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THE TUMACO SEEDEATER (*SPOROPHILA INSULATA*, EMBERIZIDAE): A SPECIES THAT NEVER WAS ?

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Resumen. – El Espiguero de Tumaco (*Sporophila insulata,* Emberizidae): ¿Una especie que nunca la era? – El Espiguero de Tumaco, *Sporophila insulata*, generalmente se considera una especie endémica de Colombia y en peligro crítico de extinción. Con base en un reconocimiento breve de los plumajes de los machos en una población silvestre y la colección de tres ejemplares (los primeros desde la colección de la serie típica hace 80 años), examinación de esta serie típica y de series largas de ejemplares de los Espigueros Golicastaño (*S. telasco*) y Menudo (*S. minuta*), dos posibles parientes, concluyo que *S. insulata* debe considerarse como una subespecie o morfo del primero y que no está emparentado con el segundo. En *S. telasco* la extensión del castaño del plumaje ventral parece no cambiar con la edad, y lo mismo probablemente ocurre en *insulata*; el plumaje dorsal parece un mejor indicativo de la edad. Hembras de las dos son indistinguibles, y no hay indicios confiables de aislamiento reproductivo. Por lo tanto, fenotipos intermedios (los cuales se constituyen en la mayoría de los machos en las poblaciones cerca de Tumaco) deben representar el resultado de entrecruzamiento libre, lo cual posiblemente se ve facilitado por los hábitos nómadas de estas poblaciones.

Abstract. – The Tumaco Seedeater (*Sporophila insulata*) is generally considered to be a critically endangered, endemic species of Colombia. On the basis of a brief survey of plumage types in a wild population and collection of three specimens (the first since the type series was taken 80 years ago), examination of the type series and extensive series of possible relatives (Chestnut-throated Seedeater, *S. telasco* and Ruddy-breasted Seedeater, *S. minuta*), I conclude that *S. insulata* is best considered a race or color morph of the former, and is not closely related to the latter. The amount of chestnut color below in males of *telasco* apparently does not increase with age, and evidence that the same is true in *insulata* is presented; dorsal coloration is a better indicator of age. Females of the two are indistinguishable, and no solid evidence of reproductive isolation exists. Thus, phenotypes intermediate between the two (which constitute the bulk of males in populations of "*insulata*" near Tumaco) most likely reflect free interbreeding that may in turn be facilitated by nomadic population movements. *Accepted 15 May 2003.*

Key words: Colombia, conservation, taxonomy, seedeaters, Tumaco Seedeater, *Sporophila insulata*, *Sporophila telasco.*

INTRODUCTION

The Tumaco Seedeater (*Sporophila insulata*) has long been one of Colombia's most enigmatic birds. Eighty-two years elapsed between the collection of the type series by W. B. Richardson on Isla Tumaco and the next time the bird was seen by an ornithologist. During this interval Isla Tumaco was engulfed by the city of Tumaco and recent searches there for the seedeater were unsuccessful. The meager data were summarized by Collar *et al.* (1992) who

feared that it might be extinct. Recent treatments have considered it to be critically endangered (e.g., Renjifo 1998). However, stunted vegetation flanked by mangroves like that described by Richardson (in Chapman 1917) on Isla Tumaco occurs widely on islands and mainland along the coast of Nariño, such that the rediscovery of *S. insulata* at Isla Bocagrande, c. 15 km west of Tumaco, in September 1994 by Salaman and Giles (Salaman 1995), while exciting news indeed, was not wholly unexpected. In March 1995, I made a brief visit to Isla Bocagrande, where I observed a flock, captured several birds in a mist net and collected three specimens, the first since the type series. The taxonomic status of the Tumaco Seedeater has also been somewhat uncertain. When he described *insulata,* Chapman (1921) compared it only with the Ruddy-breasted Seedeater (*S. minuta*) because of the extensively chestnut underparts of the males. However, Ridgely & Tudor (1989) reexamined the type series and suggested that the closest relative of *insulata* is the Chestnut-throated Seedeater (*S. telasco*) which occurs along the Pacific coastal lowlands from extreme southwestern Colombia to northern Chile (Meyer de Schauensee 1966). They suggested that *insulata* might represent simply a race of the latter species, or even hybrids of *telasco* and *minuta*. I therefore examined all specimens of *S. insulata* and series of *S. telasco* and *minuta* to try to determine the taxonomic status of this striking bird.

