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SHORT COMMUNICATIONS

Size dimorphism in mated pairs of American Kestrels.—The degree of dimorphism between males and females has been examined in a number of raptors (Storer 1966, Reynolds 1972, Balgooyen 1976, Snyder and Wiley 1976), but few studies have reported the amount of dimorphism between mated pairs of birds. If the maintenance of a size difference within pairs is adaptive, then one would predict that selective mating would occur to minimize instances of overlap. American Kestrels (*Falco sparverius*) are only slightly dimorphic, with some overlap between the sexes (Brown and Amadon 1968). In captivity, American Kestrel pairs consisting of a small female and a large male were as productive as were pairs of large females and small males, leading Willoughby and Cade (1964) to conclude that large female size was not necessary for normal behavioral interactions or successful egg production. Whether such size variance occurs in naturally paired birds, however, is unknown. Here I report tarsal lengths and weights of mated pairs of wild American Kestrels and examine them for patterns of selective mating.

During 1982–1984 I studied mate replacement in American Kestrels in southwestern Quebec (Bowman and Bird 1986). In that study, I removed one member of a pair from each of 20 pairs of birds. Prior to the removal of a bird's mate, I trapped, banded, measured, and released the artificially widowed bird. Later its mate was also trapped and measured, and was kept in captivity until the end of the experiments. Females were trapped on the nest during the third week of incubation. Males were trapped with bow nets or with mist nets, using a live owl decoy, approximately 6–10 days after the trapping of their mates. Weights were taken to the nearest 0.1 g with a Pesola 300-g scale, and tarsal length was measured to the nearest 0.1 mm with Vernier calipers following the methods described by Bird and Lague (1982). I calculated a dimorphism index (DI_p) for each pair, using both tarsal length and the cube root of weight (Storer 1966).

I found that females were, on average, 28.6% heavier than their mates, and that they had 4.7% longer tarsi (Table 1). Although Balgooyen (1976) reported a mean female weight of 117.7 g (vs 147.1 g for this study), he did not state at which time of year females were weighed. Village (1983) reported that female Eurasian Kestrels (*F. tinnunculus*) gained weight before egg laying and maintained it through incubation. If this is true for American Kestrels, we should expect a higher mean weight for females during incubation.

Pair dimorphism indices for weight ranged from 1.3 to 15.5 (Table 1). Indices calculated from tarsal length ranged from −4.5 to 13.2 (Table 1), with 2 males having longer tarsi than their mates. The mean pair dimorphism index (DI_p) (Table 1) was similar to dimorphism indices for the entire sample (DI_s) based on the mean cube root of weight ($DI_s = 8.5$) and mean tarsal length ($DI_s = 4.6$). I found no correlation between male and female weight ($r_s = -0.227$, $P > 0.1$), nor between male and female tarsal length ($r_s = 0.269$, $P > 0.1$).

Female weight and tarsal length were correlated ($r_s = 0.552$, $P < 0.05$), but male weight and tarsal length were not ($r_s = 0.413$, $P > 0.05$), suggesting that male weight is not merely a function of body size. Female body weight during incubation is a function of male feeding efficiency (Newton 1979), thus females whose weight was greater than predicted by regression with tarsal length were assumed to have "quality" mates. I found no correlation, however, between male and female deviations from their predicted weight based on tarsal length ($r_s = -0.323$, $P > 0.05$), though the tendency was for heavy females to have lightweight mates. This suggests the possibility of either assortative mating or variation in male feeding effort. Female deviation from predicted weight was not correlated with the pair dimorphism index

TABLE 1

WEIGHT, TARSAL LENGTH, AND DIMORPHISM INDICES (DI_p)[a] FOR MATED PAIRS OF AMERICAN KESTRELS

	Weight (g)			Tarsal length (mm)		
Pair no.	Male	Female	DI_p	Male	Female	DI_p
1	126	145	4.7	41.9	41.4	−1.2
2	114	167	12.7	38.2	43.6	13.2
3	121	145	6.0	39.3	43.2	9.5
4	126	131	1.3	37.0	39.4	6.3
5	118	159	9.9	38.7	41.3	6.5
6	106	167	15.1	38.1	40.3	5.6
7	108	146	10.0	38.2	39.9	4.4
8	116	130	3.8	38.7	38.9	0.5
9	117	149	8.1	38.1	40.1	5.1
10	112	139	7.2	38.5	39.4	2.3
11	121	149	6.9	39.0	40.7	4.3
12	101	150	13.2	38.0	41.2	8.1
13	120	151	7.7	39.2	41.1	4.7
14	94	150	15.5	38.6	39.9	3.3
15	111	132	5.8	38.0	30.0	2.6
16	120	140	5.1	39.1	40.1	2.5
17	109	141	8.6	38.1	40.1	5.1
18	121	140	5.1	38.6	39.1	1.3
19	119	160	9.9	37.4	40.2	7.2
20	108	151	11.2	38.5	36.8	−4.5
$\bar{x} =$	114.4	147.1	8.4	38.5	40.3	4.3
SD =	8.2	10.6	3.8	1.00	2.10	3.9

[a] DI_p = 100(female parameter − male parameter)/0.5(female parameter + male parameter). Modified from Storer (1966).

based on tarsal length ($r_s = 0.243$, $P > 0.05$), as would be expected if assortative mating was occurring. Female deviation from predicted weight was, however, significantly correlated with the dimorphism index based on weight ($r_s = 0.768$, $P < 0.01$); suggesting that as male feeding effort increases female weight increases and male weight decreases. As male feeding effort varies, we should not expect a correlation between tarsal length and weight in male kestrels during incubation.

Storer (1966) and Amadon (1975) reported that the more insectivorous races of American Kestrels were less dimorphic than the more rodent-eating races. Among 3 subspecies, *F. s. sparverius* is the most dimorphic. However, at least in tarsal length, my data show that some size overlap exists within mated pairs. My results suggest that kestrels are pairing randomly with respect to these characters. Kemp (1987) found a large degree of overlap between mated pairs of Greater Kestrels (*F. rupidcoloides*) suggesting no assortative mating in this slightly dimorphic species. European Sparrowhawks (*Accipiter nisus*) paired randomly with respect to wing length (Newton et al. 1983).

Most theoretical discussions of reversed size dimorphism (RSD) assume that it is an adaptive character associated with a raptorial lifestyle (Snyder and Wiley 1976). Recently, Mueller (1986) suggested that RSD can evolve only through sexual selection, and that appreciable RSD can evolve only if there is selection both for large females and for small males. One prediction of this hypothesis is that in species in which sexual size overlap occurs, assortative mating should also occur. My data fail to support this hypothesis in American Kestrels. Additional research comparing assortative mating patterns, pair dimorphism, and reproductive success is needed to test Mueller's hypothesis further.

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