Subspecific Variation in Two Species of Antillean Birds

Albert Schwartz

Collections of birds made between 1959 and 1968 in the West Indies have been reported upon in three recent papers (Schwartz and Klinikowski, 1963; Schwartz and Klinikowski, 1965; Paulson, 1966). Detailed study of portions of these collections reveals that the status of the populations of *Columbina passerina* (Linnaeus) on Cuba (and the Isla de Pinos) and *Geothlypis rostrata* Bryant on Cat and Andros islands in the Bahamas requires clarification. The purpose of the present paper is to discuss the variation in these two species as it is applicable to the populations in question. In addition to the specimens in my collection (herein designated AS), I have examined pertinent material in the collections of the Academy of Natural Sciences of Philadelphia (ANSP), the American Museum of Natural History (AMNH), the Field Museum of Natural History (FMNH), the Museum of Zoology, Louisiana State University (LSUMZ), and the United States National Museum (USNM). For the loan of these specimens I gratefully acknowledge the assistance and cooperation of James Bond, Wesley E. Lanyon, Emmet R. Blake, George H. Lowery, Jr., and George E. Watson.

All measurements are in millimeters and were taken from museum skins with vernier calipers by Donald W. Buden, to whom I am very grateful. Field measurement, also in millimeters, of total length, tail, wing arc and exposed culmen, taken from the bird while still in the flesh prior to skinning, have also been employed. Color designations are from Maerz and Paul (1950). I wish to acknowledge the assistance of William B. Robertson, Jr., in obtaining literature, and the capable assistance rendered me in the field by several students. Cuban collections were made with the assistance of National Science Foundation grants G-3865 and G-6252 to the author.

Columbina passerina (Linnaeus)

Bond (1956) accepted nine resident subspecies of *Columbina passerina* in the Antilles; the species is widespread throughout the islands, occurring on the Bahama Islands in the north, on all the

Greater Antilles (including Navassa and Mona islands), and south through the Lesser Antilles to Grenada. Of the nine subspecies which are found on the islands, *C. p. insularis* Ridgway has the broadest distribution as far as major land masses is concerned; this subspecies, described from specimens collected on Grand Cayman Island, occurs in Cuba, the Isla de Pinos, the Cayman Islands, Hispaniola (including the satellite islands of Gonâve, Tortue, Saona, Catalina, Ile-à-Vache) and Navassa Island (whence *C. p. navassae* Wetmore has been named; *navassae* is currently in the synonymy of *insularis*).

Collections made by myself and parties between 1957 and 1960 in Cuba include ground doves from various localities on that island. When these skins are compared, even superficially, with specimens collected in the Cayman Islands and Hispaniola in the years immediately following (and thus also fresh skins), it is obvious that birds from these latter islands are quite distinct from those from Cuba. Todd (1913, pp. 561-564) considered Cuban, Isla de Pinos, and Hispaniolan ground doves as *C. p. aflavida* (Palmer and Riley) and restricted *insularis* to the three Cayman Islands. Ridgway (1916, p. 415) likewise considered the Cuban and Isla de Pinos birds as *C. p. aflavida* and did not separate these populations from those from Hispaniola which he also regarded as *aflavida*. Todd (1916, p. 222) later regarded the Isla de Pinos birds as *aflavida* but made no comparisons of that subspecies with *insularis*. Hellmayr and Conover (1942, pp. 528-529) considered *aflavida* a synonym of *insularis* and stated that Bangs (1916, p. 307) had pointed out that Cuban birds were inseparable from topotypical *insularis*. Remarkably, of 99 *C. p. insularis* examined by Hellmayr and Conover (p. 529) only one was from Cuba (from San Diego de los Baños in Pinar del Río Province), whereas they studied 29 Caymanian and 69 Hispaniolan birds. Thus their comments on the identity of Cuban and Caymanian *Columbina* appear to have been based exclusively on Bangs' research.

I have examined 20 specimens from Cuba, 19 from the Cayman Islands, 14 from Hispaniola, and two from Navassa, as well as six birds from Jamaica (*jamaicensis* Maynard), 14 from the Bahama Islands (*bahamensis* [Maynard]), and four from southern Florida (*passerina* [Linnaeus]). I have also had available skins of the re-

maining Antillean subspecies, none of which is pertinent to the present problem.