METHODS AND MATERIALS

Study area. Isla Bocagrande is basically a sandspit c. 3 km long, separated from the mangrove swamps of the adjacent mainland by an estuary some 100 m wide, along which extensive mudflats are exposed at low tide. The eastern half or more of the island is narrow and uninhabited; the landward side consists of low dunes, covered by a narrow strip (width 10–50 m) of low vegetation dominated by the bunchgrass *Uniola pittieri* (shown in the foreground of Salaman's (1995) photo, with scattered low shrubs and stunted mangroves. I found seedeaters only in this habitat, as did Salaman and Giles. However, I would estimate the total extent of bunchgrass-scrub on the island to be 3–5 ha, rather than á1 ha as stated by Salaman (1995). The western half of the island is broader and includes a small settlement with various rustic resort hotels, mostly unoccupied at the time of my visit, as well as areas of taller scrub and second growth on the landward side. The entire seaward side of the island consists of a broad, very gently sloping sandy beach.

Field work. I arrived on Isla Grande at 14:00 on 14 March 1995. Late that afternoon, following a period of light rain, I located a loose flock of seedeaters c. 200 m east of the settlement, evidently going to roost in some small bushes scattered among the bunchgrass. Poor light prevented detailed observations, but I spent over 3 h the next morning observing this flock, and capturing five birds in a mist net. I spent the rest of the morning making a census of all seedeaters on the eastern two-thirds of the island and attempting to classify all males seen according to the following scheme: Type A = "good" *insulata* with dark chestnut underparts and only a small area of buffy white on the abdomen; type B = "pale" *insulata* with underparts mostly paler chestnut with more extensive buffy to white on the belly; type C = underparts chestnut back to the midbreast, buffy to white posteriorly; type D = entire throat chestnut but little to none on breast, belly or flanks; rest of underparts buffy-white to white; and type E = "good" *telasco* with only upper throat dark chestnut, rest of underparts white. These classes are not discrete but intergrade to some extent. However, I found that they could be applied rapidly in the field. Strong winds after about

TABLE 1. Plumage features of *Sporophila minuta, telasco* and *insulata*

Feature	*Sporophila minuta*	*Sporophila insulata*	*Sporophila telasco*
Adult males			
Pattern of underparts	Entirely uniform rufous, including belly and crissum	Throat and varying amounts of breast, sides and flanks chestnut, rest (sometimes only center of abdomen and crissum) white to buffy	Throat chestnut; remaining underparts white, sometimes tinged buff or (flanks) grayish
Color of underparts	240 (Kingfisher rufous) to 340 (Robin rufous)	32 (Chestnut) to 35 (Hazel); white to near 118 (Warm buff)	32 (Chestnut); white to paler than 118 (Warm buff)
Throat pattern	Immaculate rufous	Sides of throat gray, this extending medially across lower throat as a narrow band, usually incomplete medially	Sides of throat gray, this extending medially across lower throat as a narrow band, usually widely incomplete medially
Pattern of upperparts	Back and head immaculate gray-brown; rump and upper tail-coverts rufous	Mostly gray; midback and crown vaguely to distinctly streaked blackish; pale band across lower rump (rarely entire rump pale)	Mostly gray; midback and crown vaguely to distinctly streaked blackish; pale band across lower rump
Ground color of upperparts	Near 91 (Grayish horn)	Near 85 (Light neutral gray), often washed brownish	Near 85 (Light neutral gray), often washed brownish
Color of rump (or rump-band)	Concolor with underparts	Whitish, more or less mixed with to entirely rusty (near 36, Amber); paler than underparts	White
Tail pattern	No white in tail	Bases of 3–5 central pairs of rectrices white	Bases of 3–5 central pairs of rectrices white
Adult females			
Pattern and color of underparts	Uniform, immaculate dull tawny buff (near 39, Cinnamon, to 223D, Tawny)	Breast and sides buffy (118, Warm buff to 123C, Yellow ochre but paler); throat, belly and crissum whitish	Breast and sides buffy (paler than 118, Warm buff or 123C, Yellow ochre); throat, belly and crissum whitish

TABLE 1. Continuation.

