COMMENTS ON THE AMERICAN KESTREL *FALCO SPARVERIUS* (AVES: FALCONIDAE) IN THE WEST INDIES

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POLYMORPHISM WITHIN WEST INDIAN POPULATIONS of the American Kestrel (*Falco sparverius*) has been a controversial topic in the taxonomy of this New World species (Bond 1936, Barbour 1943, Garrido and García 1975, Berovides and Fernández 1984, Buden 1987, Garrido et al. 1997). Although these and other authors have assigned new races to West Indian populations based partly on plumage characteristics, the distribution of the races within the Caribbean is poorly defined. Plumage coloration and patterns in these kestrel populations are more variable than the morphometric characteristics of these subspecies. *Falco s. sparveroides*, described for Cuba and the Isla de la Juventud (formerly Isla de Pinos), and additionally reported from the Bahamas, may well constitute the key to clarify the origin of dispersion of these raptors in the West Indies. Here I report on my studies of populations from Cuba, Jamaica, the Bahamas, and Hispaniola.

METHODS

I examined all available specimens of the American Kestrel in eight Cuban and two Jamaican collections. However, for this study, I selected 19 Cuban specimens collected in central and eastern Cuba because that region is faunistically more closely related to the faunal regions of the Bahamas, Hispaniola, and Jamaica than is the region of western Cuba and the Isla de la Juventud. All measurements follow Baldwin et al. (1931) and were taken to the nearest millimeter using dial calipers, except for the wing chord, for which I used a chord ruler. The culmen length was measured from the tip to the anterior edge of the nostril. The general coloration and feather patterns described in this study are based on notes taken of living individuals and museum specimens.

RESULTS AND DISCUSSION

In the first edition of his *Birds of the West Indies* (1936), Bond does not mention the American Kestrel as inhabiting Jamaica. The lack of observations and specimens before ca. 1950 indicates that the species became established on Jamaica thereafter (Haynes Sutton and Sutton, ms.). Of course, small numbers of kestrels in some natural areas may have gone unobserved by naturalists in the nineteenth and first half of the twentieth centuries.

At first, the Cuban population of the American Kestrel was not recognized by Bond (1936) as belonging to the *sparveroides* race, but he assigned it to the Hispaniolan subspecies, *F. s. dominicensis*. However, during the last four decades, several authors separately suggested that the Cuban race extended its range through invasion of new territories to the northeast (Bahamas) and southeast (Jamaica), but not to Hispaniola and Puerto Rico (Bond 1956, 1964, 1970, 1978, 1980, 1986, 1987; Garrido and Garcia 1975; Buden 1987). Bond (1956:33) considered four Jamaican specimens examined by him as belonging to *F. s. dominicensis* and, until 1979, maintained that the Jamaican population was part of the Hispaniolan population. However, Bond (1980:3) later mentioned two red phase kestrels that were observed in Jamaica and Haiti (evidently members of the Cuban race, *sparveroides*).

Buden (1987) assigned specimens from Great Inagua, Little Inagua, Crooked Island, Rum Cay, and San Salvador to the Cuban subspecies, *F. s. sparveroides*, noting that considerable pattern and color variation existed among *sparveroides* individuals. To date, Buden has determined the distribution of two races: *F. s. sparveroides* inhabits Cuba, Isla de la Juventud, the southern Bahamas, Rum Cay, and San Salvador, whereas *F. s. dominicensis* inhabits Hispaniola and Jamaica (Fig. 1).

Hellmayr and Conover (1949) reported that *F. s. sparveroides* and *F. s. dominicensis* were similar, although the latter is somewhat larger and never as strongly reddish-tinted as the Cuban populations. Buden (1987) also described the coloration of the specimen of the *dominicensis* race of Hispaniola. I analyzed these characteristics in the specimens in the Jamaican collections (Institute of Jamaica and Audrey Downer's private collection).

In the Cuban archipelago, except some larger cays (e.g., Cayo Coco, Cayo Romano, and Cayo Largo) where the kestrel populations are consistent in pattern and color, conspicuous differences in these characters are evident among populations throughout Cuba and the Isla de la Juventud. Individuals in western populations often have red breasts with black markings on the chest and abdomen. These are possibly descendants of *F. s. tropicalis* of Yucatán. The black markings on the undersides fade as one proceeds toward eastern Cuba, where the red-breasted morph also occurs, but with only faint vestiges of the markings.

