

***Alloglossidium anomophagis* sp. n. (Trematoda: Plagiorchiidae) exhibiting progenesis in water fleas (Anomopoda: Daphniidae)**

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Abstract. The trematode, *Alloglossidium anomophagis* sp. n. (Digenea: Plagiorchiidae) exhibits progenesis in water fleas of the genus *Daphnia* (Anomopoda: Daphniidae) occurring in temporary rainwater-filled ditches near Houston, Texas, USA. We assume that *A. anomophagis* has achieved its truncated life cycle by eliminating the vertebrate which originally served as the definitive host. The adults of *A. anomophagis* represent the smallest trematodes in the family Plagiorchiidae, measuring less than 0.5 mm in length.

Key words. Trematode; Plagiorchiidae; progenesis; water fleas.

Representatives of the digenic trematode genus *Alloglossidium* are unusual in exhibiting progenesis in crayfish and leech hosts¹⁻³. We describe here the smallest member of this genus and family (whose length is less than 0.5 mm), which exhibits progenesis in the body cavity of a *Daphnia* species in the southwestern portion of the United States.

Materials and methods

Infected representatives of *Daphnia obtusa* (Daphniidae: Anomopoda) were collected from rainwater-filled roadside ditches at the University of Houston Coastal Center, 56 km SE of Houston, Texas. Collections were made from mid-January to early May, 1990 and 1991. Infected individuals were first placed in hanging drops and observed under the compound microscope. Subsequently, the parasites were liberated from their capsules by applying gentle pressure to the host's integument with a coverslip. The parasites were then heat killed (55 °C) in Ringers, fixed in 3% formalin and mounted in glycerin. Microscopic observations and drawings were made with a camera lucida mounted on a Nikon Optiphot microscope with Differential Interference contrast. All measurements are given in micrometers.

Description

On the basis of the characters that could be observed in this minute parasite, it is described below as a new species of *Alloglossidium*.

Alloglossidium anomophagis sp. n.

Plagiorchiidae, Macroderoidinae. Body oval to elliptical 315–453 (387) long, 157–302 (224) wide; ratio of total body length to width 1.7–2.0 (1.8). Tegumental spines (2–3 long and 1 apart) covered entire body, decreasing

in number posteriorly. Oral sucker ventroterminal, 35–51 (44) in diameter; prepharynx short; pharynx well-developed, 23–31 (26) in diameter. Cecal bifurcation 78–98 (90)% TBL from anterior end, ceca terminating in posterior third of body, 18–20% TBL from posterior end. Acetabulum 40–52 (46) in diameter, preequatorial, 25–30% TBL from anterior end. Testes equal, ovoid to round, opposite, postovarian, 63–78 (70)% TBL from anterior end of body. Cirrus sac claviform, 50–60 (56) long, containing a bipartite internal seminal receptacle. Genital pore ventral, immediately pre-acetabular. Ovary spherical to oval, larger than testis. Seminal receptacle absent. Laurer's canal was not observed. Uterus descending to posterior of body, with extensive coiling and intertwining of descending and ascending arms. Vitellaria in 2 lateral follicular bands, extending from level of cecal bifurcation to level of testes. Excretory vesicle I-shaped, expanding anteriorly and extending to level of ovary. Eggs operculate, tan colored, oval, 20–24 (22) long and 10–15 (12) wide.

Type host. *Daphnia obtusa* (Daphniidae: Anomopoda: Crustacea).

Type locality. Temporary rainwater-filled ditches at the University of Houston Coastal Center, 56 km SE of Houston, Texas.

Type specimens. Holotype (mature metacercaria) deposited in the Parasitology collection, University of California, Berkeley. Paratypes deposited in the junior authors' collection.

Diagnosis

The new species can readily be separated from previously described representatives of *Alloglossidium* by its small size, ovoid-elliptical shape, position of the testes and ovary, and occurrence in fresh water cladocerans. In their phylogenetic analysis of the Digenea, Brooks et al.⁴ have included the family Macroderoididae McMul-

