

COPY

SOME PARASITES OF THE FRESHWATER CATFISH  
*TANDANUS TANDANUS* (MITCHELL)

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## ABSTRACT

Six freshwater catfish, *Tandanus tandanus*, were surveyed for parasites. All six showed some sign of parasitic infection. Three species of parasite were found - a cestodarian *Balanotaenia bancrofti* in the gut, a nematode of the genus *Procamallanus* the gut, and a cestode larvae belonging to the Family Proteocephalidae in the gall bladder. Measurements and diagrams and a brief description of all three species is given.

## INTRODUCTION

The parasites of many species of fish and other animals as yet remain undescribed. Although a detailed study of the biology of the freshwater eel tailed catfish *Tandanus tandanus* (Mitchell 1838) was made in 1976 by Davis, no reference to the parasites of *T. tandanus* was made.

Early work on the parasites of *T. tandanus* appeared in 1924 by Johnston and later parasites were described by Johnston and Mawson (1940, 1945) and Johnston and Muirhead (1940). Checklists of parasites occurring in Australian freshwater fish were made by Johnston and Mawson in 1947 and 1951. All these studies were made of *T. tandanus* specimens obtained in South Australia.

A detailed survey of the parasites of *T. tandanus* in New South Wales has not been made except for some unpublished results of a small survey by Owen (1978).

It is proposed that a number of catfish from northern New South Wales are examined for parasites so that some understanding of their parasites is gained. *Tandanus tandanus* is a popular food fish in New South Wales, west of the Snowy Mountain divide, however they do occur east of the divide. They are regarded as having a particularly good flesh texture and flavour and are popular with fishermen because of this. They grow quite large (0.9 metre) and have been used by a number of landowners to stock farm dams as a food fish. They multiply and grow well in farm dams, requiring little or no maintenance.

A European silurid, *Ictalurus punctatus* is grown commercially in both Europe and the United States, where it is economically important as primary produce in a large number of regions. It would seem therefore, quite possible that commercial farming of *T. tandanus* could begin in Australia. Consequently, a knowledge of the parasites of the animal may be of importance in management and farming of these fish.

## MATERIALS AND METHODS

Six specimens of *T. tandanus* were caught, three by gill net and three by line fishing using the earthworm as bait. Four specimens came from the Upper Bingara creek at Upper Bingara in New South Wales and two specimens came from a farm dam at Manilla in New South Wales. The specimens from the dam were second and third generation fish derived from stock taken from the junction of the Namoi River and the Yaramanbully Creek, five kilometers north of Manilla, New South Wales, in 1975.

The fish were kept in an aquarium until examination. One specimen from each location was preserved immediately following death in 10% formalin in case the living specimens dropped any monogenea that may have been on the gills or skin.

The animals were killed by pithing and both thick and thin blood smears were made. They were weighed, measured and externally examined for parasites. Following this, the gills were removed, separated and labelled, and each put in a separate petri dish. The digestive tract and other internal organs were removed and stored in saline for subsequent examination. The buccal and body cavities were examined as was the flesh, skeleton, brain, eyes, etc.

Tremadotes and cestodes were fixed in hot formalin, as well as some of each type in Bouin's fixative and alcohol. They were then stained with Grenacher's carmine alum and mounted in Eukitt. Nematodes were fixed in 5% AA in Glycerol and stored in 5% glycerine in alcohol. They were then cleaned in lactic acid and mounted in glycerine jelly. The blood smears were stained using the technique described by Sprent *et al* (1967), using Jenner and Giemsa stain.

Specimen and parasite information was recorded on report sheets, as seen in Appendix 1.

The identification of the parasites was carried out according to the keys in Yamaguti (1959) where possible, as well as the other literature cited.



## RESULTS

Of the six specimens of *T. tandanus* examined, all had some parasitic infection. The specimens of *T. tandanus* used, and the parasites found, are summarized in Figure 1.

No parasites were found in the blood, mouth cavity, abdominal cavity, gonads, liver, pancreas, spleen, kidneys, swim bladder, heart muscles, skeleton, nervous system, eyes, or on the skin, fins, gills or pharyngeal plates.

All specimens had the Caryophyllaeidae, Cestodaria: *Balanotaenia bancrofti* (Johnston 1924) in the stomach and/or the intestine. Four of the fish had more than 100 of these parasites in all three sections of the gut (see Figure 2) and one of the remaining fish had one individual *B. bancrofti* in the midgut region only, while the last fish had six in the stomach. Drawings of *B. bancrofti* appear in Figures 3, 4, 5 and 6.

Five specimens had the Spiruidea nematode *Procamallanus* sp in the fore and mid gut regions. These fish had one, five, two, two, and one nematode in the fore or mid gut. In all cases this nematode was found moving around in the gut contents. In no case was it found attached to the gut wall. This nematode can be seen in Figures 7 and 8.

One individual specimen had 17 Proteocephalide cestode larvae in the gall bladder (Figures 9, 10, 11, 12).

Infection of individual hosts with one, two or three species of parasites is shown in Figure 1a.

One fish was infected with only one species, four with two species, and one with all three species (Figure 1b).

The parasites' sizes are shown in Figure 1c, with raw measurements shown in Appendix 2.

FIGURE 1: Host fish and parasite data\*

	Fish number					
	1	2	3	4	5	6
Length (mm)	250	350	500	248	410	270
Weight (g)	240	433	1420	212	634	256
Sex	♂	♀	♂	♀	♂	♀
Location <sup>+</sup>	UB	UB	M	M	UB	UB
Date caught	3/4/83	3/4/83	12/3/83	12/3/83	2/4/83	3/4/83
Date examined	5/4/83	3/4/83	7/4/83	11/4/83	13/4/83	15/4/83
Gall bladder	-	-	17B	-	-	-
Fore gut	>100A	>100A, 1N	6A	-	>100A, 1N	>100A
Mid gut	>100A, 1N	>100A, 4N	2N	1A	>100A, 1N	>100A, 1N
Hind gut	>100A	>100A	-	-	>100A	>100A
Number species parasites	2	2	3	1	2	2
Combination parasite species	AN	AN	ABN	A	AN	AN

