Sexual activity of Pink-footed Geese *Anser brachyrhynchus* at a staging area in Iceland

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On 30 April and 1 May 1991 several of a group of 170 staging Pink-footed Geese feeding near the Bruara, at least 16 km from their nearest known nesting sites, engaged in sexual activities while visiting the river to bathe and drink. Some copulations seemed complete. These activities were contagious, and once elicited similar behaviour by White-fronted Geese sharing the bathing area, though the Greylag Geese in whose territories the activities occurred did not join in.

Inglis (1977), who studied the breeding behaviour of Pink-footed Geese *Anser brachyrhynchus* in 1973 at Thjorsarver (64°35'N, 18°40'W), their principal breeding colony in central Iceland, saw only one copulation and suggested that copulation had probably taken place before the pairs arrived there. In 1973, the first geese were seen at the colony on 8 May, the first nest was started on 14 May and the peak of nest-building was between 19 and 24 May, timings similar to those in earlier years (Gardarsson 1976).

In 1991, at a staging area 105 km southwest of Thjorsarver, we saw copulations and related activities as early as 30 April. Our observations were made incidentally in the course of a study of the distribution and feeding behaviour of Pink-footed, Greylag *A. anser* and Greenland White-fronted *A. albifrons flavirostris* Geese in southwest Iceland between their arrival from the British Isles in April and their onward movement to breeding areas in May. That larger study, by teams from The Wildfowl & Wetlands Trust, in 1986 and each year since 1989, will be reported elsewhere (Fox *et al.* 1991, 1992). It includes almost daily counts of geese along a road circuit of 30 km near Skalholt (64°07'N, 20°32'W). The northern limit is the farm Spoastadir, bounded by the Bruara, a tributary of the Hvita. There are small islands and sandbanks in the river, where the geese roost. The counts on that part of the circuit were usually made between 0830 h and 1030 h, when most geese were feeding in fields within 2 km of the river and few were on the river itself. No sexual activities by Pink-footed Geese were seen at that time of day.

Having noticed that more geese seemed to be on the river in the afternoon, HB spent from 1400 h to 1720 h on 30 April and 1300 h to 1525 h on 1 May at a point overlooking and 220 m from the most northerly island. About 170 Pink-footed Geese were present on both days, with none to 70 on the river during the observation periods. Most of the geese came from the fields in pairs or groups of four to eight, stayed for 5-30 minutes, then returned to feed. The only movements of larger numbers were in response to human disturbance. On both days the arrival of a vehicle on the far bank of the river drove off the geese and ended the watch.

Most of the geese in the area were Pink-footed, with up to 48 White-fronted and 16 Greylag Geese. The latter included three pairs that spent much of their time on or near the island and had frequent agonistic encounters, as well as engaging in sexual activity. Most of the Greylag Geese were likely to nest in the immediate vicinity, though no nests were seen.

White-fronted Geese do not breed in Iceland. Most of those that visited the river did so solely to drink or bathe, though one group did show sexual activity, when surrounded by active Pink-footed Geese, as noted below.

Pink-footed Geese have been said to breed on cliffs on the hill Vordufell, 6-10

km south of the site of these observations, but the majority of those using the area must breed at least 16 km away, along the valley Laxardalur, even if they do not go as far as Thjorsarver to do so. While the males of the pairs of Greylag Geese using the river were behaving as residents, showing some defence of areas on the islands and river banks as well as of "moving territories" around their mates, the Pink-footed Geese showed no attachment to sites.

The afternoons of 30 April and 1 May were warm (10-14°C) and sunny, with little wind on 30th. Temperatures in the previous week had been lower, with overcast skies and some rain. The improved weather may have encouraged geese to return to the river in the middle of the day, particularly because there were few spots in the fields where they could find water to drink.

When the Pink-footed Geese came to the river, most settled on the water, drank, bathed and preened. Most pairs kept a few body lengths away from their neighbours, with little overt hostility, and then stood, in the shallows or on the island just above the water's edge, for several minutes before flying off again. Some pairs became sexually active after drinking and bathing. The male began "head-dipping", the female responding slowly, or not at all. When a female did react, either by head-dipping or by lowering her head forward, the male usually tried to mount and to grasp the feathers on the nape of her neck in his bill. Some attempts were brief and clearly incomplete. Others were protracted and followed by the post-copulatory display (Johnsgard 1965).

When sexual activities were occurring it was difficult to pay sufficient attention both to the performance of a particular pair and to the behaviour of pairs nearby. Yet it was important to do so, because sexual displays were contagious. The clearest example began at 1314 h on 1 May. Eight pairs of Pink-footed Geese were standing in the shallow water on the east bank of the island. Using the letters A-H to record their positions, from south to north, complete copulations (cc) or incomplete attempts (ic) took place in the following sequence: 1315 h B, cc; 1317 h C, cc; 1319 h G, ic; 1321 h F, ic; 1322 h H, cc.

Pair C were closely accompanied by a yearling, presumably their offspring. At 1323, when all three birds were on land, C male ran at the yearling, which retreated; C female then moved into the water and dived, before bathing and returning to the island. A few minutes later the pair took off, after a brief head shake by the female, and were joined immediately by the yearling, which has been 15-20 m away. Two other copulations by pairs accompanied by yearlings were seen. In each case there were two yearlings with the pair. The adult males did not attack the yearlings, either before or after copulating.

