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ON THE CHANGES OF PLUMAGE IN THE BOBO- LINK (*DOLICHONYX ORYZIVORUS*).

BY FRANK M. CHAPMAN.

IN a previous number of 'The Auk,'¹ I described, under the above title, the changes which occur in the plumage of the Bobo-link, with particular reference to the manner in which the breeding plumage of the male is acquired. This latter point was one on which considerable difference of opinion existed, but the question seemed to be settled by a specimen in the American Museum of Natural History (No. 32,783, H. H. Smith, Corumbà, Matto Grosso, Brazil, March 1, 1886) which showed clearly the character of the spring change of plumage.

This specimen is apparently unique and exhibits in a remarkable degree the extent of a change in color which, in a comparatively short time, occurs solely through fading and a wearing away of the exposed tips of many of the feathers.

When compared with a specimen in which, through these causes, the 'full' or black plumage has been acquired the differences are so great that it is difficult to believe they can have occurred without an actual moult. For this reason the Editors of 'The Auk' have decided to figure the Corumbà specimen and

¹ Vol. VII, 1890, pp. 120-124.

with it a bird taken later in the season (Am. Mus. No. 36,182, Rutland, Vt., Jenness Richardson, June 4, 1889) in order that the two may be readily compared. At their request I repeat here as briefly as possible the substance of my former paper.

In the course of one year the male Bobolink passes through the following phases of plumage: Late in July or early in August when the breeding season is over, the black male, similar to the figure in the background of the accompanying plate, undergoes a complete moult and appears in the yellowish, Sparrow-like plumage of the Reed-bird, which closely resembles the plumage of the breeding female. In this costume the birds migrate southward, pausing *en route* to visit the rice-fields of the South, and apparently continuing their journey to the campo districts of southwestern Brazil.

The Corumbà specimen shows that the spring change of plumage occurs by March 1. As before stated considerable difference of opinion existed as to the nature of this change, but it was generally believed that the yellowish Reed-bird became the black Bobolink not by moulting but by a change in the color of the feathers. That is, the black area which is present at the base of some contour feathers was supposed to gradually increase in size, while at the same time the tips of the feathers became worn away. As for the buffy nuchal patch and whitish scapulars and rump, I do not know that the manner of their acquisition had ever been explained until the Corumbà specimen was described.

This specimen shows that in the spring as well as after the breeding season a complete moult takes place. As a result of this moult the bird gains a plumage very similar to that shown by the figure in the foreground of the plate.

The Smith specimen is not quite so far advanced as this figure shows; the centre of the belly, the first primary and several of the secondaries in both wings belong to the old, or Reed-bird plumage, while the tail is but one third grown. In drawing this bird Mr. Thompson completed the moult of the wings and tail but did not equally alter the centre of the belly, which should be of the same color as the breast.

The change which follows is one that occurs in many birds, but in none with which I am familiar is it so marked as in the Bobolink. There is a series of birds in the American Museum which

connects the two birds figured by a finely graduated series of intermediates. These show how, as the birds travel northward, the yellow tips of the feathers slowly drop off, and that where they receive the most protection, as for example on the lower belly and crissum, they persist the longest. At the same time the nape, scapulars and rump are fading and the bill and feet are changing respectively from flesh color to blue-black and brownish black.

In a large series of spring males I have seen none taken before June which did not show remains of the yellow fringe; indeed it is exceptional to find specimens which do not show at least a trace of it.

Birds taken during summer represent the extreme of faded and abraded plumage, and Mr. Ridgway writes me, that in his opinion the western race, *D. o. albinucha*, is based on examples in this condition. He further says, that at the time *albinucha* was described, seasonal counterparts of the specimens on which the race was based did not exist in the National Museum series of Eastern birds. Thus, the specimen now figured from Rutland, although taken as early as June 4, has the nape slightly paler than a male from Pembina, N. D., taken June 14. Again, a male (Am. Mus. No. 57,792) taken at Bluff City, Utah, May 19, has the nape fully as dark as Eastern specimens taken at the same time.

I believe, therefore, with Mr. Ridgway, that the bird known as *Dolichonyx oryzivorus albinucha* should be considered a synonym of *D. oryzivorus*.

THE FOOD OF HUMMINGBIRDS.

BY FREDERIC A. LUCAS.

IN 'Science' for October 28, 1892, was an article by Dr. Morris Gibbs of Kalamazoo, Mich., entitled 'The Hummingbird's Food,' in which the author stated as the result of his observations, and



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