Status of the blue-headed quail-dove *Starnoenas cyanocephala* (Aves: Columbiformes) at Key West, Florida

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ABSTRACT. The main objective of this contribution is to suggest that John James Audubon´s nearly two-centuries-old report of the Blue-headed Quail-Dove (*Starnoenas cyanocephala* Linné, 1758) in Key West, southern Florida keys, is valid and that several lines of evidence suggest that Key West had a population of permanent resident *Starnoenas* similar to, but not identical to the Cuban *Starnoenas cyanocephala*. Specimens from Cuban provinces of Guantánamo, Santiago de Cuba, and Pinar del Río are similar in pattern, color, and measurements, whereas those from Camagüey, are decidedly smaller, as are examples from provinces of Matanzas and La Habana. Thus, the species shows some variation among populations, at least in size. The single specimen from Key West (American Museum of Natural History, AMNH 437208) agrees in coloration and size with Audubon´s description. However, it displays asymmetrical white patches concealed on some of the secondary feathers, lacks the conspicuous vinaceus-lilac zone in the chest characteristic of *S. cyanocephala*, and has longer tarsi and toes than do Cuban specimens. Audubon's original watercolor painting of the Blue-headed Quail-Dove differs in color and pattern from those characters displayed in reproductions of the painting. The nest reported by Audubon as pertaining to the Key West Quail-Dove (*Geotrygon chrysia*) is likely that of *Starnoenas*, based on its location, size, shape, and color of the eggs. *Starnoenas* (a monotypic genus) is the only quail-dove that lays white eggs, whereas all *Geotrygon* species lay beige or tan eggs. *Starnoenas* should be considered an extirpated relict from Key West, as is true for two other formerly permanent resident columbids, Zenaida Dove (*Zenaida aurita*) and Key-West Quail-Dove (*Geotrygon chrysia*).

Key words: Blue-headed Quail-Dove, *Starnoenas cyanocephala*, distribution, Key West.

INTRODUCTION

Quail-doves are represented in America by two genera, *Geotrygon* Gosse, 1847, and *Starnoenas* Bonaparte, 1838. *Geotrygon* occurs in tropical and subtropical regions, from Mexico (Sinaloa), through Central and South America to northern Argentina, including some of the West Indies and Bahama Islands. The genus is represented by 1518 species, depending on the authority consulted. One species, *Geotrygon chrysia*, apparently was formerly a permanent resident in Key West (Audubon, 1834; Howell, 1932; Robertson and Woolfenden, 1992; OHG unpubl. data).

Starnoenas, a monotypic genus (*S. cyanocephala*), is now endemic to Cuba. It has also been reported from Jamaica (Albin, 1758; Buffon, 1770-1771; Latham, 1781; Hayes and family, 1794; Bonaparte, 1838; Temminck *in* Gosse, 1847; Gosse, 1847; Gray, 1870; Scott, 1892; Cory, 1892; Ridgway, 1916; Bond, 1936; Goodwin, 1970; Long, 1981; Collar *et al*., 1992), which is the type locality, and the Florida Keys (Audubon, 1834; Gosse, 1847; Gundlach, 1876, 1893; Brewster 1898; American Ornithologists' Union 1910, 1931, 1957, 1983, 1998; Ridgway, 1916; Bailey, 1925;

Howell, 1932; Sprunt, 1954; García Montaña, 1980, but see Discussion, Hellmayr and Conover, 1942; Goodwin, 1970 Robertson and Kushlan, 1974; Collar *et al*., 1992; Robertson and Woolfenden 1992, OHG unpubl. data). In the past, these records have been attributed to introductions or vagrancy.

However, two explanations are feasible for the former presence of the Blue-headed Quail-Dove (*Starnoenas cyanocephala*) in Key West (Cayo Hueso), Florida: (a) birds were brought from Cuba, raised in captivity, and either escaped or were released or (b) a population always inhabited the key, as did (formerly) Zenaida Dove (*Zenaida aurita*), Key West Quail-Dove (*Geotrygon chrysia*), and several endemic mammals and reptiles. The main objective of this contribution is to demonstrate that Audubon´s (1834) report of *Starnoenas* in Key West probably represented a permanent resident breeding population, and that this population was similar to, but differed somewhat from, Cuban birds. Further, I provide a history of the discovery of *Starnoenas* in Key West and the morphological variation occurring among Cuban populations

History

Audubon's Sighting. Audubon (1834) was the first to report a Blue-headed Quail-Dove from Key West. In his "Birds of America," Audubon depicted three of these quail-doves (Plate CLXXII). According to Audubon "A few of these birds migrate each spring from the Island of Cuba to the keys, but are rarely seen, on account of the deep woods in which they live. Early in May 1832, while on a shooting excursion with the commander of the United States revenue Cutter, The Marion, I saw a pair of them on the western side of Key West. They were near the water, picking gravel, but on our approaching them they ran back into the thickets, which were only a few yards distant. Several fishermen and wreckers informed us that they were more abundant on the 'Mule Keys' but although a large party and myself searched these islands for a whole day, we found none there. I saw a pair I was told had been caught when young on the latter keys, but I could not obtain any other information respecting them, than they were fed on cracked corn and rice, which answered the purpose well. I have represented three of these pigeons on the ground with some of the creeping plants which grew in the place where I saw the pair mentioned above" (Audubon, 1834).

