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A New Microphallid Trematode from the Blue Crab in the Northern Gulf of Mexico¹

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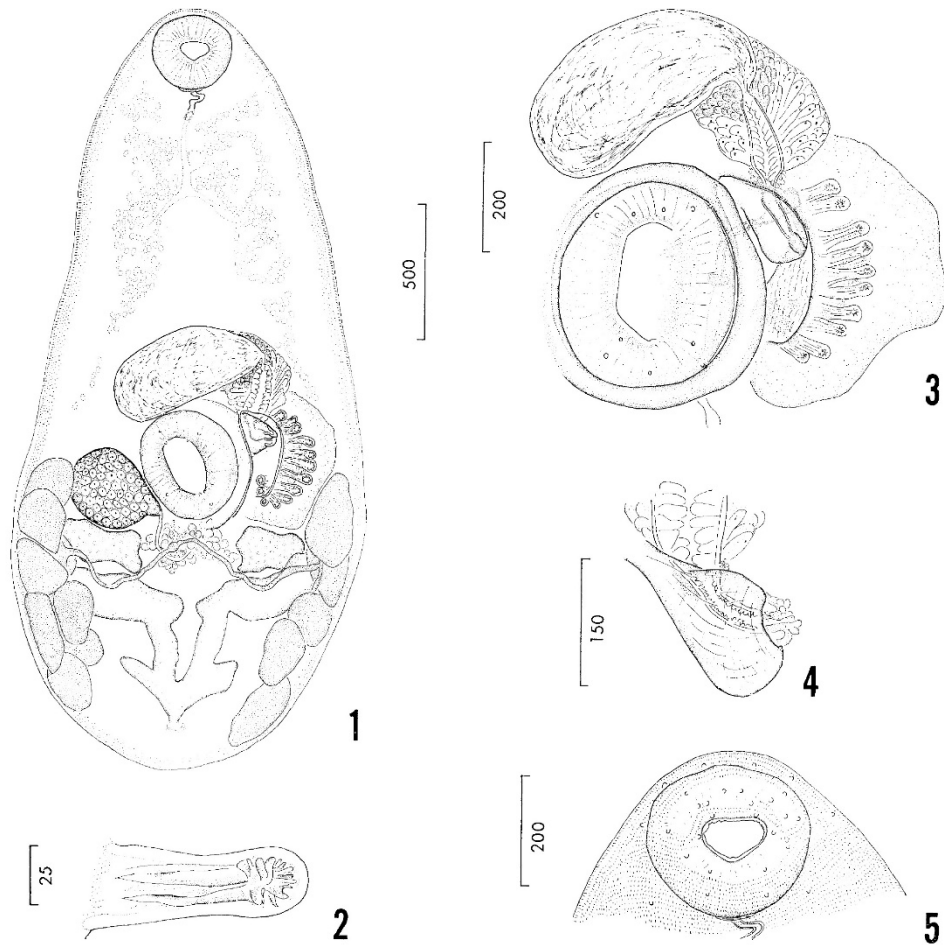
Abstract

Levinseniella (Monarrhenos) capitanea n. sp. is described from metacercariae on the hepatopancreas and gonads of *Callinectes sapidus* Rathbun from Louisiana and Mississippi. It can be distinguished from all other members of the genus by possessing 11–21 atrial pockets and an acetabulum larger than the oral sucker, not possessing a pharynx nor well-developed ceca, and being 1.9–3.6 mm in length. *Heardlevinseniella* Yamaguti, 1971 is considered a synonym of *Levinseniella* Stiles & Hassal, 1901.

An easily visible microphallid metacercaria was found on the hepatopancreas and gonads of a few large specimens of the blue crab from the northern Gulf of Mexico. Over 1500 various-sized individuals of *Callinectes sapidus* Rathbun and over 500 of *C. similis* Williams from Mississippi Sound and adjacent waters taken between June 1970 and September 1971 were routinely inspected for obvious parasites. Of these crabs, only four from a sample of 41 *C. sapidus* in July and August 1971 from the vicinity of Raccoon Island, Louisiana, and one from 92 *C. sapidus* in August 1971 from Cat Island, Mississippi, had the metacercaria present. The mean width of the carapace of the infected crabs was 151 mm. Of the five, three were females in a stage between first and second ovulations and two were mature males. The species is described below even though it is a larval stage because its reproductive system is well developed and its characteristics are unusual.

Materials and Methods

The trematodes were fixed in hot AFA under slight pressure and stained with Van Cleave's hematoxylin or studied alive with and without neutral red stain. All figures except Figure 2 were drawn with the aid of a camera lucida, and measurements are given in micra.



