

imprinting on natal site-type in House Sparrows (*Passer domesticus*). Juveniles of cavity-nesting species frequently inspect nest cavities in fall, and young bluebirds sometimes carry nesting material into these sites (pers. observ.). Although the types of sites that are visited after the young are out of the nest could influence the site-types that are later preferred for nesting (cf. Brewer and Harrison 1975), the fact that bluebirds often use more than one type of site during a single season indicates that preferences established after fledging are not strong, if they exist at all.

In summary, age and previous nesting success are evidently the most important factors influencing nest site selection in this species. Imprinting or early learning relative to the natal type of site are not important, and the birds do not become unchangeably conditioned to one site-type.

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CHOICE OF HOST NEST BY THE BROWN-HEADED COWBIRD IN COLORADO AND WYOMING

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Patterns of brood parasitism by the Brown-headed Cowbird (*Molothrus ater*) vary geographically, differing markedly between recently invaded ranges and the more arid western plains (see Friedmann et al. 1977). The western short-grass plains are the original range of this species before its recent range expansion following deforestation and agriculture (Friedmann 1963, Mayfield 1965). I present here observed patterns of brood parasitism from plains, foothills, mountain river valleys and mountain parks of north-central Colorado and south-central Wyoming, as studied in 1977 and 1978. I further attempt to relate these patterns to differences between these habitats and those of more recent ranges.

Of 21 species (869 nests), 7 species (76 nests) were parasitized. Fully 91% of the parasitized nests (69) belonged to Red-winged Blackbirds (*Agelaius phoeniceus*) and Brewer's Blackbirds (*Euphagus cyanocephalus*; see Table 1). Nests of the following species were unparasitized: Mourning Dove (*Zenaidura macroura*, 30 nests examined), Western Wood Pewee (*Contopus sordidulus*, 8), Olive-sided Flycatcher (*Nuttallornis borealis*, 1), Dusky Flycatcher (*Empidonax oberholseri*, 2), Western Flycatcher (*E. difficilis*, 1), Say's Phoebe (*Sayornis saya*, 8), American Robin (*Turdus migratorius*, 25), Yellow Warbler (*Dendroica petechia*, 7), Yel-

low-breasted Chat (*Icteria virens*, 1), Common Grackle (*Quiscalus quiscula*, 18), Lazuli Bunting (*Passerina amoena*, 1), Gray-headed Junco (*Junco caniceps*, 2), Brewer's Sparrow (*Spizella breweri*, 2).

I found one instance of parasitism for each of the following species: Solitary Vireo (*Vireo solitarius*, 3 nests examined), Warbling Vireo (*V. gilvus*, 2), and Lincoln's Sparrow (*Melospiza lincolnii*, 1 nest containing 1 cowbird egg and 2 nearly fledged sparrows). Two of the four nests of Northern Orioles (*Icterus galbula*) examined were parasitized.

Published records of cowbird parasitism indicate tyrant flycatchers, vireos, wood warblers and sparrows to be the principal hosts of the Brown-headed Cowbird over most of its range (Friedmann 1963, Friedmann et al. 1977). Parasitism of Red-winged and Brewer's blackbirds is local and generally reported from the western plains (Friedmann et al. 1977). Thus, cowbirds appear to parasitize related icterids more heavily in the semi-arid habitat to which they originally were confined. Most of the nests I examined were in areas inhabited by cowbirds at the time of European settlement (Bailey and Niedrach 1965, Marsh 1968). However, the pattern of parasitism appears to be no different in the plains and foothills than in the upper river valleys and mountain parks which, though similarly arid, are probably recently invaded ranges (see Cooke 1897, Sclater 1912). The 5 vireo nests (2 parasitized), 100 of the Yellow-headed Blackbird nests (2 parasitized), the Lincoln's Sparrow nest (parasitized), and 98 of 217 Brewer's Blackbird nests (21 parasitized) were probably from new ranges for the cowbird. All other nests almost certainly were from original cowbird range.

