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FEMALE EASTERN PURPLE FINCHES

By CHARLES H. BLAKE

In the last few years Mr. and Mrs. Parker C. Reed and myself have been able to make, in Lexington and Lincoln, Mass., more or less detailed observations on 41 banded Eastern Purple Finches (*Cardinalis p. purpureus*) which had certainly gone through at least two annual body molts, and possibly more, and which may reasonably be presumed to be females.

We are well aware of Magee's (1926) statement that some males of this species do not become fully red until the second postnuptial molt. On the other hand, we have seen intermediate plumage in a considerable number of birds which eventually proved to be males. These are mostly more strongly pink or ruddy than the birds here treated.

The ascertained number of molts is distributed as follows:

Molts	Birds
2	26
3	9
4	4
5	1
6	1

Some sort of numerical value may be assigned to four items of description: the grade of side streaking, grade of throat marking (Blake, 1955), number of streaks in under tail coverts, and wing length.

The average grade, both of side streaking and of throat marking, for 37 birds is 2.9. The side streaking bears about the same relation to that of first winter plumage as I have already made out. (Blake, 1955, p. 99). On the other hand the grade of the throat markings is a little lower than my previous figure (op. cit., p. 97). The

number of birds known to be definitely aged is too few in the present sample to draw any conclusion about grade of markings and apparent age.

The number of streaks in the under tail coverts averages 0.1 per bird and 92 per cent of 38 birds show no streaks. This is still fewer streaks and a higher proportion unstreaked than is shown by a sample of first winter birds (Blake, pp. 29-40 of this issue). We may conclude from the three characters so far considered that adult females tend to have fewer and thinner ventral markings than do young birds and, in this respect, to approach adult males.

The wing length of 38 birds in the series is slightly more informative. The mean is 80.0 mm. with a standard deviation of 1.5 mm. This is but 0.3 mm. longer than 343 unsexed birds in first winter plumage and only 0.2 mm. longer than 31 males in first winter plumage. We can safely conclude that the three samples do not differ in wing length. The present female sample is the least variable of the three. It is also rather less variable than a sample of adult males. It is reasonable to conclude that females do not increase their wing length either at the first postnuptial molt or at later molts of the primaries. In the cases in which wing lengths were available for different ages of the same bird there was no clear evidence of length increasing with age.

The color of these adult females is more interesting than their metrical characteristics. For 37 of them the color of the margins of the outer vanes of the quill feathers is on record. These margins are at least partly pinkish in 37 per cent of the birds. The percentages climb from 17 percent for the two-molt birds to 100 percent for those with four or five known molts. Hence, about one-third of the birds show the color which one would ordinarily associate with maleness. Considering the large number of molts involved in some of these cases there seems to be no probability that these birds are retarded males. The only bird known after six molts has these margins whitish, perhaps from fading.

I have more than once referred to the fact that a certain number (about 11 or 12 percent) of Purple Finches in first winter plumage show some pink or ruddy in their plumage. The available evidence is that these birds are males. For any who like clean-cut distinctions of age and sex it may be rather disturbing that 47 percent of the

TABLE I. *Percentages of pink or ruddy areas.*

	Female	First winter
Rump	25	29
Crown	23	13
Back	19	12
Face	12	7
Throat	8	12
Shoulders	8	1
Greater secondary coverts	2	8
Lesser coverts	2	5
Middle secondary coverts	2	1
Breast	—	8
Upper tail coverts	—	4

present sample show essentially similar reddish coloration aside from the pink quill edges already noticed. Again, the ruddy color is found on all the birds which have been through at least four molts. The two-molt birds show the color in 39 percent and 29 percent of the three-molt birds show it. There are some differences between these females and first winter birds. The former show $1\frac{1}{3}$ areas per bird while the latter have $2\frac{1}{2}$ areas each. Table I shows the percentage occurrence of reddish in each area for females and for first winter birds.

