FIRST RECORD OF THREE HOSTS INFECTED BY THE PLEROCERCOID OF *OTOBOTHRIUM PENETRANS* LINTON, 1907 (CESTODA: TRYPANORHYNCHA) IN KHOR UMMIA, ARABIAN GULF

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SUMMARY

Three different stages in the development of the plerocercoid larvae of the trypanorhynch cestode *Otobothrium penetrans* Linton, 1907(two plerocerci and one post larva) were described from the various sites of needlefishes. First and second stages of plerocercoid found in the muscle, body cavity, gas bladder, kidney and some time in the heart of the yellow spot tail needlefish *Strongylura strongylura*, banded needlefish *Strongylura leiura* hound needlefish, *Tylosurus crocodilus* and flat needlefish *Ablennes hians*, while the post larva found only in intestine of *S. leiura*. All needlefishes except *T. crocodilus* consider new hosts record to *Otobothrium penetrans* in the world. No monthly pattern was observed either in prevalence of infection or mean of intensity except clear peak in mean intensity of infection in *S. leiura* during July (77) and *T. crocodilus* during October (75). Both the prevalence of infection and mean of intensity were increased from smallest fish length less than 200 mm until 500 mm and then the infection was decreased in the largest fish length more than 500 mm of *S. strongylura*.

Introduction

Trypanorhynch cestodes mature in elasmobranchs and often use teleost fishes as intermediate or transport hosts (21).

Most studies in Arabian Gulf were out of Iraqi water and pointed on survey of the marine cestodes in fishes (20; 27; 11; 12; 25; 13; 8; 4; 5; 9; 10).

Only three different studies dealt with parasitic tapeworms of marine fishes in Iraqi water (2; 3; 6). Because there were no studies have been done on ecological and biological aspects of trypanorhynch cestodes in Iraq, this study come to through a light on the developmental stages of plerocerci that

infect four species of the needlefishes and some ecological aspects of this parasite.

Materials and Methods

A total of 230 fish 30-570 cm in length belong to four species of Belonidae ٥ ٤٨were collected from Fao near Khor Al-Ummia north-west Arabian Gulf (30, 48° 45 East and 29° 50, 30° 10 North) by floating gill net during the period from October 2000 until July 2001. As soon as were captured the specimens were frozen. In the laboratory the fishes were thawed from ice, dissected then examined for the presence of parasites in the body cavity, viscera and filet the flesh for revealed encysted larvae. Cysts dissected out in saline till larvae excysted. The specimens were washed and shaked vigorously with tap water, they were pressed gently between two slides and fixed in 70% ethanol, stained with semichon'carmine, dehydrate in graded series of ethanol, cleared in toluene and mounted in Canada balsam. For Parasites identification followed (28) and (23). For Ecological terms followed (17). All measurements are given in milimetre.

Result

Development of plerocerci of *O. penetrans* in needlefishes

Three different developmental stages of plerocercoid cestode *O. penetrans* Linton, 1907 were described from four belonid fish species including two stages of plerocerci and one post larva (table, 1).

1- **The first stage of plerocercoid of *O. penetrans*** (Fig.1A)

High numbers of blastocysts were removed from musculature, body cavity, gas bladder, kidney and some time from the heart of all four belonid fishes, although more than half of plercercoid were found between dorsal spines of vertebral column.

The larva (based on 20 specimens) found in white or milky cyst (blastocyst), have different shapes according to site of infection. The cyst were spindle, spherical, oval to elongate slender 2.44-5.08(3.12)x 0.45-0.61(0.51), the median part of the scolex exhibit elongate and slender and followed by a swollen pars bulbosa with laterally recurved bulbs (fig.1A). Length of the scolex 2.42-2.93 (2.61), pars bothridialis 0.215-0.252(0.224), pars vaginalis larger than both pars bothridialis and Pars bulbosa, pars vaginalis 1.104-1.289(1.148), pars bulbosa 0.287-0.337(0.309) contains of two pairs of oval bulbs overlap 0.23-0.318 (0.26) x 0.115-0.166(0.13). Pars

post bulbosa 1.1-1.29 (1.17). Ratio of pars vaginalis to pars bothridialis 4.97. Pars bothridialis to pars bulbosa 0.72.
Width of scolex in median part, pars bothridialis, pars bulbosa and pars post bulbosa were 0.216-0.261(0.233), 0.230-0.278(0.248), 0.542-0.656(0.585) and 0.303-366(0.327) respectively.

