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SHORT COMMUNICATION

Short communication articles are short scientific entities often dealing with methodological problems or with byproducts of larger research projects. The style should be the same as in original articles.

Outbreak of Pasteurellosis among wintering and breeding common eiders *Somateria mollissima* in Denmark

Thomas K. Christensen, Thomas Bregnballe, Thomas H. Andersen & Hans Henrik Dietz

Christensen, T.K., Bregnballe, T., Andersen, T.H. & Dietz, H.H. 1997: Outbreak of Pasteurellosis among wintering and breeding common eiders *Somateria mollissima* in Denmark. - Wildl. Biol. 3: 125-128.

In 1996, an epizootic occurred among wintering and breeding common eiders *Somateria mollissima* in southwest Kattegat, Denmark, causing the death of at least 900 birds during late winter, and of a total of 3,146 females in five local breeding colonies, corresponding to 35-95% of the females present within the single colonies. The cause of death was related to a bacterial infection by *Pasteurella multocida* isolated from all examined eiders collected on wintering and breeding grounds. This is the first documented incidence of pasteurellosis in Scandinavia. Based on knowledge of the phenology and winter distribution of eiders, the temporal occurrence of the disease suggests that apparently healthy birds acted as carriers of the disease bringing it from the wintering grounds to the breeding colonies.

Key words: avian cholera, common eider, epizootic, Pasteurella multocida, Pasteurellosis, Somateria mollissima

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Avian pasteurellosis in wild waterfowl, caused by the bacterium *Pasteurella multocida*, was first diagnosed in 1940 (Hudson 1959). Since then, a number of outbreaks have been described, mainly from North America (e.g. Quortrup, Queen & Merovka 1946, Rosen & Bischoff 1950, Wobeser, Leighton, Osborne, Nieman & Smith 1982, Windingstad, Duncan & Thornburg 1983, Brand 1984). Pasteurellosis, also known as avian or fowl cholera, is highly contagious, and epizootics may involve thousands of birds (Brand 1984). In North America, pasteurellosis among waterfowl occurs along all major flyways (Pacific, Central, Mississippi and Atlantic; Botzler 1991), but in Europe documented epizootics in wild waterfowl populations have been rare and so far only reported from the Netherlands (van den Hurk 1946, Mullié, Smit & Moral 1979, 1980, Swennen & Smit 1991). Generally, large epizootics caused by pasteurellosis

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occur in situations where bird densities are high, either on wintering and staging grounds or in breeding colonies (Botzler 1991).

Pasteurellosis among breeding common eiders *Somateria mollissima* has been reported from the USA and Canada (Gershman, Witter, Spencer & Kalvaitis 1964, Reed & Cousineau 1967, Korschgen, Gibbs & Mendall 1978) and in one incidence from Europe (Swennen & Smit 1991). In all cases, acute infection caused high mortality among nesting females. The present paper describes an outbreak of avian pasteurellosis in 1996 among wintering and breeding eiders in southwest Kattegat, Denmark.

Study area and methods

The southwestern region of Kattegat, Denmark (Fig. 1) supports more than 80,000 wintering and staging eiders (Pihl, Laursen, Hounisen & Frikke 1992), including birds from Finnish, Swedish and Danish populations (Noer 1991). A large proportion of the Danish population of common eiders breeds in southwest Kattegat (Franzmann 1989). The major colonies are shown in Figure 1.

In early March 1996, unusually large numbers of dead eiders were found washed ashore north and south of Hov, and during March three surveys for dead eiders were conducted along the coasts, including Hov Røn. Records, in mid-May, of many dead female eiders at the breeding colony of Stavns Fjord, Samsø, led to a systematic count of dead and live eiders on 28-30 May. Although some dead females may have remained hidden in the vegetation, the number of live females recorded incubating is considered fairly accurate, because healthy females flushed from their nests when approached during the count. All the dead birds from this colony were collected for destruction. Among the birds collected in Stavns Fjord, 134 females out of 2,052 (males and females) ringed as ducklings in the same colony in the period 1991-1995 were recovered. The three colonies at Hov Røn, Svanegrund and Alrø Polder were searched for dead and incubating eiders in early May and the colony on Mågeøerne (see Fig. 1) was searched in early June. The Hov Røn colony was searched systematically, as was the Alrø Polder colony, but the number of dead eiders found along the coastline of Hov Røn was not counted to the exact number. Svanegrund and Mågeøerne were not surveyed in detail.

To establish the cause of death, the Danish Veterinary Laboratory carried out necropsies on 20 dead eiders collected on 13 March at Hov Røn and on 33 dead eiders collected in the breeding colonies at Stavns Fjord (26), Hov Røn (2), Svanegrund (4), and Mågeøerne (1). The examination of bird carcasses included determination of bodymass, gross pathology, histopathology, bacteriology, parasitology and toxicological examinations. Bacteriological analyses were carried out on samples from the liver, spleen and lungs, intestinal contents from the caecum, and the heartblood of all 53 individuals, according to standard tissue sampling methods (Purchase, Arp, Domermuth & Pearson 1989).

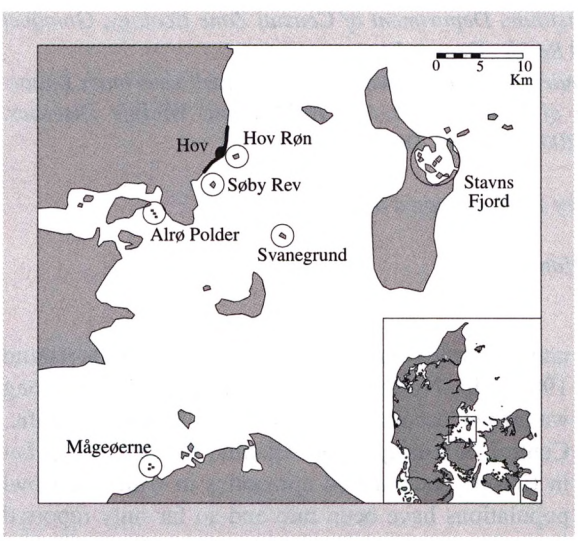

Figure 1. Location of the six largest eider breeding colonies in southwest Kattegat, Denmark. The coastline at Hov searched for dead eiders during March 1996 is indicated with a bold line.

