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Description of a New Species of *Dadaytrema*
(Trematoda: Paramphistomidae)

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Reprinted from

THE AMERICAN MIDLAND NATURALIST
Vol. 70, No. 2, pp. 347-355, October, 1963

University of Notre Dame Press

Notre Dame, Indiana

Trematodes of Turtles from Tabasco, Mexico, with a Description of a New Species of *Dadaytrema* (Trematoda: Paramphistomidae)¹

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ABSTRACT: The trematode parasites from 81 turtles, representing 7 species, taken in the Mexican state of Tabasco are reported. The trematodes represent 12 species from 7 families as follows: *Neopolystoma domitilae* and *Polystomoides coronatus* (Polystomatidae); *Dadaytrema sphaerorchidum* n. sp., *Dermatomytrea trifoliatum*, *Schizamphistomoides resupinatus*, and *S. tabascensis* (Paramphistomidae); *Octangiooides tlacotalpensis* (Angiodictyidae); *Telorchis corti* and *T. patonianus* (Plagiorchidae); *Herpetodiplostomum delillei* (Proterodiplostomatidae); *Choanophorus rouirosai* (Pronocephalidae); and *Heronimus chelydrae* (Heronimidae). The ranges of 11 of these species are extended to Tabasco, and 10 new host records are presented.

INTRODUCTION

From June through August, 1958, and from January through June, 1959, field collections of trematodes from reptiles were made in the state of Tabasco, Mexico. Most of the reptiles were obtained in an area near the Teapa River about 15 miles south of Villahermosa.

Among the reptiles examined were 81 turtles representing 7 species, as follows: *Chelydra serpentina* (2); *Claudius angustatus* (20); *Dermatemys mawii* (2); *Geomyda areolata* (1); *Kinosternon leucostomum* (24); *Pseudemys scripta ornata* (22); and *Staurotypus triporcatus* (10). The trematodes recovered represented 12 species in 7 families as follows: Polystomatidae (2); Paramphistomidae (4); Angiodictyidae (1); Plagiorchidae (2); Proterodiplostomatidae (1); Pronocephalidae (1); and Heronimidae (1).

MATERIALS AND METHODS

Trematode specimens were killed with gentle heat, fixed in alcohol-formalin-acetic acid solution, stained with Mayer's carmalum, and cleared in methyl salicylate. Numbers of trematodes were stained and cleared in groups using the same methods except that the worms were passed through the reagents while in gauze-covered vials.

Representative collections of reptile hosts were fixed in 10 per cent formalin and preserved in 85 per cent alcohol for later determination.²

All measurements given in the present paper are in millimeters.

¹ This report was taken from a dissertation submitted to Louisiana State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

² The 1958 collection of reptile hosts was determined by Dr. Edward Taylor of the University of Kansas, and the 1959 collection was identified by Dr. Hobart Smith of the University of Illinois.

In the present report, the known geographic range for each trematode species is given. The hosts listed for these species, however, are only those found in Tabasco.

Class Trematoda Rudolphi, 1808

Subclass Monogenea Carus, 1863

FAMILY POLYSTOMATIDAE GAMBLE, 1896

Subfamily Polystomatinae Price, 1936

Neopolystoma domitilae (Caballero, 1938)

Hosts.—*Pseudemys scripta ornata* and *Chelydra serpentina*.

Site.—Urinary bladder and cloaca.

Geographic range.—Veracruz and Tabasco, Mexico.

This species is represented by two specimens from *Pseudemys scripta ornata*, and a single one from *Chelydra serpentina*. The latter apparently constitutes a new host record. Sproston (1946) recognized *N. domitilae* as valid even though it closely resembles *N. orbiculare* Stunkard, 1916. She separated the two forms on the basis of the number of hooklets in the genital coronet: *N. domitilae* has from 19 to 20 such hooklets, and *N. orbiculare*, 16. The three specimens in the present collection have 19, 20 and 21 hooklets. In addition to listing a new host, the present report extends the range of the species to the state of Tabasco.

Polystomoides coronatus (Leidy, 1838)

Host.—*Pseudemys scripta ornata*.

Site.—Mouth, sometimes nostrils.

Geographic range.—Massachusetts, Iowa, North Carolina, Oregon, Texas, and Tabasco, Mexico.

A single specimen of this species was collected from the oral cavity of *Pseudemys scripta ornata* in Tabasco. The specimen, although somewhat smaller than typical mature individuals, shows the characteristic haptor anchors. It also has 36 hooklets in the genital coronet, which falls within the range given for the species.

