I am grateful to His Grace the Duke of Northumberland for allowing me to examine the Sherborne Missal at Alnwick Castle, and to Dr Peter Johnson of Pembroke College, Cambridge for giving me the reference to Suolahti, and for discussing *wórhana*.

APPENDIX

Species mentioned in the text:

Tetrao tetrix	Black Grouse (Blackcock and Greyhen)
Tetrao urogallus	Capercaillie
Perdix perdix	Partridge
Coturnix coturnix	Quail
Phasianus colchicus	Pheasant
Pavo cristatus	Peafowl (Peacock and Peahen).

REFERENCES

ALEXANDER, J. J. G. 1978. The decorated letter. London: Thames and Hudson.
BELLENDEN, J. 1536. Boece's History and chronicles of Scotland. London. Reprinted 1821.
BOECE, H. 1526. Scotorum historiae a prima gentis origine cum aliarum rerum gentium illustratione non vulgari. Paris.
COWARD, T. A. 1920. The birds of the British Isles and their eggs. London: Warne.
CRAMP, S. & SIMMONS, K. E. L. (eds). 1977. The birds of the Western Palearctic. Oxford: Oxford U.P.
EWERT, A. 1957. Glasgow glossary. Medium Aevum 25: 154–163.
FITTER, R. S. R. 1959. The ark in our midst. London: Collins.
GOULD, J. 1873. The birds of Great Britain. London.
GOULD, J. 1980. John Gould's Birds of Great Britain. London: Eyre Methuen. (Reduced reproductions of the Plates.)
GURNEY, J. H. 1921. Early annals of ornithology. London: Witherby. (Reprinted 1972. Chicheley: Minet.)
HERRTAGE, S. J. (ed.) 1881. Catholicum anglicum. Early English Text Society: Original Series 75.
LEVER, C. 1977. The naturalized animals of the British Isles. London: Hutchinson.
LILFORD, Fourth Baron. 1885–1897. Coloured figures of the birds of the British Islands. London.
RAINEY, A. 1973. Mosaics in Roman Britain. Newton Abbot: David and Charles.
SUOLAHTI, H. 1909. Die deutschen Vogelnamen. Eine wortgesehtliche Unterwebung. Strassburg.
SWEET, H. (ed.) 1885. Oldest English texts. Early English Text Society: Original Series 83. Two volumes.
WAY, A. 1843, 1853, 1865. Promptorum parvulorum sive clericorum Dictionarius anglo–latinus princeps. Camden Society: 25, 54, 89.
WILSON, D. M. (ed.) 1976. The archaeology of Anglo-Saxon England. London: Methuen. (Chapter by J. Clutton-Brock.)
WITHERBY, H. F., JOURDAIN, F. C. R., TICEHURST, N. F. & TUCKER, B. W. 1941. The handbook of British birds. Vol. 5. London: Witherby. (Revised and reprinted 1947.)
WRIGHT, T. 1884. Anglo-Saxon and Old English vocabularies. (2nd edn) Wülcker, R. P. (ed.). London.
YAPP, B. 1981. Birds in medieval manuscripts. London: British Library.
YAPP, W. B. 1979. The birds of English medieval manuscripts. J. Medieval Hist. 5: 315–348.

Church End House, Twyning, Tewkesbury, Glos, GL20 6DA

The breeding season of the flightless cormorant *Nannopterum harrisi* at Cabo Hammond, Fernandina

FRITZ TRILLMICH, KRISZTINA TRILLMICH, DOMINIQUE LIMBERGER & WALTER ARNOLD

IBIS 125: 221–223 1983 Received 2 May 1981

Harris (1979) reported that the Flightless Cormorant *Nannopterum harrisi* bred all the year round, but there was a broad peak of breeding between May and October. At

0019–1019/83/020221 + 03 $03.00/0

Cabo Hammond, Fernandina Island, Galápagos the situation was 'exceptional in that peaks of breeding were recorded in March 1970, February 1971 and August–September 1970' (Harris 1979). Harris did not visit Cabo Hammond between March and September, but concluded from reports of visiting yachtsmen and fishermen that there was little breeding in these months. This contrasted with the well documented situation at Punta Espinosa, Fernandina, about 40 km away from Cabo Hammond, where breeding followed a regular pattern. Harris speculated that perhaps the 'peak of marine productivity at Cabo Hammond is normally out of phase with that at Punta Espinosa'. Data from Maxwell (1974, cited in Harris 1979) indicated, however, that sea temperature regimes were alike in the two places, as was to be expected from their proximity and similar exposure to the upwelling of the Cromwell current (Houvenaghel 1978).

