

Pairing in hybrid flicker populations in eastern Colorado.—Short (Amer. Mus. Nat. Hist., Bull. 129: 307–428, 1965), in an extensive study of North American flickers (*Colaptes*), concluded after analysis of hybridization and introgression in the central United States and western Canada that the eastern “yellow-shafted” group (*auratus*) and the western “red-shafted” group (*cafer*) should be considered as a single species, *C. auratus*. In assessing a situation such as this one, in which secondary contact is suspected between previously isolated populations, the study of behavioral isolating mechanisms is useful in formulating taxonomic judgments based on the biological species concept. If in hybrid but heterogeneous populations males usually pair with females of similar phenotype, this represents nonrandom mating, which in turn may mean that gene flow between the two forms is not unrestricted. Nonrandom mating may reinforce genetic differences, with the interbreeding forms being maintained as distinct species. Conversely, random mating in hybrid populations may lead to complete intergradation of the interbreeding forms and the conclusion that the two are genetically compatible and conspecific.

Short analyzed 15 presumed pairs of hybrid flickers collected by F. H. Test at Forsyth, Montana, and found no evidence of preferential pairing. He suggested (op. cit.: 376) that while his findings were “not conclusive owing to the small size of the sample, there are distinct indications that the different color patterns of *auratus* and *cafer* are not being utilized in preventing interbreeding of diverse types.” The present study was designed to carry out a more extensive analysis of pairing in hybrid flickers, using populations along the South Platte and Arkansas rivers in eastern Colorado.

Data were collected on 52 pairs of flickers from three different populations during May and June of 1969 and 1970: Rocky Ford, Arkansas River (13 pairs); Fort Morgan, South Platte River (27 pairs); and Sterling, South Platte River (12 pairs). All three areas are west of the center but within Short’s “hybrid zone,” which he defined by the absence of any pure parental-type individuals. Fort Morgan and Sterling are in northeastern Colorado, about 90 and 60 miles, respectively, southwest of that point where the South Platte flows into Nebraska. Rocky Ford is in southeastern Colorado, about 90 miles west of the point where the Arkansas River flows into Kansas and about 150 miles south of Fort Morgan. Each study area consisted of 1.5 miles or less of cottonwood (*Populus*) riparian woodland, and

TABLE 1
METHOD OF SCORING CHARACTERS USED IN THE FIELD ANALYSIS
OF INTERBREEDING BETWEEN *Colaptes a. auratus* AND *C. a. cafer* IN EASTERN COLORADO

Character	Typical <i>auratus</i> (score 1)	<i>auratus/cafer</i> (score 2)	Typical <i>cafer</i> (score 3)
Nuchal patch	Extensively present ($\geq 70\%$ of area)	Intermediate	Absent or trace ($\leq 30\%$ of area)
Shaft color	Yellow or near- yellow	Orange	Red or near- red
Crown color	Gray	Gray-brown	Brown
Ear covert color	Brown	Gray-brown	Gray
Throat color	Brown	Gray-brown	Gray
Malar stripe (males only)	Largely black ($\geq 80\%$ of area)	Intermediate	Largely red ($\geq 80\%$ of area)

supported flicker populations that may be regarded as being at least potentially panmictic.

The technique used in this study was to locate pairs of flickers at their nests and to assess the phenotype of each member of the pair for six color characters, using a 15 to 60x zoom-lens spotting telescope. Most pairs were studied when they were incubating or feeding young and were watched carefully during incubation exchanges or during visits to feed the nestlings. Birds involved in courtship behavior were included only when they obviously were associated with a particular nest site as a pair and when no other individuals were involved.

