

# Occurrence of infection by *Platynosomum illiciens* (Braun, 1901) in captive neotropical primates

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Received: 22 March 2011 / Accepted: 18 October 2011 / Published online: 10 November 2011  
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**Abstract** *Platynosomum illiciens* (Trematoda, Plagiorchiida) is a trematode parasite reported in felids and falconiforms. It was identified in the gall bladder of eight captive neotropical necropsied primates from the National Primate Center (CENP), Ananindeua, State of Pará, Brazil. This is the first description of *Platynosomum illiciens* as a parasite of primates.

**Keywords** Neotropical primates · *Platynosomum illiciens* · Trematoda · Captivity

## Introduction

The genus *Platynosomum* belongs the superfamily Dicrocoeloidea, family Dicrocoeliidae (Looss, 1899). Trematodes of the genus *Platynosomum* have already been identified in neotropical primates; among them, *P. amazonensis* in *Callicimico goeldii*, *Saguinus nigricollis* (Kingston and Cosgrove 1967) and *Callithrix jacchus* (Melo and Martins 1986; Potkay

1992; Sousa et al. 2008), and *P. marmoseti* in *Saguinus nigricollis* (Kingston and Cosgrove 1967). *Platynosomum fastosum* is a trematode that has felids as definitive hosts (Soulsby 1982; Xavier et al. 2007), but it has also been observed in Old World primates. It was identified in the gall bladders of three necropsied orangutans (*Pongo pygmaeus*) from a rehabilitation and reintroduction program (Warren et al. 1998). In this report, no clinical symptoms of parasitism by *Platynosomum* were observed.

Other trematode species observed in nonhuman primates were *Athesmia heterolecithoides*, identified in *Saguinus labiatus* (Tantalean et al. 1990), and *Eurytrema* and *Leipertrema* (Kingston and Cosgrove 1967), identified in African primates.

*Platynosomum illiciens* was reported in domestic and wild felids (Raust and Legros 1980; De Castro and Albuquerque 2008) and falconiforms in Spain (Ferrer et al. 2004). The present study reports the occurrence of *P. illiciens* in nine individuals of five different species of captive neotropical primates from the National Primate Center (CENP), Ananindeua, State of Pará, Brazil.

## Methods

In 2004 and 2005, nine nonhuman adult primates maintained in captivity at the CENP (S 01 11 26.4 and W 48 23 07.5) died, and specimens of *Platynosomum illiciens* (Braun, 1901) were identified in the gall bladder and biliary ducts. The necropsied primates had different origins as well as different clinical histories, and eight individuals were found dead in the cages, with no symptoms associated with infestation by this parasite (Table 1). The stool examinations showed parasite eggs in one cage with primates of the species *Callithrix penicillata*, two cages with *Chiropotes*

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**Table 1** Clinical histories of the individuals infected by *Platynosomum illiciens* in the CENP/SVS/MS

Species	Sex	Origin	Clinical history
<i>Callithrix jacchus</i>	♂	Donation from the São Paulo Zoo	The animal did not respond well to transportation or to the adaptation process, and died one day after its arrival at the CENP
<i>Callithrix penicillata</i>	♀	Outdoor cage	The animal came from the São Paulo Zoo and died suddenly
<i>Callicebus moloch</i>	♀	Outdoor cage	It was found dead on the floor of the cage. No symptoms were identified, so the animal was not clinically treated
<i>Chiropotes satanas</i>	♀	Outdoor cage	It was found dead on the floor of the cage. The keepers did not observe any symptoms, so no clinical treatment was performed
<i>Chiropotes satanas</i>	♀	Outdoor cage	The animal became progressively prostrated during the morning of the day it died. In the afternoon, it remained on the cage floor and tried to feed. It was clinically examined at the veterinary hospital, where icteric mucosa and shock were observed. It was intravenously medicated (the treatment included hydroelectrolytic replacement and glucose) and died a few minutes later
<i>Chiropotes satanas</i>	♀	Outdoor cage	The animal was brought to the hospital after being injured by a cagemate while returning from sedation. There were several external lesions and the animal was unconscious. It died the same day
<i>Chiropotes satanas</i>	♂	Outdoor cage	The animal died after being treated for seven days due to the identification of <i>Platynosomum</i> eggs in its feces. It also showed clinical symptoms suggestive of hepatitis. The Hepatopathy Department of the Evandro Chagas Institute (IEC) suggested type A viral hepatitis, but the final result was not conclusive
<i>Callimico goeldii</i>	♀	Outdoor cage	The animal was found dead in the cage
<i>Cebuella pygmaea</i>	♀	Outdoor cage	The animal was admitted to the veterinary hospital showing apathy and diarrhea. It was treated for amebiasis (diagnosed) and dehydration for three days. It was eating well in the last two days of treatment, and was found dead in its cage in the morning