\* A = *Balanotaenia bancrofti*

B = Proteocephalidae larvae

N = *Procamallanus* sp

+ UB = Upper Bingara

M = Manilla

FIGURE 1a: Parasite species burden

Infected with	Number
One species only	1/6
Two species only	4/6
Three species	1/6

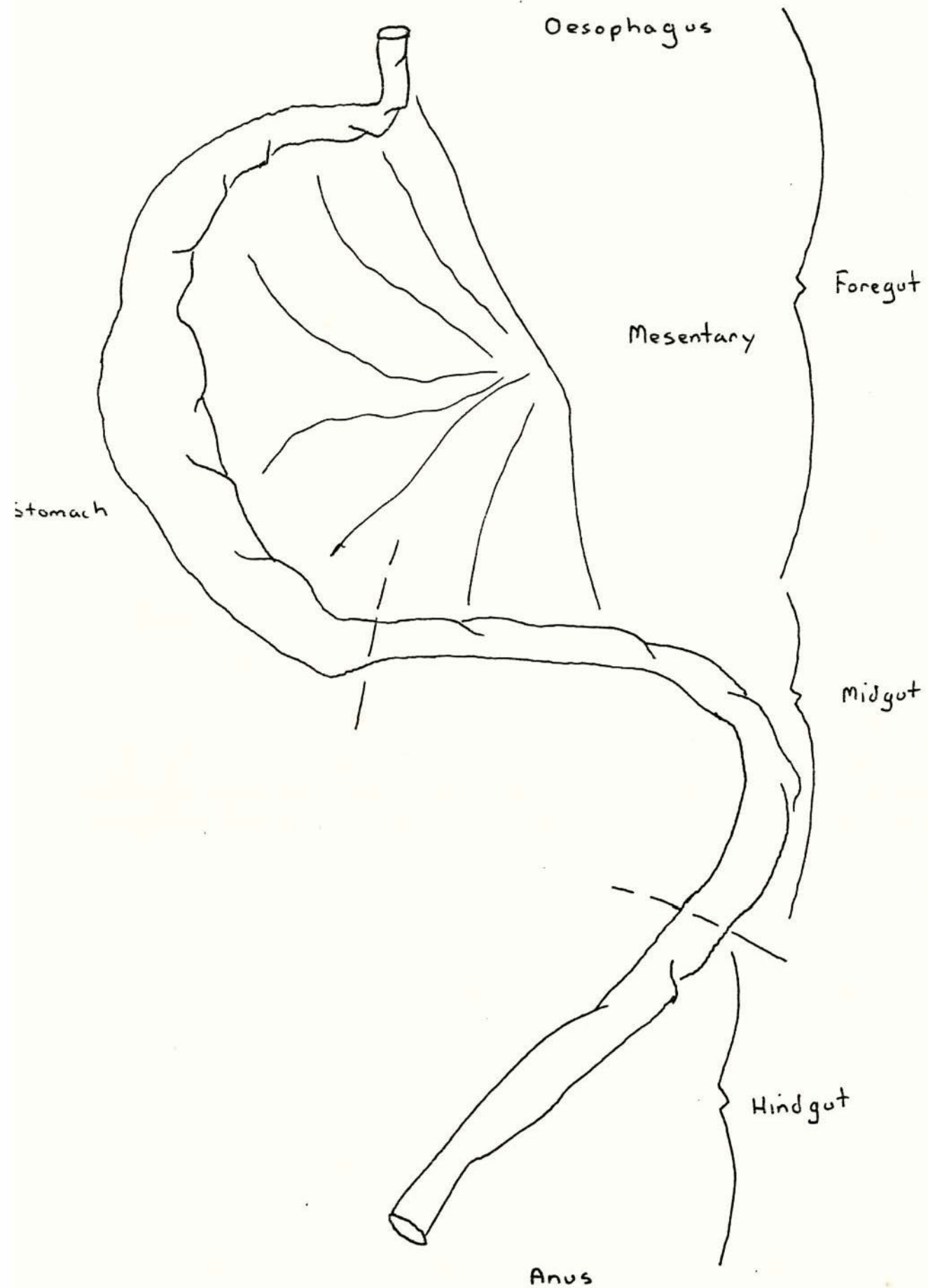
FIGURE 1b: Parasite species combinations

A	6/6	A only	6 1/6	A + B	1/6
B	1/6	B only	0/6	A + N	5/6
N	5/6	N only	0/6	B + N	1/6
		A + B + N	1/6		

FIGURE 1c: Parasite measurements

	Species	Length ( $\bar{x}$ ) (mm)	Maximum (mm)	Minimum (mm)
A	<i>Balanotaenia bancrofti</i>	2.69	3.52	2.22
B	Proteocephalidae larva	1.00	1.40	0.78
N	<i>Procamallanus</i> sp	14.03	17.03	3.70

Figure 2:



The following Figures (3, 4, 5 and 6) are

*Balanotaenia bancrofti* (Johnston 1924).

PHYLUM	Platyhelminthes
CLASS	Cestoda
SUBCLASS	Cestodaria
ORDER	Caryophyllidea
FAMILY	Caryophyllaeidae
GENUS	<i>Balanotaenia</i>
SPECIES	<i>bancrofti</i>



FIGURE 3:

