

A NEW SPECIES OF *CUCULLANUS* (NEMATODA: CUCULLANIDAE) PARASITE OF *GENYPTERUS BLACODES* AND *G. BRASILIENSIS* (PISCES: OPHIDIIDAE) IN THE SOUTH WEST ATLANTIC

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Summary :

Cucullanus genypteri sp. n., a parasite of *Genypterus blacodes* Schneider, 1801 and *G. brasiliensis* Reagan, 1903 (Pisces: Ophidiidae) from different zones of the South West Atlantic Ocean is described and illustrated. The new species is distinguished from other south american members in the genus *Cucullanus* Mueller, 1777 by the distribution pattern of caudal papillae and by the body measurements, particularly spicule length. *C. genypteri* represents the first description of a marine species of this genus from Argentina. Variations of parasitism in relation to host size, sex and geographic distribution are also discussed.

KEY WORDS : *Cucullanus genypteri* sp. n., *Genypterus blacodes*, *Genypterus brasiliensis*, parasites, systematics, Argentine.

Résumé : UNE ESPECE NOUVELLE DE *CUCULLANUS* (NEMATODA: CUCULLANIDAE) PARASITE DE *GENYPTERUS BLACODES* ET *G. BRASILIENSIS* (PISCES : OPHIDIIDAE) DE L'ATLANTIQUE SUD

Cucullanus genypteri n. sp. parasite de *Genypterus blacodes* Schneider, 1801 et de *G. brasiliensis* Reagan, 1903 (Pisces: Ophidiidae) de l'Atlantique Sud, est décrit et figuré. L'espèce nouvelle se différencie des autres espèces sud-américaines de *Cucullanus* Mueller, 1777 par la disposition des papilles caudales et par l'ensemble des dimensions, en particulier par la longueur des spicules. *C. genypteri* est la première espèce du genre décrite en Argentine. Les variations du parasitisme liées à la taille, au sexe et à la distribution géographique des hôtes sont commentées par les auteurs.

MOTS CLÉS : *Cucullanus genypteri* sp. n., *Genypterus blacodes*, *Genypterus brasiliensis*, parasites, systématique, Argentine.

INTRODUCTION

Cucullanidae is a vast family of parasitic nematodes, with numerous species, described from almost every part of the world (Rasheed, 1968). The genus *Cucullanus* Mueller, 1777 is also widely distributed; in South America, species of this genus have been reported mainly from freshwater fishes (Fortes and Hoffman, 1995; Petter, 1995).

From marine fishes of the South West Atlantic Ocean, there are only four records of members of this genus, all from Brazil: *Cucullanus pulcherrimus* Barreto, 1918, described from *Caranx lugubris* by Barreto (1922) and from *Paralonchurus brasiliensis* by Pinto *et al.*

(1992), *C. dodsworthi* Barreto, 1922, described from *Sphoeroides testudineus* by Barreto (1922), *C. carioca* Vicente and Fernandes, 1973, described from *Pinguipes brasiliensis* by Vicente and Fernandes (1973) and *C. rougetae* Vicente and Santos, 1974, described from *Plagioscion auratus* by Vicente and Santos (1974). The aim of this paper is to describe a new species of the genus *Cucullanus*, a parasite of two species of kingclips: *Genypterus blacodes* Schneider, 1801 and *G. brasiliensis* Reagan, 1903 (Pisces: Ophidiidae) from the Argentinean Sea. The relationships between parasite and both host length and sex, and the geographical distribution pattern of these nematode species in the study area are described and discussed.

MATERIALS AND METHODS

A total of 101 specimens of *Genypterus blacodes* and 31 of *G. brasiliensis* were examined for intestinal nematodes. Fish were collected during 1993 from different areas of the Argentinean Shelf (Fig. 1): *G. blacodes* in Argentinean-Uruguayan Common Fishing Zone; North-Patagonic zone; Isla Escondida zone and South zone and *G. brasiliensis* in San Jorge Gulf.