Several authors and the American Ornithologists' Union have cited Audubon's observations directly or implicitly, either accepting them, or considering the quail-dove as hypothetical. Apparently, Gundlach (1876) was the first to comment on Audubon's report, whereas Robertson and Woolfenden (1992) most recently noted that the Audubon record was "possibly the only report of it in the wild in Florida… although the species is surely a plausible Florida vagrant, the available evidence of occurrence seems uncertain." The AOU (1931, 1957, 1983, 1998) regards Audubon's record as "unsatisfactory," "likely based on introductions," or "not sufficiently documented."

Several of Audubon's recorded observations of Starnoenas are in agreement with what is known about Cuban populations. For example, Audubon (1834) reported observing a pair of quail-doves moving on foot at Key West, which matches the behavior of Cuban *Starnoenas* which always forage in pairs and are strictly terrestrial, moving along the forest floor, walking incessantly through their territory. Further, Audubon noted that the Key West birds ran into thickets of deep tangled woods when disturbed. He described no flight characteristics of the Florida birds. Cuban birds take flight only when frightened. Occasionally, they fly to a perch in a tree, or on a log or stump, to rest or to call. Although their flight is quick, they always fly low and seldom for distances more than 70 m before alighting again on the ground. Flight is quite noisy (partridge-like), especially on take off. This flight behavior is unique among quail-doves, and immediately serves to identify the bird when it is not observed. Two individuals that were captured when young and raised in captivity substantiate this conjecture.

Specimen evidence. A specimen from Key West, Florida (American Museum of Natural History [AMNH] specimen no. 43708) agrees in all characters with Audubon´s description of Key West birds. In addition, it exhibits asymmetrical white patches in the secondaries (see Discussion) and,

therefore, differs from typical Cuban birds. In contrast, a specimen (SDNHM no. 22010) from "Biscayan Key" [Key Biscayne], Florida, is indistinguishable from Cuban birds. Mary LeCroy (pers. comm.) argues that the AMNH specimen, which she considers "aberrant," represents a captive bird. LeCroy thinks the wing patches are an artifact of captivity, noting that she kept in captivity for two years a Horned Lark (*Eremophila alpestris*) that also developed white patches in its wings. Regarding the darker plumage, LeCroy claims that molting birds in captivity acquire darker plumage with subsequent molts. This seems a plausible explanation of the difference of the Key West specimen compared with Cuban birds. Still, the problem arises as to how to explain several molts in captivity without showing the clear sign of being held in captivity; i.e., enlargement of the feet. Also, the similarity with Audubon´s descriptions and paintings must be considered. Did the two birds he saw in captivity, obtained when young in the "Mule Keys," develop the same features as the American Museum of Natural History specimen?; i.e., perhaps the captives served as models for his original paintings. The facts will likely never be uncovered. On the other hand, the legs and toes of the American Museum specimen do not show signs of having been in captivity long enough for the bird to have gone through at least one molt.

The specimen from the American Museum of Natural History is unsexed, but is probably a female based on the size of the black chest medallion. It is also larger than Cuban material, agreeing with the measurements given by Audubon (Table 1). Live weights of Cuban individuals are also less than the weight given by Audubon, although his estimate of weight may not be entirely reliable if the bird he weighed had been kept in captivity.

Based on plumage, the AMNH specimen was probably collected in mid-to-late summer.

Table 1. Mean and extremes (in brackets) of 68 specimens of *S. cyanocephala* from Cuba, Jamaica, and Florida Keys. Number of specimens is given by provinces. Provinces listed from east to west. Both sexes considered under the column of weights (g). (16 individuals from Península de Zapata and three from Pinar del Río).