Figures 1-5. *Levinseniella capitanea* (scale values are micra). Fig. 1. Holotype, ventral view. Fig. 2. Atrial pocket, illustrated from photograph of living specimen. Fig. 3. Terminal genitalia and associated structures of a paratype, ventral view. Fig. 4. Male papilla of different paratype illustrating variation in both the organ and the tip, ventral view. Fig. 5. Anterior end of holotype illustrating sensory papillae, ventral view.

Results

*Levinseniella (Monarrhenos) capitanea*² n. sp.

Description (based on 24 mounted, several living, and two sectioned metacercaria): Body pyriform, 1,871–3,633 long by 835–1,489 in maximum width (at acetabular level). Tegumental spines covering entire body, larger (about 3 μ long) and more dense anteriorly and ventrally, difficult to observe posterior to acetabulum. Dorsoventral muscle bundles numerous, large and conspicuous in hindbody and smaller and less conspicuous in forebody. Acetabulo-atrial musculature well represented. Gland cells numerous in forebody, primarily near ventral surface. Nervous system conspicuous; cerebral commissure somewhat anterior and immediately dorsal to “pharyngeal” area; anterior lateral nerves divided at level of oral sucker; posterior lateral nerves with primary and secondary branching beginning near equatorial region of body and abundant in hindbody. Oral sucker subterminal, 171–313 long by 215–345 wide. Postoral muscular ring small. Acetabulum recessed, 209–465 long by 276–436 wide. Small sensory papillae numerous about oral region and less numerous but present about acetabulum. Sucker width ratio 1:1.1–1.6 (1:1.0 in specimen with distorted acetabulum). Forebody 47–56% of body length. Muscular pharynx absent but thin-walled villous swelling 17–61 long by 20–45 wide usually apparent, identical in appearance to “prepharynx,” if latter swollen. Pharyngeal gland cells surrounding posterior portion of swelling. “Prepharynx” distinct, villous, 58–206 long. Esophagus and ceca absent or poorly developed, consisting of few converging muscular fibers, outline of digestive tract occasionally distinct; “bifurcation” observed in less than half the specimens and at various levels, occasionally more than two branches, no distinct termination.

Testes irregular in shape, symmetrical, laterally elongate; left testis 78–191 long by 186–325 wide; right testis 81–183 by 171–379. Seminal vesicle arcuate, mostly preacetabular, 218–655 long by 119–307 wide, filled with sperm. Vas deferens reduced. Pars prostatica well developed, 133–296 long by 55–96 wide, surrounded by conspicuous prostatic cells. Prostatic cells apparently of at least two types, bound by thin membrane; proximal cells next to seminal vesicle staining pinkish-red with neutral red; distal cells more numerous, staining magenta-like with neutral red. Cirrus sac absent. Genital atrium sinistral, at acetabular level, almost completely open rather than with restricted pore. Atrial (male) pockets numerous, 15–20 (11–21 observed in additional living specimens), opening along sinistral and sinistral-posterior margins of atrium, typically in two parallel rows, each containing a sclerotized tooth-like structure with its “roots” pointing toward atrium. Lining of atrium dorsal to pockets irregularly corrugated. Male genital papilla muscular, up to 342 long and 143 wide, located at anterior margin of atrium and directed posterolaterally within atrium, flexible. Sperm duct entering papilla anteriorly from side of organ; terminal eversible portion distinct, more muscular than proximal portion, capable of taking various shapes.

Ovary smooth, dextral to acetabulum and contiguous or immediately anterior to right testis, 197–488 long by 206–482 wide. Laurer’s canal, ootype, and conspicuous Mehlis’ gland in intertesticular region. Vitellaria in two lateral groups of 5–8 on the left and 7–9 on the right, ranging from 55 long by 61 wide to 471 by 191, extending from near posterior end of worm to or beyond testes. Uterus often extending anterior to forward-most vitelline

follicles. Metraterm narrow, dorsal to and shorter than acetabulum, terminal portion dilated, entering atrium adjacent to male papilla. Female pouch absent. Eggs poorly developed, up to 26 long by 17 wide.

Excretory vesicle "V" to "Y" shaped with large bulges on marginal sides near base and at anterior end, well epitheliated probably because of larval state. Excretory pore subterminal on dorsal surface. Flame cell formula $2 [(2 + 2) + (2 + 2)] = 16$, four pair anterior to seminal vesicle, two pair at or near seminal vesicular level, one pair at or near acetabular level, one pair near posterior end of body.

Intermediate and type host: *Callinectes sapidus* Rathbun (blue crab).

Sites: On hepatopancreas and gonads.

Intensity of infection: Several hundred per crab.

Localities: Vicinity of Racoon Island in Bay Boudreau, St. Bernard Parish, Louisiana and Cat Island near Gulfport, Harrison County, Mississippi.

