

**STUDIES ON THE TREMATODES OF THE GENUS *ENENTERUM*
LINTON, 1910 (OPECOELIDAE) AND THE GENUS
PSEUDOCREADIUM LAYMAN, 1930 (LEPOCREADIIDAE)
FROM SOME RED SEA FISH**

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ABSTRACT

The genera *Enenterum* and *Pseudocreadium* are reviewed. It is suggested that *Pseudocreadium indicum* Madhavi, 1972 should be considered a synonym of *P. balistes* Nagaty, 1942. *Enenterum pimelopteri* Nagaty, 1942, is redescribed from *Pimelopterus tahmel* and *Pseudocreadium clongata* Nagaty, 1942 is redescribed from *Acanthurus sohal* and their specific diagnosis are amended. *Enenterum ghardaguensis* n. sp. is described from *Pimelopterus tahmel* and *Pseudocreadium laymani* n. sp. is described from *Diodon hystrix*. The characters separating the two species from related species of their genera are outlined. A key to species of the genus *Enenterum* is also proposed.

INTRODUCTION

The genus *Enenterum* was established by Linton (1910), with *E. aureum* from *Kyphosus sectatrix* from Florida as the type species. The genus was reported for the first time in Red Sea fish when Nagaty (1942) described *E. pimelopteri* from *Pimelopterus tahmel* in that locality.

The genus *Pseudocreadium* was established by Layman (1930), with *P. monacanthi* from *Catherines modestus* in the Sea of Japan as the type species. Nagaty (1942) recorded the genus in the Red Sea and described three species from Red Sea fishes.

During the present investigation, trematodes belonging to the above two genera were collected from certain Red Sea fish and are described below.

MATERIAL AND METHODS

The identification of fishes as well as the methods followed in the collection, fixation and staining of trematodes are described elsewhere (Saoud and Ramadan, 1983). Drawings are made to scale using a Camera Lucida. Measurements are in millimetres, unless stated otherwise.

DESCRIPTION

1. TREMATODES OF THE GENUS *ENENTERUM* LINTON, 1910

1. *Enenterum pimelopteri* Nagaty, 1942 (Fig. 1).

The following description is based on seventeen specimens collected from two male *Pimelopterus tahmel* locally called "Tahmel" caught from Al-Ghardaga, Red Sea in April, and August, 1977.

The body is elongated, 9.1-11.65 long and 1.25-1.75 wide. The tegument is covered with sharp spines, each measuring 21-23 μ m in length. Apparently, these spines are easily shed since several specimens are lacking these spines. The length to width ratio is 5.27-8.35:1.

The oral sucker is a funnel-shaped muscular organ that measures 0.93-1.12 long and 0.54-0.75 wide. The oral opening is surrounded by a ten flower-like tegumental fringe. In some of the specimens this floral design is well extended around the oral opening while in others it is concealed inside this opening and apparently the whole structure is capable of being folded and retracted inside.

The ventral sucker is round in shape and measures 0.69-0.78 long and 0.64-0.81 wide. The relation between the oral sucker: ventral sucker diameters is 1.19-1.40:1. The ventral sucker lies 2.24-3.62 from the anterior end of the body.

The pharynx is well developed, globular in shape, 0.26-0.41 long and 0.32-0.41 wide. The prepharynx is long, measuring 0.20-0.40 long. The oesophagus measures 0.09-0.15 long. It is followed by simple intestinal caeca which become united posteriorly to form a single duct that opens outside dorsally or laterally through a small anal opening.

The testes are elongated oval in shape, smooth in outline, tandem in the posterior half of the body. The two testes are separated from each other by a very short distance. The anterior testis measures 0.97-1.17 long and 0.61-0.87 wide. The posterior testis measures 0.92-1.38 long and 0.62-0.74 wide.

The cirrus pouch is egg-shaped, 0.46-1.19 long and 0.56-1.02 wide. The cirrus pouch includes a convoluted and tubular vesicula seminalis, a short cirrus and a large number of prostate cells. The metraterm is clearly present; it ends with a female genital opening closely posterior to the male genital opening toward the right side of the cirrus pouch. The genital pore lies anterior to the ventral sucker; it is oval-shaped and measures 0.18-0.20 in diameter.

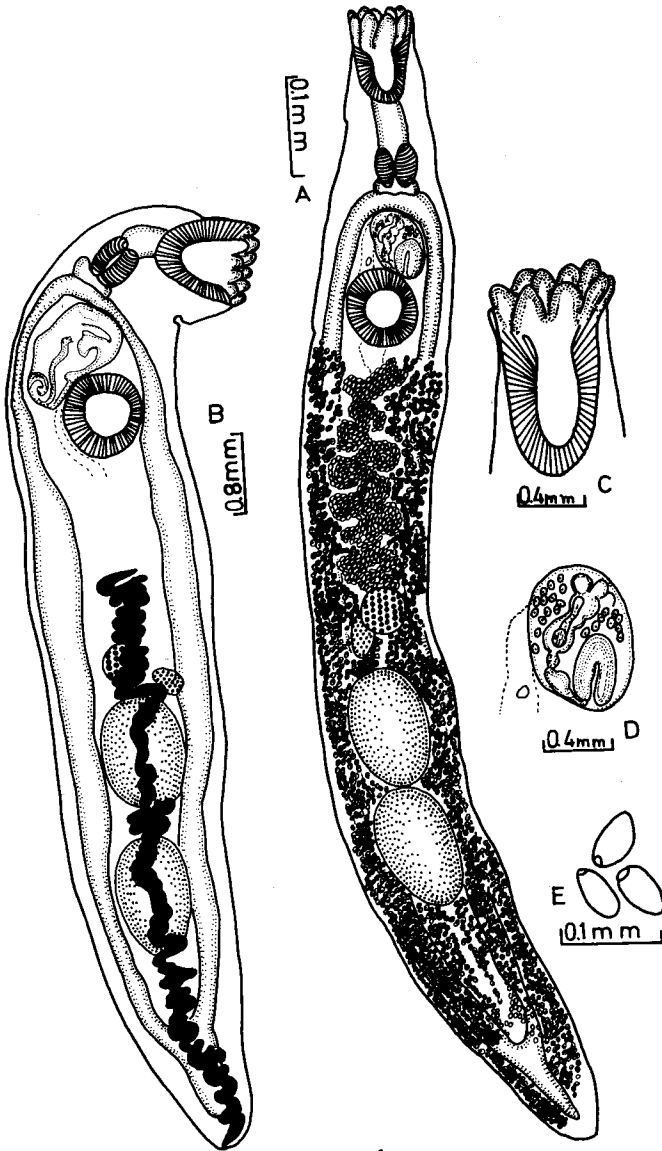


FIG.1

Figure 1. *Enenterum pimelopteri* Nagaty, 1942.

