**Sarcocystis** spp. in nine-banded armadillos (*Dasypus novemcinctus*) from Brazil

**Sarcocystis** spp. em tatus de nove bandas (*Dasypus novemcinctus*) do Brasil

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**Summary:** At a survey in the state of Espírito Santo, Brazil, nine-banded armadillos (*Dasypus novemcinctus*) tested positive for the presence of cysts of *Sarcocystis*. *Sarcocystis* spp. were observed in 30 (75%) out of 40 armadillos trapped in 2005. This reports is relevant, since *D. novemcinctus* can be infected by different species of the genus *Sarcocystis*.

**Key words:** *Sarcocystis*, *Dasypus novemcinctus*, armadillos e Brasil.

**Resumo:** Numa pesquisa no estado do Espírito Santo, Brasil, tatus de nove bandas (*Dasypus novemcinctus*) foram positivos para a presença de cistos de *Sarcocystis*. *Sarcocystis* spp. foram observados em 30 (75%) de 40 animais capturados em 2005. Este relato é relevante desde que o *D. novemcinctus* pode ser infectado por diferentes espécies do gênero *Sarcocystis*.

**Palavras-chave:** *Sarcocystis*, *Dasypus novemcinctus*, tatus e Brasil.

**Introduction**

*Sarcocystis* spp. are among the most common protozoan parasites that infect a variety of mammals throughout the world, including man (Dubey et al., 1989). *Sarcocystis* has a heteroxenous life cycle, meaning that the organism alternates between definitive and intermediate hosts. The importance of investigating *Sarcocystis* has increased due to the finding that two species of *Sarcocystis*, *Sarcocystis dasypi*, *Sarcocystis diminuta*, and an unidentified species, could infect armadillos (*Dasypus novemcinctus*) (Lindsay et al., 1996). There is no data regarding the occurrence of *Sarcocystis* spp. in *D. novemcinctus* in Brazil. The present study is aimed at verifying the presence of *Sarcocystis* spp. in nine-banded armadillos (*D. novemcinctus*) captured in Espírito Santo state, Brazil.

**Materials and methods**

During 2005, forty adult nine-banded armadillos from southeastern Brazil, in the state of Espírito Santo were studied. The Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) has authorized the capture and handling of the armadillos. The Ethics Committee on Animal Experimentation of the University Federal of Espírito Santo, Vitória, Brazil, approved the project. Euthanasia was humanely carried out in accordance with federal regulations. Tongues were removed and portions were fixed in a 10% neutral buffered formalin solution and processed for examination. Tongues were then embedded in paraffin, sectioned and stained with hematoxylin and eosin. Histologic sections were examined by light microscopy at 50 x. The 2x2 table crossing sex distribution of armadillos and infection for *Sarcocystis* spp. was submitted to the Chi-Square analysis, and Fisher’s exact test (p>0.05).

**Results**

Thirty (75%) (17 males and 13 females) of 40 armadillos examined had *Sarcocystis* in the tongue. In the current study, no significant association between sex distribution and infection was observed (p>0.05). Fisher’s exact test suggested that the sex distribution of the animals is not significant for the infection. All the cysts of the *Sarcocystis* spp. found in the armadillos were morphologically identical, large structures occupied with smaller bradyzoites (Figure 1). No inflammatory reaction was induced surrounding the cyst.

**Discussion**

Results obtained in this study are consistent with data on the prevalence of this protozoan in armadillos in other American countries. A high percentage of armadillos infected with *Sarcocystis* species were
found in Texas, Oklahoma, Kansas and Arkansas (Lindsay et al., 1996) in the USA. Similar results were reported by DeLucia et al. (2002) that examined muscle from 63 armadillos from Florida, and observed Sarcocystis in 39 armadillos (61.9%). Two species were identified, *S. dasypi* and *S. diminuta*, however mixed infections are unusual to occur. The probability that *S. dasypi* and *S. neurona* are the same species is high, however, further studies must be done to confirm this hypothesis.

The morphological observation demonstrated large cysts with small bradyzoites, which according to DeLucia et al. (2002) may suggest that the species is *S. dasypi*.

Equine protozoal myeloencephalitis is widely prevalent in horses in the Americas. Hoane et al. (2006) investigated the seroprevalence of *S. neurona* in 961 horses from 10 different states in Brazil, including in southeastern Brazil and found a sero-prevalence of 69.6%. The opossum is the only known definitive host of *S. neurona* that can transmit the diseases to horses (Dubey et al., 2001). Cheadle et al. (2001) reported that the nine-banded armadillo (*Dasypus novemcinctus*) can experimentally transmit *S. neurona* to opossums. In Brazil, armadillos are frequently killed by automobiles making them a source of infection for definitive hosts as opossums. In addition, the North American opossum, *Didelphis virginiana* (Dubey and Lindsay, 1998) and the South American opossum, *D. albiventris*, have shown to be capable of transmitting *S. neurona* (Dubey et al., 2001). The finding of *S. neurona* sporocysts in naturally infected *D. albiventris* may explain the high prevalence of *S. neurona* antibodies in horses in Argentina and Brazil (Dubey et al., 1999a, b). However, the armadillos can be a source of infection for other species of Sarcocystis.

In conclusion, the armadillos of southeastern Brazil are naturally infected with *Sarcocystis* spp., and the study suggests that they can be one of the probable intermediate hosts of *Sarcocystis* spp., and can act as a source of infection to the opossums (definitive host) in Brazil. Therefore, studies of molecular characterization, bioassays and ultrastructural examination of *Sarcocystis* are important to determine which species of this protozoan infect armadillos in Brazil, as little is known about the prevalence of *Sarcocystis* in South American opossum (*D. albiventris*) and armadillos (*D. novemcinctus*).

### Bibliography


