

قسم : علم الحيوان .  
كلية : العلوم - جامعة أسيوط .  
رئيس القسم : أ.د / محمد خليل النفار .

## دور الأسماك في نقل طفيليات الكلاب والقطط بمحافظة أسوان

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- تم الحصول على يرقات بعض ديدان التريماتودا في تجويف المخ لسمكة القرموط وقد أمكن التوصل الى معرفة الدودة البالغة لهذه اليرقات وذلك بعد تغذيتها لعدد من الكلاب والقطط الصغيرة الخالية من الطفيليات ، وقد عرفت هذه الدودة باسم دبلوستوم تريجينيا جوهر ١٩٣٢ .

- تم وصف ستة أشكال للسركاريا المتحوصلة في عضلات السمك ، وقد أجريت دراسة لمعرفة أنواع الميتاسركاريا ، وذلك بأطعام الحوم الأسماك المصابة لبعض الكلاب والقطط الصغيرة الخالية من الطفيليات وقد أمكن تحديد نوعين من ديدان التريماتودا هما :

\* بروهيميستوم فيفاكس سمونسينو ١٨٩٢ ،

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**ROLE PLAYED BY FISH IN TRANSMITTING SOME TREMATODES OF DOGS  
AND CATS AT ASSWAN PROVINCE, A.R. EGYPT**  
(With 3 Tables & 5 Figs.)

By  
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(Received at 26/8/1982)

**SUMMARY**

Some trematode larvae were found in the cranial cavity of Clarias lazera and C. anguillaris. Feeding experiments were carried out on parasite-free puppies and kittens. Samples of stool of these animals were examined from the 3rd day after infection to detect any trematode ova. When the ova were detected, the animals were sacrificed to obtain the adult flukes which were identified as Diplostomum tregenna NAZMI GOHAR, 1932.

The examination of fish revealed the presence of 6 forms of metacercariae infesting the muscles of seventeen species of fishes. The metacercariae of each form were fed singly to the parasite-free puppies and kittens. When the ova appeared in stool, the animals were killed to obtain the adult flukes which were identified as prohemistomum vivax SONSINO, 1892 and Haplorchis yokogawi KATSUTA, 1932.

**INTRODUCTION**

On studying the metacercariae, trematode larvae and the role played by fish in transmitting some trematode of dogs and cats, AZIM (1938) reported Haplorchis pumilio LOOSS, 1896; Haplorchis yokogawi KATSUTA, 1932, Haplorchis taichui nishigori, 1924; and prohemistomum vivax SONSINO, 1892 from dogs in Egypt. FAHMY and SELIM (1959) reported some trematode parasites of dogs which are transmitted by fish in Egypt. They found that Mugil cephalus and Tilapia nilotica act as second intermediate hosts for Echinostomum liliputans, Prohemistomum vivax; Heterophyes heterophyes, Heterophyes dispar, Diorchitrema pseudocirratum, Haplorchis spp., plagicola spp., Pygidiospsis genata and stichodora sawakinensis.

FISCHTAL and KUNTZ (1963) studied some metacercariae from Tilapia sp., Tilapia zilli and Clarias sp., collected from Egypt.

KHALIL (1963) described Diplostomulum tregenna, the larval stage of Diplostomum tregenna GOHAR, 1932, from the cranial cavity of Clarias lazera in the Sudan.

FAHMY et al. (1976) studied the encysted metacercariae in some fishes at Assiut province, and after feeding these metacercariae to puppies and Kittens, they succeeded in obtaining two adult parasites: Prohemistomum vivax SONSINO, 1839 and Haplorchis yokogawi KATSUTA, 1932.

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KHALIFA et al. (1977) studied the heterophyid cercariae and the life cycle of Haplorchis pumilio (LOOSS, 1896) from Assiut Province. They described the cercaria of Haplorchis pumilio from Melania truncatula. They obtained the metacercaria of this parasite from the fish Gambusia affinis and Tilapia nilotica. Experimental infestation was successful in white rats and young pigeons.

EL-NAFFAR (1980) studied the life cycle of Haplorchoides cahirinus LOOSS, 1896. He found that Cleopatra bulimoides and Cleopatra cyclostomoides are the first intermediate host for this parasite. Also, he obtained the metacercariae of this parasite from Tilapia and Gambusia, and the adult parasites were collected from the intestine of Bagrus bayad and Chrysichthys auratus.

EL-NAFFAR and KHALIFA (1981) described the metacercaria of a new species Euclenostomum ardeolae, from the kidneys of Tilapia nilotica. They succeeded in obtaining the adult parasite in the buccal cavity of Ardeola ibis ibis.

KHALIFA et al. (in press) described two types of metacercariae in the muscles of Clarias lazera, and on feeding these metacercariae to the white rats they obtained the adult flukes which are: Cynodiplostomum azimi and Cynodiplostomum depouisi.

### MATERIAL and METHODS

The fish hosts were caught from different parts of Lake Nasser at Aswan. The hosts examined fall into 17 species belonging to 5 families. The systematic list is proposed according to BOULANGER (1907) as follows: Mormyrus kannume & M. cashive (Family Mormyidae); Hydrocyon forskalii, H. lineatus, H. brevis, Alestes dentex, A. nurse and A. baremose (Family Characidae); Clarias lazera and C. anguillaris (Family Clariidae); Schilbe mystus, S. schilbe, S. uranoscopus and Eutropius niloticus (Family Schilbeidae); Tilapia nilotica, T. zilli and T. galilaea (Family Cichlidae).

