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Helminth Parasite Larvae Collected from Arabian Gulf Fish II. First Record of Some Trypanorhynch Cestodes from Economically Important Fishes

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ABSTRACT. Metacestodes of 14 different trypanorhynch larvae were found infesting Arabian Gulf economically important fish along the coasts of the United Arab Emirates. Except for *Grillotia* and *Pterobothrium*, all other larvae were recorded and described for the first time. The metacestodes were identified as : *Callitetrarhynchus gracilis, C. speciosus, Grillotia sp., Nybelini'a bisulcata, N. indica, N. lingualis, N. sp., Otobothrium dipsacum, 0. sp., Progrillotia sp., Pseudogrillotia spratti, Pterobothrium heteracanthum, Pterobothrioides sp.* and *Tentacularia coryphaenae.* Two of them, *Callitetrarhynchus gracillis* and *Pterobothriuni heteracanthum* were very common and have a conspicuously high prevalence rate. The potentiality to invade flesh of fishes was only recorded in two larvae, *Pseudogrillotia spratti* and *Pterobothrium heteracanthum.* All fish hosts are new records.

Introduction

Among fish parasites are the cestodes of order Trypanorhyncha which have been reported from various oceans (Dollfus, 1942, Beveridge and Campbell, 1993, Peterson *et al.*, 1993; Palm, 1997 and 1998, Palm *et al.*, 1998 and Oliva and Luque, 1998). Although many species of trypanorhynch larvae were described and established from the Indian Ocean (Shan and Bilqees, 1979; Bilqees and Shan, 1982; Choudhury and Roy, 1982; Bilqees and Kurshid, 1987; Chandra, 1986 and Campbell and Beveridge, 1996), information about these parasites in the Arabian Gulf are still unrecognisable and meagre. To the best of our knowledge, only two reports have been published recording an inadequate description of two types of larvae. *Pterobothrium sp.* and *Grillotia sp.* infesting *Caranx sp.* and *Thynnus thynnus* respectively and collected from the Iranian coast of the Arabian Gulf (Mirzayans, 1970 and Tigari *et al.*, 1975). Unfortunately, neither morphological details nor tentacular armature have been mentioned in these two reports. Recently, a comprehensive survey extended from 1986 up to 1992 was made to investigate these abundant parasites which commonly infest the most economically important fish (Kardousha, 1991 and El-Naffar *et al.*, 1992).The accidental human infections are very scarce (Bates, 1990) but the presence of these larvae moving actively in the fish flesh reduces the fish market value by making them unappealing to consumers (Deardorff *et al.*, 1984).

Materials and Methods

During the period of January 1986 up to December 1988 fish were collected monthly and then seasonally up to 1992. A total of 1762 fish representing 42 species of commercial important fish were examined for helminth parasites. Fish were collected from four localities representing the coasts of United Arab Emirates. Three localities on the Western Coast and one representing the Eastern side (Fig.1). Fourteen types of trypanorhynchs larvae were collected. Fish were dissected and examined shortly after capturing. The encysted larvae were individually removed. Some were encysted in saline to be observed alive for bothridial shapes. After that, larvae were left in cold saline till they released their tentacles, then fixed in 10% formal saline, stained in Aceto-Carmine, dehydrated and mounted in Canada-balsam. Drawings were made with the aid of a drawing tube. Measurements are given as average in microns unless otherwise stated. The classification and the description are according to Schmidt (1986), Campbell and Beveridge (1994). At the same time, the abbreviations of those proposed by Palm (1997), were used as follows: Scolex length (SL), Scolex width (SW), *parv bothri'dialis (pbo)*, *pars vaginalis (pv)*, *pars bulbosa (pb)*, Bulb width (BW), *pars pasta (ppb)*, *appendix (app)* and *velum (vel)*. Fish hosts, number of fish examined, cestode species, site of infection and prevalence rates are shown in Table (1).

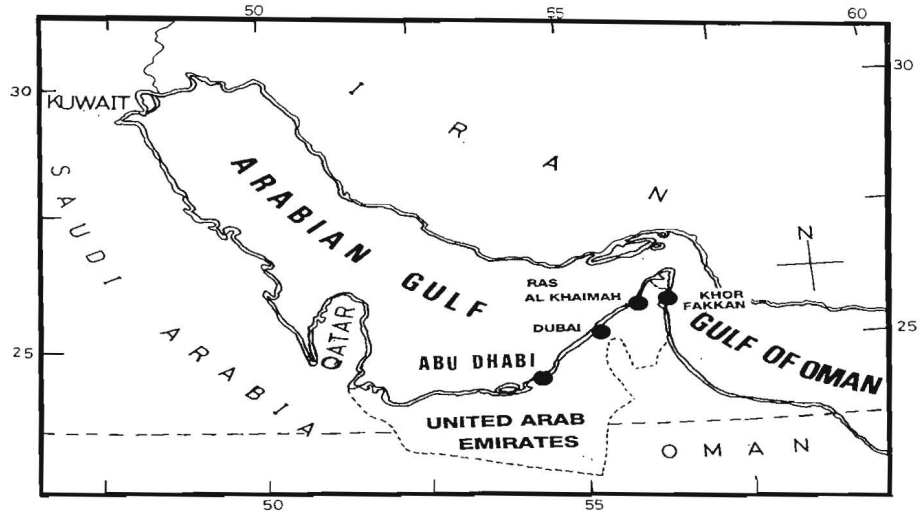


Fig.1: A map of United Arab Emirates showing the four localities of fish collection along the western coasts (Abu Dhabi, Dubai and Ras AI Khaimah) and the eastern coast (Khor Fakkan).

Table 1. Trypanorhynch cestodes larvae from commercially important fish from Arabian Gulf with their sites of infections and prevalence.

