Pneumocystis carinii Infections in Zoo Animals

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Summary. Pneumocystis carinii was found to be present in the lungs of twenty-three zoo animals in the Netherlands. The following species were represented: red kangaroo, common tree shrew, Senegal-Galago, Demidoff’s-Galago, brown howler monkey, woolly monkey, long-haired spider monkey, white-eared marmoset, chimpanzee, three-toed sloth, palm squirrel, red panda, fennec fox, tree hyrax and large-toothed hyrax.

Introduction

Pneumocysts were observed for the first time by Chagas (1909) in the lungs of a number of guinea pigs (Cavia aperea porcellus) and a black-pencilled marmoset (Callithrix penicillata) which were experimentally infected with Trypanosoma cruzi. Chagas regarded them as schizonts of T. cruzi. These pulmonary schizogonic forms were similar in shape to Pneumocystis carinii.

Chagas also found structures bearing a resemblance to P. carinii in the lung of a human subject who had died from acute schizotrypanosomiasis (1911).

Delanoë and Delanoë (1912) observed the parasite in animals not infected with trypanosomes. They termed this parasite Pneumocystis carinii.

Pneumocysts are regarded as protozoa by some and as protophytes or yeasts by others.

Vavra and Kučera (1970) believed that the ultrastructure of P. carinii bore a resemblance to fungi rather than protozoa. All efforts to grow the parasite on the usual culture media for fungi have failed so far. On the other hand, Weller (1955) successfully induced pneumocystosis in rats by long-term administration of cortisone.

Vaněk and Jirovec (1952) showed that there is a causal relationship between the presence of P. carinii in the lung tissues and interstitial plasma-cell pneumonia in man. Human pneumocystis pneumonia (pneumocystosis) occurs particularly in premature or debilitated one-to-four-month-old infants. Pneumocystosis may also appear in older patients with cellular or humoral immunological defects. Those animal species in which P. carinii was found to be present were reviewed by Kučera, Vaněk and Jirovec (1971). In addition to laboratory and domestic animals, P. carinii was described as occurring in free-living wild animals such as shrews, voles, mice, rats and brown hares.
The only zoo animal listed was the black-pencilled marmoset (Callithrix penicillata) recorded by Chagas (1909).

The present paper is particularly concerned with Pneumocystis infections in zoo animals which died in the Netherlands during the period from 1966 to 1974.

**Material and Methods**

The animals studied consisted of died exotic birds and mammals in which the causes of death had to be established. Complete post-mortem studies were done in these animals. The liver, spleen, kidney and intestine of each animal were examined bacteriologically. Impression smears were made of the liver, spleen and lung and stained with Giemsa stain. The organs of cadavers suited for this purpose were fixed in 10 per cent formalin for histological examination.

Paraffin sections were cut from these organs and stained with haematoxylin and eosin.

In cases positive for *P. carinii*, sections were also stained by the periodic acid-Schiff and Gomori-Grocott methenamine silver techniques.

**Results**

Pneumocysts were not found to be present in any of the hundreds of birds studied.

In twenty-three zoo animals, *P. carinii* was present in the lung but not in the liver or spleen.

The identification of typical cysts with eight uninucleated intracellular bodies was adopted as a criterion in the diagnosis of *Pneumocystis* infection (Fig. 1).

In the impression smears stained with Giemsa stain, the intracystic bodies were light blue in colour and contained a small red nucleus, whereas the walls of the cysts remained unstained.