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د راسة عن ال د ب دان فى بعض ال حيوانات ال ش د ب بية الصغيرة  
بمحافظة أسيوط  
١- التريما تودا

عبد المجيد فهمى ، محمد الصادق ، رفعت خليفة ، عبد الرحمن محمد ، محمود الهادى

فى هذا البحث امكن اجراء مسح على ال د ب دان المعوية من قسم التريما تودا لعدد ٤٥ مسن  
الكلاب الضالة ، ٢٩ من القطط الضالة وكذلك ٦٧٣ من الفئران والجرذان المختلفة . ولقد وجد  
الباحثون أن هذه ال د ب دان تنتمى الى عائلات مختلفة من قسم التريما تودا وهى : ال اكينوستوماتيدى  
الهتروفيدى والشيوكوتيليدى والديلوستوماتيدى . ولقد امكن التعرف على الأنواع المختلفة لل د ب دان  
ووجد أنها تنتمى الى ثلاثة عشر نوعا مختلفا من هذه العائلات . ولقد تم وصف هذه الأنسماج  
وتمييزها عن بعضها البعض . واكتشف الباحثون صنف جديد فى القطط وهو شيند بليستوم وبيوس  
اسيوطى .

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## STUDIES ON HELMINTH PARASITES IN SOME SMALL MAMMALS IN ASSIUT GOVERNORATE

### 1. TREMATODE PARASITES

(With 4 Tables & 4 Figures)

By

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### SUMMARY

The trematode fauna of 45 stray dogs, 29 stray cats and 673 different rodents was estimated and surveyed. Representatives of 4 trematode families were encountered viz Echinostomatidae, Heterophyidae, Cyathocotylidae and Diplostomatidae. Thirteen different species of trematode parasites were examined and described from them one new variety was reported from cats Cyndiplostomum buboisi var. assiutis n. var.

### INTRODUCTION

The intimate association between man and some of the small mammals create, the necessity for the study of their helminthes, particularly because some of these parasites seems to be transmissible to man. The aim of this work was therefore to explore the trematode parasites of stray dogs, cats and rodents.

### MATERIALS and METHODS

Animals were brought alive to the laboratory. Intestinal parasites were examined in 70% alcohol or 10% formalin fresh as well as from specimens fixed & stained in acetic acid alum carmine. Measurements, were taken by the aid of eye piece micrometer and all drawings were done by camera lucida.

### RESULTS and DISCUSSION

Family Echinostomatidae POCHE, 1926

Subfamily Echinochasminae ODHNER, 1910

Genus Echinochasmus DIETZ, 1909

#### (1) Echinochasmus liliputans (LOOSS, 1896)

This parasite was occasionally recorded from the small intestine of stray dogs. The specimens collected measured from 860 - 960 U in length by 240 - 270 U in width. Oral sucker measures from 48 - 52 U in diameter. The ventral sucker is about twice the size of the oral sucker. The 24 collar spines are arranged in one dorsally interrupted row. The globular pharynx measures 40 - 42 by 35 - 38 . Ovoidal testes measure 180 by 110 and 170 by 99 U respectively, while the ovary measures 84 by 60 U. The eggs measure 27 - 29 by 14 - 17 U. They are operculated golden yellow in colour and each contains fully mature miracidium. Incidence of infection is shown in table (1).

#### Discussion

The present material is similar to E. liliputans as described by FAHMY and SELIM (1959) from dogs. Minor differences were, however, noticed in the relative measurements, but these are not enough to separate it into a distinct species or a variety.

#### (2) Echinochasmus perfoliatus (RATZ, 1908)

This parasite was recovered from the small intestine of dogs and cats. It is elongate with its extremities narrower than the middle of the body. The anterior rem form collar consists of 24 spines arranged in two alternating crowns, equal in size & number, among which three smaller ones exist on either side forming corner spines. Other wise the morphological features seen to be quite similar to the description of FAHMY & SELIM (1959). Incidence of infection is shown in Table (1).