Host species (n)	Cestode Trypanorhynch Prevalence larvae	Site of Infection	(%)
Ariidae			
Arius thalassinus (30)	*Pterobothrium heteracanthum*	Muscles	20
Carangidae:			
Caranx sem (32)	(-)		
C. kalla (35)	Nybelinia sp.	body cavity	6.7
	Callitetrarh nchus gracilis	body cavity	5
Carangoides malabricus (45)	*Pterobothriuni heteracanthum*	body cavity	15
	Callitetrarhynchus speciosus	body cavity	20
Selaroides leptolepis (20)	*Callitetrarhynchus gracilis*	body cavity	5
Scomberoides commersoni (35)	*Callitetrarhynchus gracilis*	body cavity	22.6
Parastromateus niger (60)	(-)		
Lethrinidae:			
Lethrinus lenoan (15)	*Nybelinia lingualis*	body cavity	1.3
L. kallopterus (30)	*Grillotia sp.*	body cavity	3.3
	Callitetrarh nchus gracilis	body cavity	33.3
L nebulosus (20)	*Callitetrarhynchus gracilis*	body cavity	25
Lutjanidae			
Luoanus coccineus (20)	*Callitetrarhynchus speciosus*	body cavity	25
L. fulviflamma (15)	*Callitetrarhynchus gracihs*	body cavity	20
L.johni(30)	*Callitetrarhynchus gracilis*	body cavity	30
L. kasmira (30)	*Nybelinia lingualis*	stomach	6.6
	Callitetrarhynchus gracilis	body cavity	33.3
Mugilidae			
Liza macrolepis (50)	*Pseudogrillotia sprats*	musculature	0.5
Valamugil seheli (40)	(-)		
Mullidae			
Upeneus tragula (35)	*Nybelinia indica*	body cavity	11.4
Parupeneus cyclostomus (55)	*Otobothrium sp.*	body cavity	4
Nemipteridae			
Nemipterusjaponicus (70)	*Otobothrium dipsacum*	body cavity	3.2
	Callitetrarhynchus gracilis	body cavity	10
N. tolu (55)	*Callitetrarhynchus gracilis*	mesenteries	20
Pomadasyidae			
Pomadasys argenteus (35)	*Callitetrarhynchus speciosus*	body cavity	20
Plectorhynchus cinctus (30)	(-)		
P. schotaf (3 5)	(-)		
Psettodidae			
Psettodes erumei (50)	*Pterobothrium heteracanthum*	body cavity	42
	Callitetrarhynchus gracilis	body cavity	42.2
Scombridae			
Euthynnus affinis (45)	*Tentacularia coryphaenae*	body cavity	6.7
	Pterobothrium heteracanthum	muscles	13..3
	Callitetrarhynchus gracilis	body cavity	20
Scomberomorus commersoni (35)	(-)		

Serranidae			
Cephalopholis miniala (20)	*Pterobothrioides sp.*	body cavity	5
	Callitetrarhynchus gracilis	body cavity	25
Epinephelus areolatus (30)	*Pterobothrium heteracanthum*	muscles	40
	Callitetrarhynchus g-racilis	body cavity	33.3
E. chlorostigma (40)	*Pterobothrium heteracanthum*	body cavity	38
	Callitetrarhynchus gracilis	body cavity	25
E. tauvina (40)	*Callitetrarhynchus gracilis*	body cavity	25
Siganidae			
Siganusjavus (50)	*Progrillotia sp.*	body cavity	0.5
S. canaliculatus (45)	(-)		
Soleidae			
Aesopia cornuta (30)	*Plerobothrium heteracanthum*	body cavity	36.7
Sparidae			
Acanthopagrus bifascialus (85)	(-)		
Argyropsfilamentosus (50)	*Callitetrarhynchus speciosus*	body cavity	12.5
A. spinifer (40)	(-)		
Sphyraenidae			
Sphyraenajello (60)	*Pterobothrium heteacanthum*	Muscles	12
	Callitetrarhynchus speciosus	body cavity	11.7
	Callitetrarhynchus gracilis	body cavity	10
S. barracuda (20)	*Callitetrarhynchus gracilis*	body cavity	10
Stromatidae			
Pampus argenteus (30)	*Nybelinia lingualis*	body cavity	11
Synodontidae			
Saurida undosquamis (150)	*Callitetrarhynchus speciosus*	body cavity	10
S. tumbil (75)	*Nybelinia lingualis*	body cavity	2.7
	Pterobothrium heteracanthum	muscles	20
	Callitetrarhynchus gracilis	body cavity	33.3
Trichiuridae			
Trichiurus haumela (45)	*Nybelinia bisulcata*	body cavity	2.2
	Pterobothrium heteracanthum	muscles	11.1
	Callitetrarhynchus gracilis	body cavity	33.3

Results

Superfainily: Homeacantholdea Dollftis, 1942
Family: Tentacularlidae Poche, 1926
Tentacularia coryphaenae Bosc, 1797 (Figs. 2 and 3)

The post-larvae were found free in the body cavity of *Euthynnus affinis*. Description based on five specimens. The scolex had a very elongated cucumber-shaped body with four long and narrow sessile bothridia

extending from tip to the posterior extremity. Bothridium margins were bristled and completely fused with the scolex. Tentacles were short with homeoacanthous, homeomorphous hooks in metabasal armature. The basic armature had small and closely arranged hooks. Hooks are solid and arranged in 25-30 spirals. Bulbs were ellipsoidal, completely overlapped by bothridia and restricted to the anterior region. The tentacular sheaths were straight or slightly coiled. The measurements of these post-larvae are as follows: SL=8745, SW=1716, *pbo*=7115, *pv*=1330, *ph*=1048, BW=265, *app*=3278, *vel*=1665, Tentacle=742 and hooks 16.6. T *coryphaenae* is a cosmopolitan species very common in the Pacific and Indian oceans, it has also been recorded from the tuna fish *Euthynnus pelamis*. Other species like T *rugosa* Dollfus, 1942 and T *bicolor* Dollfus, 1942 are mostly restricted to the Atlantic (Schmidt, 1986 and Bates, 1990). To the best of our knowledge, this is the first record of this trypanorhynch in the Arabian Gulf. The morphological characters correspond to those given by Campbell and Beveridge (1994) with very minor differences in some measurements.