Although this species has been recorded from *Pseudemys scripta* in the United States, no report of it from Mexico has been encountered.

Subclass Digenea Carus, 1863

FAMILY PARAMPHISTOMIDAE FISCHÖEDER, 1901

Subfamily Dadaytreminae Yamaguti, 1958

Both specimens of *Dermatemys mawii* examined in Tabasco contained many specimens (about 500) of what appears to be an undescribed species of the genus *Dadaytrema*. These parasites could be distinguished readily from the two species of *Schizamphistomoides* with which they were associated. They were only about one-half as large as the species of *Schizamphistomoides*, and their testes were in tandem rather than diagonally situated.

Travassos (1931) created the genus *Dadaytrema* to include *Amphistoma oxycephalum* Diesing, 1836, and *Chiorchis papillatus* Daday, 1907. He regarded these names as synonyms. Subsequently,

Vaz (1932) described two additional species in the genus. The three species have been reported only from Brazilian fishes.

All of the specimens in the present collection have been stained, cleared, and comparatively studied. A group of 35 individuals has been whole mounted, and two additional ones have been serially sectioned. These specimens conform to the diagnosis of the genus *Dadaytrema*. Measurements are given in millimeters and are to be read as the actual size of the holotype specimen followed by the range, from smallest to largest specimen in the collection. It should be noted that all of these worms were moderately contracted. While alive, the same individuals could extend to nearly twice the indicated length.

Dadaytrema sphaerorchidum n. sp.

Figure 1

Host.—*Dermatemys mawii* Gray.

Location.—Upper large intestine and lower small intestine.

Locality.—Fifteen miles south of Villahermosa, Tabasco, Mexico.

Holotype.—U.S.N.M. Hel. Coll. No. 60309.

Paratypes.—Hel. Coll. Instituto de Biología, Mexico D. F.; Dept. of Zoology, Louisiana State University; author's collection.

Diagnosis.—With the characters of the genus. Body robust, muscular, with thick, nonspinous cuticle, tapering towards both extremities, 9.25 (3.28-9.75) long by 2.50 (1.30-2.78) wide, widest at level of posterior testis. Oral sucker barrel-shaped, with terminal aperture; 0.70 (0.51-0.70) long by 0.38 (0.36-0.45) wide. Oral aperture with cuticular rugae, which depend somewhat on state of contraction. Oral diverticula about 0.24 (0.15-0.28) long by 0.14 (0.08-0.14) wide. Oesophageal bulb 0.32 (0.17-0.37) in diameter. Intestinal caeca ending before reaching acetabulum, with posterior tips often directed medially. Acetabulum ventro-terminal, 1.0 (0.71-2.20) long by 1.05 (0.61-1.14) wide.

Testes tandem in position, situated pre-equatorially, roughly spherical in shape although sometimes showing weak lobation: anterior testis 1.08 (0.57-1.14) long by 1.0 (0.70-1.21) wide; posterior testis 0.98 (0.57-1.05) long by 1.04 (0.70-1.14) wide. Cirrus sac 0.33 (0.25-0.50) long by 0.17 (0.10-0.24) wide; containing unarmed cirrus and scattered prostatic cells. Position of genital aperture varying from level

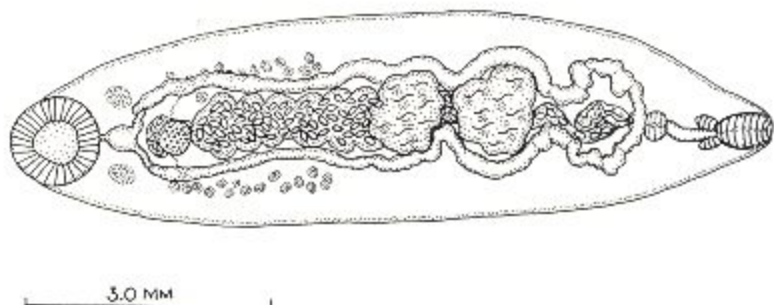


Fig. 1.—Projection drawing of *Dadaytrema sphaerorchidum* in ventral view.

of intestinal bifurcation to slightly posterior thereto depending on state of contraction of worm. Genital sucker absent.

