

THICK-BILLED MURRES *URIA LOMVIA* REPLACE MATES DURING BREEDING

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Among most seabirds, including murres *Uria* spp., the breeding pair take turns incubating the eggs and feeding and brooding the nestlings (Lack 1968, Gaston 2004). This collaboration is usually critical to the rearing of the chick. Consequently, the death or disablement of one parent during breeding may result in reproductive failure.

In socially monogamous species, the death or disappearance of one parent during the pre-laying period frequently results in remating and successful reproduction by the surviving member of the original pair (Newton 1998). However, remating after eggs have been laid is a much rarer occurrence. There are sound evolutionary reasons why individuals should not help to rear nestlings to which they are not related (Hamilton 1964, Wilson 1975).

During studies of Thick-billed Murres *Uria lomvia* Gaston *et al.* (1993, 1995) showed that pairs will sometimes adopt eggs and chicks to which they are unrelated. This behaviour, while it may have some adaptive significance, can be interpreted as misdirected parental behaviour in a situation in which reproduction has been initiated, and the birds merely fail to distinguish between their own and a foreign offspring.

In this note, we describe two observations where non-parent birds joined a breeding pair after the loss of one of the original members in the course of breeding and adopted the role of parent. Both observations were made on the breeding colony at Coats Island, Nunavut, Canada, and both involved breeding pairs subject to daily observation throughout the breeding period.

Case 1

A pair, of which both birds were individually colour-banded, laid an egg at site D1 on 19 June 1999. The same pair had bred at this site annually since 1993. A chick was first observed at the site on 21 July. On 6 August a fight between two unidentified adults was observed at the site, following which an unbanded bird occupied the site. The original female (band number 996-01920) was seen at the site frequently thereafter, continued to feed the chick and was seen to exchange brooding duty with an unbanded bird at the site at least twice. The unbanded bird was seen sheltering and preening the chick, but was not observed to feed it. The original male was not observed after 6 August.

At 18h55 on 22 August, an unbanded bird was present at the site with the fully feathered chick. The female arrived without a fish and departed again at 19h00. Soon after, the chick, which had been exercising its wings, moved to the edge of the ledge and jumped, followed closely by the unbanded bird from the site. The two birds landed on the sea close together. They were watched for another nine minutes, during which time the adult drove off

several mobbing birds. The chick stuck closely to the adult, and the two moved steadily towards the open sea on the heading typically adopted by departing adult-chick pairs.

We interpret our observations to indicate that the original male was ousted by a new, unbanded male soon after the chick hatched. The fact that the original fight was not followed by a prolonged period of aggressive interactions at the site (as described, for example, by Gaston and Nettleship 1981, pp. 50–51) suggests either that the original male was sick or injured at the time of the fight, or that it was disabled during the fight. The new male assisted in brooding the chick, but was not observed feeding it. The 32-day nestling period observed for this chick is extremely long for this species (usually about 21 days [Gaston & Hipfner 2000]). The adopting adult departed to sea with the chick. The original female—plus an unbanded male—was present at the same site the following year, but we do not know whether the male was the same as the previous year's adopter.

Case 2

On 30 July 2004, as part of a routine banding operation at Coats Island, Nunavut, Canada, we caught a 17-year old female Thick-billed Murre (996-07237), which at that time was brooding a seven-day-old chick. Unfortunately, and for no apparent reason, the bird died in the hand, although handling did not differ from that used with more than 3000 adults trapped previously at Coats Island. (Two other birds trapped in earlier years had died in similarly inexplicable circumstances.)

We continued to observe the breeding site (Q64) daily until 14 August, when we left the area. The chick was seen to be present and apparently healthy until our departure. Initially, the chick was sometimes unattended, presumably because the male parent was away foraging. The chick was sometimes brooded by neighbours during this period. On 8 and 14 August, we carried out continuous 24-hour watches to determine feeding rates by all marked birds at study plot Q, which included site Q64. On 8 August we observed two changeovers of brooding duty at site Q64, as well as two feeds delivered to the chick, both by the original male parent (band 996-80537). The new presumed female (996-70765) had previously bred in 1998 and 1999 on site Q5—a site where chicks are almost never reared and which frequently has been occupied by inexperienced breeders.

On 14 August the new female was brooding the chick at dawn and was relieved by her mate (996-80537) at 10h07. The new female then delivered four fish, all Capelin *Mallotus villosus* to the chick, the last at 21h27 when the pair switched over brooding duty again. This rate of feeding was above average for the age of the chick (21 days: the median age of departure for chicks at the Coats Island

colony [AJG unpubl. data]). The observed schedule of a roughly 12-hour brooding shift, with the female present during the night and the male during the day is typical of Thick-billed Murres at the Coats Island colony (Kober & Gaston 2004).

From our observations, it appears that the female that died was replaced within a few days by another female that undertook at least some of the brooding duties by 7 August and that was behaving like a normal parent by 14 August, two weeks after the death of the original female. We had not observed the new female in 2004 on any adjacent sites before the death of 996-07237. It had not been seen anywhere on the plot in the previous four seasons. However, its original site, Q5, was about 0.5 m vertically above Q64. It is possible that this female had been paying brief visits to the area throughout the season, but had not been seen, because most band numbers are read only after prolonged observation. In 2005, the adopting parent was present, along with the original male, at the same site. They succeeded in rearing a chick—presumably the result of an egg laid by the new female.

These two observations, although anecdotal, provide two important pieces of information:

- For unmarked pairs, the fact that we do not observe the loss of a breeding pair member does not necessarily indicate that no mortality has happened during breeding, even if reproduction proceeds normally.
- Not all adoption relates to misdirected parental care, because the adopting bird in case 2 was not resident close to the site before the loss of the original female. Reproduction by pairs occupying site Q64 generally has been successful, with chicks reared in more than half of the 15 years for which observations have been made. Likewise, reproduction at site D1 was >50% successful during 1990–1999. Hence, in both cases, adopting birds gained access to good quality sites. The adopting female in case 2 (996-70765) obtained a site known to be better than one that it had occupied earlier. It reared a nestling at that site in 2005. It appears that adoption can lead to increased reproductive success in subsequent years.

The aggregate of observations made at the Coats Island colony since 1988 demonstrate that adoption of eggs or nestlings by Thick-billed Murres is a regular, though rare occurrence (Gaston *et al.* 1993, 1995, this paper). We estimate that, under conditions where no disturbance occurs, it probably involves less than 1% of breeding attempts. However, whenever disturbance to breeding

sites occurs, causing adults to leave ledges, and especially if eggs or chicks roll or fall from sites, adoption of eggs (stealing) and chicks is a possibility.

Because the events described in this paper could not have been recorded without the presence of pairs where both birds were individually marked, it is difficult to assess how common this type of adoption may be in murre colonies generally. We suspect that it is rare, because we have seldom known banded birds to disappear during breeding. Under natural conditions it seems unlikely that it would occur in more than a few percent of breeding attempts. However, the fact that it occurs at all is testimony to the importance for murres of securing a good quality breeding site.

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