Discussion

E. perfolicatus was recovered on several occasions from man (TANABE, 1922, FAUST *et al.*, 1975). The parasite was previously recorded from different birds (LOSS, 1899, GOHAR, 1934 and GED, 1977) or from dogs (WITENBERG, 1933 and FAHMY & SELIM 1959) FAHMY *et al.*, (1981) described the new variety, E. perfoliatus var. aegyptius from cats in Assiut province. The present specimens were diagnosed as E. perfoliatus as they were very similar to the description given by FAHMY & SELIM (1959).

family Echinostomatidae POCHE, 1926

Subfamily Echinostomatinae STILES and HASSALL, 1926

Genus Echinoparyphium DIETZ, 1910

Echinoparyphium recurvatum (LINSTOW, 1873) LUHE, 1909

This parasite was recorded in the small intestine of the Norway rat. The adult worm is 2.77 - 4.50 mm in length and 0.52 to 0.75 mm in width. The head collar is reniform & carries double dorsally uninterrupted rows of spines, about 42 in number; five of which are corner spines on each side. The oral sucker measures 144 - 168 by 120 - 144 U. The ventral sucker is about three times the size of the oral sucker. The pharynx measures 120 - 144 by 108 - 132 U. The testes occupy the four fourths of the body. Ovary is shortly in front of testes. Vitelline glands are in the form of coarse follicles and occupy the lateral fields from the anterior margin of the ovary to the posterior end of the intestinal caeca. The ova are operculated, yellowish in colour, thin-shelled, measure 75 - 82.5 by 43 - 45 U. Incidence of infection among Norway rats is shown in Table (3).

Discussion

According to DAWES (1946) & YAMAGUTI (1958) E. recurvatum is mainly a parasite of birds. It was also recorded from man by WATSON (1960). KHALIL & ABAZA (1924) described the new species E. aegyptiacus as a natural infection of unidentified rat. AZIM (1930) redescribed E. recurvatum from experimental infection of rats showed that E. aegyptiacus of KHALIL and ABAZA was actually a synonym of E. recurvatum. OMRAN (1973) found that the cercariae of E. recurvatum encyst either in the snail Physa acuta or in the musculature of the toad Bufo regularis. EL-NAFFAR & KHALIFA (1975) recorded the parasite in buff-backed heron (Ardeola ibis ibis). As this bird is not a snail eater, they concluded that the infection might occur by swallowing of infected toads. The same suggestion may be applied to the rat Rattus Norvegicus. E. recurvatum described during the present study might be considered as the first record in the Norway rats.

Family Heterophyidae ODHNER, 1914

Subfamily Haplorchinae LOSS, 1899

Genus Haplorchis LOSS, 1899

1- Haplorchis pumilio (LOSS, 1896)

This is a very common parasite of the small intestine of different mammals. The morphological features are exactly similar to those reported by KHALIFA *et al.* (1977). Incidence of infection in different mammals is shown in Table (1,2,3).

Discussion

Haplorchis pumilio was described in many occasions from wide variety of birds & animals in Egypt (LOSS, 1896, KHALIL, 1932, GOHAR, 1934, FAHMY & SELIM, 1959 & KHALIFA *et al.*, 1977). The commonest natural host is the dog or cat (KUNTZ & CHENDLER, 1956) as well as fish-eating birds. KHALIFA *et al.*, (1977) added to the list of hosts Rattus rattus frugivorus, Ardeola ibis ibis and Gallus gallus domestica in Assiut province. During the present study, the parasite was also found in dogs, cats and different rodents. Among rodents, Rattus rattus alexandrinus, Rattus norvegicus, Arvicanthus niloticus are new host records in Egypt.

2- Haplorchis Yokogawai (KATSUTA, 1932)

This is rather uncommon parasite of mammals in Assiut area. It was found in the small intestine of different rodents, stray dogs & cats. Incidence of infection is shown in Table (1,2,3).

Discussion:

This parasite was recorded from different parts of the world (KATSUTA, 1932, GROGAN, 1934, AFRICA & GRACIA, 1935, CHEN, 1936, KOBAYASHI, 1942, ODENING, 1962, FAHMY *et al.*, 1976). It was noticed to be less common among the examined animals. This might be due to the fact that H. Yokogawai is more adapted to parasitize birds.

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3- Haploporchis taichui (NISHIGORI, 1924)

This is a rare parasite of mammals. It was found in the small intestine of stray cats. Incidence of infection is shown in Table (2).

Discussion:

During the present study, H. taichui was encountered only in cats. Worm burden was also noticeably low. According to PEARSON (1964) the parasite seems to be more common in birds.

Genus Phagicola (FAUST, 1920)

Phagicola longa (RONSAM, 1920)

This species was recovered from small intestine of stray dogs & cats. Morphological features of the adult agree with the description of MORGAN & HAWKINS (1951).

Discussion:

This parasite was recorded by FAHMY & SELIM (1959) in 60%, of dogs fed on Mugil fish. The parasite has been also reported naturally in dogs & cats by AZIM (1938 & 1939). This is the first record of that parasite from Upper Egyptian hosts.