Inspection of Tables 1 and 2 shows the following. Turning first to the field-taken measurements (total length, tail, wing arc), the Cuban males have the highest extremes in all measurements in

TABLE 1

Means and extremes (in millimeters) of six populations of *Columbina passerina*; all measurements taken in the flesh. See list of specimens examined for localities involved. No female Hispaniolan *insularis* studied had field taken measurements.

	N	Sex	Total length	Tail	Wing arc
aflavida	7	M	168.6 (161-179)	58.1 (55-64)	88.7 (85-94)
	1	F	171	59	89
insularis (Cayman Islands)	4	M	162.0 (160-166)	56.3 (50-59)	86.0 (84-89)
	2	F	151.5 (150-153)	56.5 (56-57)	82.5 (82-83)
insularis (Hispaniola)	3	M	169.3 (168-170)	60.0 (58-62)	87.0 (86-88)
jamaicensis	2	M	160.5 (158-163)	56.0 (55-57)	85.5 (85-86)
	4	F	160.2 (157-162)	56.5 (54-60)	84.0 (83-85)
bahamensis	7	M	162.6 (156-168)	56.7 (54-60)	85.6 (84-88)
	11	F	159.4 (150-167)	57.6 (53-63)	84.9 (82-91)
passerina	3	M	171.3 (170-174)	61.7 (58-64)	94.3 (93-95)
	1	F	150	62	90

comparison with other adjacent Antillean populations and are exceeded in total length and wing arc only by mainland *C. p. passerina*. Although the data are far less satisfactory for Cuban females, the total length of the single Cuban female is not included within the extremes of any West Indian females, nor does this measurement fall within the extremes of any population of *insularis*. The Cuban female wing arc likewise falls outside the upper limit of all *insularis* females but lies within the known range of female *bahamensis* and *passerina*.

Of the laboratory taken measurements, mean tail length in Cuban males is 61.9, of Cuban females 60.3. Of the Antillean populations, means of male tail length average from 56.1 (Hispaniolan *insularis*) to 58.7 (*bahamensis*). Even mainland *passerina* has a lower mean tail length (59.5) than do Cuban males. The tail length of Cuban females shows the same situation, with the Cuban

TABLE 2

Means and extremes (in millimeters) of six populations of *Columbina passerina*; all measurements are laboratory taken. Bill measurement equals chord from anterior border of naris to tip.

	N	Sex	Tail	Wing Chord	Bill	Tarsus
aflavida	13	M	61.9 (57.0-64.7)	83.2 (78.1-87.5)	11.6 (10.4-12.3)	14.7 (13.7-16.0)
	7	F	60.3 (59.2-61.4)	82.8 (82.0-86.5)	11.6 (10.9-12.2)	15.2 (14.4-15.8)
insularis (Cayman Islands)	10	M	57.0 (55.2-60.0)	82.9 (80.0-85.8)	10.9 (10.3-12.1)	14.7 (14.1-15.6)
	6	F	55.8 (55.0-57.9)	80.7 (79.8-82.7)	10.6 (10.1-10.9)	14.5 (14.3-14.7)
insularis (Hispaniola)	8	M	56.1 (51.3-59.5)	82.5 (80.3-85.6)	11.5 (11.0-12.2)	14.6 (14.1-14.9)
	4	F	54.2 (53.1-56.0)	81.0 (79.5-81.6)	11.3 (11.2-11.4)	14.3 (14.3-14.4)
jamaicensis	2	M	57.6 (57.3-57.9)	82.0 (81.7-82.3)	11.9 (11.4-12.3)	13.8 (13.1-14.5)
	4	F	55.6 (54.0-56.7)	79.8 (78.6-81.5)	12.0 (11.7-12.3)	14.7 (14.5-14.8)
bahamensis	6	M	58.7 (54.5-62.5)	82.4 (78.2-85.6)	11.1 (10.7-11.8)	14.7 (14.1-15.3)
	11	F	56.3 (53.9-58.8)	78.4 (76.7-83.5)	11.0 (10.0-11.4)	14.4 (14.0-15.0)
passerina	3	M	59.5 (59.2-59.7)	88.3 (87.2-89.1)	11.8 (11.5-12.0)	15.8 (15.5-16.0)
	1	F	58.7	85.7	10.3	15.8

females having a mean of 60.3 with means of 55.8 in Caymanian *insularis*, 54.2 in Hispaniolan *insularis*, 55.6 in *jamaicensis*, and 56.3 in *bahamensis*. In both sexes, despite overlap, the upper extremes of tail length of Cuban birds lie beyond those for all other populations studied.