- A: Ventral view.
- B: Ventral view of an immature specimen, showing the excretory vesicle.
- C: Anterior end, showing the oral sucker lobes.
- D: Cirrus pouch.
- E: Eggs.

The ovary is spheroid with a smooth outline and situated in front of the anterior testis. It measures 0.40-0.43 long and 0.36-0.45 wide. A pear-shaped receptaculum seminis is found dorsal to ovary; it measures 0.11-0.61 long and 0.20-0.36 wide.

The vitelline gland is profligate and is composed of small spheroid or irregularly shaped follicles that are distributed into two elongated bands on either side of the body. They extend from the posterior border of the ventral sucker to the end of the body.

The uterus varies according to the maturity of the worm, being formed from few to dense coils. It is full of large yellow and blackish coloured eggs. The eggs are operculated, measuring 65-70 μm long and 28-36 μm wide, and the operculum measures 14-18 μm long 21-33 μm wide.

The excretory vesicle is a winding tubular structure and could be traced anteriorly to about the middle of the uterus. The excretory pore lies dorsally at the posterior end of the body.

2. *Enenterum ghardaguensis* n. sp. (Fig. 2)

The following description is based on twenty specimens collected from two male *Pimelopterus tahmel* locally called "Tahmel" caught from Al-Ghardaga, Red Sea in August, 1976 and April, 1977. Both *E. pimelopteri* Nagaty, 1942 and *E. ghardaguensis* n. sp. are found together in the two infected fishes.

The trematodes are deep orange in colour when fresh, but the colour fades after fixation. They are fairly large and fleshy parasites and in most of the fixed mature specimens the anterior end is strongly bent ventrally. The posterior end is considerably narrower in diameter. The body measures 4.00-5.08 long and 0.88-1.10 wide; the length: breadth ratio is 4.0-5.4:1. The tegument is entirely beset with small spines; each spine measures 13-18 μm in length.

The oral opening, which is large and triangular, is surrounded by a flower-like tegumental fringe. This fringe is divided into ten petal-like divisions, the ventral most of which are the largest. The oral sucker is composed of a well developed funnel-shaped muscular organ that measures 0.51-0.66 long and 0.36-0.41 wide.

The ventral sucker is round in shape, measures 0.50-0.56 long and 0.49-0.56 wide. The ratio of the oral sucker: ventral sucker diameters is 1.02-1.11:1. The ventral sucker lies 1.22-1.60 from the anterior end of the body.

The pharynx is well developed, globular in shape, 0.21-0.26 long and 0.26-0.31 wide. The prepharynx and oesophagus are relatively short; the prepharynx measures

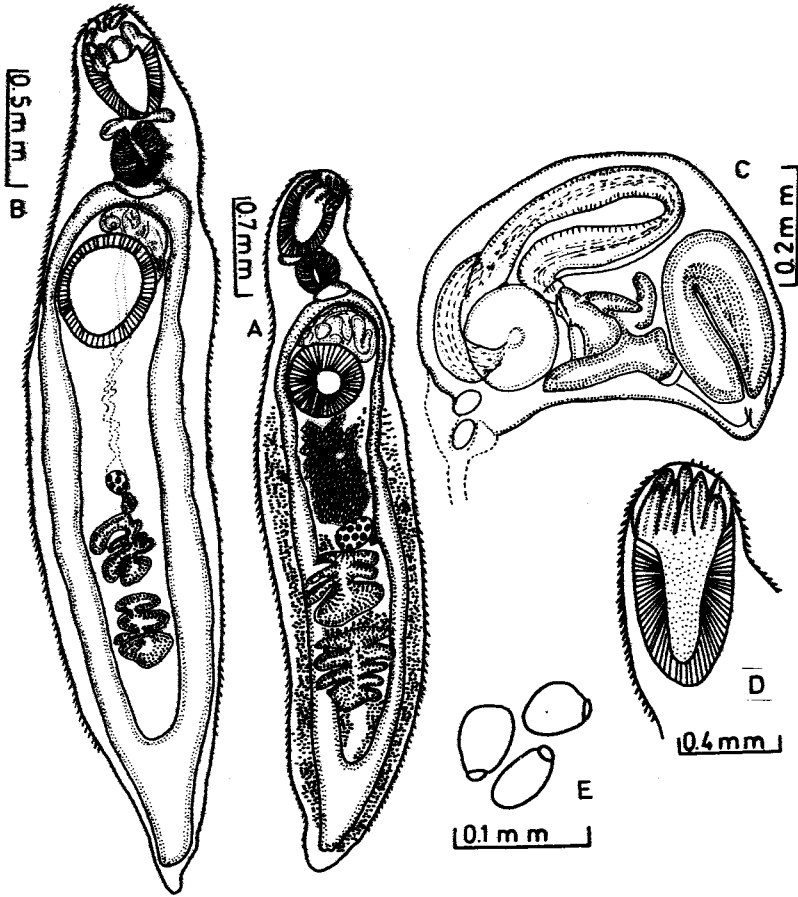


Figure 2. *Enenterum ghardaguensis* n. sp.

A: Ventral view.

B: Ventral view, immature specimen, showing lobulation of the testes.