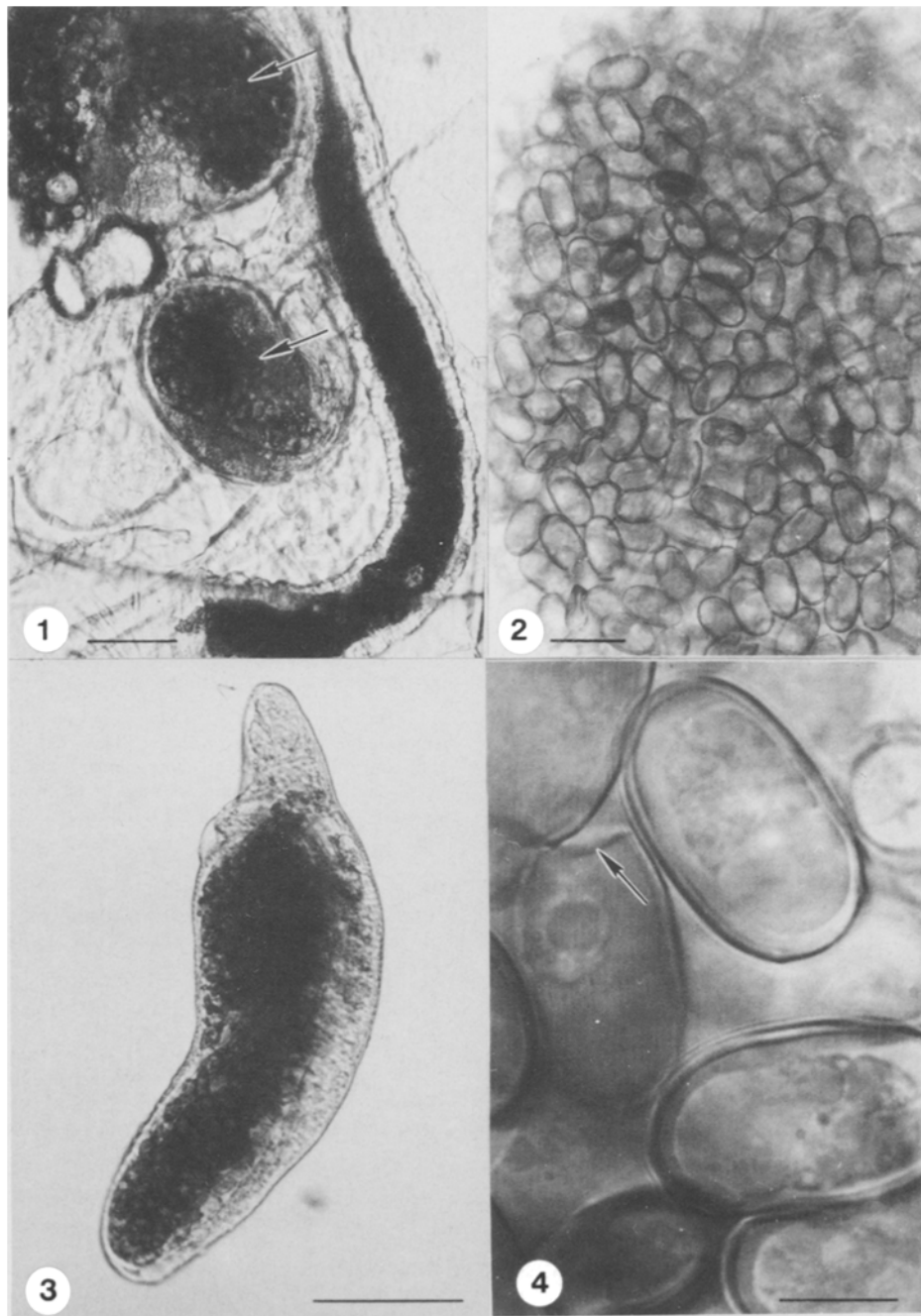


Figure 1. A parasitized *Daphnia obtusa* containing 2 cysts with *Alloglossidium anomophagus* sp. n. (arrows). (bar = 67 μ m)

Figure 2. Eggs in the uterus of *Alloglossidium anomophagus* sp. n. in the body cavity of *Daphnia obtusa*. (bar = 22 μ m)

Figure 3. *Alloglossidium anomophagus* sp. n. (lateral view) released from its capsule in the body cavity of *Daphnia obtusa*. (bar = 11 μ m)

Figure 4. Eggs of *Alloglossidium anomophagus* sp. n. containing developing miracidia. Arrow indicates egg with operculum open. (bar = 8 μ m)

len 1937 in the family Plagiorchiidae. We have followed this treatment, with the understanding that the higher categories of trematode nomenclature are subject to change.