In measurements of wing chord, the male Cuban mean of 83.2 is greater than the means of all other Antillean samples (means 82.0-82.9) and is exceeded only by continental *passerina*. Wing chord in Cuban females likewise is greater (82.8) than in the other Antillean samples (means 78.4-81.0, the highest mean that of Hispaniolan *insularis*), but the single female *passerina* has a wing chord of 85.7. Bill measurements (tip of bill to anterior margin of naris) of Cuban males and females have higher means (11.6 in both sexes) than all other West Indian populations, with the exception that male *jamaicensis* average 11.9 and female *jamaicensis* 12.0 in this measurement. The tarsus measurements of Cuban males (mean 14.7) is equal to that of Caymanian and Hispaniolan *insularis* and *bahamensis*, but exceeds the mean of male *jamaicensis* (13.8). The tarsus mean of Cuban females (15.2) is greater than that of all other Antillean females (means 14.3-14.7).

The above comments and Tables 1 and 2 indicate clearly that the Cuban population of *C. passerina* differs quite strongly in mensural characters, not only from the subspecies *jamaicensis* and *bahamensis*, but also from those populations with which it has been previously associated as *C. p. insularis*. In size, the Cuban birds are more or less intermediate between the continental *passerina* on one hand and the remainder of the western Antillean subspecies on the other. The overall size difference between Cuban *aflavida* and the remaining West Indian forms is quite obvious when skins of these four subspecies are even grossly compared.

Comparisons of male *passerina*, *aflavida*, *insularis*, *jamaicensis* and *bahamensis* as far as depth of pigmentation is concerned shows the following. Males of each subspecies are variable among themselves, but there are very definite trends toward depth of color, both dorsally and ventrally, which are obvious when series are compared. Ranked by darkness of ventral color, the races stand as *jamaicensis*, *passerina*, *aflavida*, *insularis*, and *bahamensis*, with *jamaicensis* being the darkest subspecies and *bahamensis* the palest. Male *jamaicensis* are deep vinaceous below (Pl. 54 D 1; Maerz

and Paul, 1950), with *passerina* males only slightly paler (Pl. 54 C 3). *C. p. aflavida* is still paler than the nominate subspecies, typical colors being Pl. 54 B 4 and Pl. 54 A 5. Caymanian *insularis* average distinctly paler than *aflavida* (Pl. 53 B 3) and even the darkest Caymanian males (Pl. 45 F 1) are paler and less purplish (more brown) than *aflavida*. Hispaniolan *insularis* agree closely with topotypical specimens of that subspecies, although there is a tendency for Hispaniolan birds to be slightly darker (more red) than Caymanian *insularis*. Male *bahamensis* are the palest ventrally, with a somewhat grayer tone (Pl. 53 A 2).

Ranking males by the depth of the dorsal plumage color yields a series of *aflavida*, *passerina*, *jamaicensis*, *bahamensis*, and *insularis*. Note that of this series, *aflavida* and *insularis* stand at opposite extremes. Typical *aflavida* colors are Pl. 15 E 9 and Pl. 15 C 4, whereas topotypical *insularis* dorsa include Pl. 14 A 3 and Pl. 14 B 4. Occasional Caymanian *insularis* (USNM 316752, for instance) resemble occasional *aflavida* (USNM 453536), but the series are quite easily separable on the basis of the darker (more brown) coloration of male *aflavida* and the paler (more gray) backs of *insularis*. There is no mean difference in the depth of the gray crown and squamate nape feathers nor of the tan loreal feathers, although I have the impression that very generally the latter are more reddish in *aflavida* than in Caymanian *insularis* and are even more deeply reddish in Hispaniolan *insularis*.

