

A STUDY OF *LOPHOTASPIS ORIENTALIS* IN *CORBICULA* (TREMATODA: ASPIDOGASTRIDAE)

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ABSTRACT

R. F. Huber, C. F. Lo and C. H. Wang (1975). *A study of Lophotaspis orientalis in Corbicula*. Bull. Inst. Zool., Academia Sinica, 14(1): 1-7. The parasite *Lophotaspis orientalis*, a trematode, was found in the pericardial cavity of *Corbicula*. It seems to be the same species as described by Faust and Tang (1936). Reproductive organs were studied with microscopic sections and whole mount preparations under the light microscope. Scanning electron microscopy was employed to reveal the minute structures of the ventral sucker. The differences between our specimens of *L. orientalis* and those of Faust and Tang are discussed.

There are two species of trematodes reported in *Corbicula*^(1,2). The species *Lophotaspis orientalis* is added to this list. *L. orientalis* belongs to the order Aspidocotyles.

The order Aspidocotyles attracts particular attention. Both of its structure and life cycle appear to be transitional between the monogenetic and digenetic trematodes. Many of them are parasites of mollusks and cold blooded vertebrates⁽¹⁻⁵⁾.

The genus *Lophotaspis* was proposed by Loose (1901) for an aspidogastrid trematode⁽¹⁾. Ward and Hopkins (1931) discovered *L. interiora* in the intestine of an alligator snapping turtle⁽³⁾. Faust and Tang (1936) had described *L. orientalis* from a fresh water turtle in Foochow, China⁽⁶⁾. Wharton (1939) found *L. valli* in the stomach of a loggerhead turtle. He reported the nymph of *L. valli* for the first time⁽⁷⁾. We now have

found *L. orientalis* in a new host.

The scanning electron microscope (SEM) is used for morphological studies. Wooley (1972) observed the external features of *Aspidogaster conchicola* with SEM⁽⁸⁾. The micrographs obtained from SEM are very informative and useful for the study of *L. orientalis*.

Emphasis on the attachment organ (ventral sucker) will be given in the following paragraphs because of its importance in classification. The visualization of this organ is greatly enhanced with the use of SEM.

MATERIALS AND METHODS

About 600 corbiculae were bought from the market and checked during six months. The soft parts of corbiculus were exposed by cutting the adductor muscles. Only 20 infected corbiculae were found and 24 specimens of *Lophotaspis orientalis* were recovered. The parasites were

all located in the pericardial cavity. They were fixed in Bouin's fixative for routine sections; and some were fixed, with pressure applied, in AFA for whole-mounts. The whole-mounts were stained with borax-carmin and fast green. The serial sections were stained with Delafield hematoxylin and eosin or with Mallory's triple stain.

The parasites were treated with or without ether before fixation. All of them were fixed initially in 2% glutaldehyde; 1% osmic acid was used for postfixation. After alcohol-dehydration the specimens were dried in air. The specimens were coated in a vacuum with carbon and gold in that sequence. Micrographs were then taken with the JSM-15 at 15 KV.

RESULTS AND OBSERVATIONS

A. External feature

Lophotaspis orientalis was found in the pericardial cavity of corbiculus. One to three specimens occurred in each corbiculus. Nymphs and adults differ in size and in the degree of the development of the reproductive organs. In extended specimens the total length of the adult varies between 3.9 mm and 6.4 mm. Sexually immature specimens (nymphs) measure between 2.2 mm and 3 mm. The fresh specimen is orange or red in color, it is flat-oval in shape. It has a tapered anterior and a round posterior end. The oral sucker is rudimentary (Fig. 1). The mouth opening is transverse. The ventral sucker is massive.

B. Ventral sucker

The ventral sucker is alveolated and most characteristic of *L. orientalis*. This ventral sucker is composed of 47 to 57 alveoli, arranged in four longitudinal rows, two medial and two peripheral ones (Fig. 1). The arrangement of the alveoli in two adjacent rows is slightly displaced, therefore, neighboring alveoli of two medial rows reveal a honey-comb feature. The alveoli of the medial rows are smaller than those of the periphery and usually hexagonal. The alveoli of the peripheral rows are elliptical with long transverse axis. The muscles of the

ventral sucker form bands between the alveoli. When the alveoli contract they can hold the heart of the host tightly (Fig. 2). Papillae are present at the junction of alveoli (Fig. 3). Each medial alveolus has six papillae. The periphery of the disc-like sucker is marked with a row of papillae. They are located at the tip of the interalveolar septum.

