

THE TAXONOMIC STATUS OF THE PUERTO RICAN BULLFINCH (*LOXIGILLA PORTORICENSIS*) (EMBERIZIDAE) IN PUERTO RICO AND ST. KITTS

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Resumen. – El estado taxonomico del Comeñame (*Loxigilla portoricensis*) (Emberizidae) en Puerto Rico y St. Kitts. – El Comeñame de St. Kitts (*Loxigilla portoricensis grandis*) fue descrito por Lawrence en 1882 como una subespecie del Comeñame de Puerto Rico (*L. p. portoricensis*) basado en una serie de nueve ejemplares colectados por Ober en 1880. En base a nuestros análisis de 103 ejemplares de *Loxigilla portoricensis*, concluimos que la forma de St. Kitts debería ser elevada al status de especie, *L. grandis*. Las aves de St. Kitts son consistentemente y substancialmente mayores en el tamaño del ala, cola, tarso y pico. Ambas formas se diferencian también consistentemente en coloración y patrón. Presentamos la primera descripción de la coloración del plumaje juvenil. Compartimos la opinión de algunos autores en considerar que esta forma no esté en realidad extinguida y sobreviva en ciertas remotas áreas de Mt. Misery en St. Kitts.

Abstract. – The St. Kitts Bullfinch (*Loxigilla portoricensis grandis*) was described by Lawrence in 1882 as a subspecies of the Puerto Rican Bullfinch (*L. p. portoricensis*) based on a series of nine specimens collected by Ober in 1880. Based on our analysis of 103 specimens of *Loxigilla portoricensis*, we concluded that the St. Kitts form should be elevated to full-species status, *L. grandis*. The St. Kitts birds are consistently and substantially larger in wing chord, tail, tarsus, and culmen size. The two forms also consistently differ in color and pattern. We present the first description of juvenal plumage. We share the belief of some other authors that this form may still survive in the remote high forest of Mt. Misery, St. Kitts. *Accepted 20 June 2002.*

Key words: *Loxigilla grandis*, *Loxigilla portoricensis*, *Loxigilla portoricensis grandis*, *Loxigilla portoricensis portoricensis*, Puerto Rican Bullfinch, Puerto Rico, Status, St. Kitts.

INTRODUCTION

The genus *Loxigilla* Lesson 1831 is endemic to the West Indies and includes only three species: *L. portoricensis* (Daudin) found in Puerto Rico and St. Kitts (St. Christopher); *L. violacea* (Linnaeus) in the Bahamas, Hispaniola, and Jamaica; and *L. noctis* (Linnaeus)

widely distributed in the Lesser Antilles (Hellmayr 1938, Bond 1956, Paynter 1970, American Ornithologists' Union 1998). Bond (1956) recognized 16 subspecies for *Loxigilla*: two for *L. portoricensis* – *portoricensis* (Puerto Rico) and *grandis* (St. Kitts); five for *L. violacea* – *violacea* (several islands in the Bahamas), *maurella* (Île de la Tortue), *affinis* (Hispaniola, including Île de la Gonâve and Isla Saona), *parishi* (Île-à-Vache, Isla Beata, and Isla

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Catalina), and *ruficollis* (Jamaica); and nine for *L. noctis* – *coryi* (Saba, St. Eustatius, St. Kitts, Nevis, and Montserrat), *ridgwayi* (Anguilla, St. Martin, Barbuda, and Antigua), *desiradensis* (Désirade), *dominicana* (Guadeloupe, Marie Galante, Îles les Saintes, and Dominica), *noctis* (Martinique), *sclateri* (St. Lucia), *crissalis* (St. Vincent), *grenadensis* (Grenada), and *barbadensis* (Barbados). Oustalet (1895) described *Loxigilla chazaliei* from Barbuda as a distinct species, but Bond (1956) included that population within *L. n. ridgwayi*. Only one taxon has been described recently: *Loxigilla violacea ofella* for the Caicos Islands, southern Bahamas (Buden 1986). Buden (1986) also proposed that *L. n. parishii* was in synonymy with *L. n. affinis*.

