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INTRODUCTION

On April 8, 1948, the writer collected a blue racer, *Coluber constrictor flaviventris* Say, along a small creek about three miles south of Lacey-Keosauqua State Park, Van Buren County, Iowa. Upon examination, the mouth was found to contain two trematodes belonging to the subfamily Ochetosomatinae Leão, 1944 (= Reniferinae Pratt, 1902). The trematodes were fully mature adults and were identified as *Ochetosoma vallida* (Nicoll, 1911). Nicoll originally described this species as *Lechriorchis vallidus* from the hognosed snake, *Heterodon contortrix* Linn., but it was transferred by Talbot (1933) to the genus *Renifer* Pratt because of the lateral position of the genital pore. Byrd and Denton (1938) included this species in their genus, *Neorenifer* Byrd and Denton, 1938. Kagan (1947) returned this species to the genus *Renifer*. Leão (1944) showed conclusively that *Renifer* Pratt, 1902 was a synonym of *Ochetosoma* Braun, 1901, both being originally described as parasites of the respiro-alimentary tracts of snakes.

OBSERVATIONS

Soon after recovery from the snake the two worms were examined alive under coverglass pressure before fixation. One of the two seemed at the time entirely normal, but the other worm appeared to be abnormal. It was observed that in this second worm the position of the male genital opening was in an intercecal position rather than in its normal position, just outside the intercecal space and slightly to the left of the midline. The uterine opening of this abnormal worm, instead of being located in its normal position, also just outside the intercecal space and approximating that of the male genital pore, was found to open at the extreme lateral edge of the body on the left side. Following these preliminary observations the two worms were fixed in formalin-alcohol-acetic acid under slight coverglass pressure, removed to alcohol, stained in hydrochloric acid carmine, dehydrated, cleared and mounted for further study.

Subsequent studies of the abnormal worm verified the original observations. The opening of the male genital pore was nearly on the midline in an intercecal position, while the uterine opening was at the extreme left edge of the body, the two openings being widely

separated from each other rather than closely approximated. A close examination of the testes and ovary indicated, as far as could be determined, that they were entirely normal. The seminal vesicle contained abundant spematozoa, while the cirrus pouch, pars prostatica and cirrus proper were apparently normal in their development.

Examination of the uterus, however, disclosed that about 40% of the uterine contents was abnormal in some respect. The major portion of the abnormal material consisted of vitelline masses of so-called "yolk-granules" varying in size from six to forty-four microns in diameter. These masses varied considerably in color, from light yellow to deep mahogany-brown and many were a mixture of both light and dark brown material. They were equally prominent in both the descending and ascending portions of the uterus. The vitellaria, vitelline ducts, and vitelline reservoir all appeared to be well developed and normal. Normal appearing eggs were present in the uterus along with the abnormal material. Unfortunately, no attempt was made before the worms were fixed to determine if the eggs contained active miracidia and it was impossible to determine this from the mounted specimen. It is of course possible that the increased distance between the genital pores might make self-fertilization difficult or impossible. If copulation ever occurs in this subfamily, (it has never been observed to my knowledge) this, too, would be much more difficult.

Discussion

The reported occurrences of structural abnormalities among digenetic trematodes in this subfamily are uncommon. Manter (1927) reported a case of overproduction of shell (vitelline) material in this same species of trematode. However, among twelve which he recovered from the blueracer eleven were abnormal in some respect. These abnormalities ranked from a scattering of yolk material in the uterus and surrounding parenchyma to complete suppression of ovarian function by massive accumulation of yolk material within the ovary itself.

Manter gave several possible explanations for the occurrence of the the anomalies which he found. He considered the age of the worms a possible contributing factor, believing that possibly his specimens were worms of advanced age. However, using size alone as a measurement of age, Manter could not find any difference in the younger and the older worms. It is doubtful that there is much correlation between age and size in most parasites where crowding and nutrition may be additional factors to be considered. His suggestion that the worms were found in an abnormal location, the body cavity of the snake, can probably also be discounted when one considers the difficulty in accurately determining the extent of the posterior, saccular

portion of the snake lung. Trematodes occurring in this area of the body are very often reported as being in the body cavity. In fact, it is quite difficult to always accurately determine whether or not such worms are in the posterior sac-like lung or are in the body cavity attached to the mesentery.