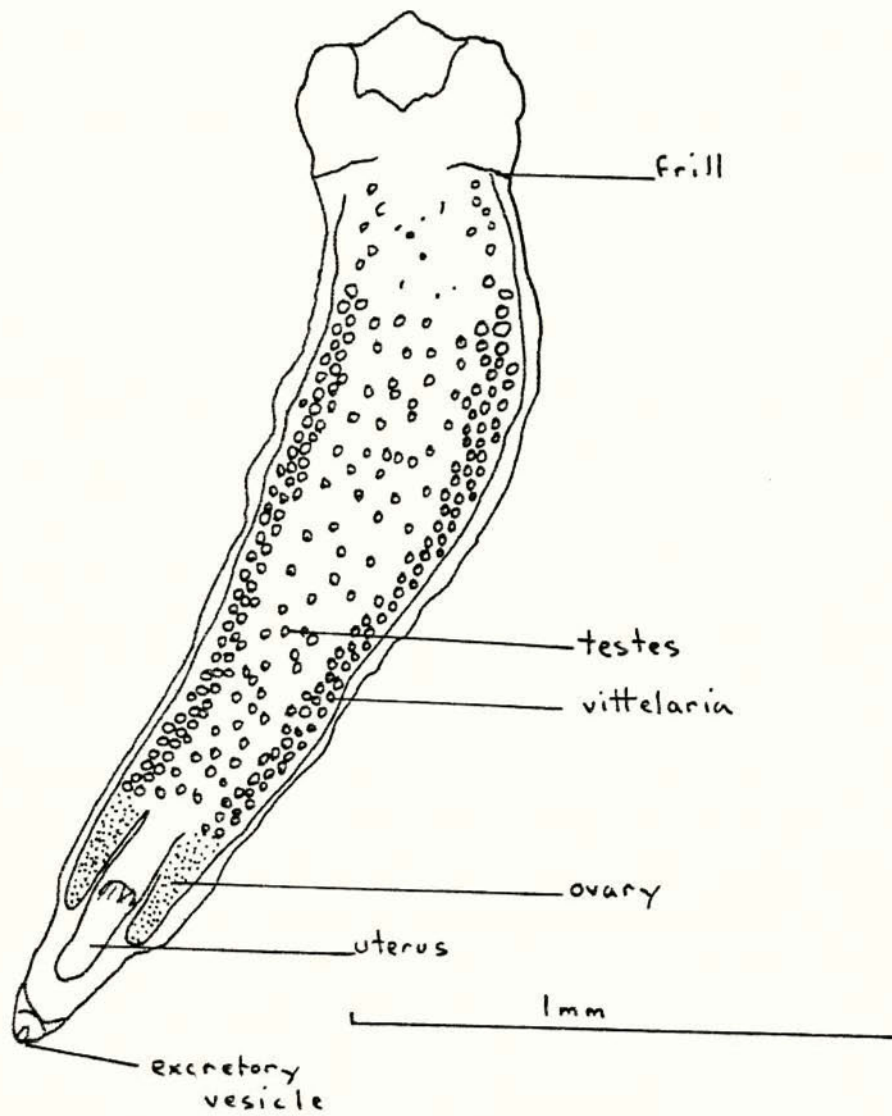


FIGURE 4:

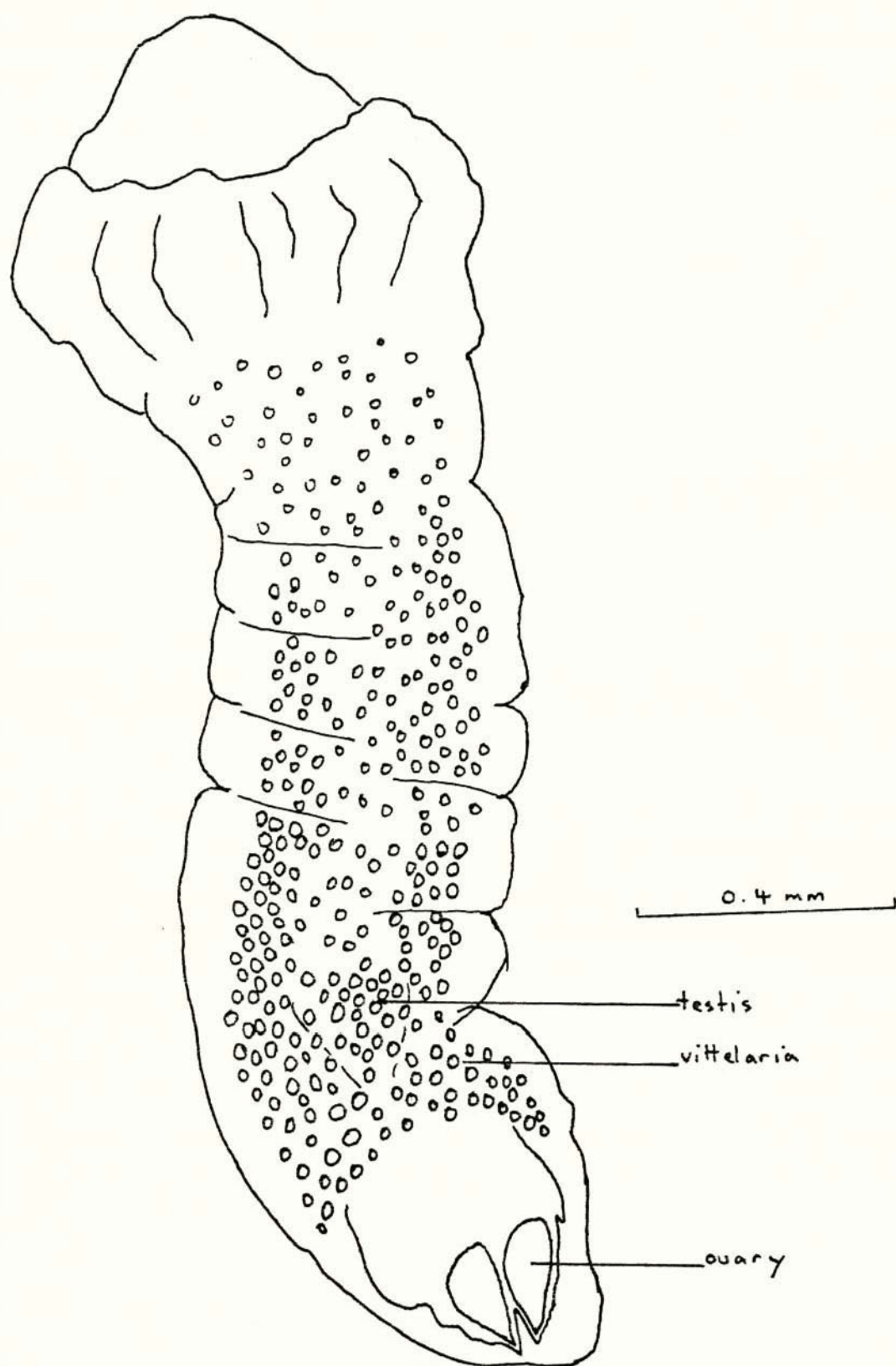
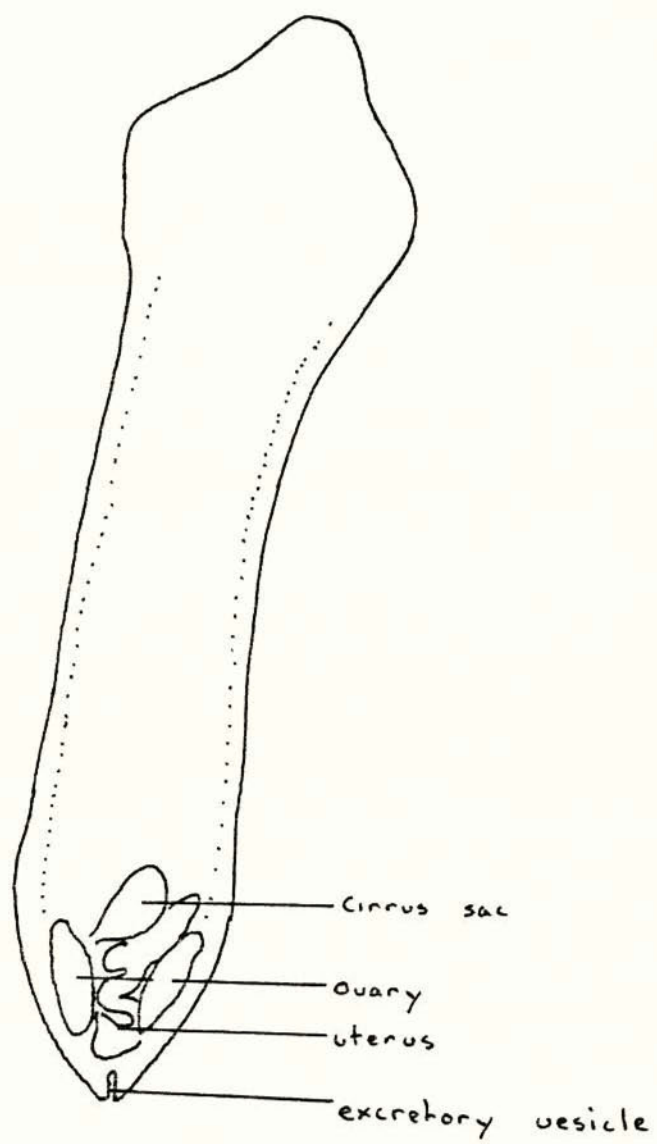


