

PHYLLOCAULIS VARIEGATUS – AN INTERMEDIATE HOST OF ANGIOSTRONGYLUS COSTARICENSIS IN SOUTH BRAZIL

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Molluscs collected in five localities in the State of Rio Grande do Sul (Brazil) were digested and examined. The infected slugs were identified as Phyllocaulis variegatus and the larvae found were inoculated per os into mice. After 50 days, worms with the characteristics of Angiostrongylus costaricensis were recovered from the mesenteric arterial system. The results establish the role of P. variegatus as intermediate host of A. costaricensis in south Brazil, where many cases of abdominal angiostrongyliasis have been diagnosed.

Key words: *Phyllocaulis variegatus* – *Angiostrongylus costaricensis* – veronicellid slugs – abdominal angiostrongyliasis

Angiostrongylus costaricensis Morera & Céspedes, 1971 (Nematoda: Angiostrongylidae) is a nematode living within the ileo-colic branches of the mesenteric artery of the vertebrate host. The main definitive hosts are rodents, while veronicellid slugs are implicated as intermediate hosts (Morera, 1973).

A. costaricensis was first described in Costa Rica, where extensive studies have been done on the disease, the parasite and its hosts (Morera, 1967; Céspedes et al., 1967; Morera, 1970; Morera, 1973). In south Brazil many cases of human abdominal angiostrongyliasis have been detected in Pathology Services (Ziliotto et al., 1975; Campos et al., 1977; Iabuki & Montenegro, 1979; Agostini et al., 1984; Ayala et al., 1982; Ayala, 1987).

Besides Costa Rica, successful searches for naturally infected molluscs were reported from Ecuador (Morera et al., 1983) and Honduras (Kaminsky et al., 1987). This study was carried out to verify the presence of *A. costaricensis* in molluscs and to identify its intermediate hosts in the State of Rio Grande do Sul, Brazil.

MATERIAL AND METHODS

Veronicellid slugs and other molluscs (*Bradybaena similaris* Férussac, 1821; *Deroce-ras laeve* Müller, 1774 and *Limax* sp.) were collected around the houses of patients in five cities in Rio Grande do Sul: Arvorezinha, Cris-siumal, Getúlio Vargas, Ilópolis and Palmeira das Missões. After maceration and digestion with artificial gastric juice the material was left overnight in Baermann funnels (Wallace & Rosen, 1969). The larvae found were inoculated *per os* into Swiss albino mice, which were killed on the 50th day of infection and had their aorta and mesenteric arteries dissected under the stereomicroscope. The same procedure was performed on the animals that died spontaneously. Intra-arterial worms were fixed with Railliet-Henry solution. Length and maximum width were taken on camera lucida drawings, while other measurements were obtained from photomicrographs of the anterior and posterior ends. A number of infected slugs were fixed for taxonomic study.

RESULTS

Eight out of 51 slugs (15.7%) from Cris-siumal and 2/10 (20%) from Ilópolis were found infected. In both places all slugs were identified as *Phyllocaulis variegatus* Semper, 1885 (Mollusca: Veronicellidae) (Fig. 1).

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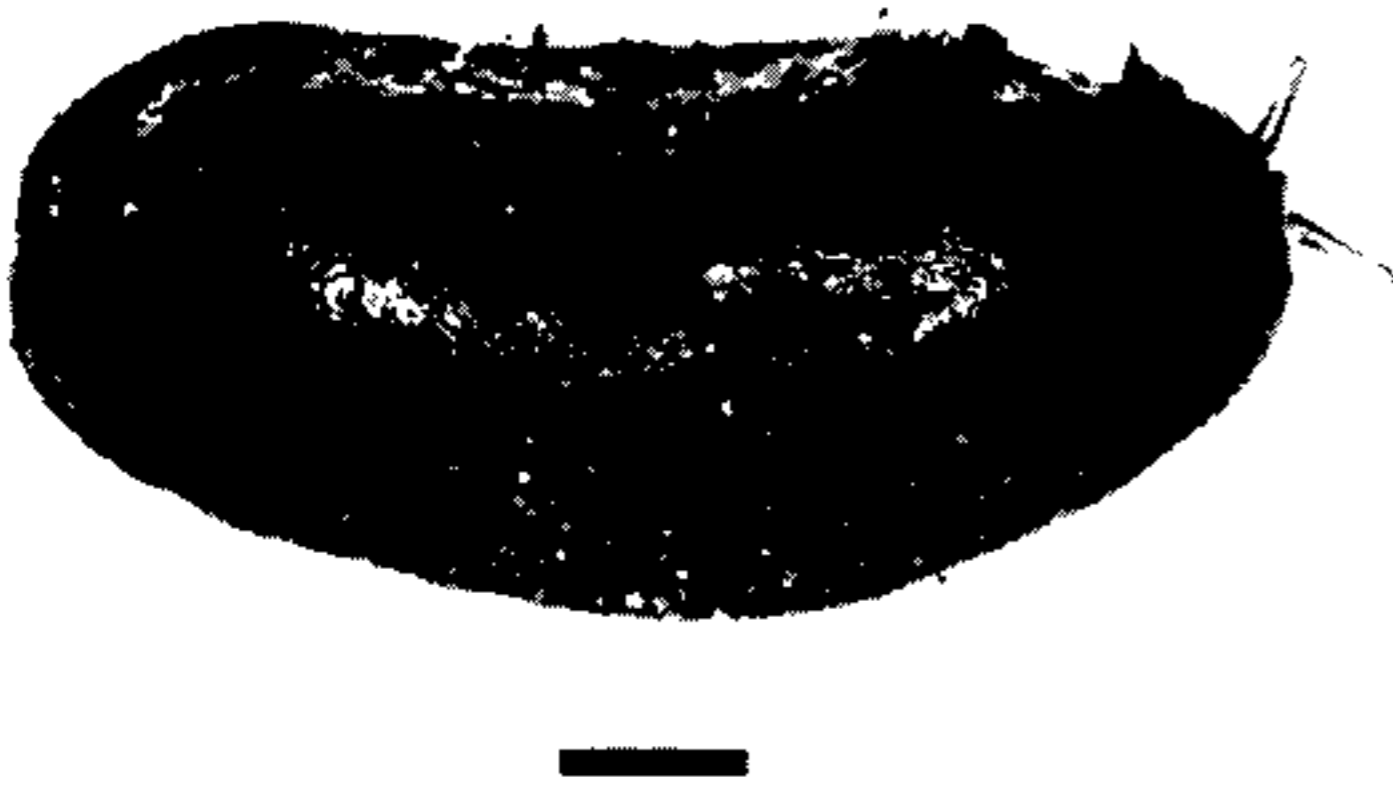


