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Systematics of the Avian Genus *Emberizoides* (Emberizidae)

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ABSTRACT

The genus *Emberizoides* has long been maintained as monotypic, with but one polytypic species *E. herbicola*. The late Argentine ornithologist William Partridge discriminated between large and small forms found together in Argentina, but his illness and untimely death prevented him from writing up the results of his observations. We studied Partridge's specimens and others available from various museums and found that the "small" and "large" forms are broadly sympatric in eastern Paraguay, southern Brazil, and northeastern Argentina; they differ in various measurements, in dorsal and ventral markings and pattern, in color of the face, bill shape, and size of the legs and toes. The available name for the small form, a sibling species of large *Emberizoides herbicola*, is *E. ypiranganus* von Ihering and von Ihering, named by them as a subspecies of *E. herbicola*. Vocal and ecological data are limited but indicate that these species of *Emberizoides* have markedly different songs, that at least *E. herbicola* does not react to the song of *E. ypiranganus*, and that *ypiranganus* favors wetter marsh grass habitats than

does *herbicola*. Extensions of these results with morphological studies of the other taxa included in *Emberizoides* strongly suggest that the Duida Mountain, Venezuela, form *E. [herbicola] duidae*, differs at least as much from races of *E. herbicola* as does *E. ypiranganus*, and especially from the subspecies *E. herbicola sphenurus* of the lowlands surrounding Duida Mountain. Northern races (the *sphenurus* group) of *E. herbicola* are divergent otherwise from the nominate southern race, but not to the extent of *E. duidae* and *E. ypiranganus*. The song of the most divergent race, *apurensis*, of the *sphenurus* group is recognizably like that of *E. h. herbicola*, São Paulo birds of which respond to it, and this group is best kept within the species *E. herbicola*. The genus *Embernagra* is closely similar to *Emberizoides* in plumage, and in structure, and may prove congeneric with it. Three species, monotypic *Emberizoides duidae*, polytypic *E. herbicola*, and monotypic *E. ypiranganus* thus seem separable within *Emberizoides*. Factors involved in their evolutionary history are mentioned.

INTRODUCTION

Following the death of Argentine ornithologist William Partridge some years ago, Eisenmann received an inquiry from Robert

W. Storer of the Museum of Zoology, University of Michigan, to whom Partridge had sent skeletons for comparisons, to establish

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his belief that there existed in Argentina two sympatric species, a "big" and a "little" one, of the supposedly monotypic Neotropical emberizine finch genus *Emberizoides*. Although Partridge sent no specimens of *Emberizoides* to the American Museum of Natural History, Eisenmann found among its other collections specimens representing sympatric large and small forms of *Emberizoides h. herbicola*. Further, he noted that the forms differed not only in size but also in various plumage characters. Long ago the small bird had been named as a subspecies of *E. herbicola* by von Ihering and von Ihering (1907) under the name of *ypiranganus*, but this was relegated to the status of a morph of *E. herbicola* by Hellmayr (1938) because it was sympatric with nominate *herbicola*.

We decided to investigate this problem since Partridge's premature death prevented him from bringing it to a conclusion. We sought to borrow specimens from various museums, especially from the Museo de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, where the bulk of Partridge's collection had been deposited. We found that Partridge had indeed distinguished "big" and "little" forms of *Emberizoides h. herbicola*, the Wedge-tailed Grass-Finch, on the basis of his field studies and collecting. Further, although considerable parts of his collections had passed out of Argentina, he assiduously had retained all specimens of the unusual small form in the Buenos Aires museum for eventual study. Ultimately through the courtesy of Dr. Jorge R. Navas of that museum we were able to examine all of Partridge's specimens of *Emberizoides* with their label data and some annotations, although unfortunately his field notes were unavailable.

Emberizoides herbicola, which ranges from Costa Rica to Argentina, actually comprises at least two sympatric and, we believe, a third allopatric species. We present the evidence of sympatric occurrence over a wide area of large *Emberizoides herbicola*, with its several races, and its smaller sibling species *E. ypiranganus*, the Lesser Grass-Finch, and reasons for our conclusion that the distinctive *E. duidae* from Duida Mountain, Venezuela, although allopatric (barely so) with *E. herbicola* and with the geographically distant *E. ypiranganus*, also represents a distinct species.

We examined about 800 specimens during the course of this investigation. Of these, approximately 320 specimens formed the data base for our analyses. Included are about 240 specimens of various races of *E. herbicola*, 77 specimens of *E. ypiranganus*, and 3 of *E. duidae*. In addition, once Short was aware of the differences between the two species, he scanned several hundreds of specimens of *E. herbicola* in European and American museums other than those from whose collections specimens were studied in detail, seeking examples of *E. ypiranganus*. Eisenmann also examined the specimens of *E. herbicola* at the National Museum in Rio de Janeiro, Brazil. Standard measurements, including wing length (chord), tail length, bill length (from nostril), bill depth (through bill at level of center of nostrils), bill width (across center of nostrils), tarsal length, and length of middle toe (without claw) were taken of all adults analyzed in detail.

Dr. Wesley E. Lanyon, apprised of the problem prior to a field trip to Brazil and Argentina, was kind enough to record on tape (using a Uher 4000-L Report tape recorder) some vocalizations of *E. herbicola* and *E. ypiranganus*, and he provided us with the tape, several specimens, and ecological data. Dr. Lanyon later secured and made available to us additional recordings and specimens from Venezuela. Dr. Helmut Sick communicated various data to us from Brazil where, after his attention was called to the matter, he was able to distinguish the two species visually and acoustically. David Ewert and William Belton also assisted with information they obtained in the field. All this help broadened our perspective of the problem, leading to a fuller understanding of these finches, and we are grateful for their assistance.

We also are indebted greatly to Dr. Navas of the Museo Argentino de Ciencias Naturales in Buenos Aires, for locating and shipping to us for comparison Partridge specimens of *Emberizoides* under his care, in addition to older specimens already catalogued in that Museum's collection. He also was kind enough to allow the American Museum of Natural History to retain a few of the specimens. One or the other of us visited certain museums, where the following cor-

dially assisted us and facilitated our studies: Dr. H. Camargo of the Museu Paulista, the Museum of Zoology at the University of São Paulo; Dr. G. Diesselhorst of the Natural History Museum in Munich; Dr. I. Galbraith of the British Museum (Natural History) at Tring; Dr. G. F. Mees at the Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands; Dr. Helmut Sick of the Museu Nacional de Brazil in Rio de Janeiro; Dr. Robert W. Storer of the Museum of Zoology, University of Michigan, Ann Arbor; Dr. H. E. Wolters of the Museum Alexander Koenig, Bonn; and Dr. R. Zusi of the National Museum of Natural History, Smithsonian Institution, Washington. Specimens also were sent to us on loan through the courtesy of the following persons: the Field Museum of Natural History, Chicago, through Mr. M. A. Traylor, Jr.; the Los Angeles County Museum through Dr. K. E. Stager; and the Phelps Collection, Caracas, through Dr. William E. Phelps, Jr. Drs. K. C. Parkes and R. A. Paynter, Jr., and Mr. R. Meyer de Schauensee kindly checked specimens in collections under their care, determining that no *Emberizoides ypiranganus* were present among their *E. herbicola*. Dr. O. Pinto gave us information regarding the type locality of *E. ypiranganus* and the specimens in the Museu Paulista. We thank all of these persons and any others whom we may have failed to mention. The facilities, staff, and collections of the American Museum of Natural History were, as always, tremendous assets to us in the course of our investigations.

TAXONOMIC AND NOMENCLATURAL BACKGROUND

The treatment of *Emberizoides* Temminck, 1822, as given in standard works recognizes a single species, *Emberizoides herbicola* Vieillot. The intraspecific classification of this taxon may be summarized from Paynter (1970). Seven putative subspecies are recognized by Paynter: *lucaris* of southwestern Costa Rica; *hypochondriacus* of western and central Panama; questionably *floresae* of eastern Chiriqui, Panama; *apurensis* of the lowlands of eastern Colombia and western Venezuela; *sphenurus* of northern Colombia, across Venezuela, through the Guianas to northeastern Brazil; *duidae* of Duida Moun-

tain, Venezuela; and *herbicola* of the vast area from Mato Grosso and Pernambuco, Brazil, south to northern Santa Fe and Entre Rios, Argentina, and Rio Grande do Sul, Brazil (also west to eastern Bolivia).

These finches are brown with dorsal streaking, and much elongated rectrices very subject to wear. The races included by Paynter (1970) fall into three groups: large, rather richly colored, southern *herbicola*; large, very dark *duidae*; and all the others, found north of the Amazon, which we call the *sphenurus* group, generally smaller and darker than *herbicola*.

Recognized generally as a synonym of *E. h. herbicola* is *Emberizoides macrourus ypiranganus* von Ihering and von Ihering, 1907, described from the Campos de Jordão, Serra de Itatiaya, and Ypirangana, state of São Paulo, Brazil. (*Emberizoides macrourus* is a synonym of *E. herbicola*.) In describing *ypiranganus*, the von Iherings noted its darker color and small wing size (wing 66 mm., tail 103 mm.) compared with *herbicola* ("macrourus") collected in the same area (they give measurements of 72 to 75 mm. for the wing and 116 to 117 mm. for the tail of their *herbicola* specimens). Of *ypiranganus* Hellmayr (1938, p. 610) had this to say "the type . . . is remarkably small . . . , and much more broadly marked with deeper black on the upper parts than any other specimen we have seen. Still we cannot believe in its distinctness, since it was obtained in the heart of the range of *E. h. herbicola*, and is, furthermore, recorded by Ihering from the Campo (*sic*) de Jordão, Serra de Itatiaya, where the typical race has also been found."

So matters stood when Partridge became puzzled by the small, dark *Emberizoides* "*herbicola*" that he was collecting, along with larger, lighter birds, in various parts of northern Argentina during the 1950s and early 1960s.

