

Dept. of Zoology,
Faculty of Science, Assiut University.

***ANCHITREMA SANGIUNEUM*
SPHAERIOVESICULARIS N.SUBSP. AND
PROSTHODENDRIUM (P.) PARVOUTERUS ASSIUTIS
N.SUBSP. ARE TWO NEW SUBSPECIES OF
TREMATODE PARASITES INFECTING BATS
TAPHOZOUS NUDIVENTRIS NUDIVENTRIS AT
ASSIUT LOCALITY
(With 2 Tables and 6 Figures)**

By

***G.H. ABED; R.M.A. KHALIFA*; NAWAL A. MAZEN*
and *B.SH. ABD EL-MALECK***

* Dept. of Parasitology, Fac. of Med., Assiut Univ. Assiut, Egypt.
(Received at 12/3/2005)

**أنكيتريما سانجنيوم سفريوفازكيولارز وبروثوديندريم بروثوديندريم
بارفويوتريس أسيوطيس كنويعين جديدين من طفيليات الديدان الورقية يصيبا
خفاش الحشرات تافوزوس نيوديفنترز نيوديفنترز بإقليم أسيوط**

جمال عابد ، رفعت خليفة ، نوال مازن ، بركات عبد المالك

تم فحص عدد ٤١ خفاش حشرات من نوع تافوزوس نيوديفنترز نيوديفنترز وأظهرت الدراسة إصابة عدد ٥ خفافيش فقط بنسبة ١٢,٢% في الأمعاء والمعدة بالطفيليات المفلطحة الورقية وهي أنكيتريما سانجنيوم سفريوفازكيولارز و بروثوديندريم بروثوديندريم بارفويوتريس أسيوطيس. النوع الأول وهي أنكيتريما سانجنيوم سفريوفازكيولارز، وهذا النوع يظهر لأول مرة ويتميز بوجود المثانة الإخراجية الكروية الشكل والتي تدعم بوجود تركيب عضلي حويصلي يحيط بالفتحة الإخراجية، وهذا يعتبر اختلاف أساسي في شكل وحجم المثانة الإخراجية، والنصف الأمامي من الطفيلي أعرض من النصف الخلفي بالإضافة إلى أن البهو التناسلي أصبح أكثر تركيزاً عند التفرع المعوي والمريء قصير جداً لكنه يشبه في باقي الصفات للأنكيتريما سانجنيوم ولذلك تم تعريفه على أنه نوع جديد ويعرف باسم أنكيتريما سانجنيوم سفريوفازكيولارز. النوع الثاني وهي بروثوديندريم بروثوديندريم بارفويوتريس أسيوطيس ، وهذا النوع يتميز بوجود عدد من الغدد المحية يصل عددها إلى ٦٠ - ٦٦ في المجموعة اليمنى، ويصل إلى ٧٠ - ٧٦ في المجموعة اليسرى إلا أنها توجد في مكانها الطبيعي أعلى الخصيتين وهنا في هذا النوع تغطي الجزء الطرفي للتفرع المعوي. كما يتميز أيضاً بوجود المبيض المفصص بالإضافة إلى وجود كيس الصفن بحجمه

الكبير ويتصل مباشرة مع الممص البطني. كما أوضحت الدراسة أن الرحم مملوء بعدد محدود من البويضات ذات الحجم الكبير نوعاً ما عن بعض الديدان وتشغل الثلث الأخير من الجسم، وقد تم تعريف هذا النوع باسم بروثودنديريم بروثودنديريم بارفور يوتريس أسيوطيس.

