

proximately 7 per cent ($1/38 \times 1/0.38 \times 100$) of all males could possibly be bigamists.

Thus, both the number of unmated males and the number of "bigamists" indicate a mating system that could be very similar to that found in the House Wren. This is rather interesting, for the ecology of these two species is so similar that interspecific territories are often maintained in areas of sympatry (Root, Auk, 86: 125, 1969). Polygyny may be of infrequent occurrence in the Bewick's Wren, but more intensive study could reveal this behavior to be more common. This would make it the fifth reported polygynous species of the North American Troglodytidae.

John A. Wiens and graduate students of the Behavioral Ecology Laboratory at Oregon State University offered helpful suggestions for improvement of the manuscript. I am also grateful to personnel of the U. S. Fish and Wildlife Service at the Finley National Wildlife Refuge for their continual aid and cooperation.—DONALD E. KROODSMA, *Department of Zoology, Oregon State University, Corvallis, Oregon 97331*. Accepted 18 Mar. 71.

Apparent migratory behavior in the House Sparrow.—A cold front with strong northwesterly winds and sharply falling temperatures moved across New Jersey the night of 4 October 1970. The predawn hours of the 5th produced a landfall of birds along the coast. During the early morning I found swarms of birds of 40 passerine species at Holgate, the lower end of Long Beach Island in Ocean County. The island is crowded with cottages for most of its length (approximately 20 miles). Holgate, a narrow, uninhabited expanse of sand dunes and salt meadows 2 miles long, is a unit of the Brigantine National Wildlife Refuge.

Most numerous were Myrtle Warblers, *Dendroica coronata*, Savannah Sparrows, *Passerculus sandwichensis*, and Yellow-shafted Flickers, *Colaptes auratus*. The Myrtle Warblers, in the thousands, were darting every which way seeking food from every bit of vegetation including beach grass. Almost as numerous were the Savannah Sparrows, feeding or resting everywhere but crowding the edges of the tidal meadows. But the flickers, many hundreds of them, generally appeared singly in a steady rapid movement up through the middle of Holgate, from the south to north and fairly close to the ground. None came from an easterly quarter, i.e. off the ocean. Seemingly stranded among the dunes at the lower end of Holgate, and seeking food in the sparse beach grass, were a few flickers, a Downy Woodpecker, *Dendrocopos pubescens*, two Yellow-bellied Sapsuckers, *Sphyrapicus varius*, and even a Blackburnian Warbler, *Dendroica fusca*.

The flickers apparently had piled up on the sand spit at the extreme lower tip of Holgate in the predawn hours. Finding themselves surrounded by water on three sides they turned tail to clear out of a bad situation. Their exodus from Holgate lasted almost to 08:30 EST. I had witnessed an example of the "north-flying south-bound" migrations that occur in south Jersey with strong northwesterly winds. Witmer Stone describes these reverse migrations in detail in his "Bird studies at Old Cape May" (vol. 2, Philadelphia, Delaware Valley Ornithol. Club, 1937, pp. 41-44).

During my initial observations at the upper end of Holgate I encountered flock after flock of small birds that flashed over me, generally about 100 feet off the ground. Like the flickers, their passage was south to north and through the center of Holgate. Moving silently, very swiftly, in a straight line, and in compact groups of 10 to 30 birds, their identity baffled me. Finally I saw a flock pitch into the dense crown of a huge clump of bayberry bushes and the birds disappeared completely. I sat down expecting the birds to show themselves. But there was not

a movement! After what seemed like an excessively long wait, heads appeared, furtively, one by one. I couldn't have been more surprised to see House Sparrows, *Passer domesticus*. Suddenly and collectively as if at a signal, they bolted into the blue and zoomed north. A repeat performance from another group satisfied me that my hitherto unidentifiable birds were unquestionably House Sparrows. And they were doing what they were not supposed to do—migrating! Like the flickers, the House Sparrows presumably had reversed themselves at the tip of Holgate. I estimated up to 400 of the sparrows in some 30 flocks during a half-hour period, but many more could have passed prior to my arrival upon the scene at 07:30 EST.

I was impressed with the extraordinary wariness of these House Sparrows, their instant retirement to the dark inner recesses of the bayberry bushes where they stayed out of sight for upwards of 10 minutes. Whereas all the other migrants (except the flickers) were either feeding or resting, the House Sparrows chose a cryptic vanishing act that was altogether out of character for this otherwise bold and aggressive species. The birds were obviously out of their element; they were in a totally alien environment, and these factors coupled with adverse migration conditions may account for the demonstration of extreme shyness.

Leaving Holgate I cruised the adjoining resort areas of Beach Haven and Shipbottom for 10 miles or so in quest of House Sparrows. But I could find no more than a dozen of the birds. A friend, A. Morton Cooper, who has lived for many years at Beach Haven and is himself a keen observer of birds, assures me that House Sparrows are indeed common permanent residents on Long Beach Island; but he has never seen these sparrows on Holgate.

