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Endoparasites in common eiders *Somateria mollissima* from birds killed by an oil spill in the northern Wadden Sea

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Abstract

Mass mortalities of common eiders *Somateria mollissima* have been ascribed to high parasite loads. However, the actual role of parasites in mortalities is disputed as in the case of a mass mortality of eiders in the Wadden Sea in the winter of 1999/2000. A critical evaluation of the role of parasites in eider mass mortalities is hampered by (1) a lack of data on actual parasite loads of the birds involved, (2) missing regional data for comparison, and (3) a lack of unbiased samples: investigations are often based on dead beached individuals, which are presumably the more heavily infected birds of a population and thus more likely to die and be washed ashore. Although published data on parasite loads in birds of the winter 1999/2000 mortality are available, no data on background parasitism in eiders from the Wadden Sea exist, making an evaluation of the potential role of parasites in this mortality event difficult. By investigating endoparasites of 102 eiders affected by an oil spill in the northern Wadden Sea in winter 1998/1999, we provide a data set of background parasitism in wintering eiders from the Wadden Sea. We found 13 different parasite taxa with high prevalence values (% infected birds) in the acanthocephalan *Profilicollis botulus,* the nematode *Amidostomum acutum,* cestodes and trematodes. In some taxa we observed pronounced differences in prevalence values between juvenile eiders and adults, as well as between adult sexes. The parasite composition shows that bivalves, crabs (*Carcinus maenas*) and other crustaceans are important sources of infections by being intermediate hosts. This is partly mirrored in the food content of eider stomachs where bivalves and crabs were predominantly found. Intensities of the acanthocephalan *P. botulus,* suspected of causing eider mortalities, were especially high in juveniles (1112±416 ind per infected host), but lower in adult males (40±7) and adult females (81±18). However, no extraordinary mortality event was observed in the winter of 1998/1999, indicating no or a very weak effect of the parasites on host condition. A comparison with the parasite loads of eiders from the mass mortality in the winter of 1999/2000 shows that parasite numbers were by no means exceptional for birds from the area. Hence, parasites alone are unlikely to have caused this mortality. Regional background parasite loads are important to differentiate between primary and secondary roles of parasites in anomalous mortality events.

Keywords: Parasites; Common eider; Wadden Sea; Acanthocephalans; Trematodes; Nematodes; Cestodes; Mass mortality

1. Introduction

Marine birds are host to a broad range of helminth endoparasites (Borgsteede, 1997; Wobeser, 1997). While many of these parasites do not seem to do their

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hosts much harm, high infestation rates of some species are supposed to cause host mortalities either directly or in combination with other stressors (Lauckner, 1985; Borgsteede, 1997; Wobeser, 1997). Especially acanthocephalans have been reported to be involved in mass mortality events of waterfowl (Wobeser, 1997) and particularly of common eiders (*Somateria mollissima*) (e.g. Garden et al., 1964; Itämies et al., 1980).

However, the actual causes of eider mass mortalities are hotly disputed. A recent mass mortality of eiders in the Wadden Sea in the winter of 1999/2000 is thought to have been caused by acanthocephalan parasites, food shortage, or a combination of both factors (Borgsteede, 2001; Dekker, 2001; Kuiken, 2001; Smaal et al., 2001; Camphuysen et al., 2002). Such debates are often hampered by (1) a lack of data on actual parasite loads of the birds involved, (2) missing regional data for comparison with 'normal' parasite loads, and (3) biased samples: investigations are often based on stranded, already dead, individuals collected on the beach, resulting in a strong bias since highly infected and thus weaker birds are presumably more likely to die and be washed ashore. For the Wadden Sea eider mortality in 1999/2000, infection data of dead birds collected on the beach were provided by Camphuysen et al. (2002). However, no comparable quantitative data from the entire Wadden Sea exist, which led Camphuysen et al. (2002) to compare their acanthocephalan infestation values with studies from Canada (Bishop and Threlfall, 1974), Scotland (Garden et al., 1964; Liatt and Pike, 1980; Thompson, 1985) and Sweden (Persson et al., 1974). Since infection intensities were similar, they concluded that parasites were not responsible for the observed mass mortality. However, their conclusion rests on the critical assumption that background parasitism of eiders in the Wadden Sea is similar to that of other regions. For a better evaluation of the role of parasites in the eider mass mortality, data on background parasitism in eiders from the Wadden Sea would be valuable.

An opportunity to gather a sample of parasites in eiders from the Wadden Sea was the wreckage of the vessel Pallas southwest of the island of Amrum in the northern Wadden Sea. On 28 October 1998, the freighter stranded 8 km off the island, and one week later 60 tons of bunk oil leaked out. During the following weeks, 16 000 birds from 35 species were affected by the oil spill (Fleet et al., 1999; Günther, 1999) and over 2000 common eiders were washed ashore with prevailing currents at the southern tip of the island of Sylt north of the wreckage site (Pfeifer, 2003). A random sample of 102 individuals of these eiders was investigated for endoparasites. Since birds present in the area had equal chances of being affected by the oil spill, we consider this study to rest on an unbiased sample of the eider population present at the time of the wreckage. Hence, this study (1) gives for the first time an estimate of natural background parasitism in wintering eiders in the Wadden Sea, and (2) helps to evaluate the potential role of parasites in the unusually high winter mortality of eiders in the winter of 1999/2000.

2. Materials and methods

2.1. Study area

Samples of common eiders (*Somateria mollissima*) were taken on beaches at the southern tip of the island of Sylt in the northern Wadden Sea (North Sea, Germany; Fig. 1). To the west of this island lies the open North Sea. To the east, large tidal flats stretch over two adjacent basins. Tides are semidiurnal with a mean range of 2 m. Salinity remains close to 30 psu. Large

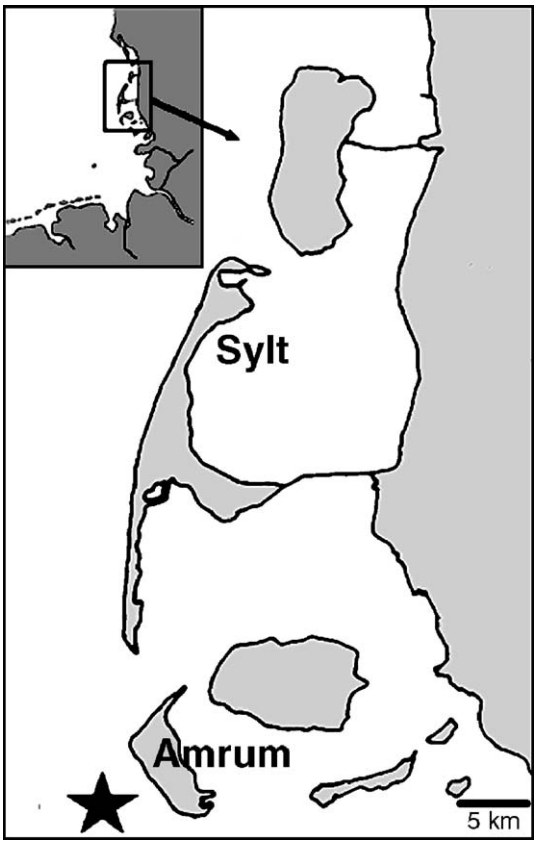

Fig. 1. Study area. Asterisk indicates site of ship wreckage off the island of Amrum. Samples of common eiders *Somateria mollissima* were taken from beaches in the southern part of Sylt island.