I am not yet convinced that all the differences between females and first winter birds are meaningful. Considering the relatively small size of the samples and the satisfactory agreement of the most frequent areas, the only differences that appear significant are those of the breast and shoulders. We may, I think, safely conclude that, on the average, females are less extensively reddened than first winter birds, and this will probably prove true even of very old females.

Two points should be made as to the color of transitional (reddened) males in first winter plumage (Blake, pp. 29-40 of this issue) and the very similar male type females here described. First, the reddish colors we are dealing with are more dilute than those of the adult male. The colors I call ruddy are a mixture of the normal brown with some red. They could quite fairly be called brownish red. The pink tints, when present on the normally white parts of feathers, are paler than the corresponding feathers in adult males and when present on parts normally pale brownish appear as brownish pinks. To sum up this point, less red pigment is present in these pink or ruddy areas than would be true of an adult male.

The second point is that the reddish tints are very generally less widespread than in adult males. For example, such tints are rare on the breast and quite wanting on sides, flanks, and under tail coverts. Ruddy coloring of the crown is usually restricted to the posterior half. Certainly few or no birds show visible reddening of all the areas which are red or rosy in adult males.

The most that can be said now is that reddened females on the average have less extensive reddening than have the transitional first winter males. It remains to be determined whether all populations of the species are alike in producing these reddened plumages.

Two further points may also be considered with reference to Magee's (1926) opinion that some males do not become really red until the second postnuptial molt. If the two pinkish males referred to in an earlier paper (Blake 1955, p. 96, 101) as being adult were truly adult and not merely somewhat precocious in completing skull ossification, then they are the only evidence I have personally seen for a delay beyond the first postnuptial molt in assuming full male plumage. On the other hand all the reddened females seen at the appropriate time of year have been evidently female as judged by the condition of vent and belly. I think it safe to say that, in the population or populations visiting Lincoln and Lexington, Mass., any bird that has been through at least one postnuptial molt and is not in full male plumage is certainly a female.

Another aspect of the coloration of adult females is, at least qualitatively, different from that of first winter birds. This is the occurrence of yellowish and occasionally orange in the plumage. It is less common than redness. The percentages in order of increasing number of molts are: 24, 40, 25, 50, and 0. The over-all percentage is 31. The average number of areas per bird is $1\frac{2}{3}$. Only four areas are so far recorded, with percentage frequencies, as follows: throat 47, rump 26, crown 21, and face 10. These percentages are necessarily rather approximate since a total of only 19 areas is involved. Either reddish, yellowish, or both is exhibited by 29 birds and of these only four show both reddish and yellowish.

For the moment we will take both yellow and red carotenoid colors together and note that they occur in about 67 percent of presumed adult females and, further, that the percentage is about 90 in birds with three ascertained molts and 100 in those with more than three molts.

While it is obvious that the difference between yellow and red requires investigation, it is almost certain that the facts will be forthcoming only from experimental work. At least two situations are possible; first, that red and yellow represent two different concentrations of the same pigment or pigments, and second, that the two colors arise from chemically different pigments. Chemical analysis will be required to distinguish these alternatives.

At present I can only conclude that females vary with age in two main directions. A rather high proportion tends to assume male characters. A much smaller fraction develops yellow carotenoid coloring at least as scattered feathers. Finally, a very few birds show an over-all yellowing that seems distinct from any variation known in males (Blake 1955, p. 99, 107).

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NOTES ON JUVENAL PURPLE FINCHES

By CHARLES H. BLAKE

It will have been apparent from my previous papers that the banding station of Mr. and Mrs. Parker C. Reed in Lexington, Mass., is noteworthy for the number of Eastern Purple Finches (*Carpodacus p. purpureus*) banded there. What follows are the first results from a study of 343 birds which could be safely diagnosed as birds of the year during the summer of 1954. The bandings cover the period from 17 July to 24 October. The one juvenal banded on the last date was taken each week through 13 November. It is perhaps quite as remarkable that young birds should have been present for four months as that a few individuals remained for two months or more.