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# Redescription of Ten Species of Digenetic Trematodes from Marine Fishes of the Emirati Coasts of the Arabian Gulf

**Abstract:** Ten species of digenetic trematodes are fully described from fishes of the United Arab Emirates. These specimens, which have been previously described in a list which comprised different helminth fauna, commonly infest Emirati fishes. The ten species include *Prosorhynchus epinepheli*, *Hexangium sigani*, *Proctotrema pritchardae*, *Pseudoplagioporos interruptus*, *Centrovarium marinum*, *Paracryptogonimus acanthostomus*, *Derogenes varicus*, *Lecithocladium unibulbolabrum*, *Lecithochirium microstomum*, and *Prosogonotrema pritchardae*. Seven out of the ten species are described for the first time among Arabian Gulf fishes.

**Keywords:** Fish parasites, Trematodes, Digenea, United Arab Emirates, Arabian Gulf.

## Introduction

The present descriptions are a part of a comprehensive survey that extended from 1986 to 1992 and which was made to investigate the abundant digenetic trematodes which commonly infest the most economically important fishes of the Emirati coasts (El-Naffar *et al.*, 1991 and El-Naffar *et al.*, 1992). Although numerous studies from other Arabian Gulf areas have been conducted on this group, descriptions are incomplete (Al-Kawari *et al.* 1996). However, many recent studies have been carried out (Nahhas *et al.* 1998 and Al-Kawari, 2001). A survey of the available literature indicated that the El-Naffar survey of 1992 is still the only published study concerning digenea of Emirati fish.

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إعادة وصف لعشرة أنواع من الديدان الطفيلية ثنائية العائل من أسماك دولة الإمارات العربية المتحدة في الخليج العربي

محمود محمود كردوشة

المستخلص: تهدف الدراسة، تقديم وصف دقيق وشامل لعشرة أنواع من طفيليات التريماتودا ثنائية العائل، الشائعة بين أسماك دولة الإمارات في الخليج العربي وهي:

*Prosorhynchus epinepheli*, *Hexangium sigani*, *Proctotrema pritchardae*, *Pseudoplagioporos interruptus*, *Centrovarium marinum*, *Paracryptogonimus acanthostomus*, *Derogenes varicus*, *Lecithocladium unibulbolabrum*, *Lecithochirium microstomum* and *Prosogonotrema pritchardae*.

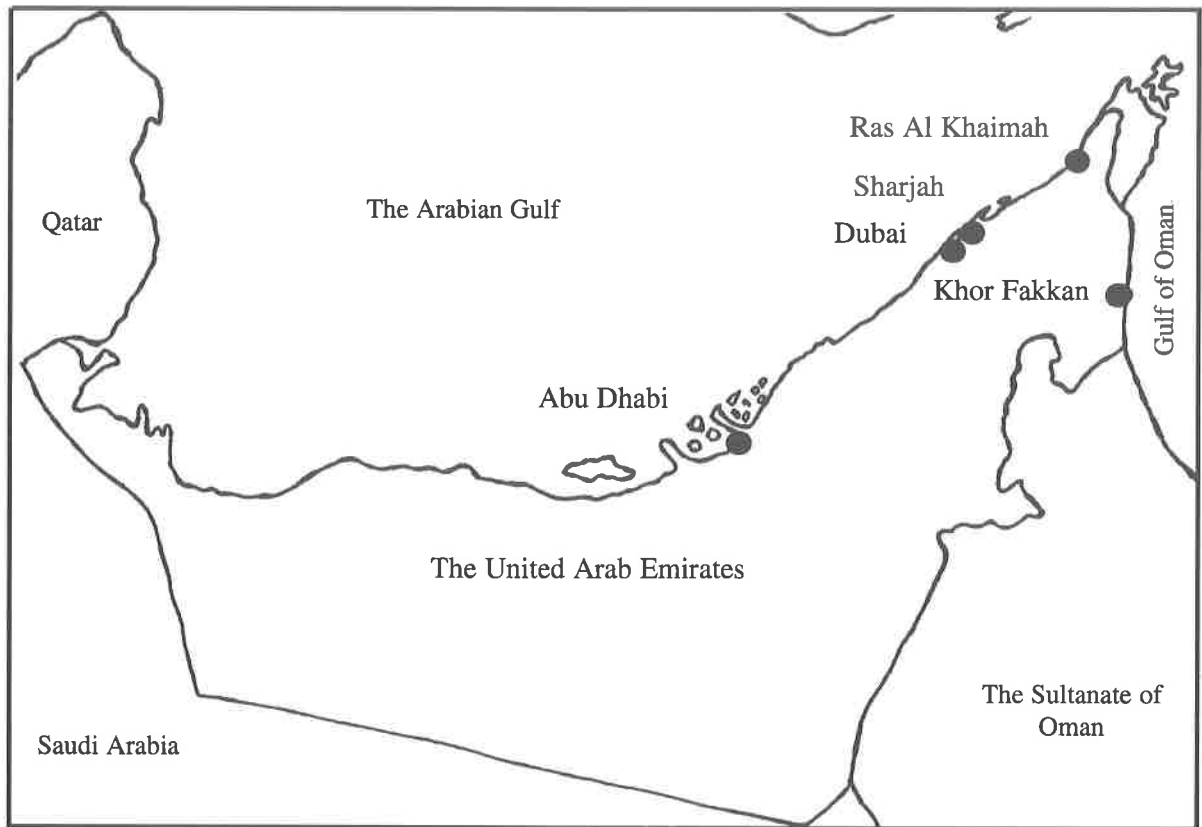
مع التنويه إلى تضمينها في بحث سابق، (أنظر مجلة الخليج العربي للبحوث العلمية 20(1): 18 - 24، مارس 2002) دون تقديم أي وصف لها، مما يستوجب تكملتها بهذه الدراسة، تجدر الإشارة إلى احتوائها على سبعة أنواع من الطفيليات يتم تسجيلها ووصفها لأول مرة في دراسات الثروة السمكية في الخليج العربي.

كلمات مدخلة: الخليج العربي، الإمارات، أسماك، طفيليات، تريماتودا ثنائية العائل.

