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ORIENTATION OF AMERICAN KESTREL NEST CAVITIES: REVISITED

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Recently, Raphael (1985) reviewed Balgooyen's (1976) orientation data of American Kestrel (*Falco sparverius*) nest cavities and trees at Sagehen Creek, 1800 m elevation, Sierra and Nevada Counties, California. Balgooyen suggested that kestrels select nest cavities with east-facing exposures to gain a thermal advantage. Raphael confirmed a preference for east-facing cavities when alternatives were available.

Assuming a thermal advantage, woodpeckers and kestrels could prefer, or be independent of certain environmental temperatures, thus possibly forcing species to compete for cavities. Clearly, available cavities are neither evenly spaced nor random in orientation (Raphael 1985) suggesting, among other possibilities, that these species are not independent of the thermal environment particularly in "cold" environments. At Sagehen Creek, inclement weather during the breeding season enters from the South (SE, S, SW). Predictably, both kestrels (19.0%, N = 11/58) and woodpeckers (21.9%, N = 23/105) avoid this "cold" direction. In addition, both kestrels (25.8%, N = 15/58) and woodpeckers (28.6%, N = 30/105) nested at relatively low frequency in the "hot" directions of the West (SW, W, NW) (Balgooyen 1976, Raphael 1985).

Woodpecker cavities were oriented to the North (N = 105, mean azimuth = 14°), yet kestrels, which depend on woodpeckers, (60.53%, N = 35/58, mean azimuth = 59°) and woodpeckers (only 40.0%, N = 42/105) nested in cavities facing easterly. The opposite occurred to the North with nesting frequencies of 41.3% (N = 24/58) for kestrels and 57.1% (N = 60/105) for woodpeckers. It is possible that woodpeckers and kestrels possess different thermal preferences during nesting, kestrels seemingly preferring warmer places than woodpeckers. An apparent difference in thermal preference might reflect different racial histories of woodpeckers from northern areas and kestrels from grassland-savanna systems. There is, however, opportunity for direct competition for a given cavity. This has been directly but infrequently observed at Sagehen Creek (Balgooyen 1976).

In 1983, 29 breeding pairs of American Kestrels were located in western Venezuela. In the States of Zulia and Tachira, 23 of the 29 pairs nested within the southwestern base of the Andes Mountains south of Lake Maracaibo (8°2'N Lat., 72°16'W Long). Four pairs nested in the basin of the Rio Chama, Merida, 1 pair resided in Barquisimeto, Lara, and the last pair nested near Barines, Barines. A wet nonbreeding and dry breeding season characterize the

Table 1. Nest orientation of American Kestrel nests in western Venezuela, S.A.

DIRECTION	MIDPOINT AZIMUTH OF GROUP (°)	NEST ENTRANCE ORIENTATION (N = 29)	%
North	0	7	24.1
Northeast	45	2	6.9
East	90	2	6.9
Southeast	135	2	6.9
South	180	7	24.1
Southwest	225	3	10.3
West	270	2	6.9
Northwest	315	4	13.8

area (Balgooyen 1989). During the breeding season (December to April), high humidity, high temperatures, and moderate breezes along a NS axis persist in the general area of study. Lands have been cleared for cattle production with intensive management by tilling and planting of non-native grasses.

Palms held 14 of 29 (48.3%), araguaney (*Tabebuia chrysantha*) and ceiba (*Ceiba pentandra*) trees possessed excavated cavities for the remainder. Nesting at the base of palm fronds provided an opportunity for kestrels nesting in all compass orientations. A working hypothesis that kestrels avoid heat by nesting into the wind and away from direct sunlight needs testing. The G-Test with a William's correction (Sokal and Rohlf 1981) statistically compares the frequencies of nest orientation (Table 1) in the compass corridors of N-S, E-W (90°), NE-SW (45°), and NW-S (120°). Depending upon local conditions, the windy corridor consisted of nests oriented N-S (N = 13), NW (N = 1), and NE (N = 1) or 15 of 29 nests faced into the prevailing winds. The "sun" corridor of E-W included 4 of the total nests. In two cases of nest destruction, pairs selected new sites similar to their former cavities with directions avoiding heat. Analysis by the G-Test (G_{adj} = 9.75, $\chi^2_{(0.05)}$ = 7.82) indicates that kestrel nest sites are not uniformly distributed (P = 0.025). The windy corridor seems favored by tropical kestrels.

One palm held a wasp's nest oriented to the N, a yellow-headed parrot (*Amazona orchocephala*) nest oriented to the NW, a tropical screech owl (*Otus asio choliba*) nest oriented to the SE, and a kestrel pair was the last to breed which may have limited the nest orientation to the vacant "hot" position in the East. Three eggs were laid and hatched, one young died, and two individuals fledged.

While further study is in order, kestrels may select a nest with an orientation in relation to the thermal demands of the environment in both North and South America. My thanks to Martin G. Raphael for comments and to Bill Bros for statistical analysis on this communication.

RESUMEN.—Mientras que los gavilanes primitivo (*Falco sparverius*) de la Sierra Nevada en California prefieren cavidades para sus nidos con orientación hacia el este y oeste, gavilanes de los llanos de Venezuela ocupan nidos que cavean los vientos (de norte a sur). Los gavilanes pueden seleccionar cavidades para sus nidos en relacion a las características termales del ambiente.

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CANNIBALISM BY BLACK KITE (*Milvus migrans*)

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Acts of cannibalism by birds are difficult to witness because of their brevity and thus may be underrecorded at nests. Among raptors, cannibalism has been considered rare and incidental to brood reduction (Mock 1984) but may be selected for if food is in short supply or unpredictable (see Alexander 1974).

We report on an adult Black Kite (*Milvus migrans*) eating a Black Kite nestling, indirect evidence of cannibalism by Black Kite in the same area and discuss a possible influence of food shortage. Black Kite nestlings have previously been found partly eaten by siblings in the Biological Reserve of Doñana on 4 occasions (Delibes 1975)

Observations of nesting Black Kites were made in the Pinar del Faro and elsewhere in Doñana National Park, Spain (36°48′N, 6°22′W). On 18 June 1987 at 1130 H

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