RESULTS

COLOR COMPARISONS: All the grass-finches of the genus *Emberizoides* are relatively small brownish birds, streaked blackish or dark brown above, with long, brown lanceolate-tipped tail feathers, pale (whitish) underparts, brownish streaked sides and flanks, yellow-green wing coverts and edges of the prima-

ries, and yellow along the bend of the wing. Differences among the species are subtle, which is of course why all forms were treated as conspecific. In comparing populations it is important to recognize and allow for the strong effects of wear and temporal color change. Form for form, worn birds are darker, much less rusty and buffy, the tail is much shortened, and there often is discoloration of the plumage (e.g., reddish in red soil areas of Misiones and Corrientes, Argentina). Worn birds may be so different from fresh-plumaged specimens from the same locality as to appear to represent a different taxon.

When specimens are examined, especially in comparable plumages, color differences between smaller *E. ypiranganus* and larger *E. herbicola herbicola* become apparent, if not immediately very striking. In tone of the upperparts the smaller form is yellower brown and less rufous-tinged.

The most obvious feature of *ypiranganus* is its strongly grayish or even blackish gray face—the ear coverts are blacker than in *herbicola*, and the suborbital region shows blackish gray color that is muted or lacking in buffy-faced *herbicola*. It is noteworthy that these differences are extreme in breeding birds, that is, in worn birds, for the face of such *ypiranganus* is entirely gray with blackish edges under the eyes and little or no sign of buff, whereas *herbicola* retains largely buffy facial coloring with some deep grayish beneath the eye.

Plumage for plumage *ypiranganus* shows broader black centers of the dorsal streaks, hence is blacker dorsally than *herbicola*. This distinction is pervasive, for the rump of *ypiranganus* invariably is streaked and that of *herbicola* less so, or not at all, and the shaft streaks of the central rectrices are broad and black in *ypiranganus*, but narrow and brown in *herbicola*. The combination of blackish and yellowish in *ypiranganus* gives the dorsum a different aspect altogether than in the rustier, narrower streaked *herbicola*. Probably correlated with the broader dorsal streaking, *ypiranganus* shows more side, flank and under-tail streaking than in *herbicola*. There is variation in ventral streaking in both species, but more individuals of *ypiranganus* are streaked, and the streaks are more nu-

merous and broader in those *ypiranganus* that are streaked below than is true of *herbicola*.

The underparts are clearer whitish in the smaller form, and less buff-tinged, again enhancing the less brown and less rusty tone of its plumage overall in comparison with the larger form. The breast and throat, especially, are whiter in *ypiranganus*, setting off the dark face and upperparts. Again this must be viewed with comparably plumaged birds to render the difference apparent.

The tail feathers of *ypiranganus* are more sharply pointed, the outer rectrices more lanceolate, and the inner vane of the rectrices near the tip more emarginate than in *herbicola*, which has generally less pointed and sharply angled edges of the rectrices.

There is relatively little information regarding soft part colors, but Lanyon and Ewert have told us that *ypiranganus* in the field has a decidedly more orange and less yellow mandible than that of *herbicola*. Both have the maxilla black, except for the pale tomia. We note that dry specimens of both species taken at the same time and place show signs of this bill color difference, the mandible being brighter, more orange-horn color in *ypiranganus*, and duller, yellow-horn color in *herbicola*. Scattered iris color data from specimens suggest that *ypiranganus* may be darker eyed (deeper brown) than brown-eyed *herbicola*.

Juveniles of the two forms are closely similar. Both have yellowish suffused over the underparts and the face (the superciliary stripe is yellow, rather than white as in adults), and variable streaking below, which often extends across the breast and abdomen. The yellow of the primaries and wing coverts of adults is, however, muted in juveniles, these areas being more brownish. Because of the yellow about the face it is difficult to utilize the dark face color as a distinctive feature of juvenal *ypiranganus*, although dark extremes are easily distinguished. The greater general streaking of the young birds also renders that character of little use. However, juveniles of *herbicola* are strongly rusty buff dorsally, and those of *ypiranganus* are yellowish buff lacking any rusty tinge. This is the best character for discrimination of juvenal *ypiranganus*; combined with the other

features and size, it is possible to identify all but nestlings. Juveniles of sympatric *Embernagra platensis* very closely resemble those of *Emberizoides ypiranganus* and especially *Emberizoides herbicola*, even having the yellow superciliary stripe; they are distinguished by their yellow-green primary edges and gently rounded tips of the incoming rectrices.

As for races of *E. herbicola* other than the nominate southern subspecies (see Addendum) we consider them in two groups, the small, dark northern *sphenurus* group, and large, dark montane *duidae*. The *sphenurus* group includes the subspecies *sphenurus*, *hypochondriacus*, *lucaris*, *apurensis*, and "*floresae*"; the last Paynter (1970) listed as of questionable validity. This group replaces *E. h. herbicola* north of the Amazon, and resembles *E. ypiranganus* somewhat in size (see the next section), the birds being less rusty buff than *E. h. herbicola*, somewhat darker faced, and with broader, darker streaks dorsally. They resemble *E. h. herbicola*, and differ from *E. ypiranganus* in having buffy flanks, sides, and often a buffy tinge on the breast and throat, in sparse ventral streaking, and in their less acutely pointed and angled rectrices (see also mensural characters).

Among the *sphenurus* group *Emberizoides herbicola lucaris* of southwestern Costa Rica most closely approaches *E. h. herbicola* in dorsal coloration, being rustier brown above than others of this group. The ear coverts of *E. h. lucaris* are brownish gray, not so blackish as in *E. ypiranganus*, and its broad dorsal streaks are brown, not black. Closely similar are yellowish gray-brown backed *sphenurus* of northern and interior Colombia and most of Venezuela to northeastern Brazil, and *hypochondriacus* of western and central Panama. These are grayer, less yellow above than *E. ypiranganus*, and they show more buff dorsally. Both races are blackish gray on the ear coverts, below the eyes, and in the malar region, but there is some buff present so they do not appear as dark-faced as does *ypiranganus*. Differences between *sphenurus* and *hypochondriacus* are in size parameters (see the next section) and in the buffier underparts of *sphenurus* (approaching geographically more removed *lucaris* rather than *hypochondriacus*, the range of which approaches that of *sphenurus*). Most distinctive among the

racies of the *sphenurus* group is *apurensis* of lowland eastern Colombia and western Venezuela, rather large and with predominately pale gray-brown dorsal coloring and blackish streaking. Its face most nearly approaches the color of that of *E. ypiranganus*, from which it differs in shape of the rectrices, much less yellowish dorsal tone, less streaked underparts, and more buffy breast, sides and flanks (see also mensural features).

Of *Emberizoides herbicola floresae*, described by Griscom (1924) from Cerro Flores, western Panama, we have examined the type closely and conclude, despite Griscom's denial of its showing signs of immaturity, that it is immature, though not in juvenal plumage. Its immaturity is indicated by a yellow wash evident in several areas ventrally, most notably on the sides of the breast; its small bill (11 mm.) also suggests immaturity. Others of its supposed traits are the result of it being in very fresh plumage; comparably plumaged *E. herbicola hypochondriacus* match it. We have seen recent examples of males taken on the slopes of Cerro Campana, western Panama by Olson and Loftin (May 11, 1963, enlarged testes) and by Morton (May 27, 1971, enlarged testes, singing). These are from close to Cerro Flores and might be expected to show some features of "*floresae*" if the type of that form were an adult of a distinct subspecies. Both males are indistinguishable from *hypochondriacus*. Hence we consider *floresae* a synonym of *E. herbicola hypochondriacus*, and all Panamanian birds as representing the latter race.

In color *duidae* is very distinctive, more so in some ways than *E. ypiranganus* is from *E. herbicola*. Occurring on Duida Mountain, Venezuela, adjacent to and surrounded by the much smaller *E. h. sphenurus*, large *duidae* is very dark with broad blackish dorsal streaks that predominate over brown edges on the crown, making that region more black than brown. Its dorsal color is dark rusty brown, somewhat like that in *herbicola* but much darker in tone. Its face is the blackest of all *Emberizoides*; the superciliary line is reduced to a small white loreal streak (exactly as in *Embernagra longicauda*), but it has a prominent white orbital ring of feathers. The forehead is nearly all black. The underparts of *duidae* are dark compared with other

TABLE 1
Weights (in Grams) of Some Specimens of
Emberizoides herbicola and
Emberizoides ypiranganus

Locality	Sex	Month	Weight
<i>Emberizoides herbicola herbicola</i>			
Garruchos, Corrientes	♂	May	26.0
San Luis de la Sierra, Paraguay	♂	September	26.9
San Luis del Palmar, Corrientes	♂	November	30.0
Rio Grande do Sul	♂	February	27.0
Garruchos, Corrientes	?	May	27.0
Rio Grande do Sul	?	May	28.0
Garruchos, Corrientes	♀	May	28.5
San Luis de la Sierra, Paraguay	♀	September	31.1
San Luis del Palmar, Corrientes	♀	November	27.0
<i>Emberizoides herbicola spheunurus</i>			
Surinam	♂	April	25.0
Surinam	♂	November	23.0
Surinam	♂	December	26.0
Surinam	♀	April	25.0
Surinam	♀	November	24.7
Surinam	♀	November	28.0
<i>Emberizoides ypiranganus</i>			
San Luis del Palmar, Corrientes	♂	November	22.0
Santa Catarina	♂	November	22.0
Rio Grande do Sul	♂	November	19.0
Rio Grande do Sul	♀	July	19.0
San Luis de la Sierra, Paraguay	?	September	18.5

forms of the genus, the sides of the breast and flanks being olive brown with a rufescent tinge. Ventral streakings are weak as in other races of *E. herbicola*. Chapman (1929) originally described *E. duidae* as a distinct species.

Bill color differences and other possible differences in soft part colors among these races of *E. herbicola* have not been documented. Juveniles of *E. h. lucaris* and *E. h. spheunurus* do not differ greatly from those of *E. h. herbicola*, except that the face is darker and dorsal streaks more prominent; they differ from juveniles of *E. ypiranganus* in more rusty brown and less yellow-brown dorsal coloration. We have seen no juveniles of *E. duidae*.

MENSURAL COMPARISONS: Data on the various size parameters of species and subspecies of *Emberizoides* are presented or summarized in tables 1 to 8.

