A Species of *Bivesicula* (Digenea: Bivesiculidae) from a Freshwater Fish of Japan

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Abstract: An unidentified species of the genus *Bivesicula* (Digenea: Bivesiculidae) is described from two gravid specimens found in the intestine of a freshwater fish, *Monopterus albus* (Synbranchidae), at Naha, Okinawa Prefecture, Japan. Morphologically, this species is similar to *B. synodi* Yamaguti, 1938.

Key words: Digenea, *Bivesicula* sp., *Monopterus albus*, Japan.

Digeneans of the genus *Bivesicula* Yamaguti, 1934, in the family Bivesiculidae Yamaguti, 1934, have been recorded from the intestine of marine fishes (Yamaguti, 1971; Cribb *et al.*, 1994). This paper reports a species of the genus from a freshwater fish of Japan.

Materials and Methods

The platyhelminth parasite collection of Dr. Yoshimasa Ozaki has been deposited in the Meguro Parasitological Museum (MPM), Tokyo. While putting specimens of the collection in order, I found two flattened and whole-mounted specimens (MPM Coll. No. 30206) labeled "*Bivesicula*" in the collection. Their labels also say that they were obtained from the intestine of a freshwater fish, *Monopterus albus* (Synbranchidae), at Naha, Okinawa Prefecture, Japan, in 1936 (the collector not given).

For comparison, some other museum specimens of the genus were borrowed from the MPM and the National Science Museum, Tokyo (NSMT). Measurements (length by width) are given in millimeters unless otherwise stated.

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Bivesicula sp.
(Fig. 1)

Description. With characters of *Bivesicula*. Body flattened, broad-obovate, 1.95-2.00 by 1.25-1.30. Tegument thin; tegumental spines not seen (possibly lost by maceration), Eyespot pigment not seen. Mouth terminal. Pharynx globular, 0.12 by 0.14-0.16. Esophagus 0.28-0.31 long; its anterior third thick-walled, 0.08 by 0.02-0.03. Intestinal bifurcation at about junction of first and second quarter of body; ceca terminating at about midlevel of testis.

Testis entire, median, in third quarter of body, 0.35-0.43 by 0.43-0.51. Sperm ducts 2, diverging from right and left anterolateral end of testis, running dorsal to cirrus pouch. External seminal vesicle oblong, anterodorsal to cirrus pouch, 0.16 by 0.06-0.09. Cirrus pouch ellipsoidal, thin-walled, median, preequatorial, slightly overlapping midlevel of body, 0.43-0.50 by 0.35-0.39. Internal seminal vesicle spheroidal, constricted posteriorly, 0.16-0.19 by 0.09-0.14. Male terminal duct complex; prostatic portion or pars prostatica 0.10-0.12 by 0.09-0.10, with 2 diverticula, surrounded by numerous prostatic cells; ejaculatory portion or