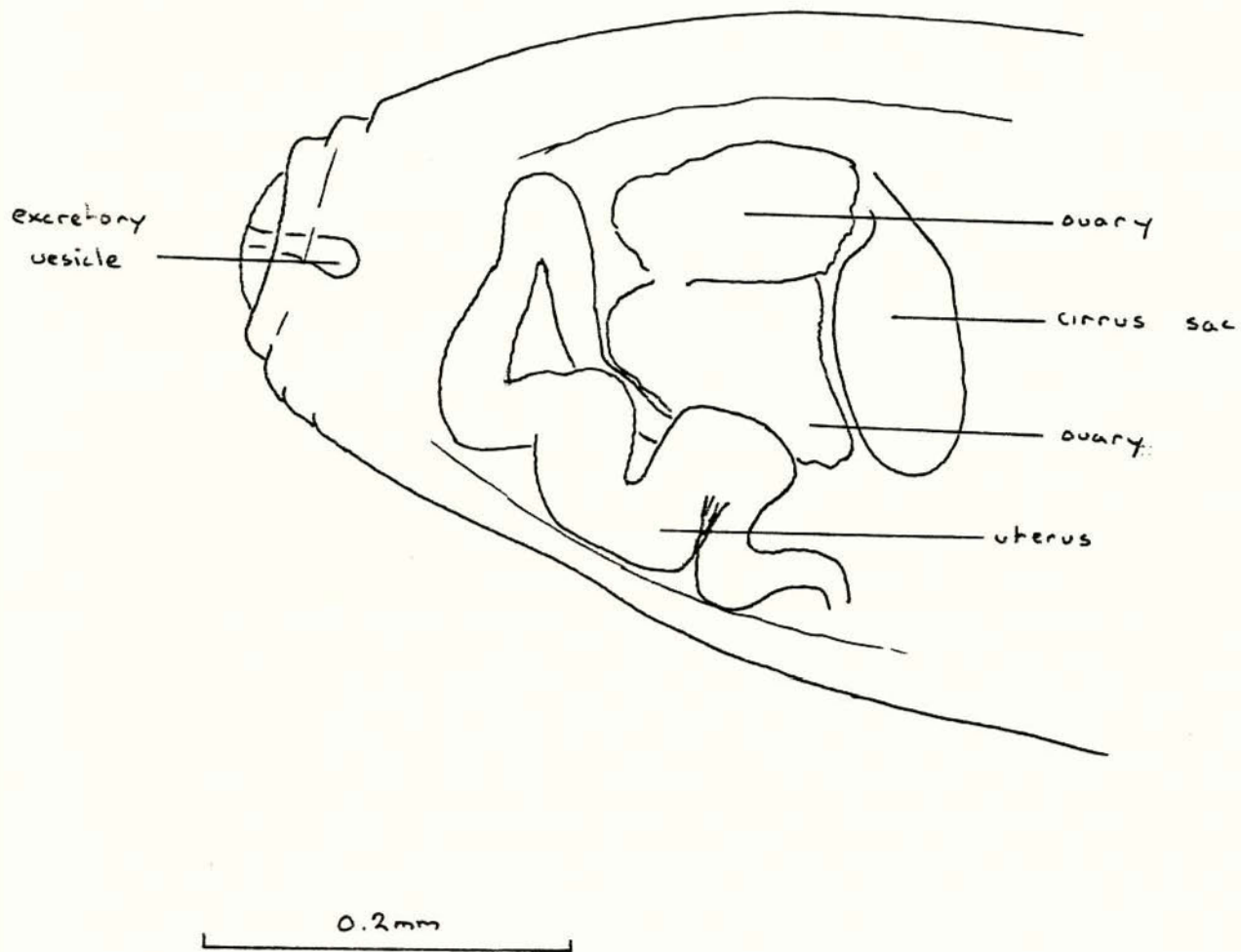
FIGURE 5 :



0.8 mm

Testes and vitellaria omitted

FIGURE 6:



The following Figures (7 and 8) are

*Procamallanus* sp

PHYLUM	Aschelminthes
CLASS	Nematoda
ORDER	Spiriudea
FAMILY	Camallinidae
GENUS	<i>Procamallanus</i>
SPECIES	unknown



FIGURE 7:

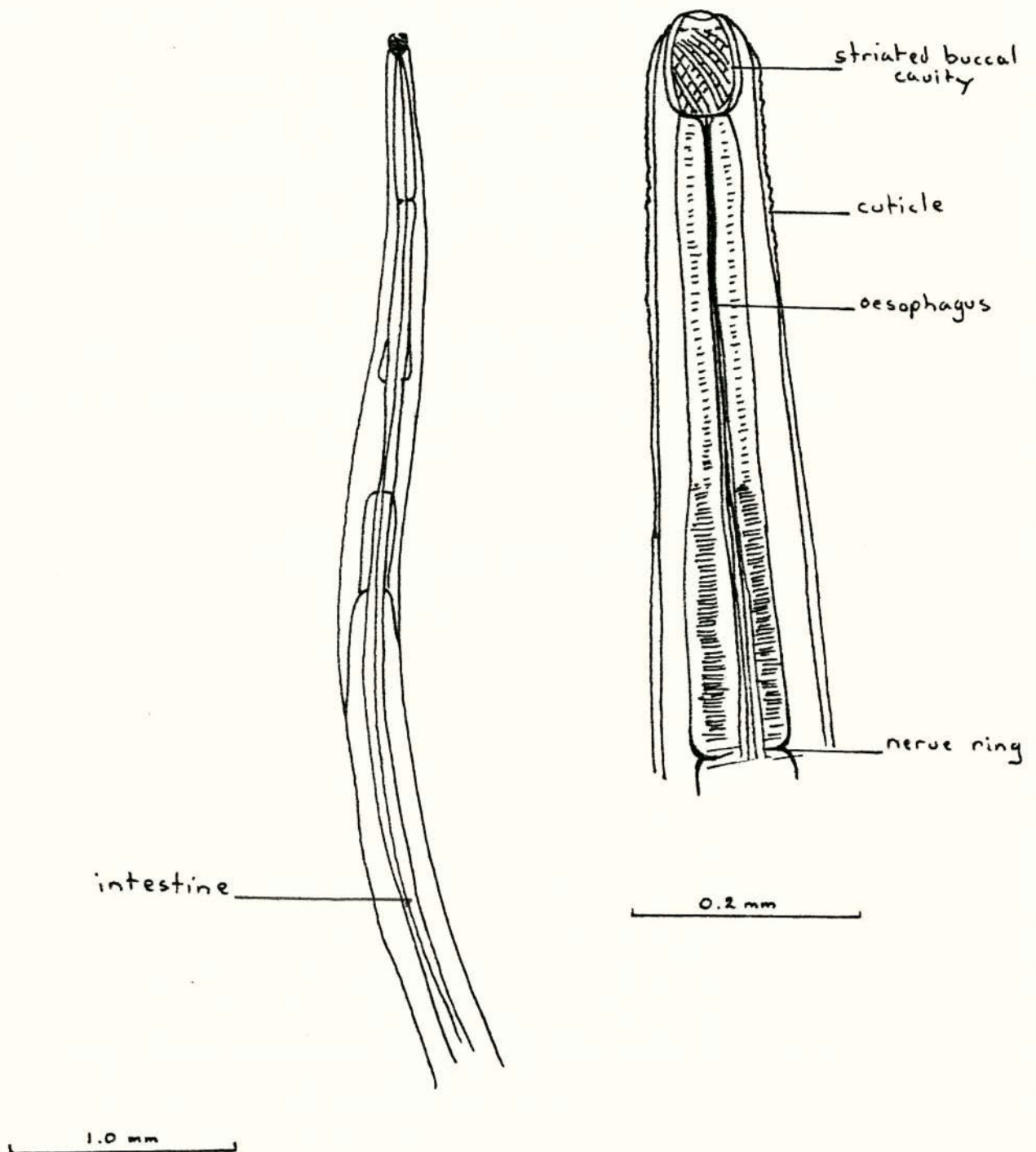
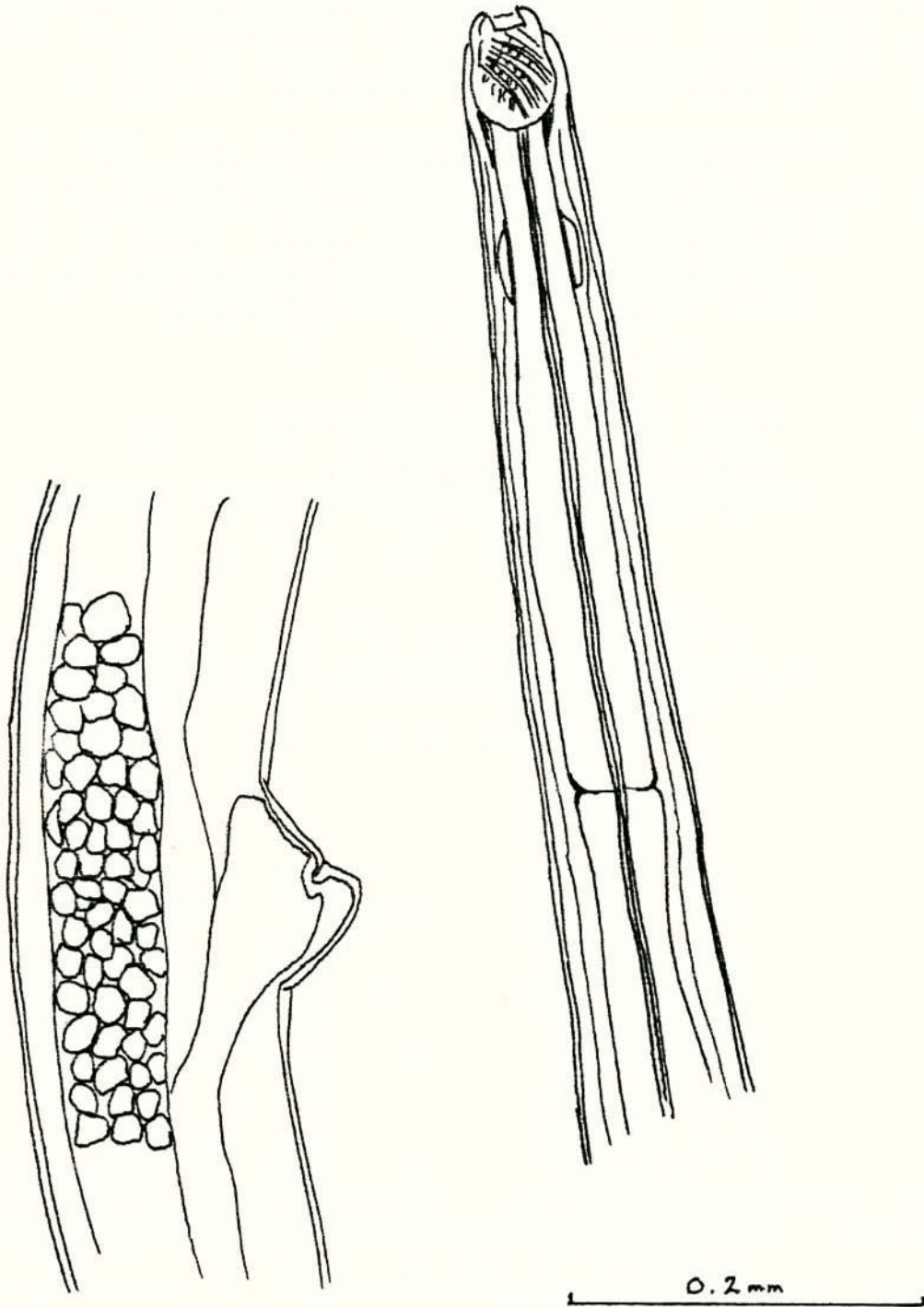


FIGURE 8:



Mid section 0.6 x body length from  
anterior end.

