

VARIABLE EXPRESSION OF SEXUALLY MOSAIC PLUMAGE IN FEMALE LESSER KESTRELS¹

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The Lesser Kestrel (*Falco naumanni*) is sexually dimorphic with respect to plumage coloration (Cramp and Simmons 1980). Adult males have a gray-blue head, rump, tail and upper wing-coverts, unspotted chestnut mantle and scapulars, pink-buff to cream with some dark brown marks on the breast, belly and flanks, and a black subterminal tail band. Yearling (i.e., second-calendar year) males differ because upper wing coverts are brown with dark bars, showing variable extension of gray and brown in the head and tail. Females are completely brownish, independent of age, with dark bars on the head, back and tail, and stripes on the breast and belly. Nestlings show sexual dimorphism in the rump, and sometimes in tail color (grayish in males, brownish in females) (Negro and Hiraldo 1991, Tella et al. 1996a). Both sexes have a partial post-juvinal molt (October–May), and a complete post-breeding molt (June–January) in yearling and older birds.

Between 1993 and 1995, we captured and color banded 389 female Lesser Kestrels in Los Monegros (NE Spain, Tella et al. 1996b). Most of them had already been banded as nestlings in the previous five years, enabling us to determine their exact age. Looking for plumage variability of these females, we found two of them showing male and female plumage expressed in a mosaic fashion.

The first one (OM), a three-year-old female, was caught on 1 May 1993. The left half of its head was like that of a male (gray) and the right side like that of a female (striped brown), and the rest of its plumage was normal. The same female was recaptured on 7 April and 21 June 1994, and it showed no male color patches. However, we trapped OM again on 26 May and 7 June 1995, and again it showed partial male coloration. On this occasion, we photographed the bird to add to our detailed descriptions. The head was bilaterally colored, gray in the left and striped brown in the right. Moreover, the left wing was more similar to that of yearling males than to that of females, with almost unspotted chestnut lesser and middle wing coverts, and banded greater covers. The tail also had one grayish central rectrix. The rest of the plumage was

typical of females. The second female (2L), a two-year-old bird, was trapped twice, on 5 May 1993 and on 1 May 1994. It presented the same plumage described above with respect to head and wings, but male coloration was emphasized, up to the point of making us doubt whether it was a yearling male with half a side of a female individual, or vice versa. Body measurements of both females were not different from the other females caught in the area.

The occurrence of sexually mosaic plumages is an uncommon phenomenon in birds, and no clear mechanisms are known to explain it. Individuals that appear to be one-half male and one-half female have been named gynandromorphs (Van Oordt 1931, Campbell and Lack 1985), and are known to possess one ovary and one testis. Assuming sex-linked differences in plumage, bilateral gynanders will externally reflect the place of gonads, but it may also result when an ovary and an ootestis, or a mixed, undifferentiated gonad, are present (Parrish et al. 1987). A case of gynandromorphism was attributed to a specimen of a female American Kestrel (*F. sparverius*) (Brodkorb 1935), but no gonadal inspection was done. Parrish et al. (1987) reported a similar case in a female American Kestrel. However, they failed to find any apparently gonadal abnormalities, thus the bird showed a sexually mosaic plumage rather than being a gynandromorph in the strict sense. We were not able to know the gonadal composition of our two females, but at least OM can be considered as normally fertile. This female was paired all three years (1993, 1994, 1995) with adult males, laid three eggs every year, and raised three, two and three chicks, respectively. By means of behavioral observations, we can discard the possibility that these broods were the result of polygyny (Hiraldo et al. 1991, Tella et al. 1996c), since no other females were seen paired with the same mate. Moreover, DNA-fingerprinting analysis revealed that all the three chicks hatched in 1993 were attributable to this female (Negro et al. 1996). Regarding female 2L, we were not able to confirm its reproduction, but both years this female was caught at nests with a mate. Its body mass indicated that the female was near to egg-laying, and successful broods were raised in those nests.

Parrish et al. (1987) proposed that sexually mosaic plumages could result from some abnormalities in the endocrine system of birds, that could provoke an imbalance between medullary (male) and cortical (female) hormonal components of gonads. Since androgens have a function in adult female birds, and are considered to influence the expression of some male secondary sexual

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characters (Balthazart 1983, Ligon et al. 1990, Potti 1993, Saino and Moller 1994), unusual increased levels of androgens could account for the simultaneous expression of male and female plumages. Supporting this, Andersson (1994) suggests in a recent review that both sexes carry the genes influencing secondary sex differences, and the differences in expression by males and females could be due to sex-specific hormones (i.e. testosterone in males, estrogen in females). Owens and Short (1995) propose that the showy breeding male plumage is the neutral stage of development, and that the cryptic female plumage is induced by the production of estrogen. In fact, Van Oordt (1931) already reported domestic hens showing male plumage after castration, but no plumage changes in castrated cocks. However, Owens and Short (1995) affirm that in species showing the same male plumage throughout the year, such as the Lesser Kestrel, plumage dimorphism is under direct genetic control, and in no case testosterone dependent. Our findings do not support an exclusive genetic control, since at least one female did not express mosaic plumage every year. Differential loads of estrogen or testosterone between years could explain the irregular appearance of mosaic plumages in genetically predisposed females. More experimental work on genetics and physiology would be advisable to clarify the origin of sexual plumage patches and, in general, of sexual dimorphism in color in birds.

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