C: Cirrus pouch

D: Anterior end, showing the oral sucker lobes

E: Eggs

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0.03-0.04 while the oesophagus measures 0.05 in length. The oesophagus leads to the two intestinal caeca which become united posteriorly to form a single duct that opens dorsally through a small anal opening.

The testes are globular, tandem, multilobulated, intercaecal in position, lying at the posterior half of the body. The two testes are separated from each other by a very short distance. The anterior testis measures 0.41-0.46 long and 0.52-0.56 wide, while the posterior testis measures 0.56-0.58 long and 0.43-0.61 wide.

The cirrus pouch is oval in shape; it lies between the intestinal bifurcation and ventral sucker and measures 0.31-0.38 long and 0.38-0.51 wide. It contains a convoluted seminal vesicle and a short bent cirrus. The metraterm is conspicuous, passing dorsally or towards the left side of the ventral sucker; it ends by the female opening that lies very close to the right side of the cirrus pouch. The genital pore is anterior to the ventral sucker, between the intestinal furca, and measures 9-11 μm in diameter.

The ovary is oval in shape and lies anterior to the testes. It measures 0.19-0.20 long 0.25-0.30 wide. A well developed receptaculum seminis is present; it lies to the left side of the ovary and measures 0.06-0.08 long and 0.15-0.20 wide.

The vitelline gland is profligate and is composed of small spheroid or irregularly shaped follicles that are formed into two elongated bands on either side of the body. They extend from the posterior border of the ventral sucker to the end of the body.

The uterus occupies a median position in the anterior part, in front of the ovary. The eggs are oval in shape, containing fine granules of vitelline follicles. They are operculated and measure 62-65 μm long and 34-36 μm wide and the operculum is 9-13 μm long and 15-18 μm wide.

The distal end of the excretory vesicle is a simple tubular structure that opens at the posterior end through the excretory pore which is slightly dorsal in position.

DISCUSSION

Linton (1910) established the genus *Enenterum* to accommodate *E. aureum* from *Kyphosus sectatrix* from Florida.

Hopkins (1934) pointed out that *Enenterum* was not closely related to papillose Allocreadiidae, but included it in Lepocreadiidae in spite of lacking pigmented eye-spots, even in young specimens. Manter (1947) concluded that perhaps it belonged to the Opecoelidae Ozaki, 1925 although it had a spiny tegument, seminal receptacle, and large prostatic gland.

Dollfus (1946) described three species of trematodes which he included in the genus *Enenterum*. The first viz. *E. pseud aureum* belongs to the subgenus *Enenterum*, while two other subgenera were established to accommodate the two other species viz. *E. cadenatella* and *E. brumpti* respectively.

Manter (1947) redescribed *E. aureum* Linton, 1910 from the *Kyphosus sectatrix* and *K. incisor* and amended Linton's description for this species. Manter also suggested that *E. pseud aureum* Dollfus, 1946 should be considered as a synonym of *E. pimelopteri* Nagaty, 1942.

Yamaguti (1958) raised the subgenera *Cadenatella* Dollfus, 1946 and *Jeancadenatia* Dollfus, 1946 to the generic rank and included these two genera together with the genus *Enenterum* in the subfamily Enenteriine Yamaguti, 1958.

Nahhas (1964) and Nahhas and Cable (1964) suggested that *Enenterum* and related genera have many features in common with the Haploporoidae, but they prefer, in the absence of the life-history, to include them in the Lepocreadiidae.

Skrjabin and Koval (1966) established the family Enenteriinae to include *Enenterum*, *Cadenatella* Dollfus, 1964, *Koseiria* Nagaty, 1942 and *Proenenterum*, Manter, 1954. However, Yamaguti (1971) arranged the trematode families on the basis of life history information of the digenetic trematodes. Accordingly, the genus *Enenterum* has been placed under the family Opecoelidae Ozaki, 1925. Moreover, he described two species from the Hawaiian fishes viz.; *E. elongatum* Yamaguti, 1970 in *Kyphosus cinerascens* and *E. kyphosi* Yamaguti, 1970 from the same host.

Fischthal and Thomas (1970) and Gomes, Fabio and Rolas (1974) concluded the synonymy of *Enenterum pseud aureum* Dollfus, 1946 with *E. pimelopteri* Nagaty, 1942.

Hafeezullah (1977) gave brief notes on the systematic position of the genera *Enenterum*, *Cadenatella* and *Jeancadenatia*. He distinguished *Cadenatella* and *Jeancadenatia* from each other by the type and structure of oral lobes, body form and the presence or absence of a long oesophagus. Moreover, he added without description *Enenterum manaarensis* from *Kyphosus cinerascens* to those species known so far from the genus *Enenterum*.

Bray (1978) reviewed the genus *Enenterum* and pointed out the features which differentiated it from the related genera. Moreover, Bray described another two species from the South-Western Indian Ocean; these included *Enenterum elsti* Bray, 1978 from *Neoscorpis lithophilus* and *E. prudhoei* Bray, 1978 also from the *N. lithophilus*.

An unnamed species of *Enenterum* was briefly described, but not figured, by Ichihara (1969) from *Kyphosus lembus* at Katsuura on the Pacific Coast of Japan.

Enenterum pimelopteri Nagaty, 1942 was originally described from *Pimelopterus tahmel* in the Red Sea. In the present investigation *E. pimelopteri* was recorded from the same host. The present material is similar to Nagaty's specimens in the main characteristics but there are certain minor differences in the body length, suckers ratio, oesophagus length and the extension of the excretory vesicle. Thus, the specific diagnosis of *E. pimelopteri* is amended as follows:

Body length 5.05-11.65 x 0.71-1.75. Length/width ratio 5.27-8.35:1. Oral sucker 0.39-1.12 x 0.52-0.93. Ventral sucker 0.50-0.78 x 0.64-0.86. Oral sucker to ventral sucker ratio 0.78-1.40:1. Ventral sucker 2.24-3.62 from anterior extremity. Prepharynx 0.20-0.40 in length. Pharynx 0.26-0.54 x 0.26-0.81. Oesophagus 0.09-0.15 in length. Anterior testis 0.43-1.80 x 0.39-0.81. Posterior testis 0.43-1.18 x 0.39-0.74. Cirrus pouch 0.46-1.19 x 0.56-1.02. Ovary 0.27-0.43 x 0.36-0.54. Receptaculum seminis 0.11-0.61 x 0.20-0.36. Eggs 57-70 μm x 28-44 μm . The excretory vesicle reaches anteriorly the middle of the uterus.

