

New Host Records for *Azygia acuminata* Goldberger 1911

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THE trematode, *Azygia acuminata*, was originally described by Goldberger (1911), from the stomach of the bowfin, *Amia calva*. Since that time *A. acuminata* has been reported from *Amia calva* by Cooper (1915), wall-eyed pike, *Stizostedion vitreum*, white bass, *Lepibema chrysops*, and *Amia calva* by Pearse (1924), blue gill sunfish, *Lepomis macrochirus*, chain pickerel, *Esox niger*, bullheads, *Ameiurus nebulosus*, and experimentally from yellow perch, *Perca flavescens* by Wootton (1957).

The life cycle of *A. acuminata* was subsequently reported by Wootton (1957), who recovered the larval forms from a snail, *Campeloma decisum*.

The present paper reports another snail, *Campeloma geniculum* Conrad, as a new intermediate host, and the johnny darter, *Etheostoma nigrum* Rafinesque, a new host for the adult of *A. acuminata*.

Four of 4,741 specimens of *Campeloma geniculum*, collected over a twelve-month period from Little River, Wake County, North Carolina, were found infected with larval forms of *A. acuminata*. Infected snails occurred only during the winter months (November, December, January, and February).

All snails were placed in well-aerated finger bowls containing pond water and observed for emergence of cercariae. Cercariae were actively shed from only two snails. Emergence occurred by the fifth day and continued until the forty-fifth day, usually between the hours of 9-12 PM. Both infected snails died by the sixty-fifth day. A total of 133 cercariae were collected from one snail and 148 from the second.

All snails collected were observed in the laboratory for at least two weeks, then crushed and examined for infection. Larval forms of *A. acuminata* were recovered from two snails by this method. Although rediae in various stages of development were recovered from the gonadal tissue of the latter two snails, cercariae were never shed.

DEVELOPMENTAL STAGES

Miracidium and sporocyst stages were not observed. Examination of the four infected snails revealed the presence of 51, 38, 42,

and 57 rediae in various stages of development in the gonads of the snail.

The smallest redial stage observed was 0.58-0.98 (0.77) long by 0.38-0.73 (0.53) wide, cream-colored, oval-shaped, entirely annulated, containing germinal balls. A terminal birth pore opens to the exterior at the anterior end.

Developing cercariae were present in rediae 1.40-1.95 (1.69) long by 0.58-0.85 (0.68) wide. As the redia increases in length, the annular appearance disappears. The largest rediae, 3.40-5.50 (4.00) long by 0.65-0.85 (0.75) wide, were thin-walled and contained from 12-20 well developed cercariae with the distome attached outside the tail stem.

Developing cercariae appear as small oblong bodies, 0.12-0.122 long by 0.6-0.7 wide, containing undifferentiated cells. As differentiation proceeds a dense accumulation of cells occurs at the posterior end of the body. A constriction develops in this region from which the tail stem forms. This is followed by an elongation of the anterior end of the body with the early formation of the oral sucker. Acetabular and intestinal ceca primordia are present. The distome body develops more rapidly than the tail stem, with the furci showing the least development. Distomes within the redia remain unencysted and are attached to the inner wall of the tail stem by two bands of muscle tissue which arise immediately posterior to each of the intestinal ceca. This muscular attachment appears to be a means of retraction of the distome into the tail cavity. The excretory bladder of the distome is contiguous with the main excretory canal of the tail stem. Once the distome becomes encysted within the tail this excretory connection is lost, and the distome comes to lie free within the cavity. Actual encystment of the distome was not observed by these authors but has been described by Wootton (1957).

DESCRIPTION OF CERCARIA

Furcocystocercous; unpigmented except for yellow-colored distome encysted in the anterior seventh of the tail stem. Tail stem club-shaped, tapering slightly toward furci. Spines and mammillations absent. Length 2.55-3.33 (2.96), width 0.65-0.83 (0.77). Opening to tail stem cavity terminal and surrounded by a large

number of prominent papillae. Anterior third of tail stem weakly muscular, posterior two-thirds strongly muscular. Furca slightly wider than long; length 0.60-0.88 (0.80), width 0.80-1.03 (0.85), weakly muscular; small scale-like projections symmetrically arranged along the outer margins. Main excretory canal medial, extending from the distome cavity to the posterior end of the tail stem, where it bifurcates with a branch passing into each furci and opening to the exterior along the posterior medial border. Secondary excretory tubules and flame cell arrangement in tail stem are similar to those described by Wootton (1957). Distome; muscular with thick cuticle and mammillations extending to the anterior level of the acetabulum. Body length 0.45-0.60 (0.53), width 0.33-0.38 (0.35). Acetabulum muscular; anterior lip mammillated; diameter 0.18-0.20 (0.19), located in middle third of the body, 0.24-0.30 (0.29) from the anterior end. Oral sucker, subterminal, muscular with mammillations on anterior lip; length 0.15-0.20 (0.18), width 0.17-0.19 (0.18). Ratio of oral sucker to ventral sucker approximately 1:1. Pre-pharynx absent. Pharynx, muscular, 0.07-0.08 (0.075) long by 0.05-0.07 (0.06) wide. Intestinal cecum thick-walled, convoluted, containing refractile granules, extending to near posterior end of body. Genitalia immature; testes intracecal, oblique, located near posterior end of body. Ovary lobate, anterior and medial to testes. Uterus medial passing anteriorly dorsal to acetabulum, opening to genital atrium located immediately anterior to acetabulum. Eggs absent. Vitellaria undeveloped. Excretory bladder posterior to testes. Excretory tubules pass anteriorly medial to testes and extend to region of oral sucker. Flame cell arrangement not determined. (All measurements are in millimeters).

FISH EXAMINATIONS

Two hundred fish of the families Ictaluridae, Centrarchidae, and Percidae, all common in Little River, were examined for the presence of the adult of *A. acuminata*. All except the johnny darters were found negative for this parasite. One adult worm was recovered from the stomach of each of the two infected fish. The morphological characters and measurements closely agree with the description of Goldberger (1911) and Wootton (1957).

SUMMARY

The recovery of the larval forms of *Azygia acuminata*, from the gonads of the snail, *Campeloma geniculum* Conrad, and adults from the stomach of the johnny darter, *Etheostoma nigrum*, are new host records, and North Carolina represents a new locality record for this parasite.

Developmental stages of the redia and cercaria are described. Morphological characters and measurements closely agree with those of Wootton (1957).

All ictalurids, centrachids, and perch that were examined from Little River for the adult of *A. acuminata*, were found negative with the exception of two johnny darters, *Etheostoma nigrum*, from the stomach of each of which a single adult worm was recovered.

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