

# **TAPIRONEMA CORONATUM n. gen., n. sp.** **(TRICHOSTRONGYLOIDEA - COOPERIIDAE - OBELISCOIDINAE),** **A PARASITE OF *HOLOCHILUS BRASILIENSIS* AND *TAPIRUS TERRESTRIS***

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## **Summary :**

In this paper we provide a description of *Tapironema coronatum* n. gen. n. sp. (Trichostrongyloidea, Obeliscoidinae) from the cricetid *Holochilus brasiliensis* or «water rat» in Argentina (Type material) and from *Tapirus terrestris* in French Guyana (voucher material in poor condition). The new genus is characterized by a corona radiata, an oesophageal tooth, a bilaterally synlophe with about 73 (male), 122 (female) cuticular ridges, a caudal bursa pattern 2-1-2 with rays 5 and 6 parallel and close together and rays 5 longer than rays 3. The most closely related genus is the monospecific *Teporingonema* Harris, 1985, from a Mexican lagomorph, *Romerolagus*. The cephalic extremity of this parasite is redescribed after the type-material. The systematic position of *Teporingonema* amongst the Obeliscoidinae is defined and the hypotheses concerning the origin of this sub family are provided.

**KEY WORDS :** Nematoda, Trichostrongylina, Obeliscoidinae, *Holochilus*, *Tapir*, neotropical zone, systematics, phylogeny.

**RÉSUMÉ :** *TAPIRONEMA CORONATUM* N. GEN., N. SP. (TRICHOSTRONGYLOIDEA-COOPERIIDAE-OBELISCOIDINAE), PARASITE D'*HOLOCHILUS BRASILIENSIS* ET DE *TAPIRUS TERRESTRIS*.

Description de *Tapironema coronatum* n. gen. n. sp. (Trichostrongyloidea, Obeliscoidinae) chez *Holochilus brasiliensis* en Argentine (matériel type) et chez *Tapirus terrestris* en Guyane française. Le genre est caractérisé par une corona radiata, une dent œsophagienne dorsale, un synlophe avec environ 73 (mâle) ou 122 (femelle) crêtes cuticulaires, une bourse caudale de type 2-1-2 avec des côtes 5 et 6 parallèles et jointives et des côtes 5 plus longues que les côtes 3.

Le seul genre possédant de fortes affinités avec ce matériel est le genre monospécifique *Teporingonema* Harris, 1985, parasite d'un lagomorphe mexicain *Romerolagus*. L'extrémité céphalique de ce parasite est redécrite d'après le matériel type. La position systématique de *Tapironema* parmi les Obeliscoidinae est précisée et les hypothèses concernant l'origine de cette sous-famille sont présentées.

**MOTS CLÉS :** Nématodes, Trichostrongylina, Obeliscoidinae, *Holochilus*, *Tapir*, zone néotropicale, systématique, phylogénie.

## INTRODUCTION

The study of a nematode from the cricetid rodent *Holochilus brasiliensis* in Argentina, known as «rata colorada», has revealed that this parasite represents a very particular new genus of Trichostrongylina. In an unexpected manner, a similar nematode was discovered in a *Tapirus* from French Guyana. The only closely related genus is *Teporingonema*, parasitic in *Romerolagus*, a relict Lagomorpha from Mexico. A complementary study of this nematode has been done in order to establish the systematic position of the two genera. This paper is a continuation of others concerning nematode parasites of rodents from the Delta del Parana, Argentina and Departamento

Artigas, Uruguay (Sutton, 1989; Sutton & Durette-Desset, 1991 and Sutton & Durette-Desset, 1995).

## MATERIAL AND METHODS

*Holochilus* cricetids were captured within live traps and euthanased. The viscera were dissected and nematodes killed in boiling water and fixed in hot 70 % ethanol where they are stored. The tapir was captured in French Guyana and euthanased. The viscera was put in 10 % cold formalin. The worms were sorted only three years later and put in cold 70 % ethanol. This long storage in the preserved stomach may explain the poor condition of the parasites particularly the anterior part of the body. Nonetheless it was possible to check the similarity of the main features (head, synlophe, pattern of the caudal bursa, shape of the spicula) and to compare several measurements. Two paratype females of *Teporingonema* from *Romerolagus* were provided by Dr. E. Harris from the British Museum of Natural History. The head of one female was cut in order to study it in apical view.

