

Bill patterns of the Whooper Swan in Finland during autumn migration

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Introduction

The black and yellow patterns on the bill of both the Whooper Swan *Cygnus c. cygnus* and especially the Bewick's Swan *Cygnus columbianus bewickii* show clear individual variations (Scott 1966; Evans 1977; Scott 1981; Bateson *et al.* 1980). Brazil (1981) described four types of bill patterns in Whooper Swans. There were "darkies" (where there is black from the tip of the bill up the centre line to the feathering) which were extremely rare; "pennyfaces" (where the central dark line is interrupted by a yellow patch) were also uncommon. Most fell into the category "yellowneb" (where the black does not extend far up the bill); this is further divided into sub-categories "black-based" (where the base of the bill is black along the feather-line from eye to eye) and "yellow-based" (where the base of the bill is yellow, with at most a few spots of black.)

In both species the proportions of the various bill patterns vary in different parts of the breeding range, so that, for instance, Bewick's Swans wintering in Great Britain have more yellow on their bills than those wintering in Japan (Scott 1981). Among the Whooper Swans the variation goes in the opposite direction, the bills of the Icelandic population wintering in England having more black than has been found on the bills of the eastern Siberian population wintering in Japan (Brazil 1981).

The proportions of the bill patterns were studied here among Whooper Swans during their autumn migration through Finland. These birds most probably represent a Finnish and north-western Russian (Fennoscandian) breeding population. Its wintering grounds are mostly in Sweden, Denmark and East and West Germany (Atkinson-Willes 1981; Rüger *et al.* 1986).

Material and Methods

During the autumn migration in September and October large numbers of Whooper Swans rest in the coastal area of Oulu, Finland, especially around the island of

Hailuoto (65°05'N, 24°50'E) in the Bay of Bothnia. In the years 1973–87 the highest daily count of Whoopers around Hailuoto varied from about 1,000 to 1,900 birds, and several hundreds could be observed simultaneously.

The bill patterns of Whoopers resting in the area were examined in late September and October 1987 and classified into the four groups described above. Brazil's (1981) observation methods were used as far as possible. Attempts were made to classify all the bills in the flocks of Whoopers examined. In most cases, however, some birds in the flock would be feeding or resting so that their bills could not be described with certainty. In such cases many sample scans were made and the highest total number of the individuals of each class recorded for the analysis. A KOWA telescope with 40 or 60x lenses allowed the bills to be seen reliably from a distance of 100–200 metres depending on weather conditions and the movements of the birds.

Results

The results are compared with the distribution of bill patterns in the other populations of the Whooper Swan in Table 1.

In a total of 552 patterns categorised in Finland, yellow-based yellownebs were the most common form (60%). The proportion of black-based yellownebs was 38% and that of pennyfaces 2%. No pure darkies were observed. For the χ^2 -test the pennyface class was pooled with black-based yellownebs. The difference between the Icelandic-British and Fennoscandian populations in the frequency of yellow and black-based yellownebs proved to be highly significant ($\chi^2=102.39$, $df=1$, $P<0.001$), and also was that between the Japanese and Fennoscandian populations ($\chi^2=232.74$, $df=1$, $P<0.001$).

Discussion

The observations on Bewick's Swans intergrades with Whistling Swans *Cygnus columbianus columbianus* from North

Table 1. Proportions of bill patterns in populations of the Whooper Swan in different parts of its breeding range.

1. Icelandic-British population (Brazil 1981), 2. Fennoscandian population (this study), 3. Eastern Siberian population (Brazil 1981).

	1. Britain		2. Finland		3. Japan	
	number	%	number	%	number	%
Darky	2	<1	0	—	0	—
Pennyface	8	3	11	2	3	<1
Black-based yellowneb	196	74	211	38	23	4
Yellow-based yellowneb	58	22	330	60	608	96
Total	264	100	552	100	634	100

America and Eurasia described by Evans and Sladen (1980) indicate a gene flow between these two subspecies across the Bering Straits. Furthermore, Scott (1981) has found that there is a cline in the bill markings of Bewick's Swan through Eurasia, the proportion of black in the bills increasing from west to east. This cline then continues in the same way in the bills of the Whistling Swan from west to east through North America.

The distribution of bill patterns in the Oulu area supports the ideas of Brazil (1981) regarding the geographical variation in bill patterns of Whooper Swan populations, where the proportion of the yellow increases from west to east. The bill pattern of the Whoopers differs most from that of the Trumpeter Swan *Cygnus c. buccinator* in the Bering Straits region, where their breeding ranges are closest together. Brazil thinks that this may indicate a much earlier divergence of these two species, or more consistent isolation than was the case with Bewick's and Whistling Swans.

The bill patterns of Bewick's and Whistling Swans indicate a gene flow between these two subspecies across the Bering Straits. By contrast those of the Whooper Swan and Trumpeter Swan suggest that the

gene flow between these two taxa operated over the north Atlantic from Europe to North America and vice versa, never across the Bering Straits. It thus seems that both pairs of subspecies have a circumpolar cline, but the discontinuity occurs in a different place: that between Bewick's and Whistling Swans in the north Atlantic and that between Whooper and Trumpeter Swans at the Bering Straits.

In order to trace the cline throughout the whole breeding range of the Whooper Swan, a study should also be carried out on bill patterns in the Middle Siberian population wintering mostly in the Caspian and Black Sea region.

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Summary

Bill patterns of Whooper Swans in Finland differ from those observed in Great Britain and Japan, the proportion of yellow being higher than in Britain and lower than in Japan. This supports the idea of a geographical cline in bill patterns of this species in which the proportion of yellow increases from west to east.

References

- Atkinson-Willes, G.L. 1981. The numerical distribution and the conservation requirements of Swans in Northwest Europe. *Proc. 2nd International Swan Symposium*. Pp. 40–48. Sapporo, Japan 1980.
- Bateson, P., Lotwick, W. and Scott, D.K. 1980. Similarity between faces of parents and offspring in Bewick's Swans and the difference between mates. *J. Zool. Lond.* 191:61–74.
- Brazil, M.A. 1981. Geographical variation in the bill patterns of Whooper Swans. *Wildfowl* 32:129–131.
- Evans, M.E. 1977. Recognising individual Bewick's Swans by bill pattern. *Wildfowl* 28:153–158.
- Rüger, A., Prentice, C. and Owen, M. 1986. Results of the IWRB International Waterfowl Census 1967–1983. *IWRB Special Publication No. 6*. Slimbridge, IWRB.
- Scott, D.A. 1981. Geographical variation in the bill patterns of Bewick's Swans. *Wildfowl* 32:123–128.
- Scott, P. 1966. The Bewick's Swans at Slimbridge. *Wildfowl* 17:20–26.