

**Overlap of House Sparrow Broods in the Same Nest.**—In four years of study of the breeding biology of House Sparrows (*Passer domesticus*) near Lawrence, Kansas, 1,682 clutch initiations have been observed. Among these I have noted eight nestings unusual because eggs of the successive clutch were laid when young still occupied the nest. Three instances were noted in 1977 and 5 more in 1978. Details of these observations are described below.

The third clutch in nestbox N02 was started on 13 June 1977 and totalled six eggs. Two eggs hatched on or about 28 June; the other four were infertile. On 11 July when I checked the box, I saw the two well-feathered young and two eggs. When I removed the eggs for examination, both young flew from the nest. One of the eggs was soiled with feces and was probably laid the previous day. This fourth clutch subsequently totalled five eggs; the first and last laid disappeared shortly after incubation began. The remaining three eggs hatched about 24 July and the young left the box when 13 days old.

A similar occurrence was recorded for box N07 on the same farm. The third clutch of five eggs, initiated on 24 June 1977, hatched at least four young on about 7 July. When the nest contents were checked on 20 July two young were present from the third clutch and two eggs of the fourth (one soiled). The next check on 23 July found one young still in the nest as well as five eggs—four soiled and one, the last laid, clean. The two young left the nest between ages of 13 and 16 days. Of the fourth clutch the first two eggs did not hatch (one was infertile) and only two young survived. These two hatched on 3 August and left the nestbox 13 days later.

The last case of 1977 occurred in nestbox N05, again on the same farm. The third clutch was initiated on 28 June 1977. Of the five eggs, two hatched and only one of the young survived. On 26 July, when I checked nests, the lone young was seen in the nest along with one egg. This bird left the nest at about 13 days old. The fourth clutch totalled five eggs; four of them disappeared between 5 and 10 August. The nest was abandoned and the remaining egg proved to be infertile.

The first clutch of nestbox H01, initiated on 9 April 1978, totalled five eggs; all eggs hatched on 25 April and four young survived. On 10 May, one young, the "runt," remained in the nestbox as well as one new egg. On the next nest check three days later, nothing was in the nest. On 17 May another clutch was initiated which was successful.

The second clutch of nestbox H29, initiated on 11 May 1978, consisted of five eggs; only two young hatched (on 25 May) and were successfully reared. On 1 June, two eggs were noticed in the nestbox with the two young. One of the young flew from the nest during the nest check on 7 June and the second left the nest on 10 June. Checking the nest on 11 June, I found the eggs gone. On 13 June another clutch was initiated which was successful.

Overlapping broods occurred twice in nestbox H24 during 1978 and I give a complete history of activities at this nest. The first clutch of four eggs was initiated on 3 April 1978. All eggs hatched but none survived—25 April was the last date young were seen in the nest. The second clutch began on 1 May totalled six eggs. One egg disappeared during incubation; on 20 May one 1-day-old young and one egg (infertile) were present. This bird remained in the nest until about 2 June. On 24 May, the third clutch of four eggs was initiated. Of these eggs, one hatched on about 5 June and two others on 7 June (the last egg was infertile). The larger young survived and left the nest about 19 June. On 14 June the fourth clutch was started: five eggs were laid. The nest check on 28 June showed two 1-day-old young, one young hatched that day, one egg pipped and the last egg laid as nest contents. The next visit, 1 July, showed nothing. A fifth clutch was initiated on 4 July and totalled six eggs; four young hatched on about 2 August and survived to leave the nest.

The second clutch of nestbox N03, began on 25 June 1978, totalled six eggs. All hatched but only one young survived. On 24 July, the nest check showed two eggs and the one young which flew. The first two eggs of this third clutch were missing on the next check, 27 July, but two additional eggs had been laid. On 2 August another clutch of four eggs was initiated (making six eggs in the nest). This fourth clutch hatched on about 15 August—the two eggs of the third clutch were infertile—and all the young were reared.