		Measurement (mm)				
Sex and locality	n	Wing	Tail	Culmen	Tarsus	Weight (g)
Males						
Cuba: Guantánamo	10	151.8 (146.5–158.0)	111.2 (99.0–117.0)	13.3 (12.0–16.3)	32.2 (31.5–33.6)	–
Cuba: Santiago	7	149.7 (145.0–157.0)	99.0 (91.0–110.0)	12.4 (11.8–13.0)	32.0 (31.6–32.9)	–
Cuba: Camagüey	14	144.9 (140.0–151.0)	103.5 (98.0–110.0)	12.7 (11.9–13.9)	31.3 (30.3–32.0)	–
Cuba: Matanzas	1	145.0 –	98.0 –	14.3 –	32.0 –	244.8 (215–271)
Jamaica	2	141.0 Worn	101.5 (97.0–106.0)	12.1 (10.9–13.4)	31.8 –	–
Audubon's specimen (Key West, Florida; probable male)	1	–	–	–	32	289
Females						
Cuba: Guantánamo	2	144.0 (140.0–148.0)	104.5 (92.0–117.0)	14.1 (11.7–16.5)	30.3 (30.0–30.6)	–
Cuba: Santiago	8	145.8 (141.0–153.0)	99.0 (90.0–106.0)	12.9 (12.1–14.0)	31.3 (30.1–32.4)	–
Cuba: Camagüey	8	142.0 (137.0–148.0)	100.5 (93.0–108.0)	12.3 (11.7–13.0)	31.5 (30.0–32.0)	–
Cuba: Matanzas & La Habana	4	144.3 (143.0–146.0)	103.7 (100.0–110.0)	13.7 (12.3–15.1)	32.7 (29.0–36.0)	–
Cuba: Pinar del Río	2	147.5	87.0	12.0	30.8	–
Key West, Florida (AMNH No. 437208)	1	150.0 (longest)	95	12.2	37.0	–

None of the feathers seem fresh, and most of the primaries and tail feathers are worn. A few remiges are not fully grown. Some of the pileum feathers are somewhat worn.

The larger feet and heavier body lead one to assume that the bird was terrestrial and probably occupied a small territory. Key West is a small coralline key 2.4 km long and 6.5 km wide, with formerly suitable habitats (hardwood hammocks and thickets) for these doves. These habitats were mainly restricted to the western section of the key. Today, some large *Ficus* and mahogany (*Swietenia mahagoni*) trees are still present as remnants of the original vegetation. The site I visited on the Western side of the key (Fig. 1), is quite similar to that illustrated by Audubon in his painting (Fig. 2).

Audubon's Painting. Although Audubon claimed to have observed only one pair, he depicted three birds in his painting, one of them in a stylized pose never observed in life. Probably (not knowing its typical behavior) he wanted to demonstrate the short and fan-like wing, as well as the color of the primaries. He painted them in a background with typical flowers (*Cyperus*) and standing on a rocky substrate (Fig. 2).

I examined the original Audubon´s watercolor of the Blue-headed Quail-Dove, finding important differences in the color of original painting and published reproductions, including the famous plates in the Elephant Folios, which I also examined at the Academy of Natural Sciences of Philadelphia. In the original painting, the bill color is not bright blue in one of the birds, being grayish with a tinge of blue (similar to Cuban birds). The legs of the bird on the left are carmine, whereas the right dove is shown with more cinnamon-colored legs (as in the reproductions); the color of the primaries is quite dark (grayish black). The most important difference, however, is the color of the area surrounding the black medallion of the breast, which is grayish (not vinaceous-lilac or brown with darker dashes, as shown in the reproductions).

However, some important speculation can be generated from Audubon´s original paintings. How could he have drawn such fine and detailed quail-doves if he did not have a model in front of him? But which model? -A specimen collected by him? The birds from "Mule Keys," which were raised in captivity? Other captive birds? In any case, the details in the drawing are impossible to observe except at close range; e.g., the reticulated tarsi characteristic of *Starnoenas*. Whereas the position or posture of the doves could have been a product of Audubon's artistic style, the color, pattern, and other morphological features depicted in his three birds are accurate.

A detailed examination of Audubon's original watercolor suggests that the doves depicted were quite similar to, but not exactly the same as, Cuban specimens of the Blue-headed Quail-Dove. The Audubon birds differ from Cuban birds in (a) having a stockier build, (b) being much darker (chocolate brown) overall (this dark color could not have been an artifact of long storage), (c) having darker remiges and rectrices (a dark slate gray), and (d) not having a violaceus-lilac zone on the chest. The pattern of the blue pileum, interrupted on the forehead by a narrow black line that continues on the sides and broadens at the nape, is shared by a small proportion of Cuban birds, especially those from the eastern part of the island.