Feature	*Sporophila minuta*	*Sporophila insulata*	*Sporophila telasco*
Pattern of upperparts	Unpatterned dull buffy-brown	Buffy-brown, streaked faintly to broadly with blackish, especially on midback	Buffy-brown, streaked faintly to broadly with blackish, especially on midback
Ground color of upperparts	Near 26 (Clay color)	Near 223C, Sayal brown	Near 223C, Sayal brown
Tail pattern	No white in tail	Bases of 3–4 central pairs of rectrices white (less than male)	Bases of 3–4 central pairs of rectrices white (less than male)
Juveniles			
Pattern of underparts	Unstreaked	Some dusky streaking on breast and sides	Variably streaked dusky on breast and sides

TABLE 2. Measurements (in mm) of parameters of external morphology, and body masses (in g) of adult males of *Sporophila minuta, insulata* and *telasco*; sample sizes, means, standard deviations and ranges given, as well as results of analysis of variance (F, P) and Tukey a posteriori tests. Means (M = *minuta*, T = *telasco*, I = *insulata*) are presented in order of magnitude; lines below connect means that do not differ significantly.

Parameter	*S. minuta*	*S. insulata*	*S. telasco*	*F, P*	Tukey
N	27	7	46		
Exposed culmen	7.98 ± 0.25 (7.5–8.5)	8.54 ± 0.17 (8.3–8.8)	8.49 ± 0.32 (7.8–9.3)	28.80 $P < 0.001$	M T I ---- ------
Bill length from nostril	5.96 ± 0.19 (5.5–6.3)	6.16 ± 0.18 (5.7–6.6)	6.29 ± 0.19 (6.0–6.6)	14.01 $P < 0.001$	M I T ---- ------
Bill depth at nostril	6.32 ± 0.20 (6.0–6.6)	6.60 ± 0.17 (6.4–6.8)	6.61 ± 0.24 (6.1–7.1)	15.35 $P < 0.001$	M I T ---- ------
Chord of closed wing	49.91 ± 1.31 (47.6–52.5)	52.16 ± 1.30 (50.5–54.0)	52.90 ± 1.35 (50.2–55.6)	41.60 $P < 0.001$	M I T ---- ------
Tail length	34.43 ± 1.19 (32.2–36.5)	37.30 ± 1.00 (36.4–38.9)	37.20 ± 1.54 (34.5–40.1)	35.87 $P < 0.001$	M T I ---- ------
Tarsus length	13.64 ± 0.47 (12.5–14.2)	14.39 ± 0.29 (13.9–14.8)	14.49 ± 0.39 (13.4–15.3)	39.50 $P < 0.001$	M I T ---- ------
Length of wing speculum	3.84 ± 0.86 (1.6–5.1)	5.58 ± 0.60 (4.1–6.4)	5.62 ± 0.84 (3.1–7.4)	60.79 $P < 0.001$	M I T ---- ------
Body mass (g)	8.38 ± 0.40 (7.8–9.2) N = 9	9.27 ± 0.62 (8.6–10.1) N = 4	8.91 ± 0.61 (8.0–9.9) N = 8	4.57 $P < 0.05$	M T I ------- -------

08:30 prevented further mist netting, and avian activity declined to virtually nil after about 10:30 due to wind and hot sun. I left the island at 13:00 on 15 March.

Museum work. I measured series of *S. minuta* and my specimens of *insulata* in the collection of the Instituto de Ciencias Naturales, Bogotá, series of *telasco* in the Academy of Natural Sciences of Philadelphia and the American Museum of Natural History, and the type series of *insulata* in the latter museum. For each specimen I measured the length of the exposed culmen, bill length from the nostril, bill depth at the nostril, chord of the closed wing, and lengths of the tail, tarsus, and the white "speculum" at the base of the primaries (see Stiles 1996). All measurements were made to 0.1 mm with a Mitutoyo dial caliper. I measured body mass of the *insulata* I captured, and compared these with masses of *telasco* supplied by M. Marín from the collection of the Museum of Zoology of Louisiana State University, as well as masses of *minuta* from my own field work in Colombia. I also took notes on plumages of specimens examined,

TABLE 3. Measurements (as in Table 2) of adult females of *Sporophila minuta, insulata* and *telasco*, with values of t-tests and corresponding probabilities for comparisons between means for *minuta* and *telasco* (except for body mass, where the nonparametric Mann-Whitney U is used).