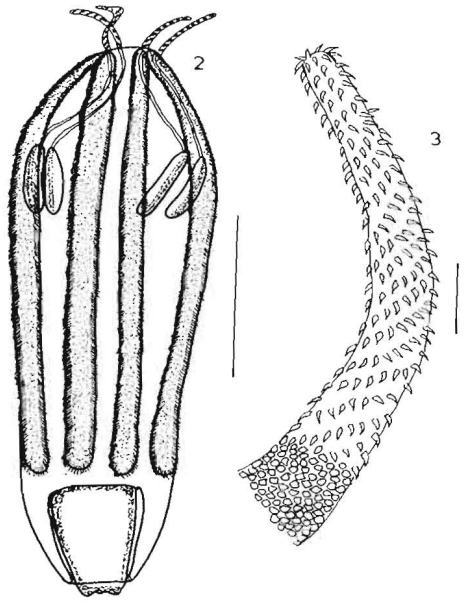


Fig. 2. Scolex of *Tentacularia coryphaenae* showing a very long Pars bothridialis which comprises most of the scolex length. (Scale bar, 2 mm).

Fig. 3. Basal and metabasal armature of *T coryphaenae* showing the spiral arrangements of the homomorphous hooks. Note the minute hooks like plates at the base. (Scale bar, 0.1mm).

Nybelini,a bisulcata (Linton, 1889) Dollfus, 1929 (Figs. 4 and 5)

Four specimens of *N. bisulcata* were found encysted in the body cavity of *Trichiuris haumela*. This species of Nybelinia was characterised by an ovate scolex with a broad anterior end, four wide notched bothridia with free bristled margins, short bulbs which were partially covered with pars bothridialis, tentacular sheaths which were somewhat straight, the homeoacanthous armature with homeomorphous hooks was arranged in 25-30 rows of spirals and appendex ends with two hairy suculi. The scolices measurements were: SL=2100, SW=1288 (at bothridial level), *pbo*=1200, *pv*=1060, *pb*=480, *ppb*=325, *app*=466, *vel*=72, tentacle=485 and hooks =7.5. It seems that the present record (which are considered new in this region), extends the recorded distribution for the genus *Nybelinia* Poche, 1926 to the tropical and subtropical regions (Stunkard, 1977 and Bates, 1990).

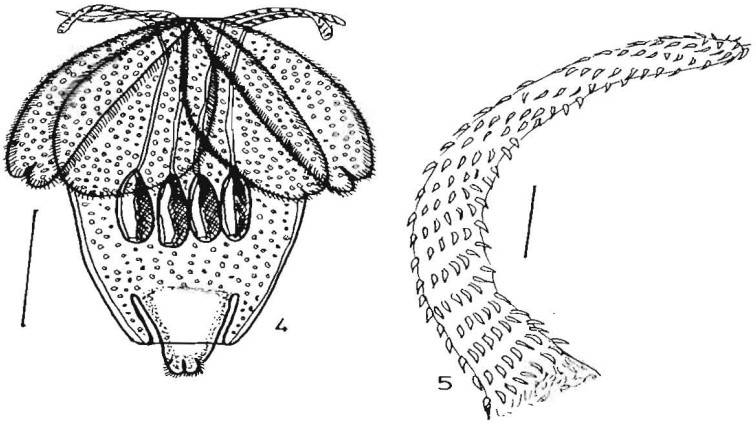
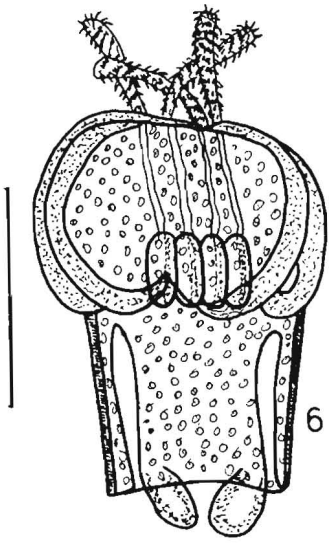


Fig. 4 Scolex of *Nybelinia bisulcata* showing the two characteristic posterior succubi. (Scale bar, 1mm).

Fig. 5 Metabasal armature of *N. busulcata* showing the homeoacanthous armature. note that the basal hooks are not present. (Scale bar,O.1mm).

Nybelinia indica Chandra, 1986 (Figs. 6 and 7)

This species was collected from the body cavity of *Upeneus tragula.* The post-larvae have a relatively small scolex with the following measurements taken from five specimens: SL=1030, SW=758, *pbo*=560, *pv*=378, *pb*=216, *app*=610, *vel*=448, Tentacle=294, small hooks=5, medium hooks=12.5 and large hooks=22.5 Chandra, 1986 categorised this species with the following diagnosis: 'The bulbs are completely overlapped by bothridia, the hooks on the basal and metabasal part of the tentacle are different in size and shape, hooks small in size at the base and increasing in the metabasal region which become large and more slender (homeoacanthous armature with heteromorphous hooks arranged in quincunxes ending with spiniform hooks'. However, the morphological characters and different scolex ratios of the Arabian Gulf specimens are very closely related to those given by Chandra (1986). Recently, Palm, 1997 also recorded this species from a mullid fish *Pseudupeneus maculatus* from the south Atlantic, indicating its cosmopolitan distribution. The ratio of SL to SW, SL to *pbo*, SL to *pv* and hook lengths, are nearly the same in both specimens.



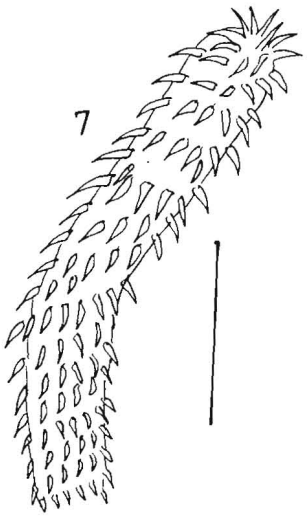


Fig. 6 Scolex of *Nybelinia indica* showing the complete covering of Pars bulbosa by pars bothridialis. Note the conspicuous secretory vesicles scattered along all scolex. (Scale bar, 0.5mm).

Fig. 7 The armature of *N. indica* showing the heteromorphous type of hooks. (Scale bar, 0.1mm).