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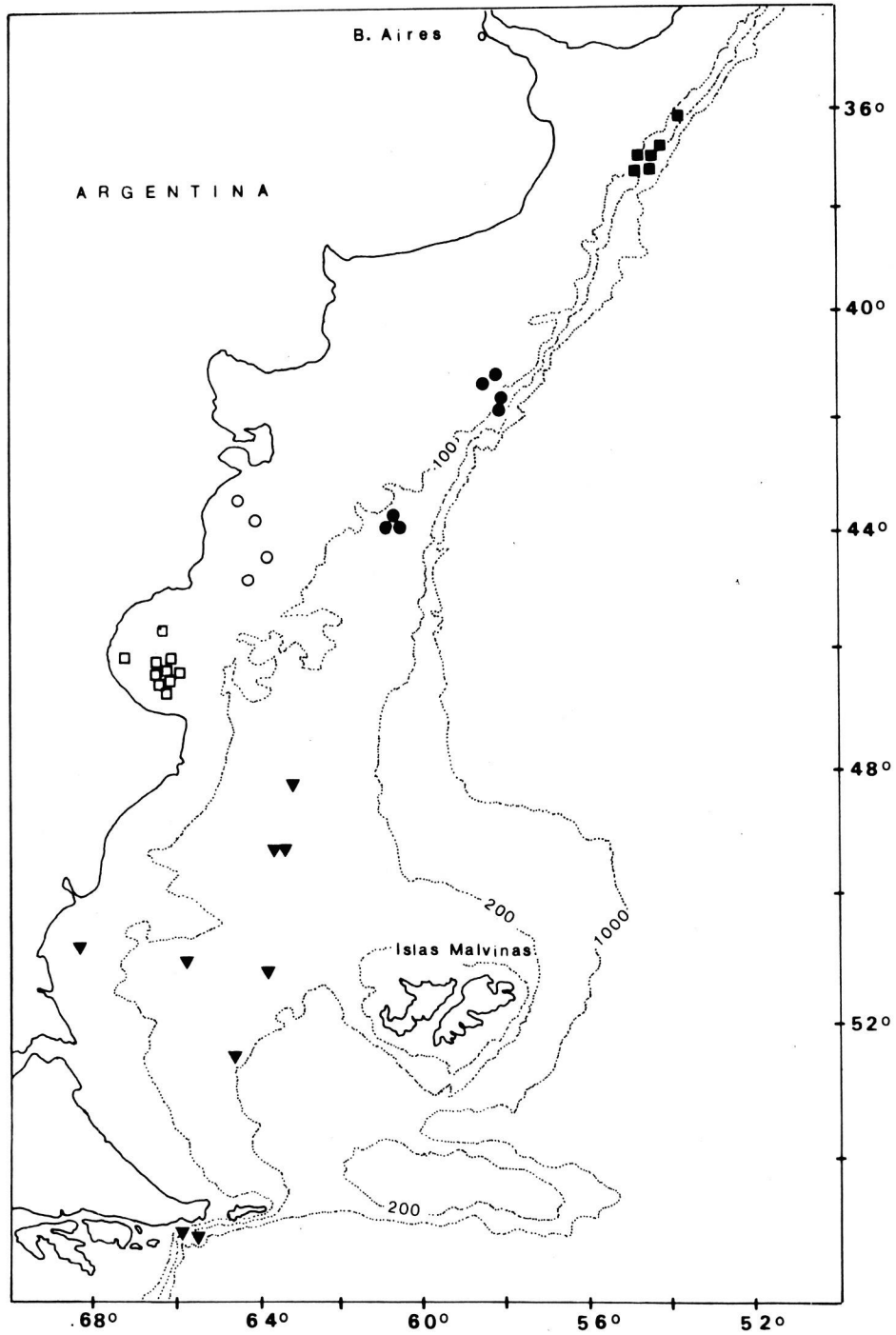


Fig. 1. — Geographic locations of the sampling areas. *Genypterus blacodes* samples: full squares: Argentinean-Uruguayan Common Fishing Zone; full circles: North-Patagonic zone; open circles: Isla Escondida zone; full triangles: South zone. *G. brasiliensis* samples: open squares: San Jorge Gulf.