The fishes were examined for trematode larvae and metacercariae. For this purpose, cavities were examined with the help of hand lens, and small pieces of row muscles were examined microscopically. When the fish proved positive, the detected larvae and metacercariae were fed singly to parasite free pupies and kittens. From the 3rd day after feeding, the faeces of these animals was examined daily until the eggs appeared in the stool, then these animals were sacrificed and dissected to obtain the adult flukes from their intestines. The trematodes were collected, studied alive, then fixed, stained, and mounted in Canada balsam, and prepared for microscopic examination.

Drawings of the parasites were made to the scale using a camera lucida. The measurements are given by the scale micrometer. The description and diagnosis was based, at least, on ten specimens except in few cases. All the measurements are in millimeters.

### RESULTS

1- On the trematode larvae, Diplostomulum tregenna and the adult (experimentally obtained) Diplostomum tregenna NAZMI GOHAR, 1932. During the course of the present work, a developmental stage of trematode larvae (Fig. 1) was found in the cranial cavity of Clarias lazera and Clarias anguillaris. The rate of infection was 3 out of 50 (6%) and one out of 35 (2.86%) respectively. The number of these larvae in C. lazera varied from 7-10 per infected fish, while the number in C. anguillaris was 5 only.



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The larva is relatively small in size, elliptical in shape with bluntly pointed posterior end. It measures 0.60-0.68 mm in length and 0.12-0.17 mm in width. The oral sucker is about 0.035-0.041 x 0.023-0.025 mm and is followed by a small pharynx measuring 0.010-0.014 mm in length. The ventral sucker measures 0.023 mm in diameter and lies nearly in the middle of the body. The holdfast organ measures 0.075-0.032 x 0.032-0.037 mm and lies at the beginning of the posterior fourth of the body at the mid line.

Family Diplostomidae Poirier, 1886

Subfamily Diplostominae Monticelli, 1892

Genus Diplostomum Nordmann, 1832

Diplostomum tregenna Nazmi Gohar, 1932

The present parasite was recovered from the intestine of puppies and kittens five days after feeding on the Diplostomulum larvae found in the cavity of both Clarias lazera and C. anguillaris from lake Nasser. Ten and four specimens were recovered respectively from the used one dog and one cat.

#### Description:

The body (Fig. 2) is 1.51 to 1.76 mm long. It is distinguished into two regions, the fore-body which is dorso-ventrally flattened, slightly concave ventrally measuring 0.72-0.81 mm in length and 0.56-0.75 mm in maximum width; and the hind-body which is conical, bluntly pointed posteriorly, measuring 0.79-0.99 mm in length and 0.77-0.86 mm in maximum width. The tegument is devoid of spines or scales.

The oral sucker is terminal and in some specimens, it projects a little anteriorly, measuring 0.082-0.11 mm in diameter. At either side of the oral sucker, a cup to ear like process (Pseudosucker), each is 0.08-0.13 x 0.04-0.06 mm, and together with the oral sucker, they form a trilobed shape at the anterior end. The ventral sucker is rounded and lies, nearly, in the middle of the fore-body slightly anterior to the holdfast organ and measuring 0.055-0.080 mm in diameter. The holdfast organ lies just above the junction of the fore-body with the hind-body and is rounded, oval to slightly elongated, measuring 0.143-0.275 x 0.126-0.302 mm. The oral sucker is directly followed by a muscular pharynx which measures 0.044-0.066 x 0.049-0.060 mm, and this is followed by a very short oesophagus which bifurcates into two intestinal caeca that terminate in the hind-body, slightly posterior to the posterior testis. The course of these caeca, in its most length could not be traced easily due to the distribution of the vitellaria.

The hind-body contains the reproductive organs. The anterior testis is claviform, measuring 0.27-0.30 x 0.27-0.33 mm. The posterior testis is bilobed, its right lobe measures 0.38-0.49 x 0.22-0.41 mm and the left lobe measures 0.35-0.51 x 0.19-0.33 mm. The ovary is oval in shape, lies opposite to the anterior testis, slightly to the left of the median line and measures 0.11-0.18 x 0.055-0.16 mm. The vitelline follicles are distributed over the posterior half of the fore-body from the posterior end of the fore-body up to the level of the ventral sucker. The uterine duct unites in its termination by the ejaculatory duct and the formed common short passage ending in the genital atrium which is 0.22-0.30 mm in diameter and lies on the dorsal side very near to the posterior extremity.

The eggs are few, about 1-3 in number, oval shaped, thick shelled and yellowish in colour. Each egg is about 0.08-0.012 x 0.06-0.07 mm.

#### Discussion:

KHALIL (1963), while he was working on the cranial nerves of the Nile fish Clarias lazera from the white and the Blue Nile in Khartoum area in the Sudan, found a very large number of



trematode larvae. Most of the fish which he examined were found to be heavily infected, each with several hundreds of the parasite. Few of these infected fishes show haemorrhage, suggesting that the parasites reached the brain through the blood stream. He described and identified the three stages of these larvae as Diplostomulum tregenna.

The occurrence of the present larval stage of Diplostomulum tregenna in Clarias anguillaris in Lake Nasser constitutes a new host as well as a new locality for the Diplostomulum tregenna larvae.