Parameter	*S. minuta*	*S. insulata*[1]	*S. telasco*	t, *P*
N	22	2	26	
Exposed Culmen	8.16 ± 0.22 (7.8–8.5)	8.5, 8.9	8.53 ± 0.28 (8.0–9.0)	4.97 $P < 0.001$
Bill length from nostril	5.93 ± 0.24 (5.5–6.6)	6.0, 6.2	6.25 ± 0.22 (5.8–6.7)	4.18 $P < 0.001$
Bill depth at nostril	6.34 ± 0.23 (5.9–6.8)	6.4, 6.5	6.53 ± 0.22 (6.1–7.0)	2.68 $P < 0.05$
Chord of closed wing	47.54 ± 1.06 (45.5–50.5)	48.5 (molting), 49.8	51.04 ± 1.40 (47.4–53.4)	9.62 $P < 0.001$
Tail length	34.37 ± 1.09 (32.6–36.6)	38.1, 35.7	36.01 ± 1.36 (33.0–38.2)	4.50 $P < 0.001$
Tarsus length	13.60 ± 0.50 (12.6–14.5)	14.6, 13.9	14.37 ± 0.34 (13.7–15.0)	6.33 $P < 0.001$
Body mass (g)	8.30 ± 0.68 (7.1–9.2) N = 8	—, 9.0	8.93 ± 0.90 (8.0–9.8) N = 3	$U = 7$ $P > 0.10$

and made color comparisons with reference to Smithe (1975, 1981).

RESULTS

Relationships of S. insulata. Before considering the field observations in detail, I will try to determine whether *telasco* or *minuta* is the closest relative of *insulata*. Because only a single female specimen of *insulata* exists, I base my quantitative analysis on male plumages. Numerous features of color and pattern are similar or identical between *telasco* and *insulata* but differ from the corresponding features of *minuta*: the presence of white or buff on the abdomen, the shade of reddish color below, the presence of a partial grey throat band (rarely complete in *insulata*, at least suggested on many *telasco*), streaking on the upperparts, the progression of dorsal plumages from brown to grey (see below), the presence of white in the tail. *Insulata* differs from *telasco* in having more extensive chestnut below (although some individuals may be almost indistinguishable on this basis) and the rusty color in the rump; the posterior (non-chestnut) underparts of this form are usually more or less strongly tinged buffy whereas those of *telasco* are white (Table 1). An interesting mark present in males of all three forms but absent from those of most *Sporophila* is a white spot beside the base of the mandible; this area is

diffusely white in *S. plumbea,* and extended into a broad moustachial stripe in *S. lineola* and *bouvronides,* but its taxonomic significance is uncertain. The female of *insulata* is essentially indistinguishable in color and pattern from those of *telasco*, but differs in numerous respects from that of *minuta*. A further resemblance between *insulata* and *telasco* is streaking below in juveniles, also unknown in *minuta* (Table 1).

The analysis of variance of measurements of males of the three forms produced equally clear-cut and concordant results (Table 2). Highly significant variation between means was found in all measurements; in all cases *minuta* differed from *telasco* and *insulata*, which did not differ between themselves except that *insulata* was significantly heavier (and thus even more different from *minuta*). However, this probably reflects the fact that all *insulata* I collected and dissected were fat and molting; especially given the small sample size, I see no reason to conclude that a real difference in mass between these forms exists. Females of *minuta* and *telasco* differ significantly in virtually all parameters except body mass; the two female *insulata* measured are either more or less internediate or much closer to *telasco* (Table 3). Thus, the overall conclusion is that *insulata* is very similar to *telasco*, but its resemblance to *minuta* is only superficial at best and probably does not indicate close relationship. Similarly, it seems most unlikely that *insulata* represents hybrids between *telasco* and *minuta*: only in the extent of chestnut below is there any hint of intermediacy. Contact between *telasco* and *minuta* prior to the collection of the type series of *insulata* seems impossible: Tumaco was entirely surrounded by forest and thus inaccessible from inland to open-country birds like seedeaters. Moreover, *minuta* was absent from the Pacific slope of Colombia or Ecuador until very recently, when it undoubtedly arrived following corredors of deforestation (Ridgely & Greenfield 2001, Cadena *et al.* in press). The main question remaining after these analyses is to what extent *insulata* is separable from *telasco*: is it a species, a race or merely an erythristic mutant phenotype?

