

409-414

**TYZZERIA - INFECTION IN BRENT GEESE,
BRANTA B. BERNICLA, DURING A COLD SPELL**

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On 18 January 1985, during a three week period of heavy winterweather with temperatures down to -16°C, a flock of 240 Dark-bellied Brent Geese (*Branta b. bernicla*) was seen at the southern shore of the Eastern Scheldt between the villages of Kattendijke and Wemeldinge (prov. of Zeeland, Netherlands). This species usually feeds on vegetations of green algae (*Enteromorpha* div. sp. and *Ulva lactuca*) on the mudflats in this areas, which were completely covered with ice sheets and no longer available as a food source. In these rough circumstances, the geese were forced to stay between the mudflats and the road on the dike, covered with snow. Here they were foraging on some grasses, as Annual Meadow-grass (*Poa annua*), Creeping Bent (*Agrostis stolonifera*), Chewings Fescue (*Festuca rubra*) and Couch (*Agropyron repens*). All birds were in a weak condition. They were mostly sitting on the snow, and demonstrated no shyness for passing motorcars. When flushed, their flight was hesitant and very laborious. Diarrhoea, sometimes stained with blood, was obvious on places where geese were sitting.

The Dark-bellied Brent Goose is a common winter visitor in the Delta area of the southwestern Netherlands. Over the past four winters, up to 20000 birds stayed in this important wetland area during January, with a mean of 13000. From 58% till 71% of them visit the Eastern Scheldt in that month (Meininger *et al.*, 1985). During the course of the cold spell of January 1985, tens of sick birds affected by diarrhoea and many corpses were found on different roosts along this part of the Scheldt estuary, where the total number of victims can be estimated at several hundreds.

Because little is published in European literature about diseases and mortality of wild geese in field conditions, three birds which died recently were collected for an autopsy on the next day.

MATERIAL AND METHODS

The three birds (one adult male and two adult females) were dissected, and all internal organs examined. From each individual at least four samples of the small intestine content and two of the caecal content, as well as macerated preparations of each kidney were examined microscopically on the presence of oocysts, for which the flotation technique of the "Ovassay fecal diagnostic system" (Pitman - Moore) was used. This quick and easy procedure is commonly applied in Belgium in the laboratories for poultry diseases. The recent paper of Gajadhar *et al.* (1983) on the morphology of coccidia form domestic and wild waterfowl was very useful for determining the oocysts. In order to obtain the sporulation of oocysts, the fecal samples were mixed thoroughly with an excess of 2% potassium bichromate solution, according to the procedure described by Soulsby (1968). Two fecal specimens of the small intestine and the caeca of each bird were examined on the presence of enteropathogenic bacteria. After enrichment in Selenite broth at 37°C for 24 h, one inocula was plated on MacConkey agar and one on SS agar. A further incubation of the selective media failed to show any pathogenic bacteria. No tests were done to determine the presence or absence of viral diseases. Two months after the period of heavy cold, 50 fresh fecal samples from apparently healthy Brent Geese were collected on several meadows, situated in the immediate vicinity of the place where the dead geese were formerly found and where they like to roost during high tide. The same examination procedure was followed.

RESULTS

Weights. The birds, which died recently were in an emaciated condition. The two adult females weighed respectively 800 and 840 g and the adult male 1150 g. A.K.M. St Joseph (*in Cramp and Simmons, 1977*) gives a mean of 1377 g for 22 adult January birds in England, and 75 adult spring birds in Denmark show a weight of 1411 g (M. Fog *in* Bauer and Glutz von Blotzheim, 1968). We can conclude that our birds weighed approximately one third less than the average.