Fish were measured and sexed and intestines were dissected out. Nematodes were recovered, placed in saline media prior to fixation in AFA and stored in 70 % ethanol. For light microscopy, specimens were cleared in lactophenol, in which they were kept during measuring and drawing. The illustrations were made with the aid of a drawing tube; measurements are given in millimeters (mm), range is followed by means in parentheses. For scanning electron microscopy (SEM) 3 males and 3 females were fixed in formalin 4 %, coated with gold-palladium and scanned in a Jeol T100 scanning electron microscope.

Morphological terminology of papillae is in accord with Petter (1974a).

The material studied is deposited in the Invertebrate Collection (Helminths) of La Plata Natural Sciences Museum (LPNSM), La Plata, Argentina, # 3497C.

Prevalence and mean intensity of infestation were calculated in relation to the body size and sex of the host and for different geographic zones. The chi-square test and the Mann Whitney U test were used to compare the effect of the host sex differences on prevalence and intensity respectively; Spearman Rank correlations were used to relate intensity and host length (Siegel, 1990).

RESULTS

CUCULLANUS GENYPTERI SP. N. (Figs. 2 and 3)

Type material: One male (holotype), 1 female (allotype), 10 males and 10 females (paratypes). Material deposited in Collection of Invertebrates (Helminths), Museo de La Plata, La Plata, Argentina (Coll. No. 3497C). Type host: *Genypterus blacodes* Schneider, 1801 (Ophidiiformes: Ophidiidae) female, length: 118 cm.

Type Locality: 49°20'S/63°25'W (South zone).

Date of Collection: June 17, 1993.

Other material: Four males from a female of *Genypterus brasiliensis* Reagan, 1903 (62 cm length), caught in San Jorge Gulf (46°46'S/66°14'W; October 17, 1993). Etymology: Specific name *genypteri* refers to generic name of hosts.

DESCRIPTION

Large sized nematodes. Body slender. Fine and closely spaced striations present on body cuticle. Head rounded, dorsoventrally expanded. Cephalic extremity with the usual characters of the genus *Cucullanus*, with two pairs of prominent cephalic papillae and one pair of lateral amphids. Mouth opening surrounded by a collarette bearing 45 to 50 triangular teeth, on each side. Close to the peribuccal frame, one pair of reniform sclerotized plates and three pairs of irregular structures were observed. Oesophagus long and

narrow, double club-shaped, with similar width at both anterior and posterior extremities. Intestine simple, without caecum. Deirids situated at the middle of the oesophagus length. Excretory pore posterior to deirids and anterior to the distal end of the oesophagus.

Male: Pre-cloacal sucker present. Cloaca not prominent, without sclerotized walls. Three pairs of pre-cloacal papillae: pair 1 anterior to the sucker; pair 2 posterior to it, and pair 3 between the sucker and the cloaca, but closer to the latter. Four pairs of ad-cloacal papillae: three subventral pairs (5, 6 and 7) and one lateral pair (4) situated slightly posterior to pair 7. Four pairs of post-cloacal papillae: two subventral pairs (9 and 10), one lateral pair (8) at the level of pair 10 or slightly posterior to it, and one pair of lateral papillae (phasmids) level with or a little anterior to pair 9. Tail conical.

Female: vulva not salient, slightly posterior to the middle of the body. Ovejector short and directed anteriorly. Uteri opposite. Eggs oval, unembryonated in the uterus. Tail conical with a pair of caudal papillae.

MEASUREMENTS

Male: 10 specimens. holotype, range (average). Length: 18.91, 18.64-23.00 (19.64); maximum width: 0.33, 0.26-0.46 (0.35); oesophagus: 2.21, 1.81-2.31 (2.10); distance from cephalic extremity: of nerve ring: 0.59, 0.61-0.71 (0.65); of deirids: 1.14, 0.82-1.39 (1.10). Spicules: 1.07, 1.04-1.20 (1.12). Tail: 0.16, 0.16-0.20 (0.19).

