

## First record of Prolecithophora (Platyhelminthes) from Argentina: *Plagiostomum cilioejaculator* sp. n.

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### Abstract

In this work a new benthic species of the genus *Plagiostomum* is described from the littoral zone of Río de la Plata (Argentina). *Plagiostomum cilioejaculator* sp. n. is the fourth eyeless species of the genus to be described. The male reproductive system is characterized by a muscular and somewhat curved penis, approximately 260 µm long. The ejaculatory duct is lined by a densely ciliated epithelium. The female reproductive system is typical of the genus. *Plagiostomum cilioejaculator* sp. n. is the first species of Prolecithophora described from Argentinian waters.

**Key words:** Plagiostomidae, benthos, turbellarian, Río de la Plata, estuary

### Introduction

Thirty-six of the 150 species of Prolecithophora known worldwide (Tyler *et al.*, 2005) have been described from South America (Noreña *et al.*, 2003). Fifteen of these species belong to genus *Plagiostomum*, and most of these (12 species) are known from the coast of Brazil, where they were described or reported by Marcus in the mid 20<sup>th</sup> century (Marcus, 1946; 1948; 1951; 1952; 1954). Species of genus *Plagiostomum* are small (0.5–4 mm in length), and mostly marine benthic. They are characterized by an anterior mouth, simple intestine and a *pharynx variabilis*. The brain is not encapsulated. The ovaries are compact with ectolecithal eggs, and the vitellaria are diffuse. The male gonopore is anterior to the female gonopore and leads to a common atrium (Cannon, 1986).

The goal of this work is to describe a new species of *Plagiostomum* collected from the littoral benthos of the middle zone (Boschi, 1988) of Río de la Plata in Argentina. This represents the first record of a prolecithophoran from Argentina and also from a brackish aquatic environment, given that earlier accounts of prolecithophorans from the South

Atlantic include four marine species of Plagiostomidae from the Malvinas Islands (=Falkland Islands) and South Georgia Islands (Westblad, 1952; Karling & Jondelius, 1995).

### Material and methods

Samples were taken seasonally from August 2000 to March 2003 in the Río de la Plata littoral benthos, from Punta Piedras locality in Punta Indio county, Buenos Aires province, Argentina (35°21'23.1"S–57°10'22.5"W). Salinity in this area varied between 1.5 and 5‰. The samples were taken with 4.5 cm diameter corer tubes along a transect from the upper tidal level (UTL) to the lower tidal level (LTL). The first two centimeters of sediments were collected and taken to the laboratory for *in vivo* observation. The following environmental parameters were measured in the field: salinity, conductivity, TDS, pH, dissolved O<sub>2</sub>, O<sub>2</sub> saturation, and water temperature (Table 1). Table 1 also shows type of substrate and associated fauna.

**TABLE 1.** Environmental data of the Punta Piedras locality. Type of substrate and associated fauna are also provided.

Date	salinity (‰)	conductivity (µS/cm)	TDS (mg/l)	pH	O <sub>2</sub> (mg/l)	O <sub>2</sub> sat. (‰)	water T° (°C)	type of substrate	associated fauna
02/08/2000	#	2750	1350	#	#	#	13	Caliche-clay/muddy*	#
12/02/2001	2.5	1171	587	7.94	#	#	27.5	Caliche-clay/muddy*	#
24/08/2001	4	2110	#	7.89	10.05	116	20.7	Caliche-clay/muddy*	#
05/12/2001**	5	9650	4790	9.46	10.22	142	33.1	Caliche-clay/muddy*	Polychaeta, Nematoda, Gastropoda
04/04/2002	4	5080	2600	8.9	5.5	100	27	Caliche-clay/muddy*	#
05/03/2003**	1.5	757	368	7.63	8.8	115	28.7	Caliche-clay/muddy*	Acari, Copepoda, Cladocera, Ostacoda, Nematoda, Oligochaeta

# not quantified; \* from Darrigran (1999); \*\* dates in which turbellarians were found

The microturbellarians present in the samples were separated under a stereomicroscope and observed *in vivo* in the laboratory. Afterwards, the specimens were fixed in Bouins; serial sagittal sections 4 µm thick were made and stained using the Azan method (Romeis, 1989).

