A review of the genus Saccocoelium Looss, 1902 (Trematoda, Haploporidae) with a redescription of S. tensum Looss, 1902 and a description of S. gohari sp. n. from Egyptian Lake Qarun fishes

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Abstract — RAMADAN M. M., SAOUD M. F. A., ASHOUR A. A., MANSOUR D. A. 1989. A review of the genus Saccocoelium Looss, 1902 (Trematoda, Haploporidae) with a redescription of S. tensum Looss, 1902 and a description of S. gohari sp. n. from Egyptian Lake Qarun fishes. Acta Parasitologica Polonica, 34, 2, 125—135.

The genus Saccococlium is reviewed. S. tensum Looss. 1902 is redescribed from the fishes Mugil cephalus, M. capito and M. chelo, caught from brackish Lake Qarun in Egypt, the last two hosts represent new host records. S. gohari sp. n. is described from the fishes M. cephalus (holotype), M. capito and M. chelo (paratypes). The new species is characterized by having very elongated testis, a prominent receptaculum seminis uterinum, oval-shaped vitelline follicles and by the sucker ratio. A key is presented to distinguish between the species known so far from the genus Saccococlium. The description of the two present species represent new locality records of the genus Saccococlium in Lake Qarun.

Looss 1902 established the genus Saccocoelium for those haploporid trematodes having short saccular caeca. Testis single, submedian, at post-caecal ends. Hermaphroditic pouch strongly developed between pharyns and acetabulum. Vesicula seminalis bipartite. Ovary posterior to acetabulum. Vitellaria consisting of paired compact lobes of irregular, or oval, shape, situated symmetrically at level of caecal ends. S. obesum Looss, 1902 from Mugil auranus, M. cephalus and M. chelo from Triest was designated as the type species of the genus. In the same paper he also described S. tensum from M. chelo from Triest.

NICOLI. 1914 reported S. obesum from M. chelo from the English Channel. FERRETTI and PAGGI 1965 redescribed the same species from M. cephalus from Triest, and the Black and Caspian Seas. Dawes 1946 presented Looss's data on S. obesum and S. tensum, but he questioned the validity of S. tensum, postulating that it was probably a synonym of S. obesum.

SKRIABIN 1956 reviewed the family Haploporidae. He presented Looss's data on S. obesum and S. tensum. Additionally, he presented certain data on S. tensum recorded by Vlasenko in 1931 in M. cephalus from the Black Sea. MIKAILOV 1958 reported S. obesum from M. saliens from the Caspian Sea.

HUNTER and THOMAS 1961 described Saccocoelium beauforti from M. cephalus at Beaufort, North Carolina. This species differs from S. tensum and S. obesum in having vitellaria consisting of coarse, closely packed follicles arranged in an irregular H-shaped structure, extending from the posterior level of the acetabulum to the posterior level of the testis; and in having very large eggs.

FISCHTHAL and KUNTZ 1963 redescribed S. obesum from the small intestine of Mugil cephalus and M. ramada obtained from the Giza Fish Market, in Egypt. The two authors agreed with Dawes's suggestion in considering S. tensum as synonym of S. obesum, on the basis of body size, various measurements of structures, sucker ratio, egg size, and general morphology. They also considered S. beauforti as a valid species in the genus. Manter 1963, on the other hand, believed that the vitellaria and uterine extent of S. beauforti suggested that it belonged to the genus Skrjabinolecithum Belous, 1954.

SKRJABIN 1964 proposed a key for two species of the genus Succocoelium (he omitted S. beauforti from the key) in which he depended on the relative size of the hermaphroditic bursa, ventral sucker and pharynx for their differentiation.

DOLGIKH 196 reported S. tensum from Rissoa splendida in the Black Sea. Overstreet 1971 agreed that S. beauforti was placed in the wrong genus; and transferred S. beauforti to the genus Saccocoelioides Szidat, 1954 as Saccocoelioides beauforti (Hunter et Thomas, 1961) Overstreet, 1971.

YAMAGUTI 1971 arranged the trematode families on the basis of life history information of digenetic trematodes. Accordingly, the genus Saccoccelium has been placed under the family Haploporidae Nicoll, 1914. Moreover, he considered the validity of S. obesum, S. tensum and S. beauforti as valid species.