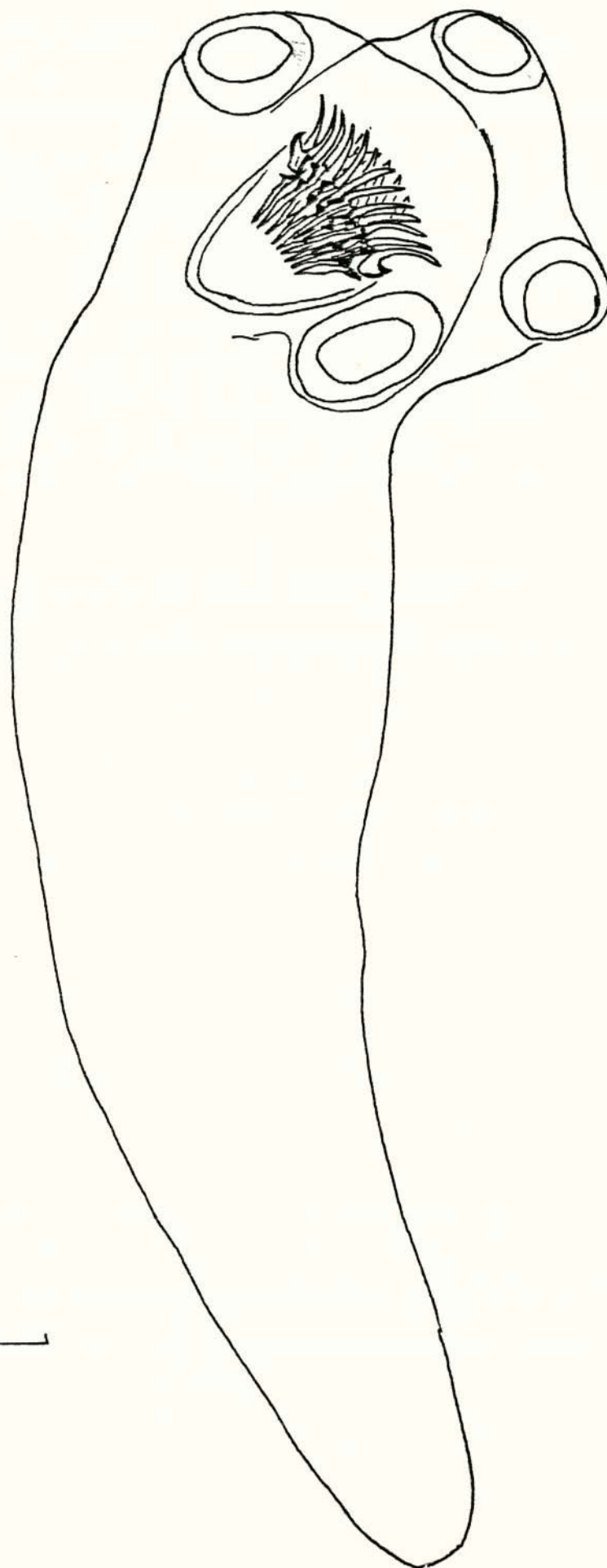
Vulvar region

The following Figures (9, 10, 11 and 12) are

Proteocephalidae (larvae)

PHYLUM	Platyhelminthes
CLASS	Cestoda
SUBCLASS	Eucestoda
ORDER	Proteocephalidea
FAMILY	Proteocephalidae
GENUS	unknown
SPECIES	unknown

FIGURE 9:



0.2mm

FIGURE 10:

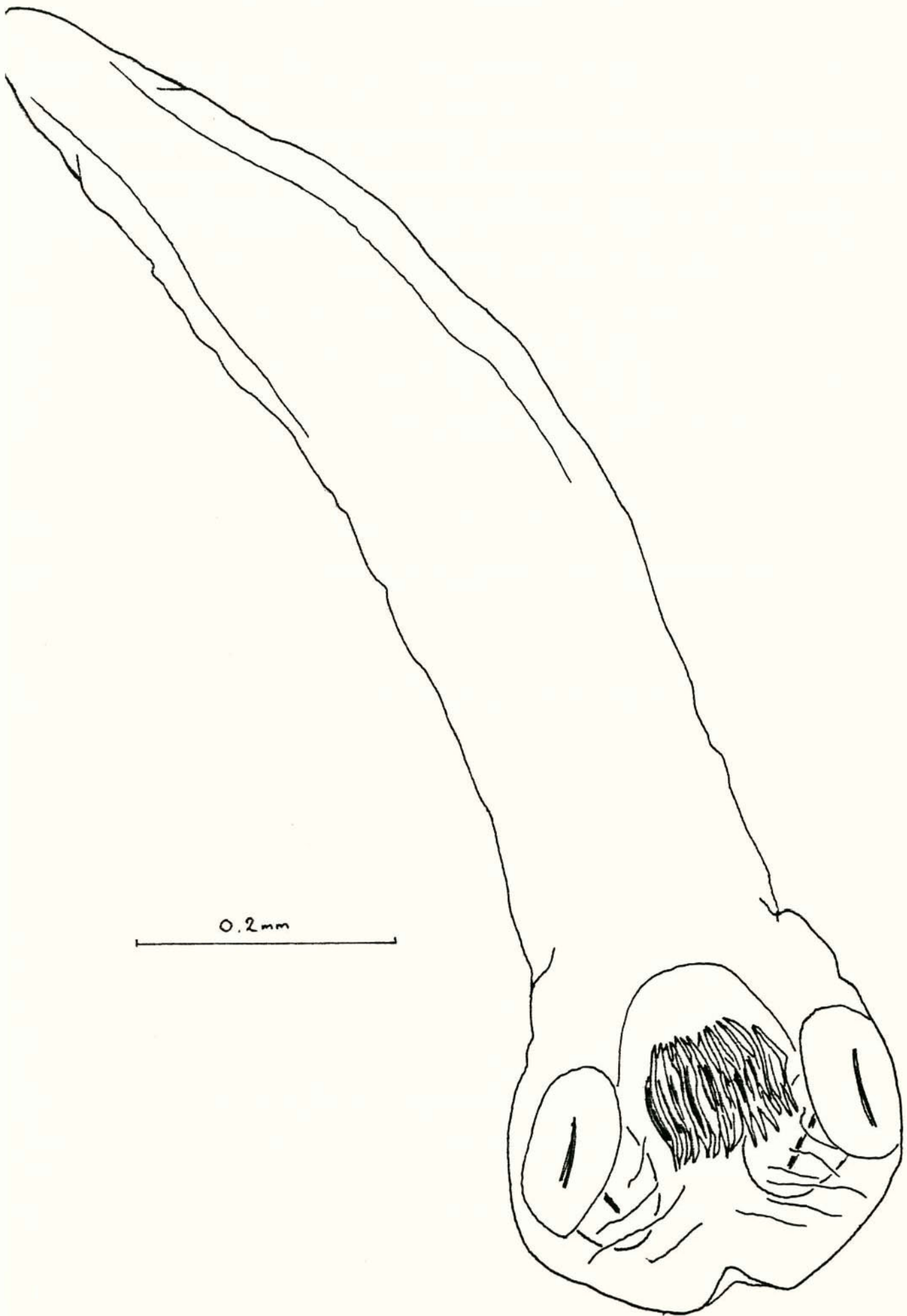
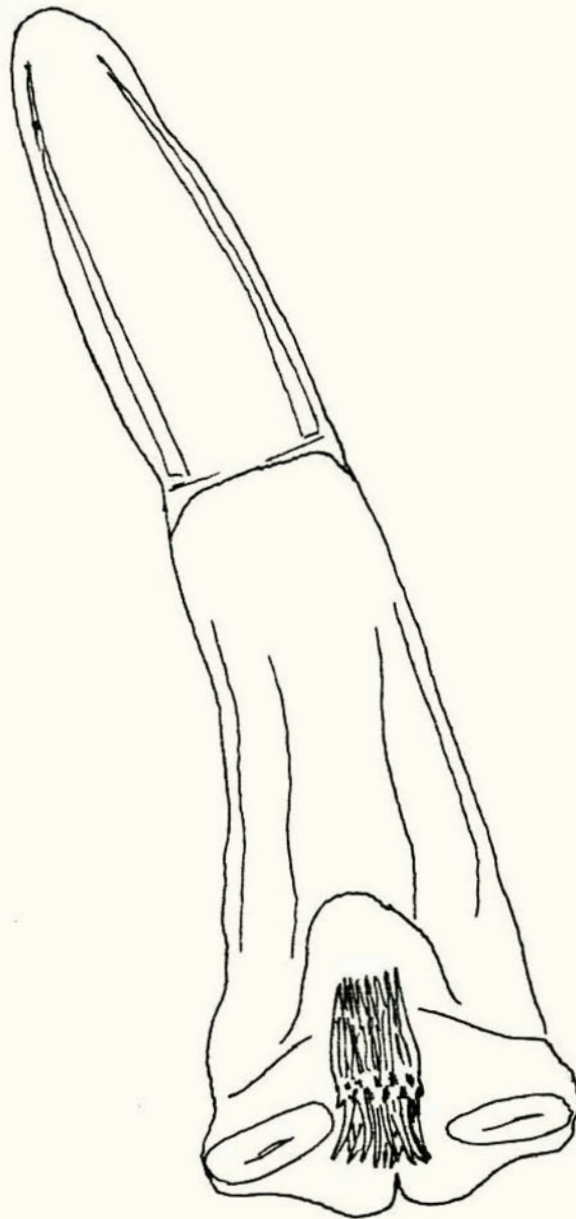


