

Monogenetic and Digenetic Trematodes of the Sweeper,
Pempheris xanthoptera

By

Masaaki MACHIDA

Department of Zoology, National Science Museum, Tokyo

and

Jun ARAKI

Department of Parasitology, Teikyo University School of Medicine, Tokyo

Two new monogenetic and one new digenetic trematodes were obtained from the sweeper, *Pempheris xanthoptera* TOMINAGA (Japanese name, "Minami-hatampo"), which was captured in the sea near Tanegashima Island, Kagoshima Prefecture, southern Japan. Trematodes were fixed in acetic sublimate under slight cover glass pressure, stained with Heidenhain's hematoxylin and mounted in balsam. The specimens are deposited in the collection of the National Science Museum, Tokyo.

The authors wish to express their sincere gratitude to the members of Urata-Minato Fishermen's Co-operative Association, Kagoshima Prefecture, for providing them facilities to collect the parasites, and to Dr. R. ARAI, National Science Museum, Tokyo, for identifying the host fish.

MONOGENEA

Family Dactylogyridae BYCHOWSKY, 1933

Subfamily Ancyrocephalinae BYCHOWSKY, 1937

Haliotrema hatampo n. sp.

(Figs. 1-3)

Host. *Pempheris xanthoptera* TOMINAGA.

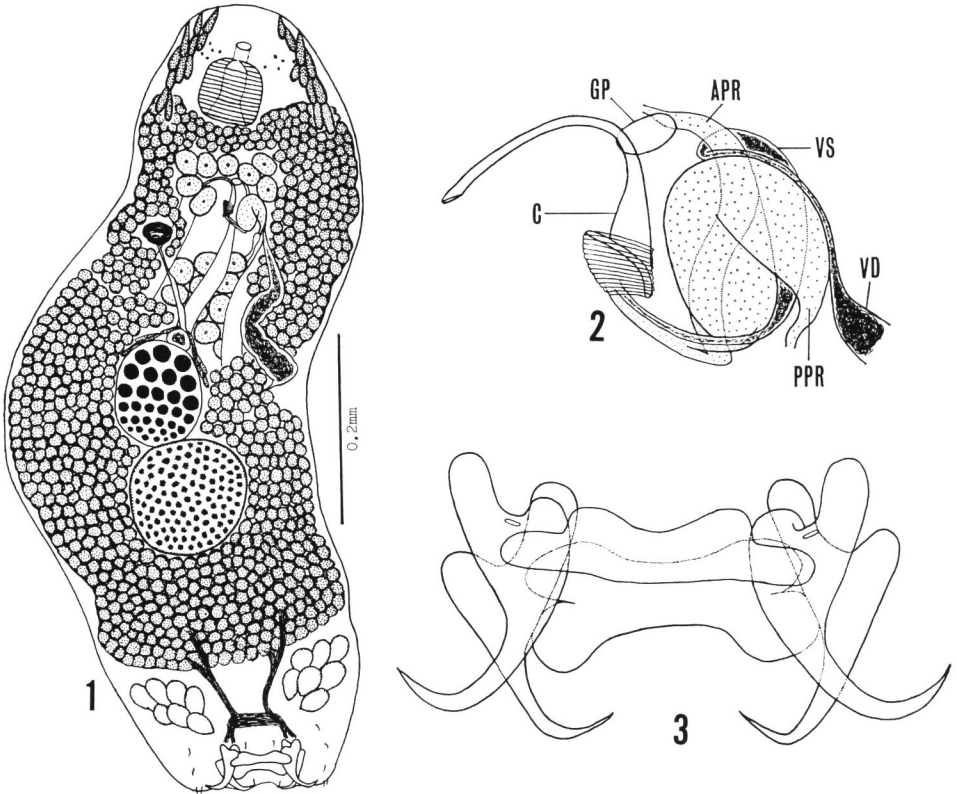
Habitat. Gills.

Locality. Tanegashima Island, Kagoshima Prefecture, southern Japan.

Date. 12-XI-1974.

Specimen No. NSMT-PI-1694 a.

