

COURTSHIP FEEDING IN BREWER'S SPARROWS (*SPIZELLA BREWERI*)

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Abstract.—Four instances of courtship feeding are reported for two subspecies of Brewer's Sparrow (*Spizella breweri*). These constitute the first published accounts of courtship feeding in the genus *Spizella*. Small differences in the frequency of courtship feeding in different habitats suggest that the occurrence and frequency of courtship feeding is related to environmental stress at the nest site.

CORTEJO ALIMENTARIO EN EL GORRIÓN DE BREWER (*SPIZELLA BREWERI*)

Resumen.—En este trabajo se informan cuatro ocasiones de cortejo alimentario en dos subspecies del Gorrión de Brewer (*Spizella breweri*). Estos constituyen la primera evidencia de este patrón de conducta en el género *Spizella*. Pequeñas diferencias en la frecuencia del cortejo alimentario en hábitats diferentes, sugieren que la presencia y frecuencia de este patrón de conducta puede estar relacionada a tensión del ambiente (Ej. bajas temperaturas) en el área de anidamiento.

Courtship feeding has been observed and reported frequently in numerous bird families (Andrew 1961, Johnston 1962, Lack 1940). Among the emberizine sparrows, however, it is uncommon, reflecting either low frequencies of occurrence or the difficulty of observing such behavior in inconspicuous birds (Zerba and Baptista 1980). There have been no reports of courtship feeding in the genus *Spizella* despite several intensive breeding studies, including Knapton's (1978) study of Clay-colored Sparrows (*S. pallida*) and Best's (1977) work with Field Sparrows (*S. pusilla*). As emphasized by Zerba and Baptista (1980), the accumulation of incidental observations of courtship feeding can eventually provide enough information to evaluate critically the frequency and significance of courtship feeding in a variety of avian taxa. Accordingly, we describe four instances of courtship feeding observed while studying the breeding ecology and behavior of two subspecies of Brewer's Sparrow (*S. breweri*).

STUDY SITES AND METHODS

Brewer's Sparrow subspecies are separated by geography and habitat preference, as well as by morphological and behavioral differences (McGillivray, unpubl. data, Swarth 1925). From 20 May to 15 Jul. 1986, six pairs of *S. b. taverneri* were studied on an avalanche path (2500 m elevation) on the east-facing slope of Mount Invincible, 75 km west of Calgary, Alberta. The study site was covered with dense shrubs 1-2

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m high consisting mainly of birch (*Betula purnila*) and willow (*Salix* spp.) with clumps of fir (*Abies lasiocarpa*). From 5 May to 5 Jul. 1986, 29 pairs of *S. b. breweri* were studied in dry sagebrush (*Artemisia cana*)-dominated pasture near Onefour in southeastern Alberta. Daily observations were made of the birds on territories at both sites to provide data on intra- and interspecific interactions as well as a quantitative analysis of foraging.

OBSERVATIONS

At Mount Invincible, the males arrived during the last week of May and the females arrived around 30 May. At Onefour, males established territories in early May and the females arrived about 18 May. At both sites, pairs formed within a few days of the arrival of the females. Birds foraged in pairs for extended periods of time each day for approximately one week, after which the females became more secretive and were rarely seen. Study at each site continued until all known nests had nestlings close to fledging.

At Mount Invincible on 2 Jun., a banded male (O/A) was observed singing in his territory. He was next seen with a large larva in his bill approaching an unbanded bird, presumably a female. The female was sitting on a branch of a fir tree, softly twittering and fluttering her lowered wings. She took the larva from the male when he presented it to her. Both then flew toward the center of the territory.

On the morning of 12 Jun., O/A and his unbanded mate were observed copulating. At midday they foraged within 1 m of one another in a clump of fir trees 40 m from their nest, which contained an incomplete clutch. They foraged for approximately 5 min. Then the female behaved as described above, but with less intensity than on the previous occasion. The male approached and fed her. The female hopped down low into nearby shrubs and was lost from sight. The male continued to feed for a few minutes and then flew away.

This pair's nest failed 2 d after hatching. A second nest was built during the next few days, and the four-egg clutch was completed by 2 Jul. On several occasions between 4 Jul. and 8 Jul., while the female was incubating, O/A was observed with large insect larvae within a few meters of the nest. Due to thick vegetation surrounding the nest, the male was not observed feeding the female. However, when the male approached the nest with food, soft twittering calls were heard and the male reappeared without food. After 8 Jul., the nest was not watched intensively, so the duration of courtship feeding is not known.

Courtship feeding was not seen in the other five pairs, but the same twittering calls were heard on two occasions from a clump of bushes where a pair was known to be foraging. These calls were not heard in other circumstances, except for the louder prolonged chipping and twittering during copulation.

Only one instance of courtship feeding was observed at Onefour. On 2 May, a banded male was seen foraging with an unbanded female. He

presented her with an unidentified food item with no apparent solicitation by the female.

DISCUSSION

Initially, courtship feeding was thought to establish, strengthen, and maintain the pair-bond (Johnston 1962, Lack 1940). Royama (1966) suggested that courtship feeding provides the female with nourishment during periods of energetic stress (Brown 1967, Fogden and Fogden 1979, Krebs 1970). Further work has indicated that courtship feeding may increase the probability of nesting success through earlier clutch initiation, laying of larger clutches, or through extending the length of incubation bouts by the female (Kallander 1974; Nisbet 1973, 1977; Tasker and Mills 1981). Females may assess male parental quality based on courtship feeding rates (Nisbet 1973, Wiggins and Morris 1986). At the Mount Invincible site, courtship feeding was observed from just after pair formation through incubation, when the pair-bond was firmly established. At the Onefour site, courtship feeding was observed only during the courtship phase.

Of the 405 foraging bouts of Brewer's Sparrows observed at the Onefour site, only one resulted in the feeding of a mate. At the Mount Invincible site, 3 of 244 foraging bouts led to courtship or incubation feeding. This sample would be too small to report, if it did not constitute the first published record of courtship feeding in the genus *Spizella*. These data suggest the following hypothesis for which there is support in the literature: the occurrence and frequency of courtship (or incubation) feeding in the genus *Spizella* is related to environmental stress at the nestsite. Lyon and Montgomerie (1987) recently concluded that a cold nest microclimate favored a high frequency of incubation feeding in Snow Buntings (*Plectrophenax nivalis*), and there is evidence of the energetic significance of courtship feeding in other birds (e.g., for larids, Tasker and Mills 1981, Wiggins and Morris 1986). We observed more courtship feeding in the harsh montane environment in which *taverneri* breeds. This was not related to observer bias as the open, flat terrain favored by *breweri* facilitated watching and following the birds. The importance of the relationship between courtship feeding and environmental stress could be tested by examining northern populations of the Chipping (*S. passerina*) and Tree (*S. arborea*) sparrows for a high rate of courtship feeding.

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