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The Post-Embryonic Development of *Ophiotaenia gracilis* Jones, Cheng and Gillespie, 1958, A Cestode Parasite of Bullfrogs

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Abstract

The development of the larval stages of *Ophiotaenia gracilis* Jones, Cheng and Gillespie, 1958, was experimentally demonstrated to occur in the copepod *Eucyclops agilis*. Eggs were recovered from worms found in naturally infected bullfrogs in Colorado. This is the first report of this parasite in Colorado.

Twenty-four hours after ingestion of the embryonated egg, proceroids were seen in the hemocoel of the copepod. Calcareous bodies appeared 9 days after infection. The larvae developed a cercomer by the 13th day of infection and lost it on the 16th day. Measurements and illustrations are given for the developmental stages.

Introduction

Ophiotaenia gracilis Jones, Cheng, and Gillespie, 1958¹ is a proteocephalan cestode parasite of the bullfrog, *Rana catesbiana*. Since the life cycle and developmental stages of this species is unknown,

an effort was made to determine if the microcrustacean *Eucyclops agilis* (Kock) would serve as the intermediate host under experimental conditions.

Methods and Materials

A total of 46 bullfrogs were examined for the presence of helminth parasites. Frogs were collected at Brisco Lake, Weld County, Colorado, from August 1967 to August 1968.

Cestodes were removed from the intestine and relaxed in tap water, where the gravid segments extruded large numbers of eggs. They were then fixed in alcohol - formalin - acetic acid solution,

stained in aceto-carmin, cleared in Beechwood Creosote and mounted with Canada Balsam.

The experimental intermediate hosts *Eucyclops agilis* (Kock) were collected by filtering stream water through a zooplankton net. The copepods were then identified,² sorted, and the *E. agilis* were kept in pond water.

Viable eggs containing fully embryonated oncospheres were introduced into the copepod cultures. At 24 hour intervals, each cyclops was removed from the culture, examined microscopically and placed in fresh oxygenated water. Precise records of the daily size increases of the proceroid larvae were obtained through the use of an ocular micrometer.

Results

Five adult *Ophiotaenia gracilis*, ranging in length from 23 cm to 70 cm, were recovered from 3 of the 46 frogs examined.

Eggs recovered from these specimens were stored in water at 5 C. The eggs of *O. gracilis* were composed of an outer pliable membrane ranging from 34 to 49 μ in diameter, an inner membrane of 23.5 μ and an embryo varying from 13 to 18 μ in diameter. The embryo contained three pairs of hooks, 5 μ in length.

When ingested by *E. agilis*, the outer membranes of the egg were digested away, freeing the oncosphere, which then penetrated the intestine and moved into the hemocoel where it grew to an average size of 28 μ in diameter in 24 hours.

Between the 2nd and 6th days the proceroid lengthened and became worm-like in appearance. By the 6th day after infection some of the proceroids had grown to a size of 187 μ by 62 μ .

Proceroids of this size remained unchanged for 3 days. Between the 9th and 10th days of development, calcareous bodies appeared within the proceroids. The calcareous bodies were retained throughout the remaining development of the larvae.

Thirteen days after the initial infection, the proceroids developed cercomers. At this stage they measured approximately 170 μ by 70 μ . During the next 48 hours the embryonic suckers developed and the body constricted to form two lobes (Fig. 1). On the 16th day after infection, the cercomer was lost.



FIGURE 1. *Proceroid* of *Ophiotaenia gracilis* measuring 187 microns in length. Note cercomer, embryonic suckers and calcareous corpuscles.

Discussion

Many of the copepods died of what appeared to be an over-infection of cestode larvae. More than 30 *O. gracilis* larvae were observed within one *E. agilis* which died shortly after the larvae began to develop and grow. The length of time between infection and the death of the copepod seemed to be related to the number of larvae present. Only those cyclops harboring three or less larvae lived the full 16 days of proceroid development.

Members of the genus *Ophiotaenia* exhibit a typical proteocephalan life cycle involving the development of a proceroid larvae with a cercomer within the body of a copepod. Yamaguti³ stated that *O. ranae*, a parasite of frogs in

Japan, utilized only one intermediate host, a copepod, and that the definitive host became infected by accidental swallowing of the infected intermediate host.

Ophiotaenia gracilis is believed to have a life cycle similar to *O. ranae* with only one intermediate host, and the proceroid larvae becomes infective as the cercomer is lost.

Previously, *O. gracilis* has been reported only from Virginia. With the discovery of this parasite in Weld County, Colorado, the range has been extended. This is not to say that the range includes all areas between Colorado and Virginia, as it is possible that *O. gracilis* was brought into this state in frogs stocked for sporting purposes.

Literature Cited

1. JONES, CHENG, and GILLESPIE. 1958. *Ophiotaenia gracilis* n. sp. a proteocephalid cestode from a frog. J. Tenn. Acad. Sci. 33: 84-88.
2. PENNAK, ROBERT W. 1963. Species identification of the freshwater cyclopoid copepods of the United States. Trans. Am. Microscop. Soc. 82: 353-359.
3. YAMAGUTI, S. 1943. Life history of a frog tapeworm *Ophiotaenia ranae* (Yamaguti 1938). Japan J. Zool. 10: 445-460.