Species : *Enenterum pimelopteri* Nagaty, 1942

Host : *Pimelopterus tahmel*.

Location : Intestine.

Locality : Al-Ghardaga, Red Sea.

Enenterum ghardaguensis n. sp. differs from all the known species of the genus *Enenterum* in the characteristic multilobulated testes and the reduced prepharynx and oesophagus.

It can be differentiated from *E. aureum* Linton, 1910 by the ratio of oral sucker/ventral sucker, certain body measurements, and the position of the ventral sucker, and from *E. kyphosi* Yamaguti, 1970 by the entire ovary, nature of oral sucker lobes, reduced prepharynx and distribution of vitellaria.

E. ghardaguensis n. sp. can be distinguished from *E. elsti* Bray, 1978 by number of the oral sucker lobes, shape of oral sucker and the multilobed testes. and from *E. prudhoei* Bray, 1978 by the body shape, oral sucker/ventral sucker ratio, distribution of vitellaria and the multilobed testes.

Finally, *E. ghardaguensis* n. sp. differs also from *E. pimelopteri* Nagaty, 1942 mainly by the smooth testes, length of oesophagus and the ratio of oral sucker/ventral sucker as well as the shape of the cirrus.

The writers believe that all these differences are sufficient to designate *E. ghardaguensis* as a new species.

Species : *Enenterum ghardaguensis* n. sp.

Host : *Pimelopterus tahmel*

Location : Intestine.

Locality : Al-Ghardaga, Red Sea.

Types : Holotype deposited in the Helminthological Collection Department of Zoology, Ain Shams University and paratype to be deposited in U.S. National museum.

The following key is proposed to differentiate the species belonging to the genus *Enenterum* Linton, 1910.

1. Oral lobes apically bifid 2
Oral lobes not apically bifid 3
2. Ovary lies directly anterior to anterior testis and testes without inter-testicular space *E. kyphosi* Yamaguti, 1970
Ovary lies a long distance anterior to anterior testis and testes with inter-testicular space *E. elongatum* Yamaguti, 1970
3. Oral lobes are 6 *E. manaarensis* Hafeezullah, 1977
Oral lobes are 7 *E. elsti* Bray, 1978.
Oral lobes are more than 7 4.
4. Testes smooth in outline 5
Testes otherwise 6
5. The ovary lies in front of the anterior testis, testes normal in size and the vitelline follicles are numerous and do not reach to the level of the ventral sucker... *E. pimelopteri* Nagaty, 1942.
The ovary lies towards the right side of the anterior testis, testes occupy much of the hindbody width and the vitelline glands are large in size and reach to posterior third of the ventral sucker *E. prudhoei* Bray 1978.
6. Testes strongly lobulated, the prepharynx and oesophagus short, cirrus bent ... *E. ghardaguensis* n. sp.
Testes slightly indented in outline, the prepharynx long, cirrus straight... *E. aureum* Linton, 1910

II. TREMATODES OF THE GENUS *PSEUDOCREADIUM* LAYMAN, 1930.

1. *Pseudocreadium elongata* Nagaty, 1942 (Fig. 3)

The following description is based on three specimens collected from a male *Acanthurus sohal*, locally called "Sohal" caught from Al-Ghardaga, Red Sea in May, 1977.

The body is elongate, tapering anteriorly and rounded posteriorly. The tegument is provided with a large number of sharp spines, measuring 18-23 μm in length. The body length measures 1.03-1.35 while the body width is 0.55-0.70. The length/width ratio is 1.87-1.92:1.

The oral sucker is subterminal, round in shape and measures 0.12 in diameter. The prepharynx is present and measures 0.01-0.02 in length. The pharynx is elongated muscular; it measures 0.07-0.08 long and 0.06-0.07 wide.

The pharynx is followed by a relatively long oesophagus measuring 0.05-0.07 in length. The intestinal caeca are simple and non-wavy and terminate a short distance from the posterior end of the body.

The ventral sucker is fairly round in shape, situated at the posterior half of the body. It measures 0.19-0.21 long and 0.21 wide. The oral sucker/ventral sucker is 0.57-0.62:1.

The testes are globular and more or less largely indented. They are obliquely situated or slightly tandem at about the middle of the posterior half of the body. The right testis is always in front of the left one; it measures 0.16-0.17 long and 0.10-0.17 wide while the left testis measures 0.12-0.16 and 0.13-0.17 wide.

The cirrus pouch is well developed, lies on the left side of and posterior to the ventral sucker and measures 0.39-0.46 long and 0.13-0.14 wide. It contains at its posterior end a highly convoluted vesicula seminalis, few cells of pars prostatica while at the proximal end a clear cirrus is present. The genital pore is round in shape; it lies anterior to the ventral sucker.

The ovary is four to five-lobed, pre-testicular and measures 0.08-0.11 long and 0.10-0.13 wide. There is large receptaculum seminis which lies postero-lateral to the ovary; it measures 0.18-0.21 long and 0.10-0.12 wide. The vitelline glands are composed of two lateral sets of large follicles found external as well as internal and dorsal as well as ventral along the whole length of the intestinal caeca.

The uterus occupies the intercaecal area to the left of the median plane and anterior to the receptaculum seminis. It contains a few large operculated eggs that measure 90-103 μm long and 49-52 μm wide.