The birds next were assigned numerical scores of 1 to 3 for each of the six characters (Table 1), based on the "hybrid index" technique (Anderson, Introgressive hybridization, New York, Wiley, 1949) used also by Short in his study of collected specimens. From Table 1, a pure *auratus* male would have a composite score of 6, a pure *cafer* male a score of 18. Short (op. cit.), because he examined collected specimens, was able to distinguish five ranks for each character, whereas I was only able to distinguish three safely in the field (Table 1). However recognition

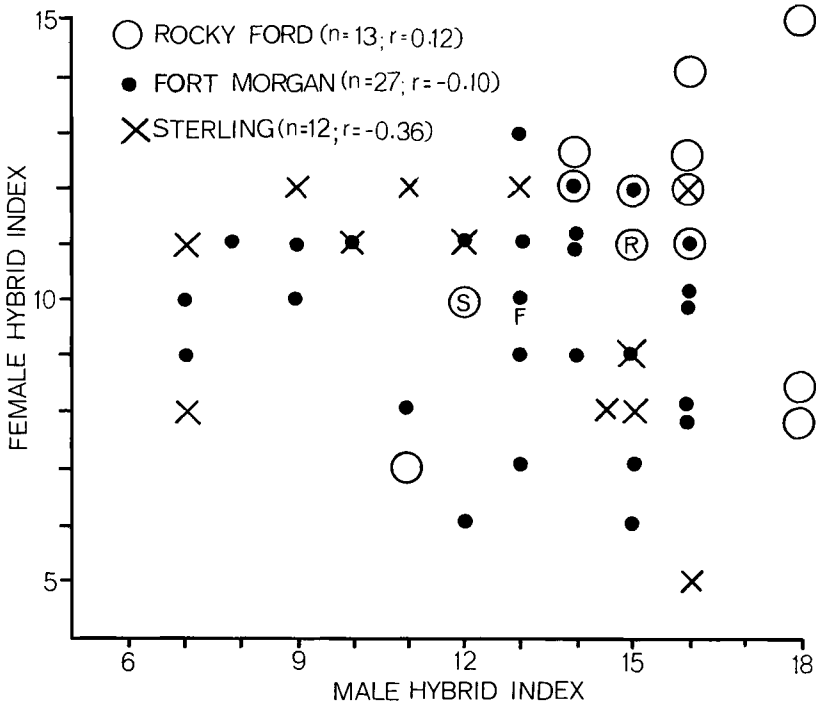


Figure 1. Total hybrid scores, based on six color characters, of individual pairs of flickers from eastern Colorado, showing scores of males plotted against scores of their mates ($n = 52$ pairs). R = average Rocky Ford score, F = average Fort Morgan score, and S = average Sterling score. "Pure" *auratus* score is 6 in males and 5 in females, *cafer* is 18 and 15. "r" = coefficient of correlation (see text).

of only three ranks gives sufficient spread in total hybrid index scores to detect significant preferential pairing. Collecting was undesirable in this study because I attempted to census every pair in the study areas in order to evaluate accurately the complete range of phenotypic variation present in each population.

Figure 1 shows the total hybrid index scores of male flickers plotted against those of their mates for all pairs examined. Also included are the average scores of the three populations. Coefficients of correlation were calculated for each sample and tested for linearity (maximum positive correlation, $r = +1.0$; maximum negative correlation, $r = -1.0$; Huntsberger, Elements of statistical inference, Boston, Allyn and Bacon, Inc., 1961). Results indicate a statistically insignificant positive correlation in the Rocky Ford sample ($r = +0.12$; $p = .410$; $p_{.05} = 1.80$); and statistically insignificant negative correlations in the Fort Morgan ($r = -0.10$; $p = 0.522$; $p_{.05} = 1.71$) and Sterling samples ($r = -0.36$; $p = 1.18$; $p_{.05} = 1.81$). This aspect of the analysis reveals no evidence to indicate preferential pairing between flickers with similar total hybrid index scores.

This does not rule out the possibility of preferential pairing based on specific color characteristics. To examine this I compared males with females for each of the six color characters independently (Table 2), using the Fort Morgan and Sterling samples, which were combined because of similar mean hybrid indices