Among these subspecies, only *L. portoricensis grandis* is considered extinct (Bond 1936, Danforth 1936, Hellmayr 1938, Bond 1956, Paynter 1970, Raffaele 1977, Olson 1984, American Ornithologists' Union 1998). Lawrence described the race in 1882 based on nine specimens collected by Frederick A. Ober in 1880. No more individuals were thought collected thereafter. In 1937, however, Paul Bartsch had secured an individual, which he pickled in alcohol and deposited in the United States National Museum of Natural History. That specimen was ignored until Storrs L. Olson (1984) published its rediscovery. Four ornithologists, Herbert Raffaele, Ralph Browning, Wayne Arendt, and David Steadman, visited St. Kitts after Bartsch, but none found the bullfinch. We have spoken with three of these ornithologists, finding that none of them stayed in the bullfinch's habitat long enough, or the weather was too poor to mount an adequate search for the bird. Further, Albert Schwartz and Ronald F. Kliniowski collected in the mountains of St. Kitts in April and May 1962, but failed to secure a specimen of *L. p. grandis*. Most recently, Joseph M. Wunderle, Jr. and Jean Lodge casually searched for the bullfinch during a day

hike on Mt. Misery on 28 April 2001. No Puerto Rican Bullfinches were found, but they did detect many Lesser Antillean Bullfinches.

It is not the objective of this paper to confirm which of the specimens collected by Ober is the type, as discussed by Lawrence (1882) in his original description (Ridgway 1901; Deignan 1961, *in* Bond 1962). Rather, here we present a re-evaluation of the taxonomic status of the Puerto Rican Bullfinch (*Loxigilla portoricensis*). Also, because the juvenile of *L. p. grandis* has not been described, we here provide such a description.

MATERIALS AND METHODS

We examined and measured all available specimens of *L. p. grandis*, as well as all specimens of other *Loxigilla* species, deposited in the Field Museum of Natural History (Chicago), Museum of Comparative Zoology (Harvard University), American Museum of Natural History, United States National Museum of Natural History, and Academy of Natural Sciences of Philadelphia. Also, we examined the pickled specimen reported by Olson (1984), which is a sub-adult individual, judging by the coloration and the length of the wing chord. All original specimens collected by Ober are adults, with the exception of an immature male (FMNH #9067), one of the topotypes originally described by Lawrence (1882). Conventional measurements of the wing chord (flattened against the ruler), tail, tarsus, and exposed culmen were taken to the nearest 0.1 mm with calipers. We present summary descriptive statistics (mean, SD, and range) for the specimens. We plotted body measurements to assess the pattern of spatial segregation between *portoricensis* and *grandis*. The hypothesis of separation derived from the plots of body measurements was tested using discriminate function analysis (DFA) (Kleinbaum & Kupper 1978). SPSS for Windows

TABLE 1. Mean, standard deviation, range, and sample size (parentheses) for wing, tail, culmen, and tarsus for *Loxigilla portoricensis* populations in Puerto Rico (*L. p. portoricensis*) and St. Kitts (*L. p. grandis*). Statistical analyses are within-sex comparisons (two-sample t-test; equal variances not assumed) between Puerto Rican and St. Kitts specimens.

Sex	Locality	Statistic	Measurements (mm)			
			Wing	Tail	Culmen	Tarsus
Males	Puerto Rico		89.7 ± 3.9	73.6 ± 3.3	15.1 ± 1.9	22.6 ± 1.2
			80.0–99.0	66.0–80.0	12.0–18.0	18.4–25.9
			(55)	(52)	(53)	(55)
	St. Kitts		102.3 ± 3.4	78.5 ± 23.4	19.9 ± 1.1	27.3 ± 2.5
			95.0–107.0	71.0–81.0	17.7–20.9	23.2–31.7
			(8)	(8)	(8)	(8)
	t	-9.50	-3.84	-10.25	-5.20	
	df	9	9	14	7	
	P (2-tailed)	< 0.001	0.004	< 0.001	0.001	
Females	Puerto Rico		84.1 ± 2.9	69.4 ± 3.7	15.5 ± 1.2	22.3 ± 1.2
			80.5–92.5	64.0–77.0	11.4–16.1	19.6–25.4
			(36)	(35)	(35)	(32)
	St. Kitts		101.7 ± 4.0	75.5 ± 2.2	19.7 ± 1.9	26.5 ± 0.8
			97.0–104.0	83.0–76.5	17.6–20.6	26.2–27.4
			(3)	(3)	(3)	(3)
	t	-7.37	-4.32	-5.68	-8.59	
	df	2	3	2	3	
	P (2-tailed)	0.018	0.023	0.030	0.003	

(SPSS 1999) was used to run DFA.