Females of the four subspecies are similar in many respects. Ventrally, female *bahamensis* have the central portion of the belly most clearly white and have the chest most distinctly squamate, the feathers with the palest buffy edges, of the populations in question. Female *aflavida* are slightly grayer ventrally and have the central portion of the belly more buffy than do female *insularis*, whereas female *jamaicensis* are the darkest (most gray-brown) of the subspecies. As far as dorsal coloration is concerned, female *jamaicensis* are the darkest (Pl. 15 G 5) and *bahamensis* the palest (Pl. 14 A 2). Female *aflavida* are a rich brown (Pl. 15 E 9) whereas female Caymanian *insularis* are paler (Pl. 15 A 7). There is a distinct tendency for the crown and squamate nape feathers to have paler centers (and thus more prominent dark edges) in *aflavida* than in *insularis*.

Two freshly collected (1965) specimens in unworn plumage from Navassa Island (which presumably might be separable from *insularis* as *C. p. navassae*) do not differ in size nor pigmentation from recently collected Hispaniolan *insularis*. There seems no reason to resurrect *navassae* from the synonymy of *insularis*.

In summary, it is appropriate to consider *C. p. aflavida* Ridgway a valid subspecies occurring on Cuba (and presumably on the Isla de Pinos whence I have seen no material). In size and in depth of pigmentation, *aflavida* meets all the criteria for a recognizable subspecies of *Columbina passerina*.

I disagree with Hellmayr and Conover (1942, p. 530, footnote 2) that *bahamensis* is "a very unsatisfactory race." Although *bahamensis* resembles *insularis* (*sensu stricto*) in its small size, its distinctly paler coloration, both dorsally and ventrally and in both sexes, reassures me of its distinctness from other adjacent subspecies.

I have, in the foregoing discussion, made no mention of the presence of, or the amount of (if present), red on the bill of the various populations. There are no color data on any of the material at hand as far as this character is concerned. However, judging by the presently pale areas on the culmens I imagine that the Cuban populations lack this feature (for which reason the name *aflavida* was proposed), and that *insularis* has some basal portions of the bill red.

Specimens examined: *C. p. aflavida*: *Cuba,* Pinar del Río Prov., San Vicente, 2 (AS); Habana Prov., Boca de Jaruco, 3 (AS); Camagüey Prov., 6 mi. S Playa Santa Lucía, 1 (AS); Oriente Prov., 4 mi. E Gibara, 1 (USNM); Santiago de Cuba, 2 (USNM); 23 km E Siboney, 1 (AS); 4 mi. W Baitiquirí, 1 (AS); vicinity of Guantánamo, 9 (USNM).

C. p. insularis: Haiti, Dépt. du Sud, Jérémie, 1 (USNM); Dépt. de l'Ouest, L'Arcahaie, 1 (USNM); 1.1 mi. S. Mirebalais, 1 (AS); Dépt. du Nord, Port-de-Paix, 1 (ANSP); Ile de la Gonâve, Anse à Galet, 2 (ANSP, USNM); Etroits, 1 (USNM); Ile de la Tortue, 1 (USNM); *República Dominicana,* Distrito Nacional, Santo Domingo, 3 (ANSP); La Romana Prov., Isla Catalina, 1 (AS); San Juan Prov., 15 km SE San Juan, 1 (AS); *Cayman Islands,* Grand Cayman, no further locality, 10 (ANSP, USNM); 3 mi. N Georgetown, 1 (AS); 3.5 mi. N East End, 3 (AS); 5.7 mi. ENE, 0.5 mi. N Bodden Town, 1 (AS); Little Cayman, Blossom Point, 1 (AS); Navassa Island, between Lulu Bay and lighthouse, 2 (AS).

C. p. jamaicensis: *Jamaica,* St. Ann Parish, 1 mi. E Discovery Bay, 2

(AS); St. Catherine Parish, Fort Clarence, 1 (AS); Manchester Parish, 0.7 mi. W Gut River, 2 (AS); 0.9 mi. W Gut River, 1 (AS).

C. p. bahamensis: *Bahama Islands*, Grand Bahama, Bootle Bay, 3.5 mi. E West End, 1 (AS); 45 mi. E Freeport, 1 (AS); 3.4 mi. W High Rock, 1 (AS); Great Abaco, 8 mi. WNW Treasure Cay, 1 (AS); Andros, 2 mi. S Fresh Creek, 2 (AS); New Providence, 3.8 mi. W Oakes Field, 1 (AS); Eleuthera, Hatchet Bay Plantation, 5 (AS); Cat, 3.2 mi. E Old Bight, 1 (AS); San Salvador, 2 mi. NNE Cockburn Town, 1 (AS); 6.9 mi. NE Cockburn Town, 3 (AS); 7.1 mi. N Cockburn Town, 1 (AS).