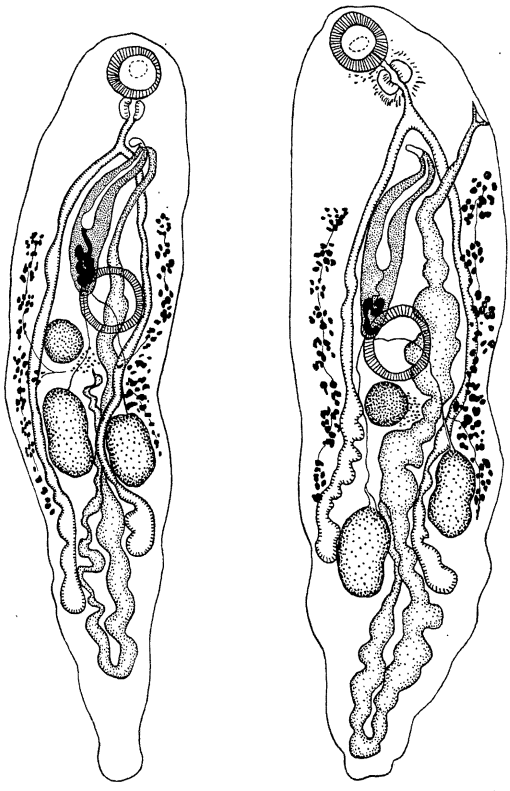
The possibility that residence taken up by the worms in an unusual or abnormal host, the blue racer rather than the hognosed snake, is to be considered but is not very likely to be the cause of the observed anomalies.

What is more interesting in the case of the present two worms is the peculiar situation arising from having one of them with a widely separated genital apparatus. One of the most important generic characters in this subfamily is the position of their genital pores. In *Ochetosoma* (= *Renifer)* the genital opening is extracecal, while in *Lechriorchis* it is intracecal. Other peculiarities of the anatomy are important, but this one factor is the most decisive one. If we should select the position of the uterine opening as the more correct position this individual would be placed in the genus *Ochetosoma,* while a consideration of the position of the cirrus pouch and its opening would suggest the situation in *Lechriorchis.* Occasionally, as in *Lechriorchis abduscens* Byrd and Denton, 1938, the genital pore is located almost exactly over the left cecal tube. As the pore was not outside the intercecal space this led Byrd and Denton to consider this species, also a parasite of the blue racer, to be a *Lechriorchis.* Actually, I have shown (1952) that this species is in reality an *Ochetosoma,* probably *Ochetosoma magna* (Byrd and Denton, 1938).

I would like to suggest a fourth factor that may be at work in producing anomalies of various sorts in this species of trematode, namely some genetic factor that produces a significant proportion of abnormal worms. This is partially discounted, however, by the fact that at the time of the collection of the blue racer I also collected an eastern hognosed snake, *Heterodon,* which upon autopsy several months later was found to contain hundreds of trematodes of this same species, and all apparently normal. The hognosed snake was taken only a few hundred yards from the blue racer.

It is evident from the observations of Manter (1927) and my own observations that additional investigations on *Ochetosoma vallida* are desirable to determine the nature and causes of the observed conditions. Although the life history of this species is not known the pattern of development for all ochetosomids is well known since the pioneer work of McCoy (1928), Talbot (1933) and Byrd (1935) on this group of trematodes.

Abnormal conditions of the genital apparatus in trematodes, though not abundantly reported, have been found in the literature.



Explanation of Plate

Figure 1 (left). *Ochetosoma vallida.* Normal worm from blue racer, *Coluber constrictor flaviventris.*

Figure 2 (right). *Ochetosoma vallida.* Abnormal worm showing widely spaced male and female genital openings.

Goldschmidt (1909) reported an overproduction of shell material in the trematode, *Dicrocoelium lanceolatum,* and more recently Odlaug (1939) reported a similar condition in *Gorgodera amplicava.* Odlaug concluded that the condition is due to some factor in the reproductive system of the trematodes and not the result of external influences.

Summary

An abnormal condition of the genital atrium of the trematode *Ochetosoma vallida* (Nicoll, 1911) has been noted and described in which there is a separation of the male and female genital pores. In this group of trematodes the position of the genital pores is of important taxonomic value, so much so that the position of the genital atrium may determine a trematode's generic identity. In the present instance both pores have left the normal location so that the position of the male opening would indicate placement of the worm in

the genus *Lechriorchis* Stafford, 1905, and the position of the female or uterine pore at the edge of the body would suggest placement of the worm in the genus *Ochetosoma* Braun, 1901. Consideration of the host, other morphological features, and the presence of a normal appearing worm along with the abnormal one led the present writer to believe that this is an example of an *Ochetosoma* possessing an abnormal genital apparatus.

Reference is made to the literature in which similar cases have been reported.

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