

RED-WINGED BLACKBIRDS: I. AGE-RELATED EPAULET COLOR CHANGES IN CAPTIVE FEMALES¹

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Abstract. Twenty-four female red-winged blackbirds (*Agelaius phoeniceus*) were trapped when juveniles and held captive during 3.5 years of observation. Color changes in upper secondary coverts (epaulets) of wings occurred at the time of the late-summer molt of the birds' first and second years. About 84% of birds had dilute rust epaulets after their first molt; 16% had orange. After the molt of the second year, 100% of the birds acquired bright rust or orange epaulets. Thus, outside of the later-summer molting period, females with orange, rust or red epaulets would by chance be 86% after-second-year birds and 14% second year birds. Observations of females caught in fall banding operations supported these findings; 10% of 109 birds in their first winter had bright rust or orange epaulets, and 90% had dilute rust epaulets.

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Plumages of red-winged blackbirds have been well documented since the beginning of this century with classical works by Dwight (1900) and Ridgeway (1902) and more recent work by Meanley and Bond (1970). Emphasis has been on male plumage, especially regarding the upper secondary wing coverts, or epaulets. The conspicuous orange of second year (SY) males and bright red of older after-second year (ASY) birds make these two age classes readily approximated in males. Female colors received less attention until Payne (1969) gave a thorough description of female redwing molts and color changes for redwings and tricolored blackbirds (*Agelaius tricolor*) of the Pacific Coast.

The need for a convenient criterion for age determination in female redwings is illustrated in the population studies by Francis (1971) and Dolbeer (1976) in Erie County, Ohio. Francis compared reproductive success in early and late nests but did not relate the differences to the ages of the females involved. Dolbeer recorded chronology of nesting events and territorial changes during the seasons. Dolbeer's results based on ages of nesting females were "interpreted with caution" (see p. 344) because of his

uncertainty of the age estimates. Both Francis and Dolbeer could have interpreted their results with more confidence if they had been reasonably certain of the ages of the birds they studied. The same principle could apply to other studies recorded in the literature.

My attention was drawn to judging ages of female redwings while I trapped and banded blackbirds (*Icteridae* spp.) on South Bass Island, Ohio, 1969-1974 from March through November of each year. The birds I handled had epaulets of buff, pale rust, bright rust, orange, or in a few birds, bright red. I began this study to determine how the color differences might be associated with ages of female redwings.

METHODS

In 1971, I began recording the colors of epaulets ("lesser marginal coverts" of Payne 1969) of all female redwings banded or recaptured. Since few birds were of known age, these data were not immediately enlightening, but they were useful later for comparison with birds of known ages. During the banding season of 1972 I kept similar records, adding notes on molting of the secondary coverts.

In the summer of 1973, I captured 18 newly-fledged redwing females and placed them in an outdoor flight cage (6 ft x 6 ft x 16 ft) in a sheltered place. The birds had ready access to water, mixed wild bird seed and/or chick starter mixture. In winter, evergreen branches provided roosting shelter but no indoor facility was available. In 1974 and 1975, I captured 3

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more hatching year (HY) females each summer, bringing the total captures to 24. Eleven of the captives survived through the fall and early winter of 1976; the others died at irregular intervals from undetermined causes. No ill health or parasitism was apparent. At first weekly and later monthly, I caught all the birds and made notes on condition of plumage, stage of molt, color changes, and general health of each. Beginning in 1974, I took samples of epaulet feathers at each capture and taped each sample to an identifying file card for further study.

I originally planned to continue the study of plumages in these captured birds and others for 5 or 6 years, but the weather in January and February 1977 was unusually cold and by mid-February all died. The project ended, therefore, with data for approximately 3.5 years, summer 1973 to February 1977.

RESULTS

Through the early summer of 1973, the fledglings had mostly buff colored feathers, including those of the upper secondary coverts, the area referred to in male redwings as "epaulets" (for descriptions of molts and plumages see Payne (1969, pp. 57-61). During July and August, a partial post-juvenile molt changed the feathers of this area to a pale, rusty color that I called "dilute rust" or "dilute." Sixteen of the birds acquired this color by the end of August; 2 birds molted to bright orange at the same time. These feathers were retained as the first winter plumage (table 1).

Beginning in late March 1974 and continuing into early May, these SY birds

molted body feathers and lower and middle secondary coverts but not the upper coverts; the 16 with dilute coverts and the 2 with orange remained unchanged at this time. In July and August of 1974, all wing feathers, heads, and tails molted. As a result, 10 birds acquired deep or bright rust upper coverts, 4 of the previously dilute molted to orange, and the 2 previously orange molted to new orange coverts like the first. Of the 3 birds captured in the summer of 1974, 2 molted the juvenile upper coverts to dilute in August and 1 molted to a deeper orange-rust. The 3 birds captured in 1975 all molted the juvenile feathers to dilute, but none survived to subsequent molts (table 1).