Since then, no studies have been conducted throughout the Emirati coasts. The description of these previously reported species is overdue.

## Materials and methods

Fishes were obtained directly from the fishing boats before marketing at four localities along the western and eastern coasts of the United Arab Emirates (Fig. 1). Fish were examined directly for helminthes including digenetic trematodes. The alimentary canal, body cavity and organs such as the heart, kidney, liver and gonads were inspected carefully and collected worms were placed in saline solution for studying in a fresh state. Some worms were fixed under light cover-glass pressure in 10% formal saline, stained in aceto-carmin, dehydrated in ethyl alcohol, cleared in terpaneol and mounted in Canada balsam. The illustrations were made with the aid of a drawing tube. All measurements are in micrometers.



**Fig. 1.** A map showing the fish collection localities, which extend along the coasts of the United Arab Emirates. On the western coast are Abu Dhabi, Dubai and Ras Al-Khaimah. Khor-Fakkan is the eastern locality.

**Results**

Family: Bucephalidae Poche, 1907

1- *Prosorhynchus epinepheli*, (Yamaguti, 1939)

Host: *Epinephelus areolatus*

Habitat: Intestine and gastric caeca

Locality: Abu Dhabi, Sharjah & Ras Al Khaimah

Prevalence: 56 %

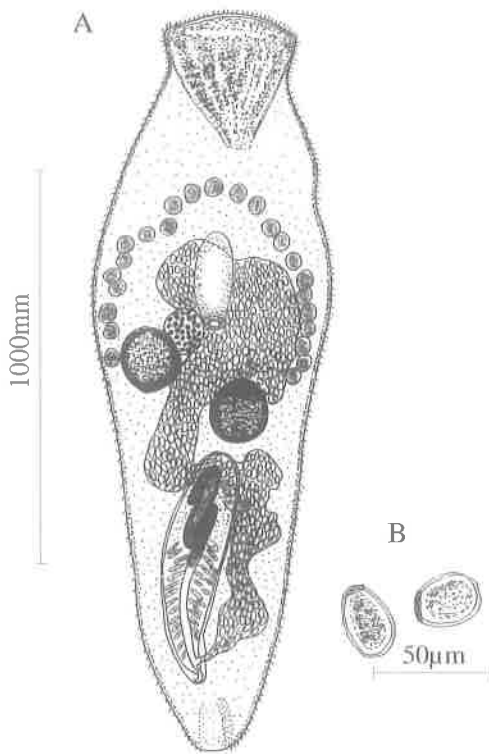
Description: (see Fig 2, A-B)

Description based on five specimens. Body elongated and slightly plumped. Anterior wider than posterior. Tegument entirely spinous. Body length 1800-2000µm and width 66-700µm. Rhynchus conical, 390-450µm long. Pharynx muscular, equatorial and ventral to ovary, 130-190µm long and 120-180µm wide. Oesophagus 220-280µm long. Intestine sac-like, directed anteriorly, 160-220µm long by 140-170µm wide. Testes symmetrical, diagonal, the anterior lateral to the pharynx and posterior located near cirrus pouch. Each 140-180µm long by 150-170µm wide. Cirrus

sac long, located at posterior of the body and sometimes overlapping posterior testes, 550-660µm long and 160-220µm wide. Seminal vesicle S-shaped, located anterior inside cirrus. Pars prostatica well developed. Genital pore located near posterior extremity. Ovary subspherical, 100-110µm by 100-120µm. Vitellaria follicular, 25 in number and arched anteriorly. Uterus voluminous, extending upwards to a level anterior to intestine then directed backwards to enter genital atrium. Eggs yellowish to brown, operculated, small in size, 26-32µm long by 17-23µm wide. Excretory vesicle sac-like and open terminally.

**Remarks**

This species is very common among Arabian Gulf groupers especially *Epinephelus areolatus*. Yamaguti (1939) described it as *E. okaara* from Japan. In addition, this species was listed among Arabian Gulf fishes of the Emirati coasts by El-Naffar, *et al.* (1991). They presented a comprehensive list of helminth parasites and the current description is related to their paratype specimens. It has also been described from Qatari waters as *E. chlorostigma* (Saoud, *et al.* 1988).



**Fig. 2.** *Prosorhynchus epinepheli* (Yamaguti, 1939)  
 A. Whole worm of holotype, ventral view.  
 B. Eggs.

Family: Angiodictyidae Looss, 1902

2- *Hexangium sigani*, (Goto and Ozaki, 1929)

Host: *Siganus canaliculatus*

Habitat: Intestine

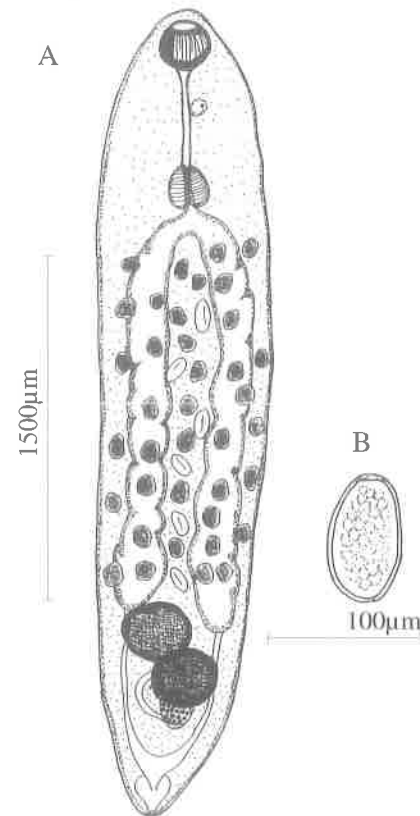
Locality: Dubai and Sharjah

Prevalence: 17.5 %

Description: (see, Fig. 3. A-B)

Based on ten specimens. Body elongate, 3130-3550µm long by 750-950µm wide. Oral sucker subterminal, 230-260µm diameter. Ventral sucker absent. Prepharynx 320-500µm long. Pharynx weakly developed, with diameter 120-200µm. Oesophagus short, bifurcating with inflated caeca which reach the level of the anterior testis. Testes symmetrical, diagonal, and located at posterior of the body, each 260-400µm long by 330-420µm wide. Cirrus pouch very minute. Ovary ovoid, post-testicular, sometimes overlapping posterior testis, 150-170µm long by 150-200µm wide. Mehlis's gland located post-ovarian. Uterus occupying the intercaecal space. Genital pore open median level near oral sucker. Vitellaria follicular, extending

laterally to intestinal caeca with a few scattered intercaecally. Eggs relatively large, operculated, 68-82µm long by 40-50µm wide. Excretory vesicle V-shaped with two terminal bladders opening with excretory pore posteriorly.



