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A REVIEW OF THE TREMATODE GENUS LECITHOBOTRYS (HAPLOPORIDAE), WITH REDESCRIPTION OF LECITHOBOTRYS PUTRESCENS LOOSS, 1902 AND LECITHOBOTRYS HELMYMOHAMEDI N. SP. FROM SOME EGYPTIAN LAKE QARUN FISHES.

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SUMMARY: The genus *Lecithobotrys* Looss, 1902 briefly reviewed. *L. putrescens* Looss, 1902, is redescribed from *Mugil cephalus*, *M. chelo* and *M. capito*, caught from brackish Lake Qarun in Egypt, all are new hosts and locality records. Moreover, *L. helmymohamedi* n. sp. was described from *M. cephalus* and *M. capito*. The new species differs from other related species of the genus by the size and numbers of vitelline follicles, the body shape, the length of the oesophagus and the shape of the intestinal caeca. A key is presented to distinguish between the species known so far from the genus *Lecithobotrys*.

INTRODUCTION

Lake Qarun, is an inland closed basin of about 40km long and 5.7 km width, with an average depth of 4.2 m (Morcos and Meshal, 1984). It lies in an arid region occupying the deepest part of Fayoum depression in the Western Desert. The lake receives only brackish water annually estimated to be as much as 390 million cubic meter which conveys about 430000 tons of salts

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to the lake each year (Meshal, 1973). A volume of water nearly equal to that of drainage influx is lost through evaporation and as a result the salinity of the water increases continuously as time passes.

The fish fauna of the lake was drastically affected by the increased salinity and those of freshwater origin gradually disappeared from the lake fauna. The only species from the original freshwater fauna that stil exists in the lake is *Tilapia zillii* which naturally resists salinity (Khalil, 1978). No parasitological investigation has been reported on fishes of the lake with the single exception of a record of a parasitic copepod on the gills of *T. zillii* and *Mugil* spp. by Khalil (1978).

Looss (1902) established the genus *Lecithobotrys* for those Haploporid trematodes having short and wide ceca, extending back beyond the ventral sucker to the posterior border of the testis. Bifurcation of the intestine dorsal to the ventral sucker. Genital pore in front of the intestinal bifurcation. Testis median, not far behind the ventral sucker, between the caeca. Ovary median, in front of the testis. Vitellaria formed of seven spherical follicles on each side lateral to the middle of the caeca. Uterus with descending and ascending limbs, much folded in the posterior region behind the caeca and the gonads. Eggs very numerous, each containing a miracidium with eye - spots. *L. putrescens* Looss 1902 from *Mugil auratus* collected from Triest was designated as the type species of the genus.

Sharma and Gupta (1970) added *L. vitellosus* in *Mugil parsia* from India. Martin (1973) added *L. sprenti* from *Liza argentes* and *Mugil cephalus* from Australia. Szidat (1954) established the genus *Saccocoelioides* to include *S. magniovatus* szidat, 1954 from *Leporinus obtusidens* from Argentina: However, Martin (1973) agreed with Overstreet's opinion (1971) and transferred *S. magniovatus* to the genus *Lecithobotrys*, on the basis of the presence of eye-spotted

miracidia and the more restricted distribution of vitellaria than in the type species of the genus *saccocelioides*.

Yamaguti (1971) arranged the trematode families on the basis of life history information of the digenetic trematodes. Accordingly, the genus, *Lecithobotrys* has been placed under the family Haploporidae Nicoll, 1914. Moreover, he divided the genus into two subgenera depending on the arrangement of the vitelline follicles and extension of caeca as follows:

1. Vitelline follicles massed together, forming symmetrical bunches; ceca usually short..... .....*(Lecithobotrys)* looss, 1902.

2. Vitelline follicles rather scattered; caeca long .....*(paralecithobotrys)* Freitas ,1984 He also listed L. putrescens Looss, (Type species) under the subgenus *Lecithobotrys* and *L. brasilienois* Freitas, 1948 (Type species) and *L. africanus* Manter and Pritchard, 1964 under the subgenus *paralecithobotrys*.

