

FIRST RECORD OF *Cephalobaena tetrapoda* (PENTASTOMIDA: CEPHALOBAENIDAE) AS A PARASITE ON *Liophis lineatus* (OPHIDIA: COLUBRIDAE) IN NORTHEAST BRAZIL

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Received November 26, 2004 – Accepted March 2, 2005 – Distributed May 31, 2006

(With 1 figure)

ABSTRACT

Cephalobaenidae constitutes one of the main pentastomid groups infecting the respiratory tract of snakes. Six specimens of *Liophis lineatus*, a colubrid, were collected by active capture and pitfalls installed on the banks of the Batateiras river, close to its source, in the 'APA – Área de Proteção Ambiental' (a protected environmental area of the 'IBAMA – Brazilian Institute for the Environment and Natural Resources'), and in a remnant of the humid tropical forest 'FLONA – Floresta Nacional do Araripe', both in the municipality of Crato, state of Ceará, Northeast Brazil. Out of the six specimens of *L. lineatus* examined, only one had its lung infected by the pentastomid *Cephalobaena tetrapoda*. This represents the first record of *C. tetrapoda* as a parasite of a snake in Northeast Brazil, as well as the first record of a colubrid, *L. lineatus*, as a new host for the pentastomid in Brazil.

Keywords: pentastomida, parasitism, snakes, neotropical region.

RESUMO

Primeira ocorrência de *Cephalobaena tetrapoda* (Pentastomida: Cephalobaenidae) no Nordeste brasileiro parasitando pulmões de um novo hospedeiro *Liophis lineatus* (Ophidia: Colubridae)

Os Cephalobaenidae constituem um dos principais grupos de pentastomídeos que parasitam o trato respiratório de serpentes. Foram coletados seis espécimes de *Liophis lineatus* pela utilização de coleta ativa e *pitfalls* instalados às margens da nascente do rio Batateiras, próximo à nascente, 'APA – Área de Proteção Ambiental' (um ambiente protegido pelo 'IBAMA – Instituto Brasileiro do Meio Ambiente e dos Recursos Renováveis'), e em um remanescente de floresta úmida, "FLONA – Floresta Nacional do Araripe". Os dois pontos de coleta estão localizados no município de Crato, Estado do Ceará. Dos seis espécimes de *L. lineatus* examinados apenas um estava infectado por *Cephalobaena tetrapoda* em seu pulmão. Isso representa o primeiro registro de *C. tetrapoda* parasitando uma cobra no Nordeste brasileiro, assim como é o primeiro registro de um colubridae servindo de hospedeiro para *C. tetrapoda* no Brasil.

Palavras-chave: pentastomida, parasitismo, cobras, região neotropical.

INTRODUCTION

The family Cephalobaenidae is a group of endoparasites that infect the respiratory tract of snakes. They are characterized by a cephalotorax with five short protuberances, from which the name pentastomid derives. The fifth protuberance is an

anterior snout like projection (rostrum) bearing the circular chitinous cadre in the mouth and four leg like projections, located at each side of the body and bearing hooks for clinging to the host (Rego, 1983; Riley, 1986). A cladistic analysis of pentastomids performed by Almeida & Christoffersen, (1999)

pointed out the cephalobenids as the most basal group among the recent Pentastomida.

Only three species of *Cephalobaena* have been described from South America: *C. tetrapoda* Heymons, 1922, *C. giglioli* (Hett, 1924) and *C. freitasi* (Motta & Gomes, 1968) (Rego, 1983). However, in posterior taxonomic reviews, Ali *et al.* (1984a, b; 1985) demonstrated that *C. giglioli* and *C. freitasi* actually belong to genus *Raillietiella*. Thus, today Cephalobaenidae is a family of pentastomids constituted by a single neotropical species, *C. tetrapoda* (see Riley, 1986: 61-63). This species live in viperid snakes collected in the neotropical regions, as in Brazil, Paraguay, Uruguay, and Argentina (Sambon, 1922a). In Brazil a single case of *C. tetrapoda* infecting snake was reported in *Crotalus terrificus* (Viperidae) collected in the state of São Paulo (Motta, 1963a: 7-8).

