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# Some Digeneans (Trematoda) of the Green Turtle, *Chelonia mydas* (Testudines: Cheloniidae) from Puerto Rico

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ABSTRACT: The Caribbean Aquatic Animal Health Project and the Caribbean Stranding Network attempted to rehabilitate a moribund green turtle, an endangered marine species, from Puerto Rico. The animal died and a necropsy was performed in an attempt to determine the cause of death. Several species of digeneans were found: a single spirorchid, *Learedius learedi*; 2 pronocephalids, *Pyelosomum cochelear* and *Glyphicephalus lobatus*, recorded for the first time in green turtles of Puerto Rico; a single angiodictyid, *Deuterobaris proteus*, which represents a new locality record for the Caribbean; and 3 microscaphidiids, *Angiodictyum parallellum* and *Octangium sagitta*, which represent new locality records for the Caribbean and Atlantic Ocean, respectively, and *Polyangium linguatula*, a new locality record for Puerto Rico.

KEY WORDS: Digenea, *Learedius learedi*, *Pyelosomum cochelear*, *Glyphicephalus lobatus*, *Deuterobaris proteus*, *Angiodictyum parallelum*, *Octangium sagitta*, *Polyangium linguatula*, green turtle, *Chelonia mydas*, Puerto Rico.

The green turtle, *Chelonia mydas* (Linnaeus, 1758), is a marine species with a geographic distribution encompassing the Atlantic, Pacific, and Indian oceans (Ernst and Barbour, 1989). Although it usually prefers a tropical climate, it has been recorded as far north in the Pacific as Alaska (Hodge, 1981) and in the Atlantic to Great Britain (Brongersma, 1972). *Chelonia mydas* is a threatened species throughout its range and an endangered species in the breeding colony populations of Florida and the Pacific Coast of Mexico (Anonymous, 1979).

Few reports are available on the parasites of wild turtles of Puerto Rico. Fischthal and Acholonu (1976) reported 28 species of digeneans from 14 Atlantic hawksbill turtles, *Eretmochelys imbricata imbricata* (Linnaeus), from Cabo Rojo.

On 15 April 1990, a moribund green turtle was snagged in a fishing line off Ponce, Puerto Rico. The animal was emaciated and the plastron severely sunken. Rotation to the right of a normal horizontal position in the water suggested damage or failure of the left lung. The turtle was held for 2 days after rescue but its health deteriorated and it died on 17 April. A necropsy was performed in an attempt to determine the cause of death. The helminths collected during this investigation are reported herein. All species are recorded for the first time from *C. mydas* in Puerto Rican waters.

## Materials and Methods

All helminths were recovered in situ at necropsy from the turtle shortly after death. The digestive tract, lungs, circulatory system, and urinary bladder were examined for helminths. The digeneans were fixed in warm AFA with light coverglass pressure, stained in Harris' hematoxylin, dehydrated, cleared in beechwood creosote, and mounted in Canada balsam. All specimens were deposited in the United States National Museum Helminthological Collection (USNM Helm. Coll.) as noted.

## Results and Discussion

Six species of digeneans, including 2 pronocephalids, 1 angiodictyid, and 3 microscaphidiids, were recovered from the digestive tract and 1 spirorchid from the cardiac cavity. All other tissues examined were negative for digeneans.

### Spirorchidae Stunkard, 1921

### Spirorchinae Stunkard, 1921

### *Learedius learedi* Price, 1934

Although 7 genera and 10 species of spirorchids have been recorded in *Chelonia mydas* from other parts of the world (Smith, 1972), none has been reported from this turtle in the West Indies.

Three specimens of a spirorchid identified as *Learedius learedi* were found in the cardiac cavity. The genus *Learedius* was proposed by Price (1934) for a single specimen of *L. learedi* found in the circulatory system of *Chelone mydas* (=*Chelonia mydas*), which died in the National Zoological Park, Washington, D.C. A more detailed account of *L. learedi* based on 45 specimens was given later by Caballero et al. (1955) from *C. mydas* of Panama. *Learedius learedi* has

also been reported in wild green turtles from Florida (Nigrelli, 1941) and Bermuda (Rand and Wiles, 1985) and mariculture-reared green turtles from the Cayman Islands (Greiner et al., 1980). It has also been reported in *Eretmochelys imbricata imbricata* from Puerto Rico (Fischthal and Acholonu, 1976).