MATERIAL AND METHODS

Fishes were collected at the Marine Biological Station of Qarun Lake. Most of the fishes were alive and identified using four standard references by Boulenger (1907), Sandon (1950), Latif (1974) and Boraey (1974) . The fishes were dissected and examined for helminth parasites. The parasites were fixed in cold or hot 70% alcohol after relaxation. They were stained using Harris's alum hematoxylin, Mallory triple stains (Wessner, 1968) and Gower's carmine (Johri and Smyth, 1956). Drawings were made to scale using a camera lucida. All measurements in millimeters unless stated otherwise. During the present investigation, the authors recorded trematodes belonging to the genus *Lecithbotrys* looss, 1902 from *Mugil cephalus*,

M. capito and *M. chelo* caught from Lake Qarun.

RESULTS AND DESCRIPTIONS

1. *Lecithobotrys (Lecithobotrys) putrescens* Looss, 1902 (Fig 1). The following description is based on seventy five specimens collected from *Mugil cephalus, M. chelo* and *M. capito* locally called "Bouri, Halilli and Tobar" respectively, caught from Lake Qarun during the period September-December, 1983-1987. (Measurements are based on 30 specimens).

Morphological Features:

The body is elongated, fusiform, tapering anteriorly and rounded at the posterior extremity, 1.34-2.51 long and 0.60-0.84 wide. The tegument is beset with minute sharp spines each measuring 4-5 µin length. Apparently, these spines are easily shed, and several specimens are lacking these spines. The length to width ratio is. 1.59 - 4.18: 1.

The oral sucker is larger than the ventral sucker, 0.12 -0.20 long and 0.15-0.21 wide. The ventral sucker is round in shape, smaller than the oral sucker and measures 0.09-0.14 long and 0.12-0.15 wide. It lies at the end of the first third of the body. The ratio between the oral sucker to ventral sucker diameters is 0.85-1.4: 1.

The pharynx is small, pyriform in shape, 0.10-0.11 long and 0.07-0.10 wide. The prepharynx is fairly long measuring 0.006-0.014 in length. The oesophagus is fairly long, measuring 0.19-0.23 long. The intestinal caeca are short and wide, but they are relatively longer than in other haploporids, extending back far beyond the ventral sucker to a little distance posterior to testis. The bifurcation of the intestine occurs dorsal to the ventral sucker. The testis is

