GENERAL NOTES

Observations on Feather Color Variation in a Presumed Common Flicker Intergrade. —The occurrence of some red flight feathers in individuals of the yellow-shafted race of the Common Flicker (*Colaptes a. auratus*), within the eastern part of its range, has been an enigma. Test (1969) discounted the idea that the presence of red feathers was the result of the transfer of *C. a. cafer* genome into the *C. a. auratus* genome, but was unable to put forth an alternative hypothesis. Short (1965) stated that although it cannot be proven,

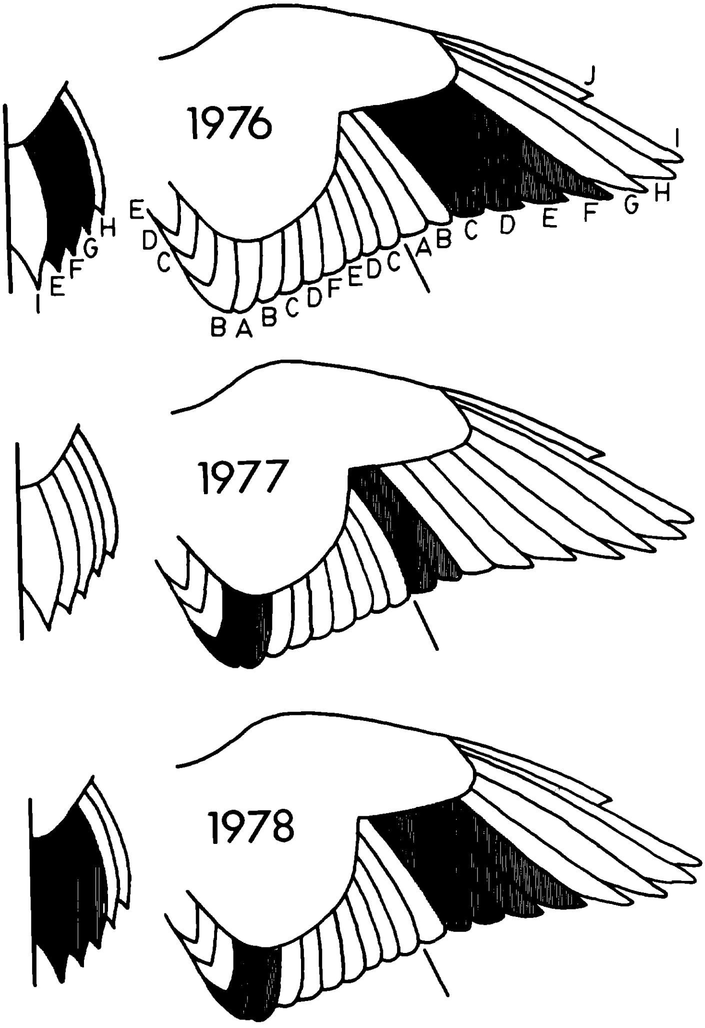

FIGURE 1. The incidence of red flight feathers (denoted by shading) in a presumed Common Flicker intergrade for 3 consecutive years: 1976, 1977, and 1978. Feathers with the same letter are molted at the same time based on the molt scheme of Test (1945).

the presence of red flight feathers in eastern *C. a. auratus* populations is probably due to introgression with the western *C. a. cafer* population. Both Test (1969) and Short (1965) used only museum specimens or specimens collected for the purpose of studying introgression. We had the unique opportunity to study the incidence and variation of red flight feathers in a wild *C. a. auratus* flicker over three seasons, a phenomenon that has not been documented.

On 14 February 1976 a male *C. a. auratus* flicker with some red flight feathers was trapped and banded at the University of Wisconsin-Milwaukee Field Station, Ozaukee County, Wisconsin (Ingold 1976). The bird was subsequently retrapped 15 January 1977, 26 February 1977, and 28 February 1978. Data on flight feather color were taken on all recapture dates except 15 January 1977.

On the three dates when plumage was examined, the only trace of *C. a. cafer* plumage characters occurred in the flight feathers. The incidence and variation in red flight feathers are outlined in Figure 1. A second individual showing red flight feathers was banded by Ingold 29 April 1978 in Brookfield, Waukesha County, Wisconsin. This bird was a female and showed only *C. a. auratus* characters except in the flight feathers of which primaries 5 and 6, secondaries 6 and 8, and rectrices 2, 3, and 4 were red. In both birds the incidence of red feathers was symmetrical.