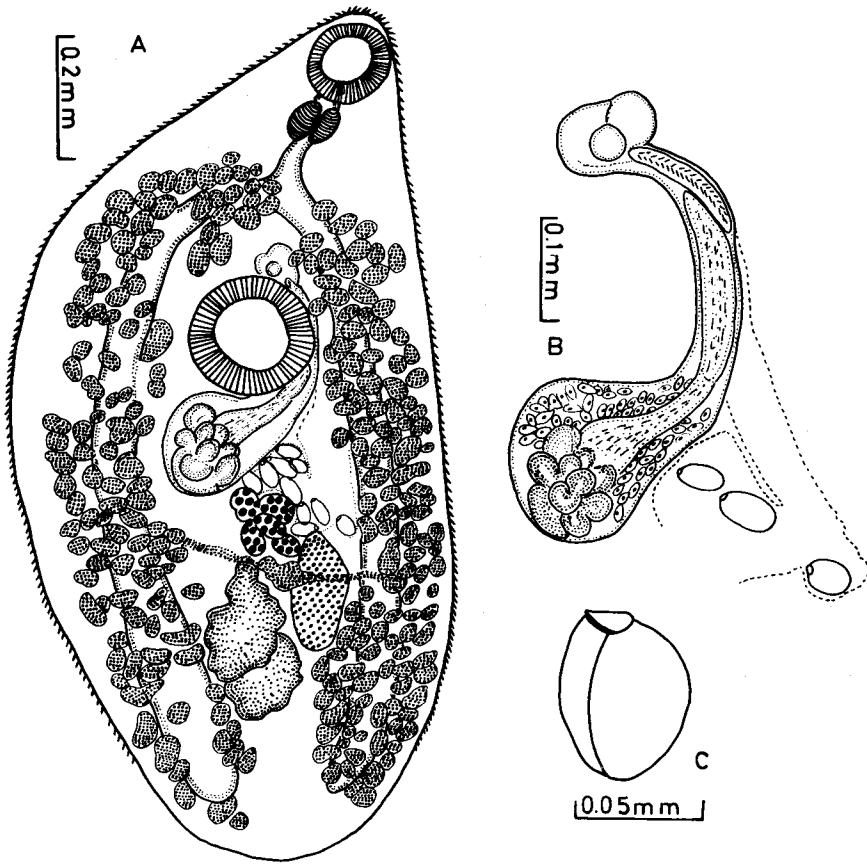


Figure 3. *Pseudocreadium elongata* Nagaty, 1942

- A: Ventral view
- B: Cirrus Pouch.
- C: Egg.

2. *Pseudocreadium laymani* n. sp. (Fig. 4)

The following description is based on five specimens collected from a male *Diodon hystrix* locally called "Shakaa" caught from Al-Ghardaga, Red Sea in August, 1977. The new species is named after the founder of the genus *Pseudocreadium*, E.M. Layman.

The body is elongate with rounded anterior end whereas the posterior end has a concavity in the region of excretory pore. The tegument is smooth, without tegumental spines. It measures 1.35-1.77 long and 0.73-0.98 wide. The length/width ratio is 1.8:1.

The oral sucker is subterminal, fairly round in shape and measures 0.25-0.27 long and 0.25-0.29 wide. The prepharynx is short and measures 0.05-0.07 in length. The pharynx is globular, measuring 0.17-0.18 long and 0.12-0.19 wide.

The oesophagus is almost absent. The intestinal caeca are long, curved, and end blindly near the posterior end of the body. The ventral sucker is transversely oval in shape, larger than the oral sucker and measures 0.30-0.41 in diameter. It is situated 0.83-1.23 from the anterior end of the body. The oral sucker/ventral sucker is 0.83-0.90:1.

The testes are globular or elongated-oval in shape and smooth in outline. They are obliquely situated in the posterior fourth of the body. The right testis measures 0.16-0.18 long and 0.28-0.31 wide, and the left testis measures 0.8-0.25 long and 0.13-0.21 wide.

The cirrus pouch is elongated; it is situated medially between the ventral sucker and intestinal bifurcation and measures 0.21-0.28 long and 0.08-0.10 wide. The vesicula seminalis is divided into three portions: two found inside the cirrus pouch and a third one outside. Anterior to the internal seminal vesicle there is a subspherical pars prostatica, and a short cirrus at the distal end. The genital pore is round in shape; it is found posterior to the intestinal bifurcation.

The ovary is round in shape, lies anterior to the right testis and measures 0.11-0.14 long and 0.12-0.14 wide. There is a large receptaculum seminis found anterior to the ovary; it measures 0.17 long and 0.05 wide. The vitellaria are profuse and composed of numerous follicles distributed from the level of pharynx to the posterior end of the body.

The uterus is light, contains 4-7 large ova; it lies between the right testis and cirrus pouch. The eggs are yellowish in colour, oval in shape and operculated; they measure 62 μ m long and 39 μ m wide.