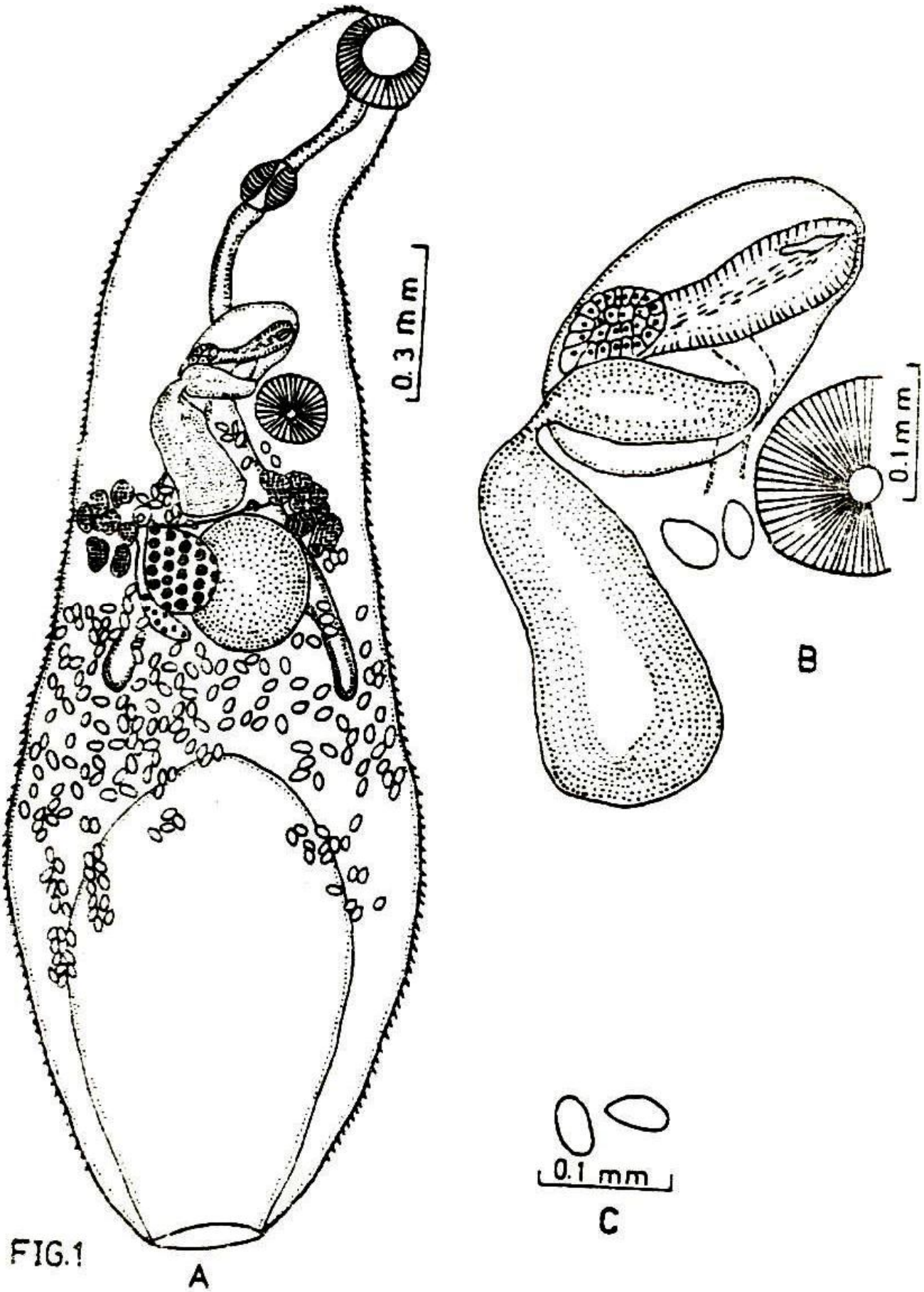

FIG.1

.ole 1: A comparison between different species of the genus Lecithobotrys Looss,1902

.aracters	L. putrescens Looss, 1902	L. putrescens Present material	L. helmymoharedi n. sp.
dy shape	usiform, tapering anteriorly, rounded posteriorly	Fusiform, tapering anteriorly, rounded posteriorly	Elongate, tapering anteriorly, and posteriorly
ength	2.3	1.34 - 2.51	1.08 - 1.30
ith	0.75	0.60 - 0.84	0.39 - 0.43
ngth/width	3.06 - 1	1.59 - 4.18:1	2.51 - 3.33:1
gument	spined	Spined, 4 - 5 μ	Spined, 3 - 4 μ
al sucker	Large, 0.21	0.12 - 0.20x0.15 - 0.21	0.11 - 0.14x0.10 - 0.15
ntral sucker	0.15	0.09 - 0.14x0.12 - 0.15	0.10 - 0.12x0.09 - 0.13
ral / entral suckers	1.4: 1	0.85 - 1.4: 1	0.9 - 1.16. 1
repharynx	Fairly long	Long, 0.006 - 0.014	Long, 0.02 - 0.04
harynx	0.1 in diameter	0.10 - 0.11x0.07 - 0.10	0.07 - 0.10x0.09 - 0.13
sophagus	Long	Long, 0.19 - 0.23	Long, 0.21 - 0.29
Intestinal ceca	Short, wide, bifurcate postacetabulum	Short, bifurcate postacetabulum	Short, saccular, bifurcate postacetabulum
estis	Median, not far behind the acetabulum	Median, 0.22 - 0.31x 0.20 - 0.30	Rounded, 0.13 - 0.16x 0.12 - 0.16
Hermaphroditic pouch	Relatively small	Small, 0.15 - 0.28x 0.12 - 0.19	0.16 - 0.25x0.12 - 0.18
Seminal vesicle	External	External; 0.06 - 0.30, internal; 0.09 - 0.18	External; 0.07, internal; 0.08
Ovary	In front of testis	0.07 - 0.20x0.13 - 0.15	0.06 - 0.10x0.06 - 0.07
Vitellaria	7 follicles on each side of the body	7 follicles on each side of the body	15 - 25 follicles on each side of body
Eggs	44 - 47x26 - 28 μ	40 - 42x 19 - 21 μ	42 - 47x18 - 28 μ
Genital pore	Preacetabular	Preacetabular	Preacetabular
Excretory vesicle	Elongate, saccular	Elongate, saccular	Y - shaped
Hosts	Mugil auratus	M. cephalus, M. chelo, M. carito	Mugil carito, M. cephalus
Location	Small intestine	Small intestine	Small intestine
Locality	Trieste	Egypt, Lake Qarun	Egypt, Lake Qarun

