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Salmonella enteritidis Isolated from an Eared Grebe (*Podiceps nigricollis*)

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The reported prevalence of salmonellosis in wild birds is relatively low, though the number of species of birds reported as having the disease or being carriers of the organism is increasing (Faddoul et al., 1966, Avian Dis. 10: 89–94). The course of the disease in birds ranges from acute to chronic. Affected birds may recover, become carriers of the organism and periodically shed it into the environment. This paper reports a case of chronic, fatal salmonellosis in an eared grebe.

A moribund eared grebe was collected at the north end of Salton Sea National Wildlife Refuge, near Calipatria, California, during an investigation of an avian cholera epizootic in February 1979. The carcass was frozen until examined at necropsy.

Numerous caseous nodules (2–10 mm in diameter) were found in the pectoral muscles, myocardium, lungs, spleen, liver, and the serosal surfaces of the abdominal cavity, and the thoracic air sac. The walls of the cecum and colon were thickened and the lumen contained a caseonecrotic core. Pectoral muscle atrophy and reduction of subcutaneous fat were also observed.

Tissues were fixed in 10% formalin, embedded in paraffin, sectioned at 6 μm and stained with Harris hemotoxylin and eosin, the Ziehl-Neelsen acid fast method, and Brown and Brenn's method of the Gram-stain. Focal granulomas with macrophages containing small rod-shaped gram negative bacteria were observed in the liver, lung, pectoral muscle, and spleen. Focal nonencapsulated caseonecrotic lesions containing dense aggregates of bacteria were present in both the myocardium and the pectoral muscles. A severe fibrinohemorrhagic enteritis was also observed in tissue sections of the small intestine. Fibrin thrombi were present in many hepatic vessels. A generalized vacuolar change was noted in the hepatocytes. Large quantities of homogeneous eosinophilic material presumed to be amyloid, and occasional clusters of bacteria, were present in the red pulp of the spleen.

Pectoral muscle, liver, and lung tissues were cultured on 5% sheep blood agar (BAP) and eosin methylene blue agar (EMB) and incubated for 18 hr at 37 C. Lung tissue was cultured for fungi on Sabouraud dextrose agar (SDA) and was negative after 21 days at room temperature. Heavy growth of small gram negative, non-fermentative, rod-shaped bacteria developed on BAP, EMB, and SDA. The isolates from the liver and pectoral muscle were identified as *Salmonella* sp. by use of the API 20E test kit (Analytab Products/Division of Ayerst Laboratories, Plainview, New York 11803, USA). They were further identified as *Salmonella enteritidis* group B by use of the modified Kauffmann-White Schema for *Salmonella* and *Arizona* (McWhorter et al., 1977, Modified Kauffmann-White Schema for Salmonella and Arizona, HEW Pub. No. CDC 78-8363, Atlanta, Georgia, 52 pp.). The flagellar antigens were (H) i: monophasic. The isolate from the liver was phage type T72, whereas that from the pectoral muscle was type T63.

The gross and histologic lesions in this grebe are similar to lesions reported from herons and egrets during an outbreak of salmonellosis in a captive colony (Locke et al., 1974, J. Wildl. Dis. 10: 143–145).

Fecal contamination in the Salton Sea by humans, domestic animals, and birds is the most likely source of infection. This body of water is connected to Mexico via the New Canal in which contamination with untreated sewage is known to occur. Although raw sewage becomes greatly diluted as it enters large bodies of water, viable bacteria may still be present. *Salmonella* spp. have been isolated from gulls with access to raw sewage (Muller, 1965, Nature 207: 1315;

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Williams et al., 1976, Vet. Rec. 98: 51). Chronically infected birds have the potential for contributing to environmental contamination with this organism.

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Isolation of *Campylobacter fetus* subsp. *jejuni* from the Common Puffin (*Fratercula arctica*) in Norway

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During the past decade, the bacterial species *Campylobacter fetus* subsp. *jejuni* has emerged as an important causal agent of human enteric disease (Smibert, 1978, Annu. Rev. Microbiol. 32: 673–709; Butzler and Skirrow, 1979, Clin. Gastroenterol. 8: 737–765). Birds, especially poultry, constitute an extensive reservoir of these bacteria (Butzler and Skirrow, 1979, op. cit.). Although *C. fetus* subsp. *jejuni* has been incriminated in hepatitis in chickens and turkeys, the clinical significance of campylobacters in wild and domestic birds is largely unknown.

During the period May to June 1981, two geographically distinct populations of the common puffin (*Fratercula arctica*) in northern Norway were examined for the presence of *C. fetus* subsp. *jejuni*, *Yersinia enterocolitica* and *Salmonella* spp.

Cloacal swabs were collected from a total of 50 adult puffins on the Røst archipelago in the Lofoten Islands, Nordland County. This population has experienced several years with reproductive failure (Lid, 1980, Fauna Norv. Ser. C, Cinclus 4: 30–39). In 1975 and 1977 through 1981, chick mortality was virtually 100%. Thousands of dead nestlings were found outside the burrows.

At the Hornøya Island near Vardø, Finnmark County, cloacal swabs were collected from 26 adult puffins. This colony has had normal breeding results, with no marked mortality.

The cloacal swabs were stored in SIFF transport medium (Sandven et al., 1982, Acta Pathol. Microbiol. Scand. Sect. B 90: 73–77). Cultivation was performed within 5 days of collection. The following procedure was employed for the isolation of campylobacters:

Each sample was plated out onto chocolate agar containing defibrinated horse blood (70 ml/liter), and the following antimicrobials: colistin (10 IU/ml), cefalotin (15 μg/ml) and nystatin (25 IU/ml). All agar plates were incubated at 42–43 C in a microaerobic atmosphere, using the GasPak system (Baltimore Biological Laboratories, Cockeyville, Maryland 21030, USA) without catalyst. The plates were examined after 48 and 72 hr. Plates showing no growth were incubated further and read after 1 wk. *Campylobacter* spp. were identified on the basis of morphological, cultural, and biochemical characters according to established criteria (Smibert, 1974, *In* Bergey's Manual of Determinative Bacteriology, Buchanan and Gibbons (eds.), Williams and Wilkins, Baltimore, Maryland, pp. 207–212).

The *Campylobacter* isolation prevalences in the two puffin populations investigated were significantly different ($\chi^2 = 16.08$; $P = 0.08 \cdot 10^{-5}$). Whereas *C. fetus* subsp. *jejuni* was recovered from 39 (78%) of 50 adult puffins captured at Røst, no isolations were made from

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