Nest and Eggs. In the upper right corner of the watercolor, Audubon hand-wrote "The nest of N.: species is rough and not much like that of the genus generally speaking" (i.e., he saw its nest, but he did not mention this in his writings). In his description of the Key West Quail-Dove (1834), however, he wrote: " The nest of the Key West Pigeon is formed of light dry twigs, and much resembles in shape that of the Carolina Dove" (Mourning Dove, *Zenaida macroura*; this dove lays white eggs, not beige as does *Geotrygon*). "Sometimes you find it situated on the ground, when less preparation is used. Some nests are placed on the large branches of trees quite low, while others are fixed on slender twigs. On the 20th May, one of these nests was found containing two pure white eggs, about the size of those of the White-headed Pigeon, nearly round, and so transparent that I could see the yolk by holding them to the light." Audubon apparently confused the nests of the two quail-dove species. Eggs of *Starnoenas* are almost as large as those of the

Fig. 1. Rocky habitat at the Western side of Key West. Note the similarity of this habitat with Audubon´s paintings.

Fig. 2. Reproduction of Audubon's original watercolor painting of the Blue-headed Quail-Dove in the Florida Keys.

White-crowned Pigeon and definitely larger than those of *Geotrygon*. All *Geotrygon* and *Leptoptila* species lay dark eggs (beige to light tan), whereas only *Starnoenas* lays white eggs. This situation was discussed by Sorrie (1979), who concluded that the species to which Audubon referred was probably Starnoenas, based on nest location, construction, shape, size and color of the eggs.

Diagnosis and Description

Because Audubon was the only person who made a detailed description of the living doves and, therefore, the only one who could describe the color of the bill, eyes, and legs, in the following description of the American Museum of Natural History specimen (AMNH 437208), I include, in brackets, some of the pertinent notations provided by Audubon (1834).

General color dark brown (Figs 3 and 4). Upper parts more pure brown, with lower sides of neck, back of nape, and hind neck a little lighter, with darker feathers on the mantle. Rump and uppertail coverts rather worn, but lighter brownish ["rich deep chocolate, slighted tinged with olive"]. Underparts more reddish-brown, almost cinnamon-brown on the belly and lower breast. Lower breast darker, less cinnamon, having two feathers with a very faint tinge of purple at the lower edge of the black medallion. Undertail coverts and flanks lighter, more cinnamon, especially at the edge of the feathers ["brownish-red, lighter on the middle of the breast, the sides and under tail coverts approaching to the tint of the back"]. A large throat patch extends down to the upper breast, more restricted than in the Cuban material, intense black in color, with three rows of blue feathers on each side (more conspicuous on the right), and the edges, especially the lower rim, speckled with pure white, or interrupted, not continuous ["a broad patch of black on the foreneck, marginated with white beneath, and on the sides spotted with bright blue"]. A broad white stripe runs across the face from the side of the nape to the lower base of the bill ["a band of white under the eye meeting its fellow on the chin"]. Lores black, being part of the black band that encircles the blue head, which narrows at the forehead and broadens on the nape. Most of the crown blue, quite worn at the back of head and nape ["upper part of the head bright blue, encircled by a band of deep black, broader on the occiput, and very narrow in forehead"]. Bill (in dried skin) greenish-yellowish at tip, followed in the middle by a dark blackish area that joins the brownish basal zone. Tip of lower mandible as the upper one, with a visible dark demarcation before reaching the basal portion which, in turn, shows the same color of the upper one ["bill bright blue above, the fleshy parts at the base bright carmine"]. Eyelids yellowish-brown ["iris very dark brown"]. Scales of tarsus and toes scutellated, brownish-yellow, darker on toes. Claws rather long, dark blackish-brown, lighter on the sides. Knee joints quite broad. Tarsus reticulated with scales rather squarish, and rather convex ["tarsus covered anteriorly and laterally with quincuncial subhexagonal scales, rounded and scaly behind; toes scutellate, free, marginate; claws rather small, arched, compressed, flat beneath, obtuse"]. Feathers of wing and tail brown, darker than the rest of the body. Most of the feathers of one wing are trimmed, some of the primaries of the other are missing, and few of the tail feathers are growing (beginning to molt). Wings: ["wings short, rounded, third, fourth and fifth quills longest and almost equal, second, third, fourth, fifth, and sixth slightly cut out on the outer web. Tail of moderate length, slightly rounded, of twelve broad round feathers"]. Some of the secondaries with asymmetrical patches of pure white, the patches varying in extension and shape, completely concealed by the tertials, lesser, middle, and greater wing coverts.

Meristic data

Standard measurements, in millimeters, were obtained with calipers and ruler to the nearest 0.1 mm, and included wing chord flattened against the ruler. Weights (g) of living specimens were obtained with a 300 g (2-g precision) spring scale. Audubon's measurements are in brackets.