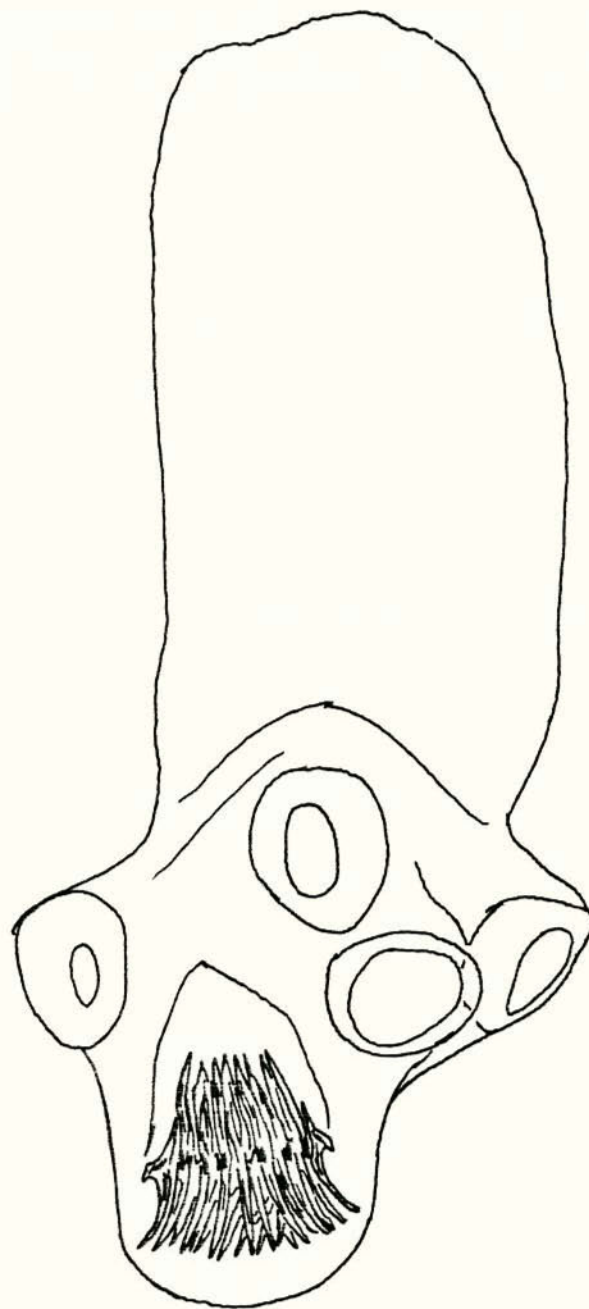


FIGURE 11 :



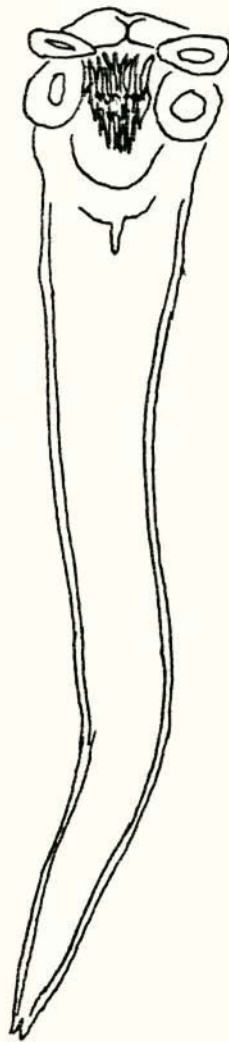
0.4 mm

FIGURE 12:



0.2 mm

FIGURE 13:



0.5 mm

## DISCUSSION

It is shown that the catfish *Tandanus tandanus* is subject to parasitism as three species of parasites were found, and at least fourteen other species are known to be found in *T. tandanus* (Johnston and Mawson 1947, 1951), four caryophyllaeid cestodarians (Johnston and Muirhead 1940), a ciliate and a monogenean (Owen 1978). However it must be remembered that the sample size was small (6) and that the specimens came from only two areas.

The infections with *B. bancrofti* were considered to be very heavy with hundreds per host being found. Johnston and Mawson (1940) found that twelve per host was a normal burden, and fifteen per host was the heaviest burden recorded. Fish from both locations came from small waterholes which may account for the large burden of *B. bancrofti* because of crowding, which gives optimum conditions for the parasites to gain entry to new host animals.

*Balanotaenia bancrofti* was found both moving around in the gut contents and attached to the gut wall. The movement of *B. bancrofti* was marked with much longitudinal expansion and contraction. *Balanotaenia bancrofti* was the first caryophyllaeid recorded beyond Europe, Asia and North America, as well as being the first member of the family occurring in fish other than Cyprinoids (Johnston 1924). An excellent description of the cestode was made in 1924 by Professor Johnston at the University of Adelaide.