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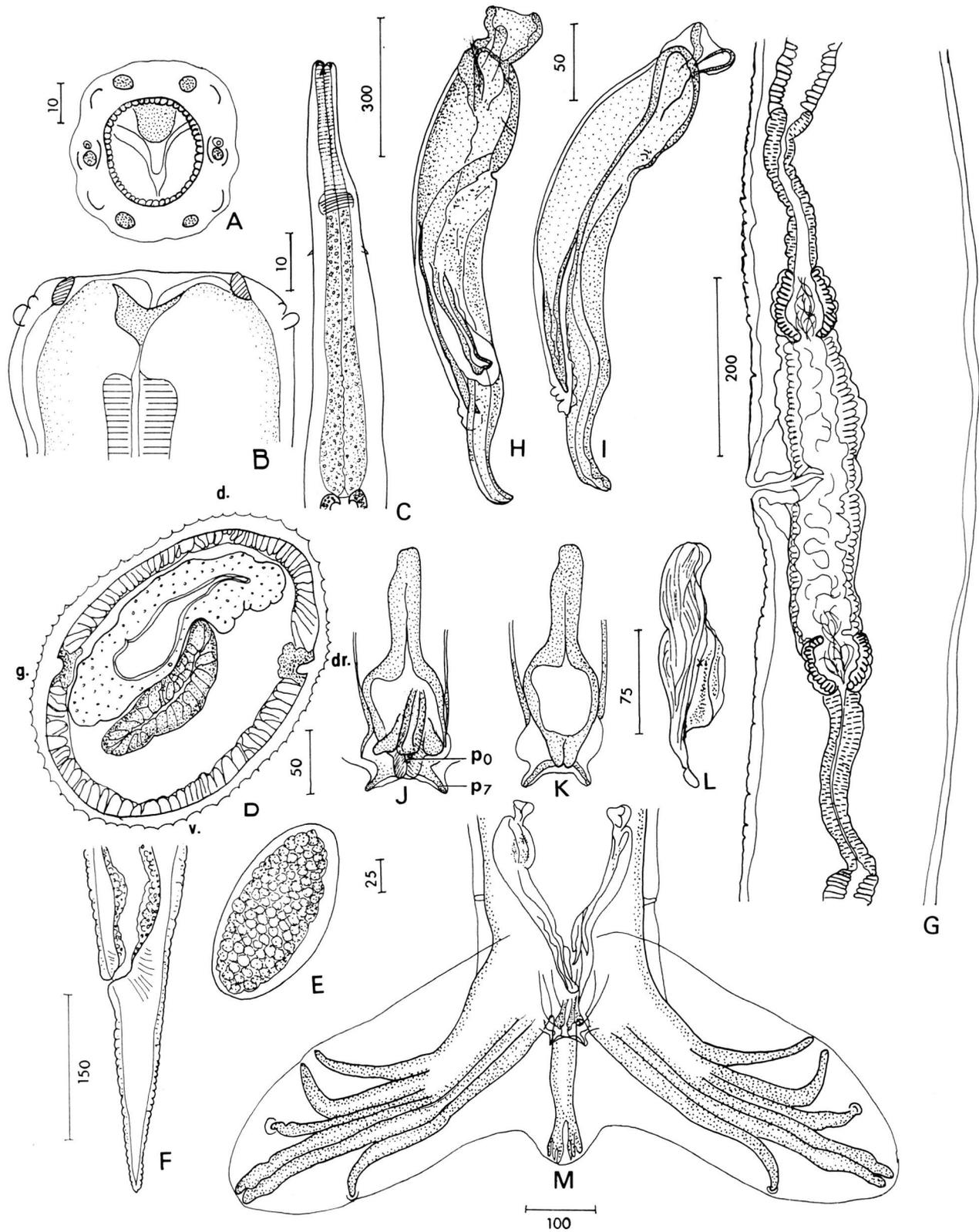


Fig. 1. — *Tapironema coronatum* n. gen., n. sp. from *Holocbilus brasiliensis*. A-B: male, head in apical and left lateral views. C: female, anterior part of body, dorsal view. D: male, synlophes at mid-body. E: egg at morula stage. F: female, tail, left lateral view. G: female, ovejector, left lateral view. H-I: male, left spicule in ventral view and right spicule in dorsal view. J-L: male, gubernaculum, ventral, dorsal and right lateral views. M: male, caudal bursa, ventral view.