FARES and MAILLARD 1974 redescribed S. obesum and S. tensum from Mugil spp. in the Western Mediterranean. He considered S. obesum and 5. tensum as two valid species and they gave some information on the life cycles of the two species.

Material and methods

The identification of the fishes as well as the methods followed in collection, fixation and staining of trematodes are described elsewhere (RAMADAN et al. 1988). Drawings are made to the scale using a camera lucida. Measurements are in millimetres unless stated otherwise.

During the present investigation, the authors recorded two species belonging to the genus Succeedium from Mugil spp. caught from Lake Qarun in Egypt. One of these species has been identified as S. tensum while the other is different from all the known species of the genus and accordingly considered as a new species.

Descriptions

Saccocoelium tensum Looss, 1902 (Fig. 1; specimen deposited, mean measurements based on 30 specimens in parantheses)

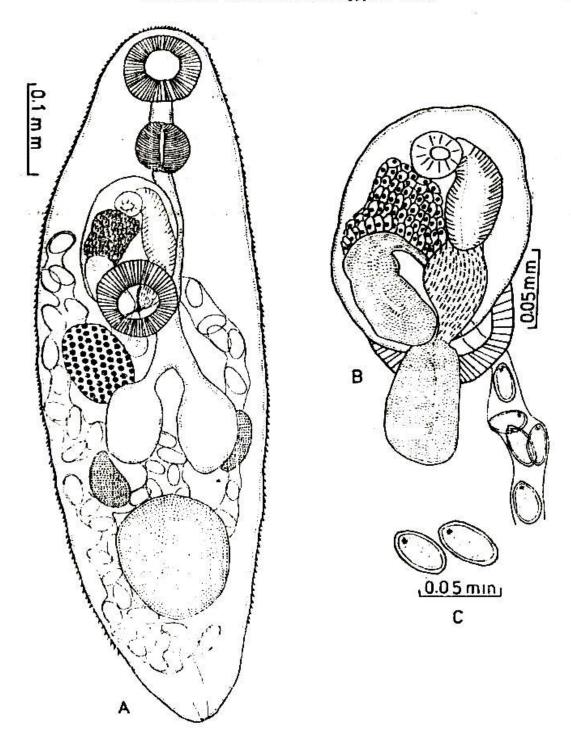


Fig. 1. Saccocoelium tensum Looss, 1902. A - ventral view, B - terminal genitalia, C - eggs

The present description is based on over two thousand specimens collected from Mugil cephalus, M. capito and M. chelo locally called "Bouri, Tobar and Halilli" respectively from Lake Qarun.

The body is small, clongate and rounded at both ends. The tegument covering the body is provided with minute spines, especially anteriorly; each spine, 3-4 (4) µm in length. Body, 0.56-0.82 (0.69) long and 0.21-0.26 (0.24) wide. Length width ratio varies from 3.15-3.90 (3.53):1.

Oral sucker subterminal and almost round in shape, 0.07-0.08 (0.08) long

and 0.08-0.10 (0.09) wide. Ventral sucker also almost round, 0.08-0.10 (0.09) in length and 0.08 -0.12 (0.10) in width. Oral sucker/ventral sucker ratio varies from 0.7-0.8 (0.8):1.

The mouth leads directly into a short prepharynx, 0.01-0.02 (0.02) in length. Pharynx muscular, spherical in shape, 0.05-0.07 (0.06) in length and 0.06-0.07 (0.07) in width. Oesophagus relatively very long, bifurcates a short distance behind acetabulum, 0.09-0.22 (0.16) in length, and leads into two sac-like or sacular-shaped intestinal caeca which may end near the anterior margin of the testis. Intestinal caeca 0.12-0.13 (0.13) in length and 0.04-0.07 (0.06) in width.

Testis almost spherical in shape, lies a short distance from the posterior extremity, 0.12-0.14 (0.13) in length and 0.09-0.11 (0.10) in width. Oval-shaped hermaphroditic pouch lies longitudinally between pharynx and middle of acetabulum, 0.11-0.18 (0.15) in length and 0.10-0.18 (0.14) in width, almost equal to the size of testis. Hermaphroditic pouch includes an oval--shaped internal seminal vesicle, prostate gland cells, uterine vesicle, and a hermaphroditic vesicle armed with two rows of spines on each side. Metraterm leads to a uterine vesicle, which opens into the hermaphroditic vesicle. External seminal vesicle leads to internal seminal vesicle, which opens into the hermaphroditic vesicle by a small curved duct that receives the prostatic secretion before leading into the hermaphroditic vesicle that opens on the genital pore.