The red and yellow colors that occur in feathers of flickers are due to carotenoid pigments that are not primary gene products but "asemantic molecules," that must be obtained from the diet (Zuckerlandl and Pauling 1965). The ingested carotenoids are modified by enzymes to different products which are then deposited in the feathers (Test 1942). Carotenoid pigments have been studied in a variety of avian species (tanagers, Brush 1967, 1970; flamingos, Fox 1962a; Scarlet Ibis, *Eudocimus ruber,* Fox 1962b; Roseate Spoonbill, *Ajaia ajaja,* Fox 1962c; flickers, Test 1942), but the site and the genetics of the enzyme system is unknown (A. H. Brush, pers. comm., Rawles 1960).

If we assume that diet alone cannot produce the red pigment (Test 1969), there must be a gene or set of genes present to produce some enzymatic interaction with the diet. The importance of our data lies in the fact that the red feathers were not the same in each of the 3 years. It is important also to note that feathers that normally are molted and regrow at the same time (Test 1945) showed different patterns of pigmentation (Fig. 1). Many alternatives can be proposed to explain the variation in flight feather pigmentation, such as: (1) the genes turn on and off during the molt process and influence all growing flight feathers, but are imperfect in timing; (2) the genes are always "on" but exert their action only on certain flight feathers; (3) the gene is under hormonal control with fluctuations in hormone levels; (4) there may be variation in carotenoid precursor uptake or in the transport mechanism. Although our limited data set does not allow us to support any of the above alternatives, we believe that it points out a variation that has not been documented and which may be of importance to further research in the area of the genetics and physiology of avian feather pigmentation.

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JAMES L. INGOLD, *Department of Biology, Oberlin College, Oberlin, Ohio 44074,* and CHARLES M. WEISE, *Department of Zoology, University of Wisconsin–Milwaukee, Milwaukee, Wisconsin 53201.* Received 15 Jan. 1985; accepted 29 June 1985.

Evidence for Reproductive Mixing of Least Tern Populations.—The Atlantic race of the Least Tern (*Sterna antillarum antillarum*) breeds along the coastal beaches and bay systems of the Atlantic Ocean and Gulf of Mexico from Maine to southern Texas, while the Interior Least Tern (*S. a. athalassos*) breeds in the interior of the United States along the Mississippi River, its major tributary drainages, and portions of the Pecos and Rio Grande rivers (American Ornithologists' Union 1957). Although various physical distinctions between these populations were suggested by Burleigh and Lowery (1942), none of these distinctions has been statistically verified, and separation of the races remains largely based on geographic separation of breeding areas.

On 15 July 1984, RLB captured an adult Least Tern while it was incubating at Quivira National Wildlife Refuge (QNWR), Stafford Co., Kansas. The tern had been banded by BCT on 27 June 1980 as a juvenile (#801-53109) on a coastal oyster shell island near Port Lavaca, Calhoun Co., Texas, approximately 1250 km S of QNWR. The mate to this tern was also captured on 15 July 1984 and had been banded (#1181-01019) at QNWR as an adult by RLB on 21 June 1980. Both terns were examined and released on the day of capture. Although no criteria have been established for sexing Least Terns, we believe that behavioral observations of the pair, as well as measurements of both birds, suggested the Texas bird was a female (Table 1). The nest that this pair was attending contained two eggs on 12 July. On 10 August 1984, a juvenile about 15–18 days old was found within 10 m of the nest site and was banded. This juvenile was likely produced by the banded pair as the nearest neighboring nest was 200 m south.

These observations demonstrate that genetic mixing is occurring naturally between members of these adjacent populations. The magnitude of such mixing cannot be estimated from this single event, but the low probability of a band recovery/return for this species (ca. 0.5%) suggests that it could be a reasonably prevalent phenomenon.

The migratory pathways and winter distribution of these populations are unknown and this observation suggests at least minimal contact during some period outside the breeding season. The belief that the Texas tern was a female is consistent with findings in many other species (Boyd 1962, Greenwood 1980, Lenington and Mace 1975, Wilcox 1959) in that the female has a greater tendency to disperse from the natal area. Massey (1974) and Wolk (1974) have suggested that the elaborate courtship behavior and vocalizations of the Least Tern are associated with the vicinity of the breeding areas and would not suggest pairing on the wintering grounds or during migration.

Site tenacity of the Least Tern is only 50–55% at QNWR (Boyd, unpubl. data), whereas populations on the west coast experience 90–95% site tenacity (Atwood, pers. comm.). Both Atwood, with Least Terns, and Austin (1951) with Common Terns, suggest that the birds tend to disperse more from less stable nesting sites. Nesting habitat of the Least Tern is subject to substantial disturbances in both Kansas and Texas.