The so-called "intermediate morph" of Cuba (red chest and beige abdomen) may or may not have black markings, but this morph is extremely variable and futher studies (already begun) are needed to determine the distribution of the variabilities in the archipelago. The upper chest of the white phase is typically immaculate white or may have a slight reddish tint, but a few individuals have markings similar to those of *F. s. sparverius*, especially in the black markings of the chest, flanks, and abdomen, as well as faint markings in the bands on the outer rectrices. Some individuals of the *sparverius* race collected in Cuba display deeply

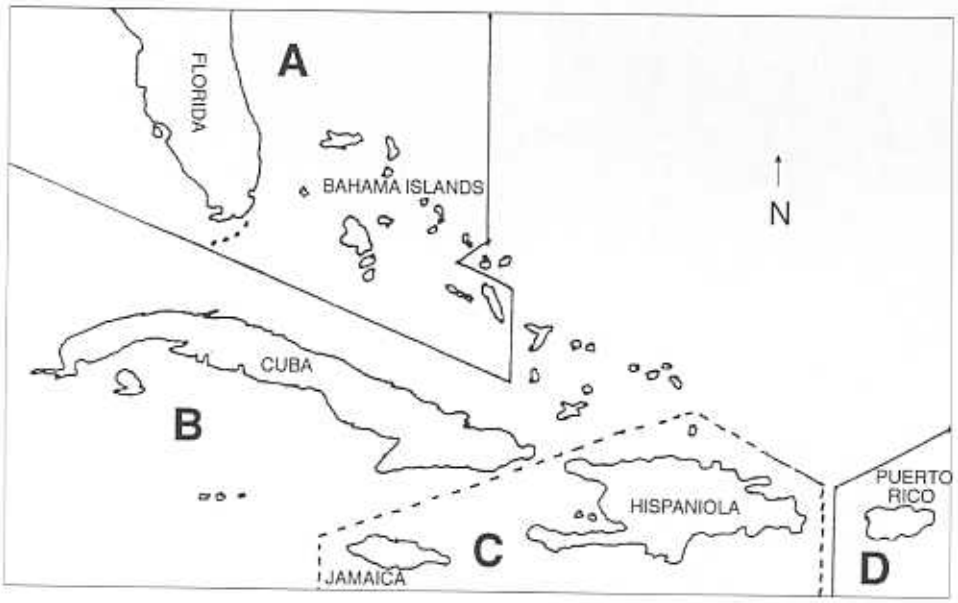

FIG. 1. Distribution of American Kestrel races in the Greater Antilles[1] and the hypothetical derivation and status proposed in this review[2].

[1]Buden's (1987) analysis of the distribution of American Kestrels in the Greater Antilles included *F. s. dominicensis* within area C encompassed by the dash line.

[2]According to my criteria the race *Falco sparverius dominicensis* does not constitute a valid subspecies, because it contains individual characteristic of *F. s. sparveroides* (B) in Cuba, and a high variability which differentiates it from more stable populations in coloration, such as *F. s. sparverius* (A) and *F. s. caribaearum* (D). Should these hypotheses prove to be true, *F. s. dominicensis* of Hispaniola would also form a block with the Cuban and Jamaican populations, and then the dash line should be removed.

red-tinted chests, which suggests the possibility of interbreeding between the *sparverius* and *sparveroides* races.

My analysis of the patterns described suggests that all of the populations (Cuba, Jamaica, Hispaniola, and some cays in the Bahamas) are of the same taxa; i.e., the contention that *F. s. dominicensis* is not a valid subspecies (Buden 1987) is supported, in part, because the Cuban population shows such variability that it is practically impossible to distinguish them from the individuals from Rum Cay, San Salvador, Inagua, Hispaniola, and Jamaica.

My morphometric analysis revealed the Cuban *F. s. sparveroides* displays ranges which surpass the extremes given by Buden (1987) for kestrels on Hispaniola, Cuba, and Jamaica (Tables 1 and 2). In these analyses I selected Cuban specimens collected in central and eastern Cuba, because these zoogeographic areas are more closely related to the Bahamas, Hispaniola, and Jamaica than western Cuba and the Isla de la Juventud. One individual (UF 19070) analyzed by Buden (1987) enters the range of the Cuban specimens I measured. Therefore I found no morphometric distinctions between *F. s. dominicensis* and *F. s. sparveroides*, as earlier suggested by Hellmayr and Conover (1949).