Length of AMNH 437208 (tail feathers rather worn and not full-grown) 271 mm [12¼" = 310]; longest primary (some primaries missing) 150 mm [Audubon only gives the length of the wing as 17½"]; tail [Audubon does not give measurements]; exposed culmen 12.2 mm; width at the

a

b

c

Figs. 3a-c. Comparison of the Key West AMNH specimen No. 437208 (center) with four Cuban specimens from the same collection. Note the much darker coloration of the Key West specimen (at the center) as well as the fragmentary white lower edge of the medallion. a. Ventral view. b. Dorsal view. c. Lateral view.

widest point 4.5 mm [“along the ridge 1/2", along the edge 1""]; tarsus 37 mm [“1¼ ""]; hind toe with claw 16 mm, claw 8.6 mm; other toes with claws 24.7 mm and 20.1 mm; claws 7.4 mm and 7.5 mm. Audubon gives the weight of one individual [10¼ oz = 289 g], probably a male according to his remark “the female is rather less, but in external appearance resembles the male.”

Comparisons

In summary, AMNH 437208 differs from Cuban *S. cyanocephala* specimens by: (a) being much darker in coloration (chocolate brown), especially on the underparts (Fig. 3), with even darker wings and tail feathers, whereas it is lighter and more drab brown on the upper parts than Cuban *cyanocephala*; (b) a bright blue bill at tip, with a conspicuous dark (blackish) area between the blue tip, and the red basal portion; (c) an absence of the vinaceus-lilac area on the lower chest and upper belly, being instead much darker (brownish-cinnamon) [in Audubon's plate, this region is lighter than the rest of the upperparts]; (d) the presence of asymmetrical white patches at the base of some secondary feathers; (e) having heavier legs with longer toes; (f) having consistently larger measurements (Table 1); and (g) being heavier. Further differences include the Key West bird having a deeper black throat patch (medallion), deeper black and rather more restricted, and with less blue feathers in the foreneck compared with Cuban birds. The white malar stripe is similar in both, as well as the blue color of the pileum. In most specimens of *S. cyanocephala* (excepting some from eastern Cuba), the blue feathers extend to the end of the forehead, reaching the fleshy parts of the bill, whereas in the Key West bird, part of the forehead is black, being part of the black band that encircles the blue pileum. More black feathers appear on the nape of Key West birds. Also, the specimen from the American Museum has fewer white feathers at the edge of the medallion, possibly an artifact of individual variation or age. According to Gundlach (1876, 1893), young cyanocephala show more white on the black patch than do adults. Thus, the Key West specimen was probably a full adult. The Key West specimen's feet are definitely bulkier, and it has more massive knees. This is evident in Audubon´s painting, where he even shows one bird in a more “gallinaceous” posture, rather than that of a pigeon. The most distinctive character in the Key West bird is the presence of white patches (asymmetrical) in some of the secondaries. The two longest patches measure 54 and 48 mm.The feathers of the lower neck in Cuban specimens are broadered in the ventral side, while in the upper side, are thinner in the Key West bird.

Fifteen Cuban individuals from the Guanahacabibes and the Zapata peninsulas ranged from 148 to 271 g (Rodríguez and Sánchez 1993; H. González, pers. comm.). Audubon´s bird was considerably heavier at 289 g (“10¼ oz”) (Table 1).

Distribution. The Blue-headed Quail-Dove is presently restricted to Cuba, but may have formerly inhabited some of the southern Florida keys, “Cayo Hueso” (Key West) and “Mule Keys” (but see Discussion). *S. cyanocephala* was unsuccessfully introduced in Hawaii (Long, 1981) and Jamaica (Gosse, 1847).

Habitat. Apparently dwelling in the former hardwood hammocks and thickets of Key West, which have since been destroyed (see Discussion).

DISCUSSION

The Key West specimen (AMNH no. 437208) is unsexed and is larger than males of *S. cyanocephala*; however, in the latter, the throat´s medallion is wider and more expanded, so probably the American Museum of Natural History specimen was a female. It was previously deposited in H. F. Aten´s collection at the Brooklyn Institute of Arts and Sciences (now Brooklyn Museum of Art), which was donated to the AMNH in 1935 (A. Andors and M. LeCroy, pers. comm.). Andors suggested (in a letter to John Guarnaccia) that Aten was possibly the original collector. Among the birds acquired by the AMNH from the Aten's collection are a few listed as from “Florida” (almost all dated as 1880 to 1883) and one specimen of *Columba leucocephala* collected from the Florida Keys

23 June 1883. Another possibility is that either J. Atkins or C. J. Maynard, who collected intensively in Key West, could have obtained the specimen. The original label, however, does not match either Maynard´s or Atkins´s labels of other birds collected by them at that time. Atkins had obtained three specimens of the Key West Quail-Dove in 1897, and deposited them at the Museum of Comparative Zoology at Harvard University.