**Fig. 3.** *Hexangium sigani*, (Goto and Ozaki, 1929)  
 A. Whole worm of holotype, ventral view.  
 B. An egg.

Remarks:

This species is clearly distinguished from its relatives by its peculiar features, as described above. It is very common among Arabian Gulf fishes especially siganids. It was described from Kuwaiti and Qatari coasts from siganid fish also (Al-Yamani and Nahhas, 1981 and Al-Kawari, *et al.* 1996).

Family: Monorchidae Odhner, 1911

3- *Proctotrema pritchardae*  
 (Nahhas & Cable, 1964)

Host: *Plectorhynchus cinctus*

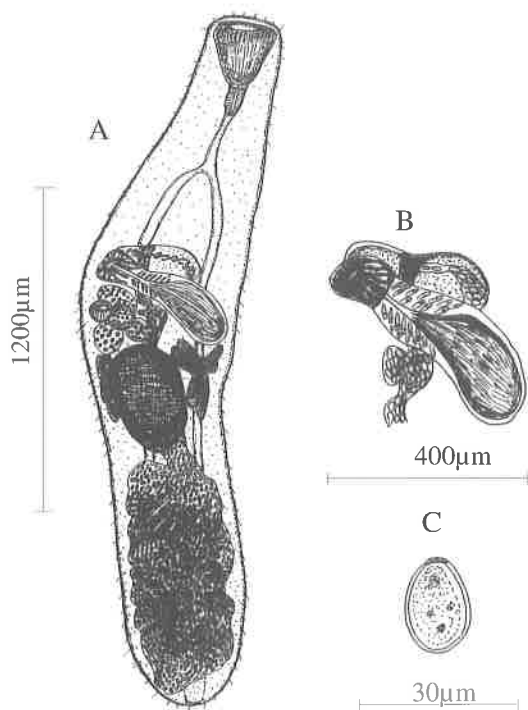
Habitat: Intestine

Locality: Emirati coasts

Prevalence: 3.33 %

Description: (see, Fig. 4, A, B, and C)

This description is based on four specimens (measurements for only one). Body elongated, rounded at posterior, 2600 $\mu$ m long by 600 $\mu$ m wide. Tegument spinose. Oral sucker funnel shape, 240 $\mu$ m long by 270 $\mu$ m wide. Acetabulum lying at mid-level of the body, with 120 $\mu$ m diameter. Prepharynx short, 50mm long. Pharynx ovoid, 80 $\mu$ m long by 60 $\mu$ m wide. Oesophagus relatively long, 180 $\mu$ m. Intestinal caeca extending to posterior. Testis single, ovoid, located at the midbody, 430 $\mu$ m long and 280 $\mu$ m wide. Cirrus sac long, muscular, pretesticular, opening in genital atrium preacetabularly, 550 $\mu$ m long by 160 $\mu$ m wide. Seminal vesicle internal, 270 $\mu$ m long and 150 $\mu$ m wide. Pars prostatica tubular. Ovary with four distinct lobes. Terminal organ with posterior vesicle and spiny anterior portion, between which is a sphincter. Uterus voluminous and restricted to the post-testicular space. Eggs ovoid, operculated, 20-22 $\mu$ m long by 9-13 $\mu$ m wide. Vitellaria present as lateral bunches of nine follicles each. Excretory vesicle tubular, opening terminally by excretory pore.



**Fig. 4.** *Proctotrema pritchardae* (Nahhas & Cable, 1964)  
 A. Whole worm of holotype, ventro-lateral view.  
 B. Terminal genitalia of holotype.  
 C. An egg.

#### Remarks

This species was previously recorded as *Lasiotocus pritchardae* (El-Naffar, *et al.* 1991) as a new combination of *Proctotrema pritchardae* but after re-examination by us, it seems that it is better to designate the specimens as *Proctotrema pritchardae*. As far as the literature has revealed, this species is described for the first time in the Arabian Gulf; however, some monorchids are recorded from other coasts, such as Kuwait (Sey and Nahhas, 1997), and Qatar (Saoud, *et al.* 1986).

Family: Opcoelidae Ozaki, 1925

4- *Pseudoplagioporus interruptus*

(Durio and Manter, 1968)

Host:- *Lethrinus lentjan*

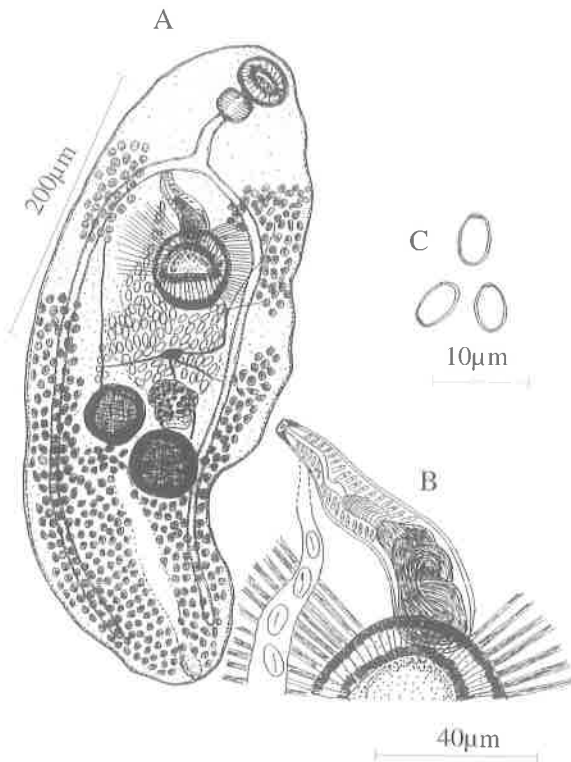
Habitat:: Intestine

Locality: Abu Dhabi

Prevalence: 6.66 %

Description: (see, Fig. 5 A, B and C)