SUMMARY

Out of forty one bats (41) examined for trematode parasites, five (12.2%), were infected with *Anchitrema sangiunum sphaeriovesicularis* n. subsp and *Prosthodendrium parvouterus assiutis* n. subsp. *Anchitrema Sangiunum Sphaeriovesicularis* (n. subsp.). This trematode parasite has an elongated body, the anterior part of the body is more broader than the posterior end which is rounded in shape. It measures 3.1 mm in length and 0.725 mm in maximum width. The length to the width of the body is 4.1: 1 and the oral to ventral sucker is 1:1. It is distinguished by having a spherical excretory bladder lying in the mid line at the posterior extremity. It measures 0.628 x 0.318 mm in diameter. It seems to have a characteristic sphincter surrounding the excretory orifice. The genital atrium is very close to the intestinal bifurcation. *Prosthodendrium (P.) Parvouterus assiutis* (n. subsp.) The body of the worm is oval in shape, not spinous and measures 2.05 x 1.25 mm. The body is supported by a layer of cuticle 0.06 mm in thickness. It is characterized by lobulated ovary and large cirrus pouch which measures 0.34 – 0.35 x 0.49–0.50 mm.. The vitellaria are (60–66) on the right group and (70–76) on the left one.

Key words: *Anchitrema sangiunum sphaeriovesicularis* n. subsp and *Prosthodendrium parvouterus assiutis* n. subsp. and bats
(*Taphozous nudiventris nudiventris*)

INTRODUCTION

Studies on trematodes of bats were carried out by many authors such as Macy (1940) and Heyneman and Macy (1962). The genus *Anchitrema* (Looss, 1899) seems to be a very common intestinal trematode of bats all over the world. *Anchitrema sangiunum* has evidently a wide geographical distribution. Although it was originally recorded from Egypt, yet it was redescribed from Malaya and it was suggested that it might range over much of Thailand, Laos and perhaps Vietnam and Cambodia (Rohde, 1966). Genus *Prosthodendrium* Dollfus, 1931, for example, is divided into two subgenera on the basis of

the lobulation of the ovary, being unlobed in members of the subgenus *Paralecithodendrium* (Odhner, 1911 and Dollfus, 1937).

Prosthodendrium urna seems to be common in Egyptian bats. It was described by Looss (1907) from the small intestine of vesperugo : *Pipistrellus kuhli*, Macy *et al.* (1961) from *Rhinolophus olivosus brachygrathus*, *Taphozous perforatus*, *Rhinolophus olivosus acrotis*, *Pipistrellus* sp. And *Rhinolepis blasi*, Saoud and Ramadan (1977a,b) from *Taphozous n. nudiventris*, *Nycteris thebacia* and *Asellia T. tridens*, Monib (1980) from *Rhinopoma hardwickei cystops* and Ammar (2001) from *Asellia tridens*, *Taphozous n. nudiventris* and *Rhinopoma h. cystops*. Other *Prosthodendrium* species were reported by Mahmoud and Jawdat (1982) and Gandhi (1992).

The present study aimed to identify two new subspecies of trematode parasites parasitizing bats at Assiut locality, and to compare the results with other previous related studies.

MATERIALS and METHODS

Total number of fourty one of bats (*Taphozous nudiventris nudiventris*) were captured from different localities in Assiut Governorate, and examined for trematode parasites. The collected trematodes were fixed in 10% formaline for 2 hours and stained with aceto-acetic alum carmine stain for 20 minutes. The drawings were carried out with camera lucida and all the measurements with eye piece micrometer.

RESULTS

Anchitrema sangiuneum sphaeriovesicularis (n. subsp.):

This species was collected from the small intestine of *Taphozous nudiventris nudiventris*. This trematode parasite has an elongated body covered with two transverse rows of backwardly directed spines which extend till the level of the two testes. The anterior part of the body is more broader than the posterior end which is rounded in shape (Figs.1,5). The body of the worm measures 3.1 mm in length and 0.725 mm in maximum width. The oral sucker is spheroidal in shape, subterminal in position and measures .0375 mm in length, and 0.33 mm in width.