Plumages of S. telasco. Accepting a very close relationship between *insulata* and *telasco*, I decided that a closer study of the plumages of the latter might help me to interpret those of the former. In all, I examined over 60 male *telasco* from Ecuador and Perú, the majority taken between January and April of different years. Most of those with gonad data also had enlarged testes and slightly to moderately worn plumage, suggesting that these months included at least the latter part of the breeding season (as juveniles were also taken). Small numbers of specimens taken between March and August of different years were molting; birds from September through December were mostly in fresh plumage, some with slightly to moderately enlarged testes.

I was able to distinguish three or four more or less discrete plumages in this sample of males. The juvenile plumage is female-like, being warm buffy-brown above with dusky streaking on the back; the throat and center of the abdomen are whitish, the breast, sides and flanks rather bright buff; dusky streaking occurs on the sides and flanks and in some, across the breast as well. The remiges, wing coverts and rectrices have brown borders. Within a few weeks or months after fledging, this plumage is replaced over much of the body: I tentatively call the resulting plumage basic I. Ventrally, chestnut feathers enter on the throat and the general coloration becomes much whiter, the streaking nearly or quite obsolete. Dorsally, grey feathers, usually more or less edged with brown, enter on the back and crown. Some wing coverts and rectrices may be replaced as well but apparently most or all juvenile remiges are retained until the first annual molt. In this molt, the males

FIG. 1. Specimens of *Sporophila telasco*: four males and (bird on far right) one female. Note variation in the extent of chestnut and the development of the gray band on the throats of the males, as well as the scattering of chestnut feathers down the right side of the breast of the fourth male from the left; also the streaked breast of the female.

acquire more grey above, although still somewhat mixed with brown; usually a fairly distinct brownish nuchal collar separates the grey of back and crown, and the rump-band is mixed with tawny. The edgings of the remiges, wing coverts and rectrices are light brownish-grey; the underparts are white (occasionally with a buffy tinge), the throat is chestnut, sometimes with a few whitish feathers mixed in. I tentatively call this plumage basic II. During the next (second?) annual molt, the definitive (basic III) plumage is attained. In this plumage the entire dorsum is slaty grey with distinct blackish streaking on

the crown and back; the rump-band is white; the edgings of the wing-coverts and flight feathers are pale grey; the throat is solid chestnut, the remaining underparts clear white except for some greyish clouding on the flanks. I should note that a postbreeding plumage in which the chestnut throat is lost has been reported in captive birds (R. Restall pers. com.), but I found no suggestion of this in any specimen I examined. Because molts and plumages can be strongly influenced by the hormonal state of the birds, which in turn may depart from normal rhythms and levels due to conditions of captivity, such data from captives should be interpreted very circumspectly. The most doubtful point in this hypothesized plumage sequence concerns the distinctness of basic I and basic II, due to a scarcity of specimens taken during the molt period of June through August or September, which clearly show a transition between the two. It is possible that only a single, variable basic I plumage exists (which would imply at least some flight feather replacement during the first year, for which I found no clear evidence) and that the definitive plumage is basic II. The latter would more closely approximate the sequence in some other species of *Sporophila* (Stiles 1996), although for yet others (e.g., *luctuosa, torqueola*) at least two years may be required for attainment of the definitive male plumage (R. Restall pers. com.).

Regardless of this uncertainty, two main points stand out: first, the chestnut feathering of the throat is acquired early, during the first year; second, the most notable changes thereafter concern the dorsal plumage, where at least two distinct stages (year classes) may be recognized, and in which males may breed (enlarged testes). A further point of interest is that the extent of chestnut of the throat varies in males in both basic II and III; in some only the anterior throat is chestnut, in others, the entire throat – the extent of chestnut does not appear to increase with age, although the chestnut area may become darker and more solid (in fact, ANSP 9384 is in nearly full juvenile plumage with a wholly chestnut throat). Moreover, c. 10% of basic II and III males have one or a few chestnut feathers posterior to the caudal margin of the throat. These feathers occur irregularly and not symmetrically: for example, ANSP 83672 has a broken line of chestnut down one side of the breast, only one or two chestnut feathers on the other side (see Fig. 1).