Nybelinia lingualis (Cuvier, 1817) (Figs. 8 and 9)

This species was apparently a prevalent parasite which was collected from the body cavity of *Pampus argenteus, Saurida tumbil* and *Lethrinus lentjan.* This was also found encapsulated in the stomach wall of *Lutjanus kasmira.* The main diagnostic features were: Scolex oval shaped with four thick and free margined bothridia which partially covered the bulbs. Sheaths were slightly sinus and abruptly joined with bulbs. Armature was homeoacanthous, hooks were solid and homeomorphous with the same size in both basal and metabasal regions. The base of each tentacle was wider than the apical end. Measurements of 10 specimens were as follows: SL=1460, SW=798, *pbo*=784, *pv*-690, *pb*=382, *ppb*=320, *app*=338 and *vel*=290. *N. lingualis* was the type of species which was re-described by Dollfus, 1942 and has a world wide distribution (Sao Clemente and Gomes 1989 and Palm 1997). The ratio of SL to SW, SL to *pbo* and SL to *pb* are nearly similar to Palm's description.

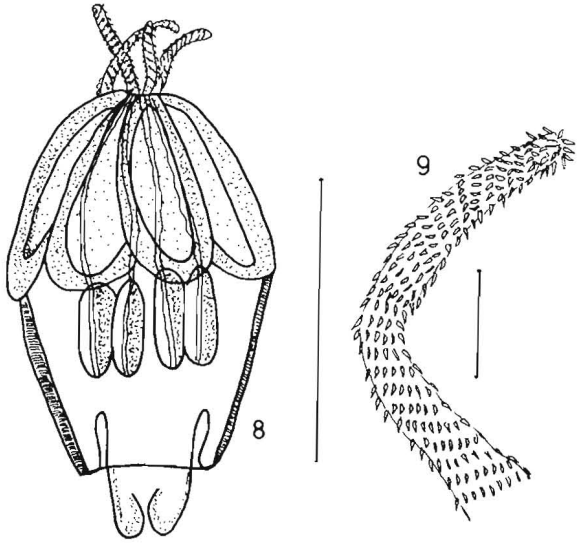
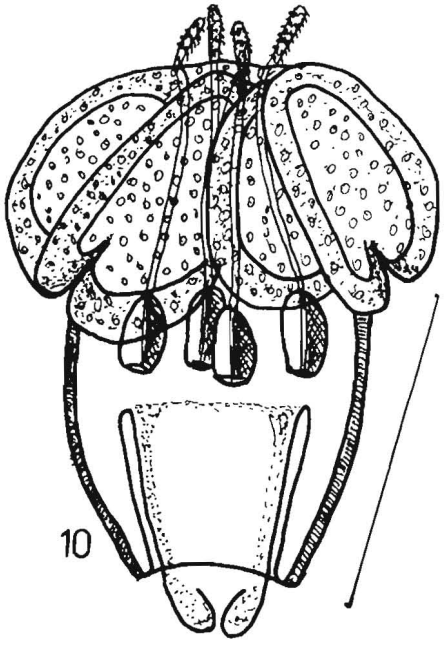


Fig. 8 Scolex of *Nybelina lingualis* showing the bulbs which are slightly covered by bothridia. (Scale bar, 1mm).

Fig. 9 The armature of *N. lingualls* showing the homeomorphous hooks. (Scale bar, 0.1mm).

Nybelinia sp. (Fig. 10 and 11)

Three specimens of the *Nybelinia* species were found free in the body cavity of *Caranx kalla.* This species was characterized by a short scolex with four bothridia, each with a deep furrow clearly visible in the posterio-lateral margin. Larva was distinctly broad with an anterior blunted end. The short tentacles having a homeoacanthous armature. The hooks were large arranged in about 14 spirals. Some spinous hooks are clearly visible terminally. The bulbs were short and partially covered with bothridia. The secretory vesicles were very conspicuous, relatively large and scattered mainly among pars bothridialis but scarcely distributed along the scolex region. Measurements can be summarised as follows: SL=1432, SW=1116, *pbo*=1050, *pv*=666, *pb*=250, *app*=670 and *vel*=400. All features of this specimen indicate the classification as belonging to the genus *Nybelinia* (Poche 1926).



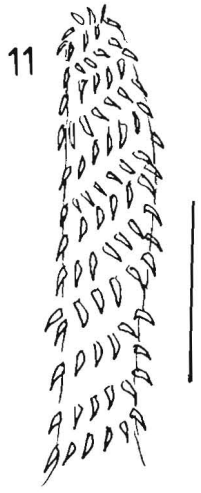
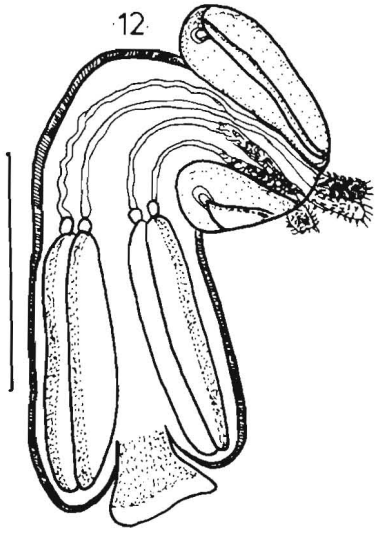


Fig. 10 Scolex of *Nybelinia sp.* showing the blunted anterior end and deeply furrowed bothridia. (Scale bar, 1mm).

Fig. 11 Armature of *Nybelinia sp.* showing the homeomorphous hook type and the clearly short tentacles. (Scale bar, 0.1mm).

Superfamily: Otobothrioidea Dollfus, 1942
Family: Otobothriidae Dollfus, 1942
Otobothrium dipsacum (Linton, 1897) (Figs.12 and 13)

Only three specimens were collected from mesenteries of *Psettodes erumei*. The scolex was relatively small with the following measurements: SL=2300, SW=800, *pbo*=300, *pv*=900, *pb*=250, *app*=260, BW=200, *vel*=50 and *ppb*=100. The morphological characters of the scolex corresponded to the description proposed by Campbell and Beveridge, 1994 who gave the generic characters as follows: bothridia with paired fossettes (cillated pits) on posterior margin, armature heteroacanthous with basal armature having spiniform and rose-thorn hooks arranged in a V shape, tentacles were short, pars bulbosa clearly swollen and tentacles terminated with enlarged rose-thorn hooks. The tentacular armature was very characteristic in this species. It showed a remarkable arrangement of the tentacular hooklets which were arranged on the internal surface as 5-6 slender, rose-thorn shapes, closely arranged in definite calary rows (Palm *et al.*, 1994). This species seems to have a world-wide distribution in tropical and subtropical waters (Southwell, 1929, Cruz-Rayes, 1973 and Palm *et al.* 1994).