Location in host

Adults of *A. anomophagus* sp. n. were coiled up in thin-walled spherical capsules attached to the outer wall

of the alimentary tract (midgut and hindgut) of the infected *Daphnia* (fig. 1). A few were loosely associated with fat globules. The capsules varied from nearly spherical to elliptical in outline and ranged from 55–281 (170) in length and 50–210 (142) in width. When released from their capsules, the parasites crawled with peristaltic movements across the bottom of the petri

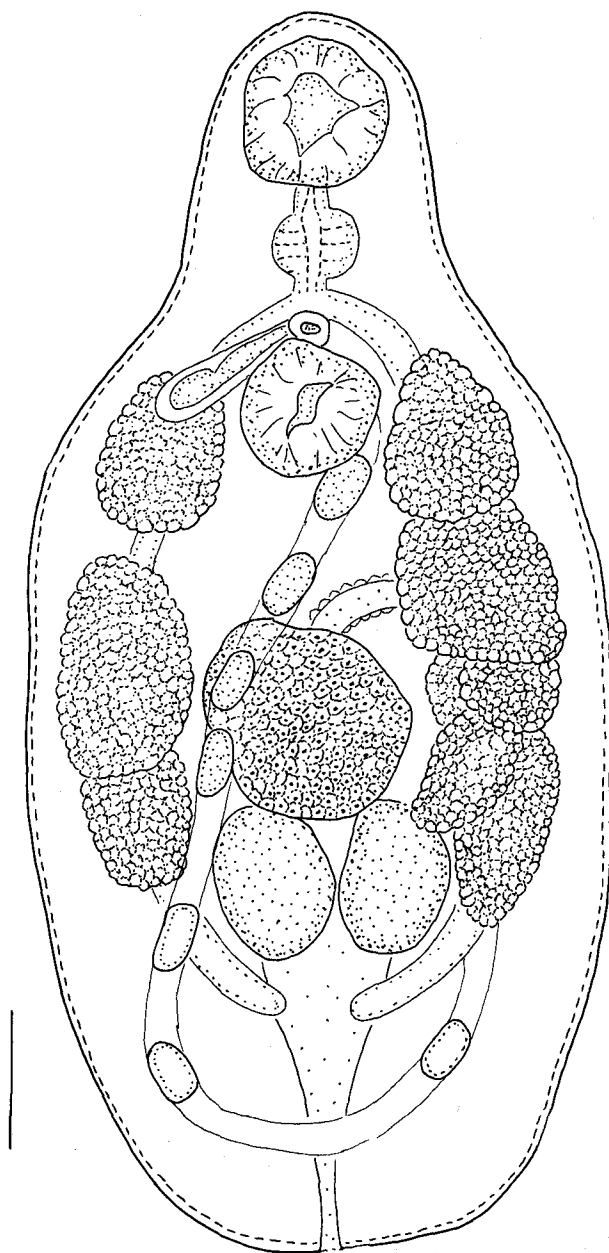


Figure 5. Ventral view of *Alloglossidium anomophagis* sp. n. removed from a capsule in the body cavity of *Daphnia obtusa*. (bar = 44 μ m)

dish. When moving, their body could stretch up to 700 in length.

Discussion

In their paper on truncated life cycle patterns in the genus *Alloglossidium*, Carney and Brooks³ concluded that species using crustaceans as definitive hosts are derived by life cycle truncation. We agree that progenesis in *A. anomophagis* sp. n. may indeed have arisen in this manner. Other aquatic organisms in the temporary pools that harbored infected *Daphnia* included amphipods, isopods, crayfish, snails, Corixidae and frog tadpoles. We failed to locate metacercaria or any other trematode stages in any of the above mentioned animals. Since progenesis was observed in all of the infected hosts, we conclude that *A. anomophagis* has achieved a truncated life cycle by eliminating the vertebrate which originally served as the definitive host. Preliminary studies showed that infections greater than 2 parasites per *Daphnia* were correlated with reduced egg production and reduced survivorship⁵.

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- 1 Vande Vusse, F. J., Revision of *Alloglossidium* Simer, 1929. (Trematoda: Macroderoididae) and description of *A. microspinatum* sp. n. from a leech. J. Parasit. 66 (1980) 667.
- 2 Font, W., The effect of progenesis on the evolution of *Alloglossidium* (Trematoda, Plagiorchiida, Macroderoididae). Acta parasit. polonica 27 (1980) 173.
- 3 Carney, J. P., and Brooks, D. R., Phylogenetic analysis of *Alloglossidium* Simer, 1929. (Digenea: Plagiorchiiformes: Macroderoididae) with discussion of the origin of truncated life cycle pattern in the genus. J. Parasit. 77 (1991) 890.
- 4 Brooks, D. R., O'Grady, R. T., and Glen, D. R., Phylogenetic analysis of the Digenea (Platyhelminthes: Cercomeria) with comments on their adaptive radiation. Can. J. Zool. 63 (1985) 411.
- 5 Schwartz, S. S., and Cameron, G. N., How do parasites cost their hosts? Preliminary answers from trematodes and *Daphnia obtusa*. Limnol. Oceanogr. 38 (1993) 602.