In House Sparrows, usually about a week elapses after young successfully leave a nest

and until the next clutch is begun (Summers-Smith, *The House Sparrow*, Collins, London, 1963; Seel, *Ibis*, **110**: 129–133, 1968; Will, "Fecundity, density, and movements of a House Sparrow population in southern Illinois," Ph.D. diss., Univ. Illinois, Urbana, 1969; Anderson, *Occ. Papers Mus. Nat. Hist. Univ. Kansas*, No. 70, 1978). My observations at Lawrence for 1977 and 1978 give a mode of eight days for the interval between young leaving a nest and the first egg of the following clutch (range: 10 to 49 days; 90% of observations between 3 and 17 days; 50% of observations between 6 and 9 days). Summers-Smith (op. cit.) told of overlapping nestings, but not, it seems, in the same nest: "... there are even reports from America of eggs of another clutch being laid in a nest before the young of the previous brood have flown. In cases like this it is clear that the cock must still be looking after the young of one brood while the hen is making a start with the next one" (p. 94). Elsewhere (p. 48–49), he reported two instances of two females laying in a nest at the same time. The original references for these statements are not given. Deckert (*J. Orn.*, **103**: 428–486, 1962) reported that European Tree Sparrows (*P. montanus*) often (vielfach) would start another clutch while young still remained in the nest—either eggs were laid in a new nest or with the young in the old nest. Kluyver et al. (in Stonehouse and Perrins, eds., *Evolutionary Ecology*, Univ. Park Press, London, 1977) give several references of overlapping nestings of several species (apparently not in the same nest) and Rothstein (*Wilson Bull.*, **85**: 242–243, 1973) wrote of Rose-breasted Grosbeaks (*Pheucticus ludovicianus*) starting another clutch in a different nest while young were still being fed in the first nest.

At the particular farm of the 1977 observations, I found a seasonal decrease in the time interval between young successfully leaving the nest and the start of the following clutch. Based on all observations at this farm in 1977, this seasonal decrease can be described by a very highly significant linear regression between day of fledging ( $D$ ) and the length of the interval between successfully leaving the nest by one brood and the start of the next clutch ( $I$ ):  $I = -0.073 D + 19.48$ ,  $r = -0.55$ ,  $P < 0.001$ ,  $n = 35$ . Nestlings did not remain longer in the nest later in the season ( $r = 0.20$ ,  $0.5 > P > 0.20$ ,  $n = 35$ ), rather females were able to lay eggs sooner after young left the nest. The three overlapping nestings of 1977 were not the very last clutches of the season. Most of the observations of 1978 were at a different farm and occurred mid-season. No pattern in the interval between clutches was found. However, the second farm at which overlapping broods occurred in 1978 was the same farm at which overlapping broods occurred in 1977. Again, at this farm the same, though non-significant, tendency of decrease in interbrood interval was noted ( $r = -0.24$ ,  $0.50 > P > 0.20$ ,  $n = 25$ ).

During concurrent observations at five other farms within 5 km, nothing similar was noted. An unusual observation concerning the farm in 1977 was that initial spring egg laying began very synchronously about a month later than at the other six study farms. Also, at the other farms, there was no significant regression describing length of interbrood interval changes with season. Spring phenology and sparrow breeding during 1978 began about 10 days later than in 1977, but the last broods of both years occurred at about the same time.

Generally the same pair of House Sparrows occupies a nest site for successive clutches (Summers-Smith, op. cit., p. 46). The involvement of two adult females is possible but, I think, unlikely. Such an occurrence might happen if there were overlap in pair bonds of two females with a male (possibly due to death of the first female) or perhaps if a nest helper (Sappington, *Wilson Bull.*, **89**: 300–309, 1977) used the nest for her eggs. These two explanations can account for strong attachment to a single nestbox by two females. No evidence of House Sparrow helpers has been noted at the Lawrence study sites, although nests were not observed extensively.

The precise physiological state of the females associated with the nestings described above is not known. Speculation suggests possible minor differences from "normal" hormonal levels conducive to egg laying, perhaps as a response to some end-of-breeding-season cue for observations at the study farm coded N. The overlapping nestings observed mid-season 1978 at the farm coded H may best be explained by some other (unknown) cause.