Holotype: USNM Helm. Coll. No. 72185; Paratype: No. 72186.

Discussion

Until the status of *Levinseniella* Stiles & Hassal, 1901, is better understood, we believe the present species should be considered in that genus. Deblock & Pearson (1970) reviewed *Levinseniella* and presented a key including most of the diagnostic characteristics for each of the 26 different species. They also erected the subgenus *Monarrhenos* Deblock & Pearson, 1970, for species without a female pouch. Heard (1968) had previously reviewed the genus when fewer species were known and divided it into four morphological groups based on the relative number of atrial pockets and the presence or absence of a female pouch. Using his scheme, *L. capitanea* belongs in Group IV which has members with more than five to seven atrial pockets and no female pouch. This group contains *L. (M.) polydactyla* Deblock & Rosé, 1962, *L. (M.) hunteri* Heard, 1968, *L. (M.)* sp. 2 (Heard in Deblock & Pearson, 1970), and *L. (M.)* sp. 3 (Heard in Deblock & Pearson, 1970). The most pockets, 10–12, are found in *L. (M.) polydactyla* from an isopod in France. The number of pockets in mounted *L. capitanea* ranged between 15 and 20, averaging 17.4. Additional living individuals had between 11 and 21 pockets. Certainly not much significance should be placed on the exact number of pockets, especially for species with several pockets.

Levinseniella capitanea differs from the above and all other members of the genus by usually having more than 12 atrial pockets, having an acetabulum larger than the oral sucker, being a much larger worm, and not possessing a pharynx nor well-developed ceca. Some specimens of a few species have equal or nearly equal sucker measurements. The longest known species are *L. (M.) byrdsi* Heard, 1968 (1.2–1.7 mm), *L. (L.) heardi* Canaris, 1971 (1.2–1.7 mm), *L. (M.) bucephalae sensu* Ryjikor & Timofeeva, 1961 (1.4–1.7 mm), and now *L. (M.) capitanea* (1.9–3.6 mm).

It is confirmed that in America there are species of microphallids in diverse genera which have a relatively large body size and a destitute digestive tract. None, however, are larger than or have a digestive tract more reduced than *L. capitanea*. *Microphallus progeneticus* Sogandares-Bernal, 1962, which Deblock & Pearson (1969) suggest should be placed in the genus *Maritrema* Nicoll, 1907, lives free in the cephalothoracic cavity of a crayfish, has

much reduced ceca, and does not have a pharynx. *Megalophallus diodontis* Siddiqi & Cable, 1960, encysted in a blue crab, has short ceca and a relatively small pharynx. *Microphallus opacus* (Ward, 1901) and *M. opacus sensu* Sogandares-Bernal *nec* Ward are encysted in crayfish and each have short ceca and a relatively small pharynx. One specimen of *M. opacus sensu* Sogandares-Bernal sent by Professor S. Deblock had one of the ceca so short it was barely discernible.

The esophagus and ceca of all the above-mentioned species, even though reduced, are true tubular structures rather than merely outlined by muscle fibers. It is possible but unlikely that adult *L. capitanea* would have a pharynx and well-developed ceca in the proper definitive host. Sogandares-Bernal (1962) suggested the lack of a pharynx in *M. progeneticus* could be because the metacercaria does not pass through an encysted stage or does so for a short time. This lacking, at least in encysted *L. capitanea*, does not appear to be because of a short period of maturation. The acetabulum and adjacent genitalia are usually formed during the metacercarial stage in microphallids. Since these structures are well developed in the present specimens, in addition to the presence of eggs in a few, it would appear that the worm is nearly mature, the digestive tract will not develop further, and the period of time spent in the definitive host is short.

Rather than consider *L. capitanea* an archaic relict, we believe it to be recent and extremely well adapted to its crustacean host. We expect it will be a more common parasite in other geographical areas.

Yamaguti (1971) erected *Heardlevinsiella* Yamaguti, 1971, for *L. byrdi* Heard, 1968, on the basis of its lack of a female pouch and a large oral sucker with paired papillae and a postoral ring. Many species listed by Yamaguti (1971) as belonging to *Levinsiella* are without a female pouch and have a large oral sucker with a postoral muscular ring. Since there is no relationship between a large oral sucker with a postoral ring and the lack of a female pouch, the only character to separate the two genera is the anterior glandular papillae. Because of the close relationship among *L. byrdi* and other species of *Levinsiella*, we do not consider the presence of papillae sufficient enough to warrant a new genus and, therefore, reduce *Heardlevinsiella* to a synonym of *Levinsiella*.

Notes

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2. The specific name comes from the Latin *capitaneus* and refers to the especially large size of the worm.

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