis* (Table 9).
### TABLE 7.

Comparison of measurements of *P. arenicola* 
(Yamaguti, 1934) and *P. antarcticus* n. sp.

<table>
<thead>
<tr>
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<th>P. arenicola Yamaguti (1934)</th>
<th>P. antarcticus n. sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire body</td>
<td>(l) 5.5-6.6 (v) 3.1-3.9</td>
<td>(l) 1.75-3.49 (v) 0.522-0.923</td>
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<tr>
<td>Postcheprons</td>
<td>(l) 1.56-1.6</td>
<td>(l) 0.372-0.372 (v) 0.497-0.566</td>
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<tr>
<td>Hartig's</td>
<td>membrane</td>
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<td>(v) —</td>
<td>(l) 0.0269-0.0359</td>
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<tr>
<td>Anchor 1</td>
<td>(l) 0.36-0.43</td>
<td>(l) 0.0539-0.137 (v) 0.0793-0.139</td>
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<td>Anchor 2</td>
<td>(l) 0.47-0.55</td>
<td>(l) 0.0755-0.126 (v) 0.0893-0.127</td>
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<tr>
<td>Anchor 3</td>
<td>(l) 0.06-0.1</td>
<td>(l) 0.0975-0.102 (v) 0.0693-0.102</td>
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<tr>
<td>Hooks</td>
<td>(l) —</td>
<td>(l) 0.00672-0.00706</td>
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<td>Preoperculum</td>
<td>(l) 0.625-0.6</td>
<td>(l) 0.155-0.223 (v) 0.180-0.252</td>
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<td>Scales</td>
<td>(v) 0.65-0.62</td>
<td>(l) 0.166-0.221 (v) 0.188-0.223</td>
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<td>Finrays</td>
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<td>(l) 0.128-0.266 (v) 0.132-0.266</td>
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<td>Fossae</td>
<td>(l) 0.56-0.73 (v) 0.5-0.71</td>
<td>(l) 0.163-0.272 (v) 0.125-0.220</td>
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<td>Ovary</td>
<td>(l) 0.4-0.61 (v) 0.55-0.72</td>
<td>(l) 0.165-0.226 (v) 0.197-0.226</td>
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<tr>
<td>Eye</td>
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<td>(l) 0.3-0.115 (v) 0.0690</td>
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(1) = Left; (v) = Right; (l) = Left; (v) = Right; (diameter) = Diameter
SUMMARY

Collections comprising 93 species of common marine fishes from Australian waters yielded ten species of copepods (Tonegenus: Copepoida) and two species of monocotylids (Toneg. Monocotylidae). Nearly all are new to science.

Six species of copepods from five host species are discussed herein. Five, 
Serostonia locoichallis n. sp., Allocerostonia taurina n. gen., n. sp., Neobenedenia wilsoni n. sp., 
Benedeniella austrosalis n. sp., and 
B. towagoni n. sp., and 
B. antarcticus (Thomson, 1920) Johnston, 1929, are described for the first time. One species, 
Macronyphyllida antarctica (Thomson, 1920) Johnston, 1929, is redescribed.

Most of the species were satisfactorily placed in suitable existing genera; however, it has been necessary to erect a new genus for one, Allocerostonia taurina n. gen., n. sp. The subfamily Trachopodinae (Price, 1936) Synnott, 1946 is extended to accommodate this new genus, Allocerostonia. The genus Serostonia Synnott, 1957 is extended to accommodate the new species Serostonia locoichallis n. sp. and the genus Macronyphyllida Johnston, 1929 is extended in order to correct Yamaguti's (1933) diagnosis of the genus.

In addition, a historical review and discussion of each taxonomic group is presented along with a discussion of those characters considered taxonomically significant. After a study of the diagnoses by Yamaguti (1933) of the subfamilies Trachopodinae (Price, 1936) Synnott, 1946 and Benedeniinae Johnston, 1931, the author accepts his rearrangements, with the cautions presented herein.
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EXPLANATION OF PLATE I

*Sprostonia longiphallus* n. sp.

Figs.

1. Whole mount, ventral view.
2. Reproductive organs and terminal genitalia, ventral view.
3. Left anteriormost anchor.
4. Right anteriormost anchor.
5. Right middle and posteriormost anchors.
EXPLANATION OF PLATE II

*Allosproctonia tauvinae* n. gen., n. sp.

Figs.

7. Whole mount, ventral view.

8. Reproductive organs and terminal genitalia, ventral view.

9. Left anteriormost anchor.

10. Left middle and posteriormost anchors.
EXPLANATION OF PLATE III

*Macrophyllida antarctica* (Hughes, 1929) Johnston, 1929

Fig 11. Whole mount, ventral view.

12. Reproductive organs and terminal genitalia, ventral view.

13. Left anteriormost anchor.

14. Right middle anchor.

15. Right posteriormost anchor.
EXPLANATION OF PLATE IV

Neobodonida wilsoni n. sp.

Figs.
16. Whole mount, ventral view.
17. Reproductive organs and terminal genitalia, ventral view.
18. Left anteriormost anchor.
19. Left middle anchor.
20. Left posteriormost anchor.
EXPLANATION OF PLATE V

Bonodendrilla cystovagina n. sp.

Figs.

21. Whole mount, ventral view.
22. Reproductive organs and terminal genitalia, ventral view.
23. Right anteriormost anchor.
24. Left middle anchor.
25. Left posteriormost anchor.
26. Left posteriormost anchor.
27. Egg in utero, ventral view.
EXPLANATION OF PLATE VI

Benedenia anteropulvi n. sp.

Figs.

28. Whole mount, ventral view.

29. Reproductive organs and terminal genitalia, ventral view.

30. Right anteriormost anchor.

31. Right anteriormost anchor.

32. Right middle anchor.

33. Left posteriormost anchor.

34. Egg in utero, ventral view.