Weights were available for few specimens

of only three taxa, and are presented fully in table 1. Although samples are inadequate, the data suggest that *Emberizoides h. herbicola* is heavier than *E. h. spheunurus*, and that *E. ypiranganus* is lighter than either of the other two forms. There is no overlap of the five *E. ypiranganus* with six specimens of the geographically distant *E. h. spheunurus*, and a gap of 4 grams separates specimens of *E. ypiranganus* from nine sympatric *E. h. herbicola*.

Data from comparably plumaged samples (table 2) of males show *E. ypiranganus* to be shorter winged than *E. h. herbicola*, with a gap of 2.9 mm. between measurements of 43 *ypiranganus* and 48 *herbicola*. Of the *sphenurus* group of races of *E. herbicola*, the data suggest that all but the Central American *lucaris* are longer winged (hence probably larger) than *E. ypiranganus*, *lucaris* being about equal in wing length to *ypiranganus*. All of the *sphenurus* group are substantially shorter winged than nominate *E. herbicola*. Data for the taxon *duidae* are meager, but indicate that this form is as long winged and probably even longer winged than nominate *herbicola*, and substantially longer winged than geographically surrounding races of *E. herbicola*.

Tail length is variable, and it is difficult to put together reasonable samples because of the variation in wear of the feather tips. Nonetheless, it is clear (table 3) that *E. ypiranganus* is shorter tailed than all forms of *E. herbicola* except possibly *E. h. lucaris* and *E. h. hypochondriacus*, and that *E. duidae* has the longest tail among these taxa.

Although the three measurements do not adequately convey the various facets of bill shape, some indication of size parameters is provided by the analysis of bill length, width, and depth in table 4. There is considerable overlap of *E. ypiranganus* and *E. h. herbicola* in all three measurements, but the latter averages a longer, deeper, and especially wider bill than that of *ypiranganus*. Races of the *sphenurus* group of *E. herbicola* tend to differ more than *ypiranganus* does from *E. h. herbicola*, especially in having a narrower bill; *apurensis*, with a bill about as long as that of nominate *herbicola* has a much shallower and especially narrower bill. *Emberizoides duidae* may be longer billed than *E. h. herbicola*.

In tarsal length (table 5) there is a clear

TABLE 2
Wing Length (in Millimeters) of Males of *Emberizoides* Species and Races Taken in September to December^a

Sample	N	Mean	SE	SD	Range
<i>Emberizoides ypiranganus</i>					
Rio Grande do Sul, Santa Catarina, Brazil	5	61.10	0.41	0.92	60.0–62.3
Santa Fe, Corrientes, Misiones	5	64.24	0.19	1.76	62.0–66.9
San Luis del Palmar, Corrientes	21	62.18	0.36	1.63	58.2–64.9
Tuyutí, Corrientes	7	63.04	0.61	2.54	61.0–65.8
São Paulo, Brazil	5	66.22	0.67	1.50	64.6–68.0
<i>Emberizoides herbicola herbicola</i>					
San Luis del Palmar, Corrientes	20	73.72	0.25	1.14	70.9–75.4
Eastern Paraguay	12	74.23	0.51	1.75	71.4–76.5
Southern Brazil, Eastern Argentina	7	74.37	0.81	2.13	71.3–77.1
Mato Grosso, Bolivia	9	76.61	0.64	1.93	73.2–79.8
<i>Emberizoides herbicola sphenurus</i>					
Táchiro, Venezuela	13	69.11	0.80	2.86	64.4–73.8
<i>Emberizoides herbicola apurensis</i>					
Barinas, Venezuela	26	68.45	0.27	1.40	65.7–71.1
<i>Emberizoides herbicola lucaris</i>					
Costa Rica	5	63.24	—	—	59.8–64.6
<i>Emberizoides herbicola hypochondriacus</i>					
Panama	4	(66.75)	—	—	62.8–70.3
<i>Emberizoides duidae</i>					
Duida Mountain, Venezuela	2	—	—	—	79.7–80.0

^a Symbols are: N, sample size; SE, standard error of mean; SD, standard deviation.

separation of *E. ypiranganus* from *E. h. herbicola*, with over a 1 mm. gap between 46 males of the former and 88 males of the latter. Among the *sphenurus* racial group of *E. herbicola*, *sphenurus* and *apurensis* though intermediate between *E. ypiranganus* and *E. h. herbicola* are much nearer the latter, whereas *lucaris* and *hypochondriacus*, although closely approaching *E. ypiranganus* in size as indicated by wing length, have proportionally longer tarsi. The tarsi of *E. duidae* are long but not so long as might be expected from its size.

The middle toe (table 6) of *E. ypiranganus* is considerably shorter (by 20 to 25 percent) than that of *E. h. herbicola*, with no overlap (between 46 and 86 male specimens, respectively). The *sphenurus* group of races have toes shorter than in nominate *herbicola*, but do not approach the very short-toed condition of *ypiranganus*. *Emberizoides duidae* is

not so long-toed proportionally as is *E. h. herbicola*.

Measurements of females (means only) are provided in table 7 to give some idea of their relation to values for the males in terms of variation among the taxa, and to suggest sexual differences. Females are slightly to appreciably smaller than males in all measurements, and their variation pattern agrees well with that shown by data from males in tables 1 to 6. Note the data for the type specimen of *E. herbicola* "*floresae*," the only specimen of this form we have seen.

Additional data for scattered individual specimens of *E. ypiranganus* are included in table 8, to show all relevant data for this previously unstudied taxon.

Emberizoides herbicola herbicola thus is heavier, longer winged, longer legged and longer toed than is *E. ypiranganus*. It is also longer tailed, despite much overlap, and has

TABLE 3
Tail Length (in Millimeters) of Males of *Emberizoides* Species and Races Taken in September to December^a

Sample	N	Mean	SE	SD	Range
<i>Emberizoides ypiranganus</i>					
San Luis del Palmar, Corrientes	19	88.22	1.65	7.20	71.2–101.5
<i>Emberizoides herbicola herbicola</i>					
San Luis del Palmar, Corrientes	11	99.72	2.03	6.74	88.8–108.0
Eastern Paraguay	11	100.45	4.79	15.88	70.8–117.0
Southern Brazil, Eastern Argentina	7	103.89	3.06	8.09	89.3–115.0
Mato Grosso, Bolivia	8	107.04	1.67	4.71	99.3–114.0
<i>Emberizoides herbicola sphenurus</i>					
Táchiro, Venezuela	12	98.33	2.37	8.22	86.0–108.0
<i>Emberizoides herbicola apurensis</i>					
Barinas, Venezuela	22	94.76	0.75	3.51	89.8–100.1
<i>Emberizoides herbicola lucaris</i>					
Costa Rica	4	(90.50)	—	—	87–94
<i>Emberizoides herbicola hypochondriacus</i>					
Panama	3	—	—	—	81–93
<i>Emberizoides duidae</i>					
Duida Mountain, Venezuela	2	—	—	—	118–122

^a Symbols are: N, sample size; SE, standard error of mean; SD, standard deviation.

a wider bill that tends to be longer and deeper than that of *E. ypiranganus*. There is remarkably little variation geographically in *E. h. herbicola*. Northeastern Brazilian birds of this race tend to be shorter winged, but do not show an approach in other features to more northern *E. h. sphenurus*, the next race to the north. More geographical variation is exhibited in *E. ypiranganus* than in *E. herbicola herbicola*. For example, intersample means for wing length vary within 6 mm., for bill depth within 0.87 mm., and for middle toe length by 0.69 mm. in *ypiranganus* versus respectively, 3 mm., 0.33 mm., and 0.37 mm. for *herbicola*. Only in bill width among seven characters measured, does *ypiranganus* show less variation than *herbicola*. The variation among samples of *ypiranganus* may reflect the discontinuous distribution of small populations of this species, but there is also a strong tendency for northeastern (São Paulo, Brazil) birds to be larger than those from farther south and west. This is reflected by the longer wings (table 2), longer tail, deeper bill (table 4), longer legs (table 5), and longer toes of São Paulo birds compared with

other samples. Not all the differences are significant, but concordance of the characters suggests that São Paulo *E. ypiranganus* are larger, the differences not being sufficiently great to warrant racial separation of the northeastern birds.

Measurements of the *sphenurus* group of races of *E. herbicola* generally indicate that these birds are intermediate in size between *E. ypiranganus* and *E. h. herbicola*, though geographically removed from both. Of interest is *E. h. lucaris*, indicated by wing and tail measurements to be about the size of *E. ypiranganus*. Bill proportions of *lucaris* as shown by the three measurements (table 4) of the bill, are similar to those of *ypiranganus*, but like all the northern races of *E. herbicola* and unlike *E. ypiranganus*, *lucaris* is long-legged and long-toed. *Emberizoides ypiranganus* differs from all races of *E. herbicola* in its proportionally small feet and short legs. *Emberizoides herbicola apurensis*, the most distinctive of the *sphenurus* group of races proportionally resembles other races of *E. herbicola*, except that its bill is narrower and shallower, differing from that of *E. ypiran-*

TABLE 4
Three Bill Measurements (in Millimeters) of Males of *Emberizoides* Species and Races^a