2-The second stage of plerocercoid of *O. penetrans* (Fig.1B, D)

This stage distinguished from the previous one by development of tentacles exist out of the scolex sheath (pars vaginalis), envaginate the lower margin of pars bulbosa to inside to surround bulbs with V shape (fig.1 b). Also all measurements were relatively bigger in this stage. (Measurements were based on 20 specimens). The scolex 2.47-3.18(2.85) found inside cyst 2.41-6.17(4.7) x 0.42-0.69(0.54), pars bothridialis 0.217-0.265(0.252), pars vaginalis 1.116-1.420(1.277). Pars bulbosa 0.310-0.369(0.355) contains two pairs of oval bulbs overlap 0.300-0.369(0.331) x 0.150-0.184(0.165), bulbs ratio (length to width) 2, pars post bulbosa 1.123-1.370(1.264).
width of the scolex in median part, pars bothridialis, pars bulbosa and pars post bulbosa were 0.318-0.389 (0.352),0.234-0.287(0.256),0.536-0.656(0.593) and 0.318-0.389 (0.354), two pairs of strong tentacles 0.132-0.183(0.142) length 0.021-0.023(0.022) width, tentacles in sheath sinuous and spiral shape armed with sold curved hooks. The armature is heteroacanthous, heteromorphous atypical.

3- Post larva of *O. penetrans* (Fig.1C-D)

One specimen of a post larva of cestode were found in intestine of *S. leiura*, it was easily distinguished from the previous two stages by clear larger specimen, continuous envaginate of lower margin of pars bulbosa, growth of bulbs and fully overlapping of each bulbs on other. There were difficult to distinguish the four bulbs under the low magnification. Tentacles in sheath were appeared sinuous shape un spiraled. Fully development of tentacles to comprised 25% of total length scolex.
The scolex free in the intestine lumen of fish 4.144, pars bothridialis 0.272, pars bulbosa 0.481, pars vaginalis 1.36 and pars post bulbosa 2.031. Width of the scolex in the median part, pars bulbosa, pars bothridialis and pars post bulbosa were 0.532, 1.11, 0.565 and 0.765 respectiverly. Tentacles 1.06-1.09 (1.08) in length and 0.059-0.073 (0.068) in width, the armature is heteroacanthous, heteromorphous atypical 0.035-0.092 (0.083).

Monthly changes in infections of needlefishes with *O. penetrans*

No monthly changes was observed either in prevalence of infection or mean of intensity during collection period except clear peak in mean intensity of infection has been found (77) in *S. strongylura* during July and (75) in *T. crocodilus* during October (table 2).

Table (1): Prevalence (or Occurrence) and Intensityof different stages of plerocercoid of *O. penetrans* in belonid fishes from khor AL-Ummia

Species	Stage	Number of examined fishes	Number of infected fishes	Prevalence%	Intensity range(Mean)
S. strongylura	I,II	112	64	57.14	1 - 11(7)
S. leiura	I,II,III	58	57	98.27	5 - 77(25)
T. crocodilus	I,II	58	38	65.5	2 - 75(17.7)
A. hians	I,II	2	1	50 *	6

* Occurrence (due to small sample)

Table (2): Monthly changes of plerocercoid of *O. penetreans* in *S. strongylura, S. leiura* and *T. crocodiles*

