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**Helpers at the nest in Barn Swallows.**—Auxiliary feeding of nestlings by immature Barn Swallows (*Hirundo rustica*) has been recorded often, as in studies by Forbush (1929, Birds of Massachusetts and other New England states, vol. 3, Norwood, Massachusetts, Norwood Press), White (1941, Brit. Birds 34: 179), Williamson (1941, Brit. Birds 34: 221-222), Armstrong (1947, Bird display and behavior, London, Lindsay Drummond, pp. 191-192), and Skutch (1961, Condor 63: 198-226). All these reports assume the helpers to be siblings from previous clutches, but none verifies the identity of the immature helpers, quantifies the amount of help given, or indicates the presence of adult helpers.

We conducted a study on three colonies of color-banded Barn Swallows in Portage County, Ohio during the 1975 breeding season to ascertain if the above stated behavior existed in these colonies and if any additional aid is given by other adults of the colony. Helpers performed a substantial proportion (6-28.5%) of the total feeding visits at 8 of the 21 nests where feeding observations were made (Table 1). A feeding visit is defined here as actual food delivery to begging chicks by any bird of the colony.

At one nest (Nest BOF, Table 1) where helping was noted, immature offspring from the first clutch were seen feeding newly hatched siblings, verifying the aforementioned observations of other authors.

TABLE 1  
SELECTED FEEDING INFORMATION FROM 8 BARN SWALLOW NESTS

Colony	Nest number	Total feeding visits noted	% feeding by helpers (adults unless noted)	Fraction of clutch fledged
1	G11	137	28.5	4/5
1	G3'	67	6.0	4/4
1	G21	122	20.5	4/5
1	G1	19	15.8	4/5
1	G8	129	7.1	4/5
1	G8 <sup>1</sup>	26	26.9	2/4
3	BOF	154	26.0	3/5
3	BOF <sup>1</sup>	324	12.3 (immatures) 7.2 (adults)	5/7

<sup>1</sup> Second clutch 1975 breeding season.

Between 22 and 25 July a flock of 17-19 unidentified individuals joined the parents and immature offspring in feeding duties, indicating that in addition to immature offspring of the year, non-colony-members also help parental adults feed nestlings. In this case, helpers' activities exceeded 19% of the total feeding observed.—GERALD R. MYERS AND DAVID W. WALLER, *Department of Biological Sciences, Kent State University, Kent, Ohio 44242. Accepted 10 May 1976.*

**Leapfrog feeding in the Great Egret.**—I studied the feeding behavior of Great Egrets (*Casmerodius albus*) during the breeding season in a mangrove lagoon in San Blas, Nayarit, Mexico, daily for 7 weeks. Except for brief feeding stops in the early morning by large numbers of departing roosting birds, rarely were more than 20 Great Egrets feeding at once, despite the presence of 40 pairs nesting nearby. The feeding ground (described more fully by Dickerman and Juarez 1971) was along the shallow side (less than 30 cm deep) of a large body of open brackish water (0.7 km × 0.4 km) among growths of a grass-like plant that grew to a maximum of 45 cm above the water. When only small numbers were present, the egrets fed in the "stand and wait" or the "wade or walk slowly" manners (Meyerriecks, 1960a).

On 14 and 16 August 125–150 Great Egrets were feeding at the study lagoon. The large feeding assemblages behaved as follows. At 0600 the birds massed in a column about 350 m long and 8–10 m wide along the side of the lagoon opposite from the usual feeding ground, and each bird hunted for food individually in the wade or walk slowly manner. During the next 1.5 hours, the column shifted towards the usual feeding side, as the birds in the rear of the column flew to the front. Upon landing they resumed feeding in the same manner. By 0815 only 50 individuals remained, the rest having flown away, and these were clustered at the usual feeding site. The egrets had foraged along the entire shallow-water periphery of the lagoon. At this time the birds became very excited, called loudly and frequently, individually flew up into the air over the others, and landed up to 5 m away. There was no directionality to this movement. Most of the birds caught small fish that apparently had been disturbed by the flights of their neighbors or themselves. Although on the 14th the group consisted entirely of Great Egrets, on the 16th the group also contained 5 Snowy Egrets (*Egretta thula*) and 3 Olivaceous Cormorants (*Phalacrocorax olivaceus*). These birds did not participate in the calling or the flights, but walked (egrets) or swam (cormorants) along, catching the fish that the Great Egrets were disturbing. The exploitation of *Casmerodius*' feeding behavior by other species did not appear to have any effect on the egrets' foraging efficiency.