Description. Body subcylindrical, 0.61-0.98 mm long, with maximum width of 0.26-0.38 mm at ovariovascular level. Opisthaptor well set off from body proper, 0.09-0.14 mm long and 0.11-0.17 mm wide at posterior extremity; ventral anchor fenestrated, 55-62 μ long lineally from tip of ventral root to height of curve of



Figs. 1–3. *Haliotrema hatampo* n. sp. — 1. Entire worm, ventral view. — 2. Terminal genitalia, ventral view. APR, anterior prostatic reservoir; C, cirrus; GP, genital pore; PPR, posterior prostatic reservoir; VD, vas deferens; VS, vesicula seminalis. — 3. Anchor apparatus, ventral view.

blade; ventral bar $65\text{--}70\ \mu$ long, with paired submedian prominences anteriorly; dorsal anchor $55\text{--}63\ \mu$ long lineally from tip of dorsal root to height of curve of blade; dorsal bar $65\text{--}70\ \mu$ long, with paired transverse protuberances anterolaterally; marginal hooklets seven-paired, $8\text{--}9\ \mu$ long. Cement glands well developed. Head trapezoidal, about $50\ \mu$ wide, with several pairs of head organs along its sloping margin. Eye pigments scattered. Pharynx oval, $62\text{--}82 \times 52\text{--}75\ \mu$; esophagus very short; caeca united posterior to testis. Testis rounded, $0.129\text{--}0.193 \times 0.134\text{--}0.168\ \text{mm}$, post-equatorial. Vas deferens arising from anterior margin of testis, looping dorso-sinistrad, then ventro-mediad encircling left caecum, forming conspicuous dilatation filled with sperm between caecum and body margin, reflexing posteriad just dorsal to posterior prostatic reservoir to form fusiform seminal vesicle. Prostatic reservoir paired; one retort-shaped, ventral to other, reflexing postero-sinistrad; other tubular, extending antero-dextrad. Cirrus spicular, $80\text{--}85\ \mu$ long, enclosed in sheath of circular muscle

fibers at proximal portion. Genital pore median, shortly post-bifurcal. Ovary oval, $0.093\text{--}0.162 \times 0.075\text{--}0.103$ mm, immediately pretesticular, almost equator of body. No eggs observed. Vagina shallow cup-shaped, opening inside right margin of body, a little obliquely posterior to base of cirrus; vaginal duct straight thin tubular, but somewhat thick in its proximal half. Seminal receptacle tiny oval, $13\text{--}25\ \mu$ in diameter. Vitellaria co-extensive with caecum.

Discussion. This species resembles *H. spiculare* YAMAGUTI, 1968, in the cirrus being spicular and without accessory structure, but differs from it in having a pair of prostatic reservoirs, cup-shaped vagina, and no genital sucker.

Family Microcotylidae TASCHENBERG, 1879

Subfamily Microcotylinae MONTICELLI, 1892

Microcotyle pempheri n. sp.

(Figs. 4–6)

Host. *Pempheris xanthoptera* TOMINAGA.

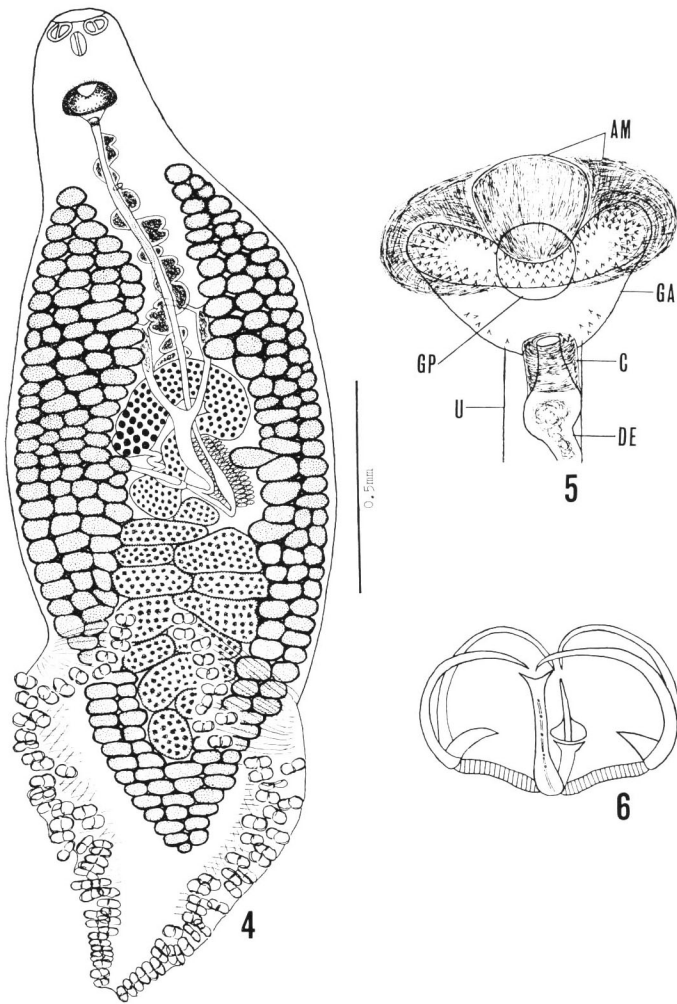
Habitat. Gills.