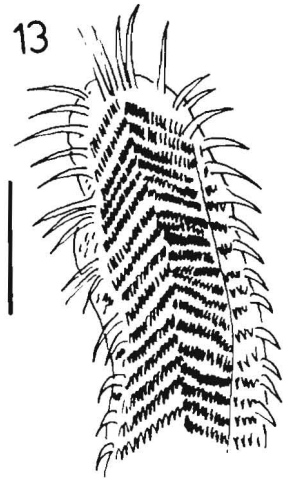


Fig. 12 Scolex of *Otobothrium dipsacum* showing the relatively elongated bulbs and the paired fossettes on posterior margin of bothridia. (Scale bar, 1mm).
Fig. 13 Metabasal armature of *Otobothrium dipsacum* showing the calary rows of hooklets on external surface. (Scale bar, 0.1mm).

Otobothrium sp. (Figs.14 and 15)

Many ovoid small cysts were found aggregating as bunched shapes attached to mesenteries in the body cavity of *Nemipterus japonicus*. Each cyst had a very minute scolex which measured (on five scolices) as follows: SL=1220, SW=500, *pbo*=220, *pv*=900, *pb*=250, BW=200, *ppb*=100, *app*=260 and *vel*=150. Many related species have already been found established in the Indian Ocean (Bilquees and Shaukat, 1976 and Reimer, 1980), however, The Arabian Gulf represents a new locality.

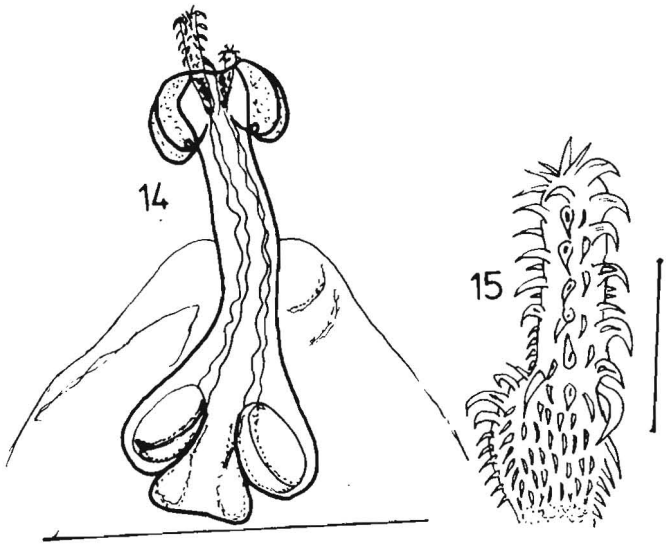


Fig. 14 Scolex of *Otobothrium sp.* showing the very conspicuous swollen base at the level of bulbs. (Scale bar, 1mm).

Fig. 15 Armature of *Otobothrium sp.* showing the special basal armature with relatively large hooks at the metabasal antibothridial surface. (Scale bar, 0.1mm).

Family: Grillotidae Dollfus, 1969

Grillotia sp. (Figs.16 and 17)

Three post-larvae of unidentified *Grillotia* were collected from the body cavity of *Lethrinus kallopterus*. The blastocyst was very similar in shape with those related to Genus *Callitetrarhynchus* which have a white colour and anterior enlarged end. One specimen only had extended tentacles, the heteromorphous hooks were clearly visible indicating the heteroacanthous atypical armature with five to six different hooks arranged in principal rows on both the ridial and antibothridial surfaces. A band of small hooks were easily seen on the external surface.

Measurements which had been taken from the specimens were as follows: SL=2530, SW=816, *pbo*=630, *pv*=1630, *pb*=750, *app*=2200 and *vel*=220. According to these morphological characteristics this post-larva can be assigned to the genus *Grillotia* Guiart 1927 (Caira and Gavarrino, 1990).

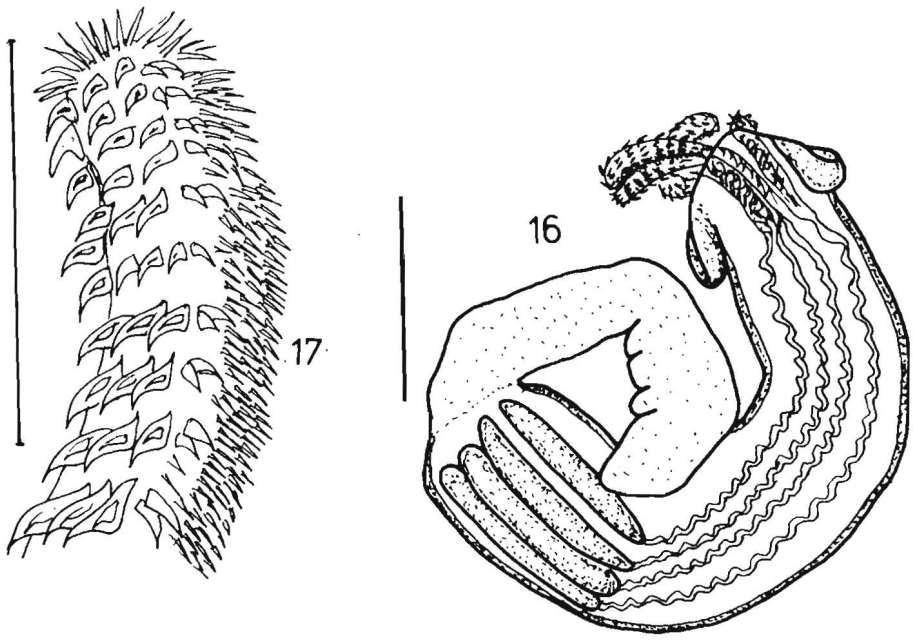


Fig. 16 Scolex of *Grillotia sp.* with relatively long bulbs. (Scale bar, 1mm).
Fig. 17 Metabasal armature of *Grillotia sp.* at bothridial faces showing the bands of hooks visible on the external surface. (Scale bar, 0.5mm).