This description is based on one specimen. Body elongated, slightly oval, 4750 $\mu$ m long by 2000 $\mu$ m mm wide. Oral sucker subterminal, 420 $\mu$ m long and 440 $\mu$ m wide. Ventral sucker with conspicuous diagonal muscles radiating from it. Pre-pharynx small. Pharynx muscular, 230 $\mu$ m long by 250 $\mu$ m wide. Oesophagus relatively long measuring 380 $\mu$ m. Intestinal caeca reaching the posterior extremity. Testes spherical, diagonal, each 500 $\mu$ m in diameter. Cirrus pouch elongated, thick walled, enclosing the seminal vesicle, which is connected by cirrus through a muscular bulb. Genital atrium opening mid bifurcation. Ovary lobulated, submedian, opposite to anterior testis, 300 $\mu$ m long by 400 $\mu$ m wide. Vitellaria follicular, extending laterally and commencing at bifurcation level to posterior end, interrupted at the level of bifurco-acetabular zone and then confluent behind the posterior testis. Vitelline reservoir preovarian and receptaculum seminis postovarian. Uterus confined to area between ovary and acetabulum. Eggs relatively large, oval-shaped and operculated, 67-78 $\mu$ m long by 32-45 $\mu$ m wide. Excretory vesicle, tubular, extending to level of posterior testis. Excretory pore opening terminally.



**Fig. 5.** *Pseudoplagioporus interruptus* (Durio and Manter, 1968)

A. Whole worm of holotype, dorsal view.

B. Terminal genitalia of holotype.

C. Eggs.

**Remarks:**

The Emirati coasts are considered as a new locality for this species, which has only been recorded by El-Naffar, *et al.* (1991). Another related species, *Pseudoplagioporus microrchis* Yamaguti (1942), was described by Saoud, *et al.* (1987) from the same host from Qatari waters, which are normally considered as an extension of Emirati waters. *P. microrchis* closely resembles *P. interruptus*, but it lacks radiating acetabular muscles and its vitellaria are not interrupted.

Family: Cryptogonimidae (Ward 1917)

5- *Centrovarium marinum*

(Hafeezullah and Siddiqi, 1970)

Host:: *Lutjanus johni*

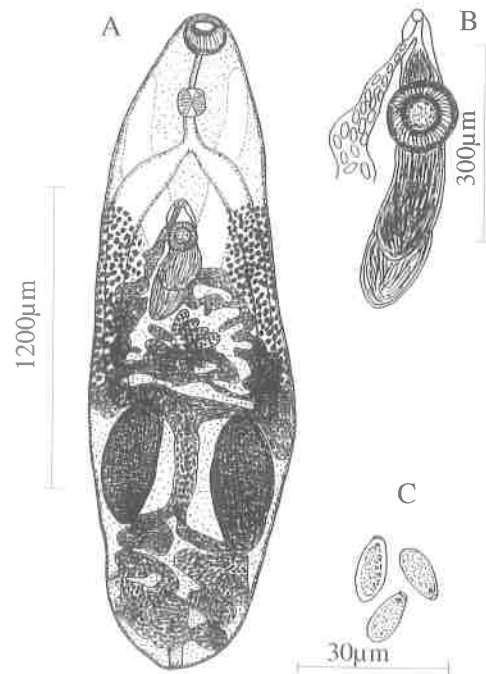
Habitat: Intestine

Locality: Abu Dhabi

Prevalence: 32 %

Description: (see, Fig. 6, A, B and C)

This description is based on four specimens. Body spindle shaped, 2450-3450µm long by 780-1180µm wide at the level of ovary. Tegument smooth. Oral sucker rounded, slightly subterminal, 150-170µm long by 140-210µm wide. Acetabulum weak, prepharynx relatively long, equaling 100-120µm. Pharynx cup-shaped, 90-110µm long and 100-150µm wide. Oesophagus nearly equal in length to the prepharynx. Intestinal caeca extending only to pretesticular region. Testes oval to slightly elongated, diagonal and located posteriorly, each 460-750µm long and 250-360µm wide. Seminal vesicle saccular, bipartite, postacetabular. Genital atrium opening preacetabular at dorsal side. Ovary multilobed, located at the midlevel of the body. Seminal receptacle preovarian. Uterus voluminous, convoluted at posterior portion of the body, directed upwards between testes then winding anteriorly to join the genital atrium. Eggs numerous, small oval shaped with operculum, 13-17µm long by 7-11µm wide. Vitellaria follicular, located lateral and extending from level anterior to acetabulum to nearly testes. Excretory vesicle Y-shaped, arms reaching the anterior end.



**Fig. 6.** *Centrovarium marinum*, (Hafeezullah and Siddiqi, 1970)

A. Whole worm of holotype, ventral view.

B. Terminal genitalia of holotype.

C. Eggs.

**Remarks:**

The central position of the ovary and the extension of the intestinal caeca only up to the level of the testes are the main criteria to prominently

distinguish genus *Centrovarium* Stafford (1904) from the closely related *Paracryptogonimus* Yamaguti (1934). Hafeezullah and Siddiqi (1970) also described *C. marinum* from a lutjanid fish, *Lutjanus fulviflamma*, which was collected from the Arabian Sea. The features of the present specimens are consistent with *C. marinum* and considered as a new record among Arabian Gulf fishes.