Spirorchid eggs have been associated with histopathological changes occurring in wild *C. mydas*. Glazebrook et al. (1981) reported that eggs of *Haplotrema* sp. released into the circulation from the heart and other sites of a moribund green turtle captured near Townsville in North Queensland, Australia, elicited a generalized focal granulomatous reponse in the host. Rand and Wiles (1985) found that eggs of *Learedius learedi* evoked a granulomatous host reaction with multiple foci in all tissues examined from several moribund green turtles from inshore Bermuda waters after storms. Greiner et al. (1980) reported what appeared to be spirorchid eggs surrounded by discrete chronic granulomata consisting of epithelial cells, multinucleated giant cells, and mononuclear cells in tissues of several mariculture-reared green turtles from Grand Cayman. Jacobson et al. (1986) found few spirorchid eggs in lung tissue of green turtles with lung, eye, and trachea disease from Cayman Turtle Farm, Grand Cayman. We did not detect eggs of *L. learedi* in either the blood or other tissues examined.

This is the first report of the species in wild green turtles from the Caribbean. Voucher specimens of *L. learedi* have been deposited as USNM Helm. Coll. No. 81202.

### Pronocephalidae Looss, 1902

### Pronocephalinae Looss, 1899

### *Pyelosomum cochelear* Looss, 1899

Three digeneans from the cloaca were identified as *Pyelosomum cochelear*. Looss (1899) established the genus *Pyelosomum* with *P. cochelear* from the urinary bladder of *C. mydas* of Egypt as type species. This species has also been reported in *C. mydas* from Panama (Caballero, 1954) and *C. mydas* from Florida (Nigrelli, 1941). To our knowledge, the only other species of *Pyelosomum* reported in *C. mydas* is *Pyelosomum posterorchis* Oguro, 1936, which was originally described from the intestine of *Eretmochelys squamosa* (Linnaeus) of Palao Island and redescribed by Caballero et al. (1955) from *C. mydas* of the Pacific coast of Panama. Fischthal and Acholonu (1976) reported *P. posterorchis* from the Atlantic hawksbill turtle, *Eretmochelys imbricata imbricata* of Cabo Rojo, Puerto Rico.

This represents the first report of *P. cochelear* in green turtles of Puerto Rico. Voucher specimens have been deposited as USNM Helm. Coll. No. 81203.

### *Glyphicephalus lobatus* Looss, 1901

Two immature and 1 mature specimen of a pronocephalid digenean from the large intestine were identified as *Glyphicephalus lobatus*. Looss (1901) erected the genus *Glyphicephalus* with the type species as *G. solidus* from *C. mydas* of Egypt. According to Yamaguti (1971), this species has also been reported in *Eretmochelys imbricata* from Cuba. *Glyphicephalus lobatus* was described from *C. mydas* in Egypt by Looss (1901). It has also been reported in *C. mydas* from Panama and in *Eretmochelys squamosa* from Palao Island. This species has been redescribed as *Pleurogonius lobatus* (Looss, 1901) by Ruiz (1946) and later redescribed as *P. lobatus* by Caballero et al. (1955) in *C. mydas*. It has also been reported from Puerto Rico in *E. imbricata imbricata* by Fischthal and Acholonu (1976).

This is the first report of this species in *C. mydas* of Puerto Rico. Specimens of *G. lobatus* have been deposited as USNM Helm. Coll. No. 81204.

### Angiodictyidae Looss, 1902

### Deuterobaridinae Looss, 1902

### *Deuterobaris proteus* (Brandes, 1891) Looss, 1902

Twenty-one angiodictyids from the small intestine were identified as *Deuterobaris proteus*. Two species of *Deuterobaris* have been described from marine turtles; *D. proteus* in *Chelone viridis* (=*Chelonia mydas*) from the Mediterranean, and *D. chelonei* Gupta, 1961, in *C. mydas* from Trinidad. Gupta (1961) did not mention the presence of ventral glands in the description. No type specimen was designated nor was any record of deposition of type material given. *Deuterobaris proteus* has been reported from green turtles of Florida (Nigrelli, 1941).

This is the first report of *D. proteus* from the Caribbean. Specimens of *D. proteus* have been deposited as USNM Helm. Coll. No. 81205.

