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Identification Criteria for some Emberizid Sparrows

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Certain Emberizid sparrows that occur in northeastern United States and southeastern Canada can be difficult to identify especially in their juvenal plumages and sometimes in their first basic plumages. Generally, these birds have streaked crowns and backs and variably streaked breasts, depending on plumage. Using selected measurements or combinations thereof, I have found that five of these similar species can be reliably separated from one another. These species are Savannah Sparrow (*Passerculus sandwichensis*), Lincoln's sparrow (*Melospiza lincolni*), Swamp Sparrow (*M. georgiana*), Song Sparrow (*M. melodia*), and White-throated Sparrow (*Zonotrichia albicollis*).

METHODS

I used the collections of the New York State Museum (NYSM) in Albany; American Museum of Natural History (AMNH) in New York City; and Museum of Comparative Zoology (MCZ) in Cambridge, Massachusetts for specimens to measure. Specimens were predominantly from New York State (60%), but included also some from New England (23%), Ontario and Quebec (4%), and the Maritime Provinces (13%). I limited my selection in order to minimize geographic distribution and size variations that might result therefrom. I gathered also some limited data on live individuals of three species at Island Beach State Park, New Jersey.

I recorded tail length (TL) and wing chord (WC, unflattened and unstopped) to the nearest 0.5 mm using a steel rule graduated to 1.0 mm. Similarly, I recorded a measurement I termed "tail tip" (TT) by measuring the distance from the tip of the outermost rectrix to the tip of the longest rectrix in the tail. I recorded two measurements of the bill using a divider: exposed culmen from the tip of the bill to the base of the horny sheath (=bill length or BL); and bill depth (BD) measured at the base of the bill representing the side profile of the bill, as described on pages 6-11 and Figures 6-6B and F, respectively, of North American Banding Techniques (1977). Both were measured to the nearest 0.1 mm. Normally, bill depth is measured with a vernier caliper. For convenience and expediency, especially with live birds, I used a divider; however, on two series of specimens, I took duplicate measurements with divider and caliper to compare results.

Several additional measurements were taken but are not presented here either because they were not useful due to

overlap or were problematical due to the method of taking or their reliability. They included "tail fork" (the distance from the tip of the innermost rectrix to the tip of the longest rectrix), width of the fifth rectrix, and "exposed tail" (the distance from the tip of the longest under tail covert to the tip of the longest rectrix).

RESULTS

The four-letter name codes of the Bird Banding Laboratory were used as follows in presenting the results: SAVS for Savannah Sparrow; LISP, Lincoln's Sparrow; SWSP, Swamp Sparrow; SOSP, Song Sparrow; and WTSP, White-throated Sparrow. Table 1 is a summary of the average values and ranges of the five measurements for the five species, representing mixed ages and sexes. Sample size is given as a range because not every one of the five measurements could always be taken or used from each bird handled. Some specimens had open bills, thereby precluding a reliable bill depth measurement, others showed shooting damage, some missed a critical rectrix, etc. Therefore, N represents the range of the number of useful measurements for each of the five measurements. Data on the live specimens from New Jersey are included for comparison purposes. They show that average bill depths on live birds were 0.1-0.3 mm less than on museum specimens, and bill lengths varied from less to more by 0.1-0.3 mm. Average tail lengths of live birds were 1.4-4.3 mm longer, average tail tips were 0.4-0.7 mm longer, and average wing chords were 0.6-1.7 mm shorter than on museum specimens.

The museum data from Table 1 are graphically represented in Figure 1 for easier analysis, and the relevant criteria for specific identification are in Table 2. Where sufficient museum data existed, I compared measurements on birds in juvenal plumage with birds representing mixed ages past the juvenal plumage. These results, representing three species, are in Table 3. Those data on birds in juvenal plumage are represented in Figure 2.

In a museum series of 15 Swamp Sparrows and 30 Lincoln's Sparrows, I made dual bill depth measurements to compare the results by caliper and divider. In both cases, the divider gave measurements slightly greater than did the caliper--by 0.45 mm for Swamp Sparrow and 0.43 mm for Lincoln's Sparrow, or 7.4-7.6% over the caliper measurements.