The ventral suckers are examined under the SEM. The parasites without anesthesia are contracted. The surface of the wall of the alveoli is wrinkled and has many small pits. All papillae are contracted. Each has 7 to 8 radial folds (Fig. 3). In anesthetized specimens, there is no contraction of the papillae and the opening of each papilla is smooth. Instead of pits, many small round swellings appear on the walls of the alveoli (Fig. 4).

Microscopic sections of the papillae show that each is composed of a sensory capsule at the bottom and a narrow channel which communicates with the exterior (Figs. 5, 6). In some specimens marginal organs like tentacles are observed at the alveolar septum of the sucker.

C. Internal organs

Among the internal organs of the parasite (Fig. 7), the reproductive organs are the dominant ones. Examinations of many serial sections and whole mounts reveal one ventral-median common genital opening at the level between mouth and pharynx. A single bilobed testis is present at the posterior end of the body. Two vasa efferentia originate at the anterior-lateral side of the testis. They unite at the level slightly below the ovary. The vas deferens goes directly to the genital opening. A folded ovary lies anterior-lateral to the testis. It is much smaller than the testis. The oviduct descends to the upper margin of the testis, where it forms a slightly curved ootype and enters into the uterus. A Mehlis gland is present around the ootype. The uterus is winding up anteriorly to the genital opening. In mature adults a large number of eggs (embryo-eggs) fill up the uterus. The embryo-eggs are large,

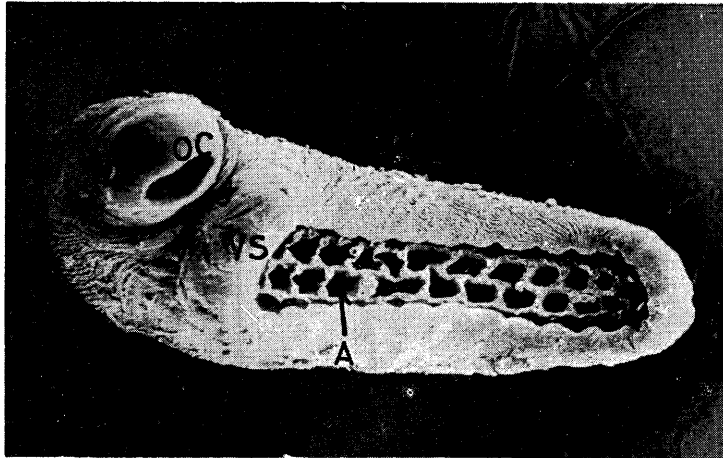


Fig. 1. Scanning electron micrograph of *Lophotaspis orientalis* showing the oral cavity (OC) and the alveoli (A) of the ventral sucker (VS). 50 \times .

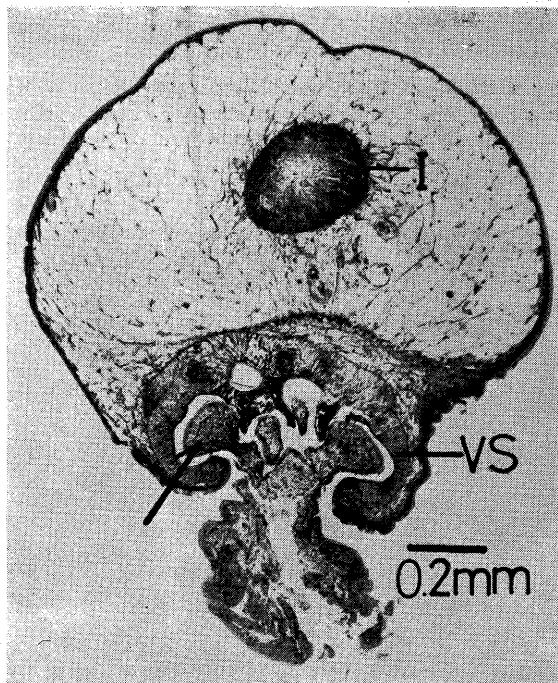


Fig. 2. A cross section of *Lophotaspis orientalis*, the arrow shows the alveoli holding the heart muscle of the host.