Family Cyathocotyliidae POCHE, 1920

1- Genus Prohemistomum ODHNER, 1913

Prohemistomum vivax (SONSINO, 1893)

This is rather a common parasite of stray dogs, cats and rodents. Incidence of infection is shown in Table (1,2,3). Morphology of the adult is identical with previous records with the exception of the possession of two rows of ventral glands shown in Figure ( ).

Discussion:

In Cairo, AZIM (1938) and FAHMY & SELIM (1954) recorded the parasite from intestine of dogs. In Assiut, EL-NAFFAR (1970) reported the parasite in dogs. NASR (1941) reported the first case of human infection in Egypt.

Prohemistomum vivax described within the present study differ from that described by EL-NAFFAR & KHALIFA (1975) from the buff-backed heron in being larger in measurements. This might be due to different biological conditions in the intestine of animals & birds. Moreover, the ventral glands reported in the present study had never been reported by previous authors. They are faulty seem in fresh specimens but could be preparily seen in well flattened specimens after staining in acetic acid alum carmine. ARAFA (1968) reported a species belonging to the genus prohemistomum from various species of rodents in Egypt. However, the present authors could identify the species in rodents as Prohemistomum vivax and it was found to be identical with these found in dogs and cats.

2- Genus Mesostephanus LUTZ, 1955 Mesostephanus melvi YAMAGUTI, 1939. This parasite was encountered from the small intestines of stray dogs & cats. Living worms appeared to have no conspicuous ventral curvature. The worm is longiform in shape (Fig. ) with aspinose integument. It measures 1.5 - 1.65 mm in length & 0.6 - 0.63 mm in width. The oral sucker is subterminal & measures 52 - 54 by 70 - 73 U & the pharynx is 55 - 60 U in diameter. The oesophagus is short & measures about 100 - 108 U. The ventral sucker is in distinct & measures 70 - 73 by 65 - 67 U. The holdfast organ is indistinct. The testes are widely separated, the anterior is slightly larger than the posterior, measuring 160 - 168 by 154 - 156 U & 140 - 144 by 132 - 135 U respectively. The ovary is usually dextral in position, ovoidal in shape & measures 72 by 75 U. The uterus pouch measures 420 by 85 U. The eggs are operculated, yellowish in colour & each contains immature embryos. They measure 102 - 108 by 60 - 66 U. Incidence of infection in different mammals examined is shown in table (1,2).

Discussion:

DUBOIS & PEARSON (1963) were the first to report the presence of members of the genus Mesostephanus in Egypt. They recorded Mesostephanus melvi YAMAGUTI, 1939 in two cats from Dakahlyia Province & kites from Beheira & Faiyum Provinces. They stated that it was very difficult to differentiate between the members of the genus Prohemistomum and the genus Mesostephanus. The only clear difference in the latter genus is the presence of a vaginal sphincter and the absence of a profound ventral concavity. Mesostephanus melvi discovered during the present study could be differentiated from Prohemistomum vivax in having.

- 1- Body longiform with blunt anterior and posterior tail like appendage.
- 2- No conspicuous ventral concavity.
- 3- No ventral glands.
- 4- Holdfast organ is ill. developed.
- 5- Vitelline glands are more conspicuous.
- 6- Smaller suckers & indistinct ventral sucker.
- 7- Testes are widely separated.
- 8- Short cirrus pouch, not extending beyond the posterior border of the ovary.
- 9- Ovary dextral in position.
- 10- Vaginal spincter is prominent.
- 11- Eggs are bigger in size.

These differences might facilitate the identification of the two species previously described from the genus Mesosotephanus viz. M. melvi by YAMAGUTI (1939) and M. idicus by VIDYARTHI (1948) Mesosotephanus melvi seems to be described for the first time from Egyptian dogs which are host records for the parasite.

Family Diplostomatidae POIRIER, 1886

Subfamily Diplostomatinae MONTICELLI, 1892

Genus Cynodiplostomum DUBOIS, 1936

- 1- Cynodiplostomum arimi (GOHAR, 1933) DUBOIS, 1936

This parasite was recorded in the small intestine of stray dogs & cats as well as rodents. Incidence of infection is shown in Table (1,2,3).

#### Discussion:

Many observers described natural infection of dogs & cats by C. azimi (GOHAR, 1933, KUNTZ & CHANDLER, 1956, FAHMY & SELIM, 1959 & DUBOIS & PEARSON, 1963). KHALIFA *et al.*, (in press) described the metacercaria of the parasite in the muscles of fish Clarias lazera & were able to bring up adults in laboratory rats. However, Rattus norvegicus is a new host record for this parasite.