Pseudogrillotia spratti Campbell and Beveridge, 1993 (Figs.18 and 19)

These two specimens were collected deep from the flesh of *Liza macrolepis* near the tail region. This was the first species found infested in the musculature and was burrowing deeply in it. The scolex was relatively long and had the following measurements: SL=11300, SW=1716, *pbo*=1060, *pv*=9405, *pb*=1250, *app*=4375, rose-thorn hooks=87.5 with base=67.5 and small hooks=50. Campbell and Beveridge (1993) amended the genus *Pseudogrillotia* and selected *P. spratti* as a new species from Australian sharks. The present specimen closely agreed with their description in the relatively long scolex which

had two widely margined deeply indented patelliform bothridia with a pair of fissures laterally. Pars vaginalis was very long and had regular sinuous sheaths. Armature was heteroacanthous with heteromorphous hooks and a band of numerous small hooks on the external side which was only restricted on the basal area, thus constituting the distinctive basal armature. This species has been reported from the flesh of congeners and may decrease the economic value of fish marketing, particularly in cases of high infestation rates (Deardorff *et al.*, 1984).

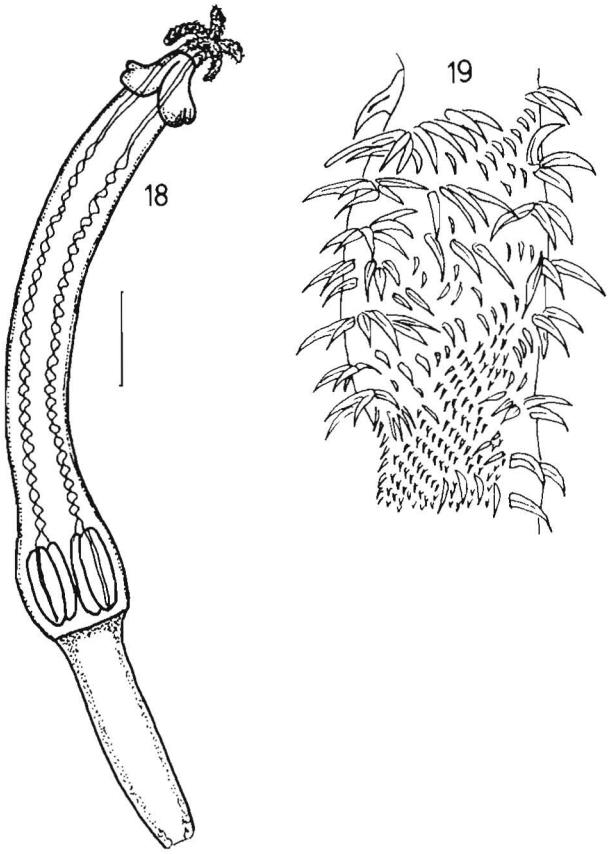


Fig. 18 Scolex of *Pseudogrillotia spratti* showing the two cardiform bothridia and the very elongated pars vaginalis. (Scale bar, 1mm).

Fig. 19 Basal armature of *Pseudogrillotia spratti* showing the band of hooklets which restricted only on the basal area. (Scale bar, 0.5mm).

Progrillotia sp. (Figs. 20 and 21)

A single post-larva was found free in the body cavity of *Siganus javus* with the following measurements. SL=9300, SW=4600, *pbo*-3000, *pv*=4800, *pb*=3800, *app*=1500 and *vel*=900. There was a presence of an atypical heteroacanthous armature with seven different hooks arranged in principal rows, longitudinal bands of hooks interrupted opposite each principal row, relatively long bulbs and an absence of a basal armature placed this specimen as genus *Progrillotia Dollfus*, 1946.

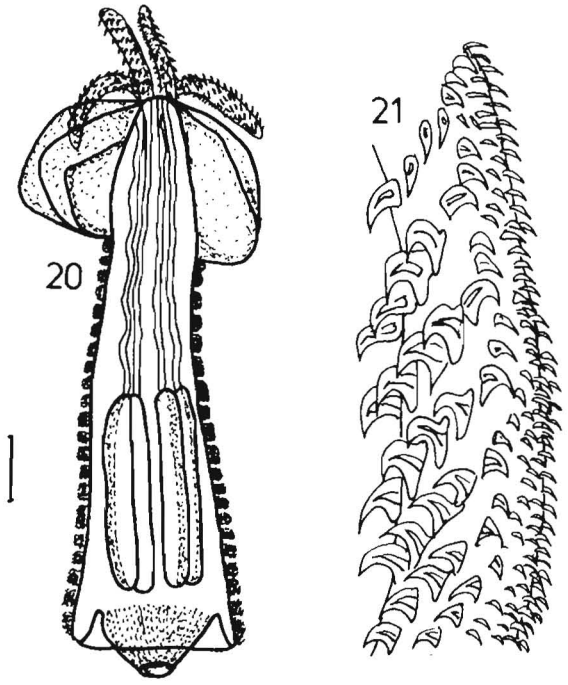


Fig. 20 Scolex of *Progrillotia sp.* showing the widely bothridia and relatively long bulbs. (Scale bar, 5mm).

Fig. 21 Basal and part of metabasal armature of bothridial face of *Progrillotia sp.* showing the ascending 5-7 rows of hollow rosethorn hooks. (Scale bar, 0.5mm).

Family: Pterobothriidae Pintner, 1931
Pterobothrium heteracanthum Diesing, 1850 (Figs. 22 and 23)

This was the second type of larvae which had the potentiality to invade muscles, collected not deep but around the body cavity. The milky white blastocyst was characterised by a sperm-like shape with an ovoid anterior end. It can reach a length of between 8.8mm to 20.4mm (including the tail). It bears a very small scolex. Based on ten specimens the following measurements are given: SL=2585, SW=415, *pbo*=242, *pv*=1448, *pb*-592, *ppb*=886, *app*=246 and *vel*=215. About ten species of fish out of 42 were recorded harboring these larvae (Table 1). The four pedicellate bothridia, the heteroacanthous atypical armature with heteromorphous hooks, intercalary rows and elongated bulbs and sinus sheaths indicated this specimen belonged to the genus *Pterobothrium*. Campbell and Beveridge (1996) characterized *P. heteracanthum* as having dissimilar principal hooks in proximal and distal regions with bands of narrow hooks continuing in the midline. Although it has a high prevalence rate among Arabian Gulf fishes, only one incomplete description has been given by Mirzayans, 1970, from fish related to genus *Caranx* collected from Iranian coasts.