The ventral sucker is nearly circular in shape and measures 0.335 x 0.315 mm in diameter. It is situated at the end of the anterior

third of the body nearly at the median position. The ratio between oral/ventral suckers is about 1:1. The pharynx is oval in shape and measures 0.25x0.15 mm in diameter. The oesophagus is very short and measures 0.065 – 0.05 in length. The intestinal caeca originated from the end of the oesophagus extending posteriorly to terminate a short distance from the distal end of the body.

The testes are oval in shape, lying at the beginning of the second third of the body and opposite to each other, situated at the postero-lateral end of the acetabulum. They are smooth in outline and nearly equal in size. The right one measures 0.56 mm in length and 0.24 mm in width. The left one measures 0.51 mm in length and 0.19 mm in width. The ovary is oval in shape with smooth margin. It lies intracaecal in the post-testicular space and measures 0.49 in length and 0.20 mm in width. The uterus is highly tubular filling the posterior half of the body. It is filled with very small eggs (Fig.2) and each egg measures 16–20 x 9 – 10 μ m. The vitellaria consist of two lateral groups of closely packed follicles starting nearly from the posterior end of the testes and extending throughout the whole length of the lateral side of the intestinal caeca.

The parasite is distinguished by having a spherical excretory bladder lying in the middle line at the posterior extremity. It measures 0.628 x 0.318 mm in diameter. It seems to have a characteristic sphincter surrounding the excretory orifice (Fig. 1).

***Prosthodendrium prosthodendrium parvouterus assiutis* (n. subsp.):**

This parasite was collected from the stomach of *Taphozous nudiventris nudiventris* from Dairout and Manflout Cities. The body of the worm is oval in shape, not spinous and it measures 2.04–2.07 mm in length by 1.24–1.26 mm in width, (mean 2.05 x 1.25 mm). The body is supported by a layer of cuticle 0.06 mm in thickness and there is a concave portion at the posterior end of the body (Figs. 3,6).

The oral sucker is oval in shape, terminal in position and measures 0.35–0.36 mm in length by 0.27–0.277 mm in width, (mean 0.355 x 0.273 mm). The ventral sucker is oval in shape, lying at the end of the second third of the body below the large cirrus pouch, and it measures 0.24–0.247 mm in length by 0.18–0.187 mm in width (mean 0.23 x 0.13 mm). The ratio between oral/ventral sucker is 1.4–1.5: 1. Pharynx is ovoid in shape and it measures 0.022–0.03 mm in length by 0.195–0.202 mm in width (mean 0.026 x 0.198). There are two arm-like intestinal caeca in front of the anterior border of the testes.

There are two testes, oval in shape, lateral in position and the left one is larger than the right. The right testis is smooth in outline and measures 0.33 – 0.337 mm in length by 0.195 – 0.202 mm in width (mean 0.333 x 0.198 mm). The left testis is also smooth in outline and measures 0.45–0.46 mm in length by 0.26 – 0.27 mm in width (mean 0.455 x 0.265 mm). The male genitalia terminates in a kidney-shaped cirrus pouch which is median in position, situated just above the ventral sucker and measures 0.34–0.35 mm in length by 0.49–0.502 mm in width (mean 0.345 x 0.496 mm). The female genitalia consist of irregularly lobulated ovary which appears divided into two closely approximated unequal parts. It lies near to the left testis and at the same level of the ventral sucker. It measures 0.18 – 0.225 mm in length by 0.135 – 0.157 mm in width (mean 0.2 x 0.146 mm). The vitellaria are in the form of two groups of small follicles which concentrate above the intestinal caeca and pre-testicular in position. The right group consists of 60–66 follicles and the left one consists of 70–76 follicles. The uterus is coiled and fills the posterior half of the body. It is filled with a small number of eggs (fig.4). The egg measures 12.75 x 4.5 µm.

DISCUSSION

From the above mentioned description, it is clear that the parasite, *Anchitrema sangiuneum sphaeriovesicularis* is very similar to *Anchitrema sangiuneum*. Some differences seen in the anterior part of the body of the present worm seems to be due its contraction at the time of fixation, leading to; more broader anterior end, oral and ventral suckers nearer to each other, shorter oesophagus and genital atrium very close to the intestinal bifurcation.