Results

Necropsy and bacteriological examination

All 53 eiders collected from the wintering grounds and the breeding colonies had *Pasteurella multocida* infections. The bacterium was isolated from the liver of 50 birds, the heartblood of 23 birds, the intestine of 22 birds, the spleen of 8 birds and the lungs of 1 bird. Histological examination of liver tissue showed acute, multifocal, necrotising hepatitis with large amounts of gramnegative rods.

Numbers of eiders recorded

During late winter, 100 dead eiders were found along

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1 km of the mainland coast near the island of Hov Røn (see Fig. 1). The first dead birds were found on 5 March, and over the following three weeks more than 800 dead eiders (males and females) were found in the same area and at Hov Røn.

On the breeding islets in Stavns Fjord 1,597 females and 239 males were found dead, and 72 live females were recorded incubating. A substantial number of the dead females were found laying on their nests, but many birds were also found in and around small stagnant pools, and along the coastlines of the islets. Estimated from the rate of recoveries of subadult (non-breeding) females from the 1994 and 1995 cohorts, ca 10% of all the dead females found in Stavns Fjord are regarded to be young non-breeding birds. The number of dead eiders recorded in the other four colonies were 1,200 at Hov Røn, 120 at Svanegrund, 213 at Alrø Polder and 16 at Mågeøerne, corresponding to approximately 95% of all females recorded dead and alive on the islets in Stavns Fjord, 80% at Hov Røn, 48% at Svanegrund, 35% at Alrø Polder and 53% at Mågeøerne.

Discussion

As all eiders examined were infected by *Pasteurella multocida*, avian pasteurellosis was considered the cause of death in both wintering and breeding birds. To our knowledge, this is the first documented record of an avian pasteurellosis epizootic in wildfowl populations in Scandinavia. The only pasteurella epizootic previously known to have occurred among common eiders in Europe was the outbreak in the Netherlands in 1984 (Swennen & Smit 1991). However, in 1985, 317 female eiders were found dead at Hov Røn in Denmark and the necropsies of two collected individuals showed matching symptoms of avian pasteurellosis, although no attempts were made to isolate *P. multocida*. Therefore, the outbreak of pasteurellosis described here may be the second major outbreak in Denmark.

Since the first large numbers of dead birds were found along the shores of Hov one month before the onset of breeding, the centre of the epidemic was probably located on the wintering grounds off the coast of Hov. As dead birds may have been preserved in the sea ice and released when the ice began to thaw in early March, the exact time of the onset of the epidemic is unknown. It is plausible that individuals infected during late winter carried pasteurellosis to their breeding colonies in southwest Kattegat, and possibly to Sweden and Finland. Unusually large numbers of dead female eiders were recorded in the summer of 1996 in Swedish breeding colonies at Hallands Väderö (ca 50), in the Stockholm archipelago, and at Gotland (500-1,000 (B. Kollberg, R. Staav, F. Ziesemer, pers. comm.). In southwestern Finland, dead female eiders were found on their nests in some breeding areas in 1996 (M. Hario, pers. comm.), indicating that pasteurellosis might have occurred in this region, too. No bacteriological examination were carried out on birds from these areas.

The most probable explanation for the outbreak in 1996 is that the epidemic was spread by chronically infected carriers (*cf.* Botzler 1991). In Canada, Korschgen et al. (1978) isolated *Pasteurella multocida* from one of 236 apparently healthy eiders collected during the winter season, and from one of 357 apparently healthy nesting females. Assuming that individuals can remain chronic carriers throughout their lives (Heddleston 1972), chronically infected eiders may have survived from the presumed Danish outbreak in 1985 until 1996. The mass death at Hov Røn in 1985 (presumed to be caused by pasteurellosis) took place the year after the documented epizootic of pasteurellosis in the Netherlands (Swennen & Smit 1991). Transmission from the Dutch to the Danish eider population may have occurred when these populations mix during the non-breeding season (Swennen 1990, Noer 1991).

The impact of the mass death on the size of the local female population of eiders in southwest Kattegat was substantial. Mortality from pasteurellosis was high, especially in Stavns Fjord and at Hov Røn where the proportion of dead females constituted 95% and 80%, respectively, of all females recorded dead and incubating at the time of the count. Correcting for the presence of young non-breeding birds among the dead birds in Stavns Fjord, we estimate that at least 85% of the potential breeders present on and around the breeding islets in 1996 died. However, as this calculation ignores the fact that some breeders died from pasteurellosis during the winter period, and that some of the dead females on the islets may have remained undiscovered, we believe the actual proportion of dead female eiders to be closer to 90% than to 85%. In other reported epizootics, mortalities among breeding eiders have ranged between 17% and 70% (Gershman et al. 1964, Reed & Cousineau 1967, Swennen & Smit 1991).

Generally, very little is known about the origin of *P.*

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multocida occurring in wild bird populations. No conclusive evidence exists of the role of carrier birds, individual immunological status and the effects of environmental conditions, which may affect outbreaks of pasteurellosis (see Botzler 1991 and references therein). Consequently, there is a need for future studies on these subjects, considering the present documentation of avian pasteurellosis in Scandinavia.

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