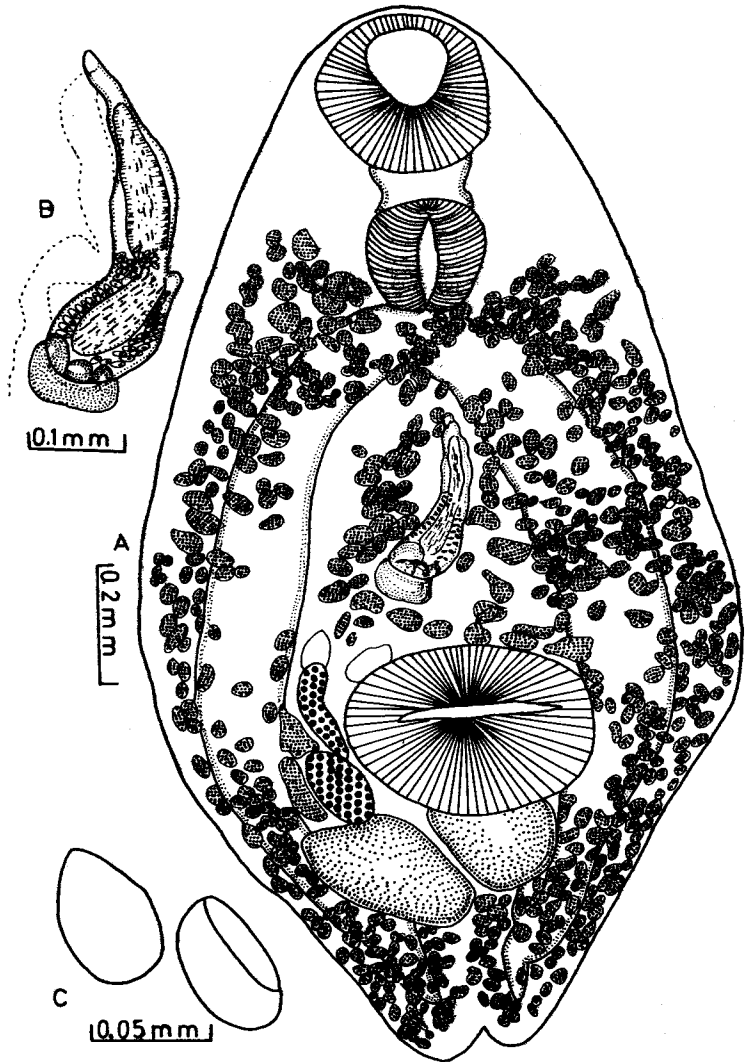


FIG. 4

Figure 4: *Pseudocreadium laymani* n. sp.

- A: Ventral view
- B: Cirrus pouch
- C: Eggs

DISCUSSION

Layman (1930) established the genus *Pseudocreadium* with *P. monacanthi* Layman, 1930 from *Catherines modestus* in the Sea of Japan as the type species.

Ozaki (1936) described the genus *Lepocreadium* to include *L. skrjabini* Ozaki, 1936 from *Catherines modestus* and *L. vitellosum* Ozaki, 1936 from *Goniistius zonatus*. He also established the genus *Hypocreadium* to include *H. symmetrorchis* Ozaki, 1936 from *Monocanthus cirrhifer* from Japan.

Yamaguti (1938) described *Hypocreadium patellare* from *Monocanthus cirrhifer* and considered *Leptocreadium* Ozaki, 1936 as a synonym of *Pseudocreadium* Layman, 1930. Manter (1940) and Arai (1962) concluded that *Hypocreadium* Ozaki, 1936 should be considered as a synonym to *Pseudocreadium* Layman, 1930. However, Yamaguti (1958) refused Manter's conclusion and preferred to retain the genus *Hypocreadium* Ozaki, 1936 as a separate genus which could be easily separated from other related genera according to the position of genital pore, ovary and prostate cells as well as the extension of the excretory vesicle.

Manter (1946) considered the genus *Trigonotrema* Goto and Ozaki, 1926 a synonym of *Pseudocreadium* on the basis of location of the genital pore, characteristics of the cirrus sac and external seminal vesicle, symmetrical testes and inter-testicular ovary.

Pritchard (1960) established the genus *Preptetos* for a new species described by her as well as two other species originally described in the genus *Lepocreadium*. These included : *P. caballeroi* Pritchard, 1960, *P. xesuri* (Yamaguti, 1940) and *P. elongata* (Nagaty, 1942). Pritchard believed that the genus *Preptetos* could be distinguished from *Lepocreadium* Stossich, 1904 on the basis of shape of the body, lobulation of the ovary, diagonal position of testes, short more or less rounded external seminal vesicle and position of uterus. The present writers believe that these characteristics normally occur within the range of species belonging to the same genus. Moreover, the characteristics of the genus *Preptetos* are closely related to the genus *Pseudocreadium* (Table 1). Accordingly, it is suggested that the genus *Preptetos* Pritchard, 1960 should be considered a synonym of *Pseudocreadium* .

Madhavi (1972) established that the genus *Lobatocreadium*, might be related to the genus *Pseudocreadium*. *Lobatocreadium* Madhavi, 1972 had a large pharynx with lobed anterior margin, testes tandem or dorsoventral and a follicular ovary with two symmetrical groups of follicles. He also described *Pseudocreadium indicum* Madhavi, 1977 from *Monocanthus chirocephalus*. The genus *Pseudocreadium* Layman, 1930 has been placed by Yamaguti (1971) under the family Lepocreadiidae (Odhner, 1905) Nicoll, 1935.

Table 1

A comparison between genera *Preptetos*, *Lepocreadium* and *Pseudocreadium*

Characters	<i>Lepocreadium</i> Stossich, 1904	<i>Pseudocreadium</i> Layman, 1930	<i>Preptetos</i> Pritchard, 1960
Body Shape	rather plump, small	oval, pyriform, elliptical and sometimes round	fusiform
Caeca	reach to post- erior extremity	reach to post- erior end	reach to post- erior end
Ovary Testes	not lobed tandem or diagonal	lobed or not diagonal	lobed diagonal
Cirrus pouch	usually extending further backward than acetabulum	infront of aceta- bulum with its posterior end, overlapping the ventral sucker or not	infront of aceta- bulum and may extend posteriorly to the aceta- bulum
Seminal vesicle	external	external and internal	external
Genital pore	antero-lateral to acetabulum	near intestinal bifurcation	near anterior margin of aceta- bulum.
Vitellaria	in hindbody, may intrude into forebody	profusely dev- eloped along caeca	profusely developed along caeca
Uterus	between ovary or anterior testis and acetabulum	between ovary or anterior testis and acetabulum.	confined to left side of the body.

Nagaty (1942) described three species of the genus *Pseudocreadium* in Red Sea fishes. These included : *P. sohali* Nagaty, 1942 from *Acanthurus sohal*, *P. balistes* Nagaty, 1942 from *Balistes aculeatus* and *P. elongata* Nagaty, 1942 from *Acanthurus sohal*. Recently, Parukhin (1970) re-described *Pseudocreadium balistes* Nagaty, 1942 from *Abalistes stellaris* in the Red Sea. *P. ghanensis* Fischthal and Thomas, 1970 was also described from *Drepane punctata* and *Cynoscion macrogathus* from coastal waters of Ghana.