- 2- Cynodiplostomum duboisi KHALIFA *et al.*, (in press)

This parasite was encountered in the small intestine of stray dogs, cats & Norway rats incidence of infection is shown in Table ( ). The most important morphological features are shown in figure ( ).

#### Discussion:

The new species C. duboisi was erected by KHALIFA *et al.*, (in press) for parasites obtained naturally from cats & dogs & experimentally raised in albino rats. The present material were found to be identical with C. duboisi. However, Rattus norvegicus is a new host record for the parasite.

- 3- Cynodiplostomum duboisi var. assiutis n. var.

This parasite was encountered in the small intestine of dogs, cats & Norway rats. It measures 1.42 - 1.58 mm in length & 1.17 in width Ratio between forebody & hindbody is about 1:1. The forebody measures 706 - 794 U while hindbody measures 714 - 786 U. Oral sucker is subferminal & measures 120 - 124 by 72 - 76 U. Osophagus is short & does not exceed 72 U in length. It bifurcates into 2 thickwalled simple intestinal caeca which could be traced to the posterior level of the ventral sucker. Ventral sucker is slightly smaller than the oral sucker & measures 82 - 96 by 72 - 76 U. The distance between the two suckers is about 400 U. Lateral pseudo suckers are well-developed & the holdfast organ is flattened into two wing like projections (Fig. ). It measures 168 - 180 by 400 U. The vitelline glands occur in the form of medium sized follicles extending from the level of the oesophageal bifurcation & fill the lateral fields of the forebody. The hindbody contains the genitalia. The anterior testis is monolobed, obliquely situated on the right lobe of the posterior testis. It measures 408 - 416 by 276 - 280 U. The posterior testis is bilobed, the right lobe measures 390 - 400 by 240 - 256 U & left lobe measures 330 - 336 by 228 - 240 U. They are connected by a comparatively thick isthmus. The ovary is ovoidal in shape & measures 168 - 180 by 120 - 128 U. The uterus contains from four to six eggs. The ova are yellowish and measure 90 - 94 by 60 - 66 U. Incidence of infection is shown in Table ( ).

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Discussion:

Although the parasite under discussion has a great resemblance to *C. duboisii* yet they differ from each other in different aspects (Table ). The main differences are, the size, ratio of fore & hindbodies, of the parasites & shape of holdfast organ, level of vitelline gland & size of eggs. These differences are enough to consider the present flukes & distinct form of *C. dubovoi*, but owing to the agreement in other features, the present authors consider that as belonging to a hitherto unknown variety, the name *Cynodiplostomum duboisii* var. *Assiutis* n. ver. is suggested for them.

