

When we returned to the falls 14 July 1970, strong winds and driving rains hindered our movements on the cliffs. All the geese had hatched and had left the cliffs—we saw not a single goose, adult or young, in the area. The goose nests were greatly weathered and little evidence remained that geese had nested there that season.

Canada Goose.—The solitary nest was located on a rock prominence on the south side of the head of the falls. It contained three eggs and the shell remains of a fourth egg were lying beside the nest. The closest Lesser Snow nest was about 200 m downstream, and the Canada Goose nest was situated precariously close to the gull colony. We found isolated nesting Canada Geese scattered between the Kazan Falls and Chesterfield Inlet to the northeast. The geese often nested several centimeters above the water on rock ledges or on small hummocks in pothole lakes.

Peregrine Falcon.—The single nest was on the north side about 5 m above the water and 3 m below the rim of the cliff. On 7 July it contained the three downy young; on 14 July they were well fledged.

The only encounters noted between Peregrines and snow geese seemed to be caused by our presence. When we disturbed nesting geese and they flew on a direct line to the Peregrine nest the adult falcons dove at them. The geese responded by honking loudly and rapidly and accelerating their wing beats. Surprisingly the geese seldom veered from their line of flight, the Peregrines never made any obvious attempt to strike the geese, and we found no goose remains along the cliffs. The many ptarmigan (*Lagopus* sp.) sternums and feathers on the rims of the cliffs showed what food the falcons preferred.

Rough-legged Hawk.—A pair of Rough-legged Hawks patrolled the air over the upstream section of the gorge. Their nest was on the south side below overhanging rocks that hid its contents from view.

Herring Gull.—On the rock island at the head of the falls were 13 Herring Gull nests, and we counted 64 gulls present. One gull nest was on a rock outcrop in the fast water above the falls. The only nest on a nonisland site was on the north bank; it contained two eggs and one downy young.

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Bigamy in the Bewick's Wren?—Attempts to discern the evolutionary strategies of avian mating systems are limited by the inadequate information on the life histories of most species (Verner and Willson, *Ornithol. Monogr.*, 9:1-76, 1969). One such species is the Bewick's Wren (*Thryomanes bewickii*). Although Verner and Willson (op. cit.) consider this wren "normally monogamous," my studies indicate that polygyny may occur.

During the 1969 and 1970 breeding seasons, at least 9 of 38 territorial males (24 per cent) that I studied at the William L. Finley National Wildlife Refuge near Corvallis, Oregon, were unpaired. Further, most of these unpaired males occupied territories that appeared inferior to the territories of breeding males. This condition is found in many populations of polygynous passerines; for example, Kendeigh found that 28 to 35 per cent of the male House Wrens (*Troglodytes aedon*) he studied were unpaired (*Illinois Biol. Monogr.*, 18: 1-120, 1941). Unpaired males here also appeared to occupy marginal habitat. However, unmated males are also

found in monogamous mating systems (French, Auk, 76: 159, 1959). Proof of polygyny must therefore lie in finding a male that simultaneously maintains more than one pair bond during the breeding season. Such a requirement is difficult with a species that inhabits thick brush and is hard to follow, but the behaviors of three males do provide evidence for the occurrence of polygyny in the Bewick's Wren.

About 6 weeks before nest building, I watched two males each foraging with two females. In each case, a neighboring male had disappeared, leaving an unpaired female. These bigamous associations did not persist until the mating season, and each male eventually mated with only one female. Verner and Willson (op. cit.) cite 25 species in which polygyny is a rare event and is suspected to arise from unusual circumstances similar to that described above.

With a third male I saw no pairing behavior, but did observe the results of what appeared to be a successful bigamous relationship. The male was a juvenile I had banded in August 1969. During February 1970 I found that he had established his territory in the same locality where banded, pairing with the female of the previously resident male. On 13 June I watched nest-building by this pair, and on 22 June the female was incubating four eggs. During my 8-hour observation period on 26 June, the male did not once feed the incubating female at the nest. This is atypical, for courtship feeding at the nest is usually very frequent. The young of this nest hatched 2 July, and the male immediately began feeding them. On 14 July, a day before the young in this nest fledged, I noted a family flock of four fledglings within the territory; the male fed both the nestlings and the fledglings. On 15 July the brood in the nest fledged and joined the other fledglings within the territory. Although I netted each of the four fledglings of the first family flock, I was unable to net and therefore unable to identify the mother.

The relationship of this male with the one banded female was similar to that of a "secondary" female in a typically bigamous species; the second female usually receives less aid in rearing her brood, and here the male fed the young but apparently did not feed the incubating female. It is improbable that the first four fledglings were not fathered by this male and originated in a nearby territory: all neighboring territorial males had been color-banded and closely watched since August 1969. The two immediate neighbors had both fledged young in May 1970, and during this time no males disappeared. Because I never saw the pairing and mating of the two females with this male, the possibility does remain that this bigamous relationship may have resulted from some unusual circumstance.

The occurrence of bigamy in the Bewick's Wren would not be surprising. Four of 10 Troglodytids Verner and Willson (op. cit.) consider are regularly polygynous. For example, in the Long-billed Marsh Wren (*Telmatodytes palustris*), Verner studied five marshes in which polygyny among the males ranged from 12.5 to 50.0 per cent (Condor, 67: 6, 1965). At the other extreme, Kendeigh (op. cit.) found that only 6 per cent of the House Wrens he studied were polygynous. In the present study, I found only one "bigamist" among 38 males (3 per cent). Of course any bigamist failing to fledge young by each female would remain unnoticed; the persistent calling of fledglings within a territory was often the only evidence of a mating. Present data indicate that nesting success following pairing is approximately 62 per cent in this population ($n = 29$). Assuming this value to be typical of both primary and secondary females (admittedly an oversimplification), the probability of any bigamist fledging young by both females would be $0.62 \times 0.62 = 0.38$. If my data are typical of the entire population, then ap-

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.

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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