C. p. passerina: Florida, Dade Co., 4 mi. W South Miami, 1 (AS); 1 mi. N North Miami P.O., 1 (AS); Monroe Co., Sugarloaf Key, 1 (AS); Boca Chica Key, 1 (AS).

Geothlypis rostrata Bryant

The Bahama Yellowthroat (*Geothlypis rostrata*) has long been known as an endemic resident on the Bahama Islands of Grand Bahama and Great Abaco (including many offshore cays), New Providence, Andros, and Eleuthera. Paulson (1966, p. 10) first reported the species from Cat Island, to the south of Eleuthera. The nomenclatural history of the various insular populations of *G. rostrata* is extremely complex. Ridgway (1902, p. 674 et seq.) recognized seven Bahamian species, three of which occurred on New Providence, two on Abaco, one on Andros, and one on Eleuthera. This most peculiar situation was later clarified by Todd (1911) who, after careful comparison and analysis of plumages, relegated Ridgway's seven species to one species with three subspecies: the nominate subspecies on New Providence and Andros, *G. r. tanneri* Ridgway on Grand Bahama and Abaco, and *G. r. coryi* Ridgway on Eleuthera. This arrangement of forms has been followed by Hellmayr (1935), although he made some comments on the still confused situation and had only limited material from several islands whence *G. rostrata* had been reported. The current Antillean checklist (Bond, 1956) likewise follows Todd's arrangement. Paulson tentatively regarded his Cat Island specimens as *G. r. coryi*, since they did not agree with specimens of nominate *rostrata* or *tanneri* but agreed in general with Ridgway's description of *coryi*. Lowery and Monroe (1968, p. 43) included Cat Island in the range of *G. r. coryi*, presumably on the basis of Paulson's statement.

In an effort to secure additional Bahama Yellowthroats, Donald W. Buden visited the islands of Cat, Eleuthera, and Andros. He was able to secure a moderate series of birds from Cat Island where

they were not uncommon, but secured only one on Eleuthera and none on Andros; the latter island was only briefly visited. In this regard, Ronald F. Klinikowski and I spent 18 days on Eleuthera in 1961, and encountered no *Geothlypis rostrata*; I have not seen the bird on New Providence, despite regular search for it over several years. Such observations are of course at best negative, but do indicate that on some islands *G. rostrata* may be either uncommon or that the populations may vary in density with changing ecological conditions. As preliminary studies of our material, along with borrowed specimens, progressed, it became evident that more birds from Andros would be most pertinent; accordingly, the author and James A. Rodgers, Jr., visited Andros for five days in November 1968 and during that period secured four birds and saw several more. The habitat was primarily coppice; *G. rostrata* was most common in patches of coppice surrounded by pinewoods (as, for instance, near Red Bay on northern Andros) and was encountered less abundantly in extensive stands of high and uninterrupted coppice (such as just north of Mastic Point).

I have examined 82 specimens of *G. rostrata*, distributed by islands as follows: *rostrata*, New Providence, 14 males, 4 females, Andros, 11 males, 2 females; *tanneri*, Grand Bahama, 20 males, 6 females, Great Abaco, 7 males, 1 female; *coryi*, Eleuthera, 8 males, 2 females, Cat, 4 males, 3 females. All series include freshly collected material (1960-1968) except the New Providence series which is composed of birds collected in the late 1800's. However, comparing freshly collected and old specimens of *tanneri* from Grand Bahama, I can discern no differences in depth of pigmentation, either dorsally or ventrally; therefore I feel confident that recently collected New Providence birds would differ very little or not at all from these older specimens, and comments on the color of topotypical *G. r. rostrata*, based on the old series, is very probably valid.

Todd (1911, p. 246) diagnosed males of the three subspecies on the basis of color: *rostrata* is characterized by having the crown decidedly grayish, the superciliaries faintly yellow-tinged, the back dull olive green, and the flanks greenish yellow; *tanneri* has the crown more greenish (only superficially grayish) the superciliaries decidedly yellow in front, the back brownish olive green, and the flanks brownish olive yellow; in *coryi*, the crown is decidedly yel-

lowish green, the superciliaries are bright yellow, the back bright olive green, and the flanks greenish yellow. No differences in size were considered important. Hellmayr (1935) confirmed Todd's diagnoses.