The description which was previously given for the adult, leaves no doubt that the parasite under discussion, belongs to the genus Diplostomum NORDMANN, 1832. YAMAGUTI (1958) listed 26 species in this genus.

NAZMI GOHAR (1932 and 1933), described two new species of Diplostomum: the Diplostomum tregenna from the Egyptian kite, Milvus migrans aegypticus, and D. azimi from the intestine of an experimental dog Canis familiaris in Egypt.

KHALIL (1963) detected Diplostomum tregenna from the intestine of domestic duck, three days after being fed on the Diplostomulum larval stages.

During the present work on Clarias spp., Diplostomum tregenna NAZMI GOHAR, 1932 has been recorded from the intestine of puppies and kittens experimentally fed on the present Diplostomum larval stage.

The obtained results agree to a very extent with Diplostomum tregenna NAZMI GOHAR, 1932 and that described by KHALIL (1963), but there are some differences which can be summarized as follows:

- 1- NAZMI GOHAR described Diplostomum tregenna from the intestine of Egyptian kite Milvus aegypticus; KHALIL described the parasite under discussion from the intestine of domestic duck, while the present parasite is from the intestine of puppies and kittens fed on the present larval stage of Diplostomum tregenna.
- 2- The occurrence of the present parasite larvae in Lake Nasser constitutes a new locality.
- 3- There are slight differences in the measurements which are given in table (1).
- 2- On some metacercariae and the adults (experimentally obtained) Prohemistomum vivax (SONSINO, 1892) ASIM, 1933 and Haplorchis yokogawi (KATSUTA, 1932).

The examination of fishes revealed the presence of six forms of metacercariae infesting muscles of the fish.

The first form (Fig. 3a) was found only in Tilapia spp. It measures 0.66-0.74mm long by 0.57-0.61mm wide. It is oval in shape and surrounded by a thin cyst wall. The larva inside this cyst has an oral sucker measuring 0.13-0.15 x 0.13-0.16mm; an acetabulum measuring 0.13-0.14 x 0.11-0.13mm, and the excretory vesicle appears as thin capillary tube about 0.311-0.33mm in length. The cyst is surrounded at either pole by masses of small fat globules.

The second form (Fig. 3b) occurs also in Tilapia spp. It is nearly spherical in shape, measuring about 0.34-0.40mm, (average 0.35mm) in diameter. It is surrounded by a thick cyst wall measuring 0.018-0.022mm. No definite features were observed inside the metacercariae which appeared as blackish mass of vacuoles.

The third form (Fig. 3c) was found also in Tilapia spp. It appeared as a black spot surrounded by a thick cyst wall. The cyst is rounded in shape measuring 0.301-0.345mm in diameter, and the cyst wall is about 0.022-0.027mm, in thickness. The only organ which can be seen, is the oral sucker which measures about 0.038-0.055 x 0.066-0.073mm.



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The fourth form (Fig. 3d) found in Hydrocyon spp., Alestes spp., Schilbe spp. and Eutropius niloticus. This cyst measures 0.329-0.385mm in diameter, and is surrounded by an adipose tissue.

The fifth form (Fig. 3e) was found in the muscles of Tilapia spp., Mormyrus spp. and Clarias spp. It appeared as a dull opaque spot, nearly oval in shape, small in size about 0.36-0.42 x 0.29-0.34mm. It is surrounded by a thick cyst wall.

The sixth form (Fig. 3f) occurs only in the muscles of Clarias spp. It is seen as a large dull oval spot measuring 1.31-1.42 x 0.94-1.08mm. It is surrounded by a thick cyst wall measuring 0.084-0.091mm. A large sucker measuring 0.20-0.25mm. in diameter, and two intestinal caeca were distinguished in the metacecaria.

Family Cyathocotylidae Poche, 1926

Subfamily Prohemistominae Lutz, 1935

Genus Prohemistomum Odhner, 1913

Prohemistomum vivax (Sonsino, 1892) Azim, 1933

The present parasite was recovered from the duodenum, jejunum and ileum of puppies and kittens about 6 days after being fed on the previously described metacercariae (Fig. 3a, b, c & d) of infected Tilapia spp., Hydrocyon spp., Alestes spp., Schilbe spp., and Eutropius niloticus from Lake Nasser. Several hundreds specimens of this parasite were collected from the four puppies and four kittens used in the experiment.

#### Description:

The flukes (Fig. 4) are pyriform, convex dorsally and concave ventrally behind the middle half of the body. The body measures 1.14-1.91mm long, by 0.52-0.82mm wide and the length width ratio is about 2:1. The cuticle of the anterior half of the body is provided with minute spines.

The anterior half of the body bears the two suckers and the tribocytic (holdfast) organ. The oral sucker is subterminal but in some specimens it projects slightly anteriorly, rounded to oval shaped, slightly wider, than long, measuring 0.03-0.06mm long by 0.06-0.09mm wide. The acetabulum is rounded, slightly smaller than the oral sucker, measures 0.046-0.077mm in diameter, and lies anterior to the tribocytic organ, nearly at the end of the anterior third of the body. The tribocytic organ lies in the median line, at the beginning of the middle third. It is mushroom like structure, poorly developed, measures 0.14-0.16mm long by 0.11-0.12mm wide. The pharynx is well developed, oval in shape, measuring 0.04-0.07mm long by 0.05-0.07mm wide. This is followed by the oesophagus which measures 0.03-0.06mm in length. The oesophagus leads to two intestinal caeca which ending at a level slightly posterior to the posterior testis.