Table 1 Cont.

Charectors	L. sprenti Martin, 1973	L. vitellosus Sharma& Gupta, 1970	L. magnovatus (Szidat,1954; Martin, 1973
Body shape	Elongate,with tubular glands opening on anterior half	Elongate,with broadly rounded ends	Fusiform or oval - shaped
Length	0.66 - 0.76	1.23	0,70 (average
Width	0.14 - 0.18	0.39	0.36 (average)
Length / width	4.44 - 1	3.19 - 1	1.94 - 1
Tegument	Spined	Spined	Spined
Oral sucker	0.08 - 0.10x0.09 - 0.11	0.09 in diameter	0.11 in diameter
Ventral sucker	0.08 - 0.10x0.08 - 0.11	0.11 in diameter	0.12 in diameter
Oral / ventral suckers	1.03: 1	1: 1.16	0.91: 1
Prepharynx	0.06	Thin walled, 0.03	Very short
Pharynx	0.06 - 0.07x0.06 - 0.09	Muscular,0.05x0.04	Muscular,0.09x0.09
Oesophagus	0.18	0.06	.....
Intestinal caeca	Saccular,bifurcate postacetabular	Tubular,bifurcate preacetabular	Saccular,bifurcate at acetabulum level
Testis	0.11 - 0.25x0.06 - 0.08	0.14 in diameter	Rounded
Hermaphroditic pouch	0.22 - 0.29x0.11	.....	Smaller than in L. sprenti
Seminal vesicle	External and internal	Bipartite,saccular	Bipartite
Ovary	0.07 - 0.11x0.06 - 0.08	0.08 in diameter	Rounded,pretesticular
Vitellaria	7 - 10 follicles on each side	8 follicles on each side, circle	8 follicles on each side (from figure)
Eggs	Operculated,77x33 - 40µ	Light, 22x15 µ	95 - 114x41 - 60 µ
Genital pore	Preacetabular,ventral	At 0.15 from bifurcation	Preacetabular
Excretory vesicle	Y - shaped with sphincter near exit	.....,	Y - shaped
Hosts	Rhabdomys argentea, Mus musculus	Mus musculus	Lenorinus obtusidens
Location	Small intestine	Intestine	Small intestine
Locality	Australia	India	Argentina

median; it is located not far behind the ventral sucker, between the caeca, measuring, 2.0
2-0.31 long and 0.20-0.30 wide. The hermaphroditic pouch is egg-shaped, 0.15-0.28 long and 0.12-0.19 wide. It includes an oval - shaped internal seminal vesicle, prostate duct, prostate bulb, and a hermaphroditic duct. The metraterm and prostatic duct join together to form a hermaphroditic duct which opens by the genital pore. The internal seminal vesicle measures 0.09-0.18 long while the external seminal vesicle measures 0.06-0.30 long. The genital pore lies preacetabularly in front of the bifurcation of the intestine, and opens on the left side of hermaphroditic pouch.