Field observations. About 20 birds comprised the flock that I spent most time observing, including 12–15 males and c. 5 birds in female plumage. When located at c. 16:45 on 14 March, the birds were evidently going to roost in small dense shrubs scattered in a flat area dominated by bunchgrass (*Uniola*) to the landward side of the dunes of the upper beach. The following dawn, they left their roost bushes and gathered in a loose flock to begin feeding on seed heads and fallen seeds of *Uniola*, which appeared near the end of its fruiting season. The birds appeared to be postbreeding, and many showed evident signs of molt. I heard no song and saw no evidence of territoriality or reproductive behavior. Indeed, the strongly male-biased sex ratio in both flocks suggests that most females and young had left the area, perhaps reflecting a decline in availability of *Uniola* seeds. Several other *Sporophila* seedeaters may show more or less nomadic behavior in response to changes in seed availability (see Stiles & Skutch 1989 for *S. schistacea*). Most striking was the array of male plumages present, including at least one type A male *insulata* and 1–2 male *telasco* (type E), but most birds appeared to be more or less intermediate between the two. The birds captured included three such intermediates which I collected, a type A male *insulata* and a juvenile in female-like plumage, which I measured and released.

I also encountered one other flock of c. 15

FIG. 2. Specimens of *Sporophila insulata* collected in the present study, in March 1995 at Isla Bocagrande. The two males on the left are classified as type C, that on the right as type D (see text). All had ossified skulls and were completing molt. Note the variability and asymmetry of the chestnut on the breast.

seedeaters in *Uniola* scrub some 300 m east of the first flock, plus two lone birds near the eastern end of the island (one of which flew across the estuary to similar-appearing *Uniola* habitat flanking the beach on the adjacent mainland). In all, I obtained good looks at some 25 males (including the four captured); the census of plumage types gave the following results: Type A = 2, type B = 3 or 4, type C = 10–12, type D = 5+, and type E = 3 or 4. Clearly only a minority of the birds seen were unequivocally "good" *insulata* or *telasco*; even assuming that a casual observer would place type B birds with the former and type D with the latter, fully half of the males seen were of the most intermediate plumage type.

Specimens of S. insulata. My specimens (Fig. 2) include two (ICN 32303, 32304) with extensively rufous-chestnut throats and breasts and buffy-white posterior underparts, flecked with chestnut in one; in the other (ICN 32305), the chestnut is nearly confined to the throat but is more extensive than in most

FIG. 3. The type series of *Sporophila insulata* in the American Museum of Natural History, taken in July 1912 at Tumaco, Nariño, Colombia. The left-hand male is the holotype; its plumage is type B (tending towards A); the next two birds are males in plumage types B and C, respectively; the right-hand bird is a female. Note the worn, molting plumage.

telasco. ICN 32303 and 32304 are type C (the former tending toward B), while 32305 is type D, tending toward E (*telasco*). All have partial to complete bands of grey across the throat, and the chestnut varies from fairly dark to pale [the lower photograph in Salaman (1995) depicts a male with distinctly paler chestnut plumage below and a partial grey throat-band]. A narrow band across the rump includes chestnut and white feathers intermixed in nearly equal amounts to mostly buffy-white, roughly in proportion to the amount of chestnut feathering on the breast. The two birds with half-chestnut underparts are in mostly fresh plumage, just finishing body molt; that with only the throat chestnut is in fairly heavy molt – but the incoming feathers on the breast and belly are buffy-white, not chestnut. This latter bird has the dorsum brown with some grey feathers coming in; in the others the dorsum is grey, washed with brown. In all, the back is streaked with dusky, much more heavily in the third bird. The two former birds had moderately enlarged testes (4–4.5 mm long), while the third bird had very small testes; all three had fully ossified skulls and considerable subcutaneous fat. The bird with the most exten-

sive chestnut (ICN 32303) had a distinctly paler, more yellowish bill than did the others, whose bills were dusky to horn color. In terms of the plumage sequence worked out above for *S. telasco*, I would place ICN 32303 and 32034 as molting from basic II to basic III (a further indication that the extent of chestnut is not an indicator of age is the fact that the former, with more extensive chestnut, has more brown dorsally). ICN 32305 appears to be molting from basic I to II. This male therefore may be at least one year old, the others at least two years old.