The reproductive organs are situated in the hindbody. The two large testes are tandem in arrangement with a very narrow intertesticular space. The anterior one overlaps the tribocytic organ, measuring 0.22-0.32mm long by 0.19-0.34mm wide. The posterior testis is larger than the anterior one and measures 0.26-0.37mm long by 0.27-0.42mm wide. The cirrus pouch is well developed, saccular shaped and has a lateral position at the posterior end, extending at a level reaching about the length of the posterior testis and measures 0.45-0.63mm long by 0.099-0.155mm wide. It contains the seminal vesicle and rod-shaped cirrus.

The ovary is small, rounded to oval shaped with smooth outline; and its position may be somewhat variable. It lies at the right or left side of the two testes in the majority of the available specimen, and in few specimens it lies between the two testes within the intertesticular space. The ovary measures 0.11-0.22mm long by 0.09-0.22mm wide. The vitellaria are well developed, irregularly shaped of closely packed follicles confined to two wide bands at either sides of the posterior half of the body extending to the posterior testis forming a complete circle around the tribocytic organ.



The eggs within the uterus are few, 3-5 in number (average 4), each is large, oval shaped, yellowish in colour and measuring 0.077-0.099mm long, by 0.044-0.066mm wide.

An excretory bladder was revealed only in alive worms as a small Y- shaped sac.

#### Discussion:

SONSINO (1892) described a cercaria from the snail Cleopatra bulimoides which he called it cercaria vivax. AZIM (1933) found that cercaria vivax could encyst in the fresh water fishes Gambusia affinis and Tilapia nilotica, and when the infected fishes were fed to cats and dogs, the adult recovered were identified as Prohemistomum spinulosum ODHNER, 1913 which was originally described from the common Egyptian kite Milvus migrans aegypticus, and the specific name (vivax) replaced (spinulosum) by AZIM (1933).

Prohemistomum vivax was described by SONSINO (1892) from Milvus m. aegypticus in Egypt. ODHNER (1913), DUBOIS (1936), and AZIM (1938) described the same species from the small intestine of dogs in Cairo and Upper Egypt. Another report of natural infection by this trematode was that found by NASR (1941), in the small intestine of man in Egypt. The parasite was recorded also from the Egyptian Kite M.m. aegypticus by NAGATY et al. (1963). EL-NAFFAR and KHALIFA (1975) reported the first record with P. vivax in the small intestine of buff back heron Ardeola ibis ibis in Upper Egypt.

FAHMY and SELIM (1959) could produce the adult trematode after experimental feeding of dogs on infected muscles of Mugil and Tilapia. Also, FAHMY et al. (1976) could produce the same species from the duodenum, jejunum and ileum of puppies and kittens previously fed on metacercariae infecting Tilapia nilotica; T. zilli; Mormyrus Kannume; Schilbe mystus; Clarias lazera; Hydrocyon forskalii and Alestes nurse in Upper Egypt.

The present material of P. vivax agrees with the description given by previous authors for species.

The occurrence of the metacercariae of Prohemistomum vivax in Tilapia galilae; Hydrocyon lineatus, H. brevis; Alestes dentex; A. baremose, Eutropius niloticus; and Schilbe uranoscopus constitutes a new intermediate hosts for this parasite.

The occurrence of the metacercaria of the present parasite in Lake Nasser constitutes a new locality.

Table (2) shows the measurements of the adult trematode obtained by the present investigators, in addition to those given by the previous authors.

Family Heterophyidae Odhner, 1914

Subfamily Haplorchiinae Looss, 1899

Genus Haplorchis Looss, 1899      Syn. Monorchotrema Hishigori, 1924      Haplorchis yokogawi  
Katsuta, 1932

This parasite was collected from the ileum of dogs experimentally fed on the metacercariae (fifth form) found in Tilapia spp.; Mormyrus spp. and Clarias spp. The flukes were found buried deep in the mucous membrane of the intestine of this experimental animal. About 43 specimens of this parasite were collected from the used puppy (one).

The sixth form of metacercariae did not developed to an adult parasite. This may indicate that puppies are not the final host of this species, and the final host is probably a fish eating bird.



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Description:

The adult (Fig. 5) is oval or pear in shape and extremely small in size, measuring 0.55–0.655mm long by 0.366–0.499mm wide, (average 0.63 x 0.43mm). The body is divided distinctly into a mobile fore-body and a hind-body containing the reproductive organs and has a cuticle covered with minute spines.

The oral sucker measures 0.022–0.044 x 0.031–0.055mm (0.029 x 0.040mm) and the acetabulum is 0.031–0.044 x 0.027–0.033mm (0.037 x 0.031mm). It is not easily detected. The prepharynx is short and the pharynx which measures 0.018–0.038 x 0.022–0.027mm (0.030 x 0.024 mm) leads to an oesophagus measuring about 0.011–0.044mm (0.039mm) in length.

The single testis is spherical in shape and lies near the posterior extremity. It measures 0.209–0.291 x 0.192–0.306mm (0.265 x 0.264mm). The cirrus pouch is not observed except in one specimen. The ovary is small, measuring 0.088–1.26 x 0.0605–0.0967mm and located just anterior to the testis. The uterus which contains numerous eggs, extends from behind the bifurcation of intestinal caeca to the posterior end. The follicular vitellaria are small, few in number and irregularly distributed at the posterior part of the body in the testicular zone.