Sample	N	Length		Width		Depth	
		Mean \pm SE	Range	Mean \pm SE	Range	Mean \pm SE	Range
<i>Emberizoides ypiranganus</i>							
Rio Grande do Sul, Santa Catarina	5	8.14 \pm 0.10	7.9–8.4	5.26 \pm 0.18	4.7–5.7	6.08 \pm 0.24	5.6–7.0
Santa Fe, Corrientes, Misiones	7	8.20 \pm 0.14	7.6–8.7	5.07 \pm 0.13	4.7–5.6	6.44 \pm 0.18	6.2–7.5
San Luis del Palmar	21	8.33 \pm 0.38	7.7–9.0	5.02 \pm 0.04	4.6–5.3	6.16 \pm 0.08	5.5–6.8
Tuyutí, Corrientes	7	8.55 \pm 0.15	7.9–8.9	5.01 \pm 0.09	4.7–5.3	—	—
São Paulo, Brazil	6	8.53 \pm 0.13	8.2–9.0	5.25 \pm 0.11	4.9–5.5	6.95 \pm 0.11	6.6–7.4
<i>Emberizoides herbicola herbicola</i>							
San Carlos, Corrientes	18	8.62 \pm 0.07	8.0–9.2	5.48 \pm 0.08	4.9–6.2	6.61 \pm 0.07	6.2–7.2
San Luis del Palmar	19	8.82 \pm 0.09	8.3–9.9	5.75 \pm 0.06	5.2–6.3	6.61 \pm 0.05	6.2–7.0
Eastern Paraguay	10	8.90 \pm 0.16	8.0–9.6	5.64 \pm 0.08	5.3–6.0	6.63 \pm 0.04	6.4–7.0
Southern Brazil, Eastern Argentina	7	8.94 \pm 0.13	8.5–9.6	6.28 \pm 0.36	5.3–7.5	6.37 \pm 0.15	5.8–6.8
Mato Grosso, Bolivia	9	8.80 \pm 0.12	8.4–9.3	5.69 \pm 0.12	4.8–6.0	6.63 \pm 0.07	6.3–6.9
Northeastern Brazil	6	8.82 \pm 0.17	8.2–9.4	5.70 \pm 0.11	5.3–6.1	6.70 \pm 0.18	6.2–7.2
<i>Emberizoides herbicola spheunurus</i>							
Táchiro, Venezuela	13	8.80 \pm 0.10	8.5–9.7	4.74 \pm 0.12	4.2–5.8	6.52 \pm 0.05	6.2–6.9
<i>Emberizoides herbicola apurensis</i>							
Barinas, Venezuela	25	8.80 \pm 0.12	7.2–9.9	4.47 \pm 0.06	4.0–5.2	5.83 \pm 0.05	5.4–6.2
<i>Emberizoides herbicola lucaris</i>							
Costa Rica	5	8.16	7.3–9.0	5.34	5.1–5.6	6.40	6.2–6.7
<i>Emberizoides herbicola hypochondriacus</i>							
Panama	4	—	8.2–8.5	—	5.1–5.4	—	6.2
<i>Emberizoides duidae</i>							
Duida Mountain, Venezuela	2	—	9.5–11.1	—	5.7–6.0	—	6.6–6.8

^a Symbols are: N, sample size; SE, standard error of mean.

ganus also. It does not tend toward *E. ypiranganus* in any mensural feature.

Emberizoides duidae is represented by an insufficient number of specimens, but these achieve greater wing, tail, and bill measurements than do specimens of all other forms in the genus. Although appearing to be larger in size than other forms of *Emberizoides*, the legs of *duidae* are not long, and particularly its toes appear proportionally shorter than in races of *E. herbicola*. It particularly appears to have a longer tail than other *Emberizoides*, as shown by measurements (tables 3 and 7), and by its tail/wing ratio of 0.67 to 0.69 (this ratio is 0.70 to 0.75 in the other forms of *Emberizoides*). The toes of *E. duidae* are proportionally short, about as in *E. ypiranganus*. This represents the only tendency toward *ypiranganus*, and directions of variation in other features indicate that *E. duidae* is nei-

ther directly related to nor does it show parallelism with regard to *ypiranganus*. It is distinctive mensurally, more so than any forms of *Emberizoides* other than *ypiranganus*.

SKELETAL COMPARISONS: Through the courtesy of Robert W. Storer the junior author was able to study skeletons of *Emberizoides herbicola* and *E. ypiranganus* at the Museum of Zoology, University of Michigan. Available there were: two adult males of *E. h. herbicola* taken by W. Partridge at San Luis del Palmar, Corrientes, Argentina; a single female of *E. h. spheunurus* from Surinam; and three adults of *E. ypiranganus*, a male and female from San Luis del Palmar and a male from Torrent, a locality near the Uruguay River in Corrientes, all taken by Partridge.

The skeletons quickly enabled us to corroborate our conclusions regarding relative

TABLE 5
Tarsal Length (in Millimeters) of Males of *Emberizoides* Species and Races^a

Sample	N	Mean	SE	SD	Range
<i>Emberizoides ypiranganus</i>					
Rio Grande do Sul, Santa Catarina	5	20.62	0.28	0.63	19.9–21.6
Santa Fe, Corrientes, Misiones	7	21.20	0.29	0.76	20.3–22.1
San Luis del Palmar, Corrientes	21	20.88	0.16	0.75	19.3–22.0
Tuyutí, Corrientes	7	21.36	0.27	0.70	20.3–22.1
São Paulo, Brazil	6	21.73	0.34	0.84	20.6–22.8
<i>Emberizoides herbicola herbicola</i>					
San Carlos, Corrientes	18	25.51	0.15	0.63	24.3–26.3
San Luis del Palmar, Corrientes	20	25.77	0.18	0.81	24.5–27.4
Eastern Paraguay	12	25.12	0.25	0.85	23.9–26.5
Southern Misiones	16	25.53	0.22	0.87	24.0–27.0
Southern Brazil, Eastern Argentina	7	25.74	0.41	1.08	24.1–27.3
Mato Grosso	9	25.58	0.32	0.97	24.4–27.5
Northeastern Brazil	6	25.77	0.19	0.46	25.2–26.5
<i>Emberizoides herbicola sphenurus</i>					
Táchiro, Venezuela	13	24.06	0.16	0.61	22.7–24.6
<i>Emberizoides herbicola apurensis</i>					
Barinas, Venezuela	25	23.92	0.13	0.64	22.6–25.0
<i>Emberizoides herbicola lucaris</i>					
Costa Rica	5	23.00	—	—	22.4–24.2
<i>Emberizoides herbicola hypochondriacus</i>					
Panama	4	(23.03)	—	—	22.7–23.5
<i>Emberizoides duidae</i>					
Duida Mountain, Venezuela	2	—	—	—	26.2–26.4

^a Symbols are: N, sample size; SE, standard error of mean; SD, standard deviation.

size of these forms, drawn from mensural data obtained from skins. That is, *E. ypiranganus* is smaller than is *E. h. herbicola*, with lesser measurements of the length of all long bones, the skull, the synsacrum, and the sternum (see table 9). In general the differences are proportional, measurements of *ypiranganus* being 80 to 88 percent of those of *herbicola*. The toes of *ypiranganus* are about 75 percent the length of toes of *herbicola*, indicating that it has proportionally shorter toes.

Several qualitative differences were apparent in the structure of the bill. *Emberizoides ypiranganus* has a notably more vaulted bill, that is, the maxilla arches upward from near its base, causing it to appear angular from a side view. Indeed, the entire dorsal curvature of the maxilla (culmen) is greater in *E. ypiranganus* than in *E. herbicola*. Perhaps correlated with this structural difference and presumably with functional differences in use

of the bill is a difference in the nasofrontal hinge area. In dorsal view the frontal bones of *ypiranganus* gradually taper outward, whereas in *herbicola* they form more bulbous, flaring lateroposterior edges. The entire nasofrontal hinge region is more massive in *E. herbicola* than in *E. ypiranganus*, even allowing for size differences. Other aspects of the skeleton of these finches appear more or less similar, although further studies with more material may show that some of the apparently minor differences actually are significant. For example, the deltoid crest of the humerus is flanged to a greater degree anterolaterally in *herbicola*, providing a greater area for muscle attachment. All the specimens of each taxon showed close agreement (table 9), so that the small sample size appears not to present a problem.

The single specimen of *E. h. sphenurus* generally was intermediate between *E. h.*

TABLE 6
Length (in Millimeters) of Middle Toe Without Claw in Males of *Emberizoides* Species and Races^a

Sample	N	Mean	SE	SD	Range
<i>Emberizoides ypiranganus</i>					
Rio Grande do Sul, Santa Catarina	5	14.32	0.17	0.37	13.8–14.7
Santa Fe, Corrientes, Misiones	7	15.01	0.26	0.69	14.0–15.8
San Luis del Palmar, Corrientes	21	14.79	0.13	0.58	13.5–15.9
Tuyutí, Corrientes	7	14.76	0.30	0.79	13.4–15.8
São Paulo, Brazil	6	14.68	0.33	0.81	13.6–15.7
<i>Emberizoides herbicola herbicola</i>					
San Carlos, Corrientes	18	17.99	0.18	0.76	16.5–18.9
San Luis del Palmar, Corrientes	20	18.36	0.18	0.78	17.2–19.9
Eastern Paraguay	10	18.04	0.20	0.65	17.0–18.9
Southern Misiones	16	17.99	0.20	0.81	17.0–19.2
Southern Brazil, Eastern Argentina	7	18.06	0.39	1.02	16.7–19.3
Mato Grosso, Bolivia	9	18.12	0.24	0.72	17.2–19.0
Northeastern Brazil	6	18.12	0.28	0.70	16.8–18.6
<i>Emberizoides herbicola sphenurus</i>					
Táchiro, Venezuela	13	15.88	0.12	0.43	15.1–16.6
<i>Emberizoides herbicola apurensis</i>					
Barinas, Venezuela	26	15.90	0.12	0.63	15.1–17.3
<i>Emberizoides herbicola lucaris</i>					
Costa Rica	5	15.80	—	—	15.1–16.3
<i>Emberizoides herbicola hypochondriacus</i>					
Panama	4	(15.60)	—	—	15.4–16.0
<i>Emberizoides duidae</i>					
Duida Mountain, Venezuela	2	—	—	—	17.5–17.7

^a Symbols are: N, sample size; SE, standard error of mean; SD, standard deviation.

herbicola and *E. ypiranganus* in its measurements, but its long bones, and especially the leg bones seem proportionally longer than in *herbicola* or *ypiranganus*. The nasofrontal area of *sphenurus* resembles that of *herbicola*, but its maxilla shows an arching like that of *ypiranganus*. In the sum of its skeletal features, *sphenurus* is more like *herbicola* than *ypiranganus*, but more material and further study are needed to verify this conclusion.