The ovary is median, oval - shaped, lies in front of the testis or on its right side. It measures 0.07-0.20 long and 0.13-0.15 wide. The vitelline glands are formed of seven spherical follicles on each side lateral to the middle of the caeca. The uterus has descending and ascending limbs, much folded in the posterior region behind the caeca and the gonads. The uterus occupies most of hindbody, and occasionally part of forebody but it leaves a free space at posterior extremity. The eggs are very numerous, measuring 40-42 u long snd 19-21 μ wide, each containing a miracidium with eye-spots. The excretory vesicle is elongate saccular and has terminal excretory pore.

DISCUSSION

L. (lecithobotrys) putrescens Looss, 1902 was originally described from *Mugil auratus* collected at Triest. In the present investigation, *L. putrescens* is recorded from *Mugil cephalus*, *M. chelo* and *M. capito* from lake Qarun, all are new hosts and locality records.

As shown in Table 1, the present material is similar to Looss's specimens in the main characteristics but there are certain minor differences such as the position of ovary lateral to the testis as well as certain

variations in measurements of the body organs. Thus, the specific diagnosis of *L. (Lecithobotrys) putrescens* is amended as follows:

Body length 1.34-2.51 x 0.60 - 0.84 Length/width ratio 1.59-4.18 : 1. Oral sucker 0.21 x 0.15-0.21. Ventral sucker 0.09-0.15 x 0.12-0.15. Oral sucker/ventral sucker ratio 0.85-1.4 : 1. Prepharynx 0.006-0.014 long. Pharynx 0.10-0.11 x 0.07-0.11. Oesophagus 0.19-0.23 long. Caeca bifurcate dorsal to ventral sucker. Testis 0.2 2-0.31 x 0.20-0.30. Hermaphroditic pouch 0.15-0.28 x 0.12-0.19. External seminal vesicle 0.06-0.30 long. Internal seminal vesicle 0.09-0.18 long. Genital pore pre-acetabular. Ovary 0.07-0.20 x 0.13-0.15. Vitellaria follicular, with 7 follicles on each side of caeca. Eggs 40-47 x 19-28 µ. Excretory vesicle elongate saccular with terminal excretory pore.

Hosts : *Mugil auratus, M. cephalus, M. chelo* and *M. capito.*
Location : Intestine.
Locality : Triest and Lake Qarun.
Types : Deposited in the Helminthological Collection, Department of Zoology, faculty of Science, Ain Shams University, No 366 (Type) from *Mugil cephalus* and No. 367 (Paratype).

2. *Lecithobotrys (Lecithobotrys) helmymonamedi* n. sp. (Fig 2)

The following description is based on sixteen specimens collected from *Mugil cephalus* and *M. capito* locally called "Bouri and Tobar" respectively, caught from Lake Qarun in October, 1983. The new species is named in the honour of the distinguished Egyptian Zoologist Prof. A.H. Helmy Mohamed.