Type specimens were deposited in the Invertebrate Zoology Collection of the Museo de La Plata, Argentina (MLP).

## Results

### Prolecithophora Karling 1940

#### Family Plagiostomidae v. Graff 1908

#### Genus *Plagiostomum* O. Schmidt 1852

#### *Plagiostomum cilioejaculator* sp. n.

Figures 1, 2.

#### *Material*

Holotype: one specimen, sectioned sagittally (MLP 5335). Collected from benthos at Punta Piedras (5/12/01; 5/3/03), where salinity varied between 1.5 and 5 ‰.

Paratypes: three specimens, sectioned sagittally (MLP 5336, MLP 5337).

#### *Type locality*

Punta Piedras (35°21'23.1"S–57°10'22.5"W), Buenos Aires province, Argentina.

#### *Etymology*

The species name refers to the presence of cilia in the ejaculatory duct.

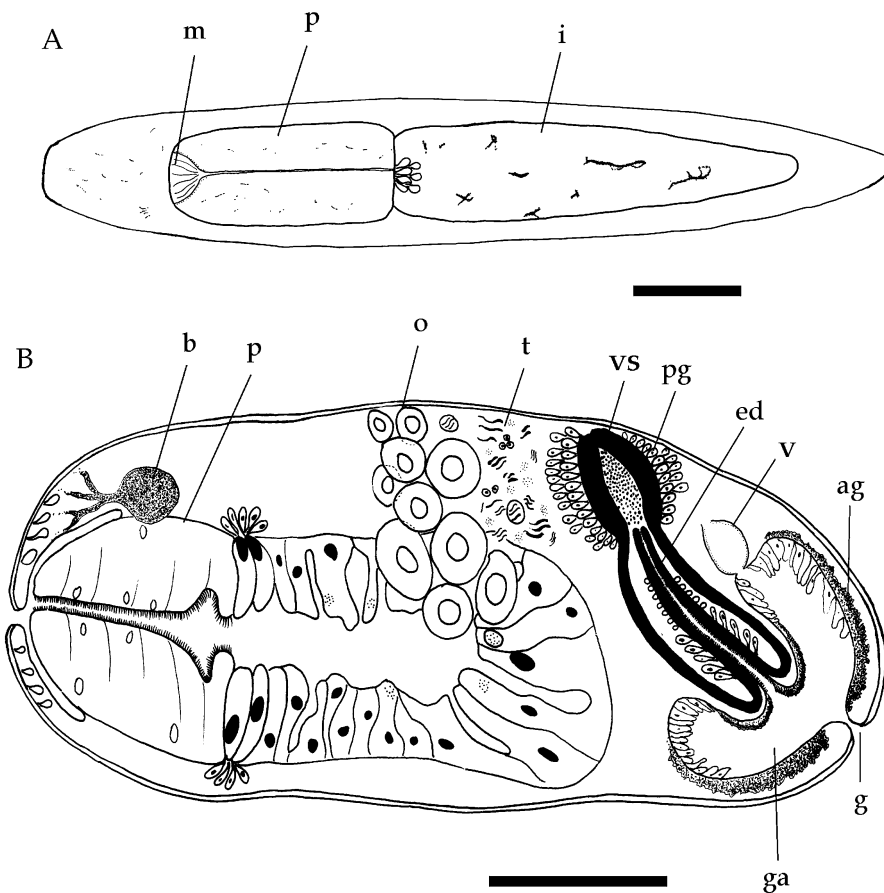
#### *Description*

Anterior end of body rounded, posterior end tapering slightly. Live specimens are 2.4 mm long and fixed specimens are 0.92 mm long. Colour is opaque white; some live specimens with granules of black pigment forming anastomosing bands. Brain situated dorsal to the pharynx. Nerve cords run anteriorly from the brain. Numerous glands in the anterior body region. Eyes absent. Mouth anterior or antero-ventral. Pharynx occupying one third of the body length in juveniles and one-fourth in adults. Pharyngeal lumen lined by a very densely ciliated epithelium. Pharynx leading to short, very glandular oesophagus. Intestine with well-developed epithelium comprising high vacuolated cells without cilia. Intestine reaching the level of male copulatory organ.