Host	Month	Number of examined	Number of infected	Prevalence%	Mean of Intensity
S. strongylura	October	25	15	60	7.89
	November	15	6	40	1
	May	25	13	52	8
	June	20	16	70	10.87
	July	27	14	44.4	5.75
S. leiura	October	14	14	100	19
	November	7	6	85.71	5.16
	May	14	14	100	14.75
	June	12	12	100	9.5
	July	11	11	100	77
T. crocodilus	October	12	8	66	75
	November	6	3	50	2
	April	13	9	29.23	4.55
	May	15	12	80	4
	June	12	6	50	3

Table (3): The changes in prevalence and mean intensity of infection by *O. penetrans* with different length categories of *S. strongylura*

Length category(mm)	Number of examined fish	Number of infected fish	Prevalence %	Mean of intensity
Less than 200	6	2	33.34	2
201-300	20	7	35	2.4
301-400	60	36	60	5.94
401-500	20	16	80	15.5
More than 500	6	3	50	7

However prevalence of infection was different among fish species for *S. leiura* have high prevalence 100 % in four out of five months, while *S. strongylura* and *T. crocodilus* have 40-70 % and 50-80% respectively (table 2).

Variations in infections with length of *S. Strongylura*

Both prevalence of infection and mean of intensity of *O. penetrans* were increased with advancing in fish length until the largest length category that the infection was decreased (table 3).

Discussion

(14) described *O. penetrans* as a new species from the flesh of *Tylosurus acus* in the Bermudas. Later Linton (15) were recorded some plerocercoid from the flesh of another belonid *T. raphidoma* (23). (23) reported and redescribed this cestode from flesh of four belonids including three full-beak needlefish *T. acus*, *T. crocodilus* and *Platybelone* sp. and one half beak needlefish *Hyporhamphus dussumieri* in Philippine waters.

O. disacum and *Otobothrium* sp. were recorded from Arabian Gulf. They were found in body cavitities of *Nemipterus japonicus* and Mullidfish *Parupeneus cyclostomus* (9).

The first and second stages in the development of plerocercoid of *O. penetrans* in this work similar to that from Philippine water; moreover they closely resemble specimens from *Platybelone* sp. (23).

In this study some variability in scolex measurement were noticed that ordered it as two stages of development similar to that of four developmental stages in plerocercoid of *Gilquinia squali* in eyes of whiting which reported by (16).

The variability in scolex measurement might be due to several reasons such as the age of the plerocercoid or storage and fixation (23) or population density and infrapopulation differences (7).

This variability were neglected by (26) when gave a brief data on 15 species within genus *Otobothrium* and described of *O. kurisi* Shield, 1985,

but (23) confirmed the last species was synonymised with *O. penetrans*, and noted a high scolex variability within the species.

(23) and (24) found plerocercoid in flesh and body cavity of widely variation in scolex measurement, (22) obtained specimens of plerocercoid from Indonesian coasts had larger scolex sized about twice as larger than that from Philippine water. However having similar scolex proportion and scolex ratio and he considered *O. pephrikos* Dollfus, 1969 as a junior synonym of *O. penetrans.*

The occurrence of plerocerci of *O. penetrans* in all four belonids except of *T. crocodilus* in this study considered new host record and three belonid fishes were added as second intermediate hosts.

The Infection of four belonid fish with plerocerci of *O. penetrans* guide to the similarity of intermediate hosts structure in their diet (24; 1).

No seasonal variations in infection with parasite was noticed, caused by availability of infected intermediate host in most time of year or to prolonged of plerocercoid life span that may be as long of host age, that probable more than ten years (17).

Slightly variation in prevalence of infection among four belonids belong to changing in their diet, feeding habitat or migration of some species such as *S. strongylura* from marine to brackish waters leaded to dissimilarity in food composition, fish length and need to bigger prey(3).

Generally both prevalence and mean intensity of infection by *O. penetrans* was high in Khor Al-Ummia in comparison to Philippine and Indonesian waters, maximum intensity was 75 in compared with 8 and 2 respectively from *T. crocodilus*. (23; 22).

Moreover *S. leiura* was the perfect host to *O. penetrans* to harbour higher prevalence and mean of intensity (24).

