Research Note

Helminth Parasites of the Cattle Egret in Puerto Rico

In a previous study of the helminth parasites of six species of birds in Puerto Rico (Whittaker et al., 1970, Proc. Helm. Soc. Wash. 37: 123–124), only five cattle egrets Bubulcus ibis (L.) were examined. To obtain additional information on the helminth fauna of this bird in Puerto Rico, 16 specimens of B. ibis were collected in May 1970 from the rookery near the University of Puerto Rico Biological Station at La Farguera and two specimens each near Isabella and Luquillo.

Table 1. Helminths found in 20 cattle egrets in Puerto Rico.

<table>
<thead>
<tr>
<th>Helminth</th>
<th>No. cattle egrets infected</th>
<th>New record (*) of helminth for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthocephala</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Centrorhynchus polymorphus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Travassos, 1926 (cystacanth)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nematoda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microtetrameres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Gynaceophila)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>egretes Rusheed, 1960</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Desportesius invergatus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Linstow, 1901)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skrjabin, Sobolev et Ivaschkin, 1965</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trematoda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosthogonimus sp.</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The helminths found, the number of egrets infected with each parasite, and new host and locality records are listed in Table 1.

According to R. W. Macy of Portland State College, who examined stained specimens of the Prosthogonimus sp., the material does not appear to fit the description of any known species of the genus, and specific identification must await revision of the genus which he will soon undertake.

We are indebted to Mr. Vincent Resh for technical assistance. This study was supported by funds from the Arts and Sciences Research Committee of the University of Louisville.

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Research Note

Egg-Shell Precursors in Trematodes

There is evidence to indicate that a major portion of the trematode egg-shell is formed by the sclerotization of proteins, presumably from precursor substances, i.e., phenols, basic proteins, and phenol oxidase, found primarily in the vitellaria (Smyth and Clegg, 1959, Exp. Parasit. 8: 286–323; Smyth, 1966, The Physiology of Trematodes, Freeman, San Francisco; Clegg and Smyth, 1968 in Chem. Zool. Vol. II, Academic Press, N. Y.). The purpose of this report is to extend our knowledge of the occurrence of sclerotin egg-shell precursor substances in several trematodes.

Seven species of digenetic trematodes and one monogenetic trematode were studied, Haematoleschus medioplexus, Megalodiscus
Table 1. Histochemical tests for egg-shell precursors of sclerotin in several trematodes.

<table>
<thead>
<tr>
<th>Trematode</th>
<th>Phenols</th>
<th>Basic proteins</th>
<th>Polyphenol oxidase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vitellaria</td>
<td>Ootype</td>
<td>Vitellaria</td>
</tr>
<tr>
<td>Echinostoma revolutum</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Echinoparyphium recurvatum</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Haematoloechus medioplexus</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Megalodiscus temperatus</td>
<td>—</td>
<td>—</td>
<td>++</td>
</tr>
<tr>
<td>Halipegus sp.</td>
<td>+++</td>
<td>++</td>
<td>+?</td>
</tr>
<tr>
<td>Gorgoderina sp.</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Glypthelmins sp.</td>
<td>+++</td>
<td>+?</td>
<td>+</td>
</tr>
<tr>
<td>Polystomoides sp.</td>
<td>+++</td>
<td>++</td>
<td>+?</td>
</tr>
</tbody>
</table>

+++ = very heavily positive,  
++ = heavily positive,  
+ = positive,  
— = negative,  
+? = questionable positive.

temperatus, Halipegus sp., Gorgoderina sp., and Glypthelmins sp. were obtained from naturally infected Rana pipiens frogs (Champlain Biological Co., Glen Gardner, New Jersey). The monogenetic trematode, Polystomoides sp. was obtained from naturally infected Chrysemys picta belli turtles (J. F. Schettle Frog Farm, Stillwater, Minn.). Two species of echnostomes, Echinostoma revolutum and Echinoparyphium recurvatum were reared experimentally in domestic chicks. Live worms obtained at necropsy and washed briefly in saline, were fixed and flattened between slides in warm 70% ethanol (Johri and Smith, 1956, Parasitology 46: 107-116). Most worms were fixed for a minimum of 24 hr and no longer than 1 wk prior to staining. Some specimens of Megalodiscus temperatus and Gorgoderina sp. were fixed for 2 hr (Salternik and Clegg, 1967, cited in Clegg and Smyth, 1968 in Chem. Zool. Vol. II, Academic Press, N. Y.).