Available at Michigan were several skeletons of *Embernagra platensis*. Impressed with the resemblances of *platensis* to *Emberizoides herbicola* in the field, the junior author compared *platensis* with *Emberizoides herbicola* and *E. ypiranganus*. Although less like *herbicola* and *ypiranganus* than is either of the last two to each other, the resemblances among all three species are striking. A full-scale investigation is needed, but we note two points at this time. First,

platensis, which is broadly sympatric with both *herbicola* and *ypiranganus*, shows measurements about as much greater than those of *herbicola* as are those of the latter greater than those of *ypiranganus*. Second, the vaulted maxilla of *Embernagra platensis* resembles that of the small *Emberizoides ypiranganus*, a fact that also might relate to sympatric interactions of the three species. Further comparative study of these species would be rewarding, and may well lead to the conclusion that *Emberizoides* and *Embernagra* are congeneric.

SYMPATRY OF *E. HERBICOLA* AND *E. YPIRANGANUS*

SYMPATRY: *Emberizoides herbicola herbicola* and *E. ypiranganus* are broadly sympatric as clearly indicated by their ranges as mentioned above. The location of actual

TABLE 7
Means (in Millimeters) of Various Measurements of Females of *Emberizoides* Species and Races^a

Sample	N Maxi- mum	N Mini- mum	Wing Length	Tail Length	Bill Length	Bill Width	Bill Depth	Tarsal Length	Middle Toe Length
<i>Emberizoides ypiranganus</i>									
Santa Fe, Corrientes, Rio Grande do Sul	13	7	61.50	91.49	7.72	5.08	5.97	20.59	14.49
<i>Emberizoides herbicola herbicola</i>									
San Carlos, Corrientes	7	7	—	—	8.54	5.39	6.54	24.67	17.76
San Luis del Palmar, Corrientes	10	7	69.60	95.35	8.84	5.71	6.51	24.94	17.29
Eastern Paraguay	8	5	72.05	99.57	8.76	5.68	6.54	24.83	17.08
Southern Misiones	6	5	69.38	102.22	8.47	5.45	6.52	24.47	17.53
<i>Emberizoides herbicola apurensis</i>									
Barinas, Venezuela	10	8	66.05	81.12	9.02	4.89	6.17	23.37	15.85
<i>Emberizoides herbicola floresae</i>									
Panama (type)	1	1	63.6	83	8.0	4.9	6.3	22.9	15.0
<i>Emberizoides duidae</i>									
Duida Mountain, Venezuela	1	1	73.9	119	9.0	5.9	6.7	25.2	17.1

^a Wing and tail measurements of *E. ypiranganus* and *E. h. herbicola* are from birds collected in September to December only; other samples are from diverse times of year. Symbols are: N, sample size.

sympatric occurrences of these species is important with regard to their status as species. Areas of sympatry include São Paulo, Santa Catarina, and Rio Grande do Sul, Brazil; eastern Paraguay; and northern Santa Fe, Corrientes, and southern Misiones, Argentina.

Localities at which both *herbicola* and *ypiranganus* have been collected are: (1) Campos do Jordão, southeastern São Paulo (von Ihering and von Ihering, 1907); (2) San Luis de la Sierra, northeastern Paraguay (four specimens of *herbicola*, one of *ypiranganus* taken September to October 1931, in Munich

Zoological Collection); (3) Parada Leis, southern Misiones (eight *herbicola* and two *ypiranganus* secured July 1961, by Partridge and associates); (4) San Carlos, northeastern Corrientes (25 *herbicola* and one *ypiranganus* taken July 1961, by Partridge and associates); (5) Itati, northwestern Corrientes (one *herbicola* and eight *ypiranganus* collected December 1961, by Partridge and associates); (6) San Luis del Palmar, northwestern Corrientes (31 *herbicola* and 34 *ypiranganus* obtained in November and December 1961, by Partridge and associates, and one *ypiranganus* collected there, with *herbicola* nearby,

TABLE 8
Measurements (in Millimeters) of Miscellaneous Specimens of *Emberizoides ypiranganus* not Included in Other Tables

Locality	Sex	Month	Wing Length	Tail Length	Bill Length	Bill Width	Bill Depth	Tarsal Length	Middle Toe Length
San Luis de la Sierra, Paraguay	?	Sept.	63.0	96.0	8.3	4.6	6.1	20.3	13.3
"Paraná River"	?	?	59.5	—	8.1	4.7	—	—	13.7
Parada Leis, Misiones	♂	July	61.6	81.1	8.3	5.1	6.3	20.3	14.0
San Carlos, Corrientes	♂	July	61.8	98.5	8.0	4.8	6.4	21.8	15.6
Parada Leis, Misiones	♀	July	59.2	87.0	8.2	4.7	5.9	19.8	13.9

TABLE 9
Skeletal Measurements (in Millimeters) of *Emberizoides herbicola herbicola*, *Emberizoides herbicola sphenurus*, and *Emberizoides ypiranganus*^a

Specimen Feature	<i>herbicola</i> ♂ no. 159014	<i>herbicola</i> ♂ no. 159013	<i>sphenurus</i> ♀ no. 155391	<i>ypiranganus</i> ♂ no. 159017	<i>ypiranganus</i> ♂ no. 159015	<i>ypiranganus</i> ♀ no. 159016
Length of maxilla	14.9	15.2	13.6	13.0	12.6	13.3
Width of maxilla	6.3	6.7	6.1	5.4	5.2	—
Depth of maxilla	4.5	5.0	4.4	4.0	4.3	4.0
Skull length to hinge	21.6	21.0	19.7	18.5	19.1	18.7
Skull width	16.1	17.2	16.1	—	14.7	14.9
Width, nasofrontal hinge	8.7	9.0	8.4	6.5	7.0	6.8
Length of humerus	20.4	22.2	20.2	18.5	18.3	18.2
Width of humeral head	6.1	6.2	5.6	5.0	4.9	4.9
Length of carpometacarpus	11.5	12.8	10.8	10.4	10.5	10.1
Length of sternal carina	19.5	20.7	18.0	17.1	16.7	16.0
Length of femur	21.8	23.1	21.5	19.1	19.2	19.0
Length of tibiotarsus	33.8	37.0	33.4	—	29.7	29.3
Length of tarsometatarsus	24.5	26.8	24.0	—	21.3	21.3
Length of hallux phalanx	9.7	10.2	9.8	7.6	8.2	7.6
Length of hallux claw	10.5	—	9.8	—	9.5	8.4

^a Specimens in Museum of Zoology, University of Michigan. All but *sphenurus* (Surinam) come from Corrientes, Argentina (see text for localities). Measurements are maximal, that is, skull width, e.g., is taken at the area of greatest width of the skull.

in November 1970, by Lanyon); and (7) Mocoví, northern Santa Fe (two *herbicola* and five *ypiranganus* from collections of the Museu Paulista in Brazil, the Museo Argentino de Ciencias Naturales, Argentina, and the American Museum of Natural History, including specimens of both species taken in September and December 1903, and also in October and November 1905—one bird of each form was taken the same day, September 24, 1903). Of the localities mentioned, San Luis del Palmar, Itati, and San Carlos are indicated on a map by Short (1971a, fig. 1).

Each species is represented, usually by only one or a few specimens, at numerous localities in which the other species is unrepresented. These occurrences doubtless represent inadequate sampling for it will be seen from the figures just given that one or the other species may seem much more common. Collectors, particularly of small samples, may avoid certain habitats, thus missing one of the species. Hence large samples would be necessary to insure obtaining the other species. One locality, Barra Concepción in southern Misiones, is represented by 12 *her-*

cola but no *ypiranganus*, but note that Barra Concepción is near San Carlos, Corrientes, from which come 25 *herbicola* and only one *ypiranganus*. Apparently *ypiranganus* is uncommon in southern Misiones, or the habitats appropriate for it were not sampled sufficiently to obtain more birds. Only in the drier chaco areas of central and western Corrientes (localities above, plus Curuzú and Concepción, Corrientes, represented by but four *ypiranganus*) and northern Santa Fe, and in Rio Grande do Sul (*herbicola* represented by four birds from three localities and *ypiranganus* by eight birds from six localities) does *ypiranganus* seem to approach or perhaps exceed *herbicola* in abundance, as judged by the sparse collections at our disposal.

The large samples of both species from San Luis del Palmar were obtained by Partridge within a 17-day period from November 23 to December 9, 1961, after Partridge had come to suspect that two sympatric species were involved. Virtually all the adults, 20 males and 10 females of *E. h. herbicola* and 21 males and 13 females of *E. ypiranganus*, are in full breeding condition with label no-

tations of "very large gonads," "eggs in the oviduct," and other such breeding indications. At this locality on November 21, 1970, Lanyon collected a singing male *E. ypiranganus* that had testes measuring 8 by 5 mm. He noted that the territory of this bird was within hearing range of pairs of *E. herbicola* breeding nearby.

The range of *E. ypiranganus* is encompassed entirely by the southern and southwestern portion of the distribution of *E. herbicola*. Their southern and southwestern range limits seem to coincide, with the possible exception of southern Rio Grande do Sul, Brazil, where localities for *ypiranganus* extend south of 32° South Latitude (Casino, and the nearby Kaempfer locality "Uruguayan Cattle Ranch," both in Rio Grande do Sul), but the numbers of specimens are too few to do more than suggest this possibility.

Altogether, *E. ypiranganus* is represented from some 18 localities in 11 states or provinces or sections of three countries. One specimen in the United States National Museum of Natural History probably representing an additional locality was collected by W. Page in 1859 and bears "Parana" on its label. It probably came from somewhere along the Parana River of southeastern Paraguay, or in Corrientes, or Chaco, or Santa Fe provinces, Argentina. The species should be sought in southeastern Paraguay, in eastern Chaco Province, Argentina, and in the state of Parana, Brazil (perhaps also in the westernmost state of Rio de Janeiro), as there is evidence from the distribution of the localities for *ypiranganus* that this species could occur there. Finally, there obviously is need for detailed information on the local distribution and habitats (see ecology section) in relation to actual sympatry of these species.

ECOLOGY OF EMBERIZOIDES *H. HERBICOLA* AND *E. YPIRANGANUS*

ECOLOGY: Only the most meager information is available concerning the ecology of and particularly any ecological differences between *Emberizoides herbicola herbicola* and *E. ypiranganus*. The junior author, unaware of the species problem, encountered

Emberizoides in lush grasslands within Corrientes, Argentina, in 1967 and 1968. Both species reach the southwestern limit of their range in the southern fringe of the chaco (Short, 1975), that is, in northern Santa Fe and western Corrientes, and in the ecotonal savanna grassland edges of central and eastern Corrientes, where the pampas meets subtropical moist forest (from Misiones, along Parana and Uruguay rivers) and associated subtropical grasslands and savannas (see map in Short, 1971a). Neither species of grassfinch penetrates the pampas.