Table 1. Selected Measurements for Species Identification.

Species	Bill Depth Range, mm	Average	Bill Length Range, mm	Average	Tail Length Range, mm	Average	Tail Tip Range, mm	Average	Wing Chord Range, mm	Average	Source ¹	N
SAVS	5.7-6.9	6.3	10.5-11.8	11.2	43-53	48.1	0.5-3.0	1.2	63-74	69.3	M	29-31
LISP	5.6-7.0	6.3	10.1-12.5	11.2	50.5-60.5	54.5	2.5-8.0	5.5	58-70	63.6	M	97-101
SWSP	5.7-7.0	6.2	10.0-12.7	11.5	52-64	56.3	7.0-13.0	9.5	56-68	61.9	M	128-137
	5.5-6.7	6.1	10.2-13.2	11.8			8.5-13.0	9.9	58-63	60.3	L	12-33
SOSP	7.0-9.3	7.8	10.8-14.0	12.4	55-70	63.6	7.0-14.0	9.5	61-71	65.9	M	73-83
	6.7-8.6	7.7	11.0-13.9	12.3	62-71.5	65.0	7.0-13.0	10.2	62-67	64.3	L	9-64
WTSP	6.8-8.4	7.5	10.8-13.7	12.0	59-77	69.4	2.0-7.0	4.6	64-79	73.7	M	124-132
	7.0-7.7	7.2	11.5-13.2	12.3	68-78	73.7	3.0-7.0	5.2	69-77	73.0	L	13-17

¹M = Museum Data
L = Live Data

Figure 1 top and Figure 2 bottom.

Figure 1. Averages and ranges of five measurements taken on museum specimens of mixed age and sex on five Emberizid species from Table 1. See results section for correlation of four-letter name code with species name.

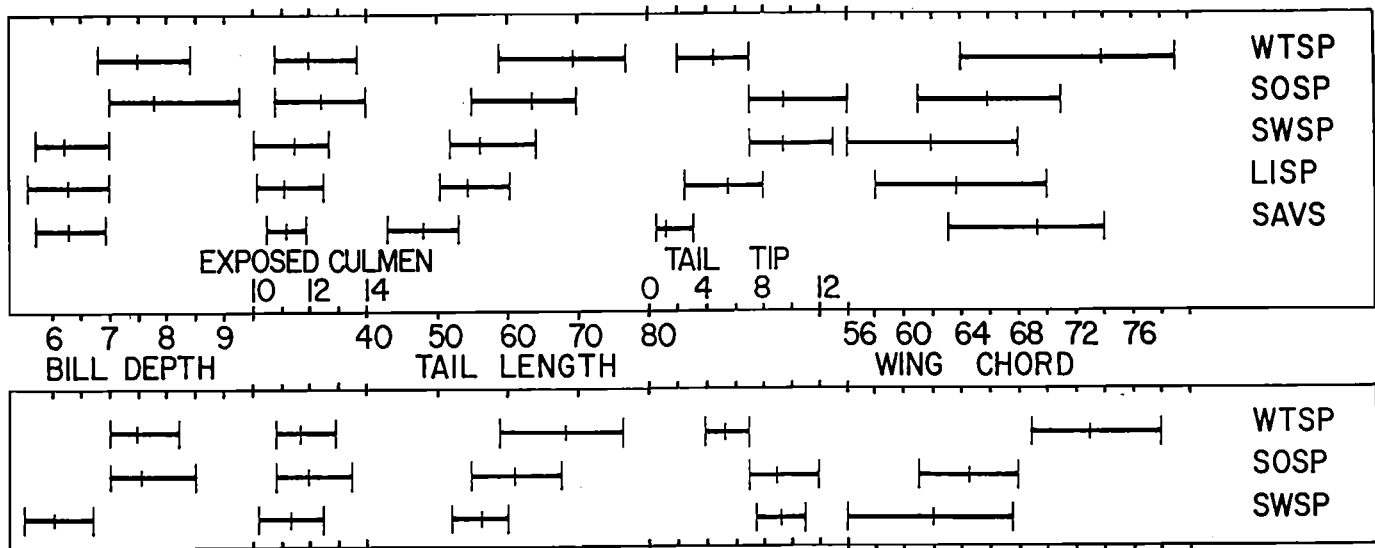


Figure 2. Same measurements and name codes for museum specimens in juvenal plumage only on the three species in Table 3.