However, the present worm differs mainly in the shape and size of the excretory bladder which is spherical in shape with a characteristic sphincter surrounding the excretory orifice. Moreover, the size of the eggs of the present material is definitely smaller than the eggs of *A. sangiuneum*. Actually, their size is comparable to the size of eggs of *A. acanthus* described by Fahmy *et al.* (1984) and Ammar (2001), but *A. acanthus* is characterized by having aspinous body devoid of any appendages or spines.

From the above mentioned discussion, the present worm is closely related to *A. sangiuneum* (table 1). In the opinion of the present worker, the differences between the present worm and *A. sangiuneum* are not enough to create a new species. Hence, the present worm was

considered as a new variety of *A. sangiuneum*, to which the taxonomic name *Anchitrema sangiuneum* subsp. *sphaeriovesicularis* is suggested as *A. sangiuneum* has a y-shaped excretory vesicle.

Anchitrema sangiuneum sphaeriovesicularis (n. subsp.) is proposed to be a new subspecies with the following characters:

Host	:	<i>Taphozous nudiventris nudiventris</i> .
Habitat	:	The small intestine.
Body length	:	2.2 – 4 mm
Body width	:	0.55 – 0.9 mm
Oral sucker	:	0.375 x 0.33 mm
Pharynx	:	0.25 x 0.15 mm
Ventral sucker	:	0.335 x 0.315 mm
Oral/ventral suckers	:	Nearly 1 : 1
R. testis	:	0.56 x 0.24 mm
L. testis	:	0.51 x 0.19 mm
Ovary	:	0.49 x 0.20 mm
Egg	:	20 x 9 μ m
Excretory bladder	:	Vesicular in shape with spherical muscular sphincter.
Locality	:	Assiut, Upper Egypt.

Type material is deposited at the Department of Zoology, Faculty of Science, Assiut University.

Prosthodendrium (P.) parvouterus was described for the first time by Saoud and Ramadan (1977b) from *Taphozous nudiventres nudiventris* and *Rhinopoma hardwickei cystops* from Cairo, but this material differs in the number of vitellaria and in the measurements of all organs. Therefore, it is suggested that the present material is a new subspecies in Assiut.

Prosthodendrium (P.) parvouterus was redescribed from Assiut by El-Naffar *et al.* (1978) and Ammar (2001), but the present subspecies can be distinguished from it by the body length, length/width ratio, the ratio between oral/ventral suckers, the level of ovary and ventral sucker (Table 2). Accordingly, the present parasite is suggested to be a new subspecies to which the name *Prosthodendrium (P.) parvouterus assiutis* n. subsp. is proposed with the following characters:

Host	:	<i>Taphozous nudiventris nudiventris</i>
Habitat	:	The stomach.
Body length	:	2.04 – 2.07 mm
Body width	:	1.24 – 1.26 mm
Oral sucker	:	0.35 – 0.36 x 0.27 – 0.277 mm
Pharynx	:	0.022 – 0.3 x 0.195 x 0.202 mm
Ventral sucker	:	0.24 – 0.247 x 0.18 – 0.187 mm
Oral/ventral Suc.	:	1.4 – 1.5 : 1
R. testis	:	0.33 – 0.337 x 0.195 – 0.202 mm
L. testis	:	0.45 – 0.46 x 0.26 – 0.27 mm.
Cirrus pouch	:	0.34–0.35 x 0.49 0 – 0.502 mm
Ovary	:	0.18 – 0.225 x 0.135 – 0.157 mm.
The vitellaria:		
Right group	:	60 – 66 follicles.
Left group	:	70 – 76 follicles
Egg	:	12.75 x 4.5 µm
Locality	:	Assiut; Upper Egypt

Type material is deposited at the Department of Zoology, Faculty of Science, Assiut University.