For dorsal coloration and pattern of males the following observations are pertinent. Of the three currently recognized populations, Eleuthera *coryi* are the most brightly colored, with back distinctly bright yellow-green, yellow superciliary stripes, and crowns only slightly (if at all) more gray than the dorsal plumage. Cat *coryi* are basically similar in color to Eleuthera males but tend on the average to be perhaps a little brighter (more yellow). New Providence *rostrata* are distinctly less yellow than any *coryi* males, have the crown pale gray with the very pale gray (almost white or with but a touch of very pale yellow) superciliary line blending into the very pale anterior margin of the crown patch. Thus, the posterior margin of the frontal portion of the black mask is outlined with very pale gray in most specimens. Andros *rostrata*, on the other hand, are darker (more olive green and thus like more northern *tanneri*) dorsally, have the crown dark gray and the superciliary lines usually dark gray (occasionally yellowish, occasionally pale gray) and never outlining the posterior frontal portion of the black mask with pale gray. Grand Bahama male *tanneri* are slightly darker than Andros *rostrata* (dark olive green) with a dull greenish gray crown, superciliary lines dull gray to dull yellowish gray and not outlining the frontal portion of the mask posteriorly. Great Abaco male *tanneri* are like Grand Bahama males, except that they tend to be slightly grayer dorsally (more gray than Andros *rostrata*), have the crown paler gray than Grand Bahama males, and have the superciliary lines paler gray (at times almost white) and very faintly outlining the posterior edge of the frontal portion of the mask. As far as dorsal color and pattern are concerned, I distinguish the following groupings: 1) Grand Bahama (including Great Abaco, where the birds are somewhat grayer), 2) New Providence, 3) Andros, 4) Eleuthera and Cat (where the birds are slightly brighter).

By far the brightest yellow birds, as far as ventral color is concerned, are Cat and Eleuthera *coryi*; the specimens from Cat are even brighter than those from Eleuthera and have the olivaceous flank feathers less brownish than do Eleuthera *coryi*. Males from

Cat Island also appear to have the lateral portions of the black mask much broader and more extensive than Eleuthera *coryi,* but this may be an artifact of the preparation of the skins. However, Paulson's single Cat male agrees in this character with the four Cat males collected by Buden, and Buden's Eleuthera male agrees with those collected by previous ornithologists on Eleuthera and not with his own Cat Island skins. New Providence, Andros, Grand Bahama, and Great Abaco males are all comparable in depth of ventral yellow pigmentation, although Abaco males have the flank feathers more deeply brown than any other sample and generally also seem to have the ventral yellow slightly paler. Andros (*rostrata*) and Grand Bahama (*tanneri*) are quite comparable in ventral color. On the basis, then, of ventral pigmentation, I distinguish two groups: 1) Eleuthera and Cat (*coryi*), and 2) all other islands (*rostrata* and *tanneri*). The more impressive pigmental features are dorsal rather than ventral in *G. rostrata.*

Since I have fewer females than males, variation in color in the former sex is less clear than it is in males. However, dorsally, Eleuthera-Cat Island females are much paler (less grayish or brownish) than females from elsewhere, New Providence females are about equally as pale as female *coryi* but lack the yellowish tinge, Andros females resemble Grand Bahama-Great Abaco females in being the darkest (most olivaceous). Certainly the populations which are most distinctly sexually dichromatic dorsally are those on Cat and Eleuthera, in which the females are much less brightly colored dorsally than are the males. In ventral color, the situation parallels that of males. Females from Eleuthera and Cat are the brightest yellow (although they are distinctly less bright than the corresponding males), and females from all other islands are quite comparable in being pale yellow to very pale yellow (often with the central feathers whitish to white) below. In female *tanneri* and *rostrata,* the brownish flank feathers are conspicuous against the remainder of the belly color, whereas in female *coryi* the flank feathers are much less brown (olivaceous) and are much less obvious.

Table 3 gives means and extremes of four measurements of male *Geothlypis rostrata* from six populations. Inspection of this table indicates that populations assigned to *tanneri* (Grand Bahama-Great Abaco) are remarkably similar in all measurements, the greatest discrepancy being in data for bill length (tip of bill to

TABLE 3

Measurements (in millimeters) of males of six populations of *Geothlypis rostrata*, arranged from north to south and west to east in the Bahama Islands. Bill measurement equals chord from anterior border of naris to tip. Low extreme of tail for Grand Bahama *tanneri* is from specimen in extremely worn plumage.