Lanyon and Ewert, informed about the problem prior to their 1970 trip to Argentina, obtained most of the available information about the ecology of these species, and made their field notes available to us. They found *E. herbicola* the more common and widely distributed species, and indeed they saw this bird as a roadside grassland bird in Corrientes, Argentina, and in São Paulo, Brazil. Its habitat is described by them as "savanna." *Emberizoides ypiranganus* they found only at the Estancia Garabatá, 50 km. east of the city of Corrientes—this is the estancia where William Partridge collected his long series of both species, designated "San Luis del Palmar" in his notes and in this report. The habitat in which they found *ypiranganus* was sedge marsh; indeed they stood in water to record the voice and collect a specimen of *ypiranganus*. The two species were adjacent to one another, and within hearing distance, *ypiranganus* being in the sedge marsh habitat and *herbicola* in drier grassland.

Corrientes contains land with a relatively high water table; there are many large and small marshes, esteros (lakes surrounded by marsh), and bañados (extensive areas of marsh and swamp); the large and little known Esteros del Iberá occupy much of central Corrientes (see map in Short, 1971a). Further, whenever it rains, and particularly during the spring rainy period much of the normally drier grasslands and savannas effectively is rendered into marshes. This leads to the points that: (1) there is extensive habitat for *E. ypiranganus* in Corrientes if indeed it is a sedge marsh bird; and (2) despite the habitat difference between these birds, during part of the year there must be rela-

tively little difference between them, and indeed *ypiranganus* may have to vacate inundated areas and move into "drier" habitat occupied by *herbicola*. Of course collectors unaware of the species problem would have favored drier sites for collecting "*Emberizoides herbicola*," so there likely is a bias in favor of *E. h. herbicola* in collections.

William Belton collected both species in Rio Grande do Sul, although not precisely at the same localities. Data from four of his specimens tend to support the habitat information provided by Lanyon and Ewert. His two *E. ypiranganus* specimens were obtained in "high grass in marsh" (at Banhado São Donato), and in "marshy grassland near edge of beach" (south of Casino, on coast), whereas the two *E. h. herbicola* specimens come from a "roadside tree" (near Jaquari), and a "marshy field" (at Fazenda São Jose).

Both species breed at the same time, during November and December in the southern part of their range. We could detect no difference in gonad condition among adults of the two species in Partridge's large San Luis de Palmar, Corrientes, series, which were obtained early in the breeding season. Likewise, juvenal birds at the same stage of development date from the same time.

VOCALIZATIONS OF *EMBERIZOIDES HERBICOLA* AND *E. YPIRANGANUS*

VOCALIZATIONS: Data in this section were obtained almost entirely through the efforts of Lanyon and Ewert who in 1970 recorded the voice of two races of *E. herbicola* and of *E. ypiranganus* and conducted a few playback experiments on *E. herbicola*. We are grateful for the opportunity to present these results, which of course require further amplification through more intensive investigations.

Lanyon and Ewert recorded the song of *Emberizoides herbicola apurensis* in Meta, Colombia. From this tape they prepared a playback loop, to be used with *E. h. herbicola* and *E. ypiranganus*. They recorded the song of one male *E. ypiranganus* in Corrientes, Argentina, and also recorded songs and calls of *E. h. herbicola* in Corrientes, and in São Paulo, Brazil. Playback experiments were conducted using: (1) the loop of the *E. h.*

apurensis song tape on *E. h. herbicola* in São Paulo, and on that race in Corrientes; (2) a loop of *E. h. herbicola* song tape from Corrientes on that race in São Paulo; and (3) a loop of the *E. ypiranganus* song tape from Corrientes on *E. h. herbicola* in São Paulo. The playback songs of the Argentine forms were recorded at Estancia Las Tres Marias, near Sombrero, Corrientes, where the playback experiments in item (1) above were conducted.

The vocalizations of the various forms are shown sonographically in figure 1. These representative sonagrams involve very few birds, and hence only a preliminary analysis can be presented at this time.

The song of *E. ypiranganus* is a series of sharp noisy notes given singly at the beginning of a series, then doubly at the end (fig. 1A, B). The notes are characterized by their strong overtones at various frequencies between 1 and 7 kilohertz. Initial notes of the song are fast mechanical chips. There is some evidence of a rise in frequency within the individual notes, especially the double notes. Two full examples were 3.0 seconds in duration with 11 single and five double notes, and 2.55 seconds with nine single and four double notes. A partial, different song is shown in figure 1D. Here a few faint, single mechanical notes lead into a series of complex, almost double notes that, like the songs above, show a definite rising tendency. Fewer overtones are stressed in this song. These songs were delivered by a male from a song perch, apparently as songs, and not in alarm or other circumstances in which one might expect such a series of notes. The quality of the song reminds Short of that of the Cactus Wren (*Campylorhynchus brunneicapillum*).

Emberizoides herbicola herbicola has a series call of chiplike notes somewhat resembling the song of *E. ypiranganus* and shown in figure 1C and E. These are fast series of short, single notes, of variable duration, and not very loud. The notes show a banded effect, sonographically and do not exhibit the great frequency range of the song notes of *ypiranganus*. The notes, particularly in figure 1E, show the rising effect observed in song notes of *ypiranganus*, and it is tempting to suggest that such a call might be the precursor of the *ypiranganus* song.

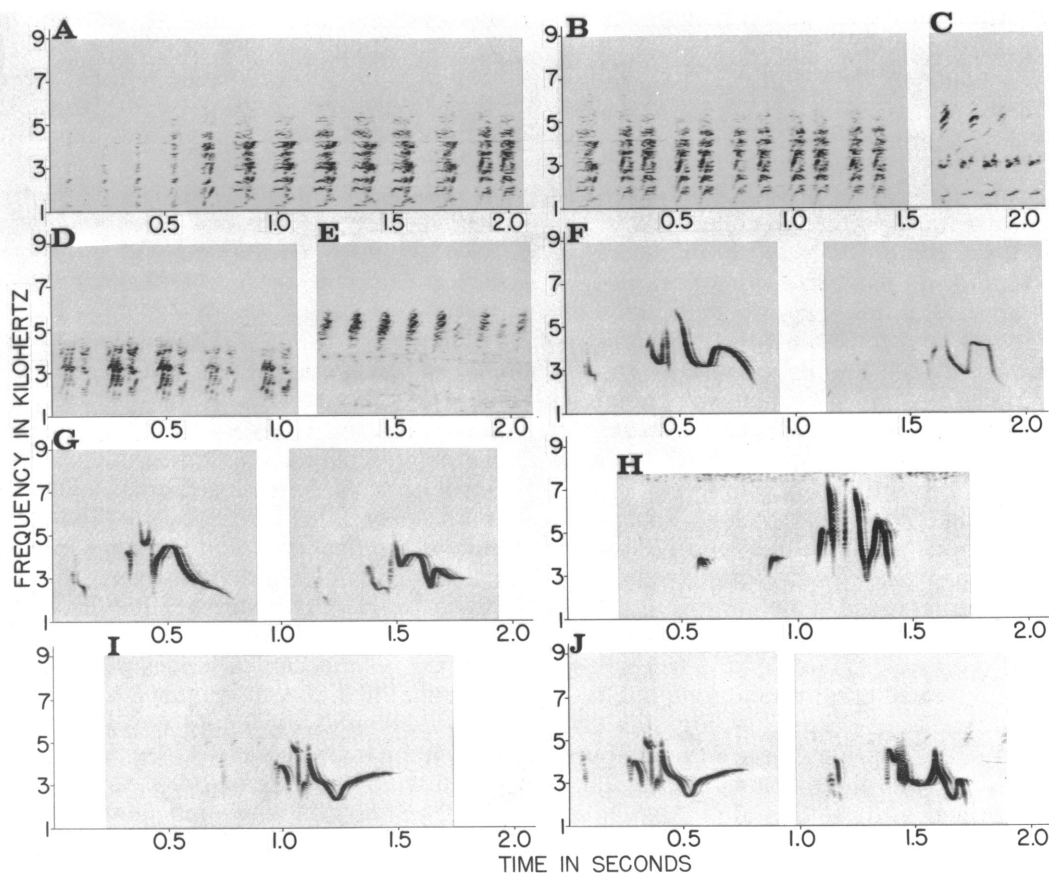


FIG. 1. Sonograms of vocalizations of *Emberizoides herbicola* and *E. ypiranganus*. A. First part of song of *E. ypiranganus*, Corrientes, Argentina. B. Second part of same song of *E. ypiranganus* as (A), repeating the last single and first double notes from (A), showing transition from single into double notes. C. Call notes of *E. h. herbicola*, São Paulo, Brazil showing peaked first two notes resembling *ypiranganus* song notes (faint rising element from left to right across first three notes is extraneous noise). D. Part of another song of *E. ypiranganus*, Corrientes, showing double-noted section, only. E. Call note series, alarm call perhaps, of *E. h. herbicola*, São Paulo. F. Two songs of *E. h. herbicola*, first from San Luis del Palmar, Corrientes, and second from near Corrientes City, showing variation in song phrase. G. Two more variant songs of *E. h. herbicola*, both from San Luis del Palmar, Corrientes (note initial element preceding each song). H. Song of *E. herbicola apurensis*, Meta, Colombia (note two elements preceding main complex). I. Song of *E. h. herbicola*, São Paulo, preceded by faint call notes. J. Two consecutive song phrases from same individual male *E. h. herbicola*, São Paulo (again note pre-song element for each). Notice that the frequency base line is 1 kilohertz. Recordings were made by Lanyon in May (Colombia), late November and December 1970. All sonograms were made using the narrow band pass filter.

