

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

PUBLISHED BY THE UNIVERSITY

A NEW SPECIES OF CLINOSTOMUM

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The genus *Clinostomum* was first described by Rudolphi in 1809. He found some parasites in the esophagus of a heron, *Ardea purpurea*, and named them *Clinostomum heterostomum*. Leidy (1856) redescribed the genus as follows: Hermaphroditic flukes; genital pore with contiguous male and female openings situated posterior to acetabulum. Oral sucker without tentacles or spines. Caudal extremity without retractile appendages. Intestine simple, bifurcate.

The described species are as follows:

Date	Observer	Genus	Species	Host
1809.....	Rudolphi	<i>Clinostomum</i>	<i>heterostomum</i>	<i>Ardea purpurea</i>
1819.....	Rudolphi	<i>Clinostomum</i>	<i>complanatum</i>	<i>Ardea cinerea</i>
1819.....	Rudolphi	<i>Clinostomum</i>	<i>marginatum</i>	<i>Ardea cocoi</i>
1899.....	Braun	<i>Clinostomum</i>	<i>foliiforme</i>	<i>Ardea purpurea</i>
1899.....	Braun	<i>Clinostomum</i>	<i>detruncatum</i>	<i>Mycteria americana</i>
1899.....	Braun	<i>Clinostomum</i>	<i>sorbens</i>	<i>Tantalus loculator</i>
1899.....	Braun	<i>Clinostomum</i>	<i>dimorphum</i>	<i>Ardea cocoi</i>
1899.....	Braun	<i>Clinostomum</i>	<i>heluans</i>	<i>Ardea coerulea</i>
1899.....	Braun	<i>Clinostomum</i>	<i>lambitans</i>	<i>Ardea cocoi</i>
1856.....	Leidy	<i>Clinostomum</i>	<i>gracile</i>	{ <i>Pomotis vulgaris</i>
1885.....	Looss	<i>Distomum</i>	<i>reticulatum</i>	<i>Perca flavescens</i>
1888.....	Leidy	<i>Distomum</i>	<i>galactosomum</i>	<i>Silurus glanis</i>
				<i>Labrax lineatua</i>

The trematodes described in this paper were collected by Dr. A. S. Pearse from a cormorant (*Phalacrocorax vigua* Vieillot), killed on Lake Valencia, Venezuela, July 20, 1918. Fifty-seven specimens were scraped from the wall of the esophagus, to which they were attached by means of their suckers. All these belong to a single species, which appears to differ from all others described in the genus *Clinostomum*. It is distinguished by the great extent of the uterus, with corresponding genital pore, and by the position of cirrus intermediate between testes, hence the specific name *intermedialis*.

In the field the specimens were placed in corrosive sublimate solution for twenty-four hours and then transferred to 70 per cent alcohol. Some months later they were stained in carmine, alum cochineal, or haemotoxylin. After destaining and dehydrating, they were cleared in bergamot oil and mounted. A few specimens were embedded in paraffin, sectioned, and stained. For toto mounts, the carmine stain was most satisfactory; haemotoxylin and eosin gave the best contrast for the sectioned specimens.

***Clinostomum intermedialis*, new species**

Type Specimen: Cat. No. 196, Museum of Zoology, University of Michigan; July 20, 1918; Collector, A. S. Pearse; taken from the esophagus of *Phalacrocorax vigua* Vieillot.

Description: Some of the largest specimens were at least twice the size of the smaller individuals—an irregularity doubtless due to degree of maturity. The average length was 7 mm. and width 1.5 mm.

Generally, the body takes a regular oblong shape and a distinct neck may be present. The neck may be terete and narrow or flattened ventrally, depending upon the state of contraction in the body. There are no spines present, the body being entirely unarmed.

The two suckers are well developed. The anterior one is situated ventrally at the edge of the anterior margin. It is smaller than the posterior sucker, although it often appears larger on account of the protrusion of the surrounding body wall. In some specimens this anterior sucker was in a protruded state, and in others it was drawn down into the body so that it touched the pharynx. The acetabulum is situated ventrally in median line about one-third the length of the body from anterior end. This sucker is deep and has a large triangular opening, around which there is a thick muscular investment.