No endemic forms of birds have been recognized in the southern Florida keys, so this new finding might cause skepticism. In his recent studies of the Key West Quail-Dove, however, Garrido (in prep.) has shown, that the populations once inhabited Key West (based in the three specimens collected by Atkins) are not identical in size to other West Indian populations (i.e., Cuba, Bahamas and Puerto Rico). The fauna of the Florida Keys remains little known, mainly because of its rapid and early disappearance. According to Lazell (1989), most of the native mammals are endemic at the species or subspecies level. At least two mammals, the silver rice rat (*Oryzomys argentatus*) and the key deer (*Dama clava*), were endemic species. Other forms considered as subspecies may prove to be good species; e.g., the key rabbit (*Sylvilagus palustris hefneri*) and the key woodrat (*Neotoma floridana smallii*). Similar possibilities are recognized for several forms of reptiles.

The genus *Starnoenas* has been considered monotypic and confined to Cuba. Goodwin (1970) placed *Starnoenas* as a separate evolutionary branch in his phylogenetic dendrogram. Although some authors consider it congeneric with *Geotrygon* (American Ornithologists' Union, 1983), this arrangement has not been accepted generally. *S. cyanocephala* differs in several aspects from the rest of the quail-doves; e.g., the eggs of *Starnoenas* are not beige, brownish, or tan, but pure white. S. L. Olson (pers. comm.) cites the reticulate tarsus as a character demonstrating the genus is not closely related to any known doves. Also, its rudimentary flight is different; it is very noisy on take off.

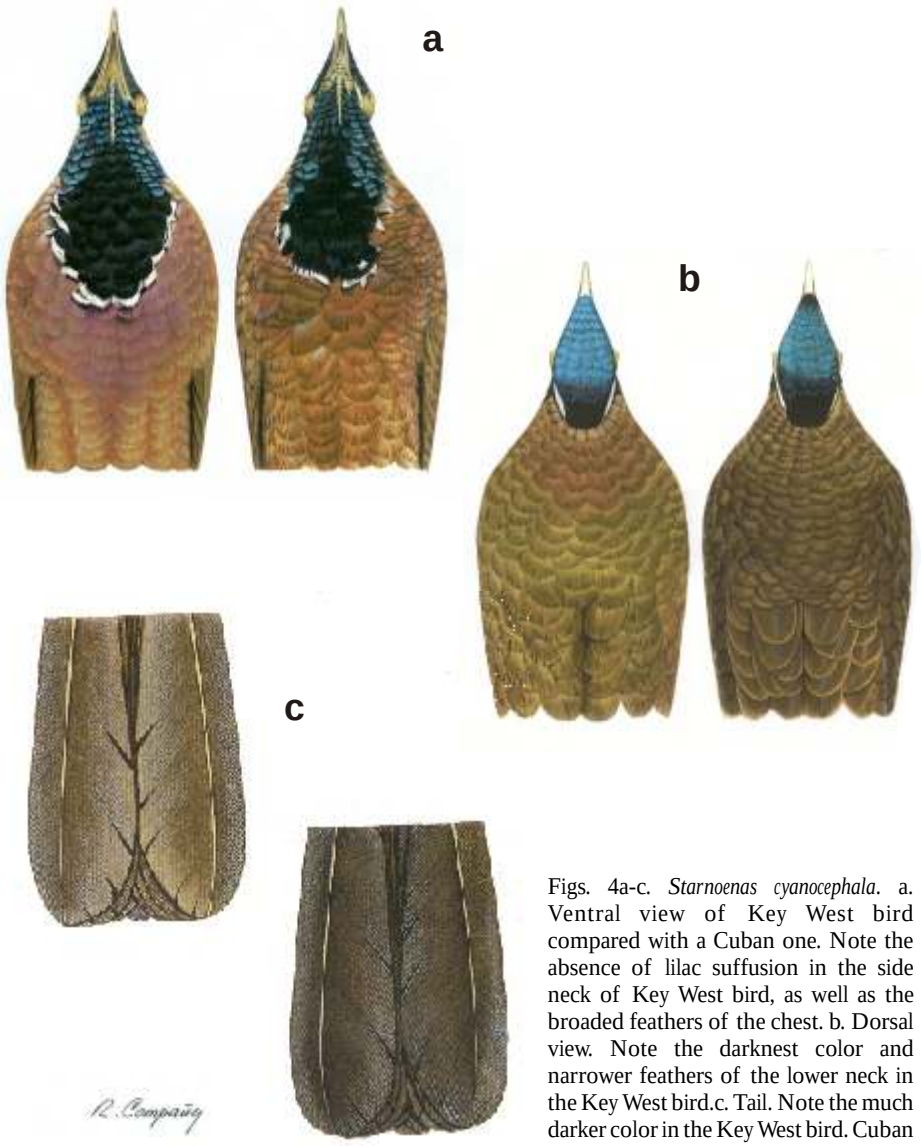
Cuban *S. cyanocephala* have been reported from Florida (Bailey, 1925; American Ornithologists' Union 1983; Robertson and Woolfenden, 1992), including a specimen from Key Biscayne, Florida (SDNHM 22010) deposited at the San Diego Natural History Museum. These individuals have been considered as either stragglers, introduced, or doves that have escaped from captivity. Traditionally, the Cuban Blue-headed Quail-Dove has been traded, introduced for food, or imported as a cage bird, I therefore consider that all Florida records (excepting the Key West specimen) are escaped captives.