**Microscaphidiidae Travassos, 1922**

**Microscaphidiinae Looss, 1900**

***Angiodictyum parallelum* (Looss, 1901) Looss, 1902**

Sixty-five specimens of a microscaphidiid from the large intestine agree quite well with specimens of *Angiodictyum parallelum* described by Looss (1901) and reexamined later by Blair (1986). Four species of *Angiodictyum* are known from marine turtles: 1 from the hawksbill turtle, 2 from the green turtle, and 1 from both species. *Angiodictyum parallelum* has been reported in the large intestine of *C. mydas* from the Mediterranean coast of Egypt and from Florida (Nigrelli, 1941). *Angiodictyum glossoides* Blair, 1986, has been reported in the intestine of *E. imbricata* from Río Cañaveral, Caribbean coast of Panama. *Angiodictyum longum* Blair, 1986, has been reported in the pseudocecum of *C. mydas* from Queensland, Australia, and the large intestine of *C. mydas* from the Straits of Malacca, Malaysia and from Ceylon. *Angiodictyum posterovitellatum* Challopadhyaya, 1972, has been recorded in the lower intestine of *E. imbricata* from the Gulf of Manar, India and the large intestine of *C. mydas* from Queensland, Australia. A key to the species of *Angiodictyum* was given by Blair (1986).

This is the first report of the digenean from the Caribbean. Specimens of *A. parallelum* have been deposited as USNM Helm. Coll. No. 81206.

***Polyangium linguatula* (Looss, 1899) Looss, 1902**

Five specimens of a microscaphidiid from the large intestine were identified as *Polyangium linguatula*. Yamaguti (1971) lists *Monostomum reticulare* Walters, 1893, *Microscaphidium linguatula* Looss, 1899, and *Monostomum pseudamphistomum* Creplin, 1846, as synonyms of this species. Our specimens agree quite well with the specimens described by Looss (1902) except that our specimens are slightly shorter. Later descriptions of *P. linguatula* include those of Teixeira de Freitas and Lent (1938), Groschaft et al. (1977), and Blair (1986). Specimens examined by Groschaft et al. (1977), although mature, were smaller (maximum body length 2.96 mm) than any recorded including our specimens (maximum body length 3.20 mm). The tegument of our specimens is smooth and the esophageal bulb weakly developed as reported by Groschaft et al. (1977).

*Polyangium linguatula* has been reported in *C. mydas* from the Mediterranean coast of Egypt (Looss, 1899, 1902; Sey, 1977), Australia (Johnston, 1913), Singapore (Kobayashi, 1915), Brazil (Teixeira de Freitas and Lent, 1938), Florida (Nigrelli, 1941; Manter, 1954), India (Mehrotra, 1973; Blair, 1986), and Cuba (Groschaft et al., 1977). Other species of *Polyangium* reported from marine turtles include *P. miyajimai* Kobayashi, 1921, in *Chelonia mydas, P. longiseminale* Chattopadhyaya, 1972, in *Caretta caretta,* and *P. colymbi* (Poche, 1926) Price 1937. The latter species was described from the collection of the University of Granz as *Nephrobius colymbi* which was allegedly found in the kidney of *Colymbus arcticus,* a bird found in the digestive tract of a marine turtle. Price (1937), however, pointed out that the specimens are indistinguishable from *Polyangium* and suggested that they must have been mislabeled. We concur with Blair (1986) that *Polyangium* is represented by *P. linguatula* as the sole species and that specimens of *P. longiseminale, P. miyajimai,* and *P. colymbi* all lie within the range described for *P. linguatula.*

This is the first report of this digenean in a wild turtle from Puerto Rico. Specimens of *P. linguatula* have been deposited as USNM Helm. Coll. No. 81208.

**Octangiinae Looss, 1902**

***Octangium sagitta* (Looss, 1899) Looss, 1902**

A single specimen of a microscaphidiid from the large intestine was identified as *Octangium sagitta* based on the description of this species as given by Blair (1987). Although several species of *Octangium* have been described, Blair (1987) recognized only 2, *O. sagitta* and *O. hypalum.* These may be differentiated by the latter species having 3 pairs of primary ducts in the excretory plexus, the more anterior placing of the testes, the shorter lateral vitelline field, and a relatively larger esophageal bulb than the former species. *Octangium sagitta,* of which *O. hasta* Looss, 1902, and *O. takanoi* Kobayashi, 1921, are considered synonyms according to Blair (1987), has been reported in the intestine of *C. mydas* from the Mediterranean coast of Egypt, Australia, India, Singapore, and Taiwan and also in the large intestine of *E. imbricata* from India. *Octangium hypalum,* of which *O. takonoi* Kobayashi sensu Mehrotra (1973) and Tandon and Gupta (1981) is considered a synonym according to Blair (1987), has been reported from the pseudocecum of *C. mydas* from Queensland, Australia.

This is the first report of *O. sagitta* from the Atlantic Ocean. A specimen has been deposited as USNM Helm. Coll. No. 81207.

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| Balance on hand, 1 January 1990 | $11,565.92 |
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