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In Table (2) a comparison between *P. balistes* Nagaty, 1942 and *P. indicum* Madhavi, 1972, is given. Except for the slightly irregular margin of the testes and the indented ovary - a character which has been observed only in a few specimens as Madhavi reported - and the doubtful presence of an egg operculum in *P. indicum*, the two species are so much alike. Accordingly, it is suggested that *P. indicum* Madhavi, 1972 should be considered as a synonym of *P. balistes* Nagaty, 1942.

It is obvious from the above description of *Pseudocreadium elongata* Nagaty, 1942 from *Acanthurus sohal* that the present material is similar in the main characteristics to the same species described by Nagaty from the same host, except for the presence of small indentation on the circumference of the testes, and minor differences in certain measurements.

Table (2)
A comparison between *P. balistes* and *P. indicum*

Characters	<i>P. balistes</i> Nagaty, 1942	<i>P. indicum</i> Madhavi, 1972
Body shape	Circular, broader than long	disc-like, broader than long
Length	0.66-1.65	0.99-1.50
Width	0.73-1.79	1.20-1.60
Length/Width	0.9:1	0.9:1
Tegument	smooth, with folded lateral edges	smooth, with folded lateral edges
Oral sucker	0.07-0.14	0.13-0.16
Ventral sucker	0.09-0.18	0.14-0.16
Oral sucker/ Ventral sucker	1:1.28	1:1.10-1.20
Ventral sucker position	in anterior half of body length	in anterior half of body length
Prepharynx	absent	absent
Pharynx	0.05-0.10 long	0.07-0.14 x 0.07-0.11
Oesophagus	nearly as pharynx length	nearly as pharynx length

Contd. Table (2)
A comparison between *P. balistes* and *P. indicum*

Characters	<i>P. balistes</i> Nagaty, 1942	<i>P. indicum</i> Madhavi, 1972
Testes	symmetrical, smooth at middle third, ovoid, and intercaecal	symmetrical, smooth or irregular margin, at middle third, globular and intercaecal.
Right testis	0.11-0.14 x 0.20-0.27	0.24-0.37 x 0.21-0.27
Left testis	0.11-0.16 x 0.20-0.27	
Cirrus pouch	elongate, anterior to ventral sucker	elongate, anterior to ventral sucker, 0.29-0.40 x 0.08-0.10.
Genital pore	anterior to intestinal caeca	anterior to intestinal caeca
Vesicula seminalis	internal and the external, is dextral to the ventral sucker	internal and the external, is dextral to the ventral sucker.
Ovary	compact, between testes, 0.10-0.22 x 0.04-0.14	compact or indented, 0.11-0.16 x 0.13-0.40.
Receptaculum seminis	elongated, anterior to ovary	elongated, anterior to ovary
Vitellaria	two large lateral groups, intra and extra - caecal; they extended from pharynx level to posterior extremity and overlapped posteriorly.	two large lateral groups, intra and extra - caecal; they extended from pharynx level to posterior extremity and overlapped posteriorly.
Eggs	68-86 x 45-59 μ m, operculate	62-66 x 35-39 μ m.
Host	<i>Balistes aculeatus</i>	<i>Monacanthus choirocephalus</i>
Locality	Red Sea.	India.

In view of the above description of *P. elongata*, the specific diagnosis of the species is amended as follows:

Body elongate, tegument spined. Body length 1.03-1.55 and body width 0.55-0.95. Oral sucker 0.10-0.12 x 0.12-0.14. Ventral sucker 0.14-0.21 x 0.21-0.24. Oral sucker/ventral sucker ratio 0.57-0.70:1. Ventral sucker lies at posterior half of the

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body. Prepharynx 0.01-0.02. Pharynx 0.06-0.08 x 0.06-0.09. Oesophagus length 0.05-0.07. Testes, smooth or indented, right testis 0.14-0.17 x 0.10-0.20, left testis 0.12-0.17 x 0.13-0.25. Cirrus pouch 0.39-0.46 x 0.13-0.14. Genital pore between acetabulum and intestinal bifurcation. Vitellaria around intestinal caeca. Receptaculum seminis 0.18-0.21 x 0.10-0.12. Eggs operculated, 86-104 x 45-59 μ m.

Species : *Pseudocreadium elongata* Nagaty, 1942

Host : *Acanthurus sohal*

Location : Intestine

Locality : Al-Ghardaga, Red Sea.

Pseudocreadium laymani n. sp. is different from *P. sohal* Nagaty, 1942 *P. balistes* Nagaty, 1942 and *P. elongata* Nagaty, 1942 in the position of the ventral sucker, position of the cirrus pouch, non-lobed ovary and the size of eggs as well as the arrangement of vitellaria.

Of the species having a pre-testicular uterus, *P. laymani* n. sp. resembles *P. sohal* Nagaty, 1942, *P. spinosum* Manter, 1940 and *P. lactophrysi* Nahhas and Cable, 1964. However, it differs from *P. sohal* in the location of the ovary away from the acetabulum and the body shape, oesophagus length and the shape of intestinal caeca; from *P. spinosum* in the suckers ratio and distribution of vitellaria and from *P. lactophrysi* by position of the ventral sucker and arrangement of gonads.

Finally, the new species can also be differentiated from *P. ghanensis* Fischthal and Thomas, 1970 by the post-bifurcal location of the acetabulum, in having the post acetabular vitelline glands, and the caeca lying dorsal to testis rather than lateral to them.

The writers believe that all the above differences are sufficient to designate *Pseudocreadium laymani* as a new species.

Species : *Pseudocreadium laymani* n. sp.

Host : *Diodon hystrix*

Location : Intestine.

Locality : Al-Ghardaga, Red Sea.

Types : Holotype deposited in the Helminthological Collection, Department of Zoology, Ain Shams University and Paratype to be deposited in U.S. National Museum.