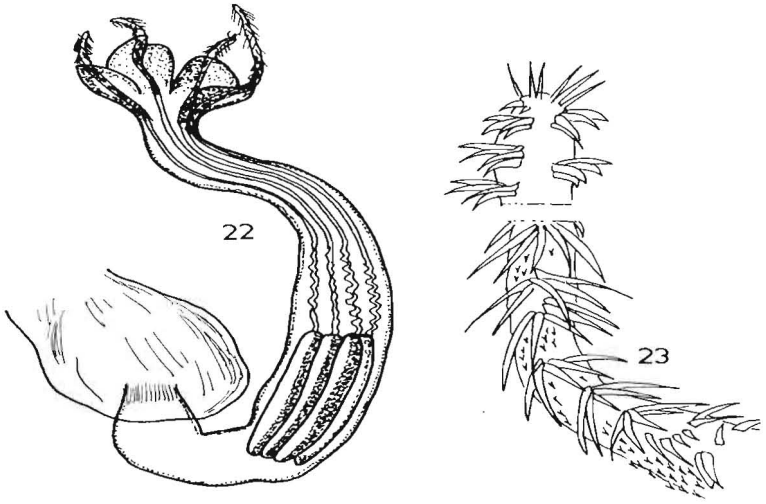
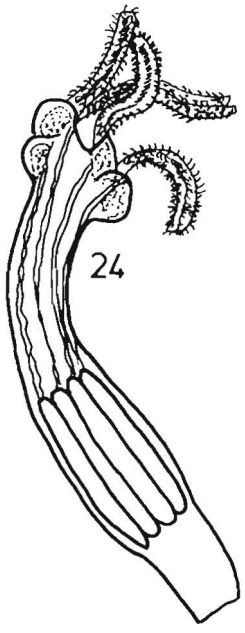


Fig.22 Scolex of *Pterobothrium heteacanthum* showing the 4 pedicellate bothridia and relatively long bulbs. (Scale bar, 1mm).

Fig. 23 Basal armature, bothridial face and a part of metabasal armature with internal surface of *Pterobothrium heteacanthum*. Note the alternating halves of spiral of five principal hooks. (Scale bar, 0.1mm).

Pterobothrioides sp. (Figs. 24 and 25)

One specimen was collected from the body cavity of *Cephalopholis miniata*. It showed a great resemblance to the genus *Pterobothrioides*. This genus was established by Campbell and Beveridge (1997) from Dasyatid stingrays in the Eastern Atlantic and Pacific Ocean. They designated *P. carvajali* and *P. petterae* as two new species. This genus closely resembled the genus *Pterobothrium* except in the armature pattern, this was characterized by a band of microhooks in combination with a chainette. The specimen was further characterized by clearly seen microhooks and also the absence of the chainette elements. The scolex found had the following measurements: SL=5000, SW=1050, *pbo*=700, *pv*-1700 and *pb*=700.



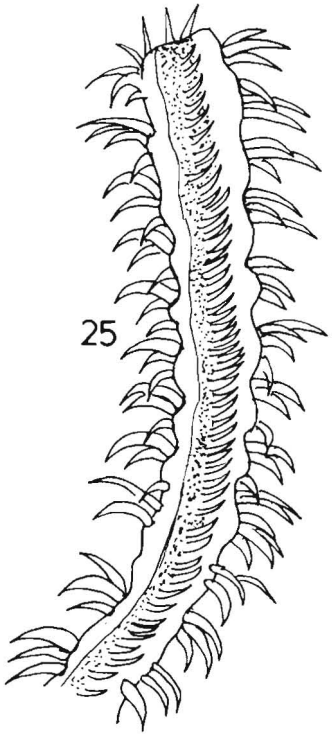


Fig. 24 Scolex of *Pterobothrioides sp.* with relatively long bulbs. (Scale bar, 1mm).
Fig. 25 Metabasal armature of external face of *Pterobothrioides sp.* note that the presence of a row of chainette hooks. (Scale bar, 0.5mm).

Superfamily: Poecilacanthoidea, 1942
Family. Lacistorhynchidae Guiart, 1927
Callitetrarhynchus speciosus (Linton, 1897)
n. comb. by Carvajal and Rego, 1985 (Figs. 26, 27 and 28)

This was the largest larva that was collected during this study. The scolex reached a length of about 3cm including appendix (strobila) and some blastocysts were about 5cm including the tail. In addition, these larvae seem to have no host specificity having been collected from many different fish species (Table 1). Five scolices were measured as follows: SL=12870, SW=2598, *pbo*=2516, *pv*=9868, *pb*=2516, BW=2662, *ppb*-254 and *app*=10840. The scolex, which has two obviously cardiform bothridia, was characterized by a poeciloacanthous armature with a single chainette located on the middle of external surface and the absence of rows of intercalary hooks. No basal swollen armature was detected. *C. speciosus* was proposed as a new combination by Carvajal and Rego, 1985, who stated that *Rhynchobothrium speciosus* could be a valid species of the genus *Callitetrarhynchus* (Pintner, 1931). In addition, it could be differentiated from the type species *C. gracilis* by long bulbs and a weakly developed marginal groove which located near the border of the bothridia.

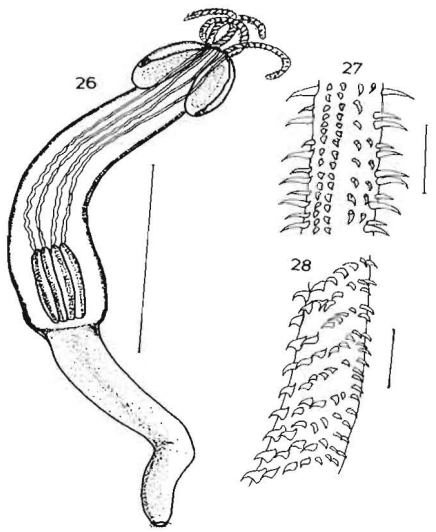


Fig. 26 Scolex of *Callitetrarhynchus speciosus*. Note the enlarged body of the scolex and relatively large bulbs. (Scale bar, 5mm).