Ovary almost oval with smooth outline; smaller than testis and lies in front of it; 0.07-0.10 (0.09) in length and 0.06-0.09 (0.08) in width. Vitellaria consist of two symmetrical compact irregular, or oval, masses, lying at level of caecal ends; right vitellarium 0.07-0.09 (0.08) in length and 0.03-0.05 (0.04) in width: left 0.07-0.09 (0.08) in length and 0.03 in width. Uterus extends from middle of hermaphroditic pouch to near posterior extremity of body. Uterine coils full of relatively large yellow eggs 33-35 (34) µm in length and 16-18 (17) µm in

width.

Excretory vesicle Y-shaped with a wide stem that opens at the posterior extremity through the terminal excretory pore.

Discussion.

The present material is similar in its main characteristics to Saccococlium tensum Looss, 1902. The above description generally agrees with that given by FARES and MAILLARD 1974 but there are certain minor differences shown in Table I which are summarized as follows: (1) the ovary lies more anteriorly, directly behind the acetabulum in the present material, but in FARES'S specimens the ovary lies directly in front of the testis; (2) the two vitelline masses are oval-shaped in the present material, but are irregular in shape in FARES'S specimes; (3) the uterus extends more anteriorly in the present material.

In view of the above redescription of S. tensum, the specific diagnosis is amended as follows: Body small, 0.56-1.40 (0.98) × 0.19-0.55 (0.37). Length/width ratio 2.82-3.90 (3.36):1: Tegument spinose, 3-4 (4) µm in length,

Table I. A comparison between different species of the genus Succoevilum Looss, 1902

Characters	Savvecellun obesign Fares and Maillard	Sarrocaelium obesian Sacrocaelium tensum Fares and Maillard Faris and Maillard 1974 1974	Succeevadium beauforti HUNTER and THOMAS 1961	Saccacoellum tensum present material	Saccocoelium pohari sp.n.
Body shape	fusiform	fasiform	variable in shape	fusiform, smull	small clongate, pointed po- steriorly
Tegument	spined	spined	plate-like spines	spined, measures 3-4 µm	spined, measures 3-4 µm
Length	1.2 1.93	0.58 1.4	0.354-0.605	0.56-0.82	long 1,019-1,21
Width	0.3 0.73	0.19-0.55	0.134 0.252	0.21 0.26	0.26-0.39
Length width	2.88 : 1	I · CNC	2.26:1	3.15-3.90 : 1	3.10 4.65 : 1
Oral sucker	0.12 0.23	0.08-0.19	subterminal, 0.083	subterminal, 0.07-0.08 ×	0.07-0.12 × 0.07-0.13 sub-
				× 0.08-0.10	terminal
Prepharynx	0.04-0.25	short	short	short, 0.01-0.02 in length	short, 0.009 0.05 in length
Pharynx	0.10-0.18	0.04-0.13	muscular,	spherical, 0.05-0.07 ×	oval, 0.04-0.06 × 0.05 0.07
			0.083×0.037	× 0.06 0.07	
Ventral sucker	0.13-0.21	0.06-0.17	slightly larger, 0.087 in diameter	0.08-0.10 × 0.08-0.12	0.07-0.08 × 0.07-0.09
Oral/ventral sucker	0.92-1.16:1	0.96-1.33: 1	0.95:1	0.07-0.8 1 1 4 10	0.87
Ocsophagus	king, bifurcate posta-	long, bifurcate posta-	long, bifurcate posta-	bifurcate postacetabular	bifurçate at level of aceta-
Cann	Committee anding at 1/1	secondar andian or 3/2	Cerandian II	_	building, U.19- U.3. In length
	body length	succular, ending at 2/3 body length	saccular, ending at 2/3 body length	saccular, ending at 2/3 body length	succular, ending at 2/3 body length
Testis	0.12-0.26	0.1-0.22	oval, submedian	spherical, 0.12-0.14 × × 0.09-0.11	elongate, 0.27-0.37 × 0.11-0.17
Hermaphroditic pouch	0.28-0.55	0.13-0.27	anteriorly, dorsal to acctabulum	longitudinally, 0.11-0.18 × 0.10-0.18	transversely, 0.16-0.19 ×
Seminal vesicle	bipartite	bipartite, external 0.08	bipartite	bipartite, internal, 0.3-0.07, external 0.05-0.06	bipartite, internal 0.07-0.15 external 0.04-0.12
Genital pore Ovary	at a level with pharynx at a kwel 0.09-0.19 u.e-0.13	with pharynx	preacetabular small, never lobate	prescetabular oval, 0.07-0.10 × 0.06-0.09	on right side, preacetabular conical, 0.09-0.14 × 0.07-0.10