REFERENCES

- Ammar, K.N.A. (2001):* Studies on helminth parasites and nematodes infecting bats in upper Egypt. A Thesis Ph.D. Faculty of Science, South Vally University, Egypt.
- Dollfus, R.PH. (1931):* Amoenitates helminthologicae: A propose de La. Creation de *Lecthodendrium leguncula* Ch.W. Stilles et M.O. Nolan, 1931. Ibidem, 9, 483-484.
- Dollfus, R.PH. (1937):* Sur *Distoma ascidia* P.J. Van Beneden, 1873 (nec Linstow) et le genre *Prosthodendrium* R.Ph. Dollfus 1931 (Trematoda: Lecithodendriinae). Bull. Mus. Roy. Hist. Nat. Belg., 13, 1-21.
- El-Naffar, M.K.; Omran, L. and Mandour, A.M. (1978):* *Acanthatrium (A) assiuti* sp.n. and other trematodes recovered from the bat (*Vespertilio innest*) collected from Assiut. J. Egypt. Soc. Parasit., 8(1): 53-60.
- Fahmy, M.A.M.; Arafat, M.S.; Khalifa, R.; Abdel-Rahman., A.M. and Monib, M.E. (1984):* Studies on helminth Parasite in some small mammals in Assiut Governorate. 1 Trematode parasites of the desert bat *Rhinopoma hardwickei cystops*, Assiut Vet. Med. J. 11: 43-50.

- Gandhi, S. (1992):* On two trematodes from bats in India. Biographic Citation): Research – Bulletin of the Panjab – University, Science, 1989; 40: 1-2, 5-8.
- Heyneman, D. and Macy, R.W. (1962):* Helminths reported from bats (Chiroptera) in Egypt with an illustrated key to the common flukes. J. Egypt. Publ. Health Ass., 25, 109-142.
- Looss, A. (1899):* Weitere Beitrage Zur Kenntnis due Trematoden Fauna Aegyptens. Zugleich Versuch einer natuerlichen Gliederung des Genus *Distomum* Retzius. Zoo. Jober. S., 12, 621-784.
- Looss, A. (1907):* Notizen zur Helminthologie Aegyptiens VII. Uber Einigeneue Trematoden der agyptischen fauna. Zbl. Bakt., 43, 748-490.
- Macy, R.W. (1940):* Description of three new trematodes with notes on other species of Acanthatrium (Lecithodendriidae), with a key to the genus. J. Parasit., 26, 279-286.
- Macy, R.W.; Heyneman, D. and Kuntz, R.E. (1961):* Records of Trematodes of the families Lecithodendriidae, Dicrocoelidae and Heterophyidae from chiroptera collected in Egypt and Yemen, S.W. Arabia. Proc. Helm. Soc. Wash., 28: 13-17.
- Mahmoud, S.N. and Jawdat, S.Z. (1982):* Firs record of two digenetic trematodes (*Plagiorchis vespertilianis* and *Prosthodendrium ovimagnosum*) from naked bellied tomb bat *Taphozous nudiventris nudiventris* in Iraq. Journal of Biological Science 1982, 13: 59-70.
- Monib, M.E.M. (1980):* Studies on Helminth Parasites in some small mammals in Assiut Governorate. A Thesis Ph.D. (Parasitology), Faculty of Medicine, Assiut University.
- Odhner, T. (1911):* Nordostfrikaische Trematoden, grobenteils yomweiben Nil (Von der Schwedischen Zoologischen Expedition gesammelt). Results Swed Zool. Egyptand White Nile. 1901 23A, 1-17. (Cited from K.J. Wissa (1967): M.Sc. thesis. Faculty of Science Cairo University, Egypt.
- Rhode, K. (1966):* Trematodes of bats in Malaya. Proc. First. Intern. Conger. Parasitology Rome, 1, 492.
- Saoud, M.F.A. and Ramadan, M.M. (1977a):* A review of the trematode genus *Anchirema* Looss 1899 (Dicrocoeliidae), With a redescription of *Anchitrema sanguineum* (Sonsino, 1894) and *Anchitrema longiformis* n.sp. from some Egyptian bats. Z. Parasitkde, 54: 61-67.