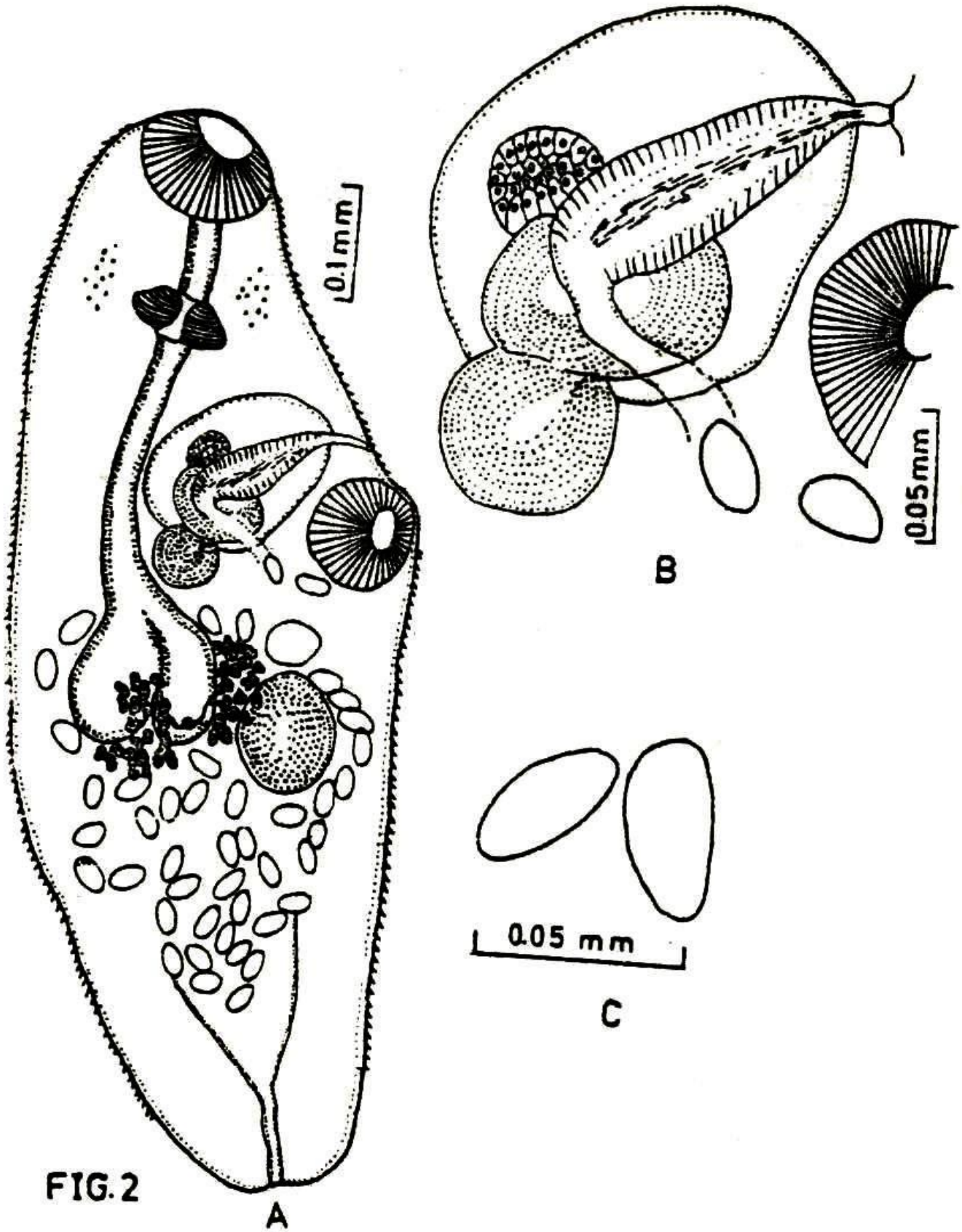

FIG. 2

Fig. 2 *Lecithobotrys* (*Lecithobotrys helmymohamedi* n. sp. A. Ventral view. B. Termimal genitalia C. Eggs.

Morphological features:

The body is elongated , tapering at both ends and measuring 1.08-1.30 long and 0.39-0.43 wide. Body surface spined, each spine measuring 3-4 μ in length but these spines are easily shed. The length to width ratio is 2.51-3.33 : 1. The oral sucker is subterminal relatively larger than the ventral sucker, 0.11-0.14 long and 0.10-0.15 wide. The ventral sucker is round in shape, preequatorial and measures 0.10-0.12 long and 0.09-0.13 wide. The ratio between the Oral sucker/ ventral sucker diameters is 0.9-1.16:1.

There are remnants of eye-spots in pharyngeal region. The pharynx is pyriform, 0.07-0.10 long and 0.09-0.13 wide Prepharynx measures 0.02-0.04 in length. The oesophagus is long, bifurcates behind the acetabulum and measures 0.21-0.29 long. The intestinal caeca are short, saccular, ending at the middle of the body and reaching to about mid-testis level and measure 0.12-0.14 long. The testis is post-equatorial; round 0.12-0.16 in diameter and lies at the begining of the hind body. The hermaphroditic pouch is oval - shaped, 0.16-0.25 long and 0.12-0.18 wide. The genital pore is ventral, lies a short distance anterior to ventral sucker. The external seminal vesicle measures 0.07 long while the internal seminal vesicle measures 0.08 long. The prostate bulb is spherical in shape and lies dorsal to the hermaphroditic duct which is well developed. The hermaphroditic duct is elongate. The internal seminal vesicle, prostate glands, prostate bulb and hermaphroditic duct are enclosed in the hermaphroditic pouch. The metraterm joins with prostatic duct to form the hermaphroditic duct that opens by the genital pore.

