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THE IDENTIFICATION OF AUTUMNAL INDIGO BUNTINGS

By DAVID W. JOHNSTON

Despite Dwight's careful study (1900) of plumages and molts in passerine birds, it is necessary, on occasion, to modify and refine his descriptive findings. Such is the case with the Indigo Bunting (*Passerina cyanea*), a species whose autumnal sex and age groups can be perplexing to the bird-bander. In the course of a long-range study of this species' migratory characteristics, I have retained in captivity, for periods of time up to five years, 35 individuals representing both sexes as well as first-year and adult birds. Several hundred birds have been handled in banding operations in northern Florida, and about 200 migrants have been examined from TV tower casualties. It has been possible, therefore, to allocate plumage types to definite sex and age groups, corroborated by dissection, and also to note sequences of molts and plumages in captive birds.

Several methods have been suggested to distinguish live first-year (immature) from adult passerine birds in autumn in the absence of distinctive plumage or other apparent differences. Norris (1961), for example, reported a simple, effective technique for examining the skull roof for the degree of ossification. Viewing the skull through bare, wet skin with a hand lens in strong light, he could

discern “. . . the many little white dots . . . in the adult birds. In immature birds the skull surface . . . was uniform and perceptibly pinkish. . . .” Yet a different technique has been employed to determine the “unossified” or single-layered skull condition in the buntings. One can simply apply *gentle* pressure with a long fingernail at a right angle to and directly onto the skull. If the skull “gives” with this pressure, the single-layered condition of the immature bird’s skull is evident. On the other hand, if the skull appears harder with this pressure, and will not “give” readily, the bird is an adult with a double-layered skull. As with other techniques, this one might require some practice, but I have tried it with success on dozens of buntings, many of which (TV tower casualties) have been double-checked by dissection and subsequent internal examination of the skull. No live birds, either captive or feral, have shown any harmful aftereffects from the application of pressure onto the skull. This method is effective in identifying first-year buntings through at least the end of October.

Another external feature is helpful in identifying first-year buntings: the fleshy, yellowish gape or corner of the mouth. Perhaps because Indigo Buntings might be hatched any time between June and August, this feature is not always a reliable indicator of age, especially in late October and early November.

Autumnal adult males are doubtless the easiest sex-age category to recognize. Typically they appear mottled with blue and brown. The head, neck, breast, abdomen, and flanks contain various mixtures of dull blue and brown feathers, many of the latter being bluish toward the base but having brown tips. The upper back is brown, the rump and rectrices being dull blue. Most of the secondary coverts are blue or blue and black with brown edges, thus giving the appearance of two brown wing-bars. Primary coverts and alulae are distinctively blue and black. Finally, adult males have noticeably longer wings (Table 1) than any other sex-age group at this time.

TABLE 1. WING LENGTHS* OF AUTUMNAL INDIGO BUNTINGS

	N	mean \pm standard error	extremes
adult male	26	67.2 \pm 0.88	64.6-70.6
first-year male	53	63.6 \pm 0.25	59.4-66.6
adult female	45	62.9 \pm 0.23	59.3-66.1
first-year female	24	62.0 \pm 0.39	59.6-63.4

*wing chord in millimeters

Brown-plumaged Indigo Buntings in autumn are more difficult to relegate to the proper sex-age group. In an earlier paper (Johnston, 1965) I pointed out (p. 203) that “. . . first-year males tend to be more bluish, to have longer wings, and to be heavier than first-year females . . .” in autumn. The same comparative statements, however, obtain between first-year males and adult females (Tables 1 and 2), except adult females, of course, have the harder skull condition. Still, on the basis of plumage alone, the three brownish, sex-

age groups can be separated by using a combination of external features summarized in Table 2. In nearly every bird I've handled, adult females can be picked out immediately by the rich rufous wing-bars alone. First-year females possess noticeable, fine streaks ventrally and characteristically have very little blue anywhere in the plumage.

In northern Florida after mid-September only an occasional Indigo Bunting was molting (head or body feathers). A few adult buntings in early September had the outermost primary partly ensheathed. Dwight (1900: 212) reported that the male's first winter plumage is "... acquired by a partial postjuvinal moult . . . which involves the body plumage, the wing coverts, sometimes the tail and sometimes five or six distal primaries." Only two out of 75

TABLE 2. PLUMAGE CHARACTERISTICS OF BROWN AUTUMNAL INDIGO BUNTINGS

	Adult Female	First-year Female	First-year Male
general appearance	fresh, not worn, plumage	worn plumage especially the secondaries, wing coverts, and rectrices	worn plumage, especially the secondaries, wing coverts and rectrices
bend of wing* and edges of rectrices	noticeably bluish	scarcely any blue	noticeably bluish
wing-bars**	rufous	creamy buff	creamy buff
axillars	gray brown	gray brown	frequently bluish
ventral streaks	indistinct or absent	distinct, narrow streaks	indistinct or with broad, dark streaks
malar stripe	pale, indistinct brown	pale, indistinct brown or absent	distinct, blackish

*bend of wing = "shoulder" = lesser secondary and marginal coverts

**tips of exposed vanes of greater and median secondary coverts

first-year males handled by me showed any replacement of primaries in autumn. From these observations and the report of Blake (1965), replacement of primaries in first-year males must occur chiefly in the late winter or spring months, only rarely in autumn.

As far as we now know, once Indigo Buntings have reached their subtropical wintering grounds in November and December, some of the characteristics cited above (especially in Table 2) are unreliable. The skull becomes double-layered in first-year birds, though, in the case of males, primary covert differences remain evident—bluish in adults, brown in immatures. According to Mrs. Audrey Downer, the age of wintering females in Jamaica cannot be reliably determined chiefly because the amount of blue is variable and all birds are somewhat worn and faded.

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THE USE OF CANNON AND ROCKET-PROJECTED NETS FOR TRAPPING SHOREBIRDS

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In 1964 the Smithsonian Institution undertook an investigation of the trans-Pacific migration of the Ruddy Turnstone, *Arenaria interpres*, through an intensive program of banding. Although several potential banding sites were investigated, only on St. George Island, one of the Pribilof Group in the Bering Sea, did a large-scale banding effort seem feasible. J. Vincent Hoeman and Max C. Thompson began operations on St. George Island in mid-July 1964 and Robert L. DeLong and Thompson continued field work during the summers of 1965 and 1966. Initial attempts at obtaining large numbers of turnstones with mist-nets failed due to high winds, foxes, and the ability of the turnstones to see the nets. Due to large concentrations of 5,000 to 6,000 birds in one small area, we decided to attempt cannon-netting. We believe this was the first use of a projected net for mass banding of shorebirds although the method is commonly used for capturing game birds and gulls (Dill and Thornberry, 1950).

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