Locality. Tanegashima Island, Kagoshima Prefecture, southern Japan.

Date. 12–XI–1974.

Specimen No. NSMT–PI–1694 b.

Description. Body elongate, 1.55–2.28 mm in total length, with maximum width of 0.52–0.93 mm in ovarian region. Opisthohaptor inverse triangular, 0.68–1.05 mm long, with a total of 75–103 clamps in two rows. Clamp skeleton $28\text{--}77\ \mu$ wide, median spring bifid at both ends; shorter prong with a slice-shaped accessory piece. Oral suckers oval, septate at middle, $44\text{--}67 \times 70\text{--}90\ \mu$. Pharynx globular to oval, $41\text{--}62 \times 39\text{--}44\ \mu$; esophagus simple, bifurcating immediately posterior to genital pore; intestinal limbs with short lateral branches, terminating at different levels in opisthohaptor. Testes oval or irregular in shape, 11–21 in number, occupying greater part of post-ovarian intertesticular field. Vas deferens winding in median field, surrounded by gland cells in preovarian area. Muscular cirrus bulbous, $30\text{--}40\ \mu$ in diameter, connected with bottom of genital atrium which is armed with a dozen of spines. Genital atrium large, cup-shaped, muscular, 0.12–0.17 mm in transverse diameter, densely lined with thorn-like spines at anterior part. Immediately antero-dorsal to genital atrium is an oval bulb of lamellar muscle fibers. Genital pore circular, ventromedian, 0.18–0.24 mm from head end. Ovary tubular, shaped like question mark, measuring $0.21\text{--}0.40 \times 0.19\text{--}0.38$ mm as a whole, situated just preequatorial of body. Germiduct first winding, then somewhat swollen in form of seminal receptacle before giving off genito-intestinal canal which opens into right caecum at level of distal end of ovary, and united with vitelline duct. Shell gland complex to left of proximal part of ovary. Uterus ventromedian; only one egg observed in uterus of a paratype, fusiform, 0.16×0.08 mm; anterior filament very long, convoluted; posterior filament much shorter. Vitellaria



Figs. 4-6. *Microcotyle pempheri* n. sp. — 4. Entire worm, ventral view. — 5. Terminal genitalia, ventral view. AM, atrial muscle; C, cirrus; DE, ductus ejaculatorius; GA, genital atrium; GP, genital pore; U, uterus. — 6. Clamp.

co-extensive with intestinal limbs except for anterior portion; vitelline reservoir Y-shaped, ventral to ovary; two arms flowing into paired longitudinal vitelline ducts which are filled with sperm anteriorly, connected anteriorly with inverted Y-shaped vaginal duct; vagina opening middorsal, some distance posterior to genital pore, 0.33–0.42 mm from head end.

Discussion. This species differs from the most closely related *M. emmelichthyops* YAMAGUTI, 1968, in the genital atrium having no posterior chamber and in the number of testes being smaller. The presence of a slice-shaped median piece, which belongs to

the middle spring of the clamp, is another differentiating feature.

DIGENEA

Family Opecoelidae OZAKI, 1925

Subfamily Opecoelinae STUNKARD, 1931

Pseudozakia hatampo n. g., n. sp.

(Figs. 7–9)

Host. *Pempheris xanthoptera* TOMINAGA.

Habitat. Small intestine.