From 13–25 August 1990, I observed several individuals, predominantly white-breasted, in the vicinities of Kingston, Blue Mountains, Port Antonio, Ocho Rios, Mandeville, and the Cockpit Country, Jamaica. However, at Hope Zoo (Kingston) on 16 August 1990, Alexander Cruz, Jorge Moreno, Simon Guerrero, and I observed a red-phase individual which I considered to be a typical *sparveroides*. Simon Guerrero (pers. comm.) noted that this color phase also occurs in the Dominican Republic. In my opinion, all the red individuals (typical of the Cuban race) should be considered as evidence of *F. s. sparveroides'* range expansion whenever the presence of *sparveroides* is confirmed on any of the Caribbean islands. In spite of the results of my investigations of Cuban kestrel populations, my observations of a *sparveroides*-like bird in Jamaica leads me to the following hypotheses:

- The races of the American Kestrel in the West Indies, with their distinctive coloration leading to subspecific separation, are derived from three continental races: *F. s. sparveroides* shows the red vestiges of *F. s. tropicalis*, inhabiting Yucatán and Honduras; *F. s. dominicensis* displays coloration similar to *F. s. isabellinus*, living in northern South America and Isla de Margarita; and *F. s. caribbaerum* resembles the patterns and coloring of *F. s. sparverius* of North America.
- With time these three Antillean kestrel races, quite well differentiated in the past, overlapped in distribution, as they expanded their ranges. The red phase of western Cuba expanded eastward, creating a polymorphic situation in central and eastern Cuba as a result of a genetic

TABLE 1. Morphometric analysis among female American Kestrel populations in Cuba, Jamaica, and Hispaniola[1].

Locality	N	Measurement (mm)	
		Wing chord	Tail (inner retrices)
		$\bar{x}$ (range)	$\bar{x}$ (range)
Cuba	11	186.5 (174-200)	120.3 (106-135)
Hispaniola	13	190.2 (183-197)	119.8 (116-124)
Jamaica	8	182.0 (169-190)	107.7 (90-113)

[1]Includes only females and, of these, only the tail and wing measurements are given to make this analysis comparable with that of Buden (1987).

TABLE 2. Morphometric analysis among American Kestrel in Cuban[1] and Jamaican[2] collections.

Island	Sex	N	Measurement (mm) — $\bar{x}$ (range)			
			Culmen length	Wing chord	Tarsus	Tail (inner retrices)
Cuba	M	8	11.2 (10.8-12.3)	175.6 (167-182)	36.2 (33.4-38.2)	110.5 (105-121)
	F	11	11.6 (11.1-12.0)	186.5 (174-200)	38.1 (32.1-45.3)	120.3 (106-135)
Jamaica	M	4	11.1 (10.6-12.2)	167.5 (158-176)	36.8 (35.7-38.3)	99.3 (95-105)
	F	8	11.5 (10.2-12.2)	182.0 (169-190)	41.0 (36.1-47.5)	107.6 (90-113)

[1]In Cuba I only selected specimen of the central and eastern provinces, because they are zoogeographically the closest populations to Jamaica and Hispaniola. Specimens examined were from the following collections: Museo Nacional de Historia Natural, Colección "Juan Cristobal Gundlach" del Instituto de Ecología y Sistemática, Instituto de Ecología y Sistemática, Colección "Felipe Poey" de la Facultad de Biología de la Universidad de La Habana, colección del Museo de Historia Natural "Charles T. Ramsden" del la Facultad de la Universidad de Oriente, Museo de Historia Natural "Carlos de la Torre y Huerta" de Holguín, Museo Polivalente "Ignacio Agramonte" de Camagüey, and the private collection of Carlos Wotzkow.

[2]The only two specimen classified as *dominicensis* are: adult No. 45, and adult No. 255 of the Institute of Jamaica. Collections examined were Institute of Jamaica and the private collection of Audrey Downer.

flow under fortuitous conditions. The presence of this red morph in the Bahamas, Hispaniola, and Jamaica is proof of such a natural invasion of the Cuban race to Antillean areas formerly not inhabited by this form.

- At the same time, and on a larger scale than occurred with the red morph (which is less abundant in eastern Cuba [Berovides and Fernández, 1984]), some individuals of the white and intermediate phases also invaded Jamaica and Hispaniola.
- If *F. s. dominicensis* is a valid subspecies, at the present its patterns may be in process of intergradation, as both the coloration and size are compatible with *F. s. sparveroides*.

Should the aforementioned four hypotheses be corroborated, then the name of *F. s. sparveroides*, in spite of its former validity and role in the evolution of present population, would then fall into synonymy, because *F. s. dominicensis* was described 39 years before *F. s. sparveroides*.

If all of the above are correct, the West Indies would, in fact, constitute one of the most notable hybrid belts for raptor populations in the world. It would have at least three subspecies derived from continental races, now gradually developing into a single race, as it would have been originally, although not the same as the ancestral one.

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