The ovum is small, measuring 0.029–0.055 x 0.011–0.022mm (0.035 x 0.016mm). Such ovum is operculated, flask-shaped with a knob at the posterior pole.

Discussion:

YAMAGUTI (1958) listed nine species in genus Haplorchis LOOSS, 1899. These nine species are:

H. pumilio (LOOSS, 1896); H. microrchis (KATSUTA, 1932); H. pleurolophocerca (SONSINO, 1896); H. tiachui (NISHIGORI, 1924); H. taihokui (NISHIGORI, 1924); H. vanissimus (AFRICA, 1938); H. yokogawii (KATSUTA, 1932); H. tagoreai CHATTORJI, 1948) and H. milvi (GOHAR, 1934).

KATSUTA (1932) was the first who discovered and described H. yokogawii from dogs, cats and rats in Formosa. AZIM (1938) found this species in dogs from Egypt. PEARSON (1964) redescribed this species from the lower part of the small intestine of cats, water rats and eagles from Australia and Egypt. FAHMY et al. (1976) redescribed the same species from the ileum of dogs fed on the metacercaria found in Tilapia sp. in Assiut province.

The present material agrees to some extent with the parasite described by the above authors with slight differences in measurements (Table 3).

The occurrence of the metacercariae of the present parasite in the fish Mormyrus spp., and Clarias spp., which act as intermediate hosts in Lake Nasser at Asswan constitutes new hosts and new locality.

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**Fig. (1):** Diplostomulum tregenna, the larvae of Diplostomum tregenna (Nazmi Gohar, 1932).

**Fig. (2):** Diplostomum tregenna (Nazmi Gohar, 1932). Ventral view of the adult.

**Fig. (3):** Different forms of metacercariae.  
a- First form                                      b- Second form  
c- Third form                                     d- Fourth form  
e- Fifth form                                       f- Sixth form

**Fig. (4):** Prohemistomum vivax (Sonsino, 1892) Azim, 1932.  
Ventral view of the adult, obtained from puppies and kittens after feeding with fish infected with the first four forms of previously described metacercariae.

**Fig. (5):** Haplorchis yokogawi (Katsuta, 1932) Chen, 1939.  
Ventral view of the adult parasite obtained from puppies fed on the fifth form of metacercariae.

	D. tregenna measurments by the present authors	D. tregenna measurments by Nazmi Gohar, 1932	D. tergenna measurments by Dubios, 1938	D. tregenna measurments by Khalil, 1963
The body length	1.51 -1.76	1.08-1.12	1.27	0.79 -0.86
The fore-body	0.72 -0.81 X 0.56 -0.75	0.52-0.62	0.78 X 0.53	0.53 -0.55 X 0.31 -0.35
The Hind-body	0.79 -0.99 X 0.77 -0.86	0.48-0.50	0.51 X 0.45	0.27 -0.32 X 0.20 -0.23
Oral sucker	0.082-0.11	0.09-0.1	0.072 X 0.85	0.057-0.061
Pharynx	0.044-0.066 X 0.049-0.060	0.07-0.09 X 0.06-0.07	0.07 X 0.57	0.039-0.050 X 0.029-0.036
Ventral sucker	0.055X0.080	0.06X0.08	0.072 X 0.092	0.040-0.050X0.057
Holdfast organ	0.143-0.275 X 0.126-0.302	0.16-0.24	0.225 X 0.25	0.11 -0.14 X 0.089-0.129
Ovary	0.11 -0.18 X 0.055-0.16	0.17-0.2 X 0.06-0.10	0.09 X 0.175	0.064-0.079 X 0.046-0.064

Table (2): Prohemistomum vivax (Sonstion, 1892) Azim, 1933

	P. vivax measurements of the Present authors	P.vivax measurements Odhner (1913)	P.vivax measurements Dubois (1936)	P. vivax measurements Nasr (1941)	P. vivax measurements of the Fahmy & Selim (1959)	P. vivax measurements of (El-Naffar & Khalifa 1975)	P. vivax measurements of Fahmy et al (1976)
The body length	1.144-1.910(1.568)	0.750-1.000	0.810-1.050	0.740-1.110	1.31 -1.55 (1.4)	1-1.2	0.949 -1.695(1.279)
The body width	0.52 -0.82 (0.717)	0.450-0.650	0.570-0.680	0.520-0.610	0.66 -0.78(0.77)	0.5 -0.6	0.480 -0.788(0.62)
The oral sucker	0.033-0.066(0.046)X	0.070X	0.060-0.081X	0.058-0.892X	0.0775-0.0868(0.0823)X	0.06 -0.065X	0.0496-0.0763(0.0629)X
	0.066-0.099(0.088)	0.085	0.077-0.089	0.065-0.077	0.0899-0.1023(0.0951)	0.052-0.055	0.062 -0.0916(0.0755)
The ventral sucker	0.044-0.077(0.061)	-	-	-	-	equal to the	0.045 -0.053(0.0495)X
	0.044-0.071(0.059)	-	-	-	-	0.5	0.045 -0.049(0.047)
The pharynx	0.04 -0.07(0.059)X	0.060X	0.60X	0.058-0.077X	0.0558-0.682(0.0606)X	0.074-0.077X	0.045 -0.072(0.058)X
	0.055-0.077(0.066)	0.085	0.093	0.058-0.077	0.0558-0.0713(0.0641)	0.050-0.053	0.048 -0.080(0.062)
The cirrus pouch	0.45 -0.63(0.570)X	-	0.240-0.315X	-	0.2793-0.372 (0.3368)	0.33 -0.39X	-
	0.099-0.155(0.122)	-	0.135	0.013-0.026	0.0806-0.1264(1.045)	0.075-0.105	-
Number of ova	3-5 (4)	4-5	-	1-4	2-3	1-3	1-4 (2)
	0.077-0.099(0.0825)X	0.100X	0.100-0.108X	0.090-0.108X	0.090 -0.093 (0.0915)X	0.090-0.092X	0.094 -0.107(0.100)X
The Ovum.	0.044-0.066(0.0475)	0.06	0.060-0.065	0.045-0.072	0.065 -0.682(0.066)	0.060	0.064 -0.071(0.068)