## REFERENCES

- Africa, C.H. and Gracia, E.Y. (1955): Heterophid trematodes of man dog in the Philippines with descriptions of three new species. *Philipp. J. Sci.*, 57: 443-450.
- Arafa M.S. (1968): Studies on ecto-and endo-Parasites of rats and mice in U.A.R. with special reference to Parasites Potentially Transmissible to man. M.D. Thesis. Fac. Of Medicine, Ain Shams University, Cairo.
- Azim, M.A. (1930): On the identification and life history of *Echinostomum recurvatum* V. Linstow, 1873. *trop. Med. parasit.*, 24: 189-192.
- Azim, M.A. (1938): On the intestinal helminths of dogs in Egypt. *J. Egypt. Med. Ass.*, 21: 1-5.
- Azim, M.A. (1939): *Ann. Parasit. hum. comp.* 17, 32. (Cited from Fahmy, M.A.M. & Selim, M.K. (1959). *Z.F. Parasitenkunde* 19: 31-3.
- Chen, H.T. (1936): A study of *Haplorchinae* (Looss, 1899) Poche, 1962 (Trematoda: Heterophyidae *Parasitology*, 28: 40-55.
- Dawes, Ben (1946): The trematods, with special reference to British and other European forms. Cambridge University press, 644 pp.
- Dubois, G. and Pearson, J.C. (1963): Les Strigeida (Trematoda) d'Egypte (Collection William M. Wells). *Annals parasit. Hum. Comp.*, 36: 77-91.
- El-Naffar, M.K. (1970): Studies on parasites of the Nile fishes in Assiut province. Ph. D. Thesis, Faculty of Science, Assiut University, Egypt.
- El-Naffar, M.K. & Khalifa, R. (1975): Parasito-fauna of the Egyptian aquatic birds I, Trematode of the buff-backed heron (*Ardeola ibis ibis*) in Assiut Governorate, Egypt, *J. Egypt. Soc. Parasit.*, 4 & 5: 42-56.
- El-Naffar, M.K., Omran, L.A.M. & Mandour, A.M. (in press): A *cantharium assiuti* sp. nov. and other trematodes recovered from the bat *Vespertillie innesi* collected from Assiut *J. Egypt. Soc. parasit.*, (in press).
- Fahmy, M.A.M., Mandour, A.M. and El-Naffar, M.K. (1976): Successful infection of dogs and cats by *prohemistomum vivax* sonsino, 1893 and *laplorchis yokogawai* katsuta, 1932, *J. Egypt. Soc. parasit.* 6: 77-82.
- Fahmy, M.A.M., Khalifa, R. and Sakla, A.A. (1981): Study on two Echinochacmid parasites (Trematoda: *Echinochacidae*) from Upper Egyptian cats, Assiut, *Vet. Med. J.*, 15 & 16: 37-76.
- Fahmy, M.A.M. and Selim, M.K. (1959): Studies on some trematode parasites of dogs in Egypt with special reference to the role played by fish in their transmission. *Z. parasitkde* 19: 3-13.
- Gohar, N. (1933): *Diplostomum azimi* sp. n., trematode, parasite of the dog. *Annals and Magazine of Natural History*, 11: 302-306.
- Gohar, N. (1954): Les trematodes parasites du milan Egyptian *milvus migrans* avex description d'une nouvelle espeece et remarques sur les genres *Haplorchis* Looss, 1899 et Comp., 12: 1218-227.
- Katsuta, L. (1932): Studies on trematodes whose second intermediate hosts are fishes from the brackish waters of Formosa IV. On a new trematode Monorchotrema *Yokogawai* of which the mullet is the second intermediate host. *J. Med. Ass. Formosa.*, 31: 253-265.
- Khalifa, R. El-Naffar, M.K. and Arafa, M.S. (1977): Studies on heterophyid cercariae from Assiut province, Egypt. L. Notes on the life cycle of *Haplorchis pumilis* (Looss, 1896) with a discussion on previously described species. *Acta parasit. Pol.*, 25: 25-58.
- Khalifa, R., El-Naffar, M.K. and Sakla, A.A. (in press): On two cynodiplostomatid parasites (Diplostomatidae Trematoda) with descriptions of their metacercariae *Acta parasit. pol.* (in press).

- Khalil, M. (1932): The live history of a heterophyid parasite in Egypt. C.R. Congr. int. Med. Trop. Hyg., 4: 137-147.
- Khalil, M. and Abaza, M.S. (1924): A new trematode parasite of the rat *Echinostoma aegyptica* n. sp. Note public Health lab. Cairo, 187-290.
- Kobayashi, H. (1942): Studies on trematodes in Hainam Island. 11- Trematoda found in the intestinal tracts of dogs by experimental feeding with certain fresh and brackish water fish. Jap. J. Med. Sci. Path., 6: 187-227.
- Kuntz, R.E. (1943): Studies on Egyptian trematodes with special reference to the Heterophyids of mammals, 1. Adult flukes with descriptions of *Phagicola longicollis* n. sp. *Cyndiplostomum mammarui* n. sp. and a *Stephanoprora* from cats. J. parasit., 52: 445-459.
- Morgan, B.B. & Hawkins, P.A. (1951): Veterinary Helminthology Burgess publishing Company. U.S.A.
- Nasr, M. (1941): The occurrence of *prohemistomum vivax* infection in man, with description of the parasite, Lap. & Med. prog., 2: 135-149.
- Odening, K. (1962): Trematoden aus indischen Vogeln des Berliner Tierparks. Z. Parasitkde, 21: 281-425.
- Omran, L.A.M. (1973): Studies on the relation of Smails to parasitic infection in Assiut Governprate. Ph. D. Thesis, Faculty of Vet. Med., Assiut Univ., Egypt.
- Pearson, J.C. (1964): A revision of the subfamily Haplorchinae Looss, 1899 (*Trematoda Heterophyidae*): 1. *Hoalorchis* group. parasitology, 54: 601-676.
- Tenabe, H. (1922): *Echinochasmus perfoliatus* (Rutz) found in japan. J. Okayama Med. Assoc., 387: 1-20.
- Vidyarthi, R.D. (1948): Some new members of the family Cythocotylidae poche, 1925 from Indian birds. Indian J. Helminth., 1: 23-40.
- Watson, J. (1960): Medical Helminthology 1st edit. Bailliers Tindall and Cox. London.
- Witenberg, G. (1932): Uper zrvie in palastina in Hunden und katzen parasitierende *Echinochasmus* Arten (*Trematode* parasitkde, 5: 213-216.
- Yamaguti, S. (1939): Studies on the helminth fauna of japan. part. 25. Trematodes of birds, IV. japan. J. Zool., 8: 129-210.
- Yamaguti, S. (1958): System helminthus. Vol. 1. The digenetic trematodes. Interscience publishers Ince. New york and London.