Family: Cryptogonimidae (Ward, 1917)  
6- *Paracryptogonimus acanthostomus*  
(Yamaguti, 1934)

Host:: *Lutjanus kasmira*

Habitat: Intestine

Locality:: Ras Al Khaimah

Prevalence: 46.6 %

Description: (see, Fig. 7, A, B and C)

This description is based on five specimens. Body oval to plumb, 1280-1570 $\mu$ m long by 620-750 $\mu$ m wide at the level of testes. Tegument spinose. Oral sucker terminal, funnel shaped with single crown of circumoral spines reaching 30-36 in number, 150-170 $\mu$ m long by 180-200 $\mu$ m wide. Prepharynx short, 10-30mm long. Pharynx muscular, ovoid, 60-70 $\mu$ m long by 56-66 $\mu$ m wide. Oesophagus nearly equalling prepharynx. Intestinal caeca reaching posterior extremity completely obscured by the uterus. Acetabulum very weak and embedded in the body, smaller than oral. Testes spherical, located at the posterior of the body, symmetrical and tandem, 250-300 $\mu$ m in diameter. Cirrus pouch absent. Vesicula seminalis long, convoluted, extending anteriorly to ovary up to level of acetabulum. Genital atrium lying preacetabularly just posterior to bifurcation. Ovary follicular, at the midbody. Uterus voluminous, between testes to open to genital atrium. Eggs brownish in color, embryonated, operculated, 20-25 $\mu$ m long by 9-14 $\mu$ m wide. Vitellaria follicular, scattered as bunches in lateral fields between ventral sucker and anterior testis. Excretory vesicle Y-shaped with arms extending anteriorly.

Remarks:

Hafeezullah (1975) stated that there are two distinct groups of species existing under genus *Paracryptogonimus*, one with vitellaria restricted mainly and largely to the pre-testicular zone as in the present material and the other in which the vitellaria are disposed lateral to testes extending into the pre- and post-testicular lateral field like *P. Ovatus* Yamaguti (1952).

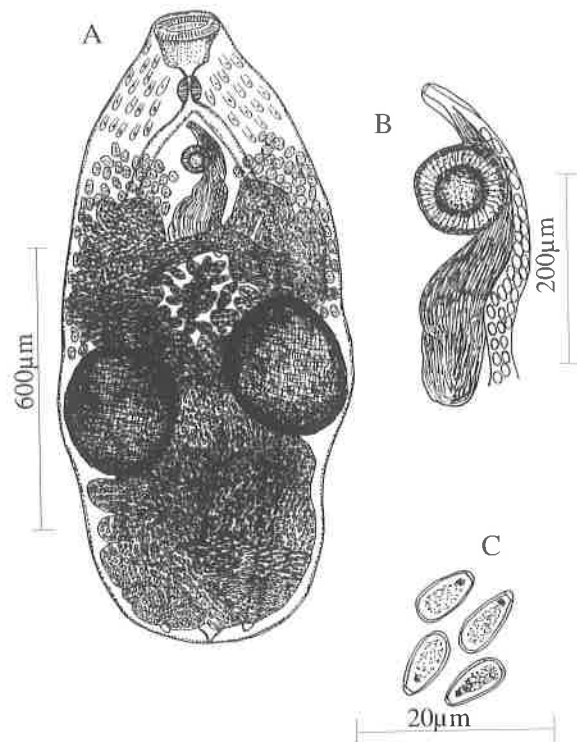


Fig. 7. *Paracryptogonimus acanthostomus* (Yamaguti, 1934)

A. Whole worm of holotype, ventral view.

B. Terminal genitalia of holotype.

C. Eggs.

Family: Derogenidae (Nicoll, 1910)

7- *Derogenes varicus*, (Looss, 1901)

Host: *Acanthopagrus bifasciatus*

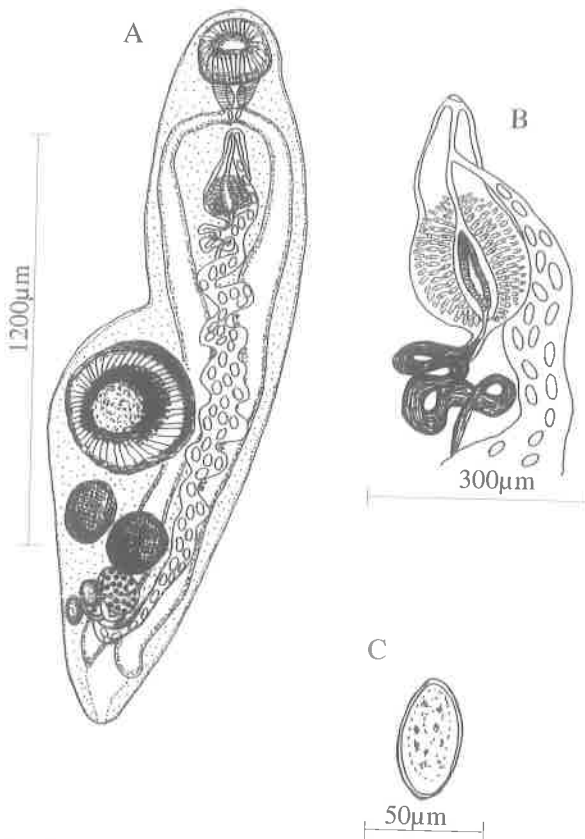
Habitat:: Intestine

Locality: Dubai, Ras Al Khaimah & Khor Fakkan

Prevalence:: 11.25 %

Description: (see, Fig. 8, A, B and C)

Description based on five specimens. Body oval to elongated, 2250-4250 $\mu$ m long by 700-1380 $\mu$ m wide. Preoral lobe present. Oral sucker subterminal, 290-460 $\mu$ m wide. Acetabulum relatively large, 500-850 $\mu$ m long by 340-800 $\mu$ m wide. Prepharynx absent. Pharynx oval, 100-220 $\mu$ m long by 160-220 $\mu$ m wide. Oesophagus short, caeca extending to posterior extremity. Testes symmetrical, slightly diagonal and postacetabular, each 120-250 $\mu$ m long by 120-220 $\mu$ m wide. Vesicula seminalis tubular and sinuous, leading to prominent pars prostatica, opening by ejaculatory duct, then into sinus organ, joining the metraterm to form hermaphroditic duct. Sinus sac muscular and conical shape, opening into the genital atrium. Ovary ovoid, posttesticular, 110-180 $\mu$ m long by 100-220 $\mu$ m wide. Vitellaria two oval compact masses usually posterior to ovary. Uterus with large eggs, operculated, 80-120 $\mu$ m long by 50-60 $\mu$ m wide.