The infection of *S. strongylura* with *O. penetrans* were increased with advancing of fish length until the fourth length category that reached to higher value, since to increased of food intake including infected intermediate hosts with advanced of fish length or continuous accumulation of worms with age progress that unable to exist from fish body(3).

The infection was decreased in largest fish probably because of changing of diet, death of heavy infected fish and development of host's immunity (18).

References

1- Abdul-Rehman, N. M. (1999). Infection of fishes with parasites and relation to their diet. MSc. thesis, College of Agriculture, Basrah University. 103p.

2- Al-Daraji, S. A. M. (1995). Taxonomical and ecological studies on the metazoan parasites of some marine fishes of Khor Al-Zubair estuary north-west Arabian Gulf. Ph.D.thesis, Basrah University, 182p.

3- Ali, A. H. (2001). Pathological effects of helminthes parasitic on some local fishes. MSc. thesis, College of Agriculture, Basrah University. 174p.

4- Al-Kawri, K. S. R.; Saoud, M. F. and Wanas, M. Q. A. (1994). Helminth parasites of fishes from the Arabian Gulf. 7. On *Eniochobothrium qatarense* sp. nov. (Cestoda: Lecancephalidae) and the affinities of *Eniochobothrium* Shipley and Hornell, 1906, and *Litobothrium* Dailey, 1969 and *Renyxa* kurochkin and Slankis, 1973, Jpn. J. Parasitol., 43(2): 97-104.

5- Al-Kawri, K. S. R.; Saoud, M. F. and Ramadan, M. M. (1996). Biodiversity of helminth parasites of fishes in the Arabian Gulf, with special reference to digenetic trematodes and cestodes. Qatar Univ. Sci. J. 16(1):141-153.

6- Bannai, M. A. (2002). Parasites of some marine fishes of Khor-Abdullah North-West Arabian Gulf. Msc. thesis, College of Education, Basrah University, 103p.

7- Campbell, R.; Marques, F. and Ivanov, V. (1999). *Paroncomegas araya* (woodland, 1934) n. gen. et. comb. (cestoda: Trypanorhyncha: Eutetrarhynchidae) from thefreshwater stingray *Potamotrygon motoro* in south America. J. Parasitol., 85:313-320.

8- El-Naffar, M. K.; Gobashy, A. F.; El-Etraby, S. and Kardousha, M. M. (1992). General survey of helminth parasite genera of Arabian Gulf fish (coasts of United Arab Emirates). Arab Gulf J. Sciant. Res., 10(2): 99-110.

9- Kardousha, M. M. (1999). Helminth parasite larvae collected from Arabian Gulf.II. First record of some trypanorhynch cestodes from economically important fishes. Arab Gulf J. Scientific Res., 17(2):255-276.

10- Kardousha, M. M. (2003). Helminth parasite larvae collected from Arabian Gulf.III. First report on genus *Dasyrhynchus* Pintner, 1928 (Cestoda: Trypanorhyncha) with a key depending on morphology of plerocercoid larvae. Rivista Di Parasitologia, Vol. XX (LXIV)-N.1:60-68.

11- Khalil, L. F. (1982). The helminth parasites of spotted lizard fish *Saurida undosquamis* in theArabian gulf region. Parasitology 85(2):1.

12- Khalil, L. F. and Abu-Hakima, R. (1985). *Oncodiscus saurida* yamaguti, 1934 from *Saurida undosquamis* in Kuwait and a revision of the genus *Oncodiscus* (Cestoda: Pothriocephalidae). J. Nat. Hist., 19: 783-790.

13- Khalil, L. F. and Abdul-Salam, J. (1989). *Macrobothridium rhynchobati* n. g., n. sp. from the elasmobranch *Rhynchobatus granulatu*, representing a new family of diphylidean cestodes, the Macrobothridiidae. Syst. Parasitol., 13: 103-109.