#### EXPLANATION OF FIGURES

- Fig. (1): *Prohemistomum vivax* adult worm  
 Fig. (2): *Mesostephnus melvi* adult worm  
 Fig. (3): *Cyndiplostomum dubois*: adult worm  
 Fig. (4): *Cyndiplostomum dubois* Var *assiutis* n. Var adult worm



## PARASITES OF SMALL MAMMALS

Table (I): Tvevatode Parasites encountered in stray dogs in Assiut province

Parasite	no examined	no infected	%	type of snigle		infection worm % mixed %		burden
				single	mixed	single	mixed	
<i>E. liliputans</i>	45	2	4.4	-	-	2	4.4	2 per host
<i>E. perfaliatus</i>	45	5	11.1	-	-	5	11.1	3-8 (4)
<i>H. pumilio</i>	45	33	18.3	1	2.2	32	11.1	2-18 <sup>oo</sup> (56)
<i>H. yokogawai</i>	45	11	24.1	-	-	11	24.1	10-28(L8)
<i>lh/longa</i>	45	8	17.7	-	-	8	17.7	6-15 (10)
<i>P. vivax</i>	45	35	77.7	-	-	35	77.7	2-2800(250)
<i>M. melvi</i>	45	5	11.1	-	-	5	11.1	1-3 (2)
<i>C. asimi</i>	45	8	17.1	-	-	8	17.7	28 (5)
<i>C. duboisi</i>	45	8	17.1	-	-	8	17.7	1-3 (2)
<i>C. duboisi si van assiutis</i>	45	8	17.1	-	-	8	17.7	2

Table (II): trematoda parasites encountered in stray cats in Assiut province

Parasites	no examined	no infected	%	types of infection		%	worm burden	
				single	mixed			
<i>E. perfoliatus</i>	29	2	6.9	-	-	2	6.9	1-3 (2)
<i>H. pumilio</i>	29	12	72.4	2	6.9	19	65.5	2-22 (8 <sup>o</sup> )
<i>H. yokogawai</i>	29	8	27.6	1	3.5	7	24.1	8-23 (16)
<i>H. taichui</i>	29	4	13.8	-	-	4	13.8	7-15 (10)
<i>Ph. longa</i>	29	2	7.0	-	-	2	7.0	2-6 (4)
<i>P. vivax</i>	29	19	65.5	1	3.4	18	62.1	4-800 (198)
<i>M. melvi</i>	29	4	13.8	-	-	4	13.8	2-4 (3)
<i>C. azimi</i>	29	6	20.7	-	-	6	20.7	2-5 (3)
<i>C. duboisi</i>	29	1	3.4	-	-	1	3.4	2
<i>C. duboisi var assituis</i>	29	2	6.9	-	-	2	6.9	1.3 (2)

Table (III): trematode parasites in rodents in Assiut province

Host	no examined	no infected	%	type of infection		%	worm burden	name of parasite	
				single	mixed				
<i>R.(R.) Erugivorus</i>	232	9	3.9	-	-	9	3.9	2-24 (12)	<i>H. pumilio</i>
	232	3	1.4	-	-	3	1.4	1.3 (2)	<i>H. yokogawai</i>
	232	9	3.9	2	0.9	7	3	1-6 (3)	<i>P. vivax</i>
<i>R.(R.) alexandrinus</i>	254	11	4.3	1	0.4	10	3.9	2-18 (9)	<i>H. pumilio</i>
	254	2	0.8	-	-	2	0.8	1-3 (2)	<i>H. yokogawai</i>
	254	11	4.3	2	8	9	3.5	1-8 (4)	<i>P. vivax</i>
<i>R. norvegicus</i>	63	13	20.6	-	-	13	20.6	4.36 (12)	<i>E. recurvatum</i>
	63	8	12.7	-	-	8	12.7	15-24 (18)	<i>H. pumilio</i>
	63	12	19.5	-	-	12	19.3	2-4 (3)	<i>H. yokogawai</i>
	63	8	12.7	-	-	8	12.7	4-12 (5)	<i>K. vivax</i>
	63	4	6.4	-	-	8	6.4	1.3 (2)	<i>O. kami</i>
<i>Arvicanthus niloticus</i>	86	5	5.8	-	-	5	5.8	4.12 (6)	<i>H. pumilio</i>
	86	6		4	4.66	2	2.34	1.5 (3)	<i>H. yokogawai</i>
	86	8	12.7	-	8	12.7	4.12	(9)	<i>P. vivax</i>
	86	1	1.6	-	-	1.6	2		<i>C. duboisi</i>
	86	1	1.6	-	-	1	1.6	one only	<i>C. duboisi var assiutis</i>