**Fig. 8.** *Derogenes varicus* (Looss, 1901)  
 A. Whole worm of holotype, ventral view.  
 B. Terminal genitalia of holotype.  
 C. An egg.

**Remarks:**

Gibson and Bray (1979) proposed a good key to distinguish the genus *Derogenes* from other representatives in the subfamily *Derogeninae*. Overstreet and Hockberg (1975) described *Derogenes varicus* from the rectum of *Sepia officinalis* at Plymouth. Their description reflects the close resemblance between the described material and the current specimens. It is believed that the current study is the only description of this species among Arabian Gulf fishes.

**Family:** Hemiuridae (Looss, 1899)

8- *Lecithocladium unibulbolabrum*  
 (Fischthal and Thomas, 1971)

**Host:** *Carangoides malabricus*

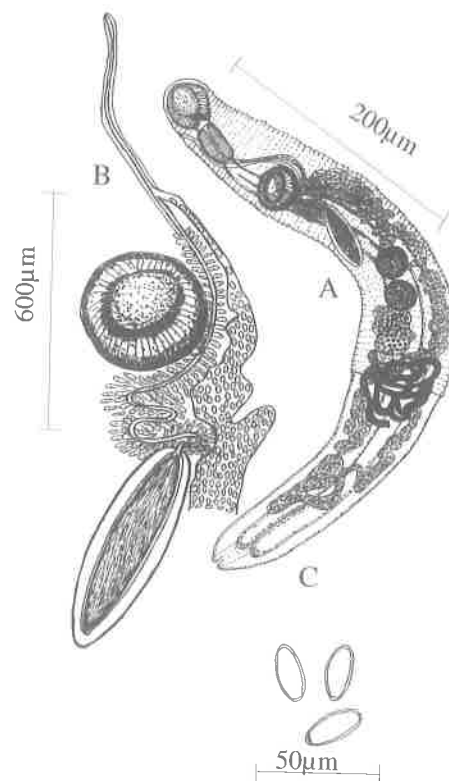
**Habitat:** Stomach

**Locality:** Abu Dhabi

**Prevalence:** 2.5 %

**Description:** (see, Fig. 9, A, B and C)

Description based on one specimen. Body elongate, plicated with ecsoma, 5350µm long by 750µm wide. Ecsoma 2420µm long. Oral sucker terminal, funnel shape, 380µm long with dorsal lip longer than ventral. Ventral sucker lying anteriorly, smaller than ventral, 330µm in diameter. Prepharynx absent. Pharynx cylindrical, muscular, 300µm long by 170µm wide. Oesophagus short, intestinal caeca reaching the posterior extremities. Testes spherical, diagonal to tandem, contiguous and located in posterior half of soma, 250µm in diameter. Seminal vesicle ovoid, thick walled, 520µm long by 200µm wide and overlapping anterior testis. Prostatic duct long, sinuous with condensed prostatic cells around the proximal portion only. Ovary ovoid, post-testicular, near the end of oma, 170µm long by 250µm wide. Receptaculum seminis located posterior to ovary. Uterus descending into ecsoma reaching near posterior end then ascending to join with prostatic duct anteriorly forming long hermaphroditic duct encircled by wak sinus sac. Genital pore opens ventral to oral sucker. Vitellaria post-ovarian, tubular, 7 in number and occupying the region of soma and ecsoma junction. Eggs numerous, small in size, 23-26µm long by 10-12µm wide. Excretory pore terminal.



**Fig. 9.** *Lecithocladium unibulbolabrum* (Fischthal and Thomas, 1971)

A. Whole worm of holotype, ventro-lateral view.  
 B. Terminal genitalia of holotype.  
 C. Eggs.

Remarks:

Fischthal and Thomas (1971) selected *Lecithocladium unibulbolabrum* for species characterised mainly by the presence of one bulb only located at the posterior lip of oral sucker rather than two bulbs as in case of *L. bulbolabrum* (Reid *et al.*, 1966). This species seems common among Arabian Gulf fishes. It was described as *Rastrelliger kanagurta* off Kuwaiti coasts (Al-Yamani and Nahhas, 1981). Recently, Al-Kawari *et al.* (2001) reported on four species of Hemiurids infected Qatari fishes and described *L. angustiovum* Yamaguti (1935) from the stomach of *Chanos chanos*. They accepted the synonymy of *L. unibulbolabrum* with *L. angustiovum* as suggested by Gibson and Bray (1986)

Family: Hemiuridae (Looss, 1899)

9- *Lecithochirium microstomum*, (Chandler, 1935)

Host: *Euthynnus affinis* fishes.

Habitat: Stomach

Description: (see, Fig. 10, A B and C)

Description based on ten specimens. Body elongate and ecsomate. Total length 2960-45800µm. Soma is 2700-4200µm long by 520-580µm wide. Ecsoma always retracted and equals 2638µm long. Oral sucker subterminal, spherical with 1400-1600µm diameter. Pre-oral lobe present. Pre-acetabular pit present with conspicuous gland cells. Acetabulum large (sucker ratio 1:2.88-3) with diameter of 4200-4600µm. Pharynx prominent, 500-800µm long by 900-1000µm wide. Oesophagus short. Caeca reaching posterior extremity. Testes symmetrical, tandem and slightly diagonal, separated by some coils of uterus. Each testis with diameter of 1500-2100µm. Seminal vesicle tripartite, slightly overlapping acetabulum anteriorly. Prostatic vesicle completely surrounded by prostatic cells, connected to ejaculatory vesicle inside the sinous organ. Hermaphroditic ducts very short. Genital pore median and ventral to intestinal bifurcation. Ovary ovoid to spherical, located posteriorly, 1400-2000µm long by 1600-2000µm wide. Vitellaria postovarian, digitiform, composed of two groups, one three and the other four in number. Uterus highly convoluted, descending posteriorly, near the end of soma then ascending anteriorly to join ejaculatory duct with metraterm to open in genital atrium. Eggs ovoid, 15-20µm long by 7-10 wideµm. Excretory vesicle bifurcating immediately posterior to acetabulum with arms uniting dorsal to pharynx.