The ovary is median, oval - shaped, in front of testis and measures 0.06-0.10 long and 0.06-0.07 wide. The vitelline glands consists of two groups, each includes 15-25 small spherical follicles on each side of the intestinal caeca. The uterus has descending and

ascending limbs, lying in the hind body, as well, leaving a free space at the posterior extremity. The eggs measure 42-47 µ long 18-28 µ wide, each containing a miracidium with eye spots. The excretory vesicle is Y-shaped, with terminal excretory pore.

DISCUSSION

L. (Lecithobotrys) helmymohamedi n. sp. can be easily distinguished from all the other known species of the genus *Lecithobotrys* mainly by the size and numbers of vitelline follicles, the body shape, the length of the oesophagus and the shape of the intestinal caeca. (Table 1).

L. (Lecithobotrys) helmymohamedi n. sp. can be differentiated from *L. (Lecithobotrys) putrescens* (the geno type) by the suckers ratio, the shape and numbers of vitelline follicles, the size of the body, the shape and length of the intestinal caeca, the shape of the excretory and the external seminal vesicles,The new species can be easily differentiated from *L. (Lecithobotrys) magniovatus* (szidat, 1954) Martin, 1973 by the suckers ratio, the body shape and size, the size and numbers of vitelline follicles, the size of the eggs, the length of the prepharynx and the shape of the phary

L. (Lecithobotrys) helmymohamedi n. sp. can easily be distinguished from *L. (Lecithobotrys) vitellosus* Sharma and Gupta, 1970 by the ratio of oral sucker/ventral sucker, the position of the bifurcation of caeca. the length of the prepharynx, the position of uterus and the size of the eggs.

L. (Lecithobotrys) helmymohamedi n.sp.can also be separated from the nearest species *L. (Lecithobotrys) sprenti* Martin, 1973 by the size of the body, the shape and number of the vitelline follicles, the size of the eggs, the length of the prepharynx, the size of the pharynx, the length of the oesophagus and the position and size of the ovary.

The present authors beleive that all the above differences are sufficient to designate *Lecithobotrys (Lecithobotrys) helmymohamedi* as a new species.

Host : *Mugil cephalus* and *M. capito.*
Location : Intestine.
Locality : Lake Qarun.
Types : Deposited in the Helminthological Collection, Department of Zoology, Faculty of Science, Ain Shams University, No. 368 (Type) from *M. capito* and No. 369 (Paratype).

The following key is suggested to distinguish between the five species known so far from the genus *Lecithobotrys* Looss, 1902.

Vitelline follicles massed together, forming symmetrical bunches, and ceca short .....a..
Vitelline follicles rather scattered and ceca long .....b
a. Bifurcation of two caeca preacetabular, vitelline follicles divided into two symmetrical groups, each composed of 8 follicles enclosed a circle, uterus occupying all hindbody .. *L. vitellosus* Sharma & Gupta 1970
Bifurcation of two caeca postactabular, vitelline follicles divided into two symmetrical compact groups not enclosing a circle, uterus leaving free space at posterior extremity.....1
1. Caeca short tubular, vitellaria 7 follicles in each side of cacea..... ..... *L. putrescens* Looss, 1902
Caeca short saccular vitellaria more than 7 follicles on each side cacea.....2
2. Prepharynx short, vitellaria 8 follicles on each side of caeca, and body oval - shaped..... *L. magniovatus* (Szidat, 1954), Martin, 1973.
Prepharynx long, body elongate.....3
3. Vitellaria 15-25 follicles in each side of caeca..... *L. helmymohamedi* n. sp.
Vitellaria 7-10 follicles in each side of caeca *L. sprenti* . Martin, 1973.

b. Vitellaria 7 follicles and prepharynx absent..... .....*L. brasiliensis* Freitas, 1948
Vitellaria 11 follicles and prepharynx long .... *L. africanus* Manter & Pritchard, 1964

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