TABLE 2
EXPRESSION OF PLUMAGE CHARACTERS IN 39 PAIRS OF HYBRID FLICKERS FROM
FORT MORGAN AND STERLING, COLORADO¹

		FEMALES			MALES		
Nuchal patch ($\chi^2 = 2.1, \chi^2_{.05} = 9.5$)	Full	1	1	1			
	Intermediate	—	2	2			
	Absent	9	8	15			
Shaft color ($\chi^2 = 1.05, \chi^2_{.05} = 9.5$)	Yellow	6	3	7			
	Orange	8	5	5			
	Red	2	1	2			
Crown color ($\chi^2 = 3.6, \chi^2_{.05} = 9.5$)	Gray	20	7	2			
	Intermediate	3	2	1			
	Brown	1	2	1			
Ear covert color ($\chi^2 = 4.7, \chi^2_{.05} = 9.5$)	Brown	2	3	10			
	Intermediate	6	3	6			
	Gray	2	1	6			
Throat color ($\chi^2 = 3.0, \chi^2_{.05} = 9.5$)	Brown	2	—	8			
	Intermediate	—	—	3			
	Gray	4	4	18			
Malar stripe ² ($\chi^2 = 4.5, \chi^2_{.05} = 15.5$)	5-6	—	1	2			
	7-8	1	1	7			
	9-10	1	3	9			
	11-12	4	1	8			
	13-14	—	—	1			

¹ Based on character scores assigned in the field, not on specimens collected.

² Plotted against total hybrid indices of females, which lack the stripe.

(Figure 1). For malar stripe color, which is absent in females, males were compared with total hybrid indices of their mates, after Short (op. cit.). There is no significant intrapair correlation here for any of the characters, using the multinomial Chi-square test for dependence (0.05 level, Table 2). The same was also true for the smaller Rocky Ford sample, which is not shown.

Insofar as pairing in the hybrid zone appears to be essentially random, the results of this study support Short's conclusion that *auratus* and *cafer* are conspecific. The apparent randomness in mate selection based on plumage characters suggests that in the area of contact and interbreeding such characters do not serve as isolating mechanisms.—CARL E. BOCK, *Biology Department, University of Colorado, Boulder, Colorado 80302*. Accepted 1 Dec. 70.

Audubon's Warbler in North Carolina.—On 28 February 1970 I trapped an Audubon's Warbler in a residential neighborhood on the western edge of Rocky Mount, Nash County, North Carolina. The bird was collected and subsequently identified as an immature male of the Pacific coast race, *Dendroica auduboni auduboni*, by Roxie C. Laybourne of the U. S. Fish and Wildlife Service at the U. S. National Museum. This is the first specimen of Audubon's Warbler to be taken in North Carolina, and according to John P. Hubbard (in litt.) only the second authentic record of the form for eastern North America. The specimen is catalog No. 3398 in the North Carolina Museum of Natural History at Raleigh.—BETTY DAVIS, 3325 Amherst Road, Rocky Mount, North Carolina 27801. Accepted 20 Oct. 70.

A transcontinental Mourning Dove recovery.—A Mourning Dove (*Zenaidura macroura*) banded in New York has been reported shot in California. On 25 August 1969, near Palmyra (43° 00' N, 77° 10' W), New York Department of Environmental Conservation personnel placed U. S. Fish & Wildlife Service band 883-97279 on the leg of a hatching-year Mourning Dove of unknown sex. During the first weekend of the dove season in September 1970, Stan Solus (P. O. Box 594, Seiad Valley, California) recovered the band from a dove he shot in the Shasta Valley, Siskiyou County, California (41° 30' N, 122° 20' W). As Mr. Solus included the band with his reporting letter and, in response to my asking him for verification, reaffirmed his original information, the recovery has been accepted as authentic.

I suggest this vagrancy may be explained by assuming that the inexperienced New York bird got emotionally involved with a western bird with which it shared winter quarters, perhaps in Mexico, and thus the following year ended up a flower child in California.—BRIAN SHARP, *Bird Banding Laboratory, Migratory Bird Populations Station, Laurel, Maryland 20810*. Accepted 18 Feb. 71.

House Sparrows feeding young at night.—In the late evening of 24 March 1955 my wife and I waited to embark our plane at the airport at Bangkok, Thailand. Our attention was attracted to a half dozen House Sparrows, *Passer domesticus*, that were engaged in a continuous foray against moths and other insects attracted to a floodlight. The birds came out of the dark, fluttered about the light, crammed their beaks with insects and disappeared, to return in a few moments. Apparently the birds were feeding young. We watched this performance at least a half hour (approximately 10:30 to 11:00) until our departure was announced. It was still another instance of the resourcefulness and adaptiveness on the part of the canny House Sparrow.