*satanas*, and one individual of the species *Chiropotes satanas*. The last animal came from an illegal wildlife trade operation, and was donated by the State Environmental Police (Batalhão de Polícia Ambiental do Estado do Pará—BPA).

In two other cases, the trematodes were observed during necropsy (Fig. 1) and histopathological exam and during further examination of the gall bladder while processing the material for histopathology.

After being collected, the trematodes were fixed in formol 10% and then transferred to alcohol 70%. The specimens were stained with chloridric carmine, cleared with creosote, and the slides were mounted with Permount and also it was drawn a figure from one of these slides (Fig. 2a, b).

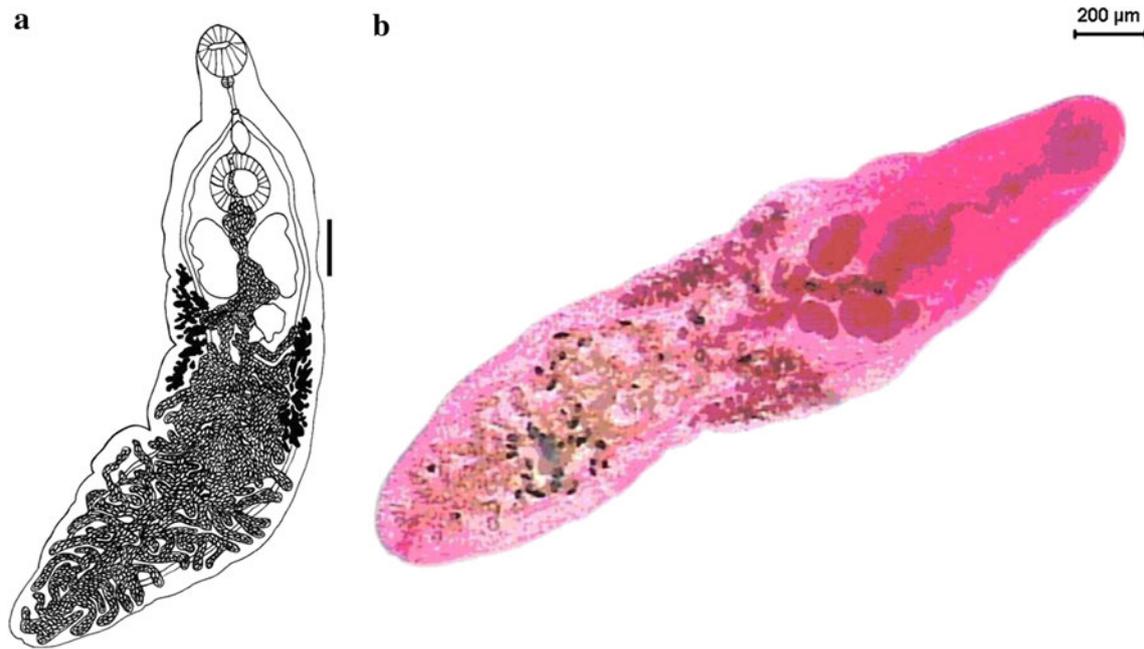
Morphological analysis was performed with the software QWin Lite 2.5 (Leica). Immature forms of the parasite were also identified in a *Hemidactylus maboyia* specimen from an outdoor cage. This lacertilian was dissected after being euthanized in an ether chamber, and three specimens of *Platynosomum illiciens* were identified in the gall bladder.

The adult parasites were sent to the Laboratory of Parasitology of Wild Animals of the São Paulo State University—Botucatu Campus (São Paulo) for identification.