## TREMATODES OF DOGS AND CATS

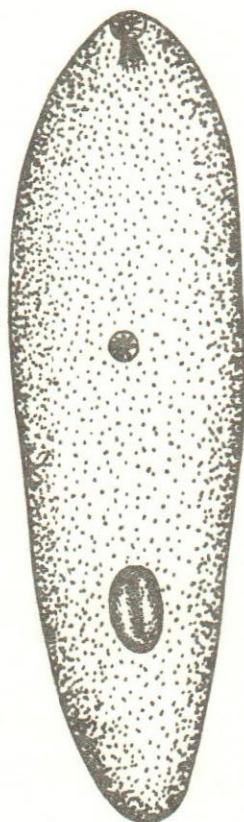
Table (3): Haplorchis yokogawi (Katsuta, 1932)

	H. yokogawi measurments by the present authors	H. yokogawi measurments by Pearson (1964)	H. yokogawi measurments by Fahmy et al. (1976)
Body length	0.555 -0.655 (0.603)	0.451-0.809(0.349)	0.542 -0.722 (0.629)
Body width	0.366 -0.499 (0.430)	0.156-0.296(0.218)	0.225 -0.271 (0.248)
Oral sucker	0.022 -0.044 (0.022) X 0.031 -0.055 (0.040)	0.028-0.047(0.042) X 0.040-0.057(0.049)	0.045 -0.053 (0.050)X 0.045 -0.064 (0.053)
Ventral suc sucker	0.031 -0.044 (0.037) X 0.027 -0.033 (0.031)	0.017-0.022(0.019) X 0.018-0.026(0.022)	0.017 -0.020 (0.018) 0.017 -0.023 (0.021)
Pharynx	0.018 -0.038 (0.030) X 0.022 -0.027 (0.024)	0.025-0.035(0.031) X 0.017-0.024(0.021)	0.026 -0.032 X 0.020 -0.025
Oesophagus	0.011 -0.044 (0.035)	0.021-0.051(0.032)	0.042 -0.060
Testis	0.209 -0.291X0.192-0.306	0.089-0.131(0.108)	0.089 -0.119 (0.108)
Ovary	0.088 -0.126 (0.098) X 0.0605-0.0967(0.081)	0.041-0.066(0.048) X 0.047-0.066(0.053)	0.066 -0.076 (0.073)X 0.061 -0.076 (0.067)
Ovum	0.029 -0.055 (0.035) X 0.011 -0.022 (0.016)	0.028-0.030(0.029) X 0.013-0.017(0.015)	0.0303-0.0318 0.0153-0.0172