Fig. 1: the veronicellid slug *Phyllocaulis variegatus* (■ = 1 cm).

Twenty adult worms (16 females and 4 males) were recovered from the aorta and mesenteric artery of the infected mice. Their measurements are presented in the Table and characteristics of male and female posterior ends are shown in Fig. 2. The examination of *Deroceras laeve* (n = 66), *Bradybaena similaris* (n = 69) and *Limax* sp. (n = 6) was negative.

DISCUSSION

In the redescription of *A. costaricensis*, adult worms were obtained from the cotton rat – *Sigmodon hispidus* Say & Ord, 1825 – the most important definitive host in Central America (Morera, 1973). The differences between our measurements and those from Morera (1973) may result from variation in the age of the parasites and from the use of distinct definitive hosts. However, the location of the adult worm – inside the mesenteric artery – and the morphology of the copulatory bursa are characteristic of *A. costaricensis* (Morera, 1973). The localization of worms in the thoracic aorta was seen only in recently dead mice, probably meaning a post-mortem migration in the rodent.

Angiostrongylus siamensis Ohbayashi, Kamiya & Bhaibalaya, 1979 and *A. costaricensis* are similar in development and migration route within rodents, but they have distinctive morphological characteristics (Kudo et al., 1983).

The exposure of laboratory grown molluscs to first stage larvae passed in the feces of infected mice allowed us to maintain the cycle. Preliminary studies failed to find the infection in rodents captured in the area of occurrence of the disease.