Female: 10 specimens. allotype, range (average). Length: 28.38, 17.98-28.71 (23.04); maximum width: 0.36, 0.32-0.53 (0.45); oesophagus: 2.52, 1.78-2.57 (2.22); distance from cephalic extremity: of nerve ring: 0.70, 0.65-0.90 (0.74); of deirids: 1.17, 0.82-1.26 (1.04); of vulva: 16.99, 11.48-18.94 (15.09). Tail: 0.47, 0.34-0.53 (0.44).

QUANTITATIVE DATA

Comparisons of parasitism in relation to host sex showed no significant differences for either prevalence or mean intensity ($p > 0.05$). Correlation analysis was also carried out for both sexes together.

For *G. blacodes*, the values of parasite prevalence were high for all length classes (Table I). Significant correlation between host length and both prevalence and mean intensity was observed ($r_s = 1$). An increase in mean intensity was observed from Argentinean-Uruguayan Common Fishing Zone to South Zone (Table II). In all geographic areas, these nematodes showed high prevalence.

Only one specimen of *G. brasiliensis* was found parasitized by four nematodes. Prevalence and intensity for this host is in Table II.

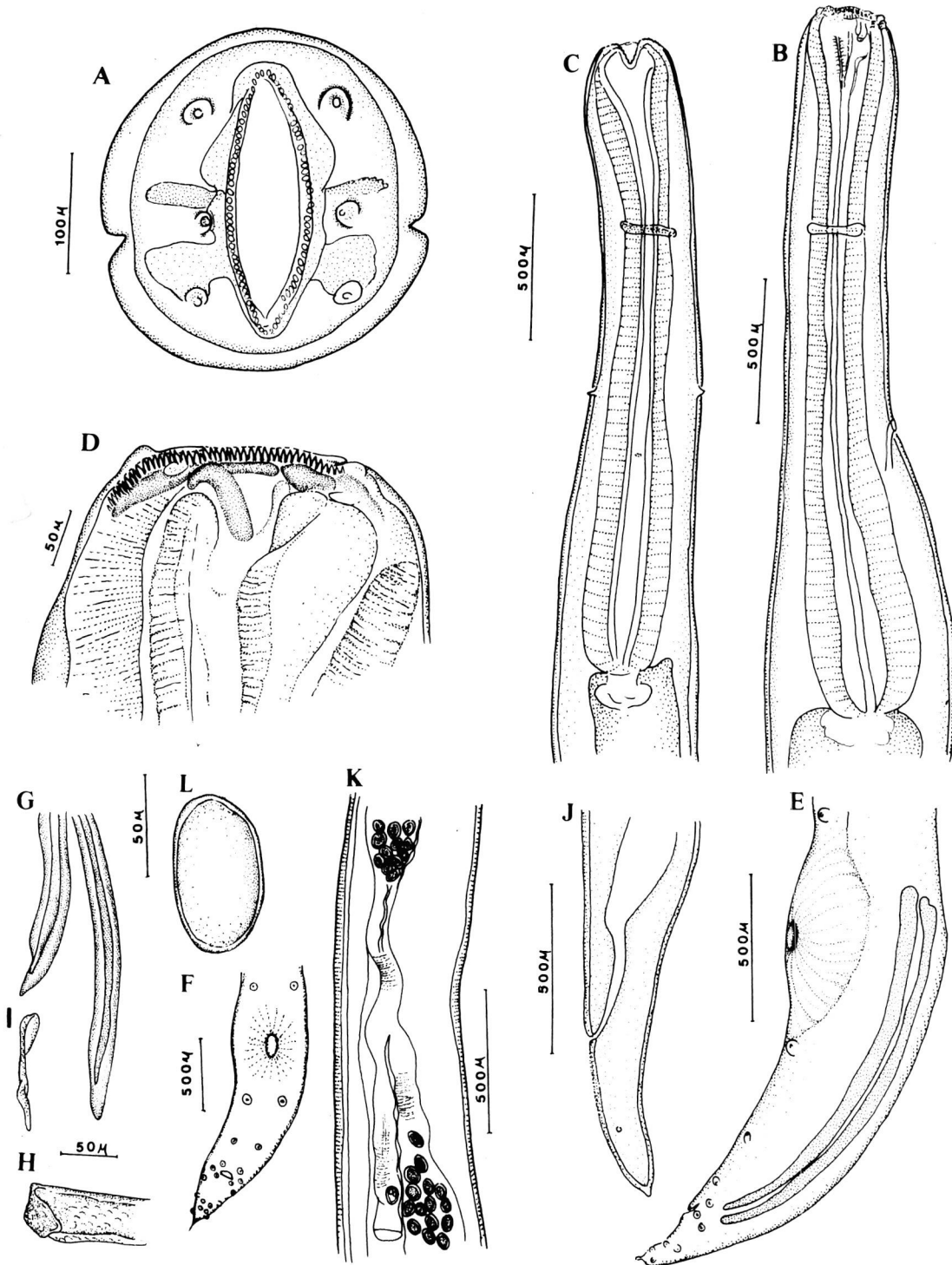


Fig. 2. — *Cucullanus genypteri* sp. n. A: apical view; B: anterior end, lateral view; C: anterior end, ventral view; D: detail of anterior end, lateral view; E: posterior end of male, lateral view; F: posterior end of male, ventral view; G: spicules, distal end; H: spicules, proximal end; I: gubernaculum; J: posterior end of female, lateral view; K: vulva region; L: egg.