Saoud, M.F.A. and Ramadan, M.M. (1977b): Studies on digenetic trematodes of the genus *Prosthodendrium* Dollfus, 1931 from some Egyptian bats. I. Trematodes of the subgenus *Prosthodendrium* Dollfus, 1931 from some Egyptian bats. *Folia Parasitologica (Praha)* 24: 249-259.

EXPLANATION OF FIGURES

- Fig. 1:** Photomicrograph of *Anchitrema sangiunum sphaeriovesicularis* (n. subsp.). Note the excretory bladder have a characteristic sphincter surrounding the excretory orifice (asterisk).x 200
- Fig. 2:** Photomicrograph showing enlarged uterus with eggs (asterisk) of *Anchitrema sangiunum sphaeriovesicularis*. x 400.
- Fig. 3:** Photomicrograph of *Prosthodendrium (P.) parvouterus assiutis* (n. subsp.).x200
- Fig. 4:** Photomicrograph of *Prosthodendrium (P.) parvouterus assiutis*, showing enlarged uterus with eggs (asterisk).x 400.
- Fig. 5:** Camera lucida drawing showing *Anchitrema sangiunum sphaeriovesicularis*. Note oral sucker (o.s.), spines (s.), Pharynx (ph.), oesophagus (oes), cirrus pouch (c.p.), ootype (oo.), ventral sucker (v.s.), testis (te), ovary (ov), vitelline follicles (v.f.), uterus (u), vesicular excretory bladder (v.ex.b.) and sphincter (sph)
- Fig. 6:** Camera lucida drawing showing *Prosthodendrium (P.) parvouterus assiutis*.

Table 1: A comparison between *Anchitrema sangiunum* described by Ammar (2001) and present material

Characters	<i>Anchitrema sangiunum</i> Ammar (2001)	The present material
Length	2.8 – 3.6 mm	3.1 mm
Width	0.77 – 0.95 mm	0.725 mm
L/w ratio	3.8 : 1	4.1 : 1
Cuticle	Spinous	Spinous
Oral sucker	0.315 x 0.31 mm	0.375 x 0.33
Ventral sucker	0.225 x 0.245 mm	0.335 x 0.315 mm
O/v ratio	1.2 – 1.4 : 1	nearly 1 : 1
Pharynx	0.205 x 0.8 mm	0.25 x 0.15 mm
Oesophagus	0.056 – 0.169 mm	0.065 x 0.05mm
R. testis	0.36 x 0.22	0.56 x 0.24 mm
L. testis	0.51 x 0.21 mm	0.51 x 0.19 mm
Ovary	0.20 x 0.19 mm	0.49 x 0.20 mm
Egg	27.3 x 11 µm	20 x 9 µm
Excretory bladder	y-shaped.	Vesicular in shape with spherical muscular sphincter.
Host	<i>Rhinopoma haldwickei cystops</i> and <i>Taphozous nud.</i> <i>Nudiventris</i>	<i>Taphozous nudiventris nudiventris</i>

Table 2: Comparison between *Prosthodendrium parvouterus* of previously records and the present species

