SOCIAL DOMINANCE AND REPRODUCTIVE SUCCESS IN A GOOSE FLOCK (ANSER INDICUS)

by

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(With 1 Figure)

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Introduction

Dominant males in quite a number of polygynous mammals and birds have been shown to command greater access to receptive females (e.g. review by DEWSBURY, 1982), but there is little evidence for advantages of dominant individuals or pairs in permanently monogamous species. However, fitness benefits through dominance in geese and swans have often been suspected: dominance may enable a family to feed first, and rest in the center of the aggregation without being pecked or chased (JENKINS, 1944; AKESSON & RAVELING, 1982). ALLEE (1951), admitting that the survival value of high rank had not then been demonstrated, suspected that "it may be felt in times of famine or during other periods of environmental stress". Yet quantitative support of these inferences is still scarce. COLLIAS & JAHN (1959) showed that high-ranking pairs of captive Canada geese were significantly more likely to hatch young. WÜRDINGER (1973) reported a positive correlation between estimated social rank and percent hatching success for six pairs of bar-headed geese. SCOTT (1978, cit. in 1980a) found that more dominant Bewick's swans spent more time feeding in the winter flock. She also reported that dominant pairs returned to the winter quarters with a greater number of young, and that nest desertion (apparently in captivity) occurred most often in low-ranking pairs (SCOTT, 1980b).

In the flock of bar-headed geese under study pairs more dominant in winter produced more offspring in the following summer (LAMPRECHT,
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A multiple regression analysis failed to explain this relationship by co-variation of dominance with age, weight, size or pairbond duration (LAMPRECHT, 1985). It seems that dominance increases reproductive success in some way, and therefore confers a selective advantage. Although this would suffice to explain the evolution of a propensity to dominate others, the social system is incompletely understood until it is known how this consequence of dominance ensues.

The annual reproductive success of a goose pair (measured here as the number of young fledged) is determined by the probability of laying and incubating eggs, by clutch size, and the probabilities that eggs hatch and hatchlings survive until fledging. These components of reproductive success may be influenced variously by dominance and other factors. This paper investigates, in a flock of semi-captive bar-headed geese, which components of annual reproductive success are positively related to a pair's dominance, and tries to develop hypotheses about how these relationships arise. As the mates' ages and their pairbond duration also correlated positively with reproductive success, data on these parameters are included and discussed in comparison with dominance.

Methods

1. The birds and their environment.

The semi-captive flock of bar-headed geese (Anser indicus) founded in 1956 (see WURDINGER, 1973) numbered 70-130 birds in the two study years. The individually ringed birds lived on the small Institute lake (7.8 ha) in Seewiesen (Southern Germany) with some 1000 m² of grazing area, the whole fenced in against disturbance. Pellet food was available ad lib. in—and sometimes outside—a big cage with a trapdoor, where birds were caught for sexing (cloacal inspection) and ringing in autumn. Occasionally wheat and crushed maize were scattered on the grazing area to attract the birds. Permanent food and an ice-free section of the lake kept most birds from leaving in winter.

Forty nest boxes supplied with straw were put pairwise on 20 floating platforms (2.5 x 2.5 m) anchored over about half the lake surface area at the beginning of April, 1982. In 1983 only about one fifth of the lake area was used, so that the birds' behaviour at all nests could be monitored from an observation tower on land. Until 1982 the 65 cm high nest boxes were closed, with only a narrow side entrance (details in WURDINGER, 1973). Otherwise identical open-topped boxes with walls 30 cm high were provided in 1983.

Only 30 (in 1982) and 29 (in 1983) pairs were present in both winter and summer and so could be used for the analysis. In 1982 one breeding pair hatched no young, but adopted the unaccompanied goslings of another pair. This latter pair was assigned hatching but no fledging success (for the purpose of this study), although the adopted young survived well. The foster parents were recorded as failed breeders with neither hatching nor fledging success, and were not used for the Table 1 analysis.

During laying and incubation nests were checked every second day in 1982 and daily in 1983 and eggs counted, examined and labelled.