From 4 to 50 worms (aver. 15) were stained for each precursor substance; i.e., basic proteins, phenols, polyphenol oxidase. Basic proteins were identified with the malachite green technique (Smyth, 1951, Nature 168: 322-323; Johri and Smyth, 1956, loc. cit.), phenols with Fast Red Salt B (Johri and Smyth, 1956, Parasitology 46: 107-116), and polyphenol oxidase with the catechol technique (Smyth, 1954, Quart. J. Microscop. Sci. 95: 139-152). Whole mounts were prepared as described in the references cited except the worms’ cuticles were punctured with insect pins following fixation. Preliminary work indicated that piercing of the cuticle facilitated infiltration of stains and provided uniform staining. Contrary to the findings of Johri and Smyth (1956, loc. cit.) no difficulty was experienced in preparing worms because malachite green stained whole mounts.

The results summarized in Table 1 reveal that basic proteins are present in the eight species, phenols in all but M. temperatus and the phenolase absent in M. temperatus and Gorgoderina sp. Histochemical identification of protein, phenol, and polyphenol oxidase in H. medioplexus confirms previous studies on frog lung flukes by Burton (1963, J. Exp. Zool. 154: 247-257) and Smyth (1954, loc. cit.). Positive reactions for the three precursors have been reported in Polystomum integerrimum, a species related to Polystomoides sp. by Kohlman (1961, Ztschr. Parasitenk. 20: 495-524). Guilford (1961, J. Parasit. 47: 757-764) reported the presence of protein and phenol oxidase in Halipegus eccentricus. The results of this study and those cited above suggest that Echinostoma revolutum, Echinoparyphium recurvatum, Haematoloechus medioplexus, Glypthelmins sp., Halipegus sp., and Polystomoides sp. utilize scleratin in their egg shell capsules.

Absence of a polyphenol oxidase must be interpreted with caution as discussed by Read (1968 in Chem. Zool. Vol. II, Academic Press, N. Y.) since "the oxidation of catechol was used as the criterion for the enzyme; thus it can only be concluded that a catechol oxidase is absent from certain trematodes."

Negative results for phenol and polyphenol oxidase in *M. temperatus* confirm the observations of Madhavi (1966, Experientia 22: 93–94; 1968, Exp. Parasit. 23: 392–397) on two amphistome species, *Diplodiscus meharai* and *Paramphistomum cervi*. He also showed the presence of large amounts of sulphated proteins in the two species, which may indicate that at least in some of the Paramphistomatidae keratin may be utilized in their egg-shell capsules.

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**Research Note**

**A Redescription of *Anchoradiscus triangularis* (Summers, 1937) Mizelle, 1941 (Trematoda: Monogenea) from the Bluegill *Lepomis macrochirus* Rafinesque**

The accessory plates on the dorsal and ventral bars of *Anchoradiscus triangularis* (Summers, 1937) Mizelle, 1941, were not mentioned in the generic description of *Anchoradiscus* Mizelle (1941, J. Parasit. 27: 159–163) but are present on both members of the genus. This species was first described by Summers (1937, J. Parasit. 23: 432–434).

Host specimens were collected by electric shocker during a study of the fish parasites conducted in Walter F. George Reservoir on the Chattahoochee River in Alabama. The hosts were placed in a 1:4,000 formalin solution as described by Putz and Hoffman (1963, J. Parasit. 49: 559–566) and after one hour formalin was added to make a 5% solution. Specimens were treated and measured as described by Mizelle and Klucka (1953, Am. Midland Naturalist 49: 720–733). Measurements are in microns; averages are followed by the range in parentheses. Illustrations were made with aid of a camera lucida.

**Anchoradiscus triangularis** (Summers, 1937) Mizelle, 1941

**Redescription**

Dactylogyridae, Ancyrocephalinae: Length 561 (470–760), width 160 (120–250). Well defined head organs in groups of four on either side of convex cephalic region. Granular eyespots four, anterior pair smaller, farther apart. Pharynx circular to ovate, transverse diameter 39 (28–60). Haptor discoidal (Fig. 6), 211 (130–350) by 246 (170–390), joined to body by stout peduncle. Anchors large, base apparently expanded into triangular concave plates of similar shape. Ventral anchors (Fig. 10)

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