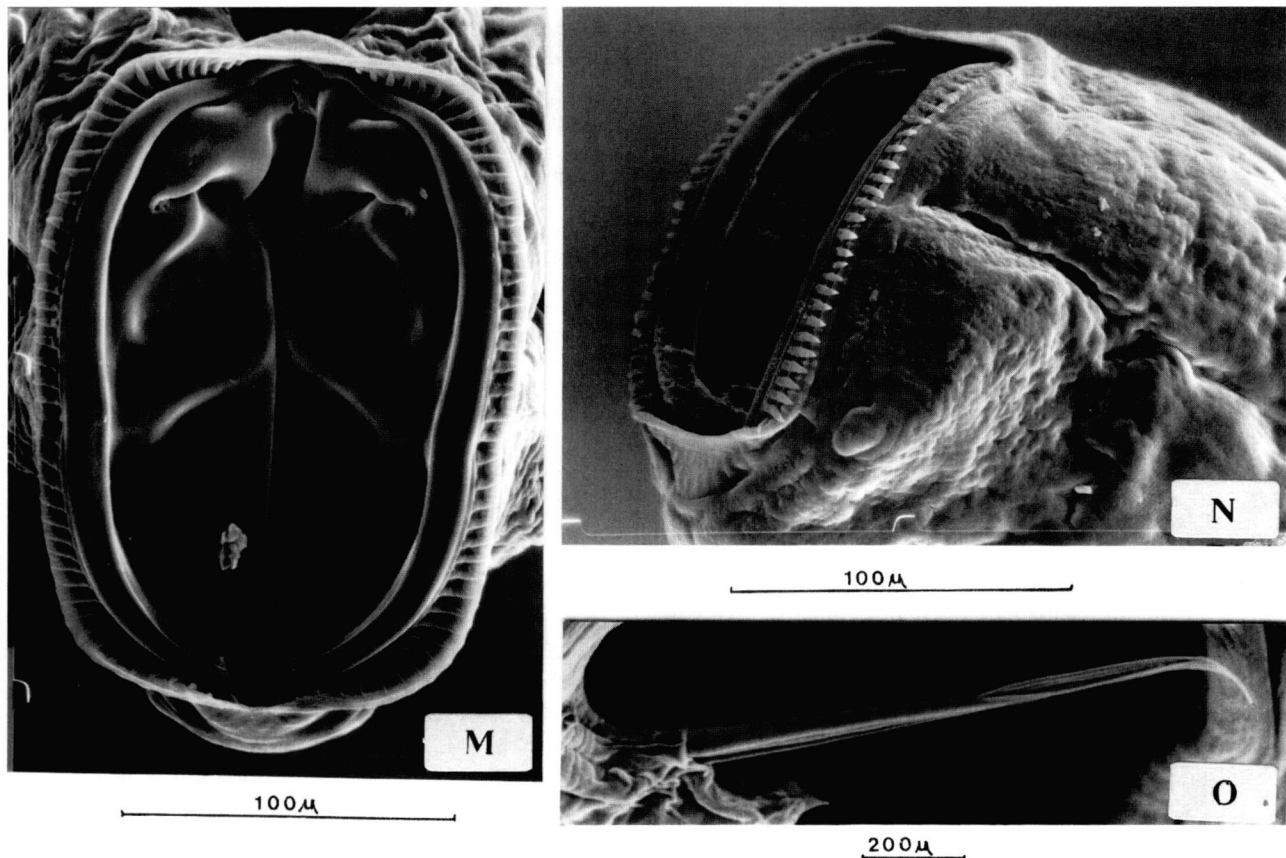


Fig. 3. — *Cucullanus genypteri* sp. n. M: apical view; N: anterior end, lateral view; O: spicules.

Host length (cm)	NHE	NHP	Prev.	NP	Int.
< 41	6	2	33.33	4	2.00
41-60	33	26	78.79	138	5.31
61-80	31	26	83.87	388	14.92
81-100	19	17	89.47	763	44.88
> 100	13	11	91.67	737	67.00
Total	101	82	81.19	2,030	24.76

NHE: Number of hosts examined; NHP: Number of host parasitized; Prev.: prevalence; NP: number of parasites; Int.: mean intensity.

Table I. — Prevalence and Mean Intensity of *Cucullanus genypteri* sp. n. in relation to *Genypterus blacodes* length classes.

DISCUSSION

At present, 14 species of *Cucullanus* have been described in South America, parasitizing freshwater fishes from Brazil (Travassos *et al.*, 1928; Vaz and Pereira, 1934; Travassos, 1948; Santos *et al.*, 1979; Fortes *et al.*, 1992, 1993a, b; Moravec *et al.*, 1993; Sarmento *et al.*, 1995; Petter, 1995), and Venezuela (Diaz-Ungria, 1968). In Argentina, Hamann