**Fig. 1** Specimen of *Platynosomum illiciens* found in the gall bladder of *Chiropotes satanas*

## Results

All trematodes found in the primates and *Hemidactylus maboyia* were specimens of *Platynosomum illiciens*. The trematodes observed in the necropsied animals were analyzed, and they presented the following characteristics: flattened body, elongated, with a length of 6,770.5  $\mu\text{m}$  and



**Fig. 2** *Platynosomum illiciens*. **a** Schematized drawing, **b** photograph of a specimen stained with chloridric carmine, collected from the gall bladder of a nonhuman primate of the CENP

a width of 1,371.1  $\mu\text{m}$ ; subterminal oral sucker with a length of 430.1  $\mu\text{m}$  and a width of 401.3  $\mu\text{m}$ ; acetabulum in the anterior portion of the body, with a length of 544.3  $\mu\text{m}$  and a width of 526.9  $\mu\text{m}$ ; pharynx with a length of 131.6  $\mu\text{m}$  and a width of 118.7  $\mu\text{m}$ ; short esophagus with a length of 237.3  $\mu\text{m}$ . The intestinal cecum was thin, slightly sinuous, extended nearly to the final portion of the body; median genital pore was located near the bifurcation of the intestinal cecum; cirrus pouch was preacetabular with a length of 396.7  $\mu\text{m}$  and a width of 157.7  $\mu\text{m}$ . The testicles were longitudinally elongated, slightly lobed, and located in the same zone. The right testicle was 807.9  $\mu\text{m}$  in length and 366.1  $\mu\text{m}$  in width. The left testicle was 754.3  $\mu\text{m}$  long and 367.7  $\mu\text{m}$  wide. The ovary was ovoid, slightly lobed, post-testicular, positioned slightly to the right, 331.8  $\mu\text{m}$  in length and 241.7  $\mu\text{m}$  in width. Mehlis' gland was present, located below and to the left of the ovary, and positioned towards the center of the body; vitellarium follicular was lateral and located from the final testicular zone until the pre-ovarian area. The eggs ( $n = 30$ ) were 40.1  $\mu\text{m}$  long and 26.6  $\mu\text{m}$  wide. The excretory vesicle was not observed.

## Discussion

In the life cycle of *Platynosomum illiciens*, small lizards and a terrestrial gastropod mollusc are involved as intermediate hosts, and avian and feline species as definitive

hosts (De Castro and Albuquerque 2008). Santos et al. (2004) reported that molluscs of the species *Subulina octona* act as intermediate hosts with an extensive geographical distribution; they are commonly identified in peridomiciliary areas such as gardens. Although this mollusc species was not observed in the CENP facilities, it is worth emphasizing that other terrestrial mollusc species such as *Megalobulimus oblongus* and *Achatina fulica* are present in the area. It is not known if these species were involved in the epidemiology of the reported case, as the issue has not yet been investigated.

All primates maintained in the CENP facilities are periodically examined for the presence of endoparasites, but the specimens related in this paper were not positive for *Platynosomum* eggs in parasitological exams. This can be explained by the small number of eggs that reach the intestine, with the gallbladder being their preferred location. In addition, the standard parasitological techniques used in the CENP are not the most appropriate for identifying them (Almeida and Labarthe 1999; Ribeiro 2004).

This is done from the time of arrival of the primate at the CENP, through quarantine and permanence at the facility. Antiparasitic drugs are administered to the animals every six months. Antiparasitic drugs such as ivermectin and praziquantel are administered periodically to the animals every six months. However, antiparasitic drugs with these formulations have questionable efficacy towards trematodes (Keiser and Utzinger 2004). Despite the care provided, eight of the nine cases involved animals maintained

in outdoor cages, located in the area of the CENP that is open to the public (visitation). These cages are accessible to small animals such as lacertilians and insects, as they are located in an open, large, grassy area of the CENP, near a wall that separates the facility from a residential area. This also makes it easier for domestic cats—which have already been observed in the area during the night—to get near the cages referred to above.

We still do not know precisely how these primates were infected by *Platynosomum illiciens*. However, it is possible that—just like felids—these animals may have fed on infected geckos, since these small reptiles have been identified as an alimentary item for these species (Auricchio 1995).

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