	N	Tail	Wing Chord	Bill	Tarsus
tanneri (Grand Bahama)	16	60.5 (57.6-62.5)	61.2 (58.3-66.7)	10.8 (10.2-11.7)	21.0 (20.2-21.6)
tanneri (Great Abaco)	7	60.6 (59.0-62.0)	60.8 (58.5-62.1)	10.1 (9.7-11.1)	20.8 (19.9-21.4)
rostrata (New Providence)	14	61.2 (58.3-63.0)	65.0 (61.1-72.0)	11.3 (10.2-12.2)	21.6 (20.6-22.7)
exigua (Andros)	11	57.7 (54.9-62.0)	60.5 (57.6-67.9)	10.8 (10.3-11.6)	21.2 (20.5-22.0)
coryi (Eleuthera)	8	60.4 (58.4-62.7)	62.9 (59.9-65.5)	10.9 (10.4-11.4)	20.5 (20.1-21.3)
coryi (Cat)	4	57.3 (55.0-59.4)	63.5 (62.1-65.2)	10.8 (10.5-11.1)	20.8 (20.1-21.6)

anterior margin of naris). Based on both color data and measurements, *G. r. tanneri* seems a well characterized subspecies which shows only limited chromatic variation and which occupies the islands of the Little Bahama Bank.

The situation with the two populations assigned to the nominate subspecies is quite different. In measurements of tail and wing chord, New Providence *rostrata* stand at the upper extreme of all specimens measured, and Andros *rostrata* at the lower. In addition, the New Providence birds have the highest mean measurements of bill and tarsus, with Andros birds showing lower means in both cases, but not at the lower extreme. Taking into consideration the chromatic differences outlined above, I consider that *Geothlypis rostrata* from Andros are not identical to their New Providence relatives. The chromatic differences are striking: comparable differences are not shown in any two populations which I assign to either *tanneri* or *coryi*, and additionally the combination of characters shown by Andros specimens are not matched by any other sample. Accordingly, I hereby resurrect *exigua* Ridgway, 1902, (type locality, Fresh Creek, Andros Island, Bahama Islands) for these Andros birds.

The two populations which are considered currently as *coryi* differ between themselves mensurally. Cat Island males have shorter tails, and the amount of overlap between the two populations in this character is slight (58.6-62.7 in Eleuthera birds, 55.0-59.4 in Cat birds). In wing chord and tarsus measurements, Cat Island males average slightly greater, and the means of bill measurements are almost identical, although Eleuthera *coryi* have a slightly higher upper extreme.

Because the series of females is less extensive than is that of the males, the mensural differences between females is less easily shown; these data are not included in Table 3. In measurements of wing chord, the single Abaco *tanneri* female has the lowest measurement (54.2) of all females studied. Five female *tanneri* from Grand Bahama have a mean wing chord measurement of 56.5 (56.0-58.5), so that the Abaco female falls below the lower limit of the Grand Bahama females. Wing chord means of females from New Providence, Andros, and Eleuthera are very similar (59.6, 59.3, 59.2) with Cat females having a lower mean (57.9),

but the range of measurements of Cat females (55.9-61.3) completely embraces the extremes for females from these other islands.

In tail length, once again the lowest measurement of all females is the single Abaco female (51.0) whereas the series of six Grand Bahama females have measurements of 55.7-56.6. Tail measurements of New Providence, Andros, and Eleuthera females have similar means (56.7, 57.7, 58.3); although these differences are more striking than those in the male samples from these same islands, the series of females are considerably smaller, and I attach little significance to the differences observed. On the other hand, the tail measurements of females from Cat show a very low mean (53.8), and very low extremes (51.9-56.5); all birds were taken in either November or March and do not show conspicuously worn plumage. In fact, Cat females are completely separable (51.9-56.5) from Eleuthera females (56.9-59.3) on the basis of this measurement. It should be recalled that Eleuthera and Cat males likewise have strongly different means (60.4, 57.3) and extremes (58.6-62.7, 55.0-59.4) in this measurement, although there is some overlap in the case of tail measurements in males. It seems likely that Eleuthera and Cat *Geothlypis rostrata* have diverged from each other (at least as far as tail length is concerned) to a greater degree than have the two populations of *G. r. tanneri*, for instance. If the chromatic differences or the single possible pattern difference (extent of the black mask posteriorly) could be confirmed by additional material, it seems likely that the Cat Island birds should be distinguished nomenclatorially from those from Eleuthera. I am not prepared to do so at this time.