Table (V)  
Showing Differences Between The Different Species of Cynodiplostomum In Mammals (Measurements are in Millimeters)

	<u>Cynodiplostomum</u> <u>azimi</u> Gohar, (1933)	<u>C. azimi</u> Present work (1979)	<u>C. duboisi</u> Khalifa, et al. (inpress)	<u>C. duboisi</u> Present work (1979)	<u>C. duboisi</u> var <u>Assiut id n. var</u> (1979)
Ratio of fore body and hind body	1: 0.66	1: 0.5	1: 0.9	1: 0.75	1: 1
Distance between suckers	360	400	300	440	400
Position of V.S.	Away from Tribocytic organ	Away from tribocytic organ	very near to tribocytic organ	near tribocytic organ	near tribocytic organ
Intestinal caeca	thin walled	thin walled	Thick walled	Thick walled	Thick walled
Intestinal					
Size of testis	1/2 these of <u>C. duboisi</u>	1/2 these of <u>C. duboisi</u>	twice these of <u>C. azimi</u>	twice these of <u>C. azimi</u>	Twice these of <u>C. azimi</u>
Position of ovary	Totally submedian	totally submedian	Partly submedian	Partly submedian	submedian
Position of tribocytic organ	equatorial of post	equatorial	pre-equatorial	pre-equatorial	equatorial
Vitellaria	to a level above the ventral sucker	to the posterior level of the lateral pseudosuckers	Just reaching the upper surface of v.s.	to the level of the v.s.	to a level midway between oral & ventral suckers
Size of eggs	0.098 - 0.102x 0.048 - 0.052	0.090 - 0.100x 0.048 - 0.060	0.110 - 0.130x 0.058 - 0.062	0.106 - 0.120x 0.060 - 0.064	0.09 - 0.094x 0.060 - 0.066

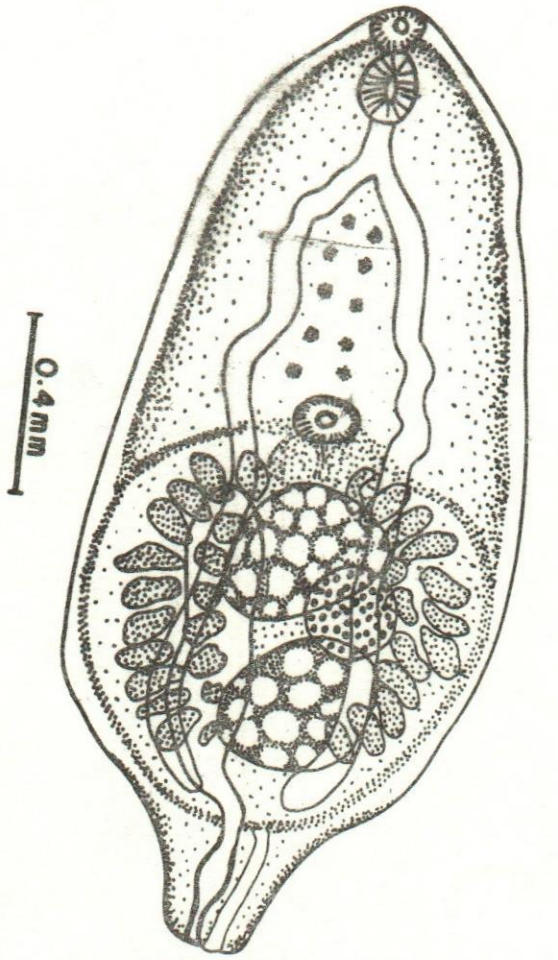


FIG ( 1 )