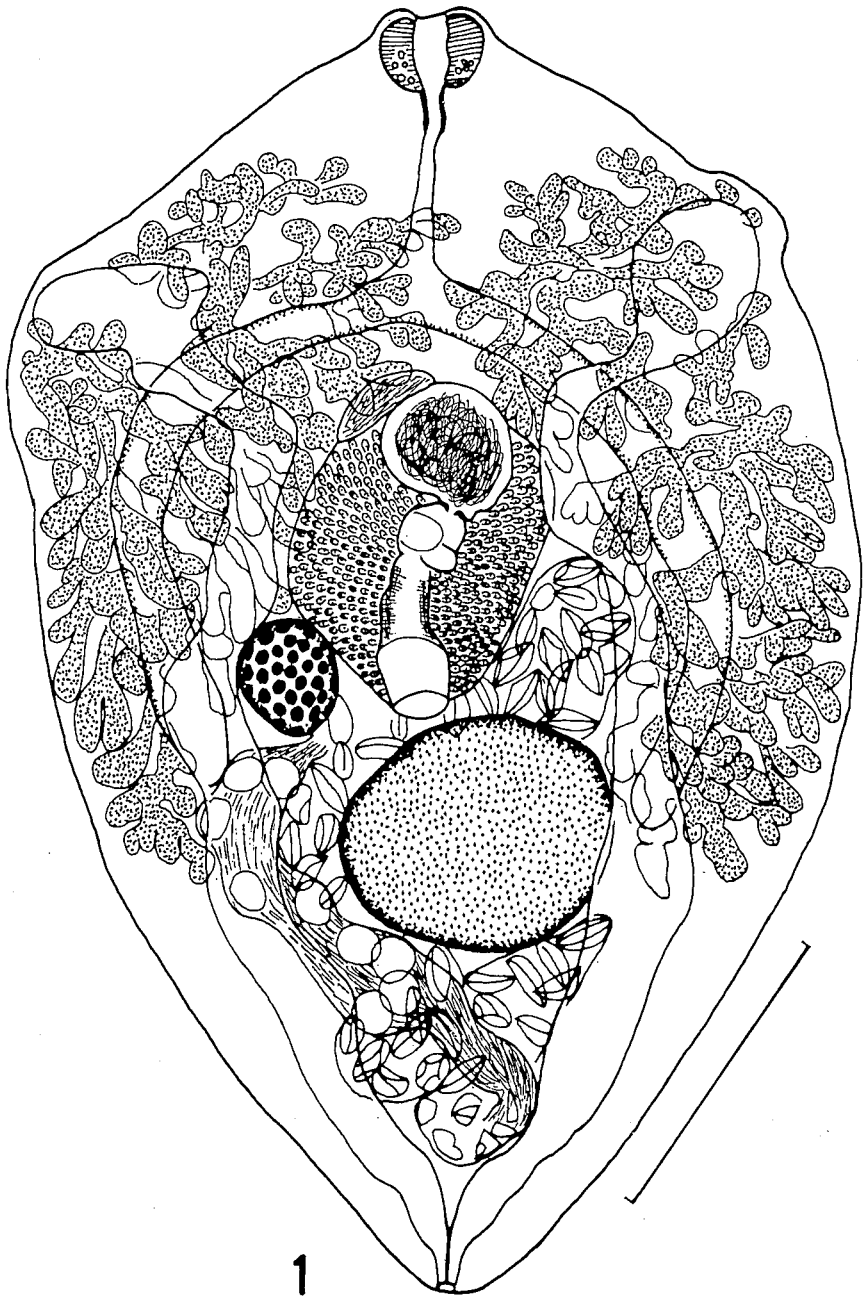

Fig. 1. A species of *Bivesicula* found in *Monopterus albus* at Naha, Okinawa Prefecture, entire worm, ventral view. (Scale bar: 0.5 mm.)

ejaculatory duct 0.10 long, surrounded by numerous gland cells slightly smaller than prostatic cells. Genital atrium may be fairly long. Genital pore on posterior margin of cirrus pouch. Ovary almost globular, entire, to right of midline, about level with genital pore, 0.16-0.18 by 0.15-0.16. Ootype-complex between ovary and testis, not worked out in more detail. Uterine coils a few, embracing testis dextrally; proximal portion of uterus acting as a seminal receptacle. Eggs operculate, light brown, numerous, 90-100 by 40-60 μm. Vitelline follicles distributed from midlevel of esophagus to midlevel of testis or slightly beyond testis, confluent medially in front of cirrus pouch; most follicles in dorsal and lateral fields of body, some extending ventral to excretory vesicle and ceca. Excretory vesicle V-shaped, in ventral plane of body; arms reaching to midlevel of esophagus; excretory pore terminal.

Discussion. Cribb *et al.* (1994) recognized 13 species including their new species in the genus *Bivesicula,* all from the intestine of marine fishes. Morphologically, the present species resembles *B. synodi* Yamaguti, 1938 (Yamaguti, 1938; my present reexamination of the holotype) in the shape and size of the body, shape and size of the pharynx, position of the esophageal thickening, posterior terminations of the ceca, and size of eggs. In *B. synodi,* however, the pars prostatica is larger, with larger diverticula; and the vitelline follicles are more numerous and extend more anteriorly to the pharynx. The species will be definitely identified when additional specimens are available. When Yamaguti (1938) described *B. synodi,* he used three gravid specimens obtained from *Synodus japonicus* (Synodontidae) at Numazu, Shizuoka Prefecture (Yamaguti, 1938). However, the holotype (MPM Coll. No. 22801) alone has been deposited in the MPM. The male terminal duct is complex also in this species. My reexamination of the holotype has shown that what Yamaguti (1938, p. 76, fig. 41) interpreted as the ejaculatory duct in the shape of an ε consists of (1) the pars prostatica which spreads two large symmetrical diverticula over its proximal globular portion and (2) the ejaculatory duct which is short and almost straight.

The present species differs from another Japanese species, *B. claviformis* Yamaguti, 1934 (Yamaguti, 1934, 1938, 1939; Fischthal and Kuntz, 1965; Cribb *et al.*, 1994; my present reexamination of Yamaguti's specimens), in the larger and broad-obovate body, smaller pharynx, preequatorial cirrus pouch, and larger eggs. I agree with Cribb *et al.* (1994) that *B. claviformis* and *B. epinepheli* Yamaguti, 1938, are the same species, according to my reexamination of Yamaguti's specimens of these two species: (1) *B. claviformis*: 1934, 5 paratypes (MPM Coll. Nos. 22798 and 22799) from *Seriola quinqueradiata* and *Parapristipoma trilineatum* at Tarumi, Okayama Prefecture; unpublished(?), 11 specimens (22800) from *Scomber japonicus* or *Epinephelus akaara* at Tarumi; and (2) *B. epinepheli*: 1938, the holotype and 1 paratype (22802) from *E. akaara* at Tarumi; 1939, 23 specimens (22803) from *E. akaara* at Tarumi. The holotype of *B. claviformis* has not been located. Fischthal and Kuntz (1965) stated that whether the two species are synonymous cannot be ascertained until the significance of the position of the esophageal thickening and the anterior separation or confluence of the vitelline follicles is determined. Yamaguti (1938) distinguished *B. epinepheli* from *B. claviformis* on the basis of the position of the esophageal thickening (the pharynx of Yamaguti): near the posterior end in *B. epinepheli*; but at the anterior end in *B. claviformis*. However, this position is not constant in the reexamined specimens of *B. epinepheli*. The vitelline follicles are separated anteriorly in the holotype, but usually confluent anteriorly in the others. Moreover, Yamaguti (1934, 1938, 1939) overlooked the fact that there are usually two, large diverticula of the pars prostatica in the specimens reexamined. Cribb *et al.* (1994) also synonymized *B. xishaensis* Gu and Shen, 1983 (originally spelled *xishaense*), with *B. claviformis*.

The host fish *M. albus* is a primary

freshwater species and feeds on small fish and aquatic insects. If the present digenean is a marine species like the other known species, its occurrence in *M. albus* suggests that this fish acquires infection with the digenean by eating some marine fish(es) or animal(s) which transfer juvenile or adult flukes within them from sea to fresh water. It seems unlikely that free-living planktonic cercariae (see Le Zotte, 1954; Cable and Nahhas, 1962) are eaten by the fish after entering fresh water.

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