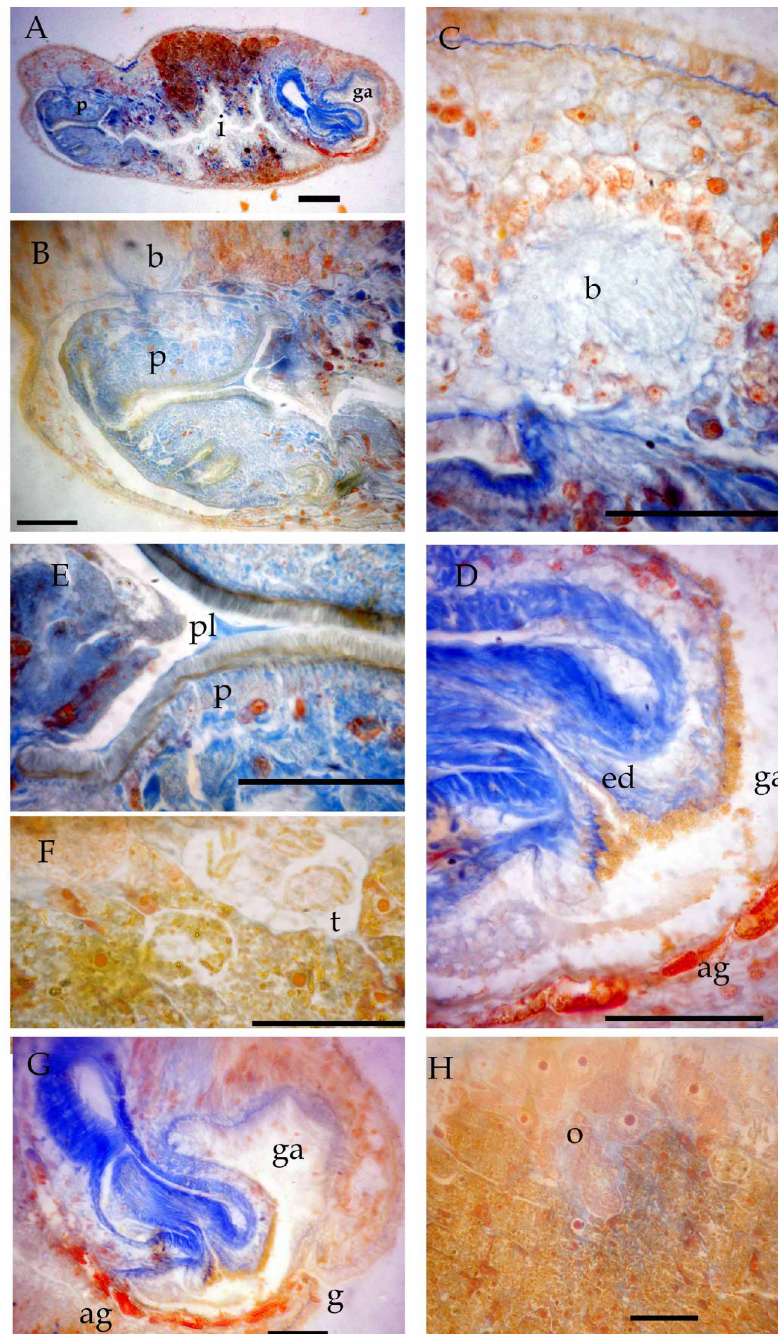
Male reproductive system comprising a pair of dorsal testes, lateral to the intestine,

caudal with respect to the ovaries. Spermatozooids spindle-shaped, 18–22  $\mu\text{m}$  long. Vesicula seminalis saculiform, with thick muscular walls and surrounded by many prostatic glands. This vesicle, which is full of prostatic secretions in adult organisms, narrows distally into a narrow duct that leads to the ejaculatory duct. Ejaculatory duct lined by a densely ciliated epithelium. Penis and surrounding sheath somewhat curved, with developed muscular walls, and approximately 260  $\mu\text{m}$  long. Penis protruding into a large genital atrium with high epithelium. Gonopore subterminal and ventral. Copulatory apparatus surrounded by numerous acidophilic glands, especially in the region of the genital atrium (atrial glands) and in the caudal end of body, near the gonopore.