14- Linton, E. (1907). Notes on the parasites of Bermuda fishes. Proceedings of the U. S. National Museum, 33:85-126.
15- Linton, E. (1924). Notes on cestode parasites of sharks and skates. Proceedings of the U. S. National Museum, 64:1-14.
16- Mackenzie, K. (1975). Some aspects of the biology of the plerocercoid of *Gilquania squali* Fabricius 1749 (Cestoda: Trypanorhyncha). J. Fish Biol., 7: 321-327.
17- Mackenzie, K. (1987). Long-Term changes in the prevalence of two helminth parasites (Cestoda: Trypanorhyncha) infecting marine fish. J. Fish Biol., 31 :۸۳–۸۸.
18- Mackenzie, K. and Abaunza, P. (1998). Parasites as biological tags for stock discrimination of marine fish: a guide to procedure and methods. Fisheries Research, 38: 45-56.
19- Margolis, L.; Esch, G. W.; Holmes, J. C.; Kuris, A. M. and Schad, G. A. (1982). The use of ecological terms in parasitology (report of an adhoe committee of the American society of parasitologists). J. Parasitol., 68(2): 131-133.
20- Merezayans, D. V. M. (1970). A case report of a cestode *Pterobothrium* found in fish from Persian Gulf. J. Vet. Fac. Univ. Tehran., 26: 43-46.
21- Palm, H. (1997). Trypanorhynch cestodes of commercial fishes from Northeast Brazilian coastal waters. Mem. Inst. Oswaldo Cruz Rio de J., 92: 69-79.
22- Palm, H. (2000). Trypanorhynch cestodes from Indonesian coastal waters (East Indian ocean). Folia Parasitol., 47(2): 123-134.
23- Palm, H. W.; Moller, H. and Petersen, F. (1993). *Otobothrium penetrans* (Cestoda: Trypanorhyncha) in the flesh of belonid fish from Philippine waters. Int. J. Parasitol., 23:749-755.
24- Petersen, F.; Palm, H.; Moeller, H.; Cuzi, M. A. (1993). Flesh parasites of fish from the Central Philippine Waters. Dis. Aquat. Org., 15(2): 81-86.
25- Saoud, M. F.; Ramadan, M. M. and Al-Kawri, K. S. R. (1986). Helminth parasites of fishes from the Arabian Gulf. 1. Preliminary general survey of fishes mainly from Qatari waters. Qatar Univ. Sci. Bull., 6:199-229.
26- Shields, J. D. (1985). Surface morphology and description of *Otobothrium kurisi* new species(Cestoda: Trypanorhyncha) from a hammar head shark *Sphyrna lewini*. Int. J. parasitol., 15: 635-643.
27- Tigari, M.; Radbakrishnan, C. V. and Howard, B. R. (1975). Occurrence of infection by the cestode *Grillotia* in Persian Gulf fish. Selected reports and notes. Amer. J. Vet. Res., 36:703.

28- Yamaguti, S. (1959). Systema Helminthum vol. 2: The cestodes of vertebrates. Inter Sci. Pub. New York, 850 p.