Characters	Saccocallum ohesum Sacco FARES and MAILLARD FARES	Saccocoelium tensum FARES and MAILLARD	Saccocoelium tensum Saccocoelium beauforti	Saccocoelium tensum present material	Saccocoelium gohari sp.n.
Vitellaria	two compact irregular masses	two compact irregular masses	closely packed follic- les, H-shaped	two compact irregular masses	two compact irregular two compact irregular closely packed follic- two compact irregular two compact oval masses masses
Eggs Receptaculum seminis	40-90 × 20-50 µm	30-70 × 20-50 µm	very large, 83 × 53 μm 33–35 × 16–18 μm	33–35 × 16–18 µm	33-36 × 17-19 µm Receptaculum seminis uteri-
Excretory vesicle	in a posterior depres- Y-shaped	Y-shaped	saccular	Y-shaped	extends from ootype to last third of testis tubular, Y-shaped
Hosts	Mugil cephalus, M. la- M. cephalus, M. aura brosus, M. auratus, M. tus, M. lahrosus, M. raramada and M. saliens mada and M. saliens	Mugil cephatus, M. la- M. cephalus, M. aura- M. cephalus brosus, M. auratus, M. tus, M. labrosus, M. ra-ramada and M. saliens	M. cephalus	M. cephalus, M. capito and M. chelo	M. cephalus, M. capito M. cephalus, M. capito and and M. chelo
Locality	intostine Black Sea and Medi- terranean Sea	intestine Bluck Sea, Caspian Sea and Mediterrane- an Sea	small intestine North Carolina U.S.A.	small intestine Lake Qarun, Egypt	small intestine Lake Qarun, Egypt

oral sucker 0.07-0.19 $(0.13)\times0.08-0.10$ (0.09). Ventral sucker 0.06-0.17 $(0.13)\times0.08-0.12$ (0.10). Oral sucker/ventral sucker ratio 0.70-1.33 (1.02):1. Prepharynx 0.01-0.02 (0.02) in length. Pharynx 0.05-0.07 $(0.06)\times0.06-0.07$ (0.07). Oesophagus 0.09-0.22 (0.16) in length. Caeca, saccular, 0.12-0.13 (0.13) in length and 0.04-0.07 (0.06) in width. Testis 0.12-0.22 $(0.17)\times0.09-0.11$ (0.10). Hermaphroditic pouch oval-shaped, 0.11-0.27 $(0.19)\times0.10-0.18$ (0.14), contains an internal seminal vesicle, prostate gland cells, uterine vesicle and hermaphroditic vesicle. Ovary 0.06-0.18 $(0.12)\times0.06-0.09$ (0.08). Right vitellarium 0.07-0.09 $(0.08)\times0.03-0.05$ (0.04) and left vitellarium 0.07-0.09 $(0.08)\times0.03$. Eggs 30-70 $(50)\times16-50$ (33) μm .

Hosts: present material Mugil cephalus, M. chelo and M. capito, other

hosts, M. auratus, M. labrosus, M. ramada and M. saliens.

Location: Intestine.

Locality: Lake Qarun in Egypt, also Triest, Black Sea, Caspian Sea.

Specimens: No. 370 from *M. cephalus* and 371 from *M. capito*; deposited in the Helminthological Collection, Department of Zoology, Faculty of Science, Ain Shams University.

The present description of this species represents the first record of the

genus Saccocoelium Looss, 1902 in Lake Qarun.