The actual song (as opposed to the calls) of *E. herbicola* is very different from that of *E. ypiranganus*, as seen from the sonograms (figure 1F to J). The song is a rather complex, half-second sound of the quality of a whistle, with no overtones and showing sharply defined upward and downward shifts in fre-

quency; a short note precedes the complex figure to comprise a song phrase. The difference between this song and that of our examples of *E. ypiranganus* is so great that there virtually are no points of similarity. Thus the songs of the two species appear to differ strikingly.

Some aspects of variation in the songs of *E. herbicola* are noteworthy in connection with intraspecific variational parameters in this genus. Figure 1F and G shows sonagrams of four variant songs of *E. h. herbicola* from two areas in Corrientes. All show the lead element, a complex but high-pitched and peaked initial part of the long second element, and a gently sloping, peaked terminal element that sonographically may be peaked or double-peaked or flat-topped, dropping sharply or gradually at the end. These may be contrasted with two basic song types of birds of the same race from Anhembi, São Paulo (figure 1I and J). The first type is shown in figure 1I and the initial part of 1J. There is considerable resemblance of this song type to the songs of Corrientes birds (fig. 1F and G), especially in the initial element, and the first part of the second element. Emphasized in the last part of this song is a steep drop and a rise, somewhat resembling aspects of certain Corrientes songs (e.g., first one in fig. 1G). The second part of figure 1J contains a different form of song uttered by the same individual that gave the song in the first part of figure 1J, and immediately following the latter. This song type has a different quality and seems to show expansion of the initial part of the long element at the expense of its terminal part that is very short. Despite the variations discussed, note that all the songs of *E. h. herbicola* show the same quality, have a similar lead element, and are of about the same duration and pitch.

Figure 1H depicts a sonagram of the song of *E. h. apurensis* in Meta, Colombia (this race is the most distinctive morphologically of those of the *sphenurus* group of *E. herbicola*, it may be recalled). This song resembles those of *E. h. herbicola* in having a lead element (actually two), in the up-down form of the complex terminal element, and in its quality and duration. The form of the main part of the song may be seen to show initial portions like those of *E. h. herbicola*, but pitched much higher and with a sweeping frequency range. The final part of this song is a simple, short peak. Overall the song is most like the second type of São Paulo *herbicola* song (second part of fig. 1J), but it differs considerably, even from that song. Nonetheless, its duration, lead notes, quality

of the sound and peaking of the elements resemble the other songs of *E. herbicola*, and of course are not like that of *E. ypiranganus*.

On November 14, 1970, Lanyon and Ewert played back the loop of *apurensis* song within the territory of a pair of *E. h. herbicola* in Corrientes. The only response was alarm notes of the type a human elicits by walking into the territory. On the next day, after recording this same individual of *herbicola*, they played back its own song, and got a strong response such that they could draw the bird about its territory through playback. Several times they switched to the *E. h. apurensis* loop of tape, hoping to elicit a response, but there was none. At all times the bird responded strongly to its own voice, but not to that of *apurensis*.

Near Anhembi, São Paulo, on December 11, 1970, they entered the territory of a pair of *E. h. herbicola* where they had heard this species singing the previous day. They began playback of the *E. h. apurensis* loop, not knowing where the *herbicola* were. There was no response. Then they switched to the Argentine (Corrientes) loop of *E. h. herbicola* song and the pair of *herbicola* at once appeared, flying about them "nervously" and criss-crossing the playback area. A rest period followed, in which the birds were allowed to go back to feeding. While Lanyon watched them feed, Ewert played the *E. ypiranganus* loop of tape from Corrientes from within 30 or so meters of the birds. They failed to respond, continuing their feeding. Ewert then switched back to the *apurensis* loop and there was an immediate, strong response; both birds oriented to him immediately and the male broke into a long rendition of primary song. Lanyon then moved 50 m. away, and while Ewert still had the birds about him, Lanyon commenced playing the just-recorded song of the *herbicola* male. The pair immediately shifted their attention to Lanyon, flying about him excitedly. Then Lanyon and Ewert alternately played their respective tapes, Lanyon playing the *herbicola* male's own voice and Ewert the *apurensis* song; the birds were drawn appropriately back and forth from one to the other. Finally, Ewert switched from the *apurensis* loop to the *ypiranganus* loop and no reorientation occurred. Rather, the birds remained with Lan-

yon (who was not at this time playing back), flitting about him nervously, and (the male) singing.

Two days later, December 13, Lanyon and Ewert returned to the territory of the same *E. h. herbicola* pair. At the time they arrived the birds were silent and their location unknown. Ewert commenced playing the *E. h. apurensis* loop, and within 30 seconds both *herbicola* appeared, flying about excitedly. They ceased playing back, and a few minutes later the male *herbicola* began singing. Lanyon recorded his voice, walked 50 m. away from Ewert, and again replayed the bird's own voice. The pair, as before, strongly reacted, orienting to Lanyon for as long as he played. Ewert then repeated the *apurensis* loop, and the birds reoriented to him. Lanyon drew them back by repeating his playback of the male's own song. Ewert then played the *E. ypiranganus* loop, with Lanyon not playing back, but the pair remained with Lanyon, the male singing and flying about in Lanyon's vicinity.

To summarize these very limited playback experiments: (1) one pair of *E. h. herbicola* in Corrientes responded positively to recordings of its own voice, but did not react to the song of *E. h. apurensis* played to it; (2) one pair of São Paulo *herbicola* showed mixed reactions to the *apurensis* song, discriminating at first, but reacting to it after playback of its own (*herbicola* to *herbicola*) song, thus not discriminating by reacting positively to its own voice, to Corrientes *herbicola*, and to Colombian *apurensis*; and (3) the one pair of São Paulo *herbicola* discriminated between *E. ypiranganus* and tapes of various *E. herbicola* (São Paulo *E. h. herbicola*, Corrientes *E. h. herbicola*, and to an extent *E. h. apurensis*), but not reacting at all to *E. ypiranganus*.

Results of the vocal analyses and available vocal data show that *E. ypiranganus* has a very different song from that of *E. herbicola*, and suggest that the differences are sufficient to preclude their reacting to each other's songs. Considerable geographic variation exists in the song of *E. herbicola*, but differences between songs of two morphologically disparate races, *herbicola* and *apurensis*, are much less marked than differences between the songs of sympatric *E. herbicola* and *E.*

ypiranganus. Further data are necessary and vocal comparisons among all species and subspecies of *Emberizoides* and of *Embernagra* would be rewarding.

DISTRIBUTIONAL AND TAXONOMIC STATUS OF *EMBERIZOIDES DUIDAE*

In previous sections attention has been called to the distinctive morphology of *E. [herbicola] duidae*, and its taxonomic status is called into question in light of the discovery of the sibling species *E. ypiranganus* within the range of *E. herbicola*. Relevant information about the voice and ecology of *duidae* largely is lacking. However, some information is available about this form in notes of William H. Phelps, called to our attention by William H. Phelps, Jr., and by Phelps and Phelps (1963).

According to the elder Phelps's notes, V. Barnes climbed Cerro Duida from its northeast side in 1950. Labeled as collected from the summit of the mountain are two specimens of *E. herbicola sphenurus*, a male from 4100 feet elevation, and a female taken supposedly at 5070 feet. If these altitudes are correct, then *sphenurus* occurs on the summit of Duida Mountain, to which *duidae* is restricted. Specimens of *duidae* were obtained by the Tate Expedition, which climbed Duida from the southeast. The plateau atop Cerro Duida is only 30 km. long, according to Phelps's notes, and it is most unlikely that two subspecies of a single species would occupy the plateau. In his black, loose-leaf notebook, Phelps indicated some uncertainty as to the correctness of the altitude and locality information on the labels of Barnes's specimens.

The second edition of Phelps and Phelps (1963) does not mention Barnes's specimens, and apparently the older Phelps had not resolved the problem of the label data of Barnes. The top of Duida Mountain is composed of thick forest broken by extensive savannas, according to the younger Phelps. Conceivably *sphenurus* occasionally might wander from its normal lowland habitat at the base of the mountain up to the summit. Certainly there is no indication that interbreeding has taken place, and we doubt that it could, even if the two forms were to meet.

Phelps and Phelps (1963, p. 427) give the occurrence of *E. herbicola spheunus* in Venezuela as savannas in the tropical and lower subtropical zone, at elevations up to "1600 m." For *duidae* they state (*loc. cit.*): "Campos escasamente arbolados en la Zona Subtropical; 1323 hasta 2010 m." Thus, *sphenurus* occurs within the range of elevations at which *duidae* is found on Cerro Duida, although, except possibly for Barnes's specimens, not on the summit of that mountain itself, whereas *duidae* seems to occur at elevations low enough to overlap with *sphenurus*. Unfortunately, we have not been able to locate Barnes's specimens, although these would not help in checking their altitudinal data.

All that we can conclude about *E. h. spheunus* and *E. duidae* distributionally is that the two forms are apt to meet on the slopes of Cerro Duida. Specimens of *sphenurus* from the base of Duida Mountain, and the few specimens of *E. duidae* show no indication of interbreeding of the two forms. The fact that *duidae* is at least as distinct morphologically from adjacent lowland *sphenurus* as *ypiranganus* is from southern *herbicola* indicates that *sphenurus* and *duidae* probably would not interbreed if they did meet. Like *ypiranganus*, *duidae* merits status as a distinct species apart from *E. herbicola*.

DISCUSSION

There can be no doubt about the status of *Emberizoides ypiranganus* which must stand as a sibling species of *E. herbicola*. In view of the allopatry of the forms of *Emberizoides* other than *E. ypiranganus* and *E. h. herbicola*, we have been obliged to examine these forms and consider their differences in the light of the differences obtaining between sympatric *E. ypiranganus* and *E. h. herbicola*. The results indicate that, of all the supposed subspecies of *E. herbicola*, only *E. h. duidae* approaches (and in some ways exceeds) the level of differentiation shown by *E. ypiranganus*. On the basis of its morphology, we consider *duidae* specifically distinct from *E. herbicola*, and we believe that studies of the behavior and ecology of *duidae* eventually will provide even stronger bases for such consideration.