Table 2. Species Identification Criterion Guide.

	<u>SAVS</u>	<u>LISP</u>	<u>SWS</u>	<u>SOSP</u>	<u>WTSP</u>
SAVS		TT	TL TT	BD TL TT	BD TL
LISP	TT		TT	BD TT	BD TL
SWSP	TT TT	TT		BD	BD TT
SOSP	BD TL TT	BD TT	BD		TT
WTSP	BD TL	BD TL	BD TL	TT	

BD = Bill Depth; TL = Tail Length; TT = Tail Tip

Table 3. Comparison of Juvenal and Non-juvenal Measurements¹

Species	<u>Bill Depth</u>		<u>Bill Length</u>		<u>Tail Length</u>		<u>Tail Tip</u>		<u>Wing Chord</u>		Age	N
	Range, mm	Average	Range, mm	Average	Range, mm.	Average	Range, mm	Average	Range, mm	Average		
SWSP	5.5-6.7	6.1	10.2-12.5	11.4	52-60	56.3	7.5-11.0	9.3	56-67.5	62.0	J	29-33
	5.7-7.0	6.2	10.0-12.7	11.5	52-64	56.4	7.0-13.0	9.5	56-68	61.9	NJ	99-104
SOSP	7.0-8.5	7.5	10.8-13.5	11.9	55-67.5	61.2	7.0-12.0	9.0	61-68	64.6	J	27-35
	7.3-9.2	8.1	11.2-14.0	12.9	58.5-70	65.1	7.0-14.0	9.9	61.5-71	66.8	NJ	33-40
WTSP	7.0-8.2	7.5	10.8-12.9	11.6	59-76.5	68.3	4.0-6.5	5.4	69-78	73.0	J	25-34
	6.8-8.4	7.7	11.0-13.1	12.0	60.5-77	69.5	2.0-7.0	4.4	69.5-78	74.0	NJ	43-44

¹In this context, "juvenal" means juveniles in juvenal plumage and J = Juvenal; NJ = Non-juvenal.

The measurements presented here for Savannah Sparrow apply only to the northeastern United States *sandwichensis* population, and not necessarily to other geographical *sandwichensis* populations and definitely not to the larger, paler *princeps* (Ipswich Sparrow) which relatively few banders are fortunate to handle. *Princeps* generally lacks the yellowish lores and malar area and the well-defined superciliary line, typical of *sandwichensis*, or has these features washed out in comparison. Its crown is more finely streaked and is paler, lacking the brown-black of most *sandwichensis*. Overall, it appears larger (especially wing chord) and is very slightly stouter of bill. Twenty-three Long Island specimens gave the following average measurements and ranges (in parentheses): BD, 6.6 (6.1-7.0); BL, 11.7 (11.0-12.5); TL, 54.4 (49-58.5); TT, 1.4 (0.5-3.0); and WC, 76.6 (72-83).

DISCUSSION

Before reviewing the results in detail, a bit of historical

perspective appears in order. Some experienced banders who routinely handle these species might question why it is necessary to try to recognize them by measurement when they are recognizable by visual inspection. When these birds are in alternate plumage, visual inspection no doubt suffices for a very large majority of banders; while in their basic plumage, they become more challenging to recognize for a greater portion of banders, especially at dawn and dusk in poor light when many individuals of these species are active. However, in their juvenal plumage they represent the greatest challenge because fewer people have extensive experience with them in that plumage and because the distinguishing field marks are less well developed and certain individual birds simply become part of a blur of brownish, dirty-looking, streaked sparrows.

Let me illustrate the potential for misidentification among these species with three examples. Over 25 years ago, a

bander told me with pride and enthusiasm about one of those rare events--a foreign encounter of one of her White-throated Sparrows. However, her enthusiasm was a bit tempered by her concern over how the distant bander who recaptured the bird reported it as a Song Sparrow. While the possibility of a clerical error could not be ruled out, the possibility of a misidentification was troubling. That thought lingered with me. At the time, as a new bander who had seen these species in basic and alternate plumages but not in juvenal plumage, I found it difficult to imagine how such an error could be made.