Almeida & Christoffersen (2002) emphasized that pentastomids are common parasites infesting the most different hosts found everywhere. In Northeast Brazil, only two pieces of work reported pentastomids on reptiles, Motta & Gomes (1968) and Dias *et al.* (in press). The former authors described *Raillietiella freitasi* in the lungs of the *Mabuya punctata* lizards and *Tropidurus torquatus*, and in the *Bufo paracnemis* toad collected on the island of Fernando de Noronha, off the coast of the state of Rio Grande do Norte (administered by the government of the state of Pernambuco) and collected in the state of Bahia. Dias *et al.* (in press) recently reported the species *Raillietiella* aff. *furcocerca* parasitizing the lungs of *Cnemidophorus abaetensis* and *Cnemidophorus ocellifer* in the state of Bahia. The occurrence of *C. tetrapoda* as a parasite of snakes in northeastern Brazil has not yet been reported and the present work interrupts this forty year gap without any record of this group of animals in Brazil.

MATERIAL AND METHODS

Between January and August, 2004 we selected five collection sites: two in the Floresta Nacional do Araripe (FLONA) (07° 16' S and 39° 26' W) and three on the banks of the Bateiras river, close to its source (07° 13' S and 39° 38' W), which is located in the 'APA – Área de Proteção Ambiental' (a protected environmental area of the 'IBAMA – Institute for the Environment and

Natural Resources'), both in the municipality of Crato, state of Ceará, Northeast Brazil.

We captured the snakes by using the classical herpetological methods of pitfalls and the active patterned collection (Vanzolini & Papavero, 1967; Auricchio & Salomão, 2002). The municipality of Crato is situated in the south of Ceará, included in the bioregion of northeastern cariri, on the borders of the states of Ceará, Pernambuco, and Piauí. The Araripe consists of a patch of ecosystems as follows: i) Pluvio-nebular Tropical Subperennial Forest (a humid forest); ii) Pluvial Tropical Subdeciduous Forest (a dry forest); iii) Xeromorphic Tropical Subdeciduous Forest (the 'cerradão', a dense savannah-like vegetation); and iv) the Thorny Deciduous Forest (the 'caatinga', a typical northeastern vegetation with stunted trees and cactuses) (Campello *et al.*, 2000). The herpetofauna is made up of species that are common to the Amazonian forest, Atlantic forest, and 'caatinga', and of endemic species (Rodrigues, 2003). The vegetation at our collection sites is part of the Humid Forest Complex, presenting a mean annual rainfall of 1,033 mm³ (Campello *et al.*, 2000).

After collection, the snakes were fixed and preserved in 70% alcohol. They were subsequently identified according to Vanzolini *et al.* (1980).

The respiratory tract of the snakes was removed and the search for pentastomids was carried out under stereomicroscopy. Their identification was known according to the methods described by Rego (1983) and Riley (1986), by observing morphology of the body, the number of rings (of the superficial annulation of the body), the characteristics of the copulatory spicules of males, and dimensions of the hooks. There were not enough specimens for multiple measurements and statistical analysis.

RESULTS

Six specimens of *Liophis lineatus* were collected, two in the Floresta Nacional do Araripe and four in the APA. After the preservation treatment, they were housed in the collection of the Zoology Laboratory at the Universidade Regional do Cariri (LZ-URCA 0023, 0024, 0025, 0026, 0027, 0028).

Among the six specimens of *L. lineatus* examined, only the one collected in the APA had its lungs infected by a male and a female of *Cephalobaena tetrapoda* (Figure 1, Table 1). We noticed that the pentastomids which had been collected were adults because of their simple hooks with no chitinous accessories, in opposition to nymphs, which have double hooks and chitinous accessories (Riley, 1986). The specimens of *C. tetrapoda* collected from the FLONA and the APA were preserved in recipients with 70% alcohol, labelled and housed in the collection at the Universidade Regional do Cariri, numbered as LZ-URCA 0043 and 0044.

This is actually, the first record of *Cephalobaena tetrapoda* as a parasite of snakes in Northeast Brazil, as well as the first record of a colubrid as a final host of this endoparasite in Brazil.