(1984, 1985) cited *C. pauliceae* Vaz and Pereira, 1934 and *C. pinnai* Travassos, Artigas and Pereira, 1928 in pimelodid catfishes from Paraná river. In marine fishes, five species have been reported from Brazil and French Guiana (Barreto, 1922; Vicente and Fernandes, 1973; Vicente and Santos, 1974; Petter, 1974b; Pinto *et al.*, 1992).

The new species described above can be distinguished from the freshwater South American species as follows.

C. patoi Fortes, Hoffmann and Sarmento, 1992, *C. fabregasi* Fortes, Hoffmann and Sarmento, 1993, *C. riograndensis* Fortes, Hoffmann and Sarmento, 1993 and *C. debacoi* Sarmento, Fortes and Hoffmann, 1995: the body and spicules are smaller in these species.

C. colossomi Diaz-Ungria, 1968 and *C. oswaldocruzi* Santos, Vicente and Jardim, 1979: in both of these species the papillae pair 9 are situated closer to the adcloacal papillae.

C. pauliceae Vaz and Pereira, 1934: this species has caudal alae and a different arrangement and morphology of the cloacal papillae.

Other South American freshwater species reported by Petter (1995) differ from the species herein described either in not having a precloacal sucker, either in having lateral alae or different male body lengths and spicule lengths.

