Penarchigetes fessus sp. n. from the Lake Chubsucker, Erimyzon sucetta (Lacépède) in the Southeastern United States

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ABSTRACT: Penarchigetes fessus sp. n. is described from the lake chubsucker, Erimyzon sucetta (Lacépède) from Alabama. Penarchigetes fessus varies from the only other known species of the genus, P. oklensis Mackiewicz, 1969, in scolex shape, development of neck, and number of testes.

Mackiewicz (1969) described a new genus, Penarchigetes (Cestoda: Caryophyllaeidae) represented by a single species from the spotted sucker, Minytrema melanops (Rafinesque) (Catostomidae: Osteichthyes) in Oklahoma. The following is a description of a new species of Penarchigetes from the southeastern United States.

Materials and Methods

Host fishes were collected with 10- and 50-ft seines, boat and backpack shocker, monofilament gill nets and trammel nets, and all were examined within 12 hr of capture. Cestodes were fixed in hot 5% formalin. Paraffin sections 12 µm thick were prepared and stained with hematoxylin and eosin, whole mounts were stained with Semichon’s carmine. Sections and whole specimens were mounted in Permount. Measurements were based on relaxed, unflattened specimens. Measurements of testes and vitellaria follow Mackiewicz (1963). Egg size is based on 10 from the uterus of each specimen measured. Average measurements are given in micrometers unless otherwise stated, with ranges in parentheses; drawings were made with the aid of a Bausch and Lomb Tri-symplex microprojector and a camera lucida. Comparative material, from the U.S. National Museum (USNM) Helminth Collection, consisted of a paratype of Penarchigetes oklensis (71263).

Penarchigetes fessus sp. n.
(Figs. 1–7)

Type Host and Locality: Lake chubsucker, Erimyzon sucetta (Lacépède), Uphapee Creek, northeast of Tuskegee, Macon County, Alabama (31 December 1970 through 30 March 1972).

Specimens Studied: 176 (10 measured) (2 cross-sectioned, 2 sagittally sectioned).


Habitat: Intestine, loosely attached.

Description: Gravid adults 1.8 mm (1.2–2.5 mm) long and 404 (258–505) wide at gonopore. Length 3.4 (2.5–3.9) times combined length of neck and scolex. Scolex 389 (330–430) wide. Neck distinct. Outer longitudinal muscles poorly developed. Inner longitudinal muscles consisting of small fascicles. Testes number

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Figures 1–7. *Penarchigetes fessus* sp. n. 1. Mature specimens. 2–4. Immature specimens. 5. Cross section through testicular region. 6. Sagittal section through gonopore. 7. Scolex. Abbreviations: C—Cirrus; G—Gonopore; ILM—Inner longitudinal muscle; O—Ovary; T—Testis; U—Uterus; V—Vitelline follicle; VD—Vas deferens; Vg—Vagina.
23 (20–26), randomly arranged. Testes measure 97 (66–120) by 89 (60–117). Testes begin 527 (412–650) from tip of scolex and extend to near anterior level of cirrus sac. Cirrus sac round 95 (85–112); cirrus eversible. Genital aperture 472 (293–576) from posterior end. Preovarian vitellaria 69 (39–100) by 49 (34–73) beginning 653 (522–860) from tip of scolex, continuous with postovarian vitellaria over dorsal part of ovary. Postovarian vitelline field longer than ovary. Ovarian commisur forms an open “V.” Wings of ovary large, expanded-rounded, wings 94 (62–117) long. Seminal receptacle absent. Osmoregulatory canals diffuse with no specific number in midpart of body. Egg with smooth shell 57 (54–58) by 38 (37–39) (in utero); presence or absence of operculum could not be definitely established.

Remarks

*Penarchigetes fessus* closely resembles *P. oklensis* Mackiewicz, 1969 in general body size and shape. It differs from *P. oklensis* by having a large instead of a small terminal disc; scolex of “disc-type” instead of expanded; neck distinct instead of indistinct.

