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A Case of Bigamy in the European Bee-eater (*Merops apiaster*)

M. I. AVERY,[1,2] J. R. KREBS,[3] AND R. E. HEGNER[3,4]
[1]*Department of Zoology, Tillydrone Avenue, Aberdeen AB9 2TN United Kingdom and*
[3]*Edward Grey Institute for Field Ornithology, Zoology Department, South Parks Road, Oxford OX1 3PS United Kingdom*

The European Bee-eater (*Merops apiaster*) is a 50-g colonial insectivorous bird. The usual course of events in our study area in the Camargue, France is that birds arrive in May and renovate or dig nest burrows. Males defend perches near their nests, at which "courtship" feeding takes place (Swift 1959, Avery et al. in prep.). During incubation, the eggs are rarely left unattended. Both sexes incubate by day (the male spends just over half this time on the nest), and at night the female roosts on the nest (Avery and Krebs unpubl. data). Both parents feed the young, and they are sometimes aided by another bird, which, at least sometimes, is a close relative (Dyer and Demeter 1981, Krebs and Avery unpubl. data). This note deals with a case of bigamy. Although only a single case, we think it is worth reporting, because bigamy is rare in species in which helpers occur (Wolfenden 1976) and the situation developed in an interesting way.

During the period of egg laying, our attention was drawn to two pairs (A and B) who occupied adjacent nest burrows (about 2 m apart). Both males were feeding and copulating with their own females. Over a period of 3 days, male A frequently attacked male B and eventually drove him from his nest site. We do not know what happened to male B, but we were able to follow the behavior of male A and his two females. Male A brought food to both females and mated with both of them during the period of egg laying (Table 1). Often both females would be outside their nest burrows at the same time, and male A frequently fed them both during these periods. On two occasions male A copulated with both females in the space of a minute. We saw no behaviors that would suggest that female B was unwilling to mate with male A, nor did we see any aggressive interactions between the females.

During incubation, female B received no help from male A. She incubated the eggs alone and hatched all of them, even though the nest was left unattended for about 35% of the day-light hours. Male A was never seen to take food to nest B, which had the lowest feeding rate of nine nests that were watched. Female B's mean feeding rate was 1.1 visits/h, compared with 4.43 ± 0.45 (mean $\pm$ SE) visits/h for eight paired females at the same colony during the same time. Presumably because of this, the weight of nestlings in nest A (118 g) was greater than that of those in nest B (55 g). (The two nests began to hatch on the same day, and brood size was six in each case.) Both nests failed, as did many others, probably because of a period of bad weather.

Out of over 100 other nests we have watched, 2 have been attended by lone females during the nestling stage. We do not know whether or not these were bigamous females, although it is possible that they were.

This example of bigamy is interesting, because it does not fit with current hypotheses about the adaptive value of polygyny. Orians (1969) argued that females may sometimes gain by being the second female on a good territory rather than a lone female on a poor territory, and Pleszczynska (1978) was able to manipulate territory quality to produce polygyny. This is not the case here; female B already had access to the nest site when her mate was displaced. Alatalo et al. (1981) suggested that male Pied Flycatchers (*Ficedula hypoleuca*) could "trick" females into mating with them by setting up new territories while their

TABLE 1. The behavior of male A toward the two females and their nests.

Behavior	Frequency	
	Nest A	Nest B
Copulations	6	7
Feeding of female (visits)	72	11
Feeding of nestlings (visits)	45	0

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[2] Present address: Edward Grey Institute for Field Ornithology, Zoology Department, South Parks Road, Oxford OX1 3PS United Kingdom.

[4] Present address: The Rockefeller University Field Research Center, Tyrrel Road, Millbrook, New York 12545 USA.

mates were incubating. Again, this is not similar to the case reported here, because male A attended to both females at the same time and within full view of each.

Because we do not know whether or not male A succeeded in fertilizing female B nor do we know what the outcome of female B's nest would have been under better weather conditions, we cannot assess the effects of bigamy on reproductive success of male or female bee-eaters. In view of the apparent rarity of bigamy in this species, it is possible that bigamy is not adaptive but that it occasionally results by accident.

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A Large Concentration of Roosting Golden Eagles in Southeastern Idaho

T. H. CRAIG[1] AND E. H. CRAIG[1]
Department of Biology, Northwest Nazarene College, Nampa, Idaho 83651 USA

Communal roosting by Bald Eagles (*Haliaeetus leucocephalus*) is a common occurrence (Swisher 1964, Servheen 1975, Fitzner and Hanson 1979), but this behavior has not been reported for Golden Eagles (*Aquila chrysaetos*; Snow 1973). Thurow et al. (1980), however, observed six immature Golden Eagles roosting in the same canyon in southern Idaho, although not communally, and immature Golden Eagles have been known to share roost sites with Bald Eagles (Edwards 1969). In this paper we describe a large concentration of nocturnally roosting Golden Eagles, some of which roosted communally on power line structures.

The study site was located at the Idaho National Engineering Laboratory (INEL), which encompasses 231,600 ha and is administered by the U.S. Department of Energy. The INEL is located on the upper Snake River Plain (average elevation: 1,524 m) and is covered primarily by sagebrush-grass vegetation (Harniss and West 1973), big sagebrush (*Artemisia tridentata*) being the most conspicuous plant. Temperatures during the coldest and warmest months of this study ranged from a lowest daily minimum of −35.6°C in February and −13.9°C in April 1982 to a highest daily maximum of 9.4°C in February and 14.4°C in April (National Oceanic and Atmospheric Administration records for Central Facilities Area, CFA).

Evening inventories of roosting eagles were conducted periodically from early February through mid-April 1982. Four roads adjacent to power lines were selected as survey routes on the study area (Fig. 1). A total of 9 surveys were conducted along route 4, 7 surveys along route 3, and 1 survey each along routes 1 and 2.

Surveys were conducted from about 15 min before sunset until dark on calm evenings, because we observed that most eagles had arrived at their roost sites by this time. We inventoried the routes by driving along paved roads and recording every eagle sighted and the number of birds roosting per pole. The direction driven on the routes was reversed on consecutive survey days, and, in most cases, eagles remained perched as we passed them. The actual roosting places on the structures were recorded on 14 of the surveys. Data on roosting preferences of eagles perched on structures of atypical design, such as angle points or short distribution lines, were lumped with those of birds seen on common power-pole types (Fig. 2). Olendorff et al. (1981) have provided a description of power-pole dimensions and configurations like those found on the INEL. The distance from roads to the power lines varied, but we calculated eagle densities by assuming that we saw

[1] Present address: Box 1, Lee Creek Road, Leadore, Idaho 83464 USA.