Ovary small, spherical, located at level of ends of caeca, 0.29 (0.17-0.30) in diameter and 0.86(0.23-0.89) in front of anterior border of acetabulum. Laurer's canal present. Uterus with one or two coils posterior to ovary before filling intercaecal area between ovary and testes. Vitelline system consisting of 30 to 50 follicles, roughly spherical, largely dorso-lateral to intestinal caeca, and extending from slightly post-equatorial level to ends of caeca: individual follicles measuring 0.09-0.19 in diameter. Eggs numerous, large, thin-shelled, operculate, 0.07-0.08 x 0.13-0.17. Eggs in terminal portions of uterus embryonated.

Excretory bladder ovoid in outline, situated between ovary and acetabulum and communicating with outside via a short duct. Excretory pore situated on dorsal surface of body. Two main excretory ducts extend anteriorly from bladder, lateral and dorso-lateral to caeca.

Lymphatic system similar to that of other amphistomes, with three main channels running longitudinally on each side of body in close association with caeca; channels emptying into sinuses in vicinity of oral sucker and acetabulum. Lymphatic channels lying dorsal to caeca considerably larger than other ones. In some specimens these dorsal channels have expanded ovoid portions posterior to ends of caeca:

TABLE I.—Dimensional comparisons of *Dadaytrema sphaerorchidum* and *Dadaytrema oxycephalum* (in mm)

| | <i>D. sphaerorchidum</i> | <i>D. oxycephalum</i> |
|---------------------------------|--------------------------|---|
| Body: | | |
| length: | 3.28-9.75 | 2.2-9.5 |
| width: | 1.31-2.58 | 0.7-3.5 |
| Oral sucker: | | |
| length: | 0.51-0.70 | 0.4-1.0 |
| width: | 0.36-0.45 | 0.3-0.4 |
| Oral diverticula: | | |
| length: | 0.15-0.28 | 0.15-0.3 |
| width: | 0.08-0.14 | 0.1-0.13 |
| Oesophageal bulb (diameter): | 0.17-0.37 | 0.15-0.17 |
| Acetabulum (diameter): | 0.610-2.20 | 0.72-1.2 |
| Anterior testis: | | |
| length: | 0.57-1.14 | 1.0-1.4 (diameter of central mass) |
| width: | 0.70-1.2 | |
| Posterior testis: | | (have ramifications extending 0.1-0.4) |
| length: | 0.57-1.05 | |
| Cirrus sac: | | |
| length: | 0.25-0.50 | 0.3-0.6 |
| width: | 0.10-0.24 | 0.1-0.5 |
| Ovary (diameter): | 0.17-0.30 | 0.26-0.4 |
| Ovary to acetabulum: | 0.23-0.89 | 0.06-0.12 |
| Egg: | 0.07-0.08 x 0.13-0.17 | 0.05-0.07 x 0.07-0.13 |

enlargements corresponding in position and appearance to the "cuerpecitos" of Caballero (see *Schizamphistomoides resupinatus*, below).

Discussion.—The three previously described species in the genus were taken from fish hosts in Brazil. The present report is believed to be the first record of a species of *Dadaytrema* in a chelonian host, as well as the first record of the genus in Mexico.

D. sphaerorchidum differs from the other described species in having testes that are nearly spherical rather than being highly lobate. Of the three species, *D. oxycephalum* most closely resembles *D. sphaerorchidum* in size and appearance. As can be seen from Table I, *D. sphaerorchidum* has a relatively larger acetabulum and oesophageal bulb than does *D. oxycephalum*. Also, the eggs of the new species are considerably larger than those of *D. oxycephalum*.

Subfamily Dermatemytrematinae Yamaguti, 1958

Dermatemytrema trifoliatum Price, 1937

Host.—*Dermatemys mawii*.

Site.—Lower intestinal tract.

Geographic range.—Tabasco, Mexico.

In describing this species, Price (1937) did not identify the state in Mexico from which the host came. In the present study, a single specimen, which is undoubtedly conspecific with Price's material was recovered from a mixed infection of hundreds of other amphistomes and angiodictyids. The specimen is about 2 mm long, and it has the general body proportions given by Price in the original description. It also has the large acetabulum with the trifoliate aperture which served as the basis for the specific name.

Subfamily Schizamphistominae Looss, 1912

Schizamphistomoides resupinatus Caballero, 1940

Host.—*Dermatemys mawii*.

Site.—Large intestine.

Geographic range.—Veracruz and Tabasco, Mexico.