Macroscopic lesions. With the exception of a few grasses, the gizzard was empty. Slight erosion of the gizzard wall occurred, as well as heavy haemorrhagic inflammation of the thickened intestinal wall, especially of the duodenum and the jejunum. Caeca and colon were somewhat less inflamed, but their wall had also thickened. Aspect of intestinal content sero-haemorrhagic till muco-haemorrhagic, especially in the proximal part. There were no gross changes in the internal organs, inclusively the kidneys. The microscopical examination showed a few *Eimeria truncata* in the kidney of one bird, apart from a few eggs of *Notocotylus attenuatus* and of *Hymenolepis* sp. The fecal samples of all birds under examination contained very large numbers of red blood cells and of oocysts of the same morphology, which were very numerous in the anterior part of the small intestine and less in the caeca and the colon.

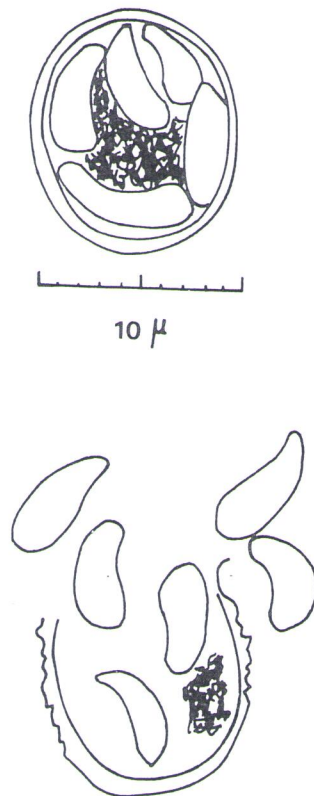


Fig. 1. Oocyst of *Tyzzeria* sp. (above) and its sporulation (below) in fecal samples of *Branta b. bernicla*.

Morphology of oocysts clearly *Tyzzeria* - like (Fig. 1): slight ellipsoidal, with a smooth colorless wall, lacking a micropyle. The wall usually appeared to be composed of a single layer, although in some oocysts a second inner line was visible. Thirty five oocysts from the three geese measured from 9 to 12 by 10 to 15 μ , with a mean of 10.9 by 12.8 μ . Their length-width ratios ranged from 1.0 till 1.4, with a mean of 1.21. There were no sporocysts. The sporulated oocysts contained eight free banana - shaped sporozoites and a small, irregular, granular residual body. The sporulation time was very short: after 22 to 24 h, nearly all oocysts got chapped, the sporozoites leaving the cracked wall by a large aperture.

The same microscopical examination on 50 fecal samples originating from apparently healthy Brent Geese, performed two months after the incidence of the cold spell, did not reveal any *Tyzzeria* sp. oocysts. In 4 samples (8%) one oocyst a field of *Eimeria brantae* was detected.

DISCUSSION

Because no tests on viral diseases were done, the cause of mortality of the geese can still be considered conjectural. But the abundance of *Tyzzeria* sp. in the fecal specimens, as well as heavy intestinal inflammation leads to believe that this coccidium was the cause of several hundreds of deaths, which occurred in the area of the Eastern Scheldt.

Until now, *Tyzzeria* sp. has been reported in Europe as a cause of infection in domestic geese (Kotlán, 1933; Nieschulz, 1947; Černa, 1956; Klimeš, 1963) and not in wild. In an extensive review on the causes of mortality in wild geese, captive in the Wildfowl Trust collections, Hillgarth *et al.* (1983) do not mention this genus. In the U.S.A., however, its occurrence was established in many host species and subspecies of wild geese, including the White-bellied Brent Geese, *B. b. hrota* (Farr and Wehr, 1952, Levine, 1952; Hanson *et al.*, 1957; Skene *et al.*, 1981; Greiner *et al.*, 1981).

The number of species of the genus *Tyzzeria* provoking morbidity and mortality in geese is not known as yet. According to Pellérdy (1974) and Gajadhar *et al.* (1983), many different species must be involved, but up till now the parhogenicity of only *T. parvula* Klimeš has been firmly recognized. The *Tyzzeria* which we observed had a very short sporulation time because it had been achieved within 24 hours. Following Pellérdy (1974), this time varies usually between 1 to 5 days. It is therefore possible that a species other than *T. parvula* may be held responsible for the severe epizootic in the Delta area.