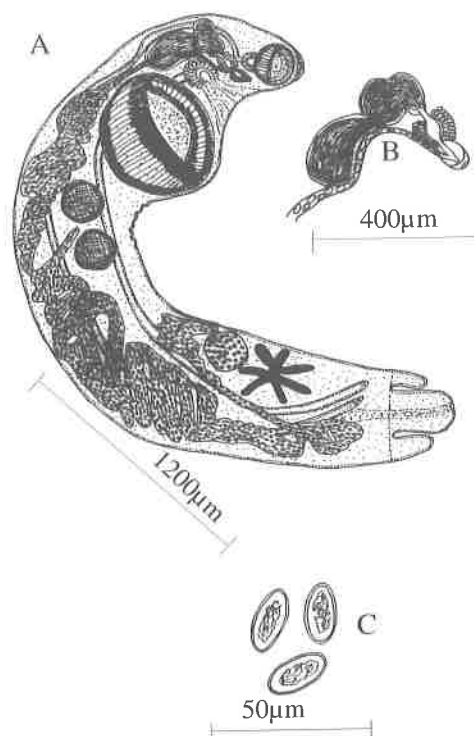


Fig. 10. *Lecithochirium microstomum* (Chandler, 1935)

A. Whole worm of holotype, ventro-lateral view.

B. Terminal genitalia of holotype.

C. Eggs.

Remarks:

The presence of a pre-acetabular glandular pit, prominent large acetabulum, cylindrical sinus sac and spherical prostatic vesicle are the main characteristic features of this species, which Chandler (1935) described as *Pseudoupeneus multifasciatus* from Hawaii. Another species, *L. macrorchis* Crowcroft (1901), has been described as *Alectis indicus* off Qatari waters (Al-Kawari, *et al.* 2001)

Family: *Sclerodistomidae* (Odhner, 19270

10- *Prosogonotrema pritchardae*, (Hafezullah, 1971)

Host: *Lutjanus coccineus*

Habitat: Stomach

Locality: Dubai and Sharjah

Prevalence 40 %

Description: (see, Fig. 11, A, B and C)

Description based on ten specimens. Body highly muscular, robust and slightly tapering at both



ends. Total length 6130-8380 $\mu$ m and width 2010-2480 $\mu$ m at the level of acetabulum. Oral sucker subterminal and pre-oral lobe present. Oral sucker 620-790 $\mu$ m long by 710-780 $\mu$ m wide. Prepharynx absent. Pharynx 210-280 $\mu$ m long by 240-340 $\mu$ m wide. Oesophagus swollen and caeca running with shoulders and extending to the posterior of the body. Acetabulum prominently large, powerful and very difficult to flatten during processing, located posterior to the midbody, 210-220 $\mu$ m in diameter. Sucker ratio (1:2.85). All gonads and terminal genitalia located pre-acetabularly. Testes globular and symmetrical and located midway between suckers, each 430-570 $\mu$ m long by 580-610 $\mu$ m wide. Seminal vesicle tubular, coiled between testes. Pars prostatica long, winding with conspicuous prostatic cells. Ejaculatory duct coiled, muscular at the base of genital cone, running parallel to metraterm, then uniting to form hermaphroditic duct. Genital cone 280-310 $\mu$ m long and 140-160 $\mu$ m wide at the base. Genital pore opening ventrally at the base of ventral sucker. Ovary globular, located just preacetabularly, 340-480 $\mu$ m long by 450-510 $\mu$ m wide. Receptaculum seminis postovarian. Vitellaria seven, tubular and coiled near ovary and running upwards in intercaecal region, not reaching level of testes. Uterus voluminous, winding transversely intercaecal, restricted to preacetabular region. Eggs numerous, elliptical with one pointed end, 20-28 $\mu$ m long by 9-12 $\mu$ m wide. Excretory vesicle Y-shaped, with broad posterior arm, the arm bifurcating at the level of acetabulum, then the two arms extending anteriorly to unite again dorsal to pharynx. Excretory pore opening ventrally at posterior end. A broad accessory vesicle present, opening at posterior extremity.

#### Remarks

It is interesting to mention that this study is considered as the first description of *Prosogonotrema pritchardae* (Hafeezullah, 1971), among Arabian Gulf fishes; however, many surveys concerning digenetic trematodes have pointed to it (El-Naffar, 1991 and Al-Kawari, *et al.* 1996). This species is very peculiar among trematodes in that the gonads together with terminal genitalia are collectively located in the anterior part of the body, prior to the acetabulum. Other characteristic criteria are the presence of Manter's organ, the fact that the vitellaria do not reach the level of the testes and the mostly posterior location of the ventral sucker.

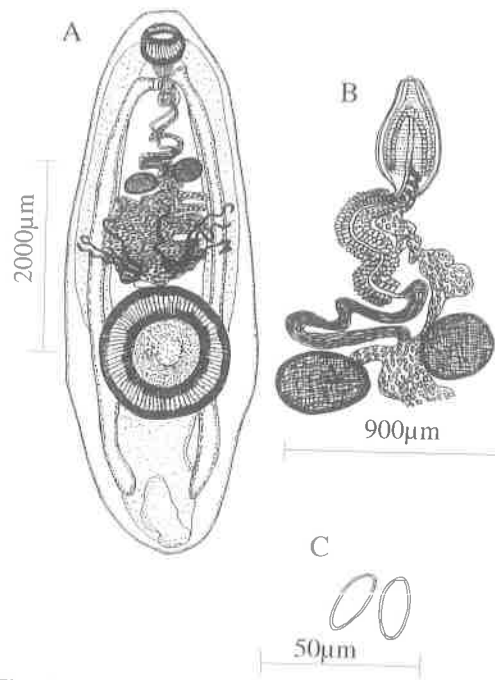


Fig. 11. *Prosogonotrema pritchardae* (Hafeezullah, 1971)

- A. Whole worm of holotype, ventral view.
- B. Terminal genitalia of holotype.
- C. Eggs.

#### Discussion

Our knowledge of the digenean fauna of fish of the Arabian Gulf has increased greatly during recent years. It has been found that most published studies concerning the Emirati coasts have reported on different digenetic genera and species without submitting a full description (El-Naffar, *et al.* 1991 and 1992). Therefore, It has become increasingly important to re-examine these species and provide full updated descriptions.