Saccocoelium gohari sp. n. (Fig. 2; holotype, mean measurements based on 30 specimens in parentheses)

The following description is based on over one hundred specimens collected from Mugil cephalus, M. capito and M. chelo locally called "Bouri, Tobar and Halilli" respectively caught from Lake Qarun in Egypt. The new species is named in the honour of the distinguished Egyptian Zoologist Prof. H.A.F. Gohar.

Body clongate oval, 1.02-1.2f (1.11) in length and 0.26-0.39 (0.33) in width; length/width ratio varies from 3.10-4.65 (3.88):1; covered with tegumental spines, 3-4 (4) μm long, a few specimens lack these spines.

Or:1 sucker fairly round, subterminal, measuring 0.07-0.12 (0.09) in length and 0.07-0.13 (0.10) in width. Ventral sucker also round, but smaller than oral sucker; 0.07-0.08 (0.08) in length and 0.07-0.09 (0.08) in width, and lies almost at the end of the first third of the body. Ratio of oral sucker to ventral sucker 0.87-1.5 (1.19):1.

Prepharynx short, 0.01-0.05 (0.03) long. Pharynx well developed, oval in shape, 0.04-0.06 (0.05) in length and 0.05-0.07 (0.06) in width. Oesophagus relatively long, 0.19-0.32 (0.26) in length, bifurcates at the level of the anterior margin of ventral sucker. Intestinal caeca short, 0.09-0.18 (0.14) in length and 0.04-0.07 (0.06) in width, saccular in shape, ending shortly behind acetabulum.

Testis large, elongate 0.27-0.37 (0.32) in length and 0.11-0.17 (0.14) in width, occupies most of hind body, extending from caecal ends to near posterior extremity. Hermaphroditic pouch oval-shaped, 0.16-0.19 (0.18) in length and 0.11-0.13 (0.12) in width, and lies completely in front of the acetabulum; its direction may be transverse or longitudinal, includes an oval-shaped internal seminal vesicle, prostate gland cells, uterine vesicle and hermaphroditic vesicle. Matraterm leads to the uterine vesicle that opens in the

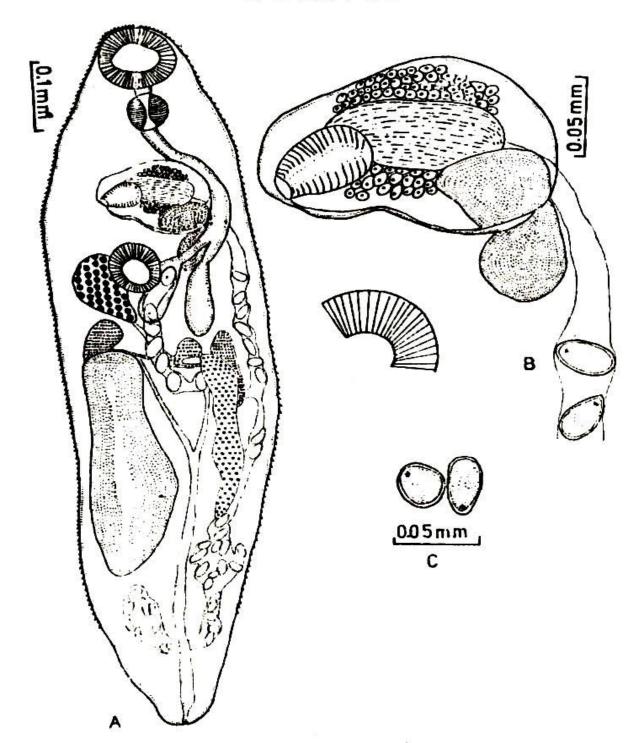


Fig. 2. Saccocochum gohari sp. n. (holotype). A - ventral view, B - terminal genitalia, C - cggs

hermaphroditic vesicle. External seminal vesicle oval in shape, 0.04–0.12 (0.08) in length, leads to the internal seminal vesicle, 0.07–0.15 (0.11), which opens into the hermaphroditic vesicle that leads to the genital pore. Genital pore lies at various levels between pharynx and acetabulum.

Ovary conical in shape and lies pretesticular, at about the same level as acetabulum, 0.09-0.14 (0.13) in length and 0.07-0.10 (0.09) in width. Receptaculum seminis uterinum is prominent, very elongate 0.17-0.27 (0.22) in length and 0.05-0.07 (0.06) in width and extends from the ootype to the last third of

testis. Ootype spherical in shape and lies between the two vitellarian masses.