The birds of the type series of *insulata* (Fig. 3) were described by Chapman (1921) as in worn plumage, but in fact are also in heavy molt. The holotype male, AMNH 118412, is in definitive plumage (fully grey dorsum) and is extensively chestnut below, but less than what I would consider type A, "good" *insulata* as in the darker bird photographed by Salaman and two I saw (one captured and released), which had only a small buffy-white area on the lower abdomen. The other two males, AMNH 11841 and 11843 (labeled "female?" and "male?" by the collector), have chestnut throats and breasts, with the lower breast and upper abdomen blotched with chestnut in the former and nearly entirely buffy-white in the latter. The former resembles ICN 32303 except for having more extensive chestnut blotching posteriorly; I would call it type B, tending toward C. The second is like ICN 32304 and I would call it type C. Both appear to be molting from basic II to III; the former has more brown feathering above than the latter and in neither do chestnut feathers appear to be replacing buffy-white ones. The fourth specimen, a female, is simply replacing its plumage with another of similar appearance. It appears no different from females of *telasco* in comparable plumage and, had it been taken alone, it would undoubtedly have been classified as the latter.

DISCUSSION

There are basically two possible interpretations for the observed variation in male plumage in *insulata*: a) the variation reflects age of males within *insulata*; or b) the variation mostly reflects intrinsic (genetic) differences between males. I feel that the available evidence supports the second alternative. Although the most chestnut bird is also the oldest, I do not find clear evidence that the amount of chestnut increases with age in either group of specimens; Chapman's interpretation that the intermediate birds are "immatures" lacks a firm foundation. This also agrees with the situation in *telasco*, in which the chestnut is acquired early and shows no appreciable increase in extent thereafter. This follows from my interpretation of the plumages of *telasco,* in particular that the dorsal plumage gives the best estimate of age. However, the only fully conclusive test would involve banding young birds to follow their subsequent plumage changes.

If the second interpretation is correct, the plumage variation could reflect interbreeding between *insulata* and *telasco*, which in turn would cast strong doubts upon the status of *insulata* as a species. Given that Salaman and Giles also observed apparent type C males in September (as well as those of the type series taken in late July), seasonal plumage change also seems unlikely (and would be very unusual in *Sporophila*). Thus, the evidence for species status of *insulata* boils down to the observation by Salaman and Giles of singing males of this form (although in several plumage types, including intermediates or "immatures") and *telasco* in apparent sympatry at Isla Bocagrande.

All of these data and observations are at least as compatible with a hypothesis of free interbreeding between *insulata* and *telasco.* The range of male phenotypes resembles that found in an undoubted zone of hybridization

of two other species of *Sporophila* (Stiles 1996). Neither Salaman and Giles nor I noted any differences among females that might suggest the existence of two good species; Salaman (1995) reported no obvious differences in song between the two forms. At best slight habitat differences were noted between the forms by Salaman and Giles (a greater prediliction of *insulata* for bushes amid the *Uniola*) but I found free intermixing of all plumage types in the same flocks. I also could not confirm the suggestion by Salaman (1995) that *insulata* forages lower in the vegetation than *telasco* – in fact, the first type A male I saw was plucking seeds from a tall seed head of *Uniola*. The much greater numbers of birds reported by Salaman and Giles, including many more "pure" (?) *telasco* apparently in flocks, may indicate a partially nomadic population with *insulata*-like birds being perhaps more sedentary, but this in itself says nothing regarding possible reproductive isolation and could in fact facilitate interbreeding. As noted above, it seems probable that the type C plumage of two of the ICN males is indeed the definitive plumage; these individuals show no sign of immaturity. Whether the type D plumage of the third specimen is definitive is more conjectural, but the very fact that this individual is undergoing a complete molt implies that it is at least one year old, as young male *Sporophila* typically do not molt their flight feathers until after their first breeding season (Olson 1981, Stiles & Skutch 1989; Stiles unpubl. data).