REFERENCES

- Arai, H.P. 1962.** Trématodes digéneos de peces marinos de Baja California, Mexico. An. Instituto de Biologia, Mexico. 33 : 113-130.
- Bray, R.A. 1978.** Two new species of *Enenterum* Linton, 1910 (Digenea) in the marine fish *Neoscorpis lithophilus* (Kyphosidae) from the South-Western Indian Ocean. J. Helminth. 52: 131-139.
- Dollfus, Ph. 1946.** Sur trois espèces de ditome, dont une a 17 ventouses *Enenterum* (*Jeancadenatia*) *brumpti* n. sp. parasites du poisson marin *Kyphosus sectatrix* (L.). Ann. Parasit. 21: 119-128.
- Fischthal, J.H. and Thomas, J.D. 1970.** Digenetic trematodes of marine fishes from Ghana; Family Lepocreadiidae. J. Helminth. 44: 365-386.
- **1972.** Digenetic trematodes of marine fishes from Senegal. Bulletin de l'Institute fondamentale d'Afrique Noire, Ser. A. Sci. nat., 34: 292-322.
- Gomes, D.C., Fabio, S.P. and Rolas, F.J.T. 1974.** Contribution to the knowledge of parasites of fish from the Guanabara Littoral. 2. Mémoires do Institute Oswaldo Cruz. 72 : 9-19.
- Hafeezullah, M. 1977.** Two digenetic trematodes of a marine fish *Kyphosus cinerascens* (Forskal), from the Gulf of Manaar with a note on the systematic position of the genera *Enenterum*, Linton, 1910, *Cadenatella* Dollfus 1946 and *Jeancadenatia* Dollfus, 1946. In: Abstracts, 1st Nat. Cong. of Parasit., India.
- Hopkins, S.H. 1934.** The papillose Allocreadiidae. III. Biol. Monogr. 13 (2) 79 pp.
- Ichihara, A. 1969.** *Enenterum* spp. of rudder fish, *Kyphosus lembus*, from Katsura, Pacific Coast, Japan. Jap. J. Parasit., 18: 664-665.
- Layman, E.M. 1930.** Parasitic worms from the fishes of Peter the Great Bay. Bull. Pacif. Scient. Fish. Res., 3: 1-120.
- Linton, E. 1910.** Helminth fauna of the Dry Tortugas. II. Trematodes, Carn. Inst. Wash. Publ. No. 133, 98pp.
- Madhavi, R. 1972.** Digenetic trematodes from marine fishes of Waltair Coast, Bay of Bengal. 1. Family Lepocreadiidae. J. Parasit. 58 217-255.
- Manter H.W. 1940.** Digenetic trematodes of fishes from the Galapagos Islands and the neighbouring Pacific Rep. Allan Hancock Pacif. Exp. 2 (14): 325-497.

- 1946. *Dermadena lactophrysi* n. gen., n. sp. (Trematoda: Lepocreadiidae) and consideration of the related genus *Pseudocreadium*. J. Parasit. 31, 411-417.
- 1947. The digenetic trematodes of marine fishes of Tortugas, Florida Amer. Midl. Nat. 38: 257-416.
- Nagaty, H.F. 1942.** Trematodes of fishes from the Red Sea. III. On seven new allocreadiid species. Public. Mar. Biol. Stat. Al-Ghardaga, (Red Sea) 4, 27 pp.
- Nahhas, F.M. 1964.** Digenetic trematodes from marine fishes of Curacao and Jamaica. Dissertation Abstracts. 24 (12, pt. I), 5626-5627.
- Nahhas, F.M. and Cable, R.M. 1964.** Digenetic and aspidogastrid trematodes from marine fishes of Curacao and Jamaica. Tulane Stud. Zool. II: 167-228.
- Ozaki, Y. 1936.** Two new genera of the trematodes Family Allocreadiidae. (Jap. text with English summary). Zool. Mag. 48: 513-518.
- Parukhin, A.M. 1970.** Study of the trematode fauna of fish in the Red Sea and Gulf of Aden. Biologiya Marya, Kiev. 20: 187-213.
- Pritchard, M.H. 1960.** *Preptetos caballeroi* n. gen. n. sp. and *Labrifer tertius* n. sp. (Trematoda; Lepocreadiidae) from fishes of Hawaii. Libro Homenaja al Dr. Edwardo Caballero Y. Caballero, Jubilee 1930-1960, 245-251.
- Saoud, M.F.A. and Ramadan. M.M. 1983.** Studies on digenetic trematodes of some Red Sea fish 1, General Survey. Qatar Univ. Sci. Bull. 3: 141-167.
- Skrjabin, K.I. and Koval, V.P. 1966.** Family Enenteride Skrjabin et Koval, 1965. In Skrjabin, K.I. (ed). Trematodes of animals and man. Principles of trematology. Moscow. 22: 479-506.
- Yamaguti, S. 1938.** Studies on the helminth fauna of Japan. Part 21. Trematodes of fishes, IV Publ. by author, 139 pp.
- 1958. Systema helminthum. I. The digenetic trematodes of vertebrates. Interscience Publ. 1-979.
- 1970. Digenetic trematodes of Hawaiian fishes. Keigaku publishing Co., Tokyo, Japan. 436 pp.
- 1971. Synopsis of digenetic trematodes of Vertebrates, Vol. I Keigaku Publishing Co., Tokyo, Japan. 1174 pp.

دراسات على ديدان التريماتودا من جنسي إنفترم وسودوكريديم في بعض أسماك البحر الأحمر

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قام المؤلفان بتقديم عرض تاريخي تحليلي وتصنيفي لكل من جنسي إنفترم وسودوكريديم . ورأى المؤلفان أن كل من س . إنديكم ، س . باليستس متشابهين بشكل واضح ، ومن ثم اقترحا اعتبارهما مترادفين . كما أعيد وصف وتشخيص كل من إ . بيموليبترى ، س . الونجاتا ، وعدل تشخيصهما النوعي . وقد وصف المؤلفان نوعين جديدين هما : إ . غردقنسيس ، س . ليماني في الأسماك من نوع ديودن هستريكس ، وقورن النوعان الجديدان بالأنواع المشابهة ، واقترح دليل تصنيفي لتمييز الأنواع المختلفة في جنس إنفترم .