The material was studied by standart methods and cleared in lactophenol. Measurements are given in micrometers unless stated otherwise. The nomenclature used for the bursa copulatrix is that of Durette-Desset and Chabaud (1981). The synlophe was studied according to the methods of Durette-Desset (1985).

The parasites are deposited in the Helminthological Collections of the Museo de La Plata (MLP) and those of the Muséum National d'Histoire Naturelle de Paris (MNHN).

## SYSTEMATICS

DESCRIPTION OF *TAPIRONEMA CORONATUM* N.GEN., N. SP. FROM *HOLOCHILUS* (Fig. 1, Table 1)

**T**ype-material: holotype male, allotype female, M1331 B; 2 male paratypes MNHN 889 MC.  
Host: *Holochilus brasiliensis* (Desmarest).

Site: stomach.

Locality: INTA, Partido de Campana, Provincia de Buenos Aires, Argentina. 24/07/1984.

Prevalence: one out of four.

Ethymology: the name of the genus is based on the name of the second host, the tapir, and the name of the species after the presence of a *corona radiata*.

Uncoiled and rather large nematodes, filiform. Excretory pore at same level as deirids, at the middle level of oesophagus. Deirids well developed and spine-shaped.

Head: absence of cephalic vesicle; reduced buccal ring, with large dorsal tooth 92 long. Presence of a *corona radiata* with about 52 elements. In *en face* view, two amphids and 4 cephalic papillae. Buccal aperture triangular (Fig. 1A, B).

Synlophe: (based on 1 male). Simple, with about 73 ridges equal in size and perpendicular to body surface, closer to each other in lateral fields at level of midbody (Fig. 1D).

Holotype male: Length: 21 mm and 380 wide at midbody. Nerve ring, deirids and excretory pore at 210, 420 and 450 from apex, respectively. Oesophagus 940 long. Caudal bursa symmetrical, heavily sclerotized, transversally elongated with small dorsal lobe. Caudal bursa pattern: 2-1-2. Prebursal papillae developed. Rays 2 shorter than rays 3, with their extremities curved towards each other. Rays 4 shorter than others. Rays 5 and 6 parallel and joined, both longer than others. Rays 8 arising at root of dorsal ray, and joined to rays 6 in their first half. Dorsal ray divided at distal third in two branches and then subdivided into three small branches (rays 9 & 10 and the phasmids) (Fig. 1M). Spicules subequal 300 long, divided into three branches: the externo-lateral branch is the longest and slightly curved at its extremity; the interno-ventral branch is the shortest and its extremity is enlarged; the

interno-dorsal branch, a little longer than the ventral, has a sharp extremity (Fig. 1H, I). In ventral view, spoon-shaped gubernaculum, 100 long (Fig. 1K). Genital cone prominent and sclerotized, with big papilla zero in ventral lip and prominent papillae 7 on dorsal (Fig. 1J-L).

Allotype female: length 20.6 mm and 360 wide at midbody. Nerve ring, deirids and excretory pore at 150, 420 and 450 from apex, respectively. Oesophagus 750 long (Fig. 1C). Didelphic. Vulva opening situated in the fourth posterior part of the body (0.78 %). *Vagina vera*: 50 long. Ovejector symmetrical. Vestibule: 700 long. Sphincters both 80 long and 70 wide, respectively. Infundibula both 200 long, respectively. Anterior and posterior uterine branch containing more than 200 eggs. Eggs not embryonated, 131-150 × 75 at morula stage (Fig. 1E). Tail 22 long, with round tip (Fig. 1F).