TABLE 1

Numbers of active nests of Flightless Cormorants at Cabo Hammond

	1976	1977	1979	1980
August	+	12	8	12
September	—	14	8	9
October	—	8	8	3
November	3	—	4	1
December	+	—	—	—

Note: + indicates breeding recorded, no nest counts made; — indicates no observations made.

We spent several months every year between 1976 and 1980 at Cabo Hammond including continuous stays from August to November in 1977, 1979 and 1980. We recorded the number of nests with eggs or young about every 10–14 days and found (Table 1) that there were always some birds breeding between August and October with the highest number of active nests recorded in August and September. We saw young birds, which had recently left the nest but were still fed by their parent, in August indicating that some pairs had bred in July. Cormorants never laid or built nests in late October or November. No breeding was seen during a visit in February and March 1978. Two nests with eggs were found in early April 1981; one was abandoned and the other destroyed (by the sea) during this time. These observations do not support the idea of a second peak of breeding in February and March and we conclude that breeding times at Cabo Hammond agree with the records from Punta Espinosa; at the latter site cormorants bred at the usual time in 1979 and 1980 (data in file at the Charles Darwin Research Station). The few breeding pairs found by Harris at Cabo Hammond in August 1971 may well have been due to the beginning of the 'el niño' phenomenon, the influx of warm, less saline and less productive waters from the Panama Bay reported for the period September 1971 to July 1972 (Maxwell 1974). We therefore suggest that throughout their range Flightless Cormorants breed mainly during the cold season, avoiding heat stress for the incubating or chick-guarding parents on land and taking advantage of peak marine productivity.

We thank the Galápagos National Park authorities for granting the permission to work at Cabo Hammond and the Charles Darwin Research Station directors Craig MacFarland and Hendrik N. Hoeck for their invaluable help.

REFERENCES

HARRIS, M. P. 1979. Population dynamics of the Flightless Cormorant *Nannopterum harrisi*. Ibis 121: 135–146.

HOUVENAGHEL, G. T. 1978. Oceanographic conditions in the Galápagos archipelago and their relationships with life on the islands. Boje, R. and Tomczak, M. (eds.). Berlin–Heidelberg–New York: Springer Verlag.

MAXWELL, D. C. 1974. Marine primary productivity of the Galapagos archipelago. Ph.D. thesis, Ohio State University.

Max-Planck-Institut für Verhaltensphysiologie, Abteilung Wickler, D-8131 Seewiesen, W-Germany

Post-nuptial primary moult in Dunlin *Calidris alpina*

JULIAN G. GREENWOOD

IBIS 125: 223–228 1983 Received 8 May 1981

Dunlins *Calidris alpina* from the western palaearctic are known to undergo post-nuptial primary moult away from the breeding grounds (Witherby *et al.* 1940), whereas those from the nearctic undergo post-nuptial primary moult on the breeding grounds (Holmes 1966a, 1971, Stresemann & Stresemann 1966). The transition between the two moult regimes occurs in the Russian arctic (Dementiev, Gladkov & Spanenberg 1969). Holmes (1971) found differences in the post-nuptial primary moult schedules between two populations in Alaska: at Barrow (northern Alaska) the onset of post-nuptial primary moult coincided with egg-laying and lasted about 70 days, whereas at the Yukon–Kuskokwim Delta (western Alaska) post-nuptial primary moult did not overlap and moult lasted about 97 days.

The present study aimed to determine the location of the transition between moult regimes in the Russian arctic and to determine the extent of variation in post-nuptial primary moult between populations moulting on the breeding grounds.

METHODS

Moult data were obtained from museum skins during a study of geographical variation in Dunlin (Greenwood 1979). All specimens from the breeding range were examined for moult. There was no evidence of primary moult in samples of Dunlin in the USSR west of the Ural mountains ($N = 23$) or in northern Scandinavia ($N = 43$). Those specimens in moult were allocated to one of six localities:

(1) Central USSR. Siberia south to 60°N, west to the Ural mountains and east to the Yenesei valley, and thence to 70°N.
(2) Eastern USSR. Siberia south to 60°N, west to the Yenesei valley and east to the Kamchatka peninsula.
(3) Western Alaska. Southern Alaska north to Cape Prince of Wales (65°N) and east to 141°W.
(4) Northern Alaska. Northern Alaska south to the Brooks Range (69°N).
(5) North-West Territories. North-West Territories south to 65°N and west to 105°W, Southampton Island, Prince of Wales Island and Somerset Island.
(6) Hudson Bay. North-West Territories north to 65°N and west to 105°W, Saskatchewan west to 105°W, Manitoba, and Ontario south to 49°N.

Like all other waders, Dunlin have ten main primary feathers and a much reduced

0019–1019/83/020223+06 $03.00/0