Some of the northern Cuban keys with suitable habitat do not harbor *Starnoenas*, probably because of the dove's "inability" to cross over wide expanses of water. Their presence in Isla de Pinos (now Isla de la Juventud) represents relicts from the western part of Cuba that were isolated by fragmentation of the land during the Pleistocene.

García Montaña (1980) suggested another scenario for the Key West birds. He wrote: "Audubon was in error when considering this dove a resident of the Florida Keys, due to the fact that this dove never had lived in Florida, nor in their keys, because it is exclusive to Cuba. The situation was that some Cubans gave Audubon a pair and, finding them attractive, he depicted them, and hoping that they could do well in the wild, released them afterwards there" [translated]. This scenario is not found in any literature, nor does it match Audubon´s (1834) account.

I believe the evidence presented here supports the possibility of a former resident breeding population of Blue-headed Quail-Dove in Key West. That evidence includes Audubon's observations of the birds and his accurate details of the quail-dove's behavior. Further, although he mistakenly reported them as Key-West Quail-Dove nests and eggs, Audubon clearly observed Starnoenas cyanocephala breeding in Key West. Finally, plumage and size differences between Key West and Cuban birds suggest a substantial period of isolation of the two populations.

Acknowledgments.- This work was supported by a Chapman Fund Grant from the American Museum of Natural History of New York. Also, I am grateful to the RARE Center for Tropical Conservation for the help and support provided to accomplish this study through visits to



Figs. 4a-c. *Starnoenas cyanocephala*. a. Ventral view of Key West bird compared with a Cuban one. Note the absence of lilac suffusion in the side neck of Key West bird, as well as the broaded feathers of the chest. b. Dorsal view. Note the darknest color and narrower feathers of the lower neck in the Key West bird.c. Tail. Note the much darker color in the Key West bird. Cuban specimen on the left in all figures.

museums and institutions, as well as sponsoring field trips to the Florida Keys to examine habitats. L. Short made the necessary arrangements for obtaining specimens in museums of the western United States. My special gratitude to J. Guarnaccia, former Director of RARE Center, for the photographs that illustrate this contribution, as well as providing pertinent literature. Thanks to the late brilliant artist of the Field Guide of the Birds of Cuba Roman Company, for the donation of the paintings illustrating this contribution. I thank C. Blake for preparing and lending the specimen from Key West deposited at AMNH so it could be properly studied. R. MacPhee kindly returned the borrowed specimen to New York from La Habana. M. LeCroy graciously sent reprints and pertinent literature, provided information on the Aten specimen, and made valuable comments and criticisms to the first version of the ms., as did K. C. Parkes from Carnegie Museum. C. Dove, of the Smithsonian Institution, provided pertinent literature, as did R. Browning who, in addition, collaborated in identifying original labels and commented on artifacts of preservation found in collections. R. Banks, also from the Smithsonian, read the first ms. version, and encouraged me to finish the work. P. Unitt, San Diego Natural History Museum, sent information and specimens deposited there. The late L. Baptista had the patience to observe several captive Blue-headed Quail-Doves in California, and provided me with those observations. A. Andors (AMNH) provided valuable information regarding the presumptive origin of the specimen from Key West. S. L. Olson (Smithsonian Institution) made useful comments about *Starnoenas*. V. L. González, former RARE Center Trustee, accompanied me to explore Key West, taking the habitat photographs that illustrated the text. W. and S. Smith kindly took me to the different Florida keys to study their habitats; and, with the late W. B. Robertson, read the first draft of the ms. J. R. González and T. R. Gamble, Trustee of the New York Historical Sciences Building, made arrangements to allow me to visit the room that houses the original Audubon watercolor paintings; also, thanks to the Curator of Paintings, A. Blaugrund. I thank C. W. Thompson, Collection Manager, for making the arrangements to examine Audubon´s Elephant Folio at the Academy of Natural Sciences of Philadelphia. D. Rodríguez, B. Sánchez and H. González (Instituto de Ecología y Sistemática, Ciudad de La Habana) provided data obtained in their field studies of quail-doves. My colleague, A. Kirkconnell, shared his analysis of the studied material, providing pertinent observations on certain characters. I am grateful to curators, technicians, and managers of collections of several museums and institutions who facilitated examinations of the collections under their custody. Finally, my deep gratitude to J. Wiley (Maryland Cooperative Fish and Wildlife Research Unit) for reading and correcting the final draft of this contribution.