DESCRIPTION OF *TAPIRONEMA CORONATUM* FROM *TAPIRUS* (Fig. 2A-E, Table 1)

Material examined: 4 males and 8 females, MNHN 502 HD. The posterior part of the body, in good condition, was studied on three male and three females.

Host: *Tapirus terrestris* L. 1758

Site: stomach.

Locality: Aratay River, 80 kms from the coast. French Guyana. 24 /11/1980.

No morphological difference was observed between the specimens from *Tapirus* and those from *Holochilus* in the characters usually used for the identification of Trichostrongylina. In spite of this, a strong difference in size was detected between the single female from *Holochilus* and the three females from *Tapirus*. The former is 21 mm long and its eggs are 131-150 long × 75 large. The latter are 51 mm long and their eggs are 80-100 long × 55-60 large. Our data are insufficient to prove a true speciation. Notwithstanding this, the possibility of a speciation is conceivable because for example, in the filarid's group, the length of the microfilaria is one of the first characters which demonstrates the existence of low speciations (Bain, 1968).

On the other hand, a difference appears in the shape and the development of the lateral fields and in the shape of the musculature between the specimens from *Holochilus*, and those from *Tapirus* (Figs. 1D, 2B). These characters are not normally utilised in the identification of the Trichostrongylina, but may be of some importance (Lichtenfels & Wergin, 1994).

DESCRIPTION OF THE CEPHALIC EXTREMITY OF *TEPORINGONEMA CERROPELADOENSIS* HARRIS, 1985 (Fig. 2F-I).

Material examined: two paratype females, BM(NH) Reg. no 1984, 3268-3292.