Female reproductive system comprising extremely large paired ovaries, dorsal and lateral to the intestine. Vitelline glands surrounding the ovaries latero-dorsally. Vagina reaching the atrium dorsally.



**FIGURE 1.** *Plagiostomum cilioejaculator* sp. n. A, ventral view. B, sagittal reconstruction. Scale A: 300  $\mu\text{m}$ . Scale B: 200  $\mu\text{m}$ . ag: atrial glands; b: brain; ed: ejaculatory duct; g: gonopore; ga: genital atrium; i: intestine; m: mouth; o: ovary; p: pharynx; pg: prostate glands; t: testis; v: vagina; vs: vesicula seminalis.



**FIGURE 2.** Sagittal sections of *Plagiostomum cilioejaculator* **sp. n.** A, general view. B, detail of the anterior region, pharynx and brain. C, detail of the brain. D, detail of the copulatory organ, atrium and atrial glands. E, detail of the ciliated pharyngeal epithelial cells. F, detail of the testis. G, detail of the posterior region of the body. H, detail of the ovary. Scale A: 100µm. Scale B–H: 50µm. ag: atrial glands; b: brain; ed: ejaculatory duct; g: gonopore; ga: genital atrium; i: intestine; o: ovary; p: pharynx; pl:pharyngeal lumen; t: testis.

## Discussion

Twelve *Plagiostomum* species have been described from the Neotropical region, all of which live in marine environments with the exception of *Plagiostomum evelinae* Marcus 1946. Most of these species are only known from coastal Brazil (Marcus, 1946; 1948; 1951; 1952; 1954). *Plagiostomum falklandicum* Westblad 1952, described from Malvinas Islands (=Falkland Islands) and South Georgias Islands, and *Plagiostomum nucleipharyngeum* Karling & Jondelius 1995, described from Malvinas Islands, are the only species that have been described in the South Atlantic Ocean outside of Brazil (Westblad, 1952; Karling & Jondelius, 1995; Noreña *et al.*, 2003).

*Plagiostomum cilioejaculator* **sp. n.** lacks eyes. Eyespots are characteristic of *Plagiostomum* species, and only three species are known to lack eyespots: *P. caecum* Böhmig 1914, *P. anocelis* Brandtner 1934, and *P. parasitorum* Brandtner 1934. In spite of this similarity, the morphology of the male copulatory apparatus in these species is different from that described for *Plagiostomum cilioejaculator* **sp. n.** These three species have a small penis and the ejaculatory duct is not lined by a densely ciliated epithelium (Westblad, 1956). In contrast, the penis of *P. cilioejaculator* is long (250–260  $\mu\text{m}$ ) and the ejaculatory duct is lined by a ciliated epithelium. Additionally, the new species described here inhabits littoral environments with brackish waters (with 1.5–5 ‰ salinity), while the other species are marine and occur in deep waters.

Among known species, *Plagiostomum ochroleucum* Graff 1882 is the one most similar to *Plagiostomum cilioejaculator* **sp. n.** Both species possess a well-developed male copulatory organ with a somewhat curved penis, 250–260  $\mu\text{m}$  long, surrounded by abundant circular muscles. The major differences in reproductive morphology concern the ejaculatory duct and genital atrium. In *P. ochroleucum*, the epithelium of the ejaculatory duct is flattened and lacks cilia, and the genital atrium is ciliated. In contrast, the epithelium of the ejaculatory duct of *P. cilioejaculator* is densely ciliated, whereas the epithelium of the genital atrium is very high and lacks cilia.

Additional differences between these two species are found in the morphology of the digestive system. The pharynx of *P. cilioejaculator* is slightly larger (1/3–1/4 of body length) than that of *P. ochroleucum* (1/4–1/5 of body length), although the pharyngeal lumen epithelium is densely ciliated in both species. Westblad (1956) described the presence of cilia in the intestinal epithelium of his specimens, while the new species described here lacks intestinal cilia. *P. ochroleucum* also lacks eyes and is known from marine environments of Scandinavia, Iceland (Westblad, 1956), England, Scotland and France (Graff, 1913).

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