	NHE	NHP	Prev.	Int.	NP	HLC
<i>G. blacodes</i>						
A.U.C.F.Z...	27	24	88.89	3.46	83	35-59
N.P.	28	20	74.43	8.30	166	24-111
I.E.	12	9	75.00	13.42	161	39-127
South	34	29	85.29	55.56	1,612	78-109
<i>G. brasiliensis</i>						
San Jorge Gulf	31	1	3.20	4.00	4	40-75

NHE: Number of hosts examined; NHP: Number of host parasitized; Prev.: prevalence; Int.: mean intensity; NP: number of parasites; HLC: host length classes; AUCFZ: Argentinean-Uruguayan Common Fishing Zone; NP: north Patagonian zone; IE: Isla Escondida zone.

Table II. — Prevalence and Mean Intensity of *Cucullanus genypteri* sp. n. in *Genypterus blacodes* and *G. brasiliensis* in relation to the geographical sampling area.

In relation to the South American marine species, the new species differs from *C. pulcherrimus*, parasite of Perciformes (Barreto, 1922; Pinto *et al.*, 1992), from *C. dodsworthi*, parasite of Tetraodontiformes (Barreto, 1922), from *C. carioca*, parasite of Perciformes (Vicente and Fernandes, 1973) and from *C. rougetae*, parasite of Perciformes (Vicente and Santos, 1974), in the smaller size of all the Brazilian species. Furthermore in *C. pulcherrimus*, *C. dodsworthi* and *C. rougetae* the papillae 4 are situated between papillae 6 and 7. In addition in *C. pulcherrimus* the spicule length is smaller, in *C. dodsworthi* the papillae 9 are displaced to the cloaca; the pre-cloacal papillae 1 and 2 are closer to the sucker and the papillae 3 are equidistant between the sucker and the cloaca and in *C. rougetae* the precloacal sucker is absent. *C. carioca* can be distinguished from the new species by having papillae 5, 6 and 7 situated anterior to the cloaca and papillae 4 and postcloacal ones close together distally.

C. bagre Petter, 1974, parasite of *Bagre bagre* (Siluriformes) of French Guiana, although presenting a similar position of papillae 4 (posterior to papillae 7), shows some differences from the new species: 1) papillae 8 displaced anteriorly, between the cloaca and the papillae 9; 2) spicules more complex and smaller and 3) cloaca prominent.

In the South East Atlantic Ocean, Parukhin (1982) described *C. hoplobrotuli* from another Ophidioidei (*Hoplobrotula gnathopus*); this species is smaller than the specimens of the present study.

On the basis of the differences listed above, a new species *Cucullanus genyptery* is proposed. This finding represents the first record of a cucullanid species in the Argentinean Sea.

In the Pacific Ocean (Chile) there are three species of kingclips: *G. blacodes*, *G. maculatus* and *G. chilensis*, which harbour unidentified species of *Cucullanus*

(Vergara and George-Nascimento, 1982; George-Nascimento and Huet, 1984; Riffo, 1994).

Recently, the Chilean specimens have been compared with the Argentinean species and their morphology coincides with the present description (George-Nascimento, pers. comm.). *C. genypteri* would be a species restricted to the Southwest Atlantic Ocean and Chilean waters. This assumption is supported by the failure to find any species of the genus *Cucullanus* in *G. blacodes* of New Zealand (Grabda and Słózarczyk, 1981). In relation to the quantitative data, both high prevalences and high mean intensities of *C. genypteri* in *G. blacodes* indicate that this nematode is a common parasite in this host and an occasional parasite in *G. brasiliensis*. The observed variations in the intensities of *C. genypteri* in relation to the host length may be due to changes in feeding habits as the host grows (Riffo, 1994).

On the other hand, the increase in intensity from the northern to the southern areas of the Argentinean Sea, suggest, probably, a higher availability in the South of the possible intermediate host involved in the nematode life cycle, which is incompletely known in Cucullanids (Gibson 1972; Anderson, 1992; Moravec & Rahemo, 1993). The extremely low quantitative values registered for *G. brasiliensis* can be explained by different trophic habits between the two host species.

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