RESULTS

We examined 103 *Loxigilla portoricensis* skins, as well as more than 540 specimens of *L. violacea* and *L. noctis*. Our examinations of the two taxa of *L. portoricensis* (*portoricensis* and *grandis*) revealed differences in size and coloration substantially greater than those defining subspecies within the other *Loxigilla* species. Because we found sexual size dimorphism in three of the measurements taken of specimens of *portoricensis* (wing – $t = -7.84$, d.f. = 87, $P < 0.0001$; tail – $t = -5.32$, d.f. = 65, $P < 0.0001$; and culmen – $t = -4.87$, d.f. = 85, $P < 0.0001$), size comparisons between *portoricensis*

and *grandis* were made within sex; i.e., male *portoricensis* with male *grandis*, and female *portoricensis* with female *grandis*. None of the measurements taken for *grandis* revealed sexual size dimorphism (all $P > 0.05$), although the small sample size of females ($N = 3$) precluded a rigorous analysis. Birds from St. Kitts (including the two immature specimens) are much larger than Puerto Rican birds in all conventional measurements (all differences significant at 0.05 level, Table 1). Also, the culmen of *grandis* is bulkier, giving an appearance of being even larger (Table 1, Fig. 1). A stepwise selection procedure within DFA revealed wing, culmen, and tarsus length were the most important of the size variables measured. Plots contrasting these variables within



FIG. 1. *Loxigilla portoricensis* specimen from St. Kitts (*grandis*) (above: ANSP #128168; male) compared with specimen from Puerto Rico (*portoricensis*) (below: ANSP #84804; female), showing the substantial difference in body and culmen size. Photograph by Douglas Wechsler of VIREO, Academy of Natural Sciences of Philadelphia.

sex showed *portoricensis* and *grandis* tending to occupy discrete regions of the morphological space (Fig. 2).

To further examine size differences between the two populations, we used linear discriminant analysis to classify specimens into two groups (“Island”), Puerto Rico and St. Kitts, using lengths of cord, tail, culmen, and tarsus as predictors. For males, the analysis produced a true group classification proportion of 1.0 for Puerto Rican specimens and 0.88 (7 of 8 correctly classified) for St. Kitts individuals, for an overall proportion correct of 0.98 (59 of 60) (Wilks’ lambda = 0.27; $F = 78.9$; $df = 2$ and 57 , $P < 0.001$). For females, the analysis produced a true group

classification proportion of 1.0 for both Puerto Rican and St. Kitts individuals, for an overall proportion correct of 1.0 (35 of 35) (Wilks’ lambda = 0.14; $F = 102.1$; $df = 2$ and 32 , $P < 0.001$).

Besides measurements, the two races of *L. portoricensis* also differ in coloration; i.e., not only richness of colors, but also in pattern. Most distinctive among these pattern differences are the consistent black markings on the undertail covert of St. Kitts birds; none of the *L. p. portoricensis* specimens displayed this pattern. To further explore these differences, we present the detailed plumage descriptions provided by Ridgway (1901): “The overall plumage of *L. p. grandis* differs from *L. p. por-*