REFERENCES

Albin, E. 1758. A natural history of birds. Vol. 2. London: W. Innys and R. Manby.

American Ornithologists' Union. 1910. Check-list of North American birds, 3rd ed. Washington D.C.: American Ornithologists´ Union.

American Ornithologists' Union. 1931. Check-list of North American birds, 4th ed. Washington D.C.: American Ornithologists´ Union.

American Ornithologists' Union. 1957. Check-list of North American birds, 5th ed. Washington D.C.: American Ornithologist´s Union.

American Ornithologists' Union. 1983. Checklist of North American birds, 6th ed. Washington D.C.: American Ornithologist´s Union.

American Ornithologists' Union. 1998. Check-list of North American birds, 7th ed. Washington D.C.: American Ornithologists' Union.

Audubon, J. J. 1834. Ornithological biography, or an account of the birds of the United States of America; accompanied by descriptions of the objects represented in the work entitled the Birds of America, and interspersed with delineations of American scenery and manners. 5

Vols. Edimburgh: Adam and Charles Black.
Bailey, H. H. 1925. The birds of Florida. Baltimore, Maryland: Williams & Wilkins Co.
Bonaparte, C. L. 1838. A geographical and comparative list of the birds of Europe and North America. London: J. Van Voorst.
Bond, J. 1936. Birds of the West Indies. Philadelphia: Academy of Natural Sciences of Philadelphia.
Buffon, G. L. L. 1770-1771. Histoire naturelle des oiseaux. Vol. 1 (1770), Vol.2 (1771). Paris: Imprimerie Royale.
Collar, N. J.; L. P. Gonzaga; N. Krabbe; A. Modroño Nieto; L. G. Naranjo; T. A. Parker III and D. C. Wege. 1992. Threatened birds of the Americas. ICBP/IUCN Red Data Book, 3rd ed. Washington D.C.: Smithsonian Institution Press.
Cory, C. B. 1892. Catalogue of West Indian birds. Boston; Alfred Mudge and Son.
Garcia Montaña, F. 1980. Las aves de Cuba: especies endémicas. Tomo I. La Habana, Cuba: Editorial Gente Nueva. 103 pp.
Goodwin, D. 1970. Pigeons and doves of the world. London: British Museum of Natural History.
Gosse, P. H. 1847. The birds of Jamaica. London: John Van Voorst.
Gray, G. R. 1870. Hand-list of genera and species of birds. London: printed by order of the Trustees of the British Museum.
Gundlach, J. 1876. Contribución a la ornitología Cubana. La Habana: Imprenta La Antilla.
Gundlach, J. 1893. Ornitología cubana. La Habana: Imprenta La Moderna.
Hayes, W. *et al*. 1794. Portraits of rare and curious birds, with their descriptions, from the menagery of Osterley Park, in the county of Middlesex. London: W. Bulmer & Co.
Hellmayr, C. E. and B. Conover. 1942. Catalogue of the birds of Americas. Vol. X111, Part. 1, No.1. Zoological Series, Field Museum of Natural History, Chicago.
Howell, A. H. 1932. Florida bird life. New York: Coward-McCann, Inc.
Latham, J. 1781. A general synopsis of birds. Vol. 11. Pt. 2nd. London: Leigh and Sotherby.
Lazell. J. D., Jr. 1989. Wildlife of the Florida Keys: a natural history. Washington D.C.: Island Press.
Linnaeus [Linné], C. 1758. Systema naturae, 10th ed. Vol. 1. Holmiae: Impensis L. Salvii.
Long, J. L. 1981. Introduced birds of the world. New York: Universe Books.
Ridgway, R. 1916. The birds of North and Middle America. Bull. United States Nat. Mus. No. 50, Part. V11. Washington D.C.
Robertson, W. B., Jr. and J. A. Kushlan. 1974. The southern Florida avifauna. Pp. 414-452 *in* Memoir 2: Environments of South Florida: present and past (Gleason, P. J., Ed.). Miami Geological Society, Miami.
Robertson, W. B., Jr. and G. E. Woolfenden. 1992. Florida bird species: an annotated list. Special Publication No. 6. Gainesville, Florida: Florida Audubon Society.
Rodríguez, D. and B. Sánchez. 1993. Ecología de las palomas terrestres cubanas (géneros *Geotrygon* y *Starnoenas*). Poeyana 428:1-20.
Scott, W. W. D. 1892. Observations on the birds of Jamaica, West Indies. Auk 9:120-129.
Sorrie, B. A. 1979. A history of the Key West Quail-Dove. American Birds 33:728-731.
Sprunt, A., Jr. 1954. Florida bird life. New York: Coward-McCann. Figure legends.