Description

- *Cephalobaena tetrapoda* Heymons, 1922;
- *Syn: Raillietiella tetrapoda* Sambon, 1922;
- *Cephalobaena recurvicauda* Motta, 1963;
- *Site: lung;*
- *Hosts: Lachesis alternatus* Duméril & Bibron, 1854 (Viperidae) (Heymons, 1922); *Crotalus terrificus* Linnaeus, 1758 (Viperidae) (Motta 1963a); *Liophis lineatus* Linnaeus, 1758 (Colubridae) (in this work);
- *Material: LZ-URCA 0043 e 0044;*
- *Female* (Fig. 1b, c): body length/ thickness 34 x 1.4; abdomen with 38 annuli (part of abdomen is damaged); hooks simple, equal in size; cephalothorax trapezoidal (shaped like a “hand”), distinct from abdomen with rostrum long and large, and podial lobes long and retracted in sockets; mouth terminal; apical and dorsal papillae present and prominent; anus ventral; caudal papillae present; and

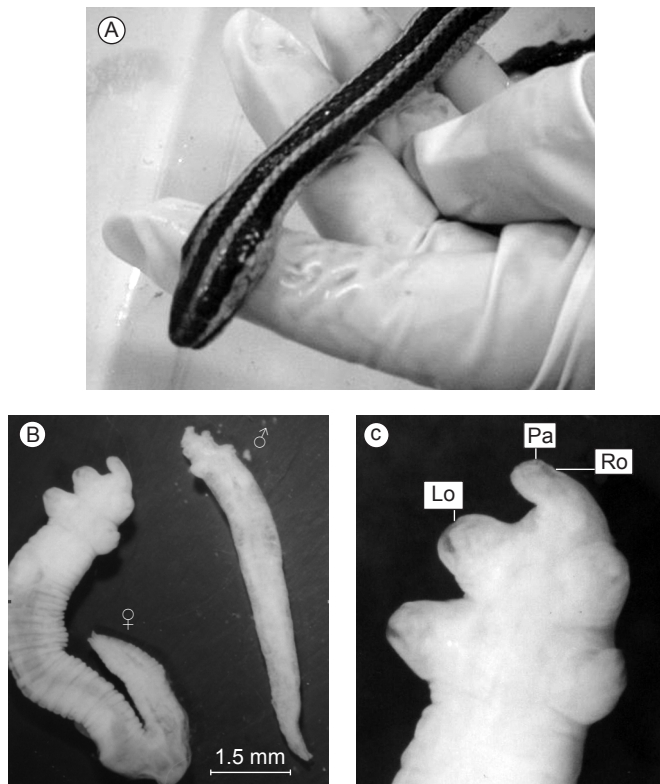


Fig. 1 — a) *Liophis lineatus* (LZ-URCA 0027) infected with; b) a female (LZ-URCA 0043) and a male (LZ-URCA 0044) of *Cephalobaena tetrapoda* viewed ventrally; c) cephalothorax (shaped like a “hand”) of the female demonstrating some typical characters of species. Lo, podial lobe of the anterior hook; Pa, apical papillae; Ro, long rostrum.

TABLE 1
Occurrence of *Cephalobaena tetrapoda* and dimensions and sex of specimens of *Liophis lineatus* collected in the Floresta Nacional do Araripe (FLONA) and in the 'APA – Área de Proteção Ambiental' (a protected environmental area of the IBAMA), in the state of Ceará.

Specimens of <i>L. lineatus</i>	Sex	Dimensions (rostrum-end of tail, cm)	<i>C. tetrapoda</i>
LZ-URCA 0023	Female	35	-
LZ-URCA 0024	Female	39	-
LZ-URCA 0025	Female	76	-
LZ-URCA 0026	Female	64	-
LZ-URCA 0027	Male	90	+
LZ-URCA 0028	Female	60	-

- *Male* (Fig. 1b): body length/ thickness 14 x 0.8 of thickness; abdomen with indistinct annuli; hooks simple, equal in size, shaped like a claw; cephalothorax trapezoidal distinct from abdomen with rostrum and podial lobes large; mouth terminal; apical and dorsal papillae present and prominent; anus ventral; caudal papillae present.

DISCUSSION

Communities of parasites may affect the morphology of hosts, their external appearance, as well as reduce their fecundity and diet, influence on predator-prey dynamics and cause mortality (Marcogliese, 2004). Thus, the study of parasites is a priority, having the purpose of preserving biodiversity. Among these animals, the Pentastomida are poorly known, with respect to their biology and number of species in Northeast Brazil. The way these animals affect their host populations is also an unsolved mystery. Studies on pentastomids, despite having been emphasized as greatly needed by several authors (Self, 1969; Riley, 1986; Haugerud, 1989; Almeida & Christoffersen, 2002), have not yet been published.