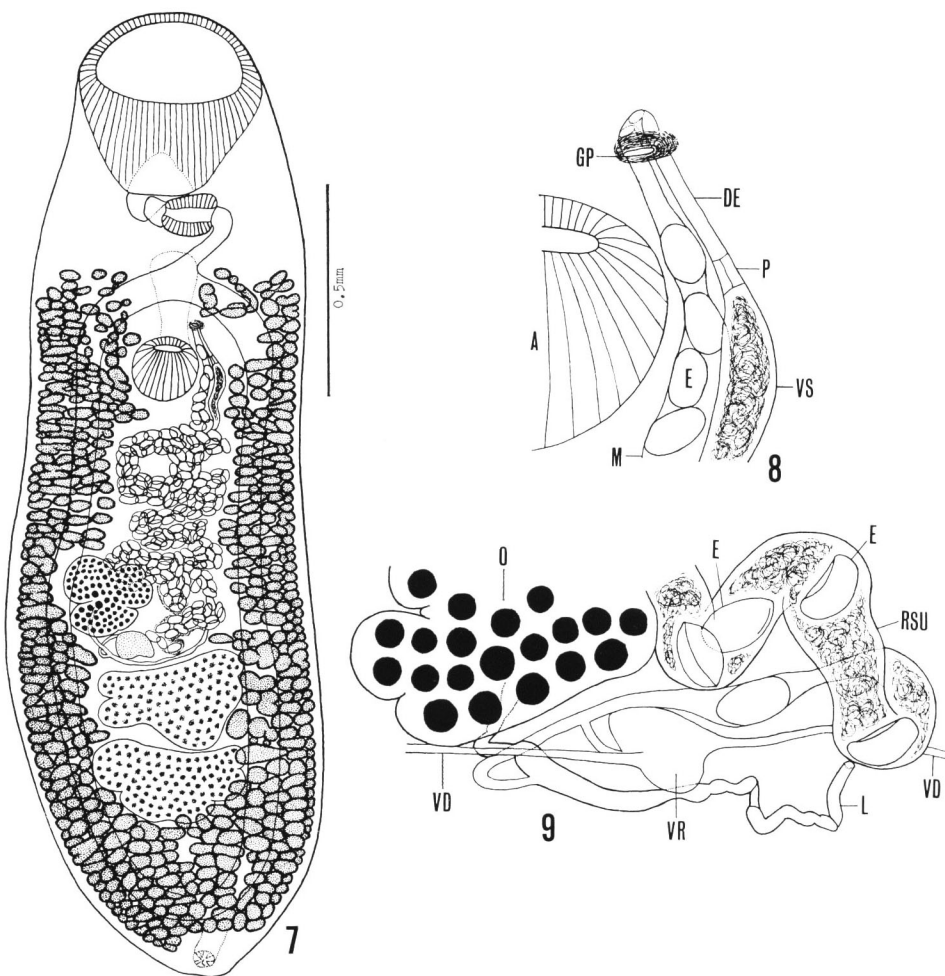
Locality. Tanegashima Island, Kagoshima Prefecture, southern Japan.

Date. 12–XI–1974.

Specimen No. NSMT-PI-1695.

Description. Body linguiform, 1.70–2.56 mm long and 0.60–0.75 mm wide. Cuticle with squamae except for posterior part of body. Oral sucker subterminal, very large, cup-shaped, $0.310\text{--}0.434 \times 0.306\text{--}0.459$ mm; prepharynx short, 0.054–0.072 mm long; pharynx oval, $0.102\text{--}0.138 \times 0.092\text{--}0.112$ mm; esophagus 0.115–0.187 mm long, bifurcating about midway between two suckers; caeca united posteriorly at about middle of posttesticular field. Acetabulum small, rounded, $0.112\text{--}0.153 \times 0.138\text{--}0.179$ mm, at anterior end of middle third of body. Sucker ratio 1: 0.35–0.45. Testes irregularly lobed, transversely elongated, sometimes with incisions, directly tandem in anterior part of posterior third of body; anterior testis $0.138\text{--}0.230 \times 0.245\text{--}0.357$ mm, posterior testis $0.128\text{--}0.265 \times 0.245\text{--}0.367$ mm. Each vas efferens united at some distance anterior to ovary to form vas deferens. Seminal vesicle long tubular, winding posteriorly, reaching near equator of body. Pars prostatica short, rudimentary, 0.025–0.030 mm long; ejaculatory duct slender, 0.030–0.10 mm long. Genital pore left to midline, between caecal bifurcation and acetabulum. Ovary lobate, $0.112\text{--}0.255 \times 0.189\text{--}0.255$ mm, antero-dextral to anterior testis. Oviduct arising from central part of ovary, giving off Laurer's canal and united with duct of vitelline reservoir to lead into receptaculum seminis uterinum. Laurer's canal opening dorsally in antero-sinistral to anterior testis. Vitelline follicles surrounding caeca mainly on ventral and lateral side. Vitelline reservoir conical, postero-sinistral to ovary. Uterus winding transversely, intercaecal, between lateral side of ovary and acetabulum; metraterm running left to acetabulum. Uterine eggs oval, thin-shelled, embryonated, $0.042\text{--}0.049 \times 0.025\text{--}0.031$ mm. Excretory vesicle tubular, extending to near caecal bifurcation; pore dorsal, close to posterior extremity of body.