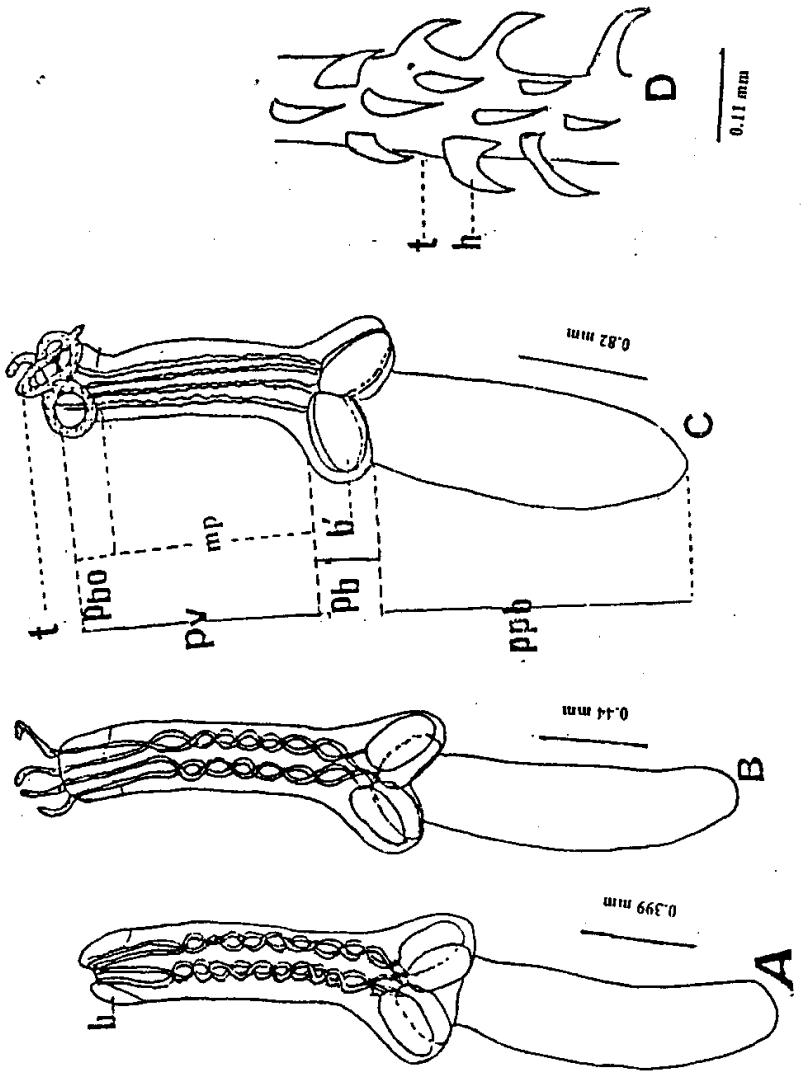

Figure (1A-D): *O. penetrans* scolex and tentacular armature A: first stage in the developmet of plerocercoid, B: second stage in the development of plerocercoid, C: post larva, D: tentacular armature, Abbreviations: b: botherium, b′ : bulb, h: hook, mp: median part, Pb: pars bulbosa, pbo: pars bothridialis, ppb: pars post bulbosa, pv: pars vaginalis, t: tentacle

مجلة البصرة للعلوم الزراعية ، المجلد ٢٠ ، العدد ١ ، ٢٠٠٧

تسجيل اول لثلاثة مضائف جديدة بيرقة الدودة الشريطية *Otobothrium penetrans* Linton, 1907 في خور العمية- الخليج العربي

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الخلاصة

وصفت ثلاثة مراحل يرقية للدودة الشريطية *Otobothrium penetrans* Linton, 1907(مرحلتين من اليرقة المتقدمة ومرحلة اليرقة المتأخرة) من مختلف مناطق جسم اسماك المخيط. المرحلة الاولى من اليرقة وجدت في العظلات، التجويف الجسمي، الكيس الغازي، الكلية واحياناً القلب للمخيط ذي البقعة اصفر الذنب *Strongylura strongylura* ، المخيط المطوق *Strongylura leiura*، مخيط كلب الحراسة *Tylosurus crocodilus* و المخيط المسطح *Ablennes hians* بينما وجدت اليرقة المتأخرة في امعاء المخيط المطوق فقط ،جميع انواع الاربعة ما عدا المخيط كلب الحراسة اعتبرت مضائف جديدة للدودة الشريطية. لم تظهر تغيرات شهرية في كال من نسبة الاصابة ومعدل شدة الاصابة بيرقة الدودة الشريطية بأستثناء الارتفاع الواضح في معدل شدة الاصابة في المخيط المطوق خلال تموز اذ بلغت٧٧ وفي المخيط كلب الحراسة في تشرين الاول اذ وصلت الى ٧٥ . ازدادت كل من نسبة الاصابة ومعدل شدتها مع زيادة طول اسماك المخيط ذي البقعة اصفر الذنب من ٢٠٠ حتى ٥٠٠ ملم وانخفظت الاصابة في مجموعة الطول الاخيرة الاكبر من ٥٠٠ ملم.