Very few years later, my own banding at Vischer Ferry, New York brought me face to face with some confusing juvenile Song and Swamp Sparrows. It was a partially troubling experience because many birds were caught at dusk requiring processing under the light of a head lamp. Some of the birds which I banded in their juvenal plumage in July-September were recaptured in their basic plumage in October, and among them were a very few whose identity I had recorded differently on the two captures. This troubled me, and I remedied this situation by studying these species in detail in daylight and found that bill profile reliably separated the two regardless of plumage. Song Sparrows had chunkier bills due to a thicker base (bill depth) and Swamp Sparrows had a slimmer, more delicate profile due to a thinner base. No longer did I have to ponder plumage color or color pattern differences, especially of intermediate molting individuals, under the sometimes inadequate illumination of a head lamp.

More recently, I began gathering bill measurement data at Island Beach and additionally found that the shapes of the tails of some of these species varied from species to species. Realizing that it would take many years of field work to capture sufficient numbers of each species for adequate data, and realizing that certain of the juveniles were not easily available to me for geographical reasons, I resorted to making this a study of museum skins. And it was in the museums that I found continued problems with misidentification, not of age or sex, which occasionally occurs on specimens, but with species identification. Even more surprising was how some specimens' initial misidentity was recognized and when re-identified, they were again misidentified! The following cases are illustrative: From 324 specimens of Song, Swamp, and Lincoln's Sparrows, I found five (1.5%) misidentifications. All were juveniles collected in July and August in juvenal plumage. Two were collected and labelled as Song Sparrows and were correctly relabelled as Swamp Sparrows. One was collected as a Lincoln's Sparrow and correctly relabelled as a Swamp Sparrow. More surprisingly, an early August specimen, labelled Lincoln's Sparrow near New York City, was clearly well out of the species' normal juvenile range and was relabelled Song Sparrow; but neither identity was correct because the bird clearly measured out as a Swamp Sparrow and during well-illuminated, close examination of its plumage, that identity was corroborated. A

more bizarre double misidentification involved a bird collected in Maine where any of its three identities were geographically possible. It was collected as a White-throated Sparrow but was relabelled Lincoln's Sparrow and placed in that tray. Clearly, based on careful inspection and measurement, the bird was a Song Sparrow!

Having confessed my own former difficulty with some juvenile Song and Swamp Sparrows, and illustrating some other persons' (who shall remain anonymous) similar difficulties, I hope that the data offered here are useful to all banders at some point in their career, and especially to those who find first exposure to the juvenal plumage so requiring of their recognition skills. But first, some words of caution. The criteria described here are not applicable to very newly fledged individuals that have not yet fully completed feather growth or bill development. Sheathing at the base of the outer primaries and rectrices should be absent before these measurements are used. New fledglings with still very fleshy gapes and not fully developed bills must also be avoided in applying these criteria. It is also necessary to count the rectrices to insure that a complete complement is present. Since these measurements were taken on dried museum specimens, they can differ slightly with live specimens (North American Bird Banding Techniques, 1977) as indicated in Table 1.

Lastly, these criteria should be used in conjunction with other species-differentiating criteria described in Pyle *et al.* (1987), and the references contained therein, especially the works of Rimmer (1986), Roberts (1955), Wood (1969), and Swinebroad and Crebs (1965), and also Forbush (1929). Rimmer's work is especially valuable in separating Swamp and Lincoln's, which is the most difficult separation among the five species here, by using relative length of primaries four and nine. His work and mine were conducted independently in partially overlapping time periods and both use some of the same or nearly similar criteria. His method for bill measurements and tail shape differ slightly from mine. His "tail formula" is the difference between the longest (innermost) and shortest (outermost) rectrices. I measured also the longest and the shortest, but found that the longest was not always the innermost in all specimens by as much as up to three mm.