Vitellaria consist of two compact oval symmetrical masses at level of the caecal ends. Right vitellarium 0.06-0.13 (0.10) in length and 0.03-0.05 (0.04) in width; left vitellarium 0.07-0.15 (0.11) in length and 0.04-0.05 (0.05) in width. Vitelline ducts clearly observed in most specimens.

Uterus with many coiled limbs, lies in the hind body and extends from the acetabulum to near posterior extremity. Eggs oval in shape, yellow or brown in colour, 33-36 (35) in length and 17-19 (18) µm in width. Excretory vesicle tubular in shape, bifurcates at level of the middle of testis whence its arms extend anteriorly. Excretory pore terminal at the posterior extremity.

Discussion

Saccocoelium gohari sp. n. differs from all the known species of the genus by its very much elongated testis, 0.27-0.37 in length, the prominent receptaculum seminis uterinum, oval-shape of the vitelline follicles and the ratio of oral sucker/ventral sucker (Tab. 1).

Succocoelium gohari is easily separated from S. tensum Looss, 1902 and S. obesum by the length of the oesophagus which bifurcates at the end of the first third of the body, the ratio of oral sucker to ventral sucker, the very large testis as well as the size of receptaculum seminis uterinum. The new species can be differentiated also from S. tensum and S. obesum by the body shape, position and shape of ovary, position of hermaphroditic pouch as well as shape of excretory vesicle.

Finally, S. gohari sp. n. differs from S. beauforti by the shape of the vitellaria, body length, the shape of the excretory vesicle, the size of egg, length of the oesophagus, as well as by the ratio of oral sucker to ventral sucker.

The authors believe that all the above differences are sufficient to designate Saccocoelium gohari as a new species.

Hosts: Mugil cephalus, M. capito and M. chelo.

Location: Small intestine.

Locality: Lake Qarun, Egypt.

Types: Holotype No. 372 from M. cephalus, paratype No. 373 from M. cheio deposited in the Helminthological Collection, Department of Zoology, Faculty of Science, Ain Shams University.

The following key is proposed to distinguish between the four species thown so far from the genus Saccocoelium Looss, 1902.

Vitellaria divided into two symmetrical compact irregular to oval masses, eggs numerous and medium sized

Vitellaria consisting of coarse, closely packed follicles arranged in irregular H-shape, eggs few in number and relatively large in size

S. beauforti Hunter et Thomas, 1961

Testis elongated, large in size; receptaculum seminis uterinum prominent; oral sucker larger that the ventral sucker, and cacca end in fore body

S. gohuri sp. n. Testis spherical, medium size; receptaculum seminis small or absent; oral sucker equal or slightly larger than ventral; cacca end at hind body

10 June 1902

Body large, herm sphroditic bursa considerably larger than ventral sucker S. tensum Looss, 1902

Body large, herm sphroditic bursa and ventral sucker nearly of equal size

S. obesum Looss, 1902

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Przegląd rodzaju Saccocoelium Looss, 1902 (Trematoda, Haploporidae) z redeskrypcją S. tensum Looss, 1902 i opisem S. gohari sp. n. z jeziora Qarun, Egipt

Streszczenie

W wyniku przeglądu przedstawicieli rodzaju Saccocoelium dokonano redeskrypcji S. tensum Looss, 1902 oraz opisano nowy gatunek S. gohari sp. n. z ryb Mugil cephalus, M. capito i M. chelo, pochodzących ze słonawego jeziora Qarun w Egipcie. Mugil capito i M. chelo są nowymi żywicielami S. tensum. Dla S. gohari sp. n. wyznaczono holotyp z M. cephalus, a paratypy z pozostałych dwóch gatunków ryb. Nowy gatunek różni się od innych przedstawicieli rodzaju wydłużonym kształtem jądra, owalnymi żółtnikami, dużym receptaculum seminis uterinum i proporejami przyssawek.

Załączono klucz do oznaczania dotychczas opisanych gatunków rodzaju Saccococlium.

Jezioro Qarun w Egipcie jest nowym stanowiskiem omawianych gatunków.