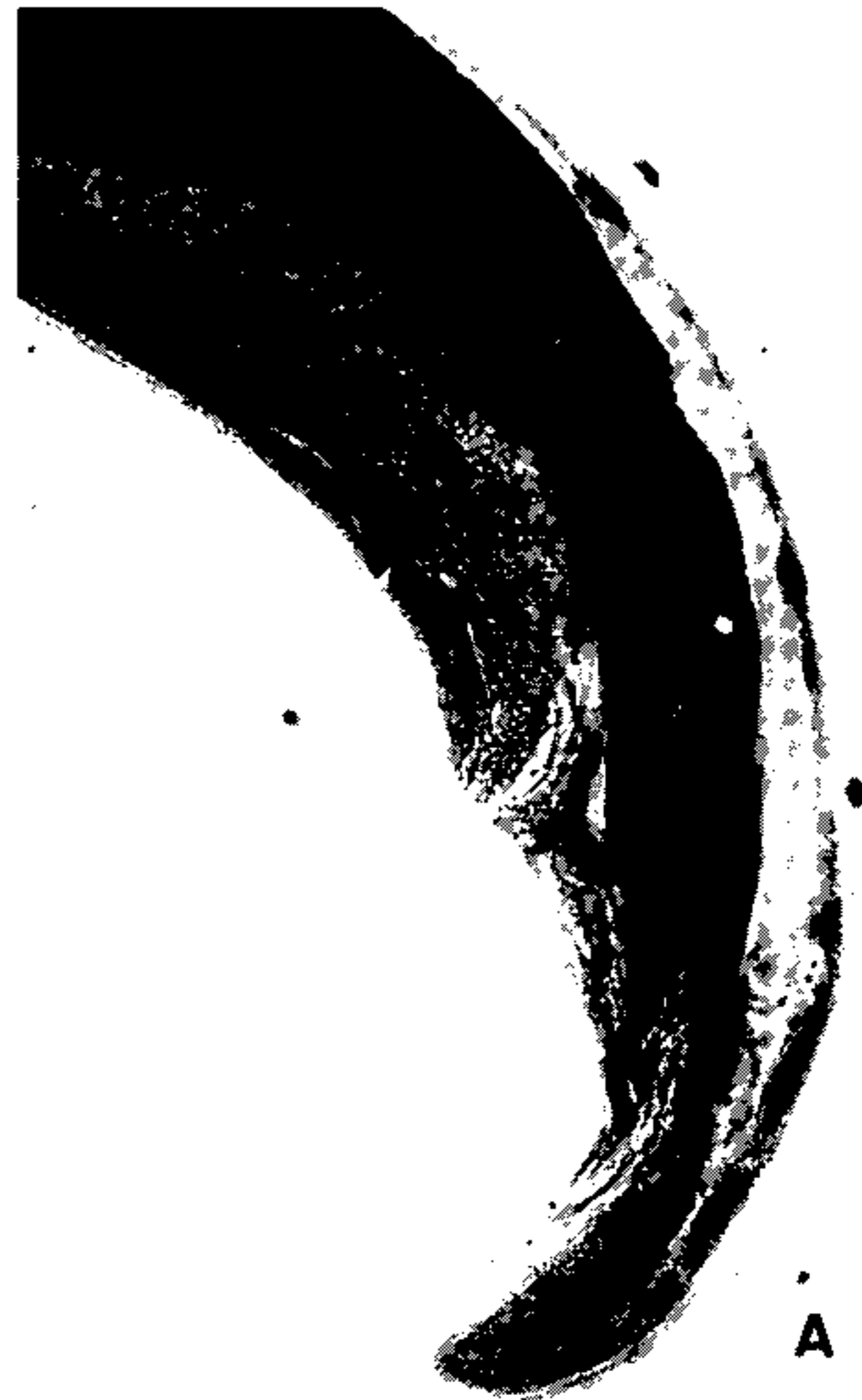


Fig. 2: posterior end of a female (A) and a male (B) worm showing the copulatory bursa with its rays (x200).

TABLE

Comparison of dimensions (mm) between *Angiostrongylus costaricensis* (Morera, 1973) from Costa Rica and south Brazil (sBR)

Measurement	Female worms		Male worms	
	sBR	Costa Rica	sBR	Costa Rica
Body length	21.3-29.3	28.4-42.0	12.8-16.2	17.4-22.2
Maximum width	0.16-0.32	0.32-0.35	0.21-0.30	0.28-0.31
Width base esophagous	0.09-0.13	0.13-0.15	*	0.11-0.14
Esophagous length	0.20-0.25	0.23-0.26	*	0.18-0.22
Tip-anus distance	0.03-0.07	0.06-0.065		
Tip-vulva distance	0.14-0.28	0.24-0.29		
Spicules			0.39-0.42	0.31-0.33

* Damaged anterior end of males (n = 4) were inadequate to study.

Phyllocaulis variegatus is a veronicellid slug with a wide geographic distribution: it occurs in south Brazil, Paraguay and north of Argentina and Uruguay (Thomé, 1976). Some resting specimens can reach 6 cm in length.

The identification of the intermediate hosts in Costa Rica, initially described as *Vaginulus plebeius* (Morera & Ash, 1970) is under re-evaluation. The finding of naturally infected *P. variegatus* stresses the importance of the family Veronicellidae in the cycle of *A. costaricensis*.

Our results establish the presence of *Angiostrongylus costaricensis* in molluscs for the first time in Brazil. Several new cases of abdominal angiostrongyliasis have been diagnosed lately in the southern States of Rio Grande do Sul, Santa Catarina, Paraná and São Paulo (Ayala, 1987; Graeff-Teixeira et al., 1987). We believe that the improved knowledge of this parasitosis among the medical personnel could be an important factor for the detection of a higher number of cases.

RESUMO

Phyllocaulis variegatus — hospedeiro intermediário do *Angiostrongylus costaricensis* no sul do Brasil — Moluscos coletados em cinco localidades no Estado do Rio Grande do Sul (Brasil) foram digeridos e examinados. As lesmas infectadas foram identificadas como *Phyllocaulis variegatus* e as larvas encontradas foram inoculadas *per os* em camundongos albinos. Após 50 dias, parasitos com as características de *A. costaricensis* foram recuperados do

sistema arterial mesentérico. Estes resultados estabelecem o papel do *P. variegatus* como hospedeiro intermediário de *A. costaricensis* no sul do Brasil, onde diversos casos de angiostrongilíase abdominal têm sido diagnosticados.

Palavras-chave: *Phyllocaulis variegatus* — *Angiostrongylus costaricensis* — veronicelídeos — angiostrongilíase abdominal

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