The nematode of the genus *Procamallanus* had a spirally striated buccal cavity with a thickened base and an oesophagus with an anterior muscular region (Figures 7 and 8). Other nematodes of the genus *Procamallanus* have been recorded from other Australian freshwater fish including the Murray Perch (*Bidyanus bidyanus*), Golden Perch (*Plectroplites ambiguus*) and Murray Cod (*Maccullochella macquariensis*). The *Procamallanus* from *T. tandanus* have not been described to species as yet, and it is possible that it is a species found in and described from another fish host. *Procamallanus murrayensis* was found in *Phalacrocorax carbo* (the Great Cormorant). Johnston and Mawson (1940) suggest that it was a secondary transmission due to the ingestion of a first host.

*Procamallanus* was first found in *T. tandanus* by Johnston and Mawson in 1947, in a checklist of South Australian fish and avian nematodes. However a description of the nematode was not made.

The cestode larvae of the family Proteocephalidae, found in the gall bladder of one specimen of *T. tandanus* could not be identified further as they were only larvae. In this case it is thought likely that the larvae are adults also in *T. tandanus* after migrating from the gall bladder to the intestine via the bile duct. It is believed that this parasite is adult in *T. tandanus* rather than another host because numerous genera of the Proteocephalidae are parasitic on silurids (Yamaguti 1959) and as far as is known by the author, *T. tandanus* is not preyed upon by any amphibians or reptiles, although it may be eaten by other larger freshwater fish as well as birds. As the Proteocephalidae are only known as adults in fish, amphibians and reptiles (Yamaguti 1959), it is not considered likely that these larvae are adult in birds.

In evaluating the results of the project, a number of points must be taken into account. Firstly the small sample size and restricted localities of sampling. Unfortunately time only permitted small sample sizes therefore it is very restricted as a survey of *T. tandanus* parasites. Secondly, it is possible that the keeping of fish in an aquarium caused monogeneans or other external parasites to be lost and/or the distribution or number of internal parasites to be altered due to the change in conditions, especially feeding.



# REFERENCES

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POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 3/4/83Locality Upper BinyangaDate Examined 5/4/83Total Length 250 mmExaminer Alan CouchWeight 240 gSex Male

Blood	No parasites present
Skin	NPP
Fins	NPP
Gills	NPP
Pharyngeal plates	NPP
Mouth cavity	NPP
Abdominal cavity	NPP
Gonads	NPP
Stomach (foregut)	> 100 A
Pyloric caeca (mid)	> 100 A
Intestine (hind)	> 100 A, 1 N
Liver	NPP
Gall bladder	NPP
Pancreas	NPP
Spleen	NPP
Kidneys	NPP
Swim bladder	NPP
Heart	NPP
Muscles	NPP
Skeleton	NPP
Nervous system and sense organs	NPP
Eggs	Male

POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 3/4/83Locality Upper BinyaraDate Examined 5/4/83Total Length 350 mmExaminer Alan CouchWeight 433 gSex Female

Blood	NPD
Skin	"
Fins	"
Gills	"
Pharyngeal plates	"
Mouth cavity	"
Abdominal cavity	"
Gonads	"
Stomach (foregut)	>100 A, 1N
Pyloric caeca (mid)	>100 A, 4N
Intestine (hind)	>100 A
Liver	"
Gall bladder	"
Pancreas	"
Spleen	"
Kidneys	"
Swim bladder	"
Heart	"
Muscles	"
Skeleton	"
Nervous system and sense organs	"
Eggs	"



POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 12/3/83Locality Macilla N.S.W.Date Examined 11/4/83Total Length 500 mmExaminer Alan CouchWeight 1420 gSex male

Blood	NDP
Skin	"
Fins	"
Gills	"
Pharyngeal plates	"
Mouth cavity	"
Abdominal cavity	"
Gonads	"
Stomach (foregut)	6 A
Pyloric caeca (mid)	2 N
Intestine (hind)	"
Liver	"
Gall bladder	17 B
Pancreas	"
Spleen	"
Kidneys	"
Swim bladder	"
Heart	"
Muscles	"
Skeleton	"
Nervous system and sense organs	"
Eggs	male

POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 12/3/83Locality Murrumbidgee N.S.W.Date Examined 7/4/83Total Length 248 mmExaminer Alan CouchWeight 212 gSex Female

Blood	NPP
Skin	"
Fins	"
Gills	"
Pharyngeal plates	"
Mouth cavity	"
Abdominal cavity	"
Gonads	"
Stomach (foregut)	"
Pyloric caeca (mid)	1 A
Intestine (hind)	"
Liver	"
Gall bladder	"
Pancreas	"
Spleen	"
Kidneys	"
Swim bladder	"
Heart	"
Muscles	"
Skeleton	"
Nervous system and sense organs	"
Eggs	"



POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 2/4/83Locality Upper BinghamDate Examined 13/4/83Total Length 410 mmExaminer Alan CouchWeight 634 gSex male

Blood	NPP
Skin	"
Fins	"
Gills	"
Pharyngeal plates	"
Mouth cavity	"
Abdominal cavity	"
Gonads	"
Stomach (foregut)	> 100 A IN
Pyloric caeca (mid)	> 100 A IN
Intestine (hind)	> 100 A
Liver	"
Gall bladder	"
Pancreas	"
Spleen	"
Kidneys	"
Swim bladder	"
Heart	"
Muscles	"
Skeleton	"
Nervous system and sense organs	"
Eggs	male

POST MORTEM REPORTFish Species Tandanus tandanusDate Collected 3/4/83Locality Upper BingeruDate Examined 15/4/83Total Length 270 mmExaminer Alan CouchWeight 256 gSex Female

Blood	NPP
Skin	"
Fins	"
Gills	"
Pharyngeal plates	"
Mouth cavity	"
Abdominal cavity	"
Gonads	"
Stomach (foregut)	> 100 A
Pyloric caeca (mid)	> 100 A, IN
Intestine (hind)	> 100 A
Liver	NPP
Gall bladder	"
Pancreas	"
Spleen	"
Kidneys	"
Swim bladder	"
Heart	"
Muscles	"
Skeleton	"
Nervous system and sense organs	"
Eggs	No eggs present.

APPENDIX 2Individual Measurements\**Balanotaenia bancrofti*

2.22	3.33	3.52
2.21	3.15	2.40
2.23	2.60	2.60

*Procamallanus* sp

17.03	13.70	13.33
8.70	10.37	15.37
15.50	17.22	15.18

## Proteocephalidae larvae

1.09	1.2	0.9
0.94	0.8	
0.78	1.4	

\* Measurements are given in mm