I: Intestine

VS: Ventral sucker

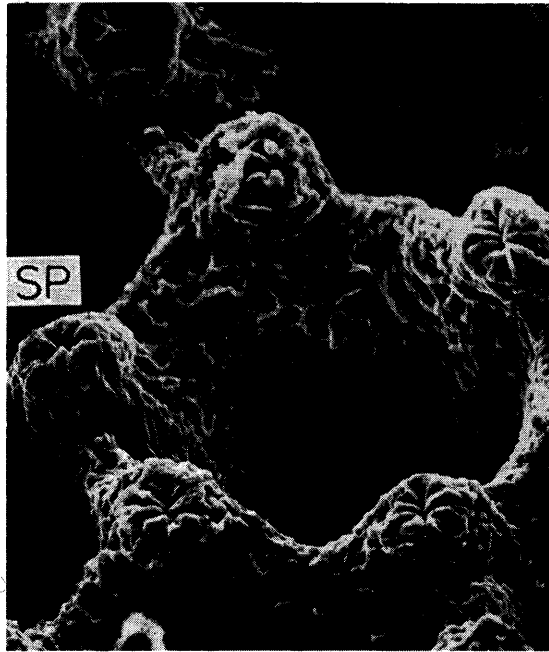


Fig. 3. Scanning electron micrograph of *Lophotaspis orientalis* which was treated without ether. The picture shows the sensory papillae (SP) on one alveolus of the ventral sucker and each sensory papilla joins with three alveoli. 500 \times .

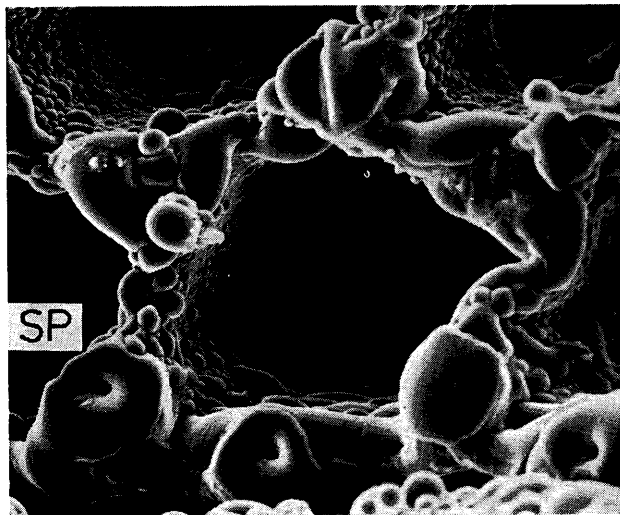


Fig. 4. Scanning electron micrograph which was treated with ether. The picture shows the opening of sensory papillae (SP). 500 \times .

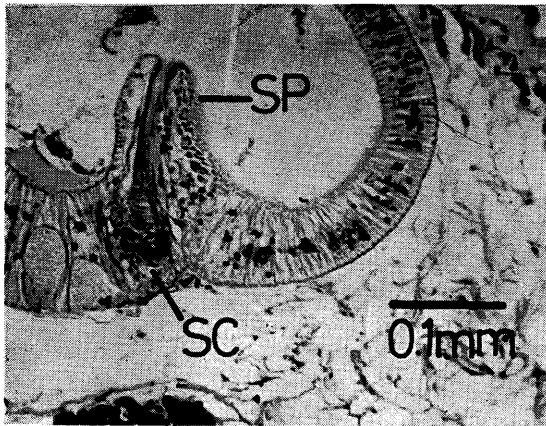


Fig. 5. Light micrograph of the longitudinal section of sensory papillae and sensory capsule (SC).