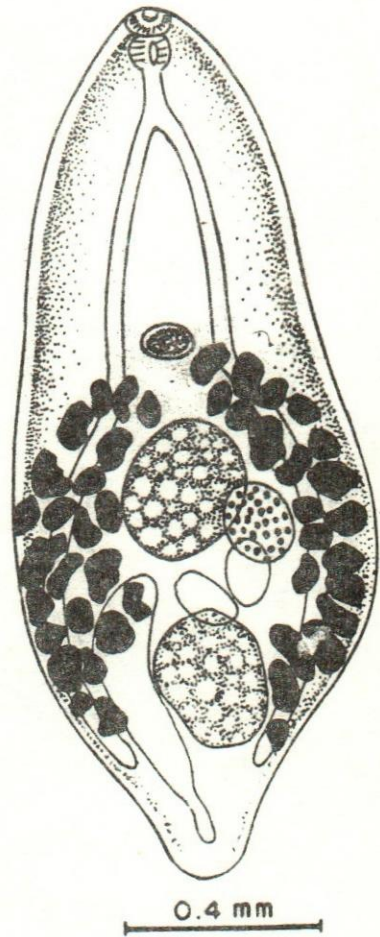


FIG ( 2 )



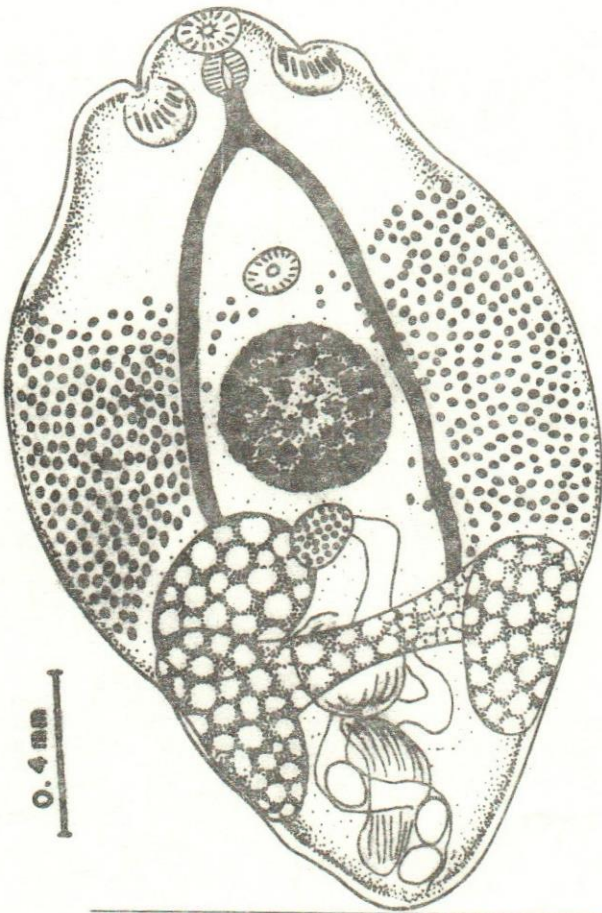


Fig (3)

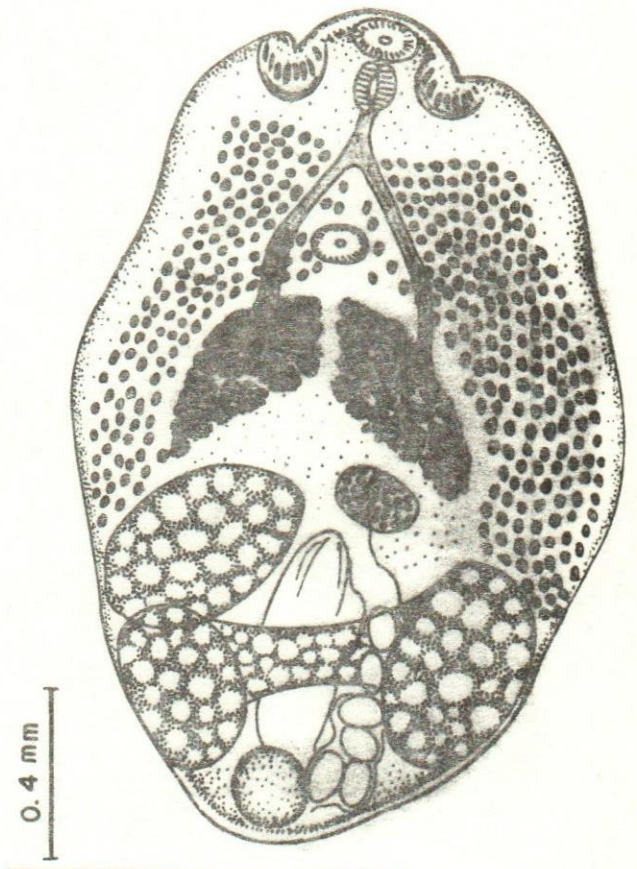


Fig (4)