Availability of water could limit the production of

TABLE 1. Cowbird parasitism of three species of blackbirds in Colorado and Wyoming.

Species	No. nests parasitized
	No. nests found
Red-winged Blackbird	27/154 (17.5%)
Brewer's Blackbird	42/217 (19.4%)
Yellow-headed Blackbird	2/381 (0.5%)

cowbirds in semi-arid Colorado and Wyoming. Cowbirds preferentially parasitized nests of Brewer's Blackbirds that were close to water over those that were further away. Only 1 of 42 Brewer's Blackbird nests further than 300 m from permanent water contained a cowbird egg. Of those Brewer's Blackbird nests that I found within 300 m of permanent water (177), 41 (23.2%) were parasitized, containing 66 cowbird eggs. Ephemeral sources of water such as irrigation ditches were discounted. A chi-square goodness-of-fit test shows the distribution of parasitized Brewer's Blackbird nests with respect to proximity of permanent water to be significantly non-random ($\chi^2 = 7.20$; d.f. = 1; $P < 0.01$).

Most icterids feed insects to their young (Bent 1958, Orians 1966). Although frequency of brood parasitism may correlate with availability of water, the actual relation may be to insect production near the nest. Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*) have been found to be limited to the highly productive central portions of marshes (Willson and Orians 1963, Orians 1966, Miller 1968), leaving the less productive peripheral areas to the subordinate Red-winged Blackbird (Miller 1968). It is possible that the demands of raising the larger cowbird young may prove excessive for smaller upland-nesting birds, resulting in more frequent nest failure. Cowbirds parasitizing larger birds near water, then, would be favored reproductively. The Brown-headed Cowbird is a recent invader parasitizing Brewer's Blackbirds around sloughs (Furrer, in Friedmann et al. 1977) in arid eastern Washington.

The rapid recent population growth of the cowbird following invasion of the East and far West may be a result of having more host species available. If small

birds are capable of raising cowbird young in the new ranges and not in the western plains, then selection against parasitism would be diminished there. A habit of parasitizing a wider variety of nests might be favored. Total cowbird reproduction may not be hurt by parasitizing a few individuals who reject their eggs, if in so doing they succeed in increasing the number of available hosts.

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STARLINGS BECOME ESTABLISHED AT FAIRBANKS, ALASKA

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Eighty-eight years after its first successful establishment in North America, in New York City in 1890 (Chapman 1906), the Starling (*Sturnus vulgaris*) established itself across the continent at Fairbanks, Alaska (64°51'N, 147°43'W)—a straightline distance of 5,250 km. In 1978 a dramatic change in the status of the Starling in interior Alaska occurred, including the apparent establishment of a regular breeding population at Fairbanks.

The Starling was first recorded at Fairbanks in 1960, when a single spring migrant was sighted on 4 May (Kessel 1960). During the ensuing years, individuals

or groups of two or three Starlings have been seen almost annually east of 152°W in interior Alaska (Kessel and Springer 1966, Kessel and Gibson 1978, unpubl. records). In recent years, the species has become a regular summer resident in small numbers between Delta Junction (64°02'N, 145°44'W) and the Alaska-Canada border. Prior to 1978, maximum numbers had been flocks of 16 and 17 Starlings, which were present about a farm at Delta Junction on 28 September 1976 and 11-20 September 1977, respectively. Nesting had been recorded in western Yukon Territory (Canada Department of Agriculture Experimental Farm, near Haines Junction, in 1966 [fide R. B. Weeden, Univ. Alaska]), and four times in interior Alaska, including a successful nest at Fairbanks in 1968 (Kessel and Gibson 1978).

In 1978 Starlings arrived earlier in interior Alaska—one on 27 April at George Lake Lodge, Mile 1385 Alaska Highway, and one on 29 April at Delta Junction—and were present in greater numbers than ever before. Just west of Fairbanks, a flock varying from 6 to 26 non-breeders frequented farms and other open areas