Germane to this discussion would be a brief consideration of the status of the House Sparrow at Island Beach. This major barrier beach extends 22 miles north from Long Beach Island. The lower end of Island Beach for some 12 miles is a strictly regulated state park, with abundant varied vegetation and a few buildings. Here for the past 15 years scores of birdbanders have converged in the late summer and fall to participate in "Operation Recovery" for the Fish and Wildlife Service. Many thousands of birds have been netted and banded.

Mrs. J. Mabel Warburton of Yardley, Pennsylvania, and Miss Dorothy L. Bordner of State College, Pennsylvania, both veteran banders at Island Beach, tell me that a few House Sparrows appear to be resident at the picnic and bathing areas, at the Coast Guard Station, and at headquarters buildings. Miss Bordner reports that she has netted one or two House Sparrows each season—about par for any of the banders. The House Sparrows are not banded although they should be. None of the banders has witnessed a migration of House Sparrows.

A bit of conjecture about the migrating House Sparrows of Holgate may not be amiss. I think the birds could derive from the densely crowded resort areas farther north where the birds prosper among people. When these resort areas become emptied of people at the close of the summer season, a critical food problem must confront the birds—they either move out or perish. It would be sheer luck to detect any limited nocturnal movements of the House Sparrows. Hence the negative reports from Island Beach.

The House Sparrow is known to be regularly migratory in parts of Europe and Asia, according to J. D. Summers-Smith (*The House Sparrow*, New Naturalist Monogr., 19, 1963, p. 117). Recoveries of banded sparrows have been made up to 340 miles in Europe and there is "considerable visual evidence of House Sparrow movement on the east coast of England from Yorkshire to Kent. Flocks of birds have been reported from September to November either moving southwards with other migrants or turning up at places where they are not usually to be seen."

Kenneth Williamson and Robert Spencer (Bird Migration, 1: 176, 1958) record a House Sparrow banded in Britain and recovered in Spain.

Instances of migratory behavior of the House Sparrow in the New World are unknown, so far as I know, but it is possible that House Sparrows may have long since established a migratory pattern. We take this avian pest for granted and give it such casual attention that we may have overlooked newly emerging aspects of its biology.

I am most grateful to Robert J. Newman and to Mary H. Clench for valuable suggestions and reference material.—MAURICE BROUN, *Strawberry Hill Farm, New Ringgold, Pennsylvania 17960*. Accepted 4 Mar. 71.

Digestion and passage of blue mussels eaten by Black Ducks.—Male Black Ducks (*Anas rubripes*) were wild trapped during November and December 1969, caged in outdoor pens in Chatham, Massachusetts, and fed a mixture of corn (*Zea mays*) and blue mussels (*Mytilus edulis*) until 2 weeks before the test date (12–24 March 1970). I fed ducks only cracked corn for 2 weeks before the test. All ducks were in good condition, with weights between 950 and 1100 g.

Test ducks were starved from 12:00 to 17:00 on the day prior to the test. From 17:00 to 17:15, ducks were offered cracked corn *ad libitum*. At 17:15, I removed the cracked corn, and at 10:00 on test day I placed the test food, either corn or blue mussels, in the pens. Ducks fed for specific periods and then were sacrificed and necropsied. For necropsy, I divided the digestive tract into five sections: 1) Mouth to the gizzard entrance, 2) gizzard, 3) from the end of the gizzard to the end of the pancreas, 4) from the end of the pancreas to the entrance of the caeca, and 5) from the end of the caeca to the end of the rectum.

Black Ducks in this study digested and passed a blue mussel in 30–40 minutes (Table 1). Similarly Malone (J. Wildl. Mgmt., 29: 529, 1965) reported that Mallards (*Anas platyrhynchos*) can pass crayfish (*Camborus* sp.) in as little as 45 minutes. Ducks number 3 and 6 (Table 1) indicate that there was probably no carryover of mussel fragments in the digestive tracts of other tested ducks. No duck contained

TABLE 1
DISTANCE OF PASSAGE OF BLUE MUSSELS THROUGH THE DIGESTIVE TRACT
OF BLACK DUCKS PENNED OUTDOORS IN MARCH 1970

Duck No.	Food ¹	Allowed to feed (minutes)	Mussels found ² Digestive tract section ³				
			1	2	3	4	5
1	Mussels	15	YW	YWF	YF	N	N
2	Mussels	50	N	YF	YF	YF	YF
3	Corn	50	N	N	N	N	N
4	Mussels	30	YW	YWF	YF	YF	YF
5	Mussels	45	N	YF	YF	YF	YF
6	Corn	45	N	N	N	N	N
7	Mussels	20	YW	YWF	YF	N	N

¹ Food offered *ad libitum*.

² YW = yes, whole only; YWF = yes, whole and fragments; YF = yes, fragments only; N = no fragments or whole mussels.

³ Explained in text.