Fig. 27 Metabasal armature at external face of *C. speciosus* showing the arrangements of the chainette hooks in a double rows. (Scale bar, 0.1mm).

Fig. 28 Metabasal armature, inner surface of *C. speciosus* showing the ascending rows of five hollow rosethorn hooks. (Scale bar, 0.1mm).

Callitetrarhynchus gracilis (Rudolphi, 1819) (Figs. 29A, 29B and 30)

These species are the most abundant larva among fish. It was found infesting 20 out of 42 species of fish hosts (Table 1). This species closely resembled *C. spicuosus* but differed in the smaller scolex length which was highly slender, had relatively short bulbs together with the presence of a conspicuous marginal groove near the bothridial borders (Carvajal and Rejo, 1985). The following measurements were taken from ten scolices: SL=5942, SW= 739, *pbo*=914, *pv*=4818, *pb*=947, BW=238 and *app*=5910. Inspite of the wide range of infestation of this species among Arabian Gulf fishes, it is recorded for the first time in this locality.

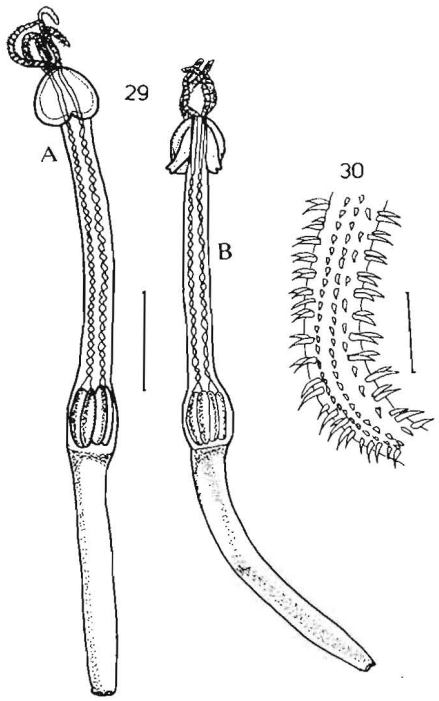


Fig. 29 Scolex of *Callitetrarhynchus gracilis* with side view (A) and frontal view (B) showing the clearly cardiform bothridia which indented posteriorly. Note the relatively short bulbs when compared with *C. speciosus* and the characteristic marginal groove near bothridial borders. (Scale bar, 1mm).

Fig. 30 Metabasal armature in *C. gracilis*, external surface showing the double rows of hooks forming a chainette. (Scale bar, 0.1mm).

Discussion

Most of the studies which have been carried out on fish parasites in the Arabian Gulf region give very little attention to trypanorhynch cestodes larvae (Merzayans 1970, Tigari *et al.* 1975, El Naffar *et al.* 1902, Kardousha 1992 and Al Kawari *et al.*, 1996). In our study *C. gracilis* was the most common larva occuring in 20 out of 42 host fish species. The study also emphasised a wide host range for *P. heteracanthum,* infesting ten of the fish hosts. *P. heteracanthum* has the potential to invade muscles but in a superficial way in the abdomen around viscera. Only *P. spratti* was found to have had the potentiality to burrow deeply inside muscles of *Liza macrolepis* but with a very low prevalence. Fortunately these infections are of no concern to public health but they may reduce the fish market value for consumers (Deardorff *et al.*, 1984).

Trypanorhynchs were the predominant cestodes represented in the area (El Naffar *et al.* 1992) and the total of 42 host species is considered a new host record. These Arabian Gulf Trypanorhynchs are similar to that of the Indian Ocean especially the west coast. Five larvae detected during this study are common for both localities. These were *Callitetrarhynchus speciosus, C. gracilis, Nybelinia indica, Tentacularia coryphaenae*, and *Pterobothrium heteracanthum.* (Bilqees and Shaukat 1976, Chandra 1986, Bilqees and Khurshid 1987 and Bates 1990).

One approach of this study was to give attention to fulfilling a thorough investigation for trypanorhynchs, especially the adult forms in Elasmobranchs so as to give accurate identification and to fill the knowledge gap for this geographic area.

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يرقات الديدان الطفيلية التي تصيب اسماك الخليج العربي: السجل الأول لبعض يرقات الديدان الشريطية (التريبانورنكا) من الأسماك ذات الأهمية الاقتصادية .

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المستخلص: سجلت هذه الدراسة أربعة عشر نوعاً مختلفاً من يرقات الديدان الشريطية (التريبانورنكا) والتي جمعت من أثنين و أربعين من الأسماك ذات الأهمية الاقتصادية في الخليج العربي . وبخلاف النوعين الذين سجلاً من قبل وهما ، جريلوتيا وبتيروبوثريوم ، تسجل الإثنا عشر نوعاً الأخرى لأول مرة في الخليج . وهذه اليرقات هى : كاليتترارينكس جرازيليس ، ك . سبكيوزس ، جريلوتيا ، نيبيلينيا بيسالكاتا ، نيبيلينيا انديكا ، نيبيلينيا لنجواليس ، نيبيلينيا ، اوتوبوثريوم دبساكم ، اوتوبوثريوم ، بروجريلوتيا سودوجريلوتيا سبراتى ، بتيروبوثريوم هتيراكانثم ، بتيروبوثريويدز وتنتكيولاريا كوريفينى . وقد سجلت الدراسة ايضا اكثر هذه الأنواع إصابة لأسماك الخليج من حيث معدل الإصابة. وهذين النوعين هما كاليتترارينكس جرازيليس وبتيروبوثريوم هتيراكانثم . أما مايتعلق بالقدرة على إصابة لحم العوائل ، فقد بينت الدراسة أن يرقة سودوجريلوتيا سبراتى لها هذه الخاصية وتتوغل بعمق. ولكن معدل الإصابة لا يتعدى النصف في المائة . أما يرقة بتيروبوثريوم هتيراكانثم فقد أوضحت الدراسة انها لا تتوغل في اللحم بعمق وتظل موجودة فقط في العضلات المحيطة بالأحشاء .