Since *E. ypiranganus* and *E. h. herbicola* are very broadly sympatric, it might be main-

tained that their differences considerably exceed those that would be required to maintain two grass-finches as species in parapatry rather than sympatry. Perhaps not only *E. duidae* and *E. ypiranganus*, but even the allopatric *sphenurus* group of *E. herbicola* are specifically distinct from nominate *herbicola*. We cannot discount this possibility. However, we believe that the various morphological features of the *sphenurus* group are not sufficiently important to warrant specific treatment for this group, and that these features are not likely to preclude interbreeding if members of the *sphenurus* group and *herbicola* should come into contact. The limited vocal data also suggest that the morphologically most distinctive subspecies of the *sphenurus* group, *apurensis*, has a song sufficiently resembling that of *E. h. herbicola* as to allow conspecific playback reactions.

It is tempting to consider the possibility of character displacement between sympatric *E. ypiranganus* and *E. h. herbicola*, even extending this possibility to *Embernagra*. For example, we have seen that *Embernagra platensis* is about as much larger than *Emberizoides herbicola* as *Emberizoides ypiranganus* is smaller than *herbicola*. Further, *E. ypiranganus* is more variable mensurally than is *E. h. herbicola*, and this could be because it is at an extreme, whereas *herbicola* is "sandwiched" between *Embernagra platensis* and *Emberizoides ypiranganus* with, perhaps, little room for variation toward either (e.g., as *Picoides nuttallii* is between *P. pubescens* and *P. scalaris*; Short, 1971b). Other supportive data are the generally intermediate size of the *sphenurus* group of races, between *E. ypiranganus* and *E. h. herbicola* in areas where neither *E. ypiranganus* nor *Embernagra* occurs, and the absence of dorsal streaking in *Embernagra platensis* where it is sympatric with the two species of *Emberizoides*, and the presence of streaking in populations outside (west of) the area of such sympatry (Short, 1975).

Possibly arguing against character displacement among the three species just mentioned is the evolution in allopatry (but surrounded by the *sphenurus* group of *E. herbicola*) of large *E. duidae*. The substantial differences of *duidae* from *sphenurus* in allopatry caution us that character displace-

ment may not be involved farther south, although we believe that it has been involved to at least some degree.

It is important to obtain more biological information about all of the species and at least some of the subspecies discussed in this report. Details of nesting, territoriality, song variation and functions, other vocalizations, foods, habitat requirements, and other information are virtually lacking and could provide taxonomic input.

We stress the close similarity of *Embernagra* to *Emberizoides*. The bill structure, many aspects of the pattern, and body proportions of *Embernagra* all point to a relationship with *Emberizoides*. There is even an approach to the attenuation of the tail of *Emberizoides* in little known *Embernagra longicauda*, which also has the reduced superciliary (loral mark) found in *Emberizoides duidae*, and a pale throat and center of the breast resembling various taxa within *Emberizoides*. The juveniles of species of the two genera are remarkably alike in pattern. We suggest that further studies of *Embernagra* and *Emberizoides* be undertaken, the suspicion being that they may prove congeneric.

We resist the temptation to hypothesize on the evolution of the taxa discussed. Any possible evolutionary history should treat: (1) the evolution of *Emberizoides* and *Embernagra* from an ancestor in common; (2) further speciation in both, including evolution of *Emberizoides duidae* as an isolate on Duida Mountain; (3) the origin of *Emberizoides ypiranganus*; (4) sympatric interactions and their effects on *Embernagra platensis*, *Emberizoides herbicola* and *Emberizoides ypiranganus* (e.g., possibly the limited variation of *E. herbicola herbicola*); (5) failure of *Embernagra* to reach northern South America; and (6) the largely clinal decrease in size northwardly of *E. herbicola* with, however, large *E. duidae* isolated in the midst of small *E. herbicola*.

We recommend that *Emberizoides* follow *Embernagra* in the sequence of Emberizinae, and that the species of *Emberizoides* be listed in the order: *duidae*, *herbicola*, *ypiranganus*.

ADDENDUM

Note: These notes were written by Eisenmann shortly before his death. Short had no

chance to discuss them with him, but it is clear that he wanted them included as an addendum, and they are so rendered.

EMBERIZOIDES IN PANAMA

In Panama *Emberizoides* is known only in open country of the drier Pacific slope, in four apparently isolated areas: the grassy hill country of western Chiriquí Province in the Boquete district (specimens from Boquete and from Frances, 2000 feet, type locality of *E. herbicola hypochondriacus*); the hill country of eastern Chiriquí Province, known only from Cerro Flores, 3600 ft. (type locality of "*floresae*," based on the unique type); Cerro Campana, western Panama Province on grassy slopes and gullies between *circa* 1200 and 2800 feet, near the summit of the mountain; and level grassy country near sea level in eastern Panama Province just east of Panama City from Tocumen Airport to Chepo.

Eisenmann frequently observed individuals in both areas of Panama Province and we have compared specimens in the American Museum taken on Cerro Campana with a series (including the type) of *hypochondriacus* from western Chiriquí, and the type of *floresae* (see text), as well as specimens of the Costa Rican *lucaris* and the various described South American subspecies. We know of no museum specimens of the eastern Panama population, although Eisenmann has found it locally not uncommon in the open grassland east of Panama City.

TAXONOMY: One troublesome fact may militate against treating the Cerro Campana and eastern Panama birds as *hypochondriacus*. The five specimens of its type series are all labeled as having "iris yellow," while Eisenmann's field notes indicate that birds seen in Panama Province had a dark iris, and this is corroborated by the brown iris indicated on the label of the one Cerro Campana specimen with iris color indicated. Further specimens of *lucaris* and specimens from other areas are either labeled as having a dark iris or have no iris color indicated—usually signifying a dark iris.

ECOLOGY: In Panama the one ecological feature required is open country dominated by tall grass or similar vegetation such as sedge. Karr, when studying the avifauna of

study plots in eastern Panama Province east of Río Pacora near La Joya airstrip (1964–1965), found *Emberizoides* apparently resident in both dry and damp *ungrazed* grassland, but not in grazed grassland. Generally there are scattered bushes and low trees in the habitat. Eisenmann found one singing on a fence on the lower slope of Cerro Campana (about 1000 ft.) in a sedgy meadow.

SONG: For singing, the birds favor a somewhat elevated, rather conspicuous perch, a tall grass stem, a weedy plant, a low shrub, a rock, or a fence. In singing the birds adopt an almost vertical stance; if startled they dive into the grass and disappear.

On the Pacific-facing slopes of Cerro Campana, where the species is fairly common in the grassy eroded, rounded gullies Eisenmann noted two very different songs. One was a very fast, somewhat buzzy, high, wiry, but fairly loud, fast “tsiritsitzeew,” uttered June 21, 1953. The same style song, syllabized as “tzit-zeereea,” was given by a bird singing persistently from a fence at 11:00 A.M. on September 25, 1965. This individual uttered a call “tsit.” (Calls noted on other occasions on Cerro Campana have been syllabized as “tsip” and “dzeet.”) A different, rather musical, clear song, heard on Cerro Campana by Eisenmann (when with Morton) on the morning of May 27, 1971, and on May 30, 1971 (when with Frank Smithe in the late afternoon) was written as “tit-leéoo,” sometimes varied to “teedleé.” Morton told Eisenmann that this musical song was the only one he had heard on Cerro Campana, but that he had heard the buzzy song near Tocumen Airport. Eisenmann had heard both on Cerro Campana but not from the same individual, so far as he could determine.

In eastern Panama Province on the road from Tocumen Airport to Chepo, Eisenmann and Morton on September 15, 1965, encountered this grass-finch at three localities, all near sea level in open grassland. The first bird, observed near Tocumen Airport perched on a grass stalk, was singing a fast, wiry, “zit-zipzirréé” or “zip-zitzireeree,” each phrase lasting one and a quarter to one and a half seconds, then repeated after a five-second interval. By “squeaking” Morton attracted the bird, which sang very near to them; then the bird changed its song to a much sweeter, but

less varied, “tsee-tsee-tsee” (1¼ second). This bird called “dzeet” and “dzit.”

Eisenmann had seen birds singing on Cerro Campana in May, June, July, and late September and once briefly in flight on March 2.

In early July in this area not only were singing males observed, but also apparent pairs and fully fledged young. Slud (1964) stated that in Costa Rica the song he had heard from related *E. h. lucaris* was “an unmusical decelerating ‘ticking’ rattle.” Eisenmann did not recall hearing a song of this type in Panama, although the call could be interpreted sometimes as a “tick.”

LITERATURE CITED

- Chapman, F. M.
1929. Description of new birds from Mt. Duida, Venezuela. *Amer. Mus. Novitates*, no. 380, 27 pp.
- Griscom, L.
1924. Descriptions of new birds from Panama and Costa Rica. *Amer. Mus. Novitates*, no. 141, 12 pp.
- Hellmayr, Charles E.
1938. Catalog of the birds of the Americas. Part XI. *Field Mus. Nat. Hist.*, publ. 430, zool. ser., vol. XIII, vi + 662 pp.
- Paynter, Raymond A., Jr.
1970. *Emberizinae*. In *Check-list of birds of the world*, vol. XII. Cambridge, Mus. Comp. Zool., pp. 3–214.
- Phelps, William H., and William H. Phelps, Jr.
1963. Lista de las Aves de Venezuela con su distribución. Vol. I, Pt. 2, *Passeriformes*, Sec. Ed. Caracas, Edit. Sucre, 479 pp.
- Short, Lester L.
1971a. Aves nuevas o poco communes de Corrientes, Republica Argentina. *Rev. Mus. Arg. Cien. Nat., Zoologia*, vol. 9, pp. 283–309.
1971b. Systematics and behavior of some North American woodpeckers, genus *Picoides*. *Bull. Amer. Mus. Nat. Hist.*, vol. 145, pp. 1–118.
1975. A zoogeographic analysis of the South American chaco avifauna. *Bull. Amer. Mus. Nat. Hist.*, vol. 154, pp. 163–352.
- Slud, P.
1964. The birds of Costa Rica. *Bull. Amer. Mus. Nat. Hist.*, vol. 128, pp. 1–430.
- von Ihering, H., and R. von Ihering
1907. *Catalogos Fauna Brasileira*. Vol. 1. As Aves do Brazil. São Paulo, Typographia do Diario Official, xxxviii + 485 pp.