In May and early June of 1975 and 1976, the birds, most then in their third and fourth years, molted the lower and middle coverts as in 1974 but not the body feathers or the upper coverts. In the summers of 1975 and 1976, the ASY birds molted all feather areas without any changes in color. Old feathers at these times were often frayed, so new feathers appeared brighter, but colors remained the same. I could detect no color changes due to wear or to fading.

The records show that of the redwing females in their first winter and early second summer, 88% had dilute rust epaulets and 12% had orange or deep

TABLE 1
Summary of color of upper secondary coverts in captive red-winged blackbird females, South Bass Island, OH

Captured	1973	1974	1975	Total % No.
Juvenile	buff, 18	buff, 3	buff, 3	24 100
1st winter (HY)	dilute, 16 orange, 2	dilute, 2	dilute, 3	21 88
		rust, 1		2 8 1 4 100
2nd and 3rd winters (AHY)	rust, 12 orange, 6	rust, 3		15 71
				6 29 100
4th winter (AHY)	rust, 7 orange, 6			7 54
				6 46 100

*HY = hatching year, AHY = after hatching year.

rust (table 1). Following the late summer molts of the second year and the following year, 71% had rust epaulets and 29% had orange. The 13 birds surviving into the fourth winter were 54% rust and 46% orange.

Redwing Females Banded in 1971, 1972 (table 2). On 15 July 1971, the first juvenile female redwing was banded in typical juvenile plumage. Before that, all captured were of unknown ages, as were all later captives not evidently juveniles. Between early April and late October 1971, I banded and recorded epaulet colors of 252 adult (AHY) females. Of these, 147 had dilute epaulets, 71 had rust, 24 orange, and 10 red (table 2a). In the same year, I banded 329 HY females between mid-July and late-October. Of these, 258 were in juvenile plumage with buff epaulets (table 2b). Between 26 July and late October 1971, I caught 71 HY females that were molting: 62 to dilute, 5 to rust, and 4 to orange (table 2c).

In 1972, I recorded 545 AHY redwing females: 226 dilute, 216 rust, 92 orange, and 11 red. HY females came first on 4 July 1972. Between then and 11 November, I banded 104 HY birds: 66 buff, 36 dilute, 1 rust, and 1 orange and 47% of the birds retained the dilute color beyond the first winter (tables 2a, b). Inspection of the raw data shows that in

1971 all but 2 birds recorded as "dilute" were captured on or before 20 May and were probably in second year. One dilute bird was recorded on 29 June and 1 on 15 July. Thereafter, any recorded as dilute were molting HY birds. In 1972, dilute epaulets were observed through June and thereafter only in molting HY birds.

Table 2c deletes the juvenile "buff" birds from the total HY numbers and records the birds entering on their first winter. This record shows that in 1971 and 1972 90% of the wild HY birds captured had acquired dilute epaulets, and 10% had rust or orange. This percentage is close to the record of captive birds in which 86% were dilute in the first winter and 14% orange or rust (table 1).

CONCLUSIONS

A field worker examining redwing females might assume that birds with pale, dilute-rust epaulets are younger than the second summer molt. Spring birds with orange, rust, or red epaulets would by an 86% to 90% chance be older than SY; 10% to 14% by chance would be SY. These results are similar to those reported by Payne (1969) for female red-winged blackbirds in California. Table 2a shows that in both 1971 and 1972, females with dilute epaulets outnumbered those with orange, rust, and red. This finding suggests that younger birds are very im-

TABLE 2
Summary of colors of upper secondary coverts of wild red-winged blackbird females trapped on South Bass Island, OH.

	Year	Buff	Dilute	Rust	Orange	Red	Total No.
a. AHY							
	1971		147	71	24	10	252
	1972		226	216	92	11	545
	Total		373	287	116	21	797
			47%	36%	14%	3%	100%
b. HY							
	1971	258	62	5	4		329
	1972	66	36	1	1		104
	Total	324	98	6	5		433
		75%	23%	1%	1%		100%
c. 1st winter (HY only)							
	1971		62	5	4		71
	1972		36	1	1		38
	Total		98	6	5		109
			90%		10%		100%

portant in reproduction, but one cannot draw this conclusion without detailed records of nesting to estimate the age of each bird.

None of the captive birds in this study had bright red secondary coverts as were observed in a few of the wild redwing females. Nothing in this study shows whether the bright red color is due to aging, diet, or genetics. Other investigators have found, however, that diet can have an influence on feather coloration (Brush and Power 1976). One female with bright red epaulets that we captured on 6 May 1971 had been banded on North Bass Island on 10 July 1967 with no record of its age or coloring at that time. Since redwing females enter traps much less readily than males and are rarely retrapped, other methods of study may yield results in the matter of the effects of aging on pigmentation.

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