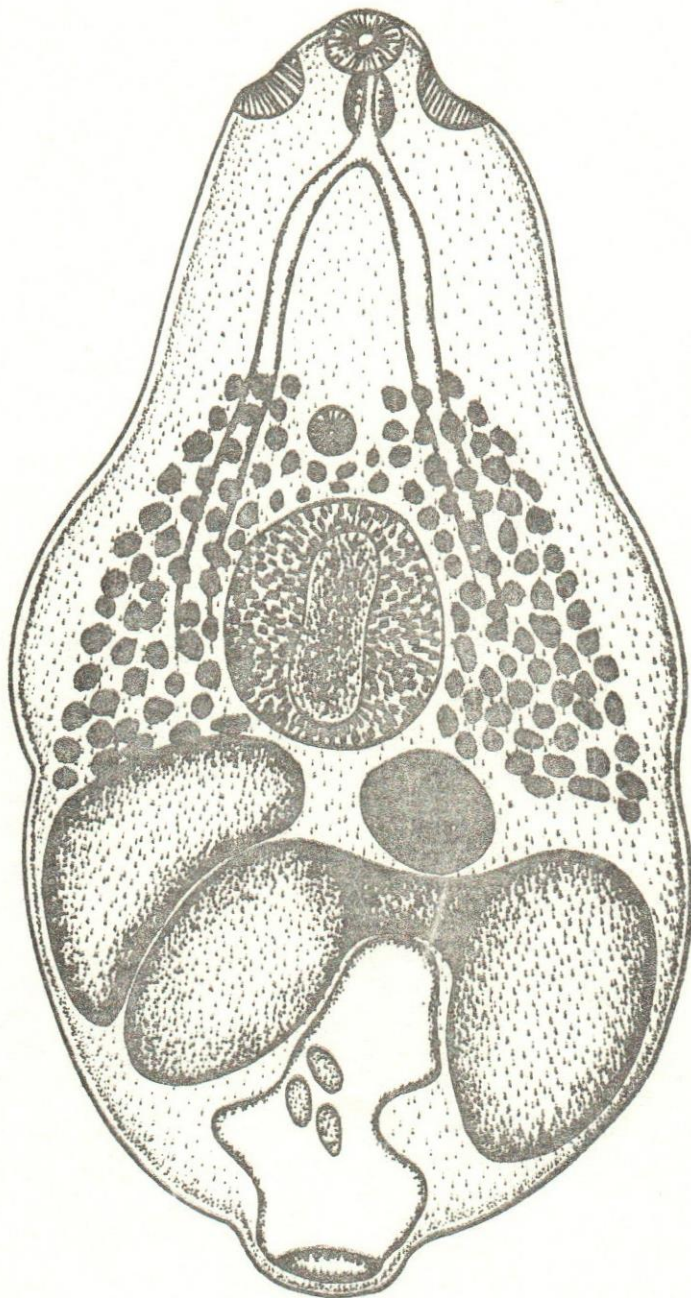
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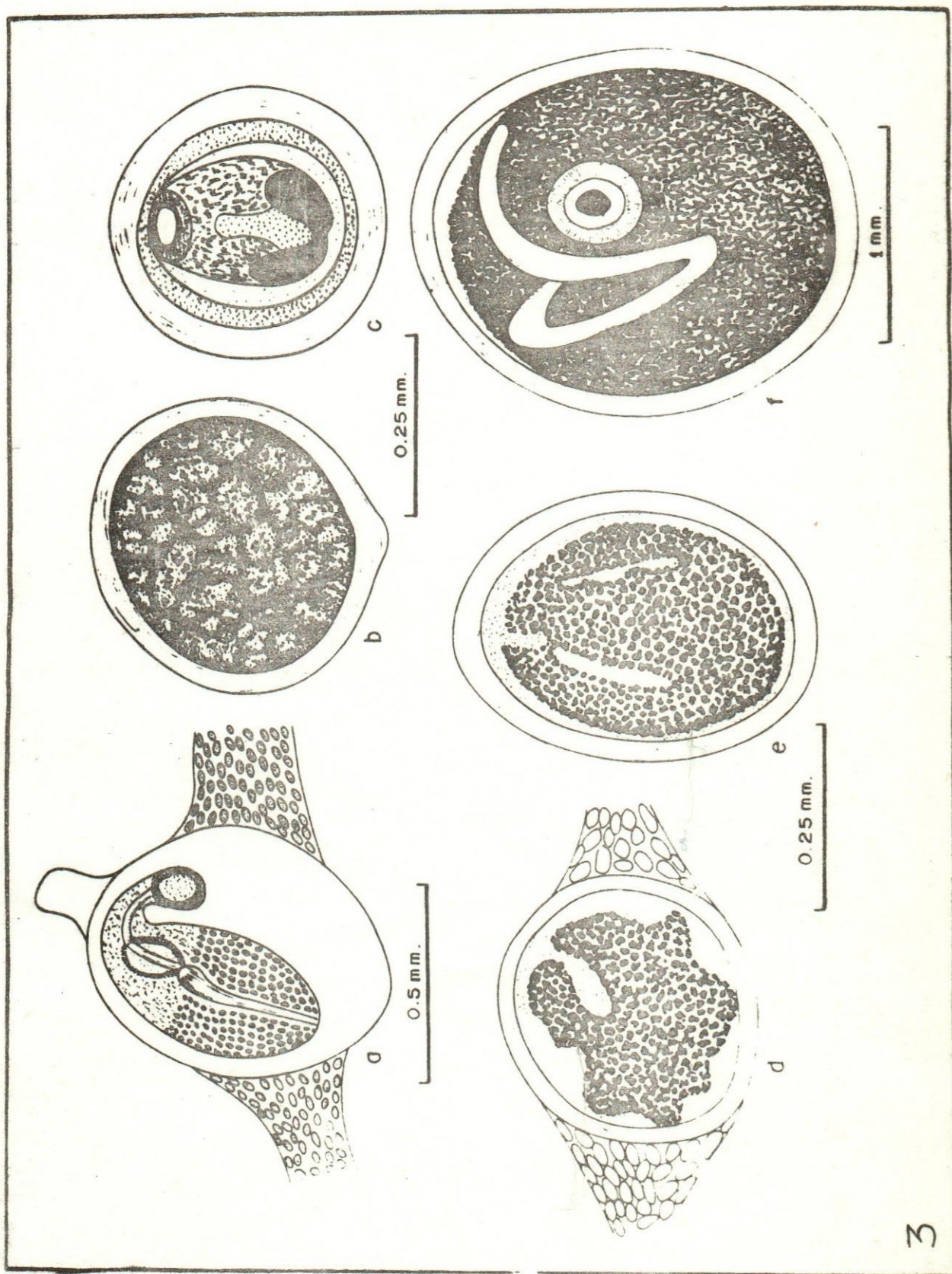