The digestive system consists of an oral sucker, pharynx, and two simple intestinal branches. The latter extend to the posterior part of the body where they end blindly. Although these coeca remain simple, they become much sacculated by numerous folds; especially in the region from the acetabulum to posterior testes these folds are much more complex.

An excretory pore at the extreme posterior portion of the body is connected with a reservoir-like region from which there are two main lateral branchings. These lateral branches extend forward, taking somewhat the same position as the branches of the intestinal coeca. These excretory branches cannot be traced in toto mounts, but in serial cross-sections the main lateral branches could be followed from caudal reservoir about half the length of the body—almost to the acetabulum. There seem to be many side branches from the main canals but the network is so delicate that it could not be followed.

The two large lobate testes are connected to a coiled cirrus by vasa efferentia. The testes are divided distinctly into three lobes situated in mid-line in the posterior third of the body. The vasa efferentia could be seen only at the point where they entered the cirrus sac. The cirrus sac is about half as large as one testis and has very thin walls. Within the walls of the cirrus sac there is a complicated tubular arrangement by which spermatozoa are

conducted from vasa efferentia to the genital pore. Immediately back of the genital opening this convoluted tube becomes narrowed and straightened and finally connects with the penis which leads to the exterior or ventral surface, just below the opening from the uterus. The striking feature about this species is the fact that the cirrus sac lies between testes and not anterior to them.

The female reproductive system consists of an ovary, uterus which fills the region in the body between acetabulum and testes, bounded laterally by intestinal coeca, and vitelline glands with connecting ducts. The ovary is about half the size of the cirrus sac and lies between it and the posterior testis. Observing a specimen from ventral side, the ovary is equidistant between cirrus above, right branch of the intestine, and posterior testis. The ovary takes somewhat of an ovoid shape and lies a little to one side of the mid-line.

In toto mounts the uterus was so filled with eggs that the finer connecting ducts were obscure. The uterus and ovary seem to connect directly. After the uterus has made several convolutions in the area between the testes, it runs to the right and forward until it reaches the region between acetabulum and anterior testis where it makes two longitudinal loops, which are bounded laterally by intestinal coeca. In mature specimens the folds of the uterus are crowded with eggs and fill all available space between intestinal coeca, anterior testis, and acetabulum.

Most interesting is the way in which one branch of the uterus extends to the left and downward until it reaches the region of the cirrus sac so that it opens exactly above the opening of the male apparatus. In some mounts this terminal arm of the uterus was smaller and free from eggs, while in others eggs were present the entire length of the channel; the last egg might be lying at the edge of the genital opening. This shows the close proximity of the two genital openings.

The vitelline glands begin at the level of the acetabulum and extend to posterior part of the body. They are on either side of the coeca with many more on the outer side and only a few scattered on inner margin of intestinal branches. The genital field without vitellaria occupies all the space between acetabulum and excretory pore with coeca laterally—more than one-half the length of the body. The male reproductive system is largely confined to the lower third of the body while the female reproductive system extends nearly to the acetabulum.

Larva: Larval forms of *Clinostomum intermedialis* were found encysted in muscle at base of tail, under skin of operculum, and in the floor of the mouth of a catfish, *Rhamdia quelen* Quoy and Gaimard, collected by Dr. Pearse in the Rio Castaño, July 7, 1918. The general appearance and structure are like that of the adult. Length 6 mm.—7.5 mm., width 1 mm.—1.5 mm.

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PLATE I

Clinostomum intermedius: adult seen from ventral surface; *as*, anterior sucker; *an*, anterior testis; *ci*, cirrus sac; *co*, coeca; *cu*, coiled uterus; *eb*, excretory branch; *ex*, excretory pore; *go*, genital opening; *mo*, mouth opening; *mp*, muscular pharynx; *ov*, ovary; *ps*, posterior sucker; *pt*, posterior testis; *sv*, coiled seminal tube; *ut*, uterus; *vt*, vitelline glands.