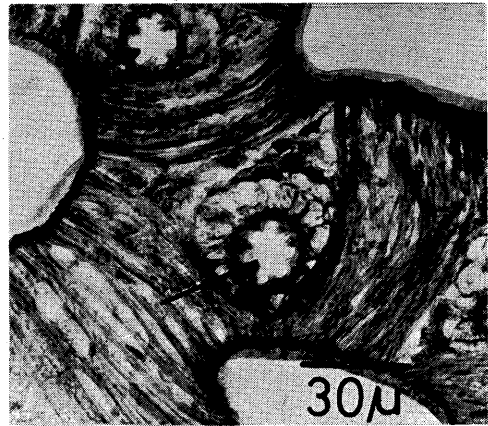


Fig. 6. Light micrograph of the cross section of sensory papillae between three muscle bands. The arrow shows the channel of sensory papillae.

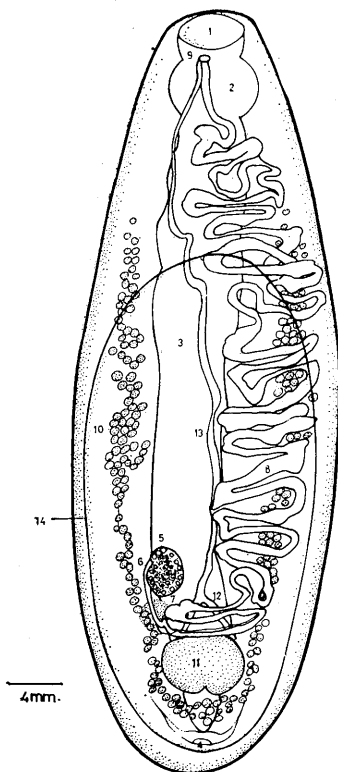


Fig. 7. The drawing is showing the internal organs of *Lophotaspis orientalis*.

1. Oral cavity
2. Pharynx
3. Intestine
4. Excretory pore
5. Ovary
6. Oviduct
7. Mehlis gland
8. Uterus
9. Genital pore
10. Yolk gland
11. Testes
12. Vasa efferentia
13. Vas deferens
14. Ventral sucker

elongated and convex on one side and concave on the other side. Paired yolk glands consisting of small follicles extend laterally almost the entire length of the body. They meet behind the posterior end of the intestine, thus forming a U-shaped chain. The narrow ducts of the yolk glands unite at the level of the testis and enter the oviduct.

The digestive system is very simple. The oral cavity is connected to a strong, short and ellipsoid pharynx. Behind the pharynx is a blind sack-like intestine extending almost to the posterior end of the body. A bifid excretory bladder lies just behind the intestine. The excretory pore lies on the dorsal surface of the posterior end of the body.

DISCUSSION

The specimens of *L. orientalis* collected from corbiculus in Taiwan show some differences from those described by Faust and Tang (1936). First, there is a different host; then there is a difference in the number of alveoli; and finally there are differences in the reproductive system.

The host of the parasite in Taiwan is corbiculus; the host of the parasite described by Faust and Tang is a fresh water turtle.

The number of alveoli in our specimens is not always 54. The number varies between 47 and 57. The number of alveoli seems to increase with the age. The number of 54 is common among adult parasites.

Our specimens of *L. orientalis* have two vasa efferentia arising from the anterior-lateral side of the testis, not one vasa efferens arising from the anterior part of the testis as indicated by Faust and Tang. Another difference between our specimens of *L. orientalis* and those of Faust and Tang is the shape of the embryo-eggs. Instead of being ovoid in shape, they are convex

on one side and concave on the other side.

All the discrepancies may arise from the differences in the methods of observation and sampling. Faust and Tang⁽⁶⁾ had suggested that the *L. orientalis* might infect some mollusks, then resided in the stomach of the turtle when they were taken up as part of the ingested food. The significance of morphological differences of the alveoli in *L. orientalis* treated with or without ether remains to be elucidated.

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寄生於蜆之盾吸蟲 *Lophotaspis Orientalis*

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作者發現於蜆之圍心腔中有盾吸蟲 *Lophotaspis orientalis* 之寄生。本篇報告除應用切片技術來瞭解其內部構造外，並且利用掃描式電子顯微鏡觀察其外形及腹吸盤上之感覺突起。