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Survey of antibodies against *Francisella tularensis* and some enteropathogenic bacteria in the Hooded Crow *Corvus corone cornix*

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Eighty-two hooded crows *Corvus corone cornix* L., 1758, were trapped in December 1980 using a great Norwegian Hooded Crows Trap in Grorud-dalen, Oslo, Norway. The birds were separated into two groups according to age (less than one year old, and more than one year old). Blood samples were taken by heart puncture and the sera were tested for antibodies against *Francisella tularensis* and three species (serotypes) of *Salmonella*. Sera from two birds showed antibodies against *F. tularensis,* but no antibodies against *Salmonella* were demonstrated. Cultivation of rectal swab samples for species of *Salmonella* or *Yersinia* was negative, but *Campylobacter fetus* subsp. *jejuni* was found in faeces of 88 % of the crows tested.

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INTRODUCTION

Hooded Crows, *Corvus corone cornix* L., 1758 often search for food among remnants of human household on garbage dumps. Another staple diet is carcasses of dead animals. One may therefore suspect the hooded crow to be an important potential spreading source of pathogenic microorganisms. This has earlier been established for gulls (Müller 1975, Williams et al. 1976, Bø 1980, Pärssinen 1980). Diseases spread with animals or birds are often of zoonotic nature e.g. tularemia. The pathways of spreading within the fauna are most interesting. This investigation reports the presence of some pathogenic bacteria or indication of earlier infections in hooded crows.

MATERIAL AND METHODS

A great Norwegian Hooded Crow Trap (Sørensen 1978) was placed in Grorud-dalen in Oslo. Eighty-two hooded crows were trapped from December 12—16, 1980.

The birds were transported alive to the laboratory where the identification of juvenile (born the same year) or adult status (more than one year old) was carried out by the criteria of Slagsvold (1979, 1980). Blood samples were taken by cardial puncture using vacutainers, and the bacteriological samples with rectal swabs.

Immunological and bacteriological testing

The sera were tested for antibodies against *F. tularensis* by tube agglutination (Widal test) using antigens prepared from two different bacterial strains, «Jap Down» and «HN63 (hare)». The first strain was isolated in Japan and the second in Norway from a hare dead of tularemia. The preparation of antigen and the immunological assay is described by Holth Haugh & Pearson (1972). The presence of antibodies against *Salmonella typhimurium* var. Copenhagen, *Salmonella newport,* and *Salmonella saint-paul* was also tested by tube agglutination. Rectal swab samples from the crows were cultivated using the methods described by Kapperud & Olsvik (1982), in order to registrate the occurrence of *Salmonella* spp., *Yersinia* spp. and *Campylobacter* spp.

RESULTS

The serological assays are shown in Table 1. Two out of the 82 crows had antibodies against

Table 1. Serological testing of 82 *Corvus corone cornix* for antibodies against *F. tularensis* and three serotypes of *Salmonella*.

No. of birds tested	*Francisella tularensis* Jap Down	NH63 (hare)	*Salmonella* 1*	2	3
Juv. 57	0	0	0	0	0
Ad. 25	2**	2**	0	0	0
Tot. 82	2	2	0	0	0

1 = *Salmonella typhimurium* var. Copenhagen
2 = *Salmonella newport*
3 = *Salmonella saint-paul*
** titer ≥160

F. tularensis. These birds were adults, and the sera showed identical titers of 160 against both the «Jap Down» and the «HN63 (hare)» antigen. No antibodies were found against the species (serotypes) of *Salmonella* tested for.

The bacteriological analysis showed that 43 out of 48 crows were carrying *Campylobacter fetus* subsp. *jejuni*. There were no difference in carrier state between young and old birds. *Salmonella* and *Yersinia* bacteria were not found.

DISCUSSION

Considering the importance of tularemia for both animals and humans, knowledge of how this disease is spread is of great importance. The reservoirs are not known, but epidemics often occur among rodents (Omland 1972, Bell & Stewart 1975, Omland et al. 1977). Following rodent population peaks, large amounts of hooded crows have been observed searching for food among the remains of dead lemmings appearing after snow melt (Berdal & Mehl, pers. comm.). If dead infected rodents still contained viable organisms of *F. tularensis*, this might be a contamination source. Our finding of two hooded crows with antibodies against *F. tularensis* supports this possible epidemiological aspect. Previously, two cases of tularemia in birds predating on rodents have been reported (Borg 1980).

At the time of crow trapping, some large scale outbreaks of salmonellosis occurred in nearby chicken farms. Salmonellosis was also registered in gulls frequenting the same garbage dump as the crows (Bø 1980). No Salmonella bacteria were registered in the examined crows, although such observations have been reported previously (Olsvik1980). Antibodies against the *Salmonella* species (serotypes) most commonly represented at the local outbreaks of salmonellosis in chicken or seagulls, were not found. *Yersinia* species were not observed in the present samples, but enterotoxigenic *Y. enterocolitica* has been found in two young crows at Tranøya in northern Norway in 1979 (Kapperud & Olsvik, 1982).

It is difficult to evaluate the pathological importance of the very high percentage of crows carrying *Campylobacter fetus* subsp. *jejuni*. The present findings indicate that crows can be a vector for this bacterium, which possibly is of zoonotic nature (Kapperud & Rosef 1982).

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