There is little doubt that the cold weather of January 1985 had its influence on the outbreak and the severity of the *Tyzzeria* - infection. Owing to a sudden shift to a different food source in this period (*i.e.* from the habitual green algae to grasses) a protein-calorie malnutrition probably occurred in the affected geese. An increased susceptibility to infections is a well known phenomenon in such circumstances. In poultry, Glick *et al.* (1981) showed that energy- and amino acid- deficient diets depressed the immunoglobulin G titre and the total serum protein significantly for several weeks. Moreover, the severe weather conditions themselves appear to have a profound influence on the immunological status and disease resistance. But the mechanism by which such influence is extended is as yet not understood (Hudson *et al.*, 1974). In the future, more research is needed to establish whether *Tyzzeria* - infections also occur in wild geese during normal winter conditions.

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SUMMARY

A heavy infection of *Tyzzeria* sp. was detected in Dark-bellied Brent Geese (*Branta b. bernicla*) in the province of Zeeland (Netherlands) during the cold spell of January 1985, causing the death of several hundreds of birds. Sick birds suffered from diarrhoea, and an autopsy of three birds, which died recently, showed a haemorrhagic enteritis. The fecal samples showed many oocysts, the morphology of which were like *Tyzzeria* sp. This seems to be the first record of a *Tyzzeria* - infection in wild geese in Europe. Shortage of the usual food for the geese may be considered to accelerate the course of this infection.

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SAMENVATTING

Gedurende de zeer koude januari-periode van 1985 werd een *Tyzzeria*-infectie vastgesteld bij in Zeeland overwinterende Rotganzen (*Branta b. bernicla*). Het totaal aantal slachtoffers werd op meerdere honderden geschat. De zieke vogels voedden zich met verschillende wilde grassoorten en vertoonden symptomen van erge verzwakking en van diarree, die in sommige gevallen met bloed vermengd was. Bij een autopsie van drie pas gestorven vogels werd een ernstige hemorrhagische enteritis gevonden, vooral ter hoogte van het duodenum en van het jejunum. Flottatie - preparaten van de feces vertoonden veel oöcysten van het genus *Tyzzeria*. De soort kon niet bepaald worden maar de korte sporulatietijd van de oöcysten in acht genomen, ging het waarschijnlijk niet om *T. parvula*. Voor zover gekend is dit een eerste melding van een *Tyzzeria* - infectie bij wilde ganzen in Europa. Wel was deze ziekte reeds voordien bij tamme ganzen beschreven. Verondersteld wordt, dat de aanhoudende vorst en het daardoor langdurig onbeschikbaar zijn van het voor Rotganzen normale voedsel (*Enteromorpha* sp. en *Ulva lactuca*) deze infectie bevoordeligd hebben.

RESUME

Durant la période de grand froid de janvier 1985 une forte infection provoquée par *Tyzzeria* sp. a été diagnostiquée chez les Bernaches cravants (*Branta b. bernicla*) hivernantes en Zélande (Pays-Bas), entraînant la mort de plusieurs centaines d'oiseaux. Les oies atteintes présentaient des symptômes de grande faiblesse et de diarrhée d'un aspect parfois hémorragique. Une autopsie de trois bernaches décédées récemment démontrait une sévère entérite hémorragique, surtout au niveau du duodénum et du jéjunum. Un grand nombre d'oocystes appartenant au genre *Tyzzeria* ont été trouvés dans le contenu intestinal enrichi par la technique de flottation. L'espèce ne fut pas identifiée mais, compte tenu de la sporulation rapide des oocystes, *T. parvulane* ne semblerait pas en cause. Une infection de *Tyzzeria* fut déjà décrite auparavant chez les oies domestiques en Europe, mais en ce qui concerne les oies sauvages, il s'agit vraisemblablement d'une première mention pour ce continent. L'auteur suppose que cette infection a été favorisée par la longue période de gel, qui a rendu la nourriture traditionnelle de la Bernache cravant (*Enteromorpha* sp. et *Ulva lactuca*) inaccessible pendant plusieurs semaines.

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