

Notes on the Life History of a Brachylaemid Trematode

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All stages in the life cycle of a brachylaemid trematode have been observed in experimental infections. The cercariae are produced in branched sporocysts in the digestive gland of *Anguispira alternata*; they emerge from the snail and penetrate the same or another individual of *A. alternata* or *Polygyra thyroidus*, migrate to the pericardium, but do not encyst. Developmental and sexually mature stages have been recovered from *Peromyscus leucopus* and from the white mouse. Eggs are produced at about 13 days after ingestion of metacercariae by a white mouse and appear in the feces at about 21 days.

The adult measures 3.5×2.0 mm. The oral sucker is 500×580 μ , and the ventral sucker, 460×560 μ . The pharynx is muscular; the caeca loop back and forth, extend to the posterior end of the body, and have numerous evaginations on both lateral and medial sides. The gonads lie close together, forming a triangle in the most posterior portion of the worm, with one testis on the left side, one in the midline and posterior, and the ovary on the right. The testes are indented. In a mature worm from *P. leucopus* the left testis measures 420×460 μ ; the posterior one, 460×540 μ . The ovary is smooth and measures 650×550 μ . The genital pore is median, at the level of the anterior testis. The vitellaria are lateral, follicular and sparse, and extend from the pharynx to the ovary. The uterus fills the body between the caeca from the oral sucker to the anterior testis. Both ascending and descending loops are much convoluted; the descending loop is conspicuous in the dorsal midline. The main collecting ducts of the excretory system are lateral to the caeca, and the bladder empties through a posterior pore.

The thin-shelled but somewhat yellowish egg measures 32×18 μ . The shell is thicker at the adopercular end than elsewhere. Miracidia are visible in the eggs when they are passed by the mice. The larvae do not move, but the adopercular half appears to be ciliated.

The sporocyst is much branched and dendritic and ramifies through the entire liver of the snail. The branching of a fragment is irregular, starting from a roughly defined main trunk. Each branch, but not the main trunk, is divided by constrictions, and may end in a filament with a terminal knob. All parts of the sporocyst except the constrictions are filled with cercariae in different stages of development. Some portions of the sporocyst contain but one cercaria between constrictions; others, from two to many. No birth pore has been observed.

Cercariae washed from the surface of infected snails are about 250 μ long when extended. The tail is a small protuberance in a posteroventral position; the caeca are broad and extend to the level of the center of the ventral sucker; and a prepharynx and short esophagus are visible

in a fully extended cercaria. The cuticle bears a few widely-scattered, conspicuous projections, possibly sensory. Just posterior to the ventral sucker is a germinal mass. The flame cell pattern has not been entirely worked out, but there appear to be 5 flame cells in each anterior quadrant and 4 in each posterior one. The vesicular bladder empties through two ducts leading to pores on the tail.

The metacercariae are over 1 mm long at maximum size, broad, white and somewhat concave ventrally. The caeca extend to the posterior end and are looped back and forth. There is a thick cuticle which, in the living worm, is transversely folded and may present a spinous or scale-like appearance. Three distinct gonad rudiments are present. After three weeks in the second intermediate host the worms still have the cercarial tail, although they are larger and the caeca have increased in length.

This trematode possibly is identical with the metacercaria described by Leidy in 1847 as *Distoma heliciis* (renamed *D. pericardium* by Creplin, 1849), and with *D. vagans* Leidy (1850). The morphological and taxonomic features will be presented in a later publication.

Vitamin B₁₄ and Cell Proliferation

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A crystalline compound has been isolated from urine which had a very high activity on cell proliferation *in vitro* and on hemopoiesis *in vivo*.

From 100 liters of normal human urine 33 mg of a material was obtained as balls of small brown crystals which is designated here as vitamin B₁₄, although its origin and function is probably more that of a hormone than a vitamin. On analysis the material was found to contain 19.6% nitrogen and 4.0% phosphorus. Sulfur was not present. Cobalt was absent, or, if present, there was so small a fraction of a per cent that it could not be considered anything but an impurity.

Rickes, *et al.* (4), Shorb (5), and West (7) have reported a cobalt-containing compound (vitamin B₁₂) isolated from liver, which had a hematological activity in cases of addisonian pernicious anemia. Smith (6) described a pigment from liver as an antipernicious anemia factor which may be identical with vitamin B₁₂.

The activity of vitamin B₁₄ was tested on bone marrow cultures by the technique previously described (1). The results are given in Table I. The table shows that in bone marrow cultures vitamin B₁₄ is at least 5,000,000 times as effective as xanthopterin, or 1×10^{-6} γ /ml of cell suspension gives an increase in the rate of cell proliferation similar to 5 γ /ml of xanthopterin. Vitamin B₁₄ was not toxic in concentrations up to 100 γ /ml. Its effect in accelerating cell proliferation is counteracted by 2-amino-4-hydroxy-7-methyl pteridine (7MP), which also counteracts the effect of xanthopterin.