Characters	Saoud & Ramadan (1977b)'s specimen	Ammar (2001)'s specimen	The present species
Length width L/W ratio	0.530-1.47 mm. 0.599-0.84 mm. 1.2-1.8 : 1	0.79-1.31 mm. 0.67-0.85 mm. 1.2-1.5:1	2.04-2.07 mm. (2.05) 1.24-1.26 (1.25 mm.)
Oral sucker	0.064-0.094 x 0.075- 0.126 mm.	0.05-0.10 x 0.07 – 0.11 mm.	0.35-0.36x 0.277 mm. (0.355 x 0.273 mm.)
Ventral sucker	0.062-0.91x0.060- 0.102 mm.	0.07-0.08x0.07-0.09 mm.	0.24-0.24x0.18-0.187 mm.
O/V ratio	0.92-1.2:1	1.2:1	1.4-1.5:1
Pharynx	0.034-0.057x0.034- 0.057 mm.	0.03-0.05x0.04-0.07 mm.	0.022-0.03x0.195-0.202 mm. (0.026x0.198 mm.)
Oesophagus	0.113-0.189	0.13-0.17	-
R. testis	0.132-0.225x0.124- 0.241 mm	0.16-0.24x0.15-0.23 mm.	0.33-0.337x0.195-0.202 mm. (0.333x0.198 mm.)
L. testis	0.113-0.236x0.128- 0.253 mm.	0.17-0.25x0.16-0.26 mm	0.45-0.46x0.26-0.27 mm. (0.455x0.265 mm.)
Ovary	Post-acetabular	Post-acetabular	0.18-0.225x0.135-0.157 mm. (0.2x0.146 mm.)
Vitelline follicles right Left	-	20-35	60-66 70-76
Eggs	0.021-0.023x0.008- 0.011 µm.	0.026-0.031x0.017 µm.	12.75x4.5 µm.



1

2

3

4

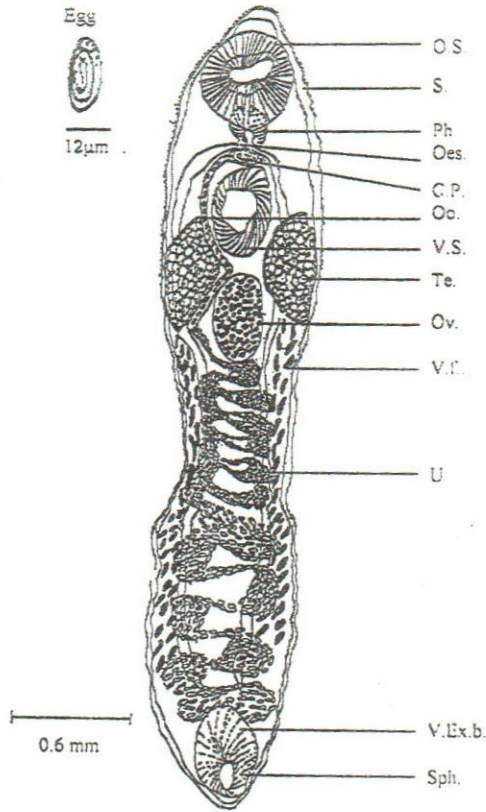


Fig. (5) Camera lucida drawing of *Anchitrema sanguinum sphaeriovicularis*.

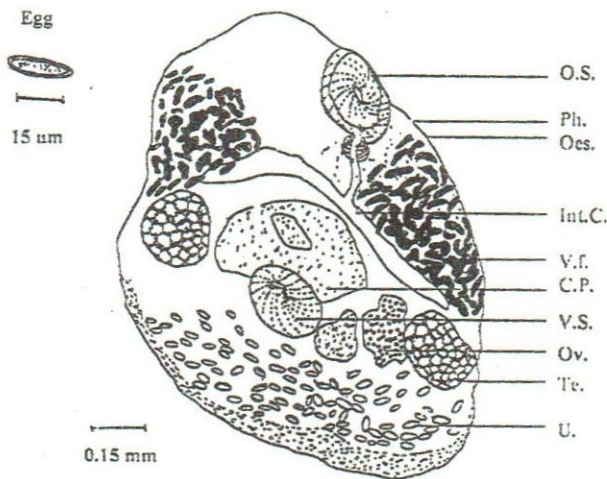


Fig. (6) Camera lucida drawing of *Prasthodendrium parviteris assiutis*.