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Authors: KAPPERUD, GEORG, and OLSVIK, ØRJAN

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ISOLATION OF ENTEROTOXIGENIC *YERSINIA ENTEROCOLITICA* FROM BIRDS IN NORWAY

GEORG KAPPERUD, Norwegian Defence Microbiological Laboratory, National Institute of Public Health, Geitmyrsveien 75, Oslo 4, Norway.

ØRJAN OLSVIK, Department of Microbiology, Institute of Pharmacy, University of Oslo, Blindern, Oslo 3, Norway.

Recognition of the role of *Yersinia enterocolitica* as a human and animal pathogen has increased in recent years (Mollaret et al., 1979, Contr. Microbiol. Immunol. 5: 174-184). Despite the comprehensive information available on the occurrence of *Y. enterocolitica* and related bacteria in various habitats, the epidemiology of yersiniosis is still hypothetical. This bacterial group has been isolated from numerous animal species including some wild and domestic birds. However, the avian wildlife reservoir has been incompletely investigated.

During May to October 1979, 76 rectal swabs were collected from six avian species at four different localities in Norway. Cultivation was performed on lactose-bromothymol-blue agar and lactose-sucrose-urea (LSU) agar at room temperature for 48 h. Isolated strains were characterized biochemically and antigenically as described previously (Kapperud, 1975, Acta Path. Microbiol. Scand., Sect. B 83: 335-342). All strains were tested for their ability to produce heat-stable enterotoxin at 22 C and 37 C, using the infant mouse assay (Dean et al., 1972, J. Infect. Dis. 125: 407-411). Invasiveness was examined by means of a HeLa cell model (Lee et al., 1977, Can. J. Microbiol. 23: 1714-1722).

Six strains of *Yersinia* were isolated (Table 1) from four (5%) of 76 birds. Each of two birds harbored two antigenically distinct strains. Isolations were obtained from two of six herring gulls *(Larus argentatus)* frequenting a refuse dump heavily contaminated with sewage sludge. Negative results were obtained from another 10 herring gulls and 12 great black-backed gulls *(Larus marinus)* captured at an ornithologic research station. However, strains were isolated from two of four carrion crows *(Corvus corone)* which were predators of eggs and nestlings within the same area. *Yersinia* was not recovered from 27 willow ptarmigan, *(Lagopus lagopus)* 13 rock ptarmigan *(Lagopus mutus)* and 4 wood pigeons *(Columba palumbus)*.

Enterotoxin production at 22 C, but not at 37 C, was indicated for three of the six isolates (Table 1). Invasiveness for HeLa cells was not demonstrated for any of the strains. Enterotoxin production is widespread among *Y. enterocolitica* and *Y. enterocolitica*-like bacteria (Kapperud, 1980, Acta Path. Microbiol. Scand., Sect. B 88: 287-291; Pai et al., 1978, Infect. Immun. 22: 334-338). However, the clinical significance of this enterotoxin in man or animals has not yet been established. Some *Yersinia* strains produce enterotoxin at refrigeration temperature (Kapperud and Langeland, 1981, Curr. Microbiol. 5: 119-122) which is the common storage condition for perishable foods. A possible role of this enterotoxin in food-borne intoxication has been suggested (Boyce et al., 1979, Infect. Immun. 25: 532-537).

Gulls and crows represent a potential source of human infection through fecal contamination of the environment. In this work, *Y. enterocolitica* was isolated from a population of gulls which frequented a refuse dump where sewage sludge was deposited. The same birds

TABLE 1. Characterization of *Yersinia enterocolitica* strains isolated from birds in Norway.

Strain[a]	Source	Serogroup[b]	Biotype[c]	Enterotoxin[d] production
K3	Carrion crow	6	1	+
K4A	Carrion crow	16	1	—
K4B	Carrion crow	6	1	+
K38A	Herring gull	NAG	1	+
K38B	Herring gull	17	1	—
K42	Herring gull	NAG	S,SO,C	—

[a]Vertical lines indicate strains isolated from the same host.
[b]NAG = non-agglutinable.
[c]According to Wauters' biotype scheme. Strain K42 did not produce acid from sucrose (S), sorbose (SO), nor cellobiose (C).
[d]At 22 C.

breed in areas close to drinking water reservoirs. On the other hand, contact with sewage or sewage sludge may represent a health risk to populations of free-living birds and mammals. The clinical significance of *Y. enterocolitica* and *Y. enterocolitica*-like bacteria in avian populations is not known.

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