There have been at least two reports of *S. insulata* much further north along the Pacific coast. In December 2000, Felipe Estela discovered a population of seedeaters in Parque Nacional Natural Sanguianga, in extreme northern Depto. Nariño (c. 2º40'N), c. 100 km northwest of Isla Bocagrande and Tumaco. This population included both *insulata*-like and *telasco* male phenotypes; one of the former was captured and photographed; it had a wholly chestnut rump. However, further field work in this area suggests that the *insulata*-type birds are in fact *minuta*, which may be invading (J. C. de las Casas pers. com). A report by L. G. Olarte of *insulata*-like and *telasco* seedeaters still further north also requires verification. He noted the distinctly different songs of the two, but if the former were in reality *minuta* this would be expected. Unfortunately, Olarte apparently did not collect specimens or photograph any birds. Hence, at this point there is no solid evidence that *insulata* occurs north of Tumaco (and so far no *insulata* have been seen or collected in Ecuador).

In conclusion, I consider *Sporophila insulata* to represent a form of *S. telasco* and not a distinct, endangered species. Its exact taxonomic status cannot be defined without more detailed study of populations north and south of the Tumaco area. If it were found that the type A plumage does increase northwards, *insulata* might be considered a race of *telasco*, possibly reflecting differentiation of an isolated population at the northern extreme of the species range, which is now in secondary contact with concomitant interbreeding. In the absence of clear geographic structure of phenotypes, it would simply constitute a color morph. Hence, I would not recommend "urgent conservation measures" at this time, particularly on Isla Bocagrande (given pressures for development there and the intermediate, possibly nomadic nature of the seedeater population). The available evidence further suggests that the *insulata* phenotypes represent one or several mutations increasing the amount of chestnut and replacing white areas with buff in the ventral plumage of the males. Plumage types B through D might represent distinct genotypes or heterozygotes or backcrosses between *insulata* and *telasco*. If birds could be captured, genetic analysis should be performed on samples of males with different phenotypes, to shed light on the origin of *insulata*. It would be most

interesting to institute a banding program to follow plumage sequences in known individuals, and to conduct laboratory breeding and genetic studies. While the Tumaco Seedeater might no longer fall within the sphere of action of BirdLife International, it represents an interesting biological phenomenon that is clearly worthy of further study.

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REFERENCES

Chapman, F. M. 1917. The distribution of bird-life in Colombia. Bull. Am. Mus. Natl. Hist. 36: 1–729.

Chapman, F. M. 1921. Descriptions of proposed new birds from Colombia, Ecuador, Peru and Brazil. Am. Mus. Novit. 18: 1–12.

Collar, N. J., L. P. Gonzaga, N. Krabbe, A. Madroño N., L. G. Naranjo, T. A. Parker III, & D. G. Wege. 1992. Threatened birds of the Americas. ICBP, Cambridge, UK.

Olson, S. L. 1981. A revision of the subspecies of *Sporophila ("Oryzoborus") angolensis* (Aves: Emberizidae). Proc. Biol. Soc. Wash. 94: 43–51.

Renjifo, L. M. 1998. Especies de aves amenazadas y casi amenazadas de extinción en Colombia. Pp. 416–426 *in*: Chaves, M. E., & N. Arango (eds.). Informe nacional sobre el estado de la biodiversidad. Volume I. Instituto A. von Humboldt, Bogotá, colombia.

Ridgely, R. S., & P. J. Greenfield 2001. The birds of Ecuador. Volume 1: Status, distribution and taxonomy. Cornell Univ. Press, Ithaca, New York.

Ridgely, R. S., & G. Tudor. 1989. The birds of South America. Volume 1: The Oscine passerines. Univ. Texas Press, Austin, Texas.

Salaman, P. G. W. 1995. The rediscovery of the Tumaco Seedeater, *Sporophila insulata.* Cotinga 4: 33–35.

Smithe, F. B. 1975, 1981. Naturalists' color guide. American Museum of Natural History, New York, New York.

Stiles, F. G. 1996. When black plus white equal gray: the nature of variation in the Variable Seedeater complex (*Sporophila,* Emberizidae). Ornitol. Neotrop. 7: 75–107.

Stiles, F. G., & A. F. Skutch. 1989. A guide to the birds of Costa Rica. Cornell Univ. Press, Ithaca, New York.