Mackiewicz (1969) did not give measurements for the testes of *P. oklensis* nor mention their shape. His plate of *P. oklensis* shows spherical testes which measure less than 50. The testes of the paratype (USNM 71262) agree with those of his plate in size and shape. The testes of *P. fessus* are spherical to oblong in shape and average 89 × 97 in size. Mackiewicz (1969) stated that in all gravid specimens of *P. oklensis* the testes contained only a few spermatogonial cells along the testis membrane, making counting the testes difficult. In the present study, testes of *P. fessus* contained numerous spermatogonial cells and were very distinct in stained specimens.

The range of vitelline distribution mentioned by Mackiewicz (1969) as an intermediate condition between a continuous and discontinuous vitelline condition in *P. oklensis* did not occur in *P. fessus*. The preovarian and postovarian vitellaria in *P. fessus* were always continuous. The vitelline cells of *P. fessus* have vacuolated nuclei as described by Mackiewicz (1968). Shape of vitelline follicles may possibly vary with the age and development of a worm or with the method of fixation (room temperature 5% formalin for *P. oklensis* and hot formalin for *P. fessus*). However, the shape of the vitelline follicles in adult *P. oklensis* was elongate to very elongate, while the follicles of *P. fessus* were short and spherical.

An oblong area of intestine 10 mm by 7 mm in one *E. sucetta* was covered by 122 closely packed, attached *P. fessus*. No pit or irritation was evident. One mature and one immature specimen of *Isoglaridacris agminis* Williams and Rogers, 1972 were loosely attached in another portion of the same host's intestine. One immature specimen of *Camallanus* sp. (Nematoda) and 104 specimens of *Triganodistomum* sp. (Digenea) also occurred in the intestine of this host. The only closely associated parasite was an acanthocephalan, *Neoechinorhynchus cylindratum* (Van Cleave, 1913) Van Cleave, 1919.

Level of infection of *P. fessus* varied from eight to 122 specimens per fish. Host total length ranged from 17.8 to 25.4 cm, and averaged 23.7 cm.

The collection locality for *P. fessus* is interestingly similar to the collecting locality described for *P. oklensis* (Mackiewicz, 1969). The latter was a shallow, 10-acre lake periodically confluent with the Illinois River. The locality for *P.*
fessus was a shallow, 7-acre lake periodically confluent with Uphapee Creek through a complex of quarry lakes and beaver ponds. Erinyzon sucesta from five other collecting sites in the same area failed to harbor P. fessus. One hundred and forty-six specimens of the type host ranging in length from 13.0 to 36.5 cm and averaging 28.4 cm, examined from 23 collecting localities in Alabama, Georgia, and Florida, were negative for P. fessus or P. oklensis.

Spotted suckers, Minotrema melanops (Rafinesque), the definitive host of P. oklensis, from the type locality of P. fessus were not infected with P. fessus or P. oklensis. Two hundred and eighty-one spotted suckers examined by the author from 26 collection localities in Alabama, Georgia, and Florida were negative for Penarchigetes spp. They ranged in total length from 9.0 to 48.2 cm and averaged 34.7 cm.

The name is Latin (fessus—weary, tired, exhausted), and refers to the posterior bend of the ovarian commisure.

Mackiewicz (1969) assumed that the intermediate condition between continuous and discontinuous preovarian and postovarian vitelline fields, as found in Biacetalum carpiodi Mackiewicz, 1969, Caryophyllaideae fennica (Schneider, 1902), Khawia baltica Szidat, 1942, and Penarchigetes oklensis Mackiewicz, 1969, was a variation of the discontinuous distribution of vitellaria. The completely continuous condition in P. fessus implies that the intermediate condition in this genus is a variation of the continuous distribution.

The genus Archigetes contains the only known caryophyllid species capable of becoming gravid in the fish and invertebrate hosts (Kennedy, 1965). However, the two species of the genus Penarchigetes are well under the minimum size (Mackiewicz and Deutsch, 1976) for neotenic development in the tubificid intermediate host, are at least morphologically similar to members of the genus Archigetes, and their life cycles are unknown. It is possible that progenetic development could occur in members of the genus Penarchigetes.

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Literature Cited


Mackiewicz, J. S. 1968. Vitellogenesis and eggshell formation in Caryophyllaesus laticeps (Pallas) and Caryophyllaideae fennica (Schneider) (Cestoidea: Caryophyllaidea). Z. Parasitenknd. 30:18–32.
