

A NEW MEGALURA CERCARIA FROM OHIO¹

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A number of schemes have been devised in an attempt to classify larval trematodes, and thereby to bring some order into an area of considerable misunderstanding—frequently bordering on confusion. Lühe's (1909) work is generally considered to be the first comprehensive effort along this line. Among the groups defined by this worker, of particular interest are those organisms referred to as the Gymnocephalous cercariae. These are described as cercariae which develop in rediae, are poor swimmers, live near the bottoms of ponds, are either unresponsive to light, or show no special behavior in response to light stimulation. After encystment on herbage in the open, the cysts are passively transferred to the final host, the intervention of a second intermediate host being unnecessary. The cyst is protective to the metacercaria under fairly severe conditions of desiccation. In some instances, encystment appears to occur in snails.

Among the many modifications of Lühe's original classification, one of the better known is that of Sewell (1922). The latter has included as subgroups under the Gymnocephalous cercariae, the Pleurolophocerca, Parapleurolophocerca, Isopori, Agilis, Reflexae, and Megalura groups. It is with the last named that this paper is concerned. The Megalura group was erected in 1914 by Cort who used as the type species, *Cercaria megalura*, so-named by him, because, in his words, "of the great length to which the tail is sometimes stretched." He included besides *C. megalura*, *C. distomatosa* Sonsino and an un-named species discovered by Lutz. Sewell added a fourth member, *C. indica* IV. His studies convinced him that these larvae are related to the echinostomes, intermediate forms between the two groups being what are now recognized as the larval stages of *Parorchis acanthus* Lebour and *P. avitus* Linton.

Sewell's characterization of the Megalura group is as follows:

1. The cercariae are large, ranging in body length from 0.40 mm to 0.79 mm, and the body wall is crowded with cystogenous cells.
2. The tail is long and is composed of a very characteristic reticulate or vesicular parenchyma; a glandular adhesive organ is situated at its distal end.
3. The alimentary tract is of the "triclad" type: a short prepharynx leads back to a small pharynx, which is succeeded by an esophagus of short or moderate length. The intestinal ceca reach back to the posterior end of the body.
4. Salivary glands are probably present in all cases and consist of a group of pyriform cells, whose ducts open on the anterior lip of the mouth.
5. The excretory system consists of a small pyriform excretory vesicle from which a pair of main excretory canals arise. These contain no refractile globules. Each canal can be traced as far forward as the side of the pharynx, where it turns back and, opposite the acetabulum, divides into anterior and posterior collecting tubes. There is, as a rule, no caudal canal.
6. Development occurs in rediae which are elongate in shape. A pair of locomotor processes are present, and, in young individuals, a collar can sometimes be seen. There is a well-developed pharynx, followed by a stomach which reaches back for at least one-half of the body length. A birth pore is situated just behind the level of the pharynx.

¹This cercaria, among others, was first reported in a thesis presented in partial fulfillment of requirements for the master's degree, at The Ohio State University, in the autumn of 1949.

7. The cercariae encyst in the open in flask-shaped cysts.

To the foregoing should be added the further observation that all known members of the group are from freshwater snail hosts.

A cercariae which, in all of its essential features, conforms with the *Megalura* group characteristics will now be described.

Cercaria darbiensis n. sp.

Figure 1

The cercariae were taken from snails, *Goniobasis livescens* Say, collected from Big Darby Creek, in the vicinity of Darbydale, Ohio. Examination of many hundreds of these snails reveals an incidence of infection of two percent. The cercariae escape from large sac-like redia (fig. 2) which, in many cases, have all but completely eroded the host's digestive gland (liver). The bodies of the larvae are of oval shape and, due to the abundance of mucoid material in their cystogenous cells, white in appearance.

The cercariae, after emergence in the early morning hours, are very active. They swim through the water, body foremost, their long tails lashing vigorously. By mid-morning, their activity is considerably reduced; and by noon, or shortly thereafter, swimming movements have ceased. The cercariae can then be seen covered by flask shaped cysts at the bottom of the container (fig. 3). Encystment may otherwise be hastened by agitating the vessel containing the cercariae; or by the act of transferring the larvae by means of a micro-pipette from the container to a slide. In either case, the organism may be enveloped completely in two or three minutes. In all cases, the tail is cast free, and slowly disintegrates (fig. 4).

Details of the internal structure can be studied to best advantage after, rather than before, encystment. Particularly is this true in making out details of the excretory system and its flame-cell pattern, which are greatly masked prior to the elaboration of the cystogenous substances. Then too, after about twenty-four hours, the intestinal ceca are much reduced in diameter.

The average measurements of 20 live cercariae are: body 0.736 mm long, 0.132 mm wide; tail 1.976 mm long, 0.034 mm wide; oral sucker 0.05 mm in diameter; pharynx 0.029 mm long, 0.017 mm wide; ventral sucker 0.066 mm in diameter; flame cells, 11 on each side of the body, none in the tail.

Externally, a smooth cuticle is superimposed upon a cellular epidermis. Just beneath this lies a dark, narrow band of muscle. From the oral sucker extends a short, narrow prepharynx, which enters a muscular pharynx. This is followed by the esophagus, at first constricted, then expanding as it bifurcates distally, giving rise to the two branches of the intestinal ceca. These reach nearly to the end of the body and, being greatly distended, are the most conspicuous structures in fresh material.