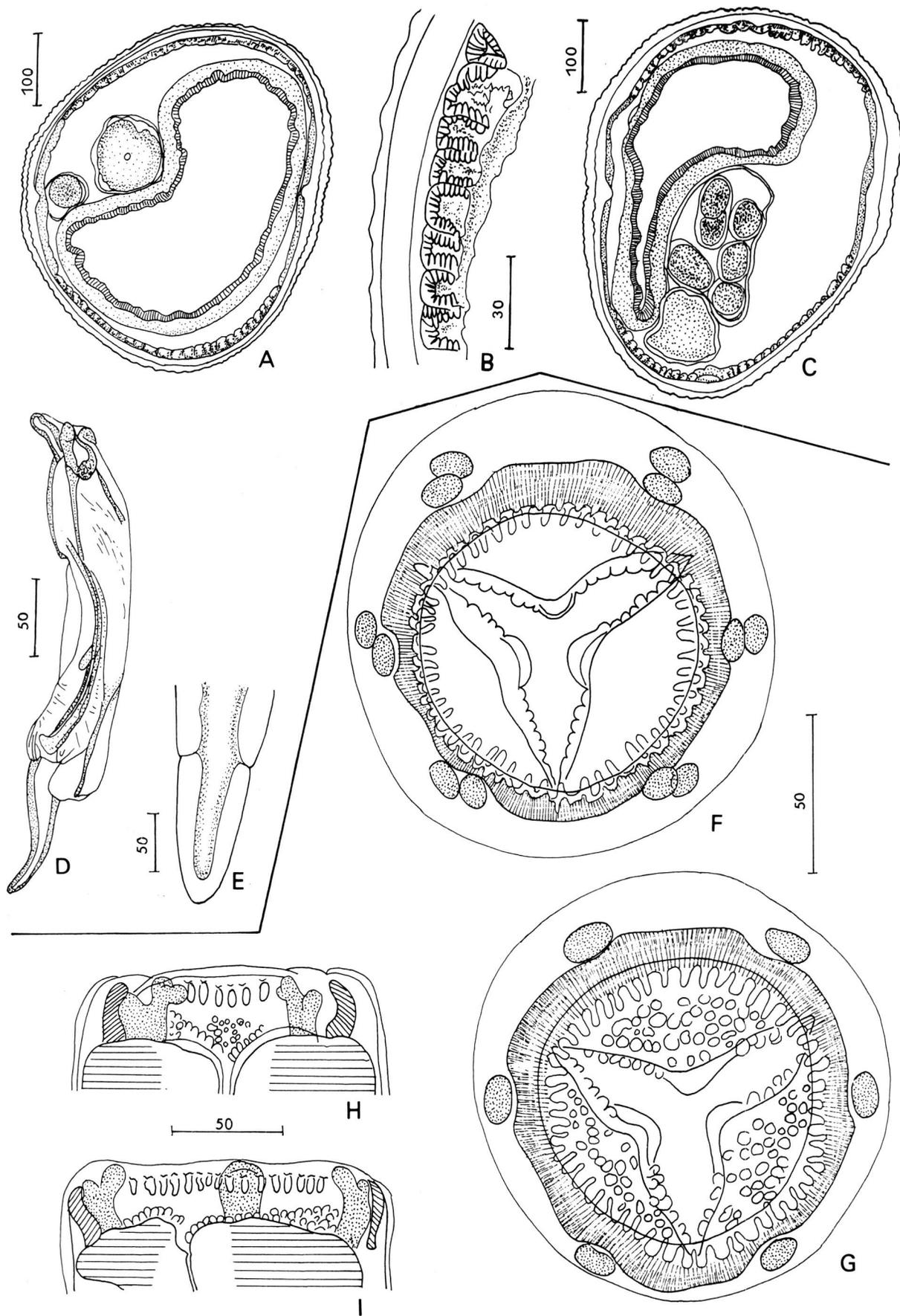


Fig. 2. — *Tapironema coronatum* n. gen., n. sp. from *Tapirus terrestris* A-E. A: female, synlophe at mid-body. B: section of the body, detail of the musculature at the level of the anterior uterine branch. C: synlophe at the same level. D: male, right spicule, interno-lateral view. E: female, tip of the tail with the phasmids, ventral view. *Teporingonema cerropeladoensis* Harris, 1985 from *Romerolagus cerropeladoensis* F-I: head. F, in apical view. G: *idem* but in deeper position. H: in median view. I: in lateral view.

Tapironema Dimensions	from <i>Holocbilus</i>		from <i>Tapirus</i>	
	Male	Female	Male	Female
Length (mm)	21.0-18.9-23.1	20.6	23.1-22.9-22.4	52.7-50.9-50.7
Width at midbody	380-400-400	360	230-220-220	500-600-450
Nerve ring	210-310-310	150	—	—
Excretory pore	450-430-430	450	—	—
Deirids	420-470-470	420	—	—
Oesophagus	940-910-970	750	710-700-700	1 450-1 450-1 500
Spicula	300-300-300	—	310-320-330	—
Gubernaculum	100-100-125	—	110-110-115	—
Cut. ridges at midbody	73	—	62	122
Vulva-Anterior extr.	—	16.1 mm	—	44.7-50.3-42.6
Vulva/Length %	—	0.78	—	0.85-0.82-0.84
Ant. part of vestibule	—	350	—	250-250-250
Ant. sphincter	—	80 × 70	—	175-200-170
Ant. infundibulum	—	200	—	480-475-600
Post. part of vestibule	—	350	—	225-290-250
Post. sphincter	—	80 × 70	—	175-200-170
Post. infundibulum	—	200	—	410-500-600
Eggs	—	131 × 75-150 × 75	—	80 × 55-100 × 60
Ant. uterine branch	—	—	—	4.6-4.6-5.3
Post. uterine branch	—	—	—	7.7-4.6-4.7
Tail	—	220	—	500-390-380

Table I. — Measurements of *Tapironema coronatum* n.gen., n.sp.

Head: rounded buccal aperture; presence of a *corona radiata* composed of an external *corona radiata* with 53 small elements, 2 long and an internal *corona radiata* with 51 elements, 5 long. Buccal capsule with thick and notched hexagonal-shaped buccal ring, 30 wide. Inside the six notches (2 lateral and 4 submedian) of the external wall of the ring, there are 6 externo-labial papillae. The 2 amphids and the cephalic papillae have a common peduncle with the corresponding externo-labial papillae. Absence of oesophageal tooth. The oesophagus protrudes into the base of the buccal cavity and each lobe is covered with numerous protuberances.