Qatari waters are the closest area to the Emirati coasts. The digeneans have been extensively studied on Qatari fish since 1986 (Saoud, *et al.*, 1986, 1987, 1988, Al-Kawari, *et al.* 2001). Additional thorough studies have been carried out on Kuwaiti fish since 1982 (Al-Yamani and Nahhas, 1981, Nahhas, *et al.* 1998). After reviewing the published data related to both localities, it is believed that the digenetic fauna of Emirati fishes seem to be peculiar, the current study describes ten digeneans involving seven species recorded for the first time among Arabian Gulf fishes. These are *Proctotrema pritchardae* (Nahhas and Cable, 1964); *Pseudoplagioporos interruptus* (Durio and Manter 1968). *P. macrorchis* was described from Qatari waters, (see Saoud, *et al.* 1987); *Centrovarium marinum* (Hafeezullah and Siddiqi, 1971); *Paracryptogonimus acanthostomus*

(Yamaguti, 1934). *P. ramadani* was described from Kuwait, (see Nahhas, *et al.* 1998); *Derogenes varicus* (Looss, 1901); *Lecithochirium microstomum* (Chandler, 1935) *L. macrorchis* was described from Qatari waters, (see Al-Kawari, *et al.* 2001); and *Prosogonotrema pritchardae* (Hafeezullah, 1975). As far as can be determined, no previous reports on these seven species have been recorded from Arabian Gulf fishes and the current study is considered as the first description of them in this locality.

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#### References

- Al-Kawari KSR, Saoud MFA and Ramadan MM** (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.
- Al-Kuwari KSR, Kardousha MM and Saoud MFA** (2001). Helminth parasites of fishes from the Arabian Gulf. 9- Some Hemiurids (Digenea) from fishes of Qatari waters. *Rivista. di Parassitologia.* **XVIII** (LXII)-N. 2. 123-133.
- Al-Yamani FY and Nahhas FM** (1981) Digenetic trematodes of marine fishes from the Kuwaiti coast of the Arabian Gulf. *Kuwait Bull. of Mar. Sci.* **3**, 1-22.
- Chandler A C** (1935). Parasites of fishes in Galveston Bay. *Proc. US. Nat. Mus.* **83**: 2977, 123-157.
- Durio WD and Manter HW**, (1968). Some digenetic trematodes of marine fishes of New Caledonia, part II. *Opecoelidae and Lepocreadidae.* *J.* **54**:747-756
- El-Naffar MK, Gobashy AF, El-Etreby S and Kardousha MM** (1991). Monogenea and digenetic trematodes from fish of United Arab Emirates (Arabian Gulf). *Bull. Fac. Sci., Assiut Univ.*, **20** (2 E), 301 - 308.
- El-Naffar MK, Gobashy AF, El-Etreby S and Kardousha MM** (1992) General survey of helminth parasite genera of Arabian Gulf fish (coasts of United Arab Emirates). *Arab Gulf J. Scient. Res.* **10** (2), 99-110.
- Fischthal JH and Thomas JD** (1971). Some hemiurid trematodes of marine fishes from Ghana. Families *Acanthocolpidae, Bucephalidae* and *Didymozoidae.* *Proc. Helm. Soc. Wash.* **38**: 2, 181-189.
- Gibson DJ and Bray RA** (1979). The hemiuroidea: terminology, systematics and evolution. *Bull. Brit. Mus. (Nat. Hist.). Zool. Ser.* **36**, 2.
- Hafeezullah M and Siddiqi AM** (1971). Digenetic trematodes of marine fishes of India. Part I. *Bucephalidae* and *Cryptogonimidae.* *Indian J. Helm.* **22**: 1-22.
- Hafeezullah M** (1975). Two new trematodes (*Digenea: Hemiuridae*) of marine fish from east coast of India. In: *Tiwari, KK and Srivastava CB [Eds.]. Dr. BSChauhn commemoration volume* (presented on his 60<sup>th</sup> birthday). Bhubaneswar: 203-210.
- Nahhas FM, Sey O and Nishimoto R** (1998) Digenetic trematodes of marine fishes from the Kuwaiti coasts of the Arabian Gulf: Families *Pleorchidae, Fellodistomidae* and *Cryptogonimidae*, with a description of two new species, *Neoparacryptogonimus sphericus* and *Paracryptogonimus ramadani.* *J. Helminthol. Soc. Wash.* **65** (2), 129-140.
- Overstreet R and Hockberg FG** (1975). Digenetic trematodes in cephalopods. *J. Mar. Biol. Ass. U.K.* **55**, 893-910
- Reid WA, Coil WH and Kuntz RE** (1966). Hemiurid trematodes of Formosan marine fishes: II. Subfamily *Lecithochiriinae.* *Proc. Helm. Soc. Wash.*, **32**, 100-205.
- Saoud MFA, Ramadan MM and Al Kawari KSR** (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.
- Saoud MFA, Ramadan MM and Al Kawari KSR** (1987). Helminth parasites of fishes from the Arabian Gulf. 3. On *Pseudoplagioporos microrchis*, Yamaguti, 1942 (*Digenea: Opecoelidae*). *Qatar Univ., Sci. Bull.* **7**: 171-178.
- Saoud MFA, Ramadan MM and Al Kawari KSR** (1988). Helminth parasites of fishes from the Arabian Gulf. 6. On three species of Digenetic trematodes: *Prosorhynchus epinepheli* Yamaguti, 1939; *Paraproctotrema qatariensis* n. sp. and *Prosorhynchus breviformis* Srivastava, 1936. *Rivista Di Parassitologia.* **XLIX.** 79-85
- Sey O and Nahhas FM** (1997). Digenetic trematodes of marine fishes from the Kuwait coast of The Arabian Gulf: Family *Monorchidae* Odhner, 1911. *J. Helminthol. Soc. Wash.* **64** (1), 1-8.
- Yamaguti S** (1939). Studies of helminth fauna of Japan. Part 21. Trematodes of fishes (VI). *Japanese J. Zool.* **8**, 211-230.

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