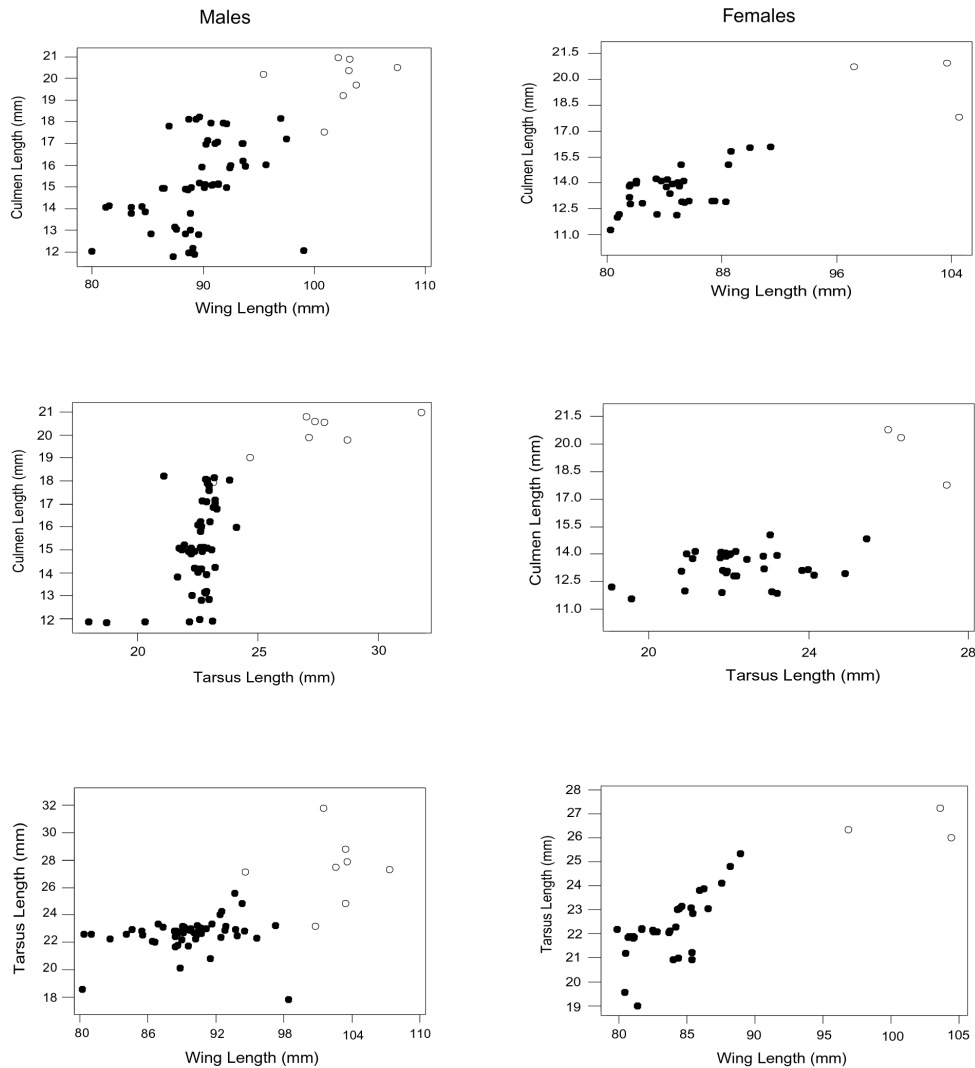


FIG. 2. Plots contrasting body measurements of specimens of *Loxigilla portoricensis portoricensis* (solid dots; N = 52 males, 32 females) and *L. p. grandis* (open circles; N = 8 males, 3 females).

toricensis in being a more glossy black. The anal coverts are darker, more dark terra-cotta. The throat and upper breast patch is more extended and darker, as are the anal coverts, which show speckles or black marks. Also, *L. p. grandis* is a substantially larger bird.”

Based on the male specimen collected by Bartsch (USNM 80929), we provide the fol-

lowing description of the juvenal plumage of *L. p. grandis*: Only a few reddish feathers on throat; underparts brownish-beige, with a tinge of cinnamon; feathers around vent dark gray; wings brown, as are some of the outer rectrices, with the central rectrices darker, more blackish; inner edge of secondaries clearly demarcated in beige; rump and back

brownish, with a tinge of olive-reddish; anal feathers terra-cotta (lighter than in adults) and not blotched with black; forehead, as well as above eyes, with few reddish feathers; pileum almost slate-grayish. Comparing this specimen with young birds from Puerto Rico, we find that *grandis* is darker and more brownish, with less greenish-olive on the underparts. The color of the undertail coverts is the same in both forms, as is the white of the axillars. Upperparts also differ: olive in *portoricensis* and reddish-brown in *grandis*. The head of *grandis* is grayer than in *portoricensis*.