As noticed by Harris (1985), the head bears some resemblance to those of some Strongyloidea as in *Trachypharynx* Leiper, 1911, but in contrast to these parasites, the internal *corona radiata* is more developed than the external one and the number of elements is equivalent in each *corona* whereas in the Strongyloidea, one element of the internal *corona* corresponds to two elements of the external one.

## DISCUSSION

### SYSTEMATIC POSITION OF *TAPIRONEMA* AND RELATIONSHIPS WITH *TEPORINGONEMA*

According to the classification of Durette-Desset *et al.* (in preparation), the specimens described herein belong to the family Cooperiidae: the rays 3 are directed posteriorly then curving

abruptly anteriorly. Consequently, the distal ends of rays 2 and 3 are close together and the ensemble looks like a pair of pincers. The specimens belong to the sub-family Obeliscoidinae based on the caudal bursa pattern 2-1-2 and the fact that rays 5 and 6 are joined. Cephalic vesicle and bulb-shaped head are absent and the synlophe is made of numerous cuticular ridges. The sub-family is composed of 3 genera:

- *Hoazinstrongylus* Pinto & Gomes, 1985, parasitic of a relict bird, *Hoazin*, from the Amazon, has a monodelphic female. It does not have a synlophe and the head lacks *corona radiata* and lips. The caudal bursa has a thin dorsal ray.
- *Obeliscoides* Graybill, 1923, parasitic in lagomorphs from the Holarctic region (USA, Russia, China and Japan) also possesses a thin dorsal ray but the buccal aperture is trilobate with a small chitinous ring.
- *Teporingonema* Harris, 1985, parasitic in the volcano rabbit *Romerolagus* from Mexico, is the only genus to the closest affinity with the specimens from *Holocbilus*: because of the presence of a *corona radiata*, a thick buccal ring and a similar synlophe and pattern of the caudal bursa.

The specimens described herein as *Teporingonema* can be distinguished from the other genera, particularly by the presence of a strong dorsal tooth, the length of rays 5 longer than rays 3, relatively short rays 4 and a well developed dorsal ray.

Taking into account these morphological differences, the specimens examined herein are considered as belonging to a new genus for which the name *Tapir-*

*ronema* n. gen. is proposed, and with *Tapironema coronatum* as the type species.

#### DEFINITION OF *TAPIRONEMA* N. GEN.

Cooperiidae. Obeliscoidinae. Head with *corona radiata* and oesophageal tooth. Synlophes with numerous longitudinal ridges. Caudal bursa symmetrical and transversally elongated. Dorsal ray medium sized. Rays 4 shorter than all others. Rays 5 and 6 long and joined. Didelphic. Tail of female without spine.

Parasites of *Holochilus* and *Tapirus*.

Type species: *Tapironema coronatum* n. gen. n. sp., a parasite of *Holochilus brasiliensis* from Argentina and *Tapirus terrestris* from French Guyana.

#### HYPOTHESES ON THE PHYLOGENY OF THE OBELISCOIDINAE

The knowledge of this new genus allows us to give a more precise interpretation of the phylogenetic relationships of the Obeliscoidinae. Although this genus occurs in Neotropical region (from a cricetid rodent in Argentina and from a tapir in French Guyana), we believe that its origin is from the Nearctic region for the following reasons:

The tapir appears to be the original host for *Tapironema* because *Holochilus* is well known for its exceptional receptivity to many helminths (e.g., it is known as experimental host of *Schistosoma haematobium*, a parasite difficult to maintain under laboratory conditions). The spread of the tapirs throughout the World, particularly in Nearctic region but not Neotropical region, occurred during the Eocene era (Lavocat, 1967). Also, the host of the most closely related nematode genus, *Teporingonema*, is a relict lagomorph *Romerolagus*, from Mexico. According to Hartenberger (1996) the first appearance of lagomorphs occurred during the upper Eocene period in the Nearctic region.

Furthermore, the genus *Obeliscoides* is also a parasite of lagomorphs. It is known from North America and based on its distribution, seems to have migrated from the Nearctic region to the Palearctic region through the Bering strait.

In conclusion and paradoxically, even if *Tapironema* was only known in the Neotropical region, its discovery seems to confirm the Nearctic origin of the Obeliscoidinae in the Nearctic region.

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