Both specimens of *Dermatemys mawii* examined in the present study harbored numerous examples of *S. resupinatus*. This material closely conforms to Caballero's description of the species he took from the same host at Alvarado, Veracruz. Caballero (1940) reported that a small spherical body could be observed on either side of the body, a short distance anterior to the posterior sucker, in both living and fixed specimens. He referred to these structures as "cuerpecitos," but did not speculate on their nature or function. Since they could be seen readily in the present series, an attempt was made to determine their nature. To this end, serial sections were made through the posterior region of several specimens. The sections revealed that the cuerpecitos are relatively heavy-walled portions of the lymphatic system filled with lymphatic fluid and scattered amoebocytic cells.

Looss (1902) reported that the lymphatic tubules of certain amphistomes are contractile. He believed that contractions of the tubules cause the circulation of fluid within the system. It is not

difficult to observe that the lymphatic tubules widen and narrow, but whether this movement is active or passive remains a matter of speculation. Willey (1930) rejected the suggestion that the lymphatic structures are contractile. His opinion was apparently based on studies of sectioned material. The movements of the known contractile structures (e.g., body wall, uterus, excretory bladder, and ootype) could account for the flow of lymphatic fluid without the active participation of the tubules. Willey also described lymphatic sinuses near the posterior and anterior suckers. In view of the posterior position of the cuerpecitos of Caballero, it is probable that they are homologous to the posterior sinuses reported by Willey. The possibility that the cuerpecitos may be contractile lymphatic "hearts" cannot be ruled out. That they are heavy-walled and spherical, quite unlike typical sinuses, suggests this possibility. Additional study of immature living specimens might help to resolve this question.

Schizamphistomoides tabascensis Caballero and Sokoloff, 1934

Hosts.—*Dermatemys mawii*, *Pseudemys scripta ornata*, and *Kinosternon leucostomum*.

Site.—Large intestine or cloaca.

Geographic range.—Veracruz and Tabasco, Mexico, to Panama.

This species, originally described from *Dermatemys mawii* from Tabasco, has been recorded by Rosales (1951) from the same host at Alvarado, Veracruz, and by Caballero, Zerecero, and Grocott (1958) from *Pseudemys ornata* from Panama. Although large numbers of *S. resupinatus* were collected during the present study, *S. tabascensis* was infrequently encountered. Two and three specimens, respectively, were collected from each of the two examples of *Dermatemys mawii* examined, and a single specimen was obtained from each of the other two hosts listed.

This large, robust amphistome is similar in size and appearance to *S. resupinatus*, but can be distinguished from it, in living or fixed material, by the position and arrangement of the testes: diagonal in *S. tabascensis* and parallel in *S. resupinatus*.

K. leucostomum represents a new chelonian host for this species.

FAMILY ANGIODICTYIDAE LOOSS, 1902

Subfamily Octangioidinae Yamaguti, 1958

Octangioides tlacotalpensis Caballero, 1942

Host.—*Dermatemys mawii*.

Site.—Lower intestinal tract.

Geographic range.—Veracruz and Tabasco, Mexico.

According to Skriabin (1949), *O. skrjabini* Price, 1937, is the only other species in the genus. The latter was described from the same host collected in Mexico.

In the present study, about 450 worms of this species were collected. The two hosts examined were both infected. Most of the specimens have been stained, cleared, and comparatively studied, and in addition, transverse and frontal serial sections have been studied.

Mature specimens in the collection measure 1.7-3.8 mm in length. The length given by Caballero was 3.456 mm. The length of *O. skrjabini* is reported to be 1.6-2.5 mm. Present specimens are assigned to *O. tlacotalpensis* on the basis of the following characters; the excretory vesicle and canals are comparable to the description given by Caballero; the size and general body and organ configuration are similar; and the intestinal caeca are long and closely approach the excretory vesicle (in *O. skrjabini* the caeca are short and the excretory vesicle is small, which results in the presence of a considerable distance between them). Since the egg size was not given in the original description of *O. tlacotalpensis*, it is included herein. The eggs measure 0.050-0.065 x 0.09 - 0.10.

FAMILY PLAGIORCHIDAE LUEHE, 1901

Subfamily Telorchinae Looss, 1899

Telorchis corti Stunkard, 1915

Hosts.—*Pseudemys scripta ornata*, *Chelydra serpentina*, *Claudius angustatus*, and *Kinosternon leucostomum*.

Site.—Upper intestinal tract.

Geographic range.—United States and Mexico.