The present first record of *Cephalobaena tetrapoda* parasitizing *Liophis lineatus* will certainly be useful to understand the host-parasite relationships and their geographical distribution. In Brazil, this pentastomid had been related solely to large poisonous serpents (Motta, 1963a) (Table 2). However, our present result points to a broad form of *C. tetrapoda* utilizing hosts. *L. lineatus*, belonging to the family Colubridae, is quite a

common snake in the caatinga and other ecosystems of the Brazilian semi-arid region. It has a diurnal habit, thriving on banks of rivers and lakes, as a batrachophagous species (Vanzolini *et al.*, 1980: 39), an aspect we confirmed here. Its habit of eating the young of toads and small toads (or 'caçotes', a Brazilian designation for small amphibians), makes *L. lineatus* popularly known in the cariri region of Ceará, as 'cobra-caçote' ('caçote'-snake). When examining the stomach content of individuals of this species, we observed they also feed on arthropods. On the other hand, adult viperids feed on a wide variety of adult and young vertebrates; and *L. lineatus* young also feed on arthropods (Vanzolini *et al.*, 1980: 64). We know that intermediate hosts of *C. tetrapoda* are still unknown (Riley, 1986: 47). However, we now suspect that small vertebrates, commonly found in their definitive hosts' diet, represent a potential intermediate host, an aspect that needs further investigation.

L. lineatus is geographically distributed from Paraguay, north of Argentina and Brazil to Panama (Vanzolini *et al.*, 1980: 39). *C. tetrapoda* was formerly recorded as occurring in Uruguay, Paraguay, Argentina, and southeastern Brazil. Our results, however, showed that *C. tetrapoda* is widely distributed, extending to northern Brazil, overlapping with *L. lineatus* to some extent.

In conclusion, a certain amount of knowledge needed on pentastomids leads us to make a few enquiries concerning these animals as follows: i) which pentastomids species live in the North and Northeast regions of Brazil? ii) what impacts would they cause on their host populations? iii) should they maintain any intra- and interspecific

TABLE 2
Pentastomids living as parasites on snakes of Brazil.

Pentastomids	Hosts	References
<i>Cephalobaena tetrapoda</i>	<i>Crotalus terrificus</i> , <i>Liophis lineatus</i>	Motta (1963a), Rego (1983); in this work
<i>Raillietiella furcocerca</i>	<i>Boa constrictor</i> , <i>Coluber lichtensteinii</i> , <i>Drymarchon corais</i> , <i>Crotalus terrificus</i> , <i>Xenodon merremii</i> , <i>Lachesis</i> sp.	Motta (1963b), Rego (1983)
<i>Kiricephalus coarctatus</i>	<i>Dryadophis bifossatus</i> , <i>Aporophis lineatus</i> , <i>Herpetodryas carinatus</i> , <i>Coluber corais</i>	Sambon (1922b), Rego (1981)
<i>Porocephalus crotali</i>	<i>Crotalus terrificus</i>	Sambon (1922b), Heymons, (1935), Rego (1981, 1984)

relationships with other communities of parasites? We look forward to answering these enquiries in the near future to help conserve our herpetofauna.

Acknowledgments — We are grateful to FUNCAP-Fundação Cearense de Apoio ao Desenvolvimento Científico e Tecnológico for our research grant (Ref. 943/03 – Edital 003/03), and the CNPq-Brazilian National Research Council for support from Samuel Vieira Brito's scholarship; to the IBAMA-Brazilian Institute for the Environment and Natural Resources for their permission to collect samples from reservation areas (080/04 – RAN/ IBAMA Processo 02007.001009/04-73); to Prof. Dr Davor Vrcibradic (UERJ), Prof. Dr Alexandre Vasconcelos (UFPB), and an anonymous reviewer for valuable suggestions and critics to the manuscript; to Prof. Antônio Álamo Feitosa Saraiva (URCA) for his help with our field work; and to Prof. Dr Breno Grisi for suggestions and the English version of the manuscript.

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