Two distinctly different behaviors occurred during my observations, each of which consisted of the Great Egrets flying over the heads of other members of a foraging flock and feeding upon landing. In the earlier occurring behavior, feeding behavior ceased, the bird flew and landed, and then reinitiated feeding (this is referred to as type 1). In the later occurring behavior (hereinafter referred to as type 2), the flight was an integral part of the feeding behavior, as the disturbance it created was being used to flush out more food. Type 1 behavior was apparently caused by local resource depression. Food becomes too scarce around the foraging egret, so the bird must relocate to maintain efficiency. In the observed case, a bird foraging at the "rear" of the flock could fly in only one direction i.e. toward the "front", as movement in other directions would have taken the bird into parts of the lagoon unsuitable for foraging. This behavior differs from simple relocation only because the bird had to fly over the other members of its feeding flock to arrive at a new place to forage. When the column reached the usual foraging area, which was broader than the previously foraged periphery, the column spread out. Type 2 behavior, in contrast, has motor patterns that function analogously to most of the other feeding behaviors listed by Meyerriecks (1960a) or Kushlan (1976). The behavior is directly responsible for enabling the bird to detect and capture prey items. In effect, type 2, called "hopping" by Kushlan (1976) is a feeding behavior, while type 1, called "leapfrog feeding" (Kushlan, 1976 and others), is a behavior that occurs during feeding. This is further emphasized by the fact that during my observations, many of the Great Egrets flew off rather than over the feeding flock.

In other reported cases of "leapfrogging" the distinction is not so clear. Both Meyerriecks (1960b) and Wiese and Crawford (1974) reported that the rear to front flights, as performed by Cattle Egrets (*Bubulcus ibis*) served to scare up food for the birds. Siegfried (1971) and Blaker (1969), in their reports of leapfrogging by Cattle Egrets, separate the flights from the feeding. Kushlan (1976) defines the behavior simply as the flight, although he equates it with other feeding behaviors, such as hopping. I feel that a distinction should be maintained in the definitions of these behaviors. Leapfrogging should only be where "birds repeatedly fly to forward positions of a feeding flock" (Kushlan 1976) and should not be regarded as an equivalent of feeding behaviors. This is particularly important because of the difference of opinion that exists concerning the function of this behavior. Meyerriecks (1960b) and Wiese and Crawford (1974) feel that leapfrogging functions to scare up more prey. Siegfried (1971) and Kushlan (1976) believe the behavior maintains flock cohesiveness in places of low visibility. In my observations and in those of Wiese and Crawford (1974), leapfrogging could not have served to maintain cohesiveness as both occurred in areas of high visibility. Where the behavior does serve to scare up prey along with relocating the forager, it should be more aptly called "leapfrog-hopping," the former term indicating a directional pattern to the motion and the latter indicating a functional feeding behavior.

I believe that leapfrogging occurs as a result of a clumped distribution of prey or foraging sites. The bird is able to cue in on the distribution of these by seeing the distribution of the foraging flock. If foraging birds are dispersed, this would indicate a wide dispersion of available resources, while if they are clumped, the opposite would be indicated. In my study foraging sites were limited. Habitat descriptions in other studies are not detailed enough to allow analysis of this type.

Leapfrogging is a method of forager relocation that can occur in conjunction with a wide variety of feeding behaviors. The analogous feeding behavior, in which individual flights are an integral part, is hopping. Hopping is a costly feeding method and should be used in response to lowered prey densities, such as those from resource depression (Kushlan 1972, Charnov et al. 1976). Leapfrogging is a response to the clumped distribution of prey or feeding sites.

I thank L. Miller, J. Burger, W. Vesterman and two reviewers, J. Kushlan and R. L. Crawford, for criticizing the manuscript. Financial support for the study was received from J. Gladstone.

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**Nest appropriation and mate replacement in the Bushtit.**—Incidents of nest reuse from season to season and the interspecific appropriation of nests have been reported in several passerines (Bourke 1942, Emu 41: 277-279; Favaloro 1942, Emu 41: 268-276), but no records of intraspecific appropriation of active nests exist. The lack of information on this behavior may reflect the difficulties involved in observations rather than its absence in populations. Documentation of intraspecific appropriation requires large numbers of known individuals and careful observation.

A study of the breeding biology of the Bushtit (*Psaltriparus minimus*) near Santa Barbara, California (Ervin 1974, unpubl. Ph.D. Dissertation, Santa Barbara, Univ. California) revealed 13 pair or mate replacements among 179 nests located from 1972 through 1974; 325 birds in the population were color marked for individual identification. During 1974, bands confirmed that a pair had been replaced by new individuals at two nests, while at four nests only one bird had been replaced. I was unable to determine whether a mate or pair replacement had occurred at the remaining seven nests. At least one nest was occupied by two and potentially three pairs during the same season (Table 1, nest 119). Nest 119 was in the same tree as a nest built in 1973 by the marked displacing bird, 189. The original marked bird at nest 119, bird 834, was the offspring of 189 in 1973.

TABLE 1  
 NEST AND MATE SWITCHES AT FOUR NESTS<sup>1</sup>

Nest	Sex	January 1974				February 1974					
		22	25	28	30	4	6	8	12	21	25
119	M	U	—	U	U	—	—	821	821	A	A
	F	834	—	189	189	—	—	U	U	—	—
121	M	—	U	—	U	U	—	U	—	823	A
	F	—	189	—	189	189	—	189	—	U	—
128	M	—	—	—	U	U	—	—	—	821	821
	F	—	—	—	834	834	—	—	—	834	834
130	M	—	—	—	—	—	832	832	—	832	823
	F	—	—	—	—	—	U	U	—	U	U

<sup>1</sup> U = unmarked individual; A = nest abandoned; blank spaces indicate no observations made.