Figure 1 shows that except for the smaller SWSPs and larger WTSPs, there is substantial overlap of wing chord measurements, placing most of these birds in approximately the same size range. The measurements of exposed culmen show even greater overlap with the averages varying by less than three mm. Given that the bills are approximately the same length, the differences in bill depth then give rise to two recognizable bill profiles: (1) the stubby, thicker-appearing bill of the SOSP and WTSP; and (2) the thinner profile of the SAVS, LISP, and SWSP. This criterion, coupled with tail shape, serves as the basis for species separation.

The critical bill depth measurement must be taken with care

to be useful. As previously indicated, divider values were 0.43 to 0.45 mm, on average, greater than caliper values. The reason is that the divider point is tapered and the bottom ridge of the mandible tends to contact the divider on that taper rather than at the divider point. This effect can be minimized by holding the divider at slightly below horizontal to the bill while measuring to achieve point-to-point contact. Nevertheless, once the measuring technique is mastered with divider or caliper on known specimens, the main point to develop and use is the recognition of the profile. Once this profile difference is learned, it can be recognized at a glance, and actual measurements will infrequently be required, except in the most demanding individuals.

In comparing the results in Table 1 and Figure 1 for birds of all ages to the results in Table 3 and Figure 2 where data on only juveniles in juvenal plumage are separated, there are slight differences in some of the measurement ranges. However, these differences do not change the interpretation of the results in Table 1 and Figure 1. Therefore, I felt confident in using the larger mixed-age data sample to apply to birds in both juvenal and basic plumage. With due consideration, the mixed-age data sample in Table 1 and Figure 1 represents greater spread, and therefore a worst-case scenario which maximizes the opportunity for possible overlap of measurements. The juvenal measurements in Table 3 and Figure 2 show greater separation of measurements ranges. It was not evident to me whether this was caused by a genuine difference in measurements for birds in juvenal plumage or caused simply by smaller sample sizes.

Besides bill profile, the next critical factor was tail shape as measured by tail tip. Birds with longer tail tips, such as SWSP and SOSP, give the appearance of having a rounded, more fan-shaped tail on the underside. Short tail tips create an impression of squaring off the shape of the tail. These five species again separate into two groups with some slight overlap of the LISP into the rounder group of the SWSP and SOSP at between seven and eight mm. Birds falling in that range cannot be reliably separated (11.1% of the LISPs and 14.8% of the SWSPs measured in that range), except to use the criteria in Rimmer (1986): primary nine longer than four is LISP, and nine shorter than four is SWSP. Other of his criteria are also very helpful given adequate light. The criteria presented here are intended to work under adverse lighting.

Tail length is useful here only in separating SAVS from SOSP and WTSP and some of the smaller individuals from the larger ones of the other species. Only 2.4% of the WTSP had wing chords less than 60.5 mm, thus falling in the LISP range; and 8.0% of the WTSPs were less than 64 mm, falling in the SWSP range; while 94.6% of the LISPs and 79.7% of the SWSPs were below the minimum wing chord of 59 mm of the WTSP. For years I have heard some banders claim separation of SAVS from SOSP by characterizing the Savannah as a "short-tailed Song Sparrow with a yellowish face."

While this is a useful rule of thumb, it is apparent from Figure 1 that the Savannah Sparrow differs also in bill profile and tail shape. In juvenal plumage it also has a yellowish cast to the abdomen and more sharply pointed rectrices than does SOSP.

Finally, Table 2 is a quick reference guide for separating each species from the other based on the measurements presented, except for Swamp and Lincoln's Sparrows that overlap tail tip measurements, for which one is referred to Rimmer (1986) to separate birds in the overlap range. Based on the species separation sought in Table 2, one should then refer to Table 1 or Figure 1 for the required measurements. To use Table 2, consult the left species column for the species best described by plumage characteristics of the bird in the hand, and then move to the appropriate vertical column to the right for what may be a species with similar plumage characteristics to determine what measurements are required to confirm identity. For example, consider a bird in the hand that suggests a Swamp Sparrow but there is some doubt that it might be a Song Sparrow due to a confusing mix of prebasic molt. Locate SWSP in the far left column and go right to the SOSP vertical column, where one is advised to check bill depth to confirm identity.

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