

Concurrent Infection of a Patas Monkey (*Erythrocebus patas*) by *Citrobacter freundii* and *Trichuris trichiura*

Authors: Ocholi, R. A., Chima, J. C., and Spencer, T. H. I.

Source: Journal of Wildlife Diseases, 25(1) : 124-125

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-25.1.124>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Concurrent Infection of a Patas Monkey (*Erythrocebus patas*) by *Citrobacter freundii* and *Trichuris trichiura*

R. A. Ocholi, J. C. Chima, and T. H. I. Spencer, Diagnostic Department, National Veterinary Research Institute, Vom, Nigeria.

ABSTRACT: Concurrent infection of *Citrobacter freundii* and *Trichuris trichiura* in a Patas monkey (*Erythrocebus patas*) is reported. A synergistic effect of both organisms contributing to host mortality in this case is suggested.

Key words: *Citrobacter freundii*, *Trichuris trichiura*, concurrent infection, Patas monkey, *Erythrocebus patas*, case history.

Citrobacter freundii, found in water, food, feces and urine, is recognized as an opportunistic pathogen, causing disease when other factors reduce host resistance to infection (Sedlak et al., 1971; Sedlak, 1974). It has been associated with various disease conditions in guinea pigs, rabbits and mice (Owens et al., 1975) but no information is available on its involvement in diseases of captive wild animals. *Trichuris trichiura* infection is apparently of little significance except in heavy infections but where it causes bloody diarrhea (Dunn, 1977). Previous reports have described synergistic effects of concurrent infections of helminths, protozoa and bacteria in animals (Wescott, 1970; Grieve et al., 1977; Hazen et al., 1978), but none of these involved free-living or captive primates. This report describes a concurrent infection of *Citrobacter freundii* and *Trichuris trichiura* in a captive monkey.

An adult female Patas monkey (*Erythrocebus patas*), one of the five Patas monkeys housed together in a wire enclosure set among trees in the Jos Zoo (Jos, Nigeria) had profuse diarrhea, weakness, inappetence and pyrexia with temperature of 41 C for about 3 days. Therapy with Bisol-M® (Pfizer, Inc; New York, New York 10017, USA) containing methscopolamine and neomycin at 5 mg/kg three times daily was begun, but the animal did not improve and suddenly died the following day. The carcass was submitted to our labora-

tory for necropsy 4 hr after it died. Samples of the lung, liver and intestine were cultured for bacteria aerobically and anaerobically at 37 C on blood and MacConkey agar (Carter, 1975). A fecal sample was examined for intestinal parasites by a modified Shaether's sugar flotation technique (Dunn, 1977). Mature and immature worms recovered from the intestine were identified as *T. trichiura* by morphological characteristics (Dunn, 1977).

At necropsy, the carcass was emaciated and had bloody feces. Numerous worms were found in the large intestine. Thickening of the intestinal wall and edema and petechiation of the intestinal mucosa also were seen. Gross lesions in other organs were suggestive of acute septicemia: (1) pneumonia and acute congestion of both lungs, (2) Petechial hemorrhages in the liver, spleen, kidney, epicardium and endocardium and (3) hydrothorax. Microscopically, there was thickening of the interalveolar septa in the lung which were congested and contained neutrophils, lymphocytes and numerous gram-negative bacilli. Septic thrombi were seen in the large vessels and capillaries of the liver and spleen. Significant changes in the intestine included loss of epithelium and fusion of villi.

Citrobacter freundii was isolated from the lung, liver, heart blood and intestines. Identification was based on the following biochemical reactions: catalase positive; fermented mannitol with production of gas; produced acid from lactose, raffinose, sucrose, xylose, trehalose and dulcitol; produced β -galactosidase; hydrolysed urea; decarboxylated ornithine; did not decarboxylate lysine; methyl-red tests were positive; Voges-Proskauer test was negative; produced hydrogen sulfide from TSI agar;

grew on KCN media; and it was indole negative (Holmes and Roger, 1984). Fecal samples contained trichuroid eggs at 7,000/g of feces.

A survey for helminth parasites in animals in the zoo showed that all the other four Patas monkeys harbored *T. trichiura* but *C. freundii* was not isolated. Routine administration of suitable anthelmintics is important in the management of captive animals. Infection by either *T. trichiura* or *C. freundii* alone may not have been capable of causing the severe disease we observed in this case. However, it is conceivable that the heavy infection by *T. trichiura* might have resulted in debilitation, stress and physiologic conditions favourable for rapid proliferation of *C. freundii* with the subsequent invasion of tissues and resulting in death of the animal. Dual or multiple infections of this nature are common (Wescott, 1970; Salkin et al., 1975) and the relationship between infectious agents and the complications of such infections must be considered in the management of captive animals. *Citrobacter freundii* has not been reported as a cause of disease in captive wild animals, but its ability to cause mortality under certain predisposing conditions, or in association with other organisms as in the present case, should be appreciated.

LITERATURE CITED

- CARTER, G. R. 1975. Diagnostic procedures in veterinary microbiology, 2nd ed. Charles C Thomas, Springfield, Illinois, 362 pp.
- DUNN, R. 1977. Veterinary helminthology, 2nd ed. William Heineman Medical Books, Ltd., London, England, 323 pp.
- GRIEVE, R. B., R. C. BERGSTROM, AND E. L. BELDEN. 1977. Dual infection of lambs with *Trichostrongylus columbriformis* and chlamydiae. *Veterinary Parasitology* 3: 343-348.
- HAZEN, T. C., M. L. BAKER, G. W. ESCH, AND C. B. FLERMANS. 1978. Ultrastructure of red-sore lesions on large mouth bass (*Micropterus salmoides*): The association of *Petrich*, *Epistyx* sp. and the bacterium *Aeromonas hydrophila*. *Journal of Protozoology* 25: 351-355.
- HOLMES, B., AND J. C. ROGER. 1984. "Citrobacter." In Topley and Wilson's principles of bacteriology, virology and immunology, 7th ed., Vol. 2. Edward Arnold, London, England, 562 pp.
- OWENS, R. D., J. E. WAGNER, AND J. B. ADDISON. 1975. Antibigram of pathogenic bacteria isolated from laboratory animals. *Journal of the American Veterinary Medical Association* 167: 605-609.
- SALKIN, I. F., M. A. GORDON, AND W. B. STONE. 1975. Dual infection of white-tailed deer by *Dermatophilus congolense* and *Alternaria alternata*. *Journal of the American Veterinary Medical Association* 167: 571-573.
- SEDLAK, J. 1974. "Citrobacter." In Bergey's manual of determinative bacteriology, 8th ed. William and Wilkins, Baltimore, Maryland, 1268 pp.
- , M. PUCHMAYEROVA-SLAJSOVA, J. KÉLÉTI, AND O. LÜDARITZ. 1971. On taxonomy, ecology and immunochemistry of the genus *Citrobacter*. *Journal of Hygiene, Epidemiology, Microbiology and Immunology* 15: 366.
- WESCOTT, R. B. 1970. Metazoan-Protozoa-bacteria interrelationships. *American Journal of Clinical Nutrition* 23: 1502-1507.

Received for publication 14 August 1987.