The excretory vesicle, when expanded, is oval in shape. It appears to fill and empty in a manner similar to a protozoan contractile vacuole. Arising from its anterior margin is a common duct, from which two excretory canals extend to opposite sides of the body, and forward to the level of the oral sucker. Along their lengths, excretory tubules branch off. To these are connected the flame cells, through which the body fluids are propelled and channelled into the excretory canals. The excretory vesicle appears not to have any communication with the tail.

The tail exhibits externally a cellular epidermis overlying a muscle layer. It is largely filled by round bodies containing what appears to be a lipoid substance. It is capable of considerable extension and contraction. The distal end is truncated and is of the nature of an adhesive disc. As the cercariae become less active, they tend to attach to the bottom by means of their tail discs. From this position they may sway with a pendulatory or revolving motion.

The cercariae to which this form seems closely allied are *C. megalura* and *C. indica* IV. Features shared by the three of them are: development in rediae, ventral sucker larger than the oral sucker, ready encystment on a solid substratum, tail truncated distally and greatly extensible. The cercaria described here differs from both *C. megalura* and *C. indica* IV in that the main excretory canals arise from a common duct, while in the latter they arise separately from the lateral margins of the excretory vesicle. A further difference is to be noted between the new cercaria and *C. megalura*. Of the latter, Cort states: "The cercaria was unable to use its tail for swimming in

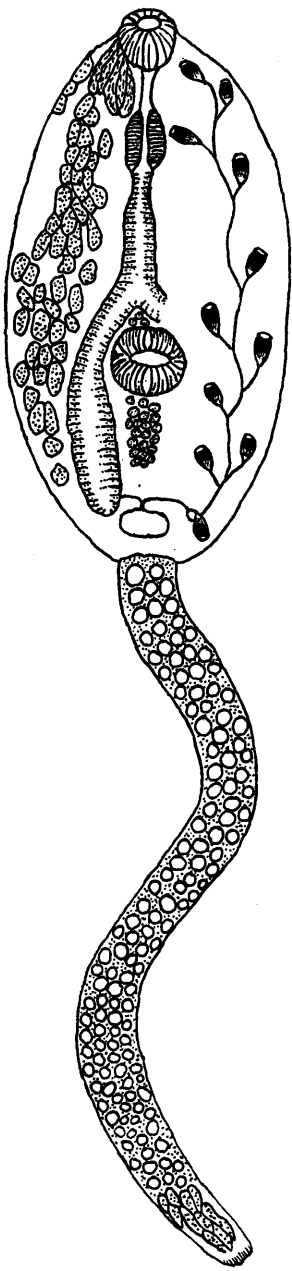


FIG. 1

FIGURE 1. *Cercaria darbiensis* n. sp.

FIGURE 3. Encysted metacercaria.

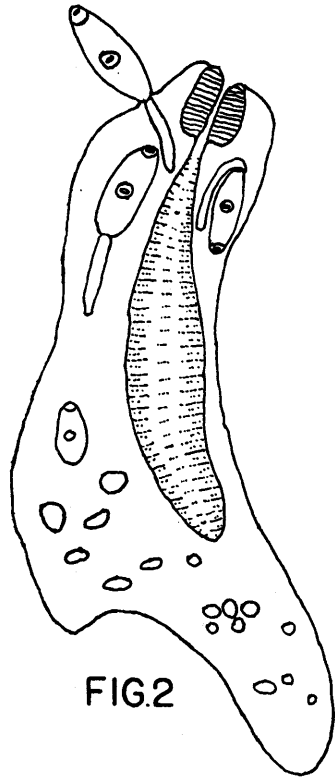


FIG. 2

FIGURE 2. Redia.

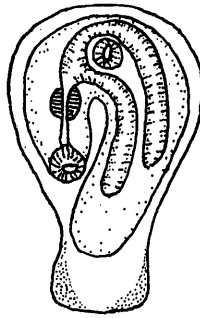


FIG. 3

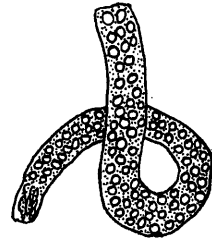


FIG. 4

FIGURE 4. Cast-off tail.

open waters, but, on a substratum, it moved fairly rapidly with the aid of the suckers. With the acetabulum attached, the anterior end would reach out and the oral sucker take hold. The acetabulum would then loosen its grip, and the body contract until the suckers were close together Locomotion consisted in a continued repetition of these movements." According to Cort, this inability to use the tail in swimming movements was shared by *C. distomatosa*. Neither the cercaria discussed here nor *C. indica IV* was so limited in mobility. There appears here a striking difference in the muscular development of the tail that may be of some genetic significance. The body of *C. indica IV* is heavily spined, and its excretory system is characterized by having 14 flame cells on each side of the body. By way of contrast, this cercaria has no spines on its body and has 11 flame cells on each side. The number of flame cells possessed by *C. megalura* was apparently not determined.

The morphological features of the cercaria described in this paper seem to justify its inclusion in the *Megalura* group. Moreover, its variation from forms previously described appear to justify one's considering it to be a new species.

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