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Bovine coronavirus 1 from geese in North America.

A new bornavirus 1 from free-ranging wild Canada geese, the virus has been renamed aquatic bird bornavirus 1 (ABBV-1) in a reorganization of the taxonomy of the Bornaviridae (4). A second waterfowl-associated virus (ABBV-2) was isolated from ducks in North America in 2009 (5). In 2007, avian bornaviruses were first identified as the probable causative agent of proventricular dilatation disease in parrots in 2008 (1,2). Eight psittacine viruses and 5 passerine viruses have since been described (3,4). In 2009, aquatic bird bornavirus 1 was detected in free-ranging Canada geese (Branta canadensis) and trumpeter swans (Cygnus buccinator) in Ontario, Canada (5). The purpose of this study was to investigate the presence of aquatic bird bornavirus 1 in wild waterfowl in Denmark.

To investigate aquatic bird bornavirus 1 in Europe, we examined 333 brains from hunter-killed geese in Denmark in 2014. Seven samples were positive by reverse transcription PCR and were 98.2%–99.8% identical; they were also 97.4%–98.1% identical to reference strains of aquatic bird bornavirus 1 from geese in North America.

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Anders F. Thomsen,1 Jesper B. Nielsen,1 Charlotte K. Hjulsager, Mariann Chriél, Dale A. Smith, Mads F. Bertelsen

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clasted together with North American ABBV-1, and a pairwise comparison in CLC software showed 98.2% to 99.8% identity among the 7 sequences and 97.4% to 98.1% identity to the reference strain of ABBV-1 (GenBank accession no. KF578398).

The 2.1% (95% CI 0.6%–3.6%) prevalence of ABBV-1 in wild geese in Denmark is considerably lower than the prevalences reported in North America, which average 10%–30% but in some studies have exceeded 50% (6,7,9,10). In 1 study, the prevalence of ABBV-1 was higher in stable nonmigrating populations of Canada geese than in migratory birds, suggesting that prevalence may vary with population density and intensity or duration of use of geographic locations. In the investigation described here,
we surveyed only a limited number of species previously identified as positive for ABBV-1 but identified 3 novel host species. Thus, the low prevalence found in geese in Denmark might be due to the sampling of a high proportion of transient migratory and apparently healthy birds as well as a possible variation in species susceptibility.

The finding of ABBV-1 in migratory waterfowl in Denmark suggests that the virus is widespread in waterfowl populations in Europe, but further investigation is needed to verify this claim. Pink-footed goose (Anser brachyrhynchus) and greylag goose (A. anser) migrate through the western part of Europe from Svalbard, Norway, to Spain. Barnacle goose (A. leucopsis) migrate from wintering grounds in the Wadden Sea area to northern Scandinavia and Russia. Because migrating waterfowl often gather in flocks of mixed species, transmission of pathogens between species is possible, and even likely, on the basis of our findings of nearly identical (99.7%) sequences in 1 pink-footed goose and in 1 greylag goose. The origin of ABBV-1 cannot be determined from this study, but the presence of highly homologous viruses in North America and Europe promotes speculation on possible transmission routes between these continents. Avian populations in Greenland could be the link between American and European flocks; the country is host to large breeding populations of geese that winter in both North America and in Europe.

The results here do not allow the clinical implications of ABBV-1 infections in waterfowl in Denmark to be determined, because none of the sampled geese were reported to be ill, and only goose heads were examined in the study. In North America, birds infected with ABBV-1 have exhibited nonsuppurative inflammation of the central, peripheral and autonomous nervous systems and associated neurologic and gastrointestinal clinical signs, including proventricular stasis.

Conclusions
This study identifies ABBV-1 in wild geese in Europe; phylogenetic analyses demonstrated that the sequences from our investigation cluster with those from North America in the waterbird-1 cluster. The barnacle goose, greylag goose, and pink-footed goose were added to the list of waterfowl known to be hosts of ABBV-1. On the basis of the migration patterns of the affected species, we propose that the virus is distributed widely in Europe, but further investigation is needed to determine the validity of this hypothesis.

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Drs. Thomsen and Nielsen recently received their doctor of veterinary medicine degrees from University of Copenhagen, Denmark. Their main interests are avian medicine and pathology, along with molecular detection of disease.

References

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