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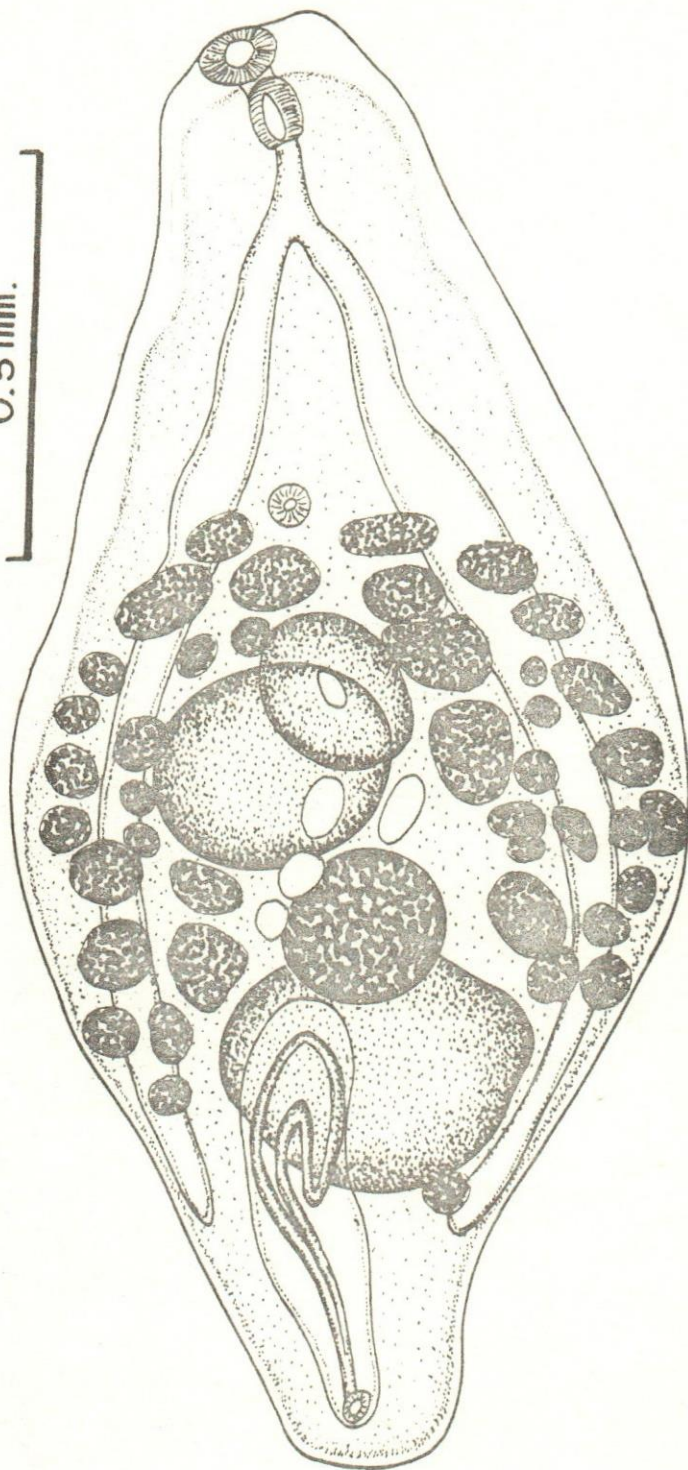






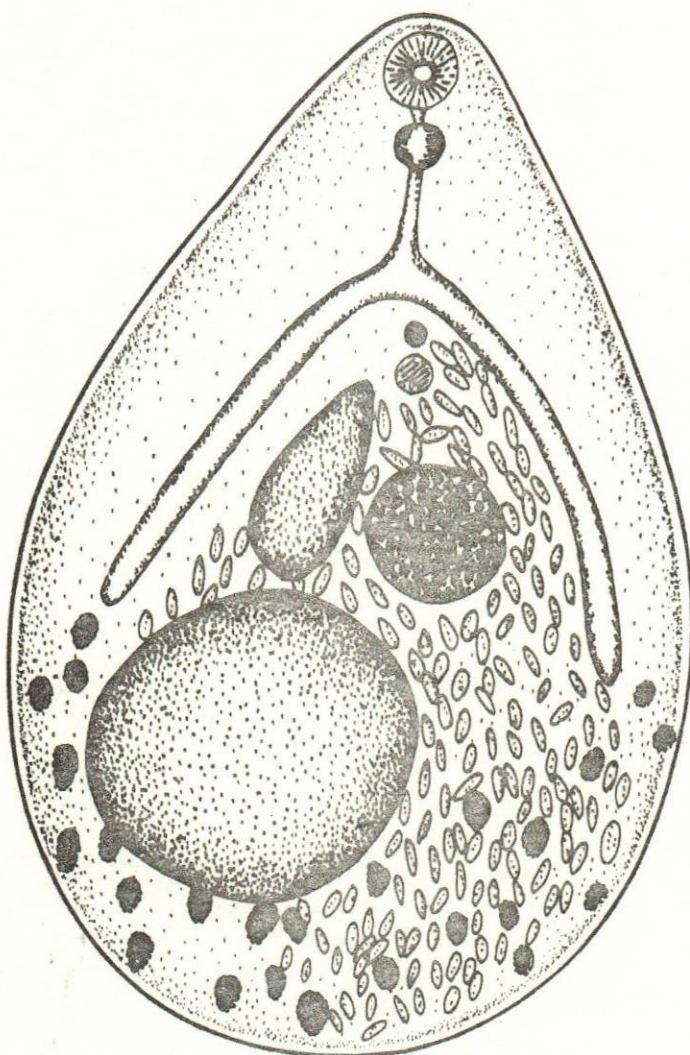


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0.2 mm.