DISCUSSION

In the nineteenth century, most authors had the tendency to describe new taxa as species. An exception was Lawrence's (1882) description of *Loxigilla portoricensis grandis* as a subspecies. Three factors may have contributed to his decision: (1) a lack of material for comparison, (2) poor knowledge of the genus (Lawrence had to consult Juan Gundlach by correspondence regarding the plumage), and (3) Lawrence's inability to assemble Ober's nine topotypes to write his description. Surely, if he had gathered these specimens and compared them to Puerto Rican specimens of *L. portoricensis*, Lawrence would not have hesitated in naming the new taxon as a species. In fact, two contemporary authors, Cory (1892) and Ridgway (1901), considered the taxa as distinct species. Subsequent authors, probably also not assembling the topotypes, and taking for granted the original description of Lawrence, have considered these forms as conspecific.

Buden (1986) noted that the subspecies of *L. violacea* are distinguished both by differences in size (especially wing and tail measurements) and coloration. This pattern of differences also applies to the races of *L. noctis* (Danforth 1937). Thus, all described or proposed subspecies of *L. violacea* and *L. noctis*

differ from one another in moderate differences in length of wing chord, tail, or tarsus, as well as small differences in the culmen. These differences are correlated with differences in color. Our examinations of the two taxa of *L. portoricensis* (*portoricensis* and *grandis*) revealed differences in size and coloration substantially greater than those defining subspecies within the other *Loxigilla* species.

Nothing is known about the natural history of *grandis*, so no comparisons can be made with the Puerto Rican form. In contrast, considerable natural history information has been collected for *L. p. portoricensis* (e.g., Pérez-Rivera 1994). Although the bullfinch is common in Puerto Rico, it is not easy to observe and is heard more often than it is seen, because it keeps to thickets, bushy vegetation, and tangled bushes (Biaggi 1983). The bullfinch is widely distributed in Puerto Rico, occurring from the coast to the highest peaks (Pérez-Rivera 1994). Garrido heard them at Cerro de Punta (1330 m) and Maricao (900 m). According to the only two collectors (Ober and Bartsch), the St. Kitts form was restricted to the high slopes of Mount Misery, where the habitat differs from the rest of the island. Raffaele (1977) speculated that the recent arrival of the Lesser Antillean Bullfinch (*L. noctis*), in combination with hurricanes, introduced monkeys, and other problems, could have been detrimental to the survival of *L. p. grandis*. This seems plausible, but one additional fact should be taken into account in evaluating the decline of *L. p. grandis*. When Ober collected *grandis* in St. Kitts at the end of the nineteenth century, *L. p. noctis* already inhabited the island (specimens examined at the Field Museum of Natural History). At that time, *L. p. grandis* and *L. p. noctis* were apparently segregated in different habitats, with *grandis* keeping to high-elevation forest, and *noctis* restricted to lower elevations.

Raffaele (1989) and Pérez-Rivera (1994) considered *Loxigilla portoricensis* as a species

endemic to Puerto Rico because, *L. p. grandis* being extinct, Puerto Rico is the only island to have the species. But this is not a valid reason for considering a species endemic. It should be considered an endemic species only if the St. Kitts form is considered a different species, whereas, to date, the forms *portoricensis* and *grandis* are considered subspecies (American Ornithologists' Union 1998).

CONCLUSIONS

Unfortunately, no analyses of biochemical or vocal characters have been performed on *L. p. grandis*. Such analyses may provide support for the differences in size, plumage pattern, and coloration. Nevertheless, the morphological differences are too obvious to be dismissed and, based on these and the isolation of the two populations, we propose the taxa *grandis* and *portoricensis* are different species. Under this scheme, *Loxigilla portoricensis* becomes monotypic and a species endemic to Puerto Rico, whereas *Loxigilla grandis* is endemic to the island of St. Kitts.

Loxigilla grandis indeed may be extinct, but Bartsch's 1937 specimen, and the likelihood that the bird is an elusive species with habits similar to the Puerto Rican form, leaves the possibility that the bird is not yet gone. We agree with Olson (1984) and Lindsay (1997) who suggest the remote montane habitat of St. Kitts deserves additional searches.

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