This species is divided into two types owing to the position of the ovarian complex and the terminal genitalia. In one type, as described above, the ovary lies right to the midline and the genital pore left to the midline, whereas in the other type, they are situated bisymmetrically against those of the former type. The two types appear at the rate of half-and-half.



Figs. 7–9. *Pseudozakia hatampo* n. g., n. sp. — 7. Entire worm, ventral view. — 8. Terminal genitalia, ventral view. — 9. Ovarian complex, ventral view. A, acetabulum; DE, ductus ejaculatorius; E, egg; GP, genital pore; L, Laurer's canal; M, metraterm; O, ovary; P, pars prostatica; RSU, receptaculum seminis uterinum; VD, vitelline duct; VR, vitelline reservoir; VS, vesicula seminalis.

Discussion. This genus resembles *Ozakia* in the caecum united posteriorly, but differs from it in having no cirrus pouch, in the genital pore lying at submedian between caecal bifurcation and acetabulum, and the excretory vesicle reaching near the caecal bifurcation. In *Ozakia*, the cirrus pouch is rudimentary but encloses more or less weakly developed pars prostatica and short ejaculatory duct, the genital pore lies submedian at the level of esophagus, and the excretory vesicle extends to the shell gland. In respect of the male terminal genitalia, this genus resembles *Pseudopecoelus*, which

has no true cirrus pouch or prostatic gland. In *Pseudopecoelus*, however, the caecum terminates blindly, the genital pore lies at the level of pharynx or esophagus, and the excretory vesicle extends to the ovary.

Pseudozakia n. g.

Opecoelidae, Opecoelinae. Body linguiform, with squamae except for posterior part. Oral sucker subterminal, large, cup-shaped; prepharynx short; pharynx well-developed; esophagus short; caeca united posteriorly. Acetabulum small, at anterior end of middle third of body. Testes irregularly lobed, directly tandem in anterior part of posterior third of body. Seminal vesicle tubular, winding posteriorly, reaching near equator of body. No cirrus pouch. Pars prostatica rudimentary, ejaculatory duct slender. Genital pore submedian, between caecal bifurcation and acetabulum. Ovary lobate, submedian, pretesticular. No seminal receptacle. Laurer's canal and receptaculum seminis uterinum present. Vitellaria co-extensive with caecum. Uterus winding transversely, intercaecal, between ovary and acetabulum. Excretory vesicle tubular, reaching near caecal bifurcation. Intestinal parasites of marine teleosts.

Type-species: *Pseudozakia hatampo* n. sp.

References

- JOHNSTON, T. H., & O. W. TIEGS, 1922. New gyrodactyloid trematodes from Australian fishes, together with a reclassification of the super-family Gyrodactyloidea. *Proc. Linn. Soc. N. S. Wales*, **47**: 83-131, pls. 9-22.
- YAMAGUTI, S., 1937. Studies on the Helminth Fauna of Japan. Part 19. Fourteen new ectoparasitic trematodes of fishes. 1-28 pp., pls. 1-6. Publ. by author.
- 1942. Ditto. Part 37. Trematodes of fishes, VIII. *Jap. J. med. Sci.*, (VI-Bact. & Parasit.), **2**: 105-129, pl. 1.
- 1953. Parasitic worms mainly from Celebes. Part 2. Monogenetic trematodes of fishes. *Acta Med. Okayama*, **8**: 203-256, pls. 1-9.
- 1968. Monogenetic Trematodes of Hawaiian Fishes. 1-287 pp. Honolulu, Univ. Hawaii Press.
- 1970. Digenetic Trematodes of Hawaiian Fishes. 1-436 pp. Tokyo, Keigaku Publ.
- 1971. Synopsis of Digenetic Trematodes of Vertebrates. 1-1074 pp., pls. 1-349. Tokyo, Keigaku Publ.
- YOUNG, P. C., 1968. Ten new species of *Haliotrema* (Monogenoidea: Dactylogyridae) from Australian fish and a revision of the genus. *J. Zool.*, **154**: 41-75.