In a group of three Greylag Geese, including a yearling that seemed less closely attached to the adults than did the young Pink-footed Geese, the adult male attacked the yearling vigorously almost immediately after completing the post-copulatory display. Fischer (1965) noted that parent Greylag Geese in a non-migratory flock drove off their progeny of the previous year at the time when copulation occurred.

The sexual activity of the Pink-footed Geese was noticeably less vigorous than that of the Greylags, which were also much noisier, particularly in post-copulatory displays. Whether this reflects a general difference between the species or that the Greylag Geese were closer to the start of nesting is not yet clear. Johnsgard (1965) noted that the post-copulatory display of Bean Geese *Anser fabalis* (in which he included *brachyrhynchus*), was not so conspicuous as that of *A. cygnoides*, but that the copulatory behaviour of the Greylag Goose was exactly like that of the White-fronted and Bean Geese.

The continual comings and goings of the geese, which were not individually recognizable (only one was marked with a leg-ring), and the difficulty of tracking the activities of all members of a group when it included five or more pairs, made it impracticable to keep a complete log of the sexual activity. Some of its frequency may be gathered from notes made when fewer than ten pairs were present: in 216 minutes of watching a total of 72 pairs (= 259 "pair-hours"), seven complete and 12 incomplete copulations were recorded. There were at least eight more cases in which females did not seem to respond to male head-dipping. Although the time spent in sexual activity was not measured, it represented only a small proportion of the period spent at the water. In two cases, pairs began head-dipping soon after arrival

and went back to the fields soon after copulating and in a third case the male began head-dipping almost immediately after arrival. In this case, eliciting no response from the female, the male started head-shaking and the female also changed to head-shaking and flew off from the water, followed by the male. In most cases departures took place from the island, or from standing in the shallows. When it was preceded by head-shaking the female usually seemed to take the initiative.

On 30 April, at a time when about 35 Pink-footed Geese were on the island or in the water, a male in a group of five swimming birds started head-dipping, then attempted to mount its nearest neighbour, apparently a female. She swam away, then walked ashore. The male resumed head-dipping, approaching another female. After displaying for nearly two minutes, while the female remained very still, the male mounted her, but did not succeed in completing the act. They both remained in the swimming group and after a little while could no longer be identified.

On 1 May, a group of 12 White-fronted Geese joined a rather larger number of Pink-footed Geese swimming off the south end of the island. Many of the geese began to bathe, a few engaging in "dashing-and-diving", and there were several mild threats and attacks, by individuals of both species. A pair of White-fronted Geese started head-dipping, rapidly imitated by two more pairs. The first two pairs soon stopped. The third pair proceeded to a complete copulation, promptly followed by the nearest pair of Pink-footed Geese. Before any more sexual activity could occur in the group of White-fronted Geese, three pairs of Pink-footed Geese swam through them, causing them to disperse and fly off.

Recording of the abdominal profiles (APs) of geese in the local flocks, using the scoring system devised by Owen (1981), has shown that the scores of paired female Pink-footed Geese increase rapidly in early May (Fox *et al.* 1990 and in prep.). The APs of four females seen copulating on 30 April and 1 May were: 1.5 - two, 2.5 - two. Other females seen in the vicinity on those days scored: 1.5 - eight, 2 - seven, 2.5 - five, 3 - one.

Two similar incidences of copulations amongst small groups of Pinkfeet were seen along rivers within 20 km of the above site in spring 1992.

Discussion

Though the sexual behaviour of Greylag Geese breeding in semi-captive flocks at temperate latitudes has been studied in detail (Fischer 1965, Lorenz 1979, 1988) remarkably little has been published about the sexual activities of geese breeding in the Arctic. Few copulations have been seen in nesting areas, so that some investigators have assumed that most copulations must occur on staging areas close to breeding places, where sexual activity is likely to be greatest. Kurechi & Fukuda (1983) saw single examples of copulation by White-fronted and Bean Geese at staging areas in Hokkaido, northern Japan. In subarctic and arctic Canada and Russia it would be difficult and expensive to search for geese in remote known areas, where the birds are likely to stay for only a few days, with a high risk of seeing very little.

The chance discovery that the geese roosting on the Bruara at Spoastadir (and presumably other comparable sites in Iceland) may enable the sexual behaviour of northern-breeding geese to be studied closely prompts questions about what needs to, and can, be found out. One obvious limitation of an opportunistic approach is that it is unlikely to provide data on the behaviour of marked individuals whose status is known, or can be readily established on site. The likelihood of being able to catch and mark geese in such places, and to do so without unsettling the birds, must be small. Watching unmarked individuals that lack distinguishing marks often produces confusing results. Yet, even when individual identities are uncertain, it should be possible to compare the activities of pairs accompanied by yearlings with those of unaccompanied pairs, and to establish whether the observation of a male attempting to mount two females in quick succession was exceptional. Should such behaviour prove to be common, there is a need to see whether it reflects temporary promiscuity by birds not yet in strongly-bonded pairs, or the occurrence of persistent polygynous relationships. Both have been reported in non-migratory flocks of Greylag Geese (Lorenz 1988).

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