T. corti has a wide distribution in North America. In Mexico it has been reported from Morelia (Bravo-Hollis, 1944) and Veracruz (Rosales, 1951). It has also been reported from Panama in *Pseudemys ornata* and *Kinosternon panamensis* (Caballero, Zerecero, and Grocott, 1958). This species was found to be a common parasite of *Pseudemys scripta ornata* in Tabasco. Of the 22 hosts examined, 11 were found to harbor this worm, and the largest infection contained 65 individuals. *T. corti* was only occasionally encountered in *Claudius angustatus*, and three specimens were recovered from *Chelydra serpentina*. In addition, one specimen came from *Kinosternon leucostomum*.

This is the first report of *T. corti* in Tabasco. Three species are added to the list of known hosts.

Telorchis patonianus Caballero, 1935

Hosts.—*Claudius angustatus* and *Staurotypus triporeatus*.

Site.—Upper intestinal tract.

Geographic range.—Veracruz and Tabasco, Mexico.

Caballero (1935) described this species from Veracruz on the basis of two specimens from the intestinal tract of the caecilian, *Dermophis mexicanus*.

In Tabasco, this form was often encountered in the above-listed chelonian hosts. A total of 52 specimens of *T. patonianus* has been studied from these hosts. Although four specimens of *Dermophis mexicanus* were examined in Tabasco, no trematodes were found in these hosts. In view of these facts, it seems probable that the caecilian is an accidental host for *T. patonianus*.

Mature specimens in the present series measure 1.85-5.35 mm in length. In the original description, the length is listed as 4.290-5.445 mm.

The present paper is believed to constitute the second report of *T. patonianus*, and it is the first record of the species in Tabasco.

FAMILY PROTERODIPLOSTOMATIDAE DUBOIS, 1936

Subfamily Ophiodiplostominae Dubois, 1936

Herpetodiplostomum delillei Zerecero, 1947

Hosts.—*Chelydra serpentina* and *Claudius angustatus*.

Site.—Upper intestinal tract.

Geographic range.—Veracruz and Tabasco, Mexico.

This species was originally described from material collected at Alvarado, Veracruz, from *Chelydra serpentina*. The two specimens of *C. serpentina* examined in Tabasco were found to harbor infections. In addition, two mature specimens of *H. delillei* were recovered from *Claudius angustatus*. In all, some 45 specimens of this species have been stained and studied.

Present material compares closely to Zerecero's (1947) description. Some specimens reach 3.75 mm in length, however, while a maximum of 3.39 was listed in the original description. The present paper extends the known range of the species to Tabasco, and adds an additional host.

It should be noted that the Skriabin monograph (1960, Vol. XVIII) lists this species in the genus *Cheloniodiplostomum* Sudarikov, 1960, in the subfamily Polycotylinae Monticelli, 1888.

FAMILY PRONOCEPHALIDAE LOOSS, 1899

Subfamily Choanophorinae Caballero, 1942

Choanophorus rovirosai Caballero, 1942

Host.—*Dermatemys mawii*.

Site.—Lower intestinal tract.

Geographic range.—Veracruz and Tabasco, Mexico.

Caballero (1942) described this species from *Dermatemys mawii* from Tlacotalpan, Veracruz. Present material consists of 12 specimens collected from a single host of the same species in Tabasco. Mature specimens in the series vary from 2.5 to 6.6 mm in length. In the original description, the length of the holotype is listed as 6.858 mm.

As far as can be determined, the present paper constitutes the second record of the species and the first report of it for Tabasco.

FAMILY HERONIMIDAE WARD, 1917

Heronimus chelydrae MacCallum, 1902

Hosts.—*Kinosternon leucostomum* and *Claudius angustatus*.

Site.—Lungs.

Geographic range.—United States to Panama.

MacCallum (1902) described this species from the snapping turtle, *Chelydra serpentina*, from the United States. In 1921 he described two more forms from American turtles. Caballero (1940) recognized *H. chelydrae* as the only valid species in the genus and placed the other names in synonymy.

In Mexico, this species has been reported from *Kinosternon*

hirtipes from Michoacan and Guanajuato (Caballero, 1940) and from *K. leucostomum* at Alvarado, Veracruz (Rosales, 1951). In Panama the species has been reported from *K. panamensis* from the Curundu River (Caballero, Zerecero, and Grocott, 1958).

Present material consists of 35 specimens. This species was encountered in half of the 24 specimens of *Kinosternon leucostomum* examined, and in 9 out of 20 of the specimens of *Claudius angustatus*. Present material undoubtedly belongs to the one valid species of *Heronimus*. It is believed that this represents the first report of the species for Tabasco, and *C. angustatus* is a new host record.

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