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tion of Richard F. Johnston. Partial support for this research has been given by NSF grant BMS 76-02225 and grants from the General Research Fund of the University of Kansas. Helpful discussions were conducted with R. F. Johnston and C. L. Cink.—PETER E. LOWTHER, *Museum of Natural History and Department of Systematics and Ecology, University of Kansas, Lawrence, Ks 66045*. Received 9 March 1978, accepted 29 September 1978.

**Side-stepping and Side-hopping in Arboreal Birds.**—Despite the extensive literature on avian behavior, some aspects remain little studied even for common species. I report here new observations on locomotion along branches and elevated perches. The data were obtained in many hours of observing wild birds and about nine hours of watching captives. In addition, I searched the literature extensively but found only a few pertinent references. I summarize here the limited available information on side-stepping and side-hopping in arboreal locomotion.

Although birds ordinarily fly, hop, or step between branches within a tree, at times they move in one of several ways along the long axis of a single limb. Hailman (1960) first used the term side-stepping for movement of a Song Sparrow (*Melospiza melodia*) along a dandelion stem which the bird had bent to the ground. I use the term side-stepping to refer to movement in which the legs are alternately lifted sideward along the perch so that one leg always remains ahead of the other in the direction in which the bird moves. The forward toes of both feet are bent over the same side of the perch, and the long axis of each foot is often at roughly a right angle to the direction of movement of the bird but can be at an acute angle. Side-stepping by definition involves no crossing of the legs and contrasts with switch-sidling in which a bird alternately places one foot, and then the other, forward along the perch (Hardy, 1974). Side-hopping refers to movement along a perch by a hop to the side with no crossing of the legs, with the long axes of both feet oriented in the same direction, often at a right angle to the direction of movement of the bird, and with both feet simultaneously off the perch during the brief hop. Unfortunately most published comments on sideward movements of birds have not clearly indicated the kind of movement used, and such terms as sidling are ambiguous unless further explained.

Side-stepping occurs in a wide variety of taxa (Table 1). In addition, I have seen side-hopping in four species, all in captivity: *Berenicornis comatus* and *Buceros hydrocorax* of the Bucerotidae, *Sitta castanea* of the Sittidae, and *Zosterops palpebrosa* of the Zosteropidae. For no species or family have I seen both side-stepping and side-hopping. Furthermore, I have not detected either side-stepping or side-hopping in hundreds of observations of many additional species on elevated perches, both in the field and in cages.

Records of side-stepping and side-hopping are too few to generalize on possible taxonomic differences, although in one case such a difference has been noted. Willis (1968) reported that the antbirds *Gymnopithys lunulata* and *G. salvini* side-step along branches "much more readily" than does *G. bicolor*. For many species side-stepping and side-hopping appear to be infrequent in the wild, as indicated by the small number of records in my own observations and in the literature (e.g., Hailman, 1973). In addition

TABLE 1.  
Taxa seen side-stepping on elevated perches.

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Ardeidae: *Bubulcus ibis*<sup>1</sup>; Columbidae: *Columba livia*<sup>1</sup>, *Zenaida macroura*; Psittacidae: *Amazona ochrocephala*<sup>1</sup>, *Ara macao*<sup>1</sup>; Ramphastidae: *Andigena laminirostris*<sup>1</sup>, *Ramphastos sulfuratus*<sup>1</sup>; Formicariidae: *Gymnopithys* spp. (Willis, 1968); Sturnidae: *Sturnus vulgaris*<sup>1</sup>; Icteridae: *Cassiculus melanicterus*<sup>1</sup>, *Agelaius phoeniceus*, *Quiscalus quiscula*; Fringillidae: Cardinalinae: *Cardinalis cardinalis*, *Passerina ciris*; Carduelinae: *Carduelis tristis*, *Carpodacus purpureus*, *C. mexicanus*, *Hesperiphona vespertina*; Emberizinae: *Junco hyemalis* (Hailman, 1973).

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<sup>1</sup> = in captivity. Observations by the author unless otherwise noted.