The distribution of the subspecies of *G. rostrata* is confined to islands of the Great and Little banks. The Little Bank is occupied by *G. r. tanneri*; considering the similarity between the two *tanneri* populations, it seems likely that the Abaconian birds have been relatively recently derived from those from Grand Bahama, or vice versa. The Great Bahama Bank is essentially a U-shaped bank, with the deep Tongue of the Ocean separating the two arms of the U, oriented with the opening toward the north. Andros lies on the western arm of the U, New Providence and Eleuthera on the eastern arm. Cat Island is usually associated with the eastern arm also (Cat is quite close to Eleuthera) but in actuality Cat lies on its own bank. The differences between *exigua* (on the western

arm of the bank) and *rostrata* (on the eastern arm) are not surprising. Despite the proximity of Andros and New Providence (about 40 km), these two islands lie on different sections of the bank and, separated by the deep Tongue of the Ocean, have presumably never been directly connected. On the other hand, the shallow banks connecting Eleuthera and Cat Island suggest that since the Pliocene, these two islands have been variously associated with each other and for varying lengths of time. Thus, differentiation between *exigua* and *rostrata* is more pronounced than between the two *coryi* populations (which however seem to have diverged in at least one character); each member of the former pair of subspecies has had an independent history and the two populations have never been directly in contact, whereas the latter pair of populations may have been in contact at various times and for varying durations during the more recent geologic history of the Bahama Islands.

Specimens examined: *G. r. tanneri*: *Grand Bahama,* Bootle Bay, 3.5 mi. E West End, 1 (AS); 5.5 mi. E West End, 2 (AS); 1 mi. E Eight Mile Rock, 2 (AS); Queen's Cove, 1 (AS); 8.4 mi. E Freeport (airfield), 1 (AS); 17 mi. E Freeport, 1 (AS); 1.2 mi. W McLean's Town, 1 (AS); 1.0 mi. W McLean's Town, 1 (AS); 0.5 mi. W McLean's Town, 1 (AS); 2.2 mi. E McLean's Town, 1 (AS); 2.5 mi. E McLean's Town, 1 (AS); 4.1 mi. E McLean's Town, 3 (AS); 4.2 mi. E McLean's Town, 2 (AS); 4.2 mi. E. McLean's Town, 2 (AS); 7.0 mi. W High Rock, 1 (AS); 35.5 mi. E Lucaya, 1 (AS); 36 mi. E Lucaya, 1 (AS); 45 mi. E Freeport, 1 (AS); no data other than Grand Bahama, 3 (FMNH); *Great Abaco,* 6 mi. NW Treasure Cay, 3 (AS, LSUMZ); 16 mi. NW Treasure Cay, 1 (AS); 15 mi. S Lake City, 1 (AS); no data other than "Abaco", 3 (FMNH).

G. r. rostrata: *New Providence,* Nassau, 15 (AMNH, FMNH); no data other than New Providence, 2 (USNM); "Bahama Islands", 1 (FMNH).

G. r. exigua: *Andros,* 1.5 mi. S Fresh Creek, 1 (AS); 1 mi. N Mastic Point, 2 (AS); 2 mi. ESE Red Bay, 2 (AS); no data other than Andros, 8 (ANSP, FMNH).

G. r. coryi: *Eleuthera,* 2.3 mi. SE Governor's Harbour, 1 (AS); no data other than Eleuthera, 9 (AMNH, FMNH, USNM); *Cat Island,* The Bight, 1 (AS); Tea Bay, 1 (AS); 9.6 mi. S Bluff Settlement, 1 (AS); 8.3 mi. SE Old Bight, 1 (AS); 3.0 mi. E Old Bight, 1 (AS); 0.9 mi. E Old Bight, 1 (AS); 1.8 mi. N Bennett's Harbour, 1 (AS).

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Department of Biology, Miami-Dade Junior College, Miami, Florida 33167.