

Courtship and copulation by a hand-reared Broad-winged Hawk.—In July of 1967 Frances Hamerstrom and Frank Renn obtained for me a Broad-winged Hawk (*Buteo platypterus*) about 2 weeks old from a nest in Portage County, Wisconsin. The bird was hand-reared, kept in my laboratory, and used in prey selection and motivation experiments. In late May 1969 the bird began to exhibit a strange behavior toward me whenever I entered the laboratory. It soon became apparent that this was courtship behavior, and when I presented my hand and forearm in a horizontal position the bird attempted copulation. Courtship in this tethered bird consisted of assuming a near horizontal posture (head about 20° higher than the tail), dropping the head to an angle of about 30° below the horizontal, raising the feathers of the back, flattening and spreading the breast feathers so that they projected about 5 cm laterally beyond the tucked-in wings, and lowering and spreading the tail. The bird paced about, calling constantly and stopping frequently, usually while facing me. The call was a short and emphatic “whee-oh!” similar to that described by L. O. Shelley (*in* Bent, U. S. Natl. Mus., Bull. 167, 1937, p. 239). The call was quite different from all other notes I have heard my captive Broad-winged Hawks utter. When I presented my forearm to the bird it fluttered upon it in a manner quite different from its characteristic jump when I removed it from the perch at other times. The bird landed gingerly with the toes completely flexed (“balled into fists”), resting its weight upon the entire length of the tarsometatarsus. Flapping its wings slowly and constantly and keeping them well above the plane of the body, it then lowered its tail under my hand or arm. The attempts at copulation were never completed because the bird invariably fell off my arm. It is interesting that the feet and talons were not used in gripping during this awkward procedure. I suggest that this behavior has evolved in this species, and perhaps in all Falconiformes, as an adaptation to prevent the male from injuring or killing the female during the excitement of copulation. Of published accounts that I have seen, only the description of copulation in the Sparrow Hawk (*Falco sparverius*) by Willoughby and Cade (*Living Bird*, 3: 85, 1964) is sufficiently detailed to determine the position of the toes, and in this species the toes are also flexed when the male mounts the female. As this behavior occurs in both a falcon and a buteo, it would be most interesting to see whether it occurs in all Falconiformes, especially the Cathartidae and Sagittariidae.—HELMUT C. MUELLER, *Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514.*

Notes on the Snail Kite in Surinam.—In the coastal plain of Surinam the Snail Kite (*Rostrhamus sociabilis*) is the most numerous hawk wherever freshwater marshes occur. The cultivation of rice, which inundates large areas during part of the year, has undoubtedly expanded its feeding grounds. When the rice is growing the birds concentrate along the many trenches in the fields. The raising of sugar cane, as it is grown in Surinam, has the same result because after a field has been cultivated for a number of years, it is burnt over, ploughed, and inundated. Vegetation grows up rapidly in these large artificial lagoons, and they are frequented by large numbers of feeding kites until the water is let out after a year or two and the field is replanted. These artificial lagoons provide no cover for nesting, but the kites sometimes nest in neglected canefields that are overgrown with rushes and bushes.

Flocks of kites are present all through the year in these places. The great marsh bordering the plantation Ma Retraite near Paramaribo always supports a number of them, and during periods of drought they frequent the trenches in the plantation,

but they have never nested there. They wander about a great deal and their numbers fluctuate from day to day. Sometimes kites appear in quite unexpected places, thus on 20 May 1962 four birds (one adult male and three in the brown plumage) coursed over a savanna pool near Zanderij where I had never seen the species before. The normally quite dry sandy savanna was then very wet after much rainfall. I collected the adult male (weight 357 g) that was in nonbreeding condition.

The flocks of nonbreeding birds contain few adult males, and 90 to 95 per cent of the birds are in the brown plumage. On 24 April 1966 I saw hundreds of kites over a distance of about 20 kilometers in the marshes along the road leading westward to the Coppename River. On nearly every telephone pole sat a kite, but very few of them were adult males.

Whether the population has a true migration is difficult to state. Flocks passing over high in the air could give that impression, but such occurrences are mostly confined to the late afternoon or early morning when the birds are probably going to and coming from their large social roosts (Haverschmidt, 1954). They cover long distances to reach their roosts; thus from 21 March until 21 May 1946 flocks regularly passed high above Paramaribo every afternoon and crossed the Surinam River to the east.

Nesting.—In 1967 Mr. Th. Renssen reported finding a large colony nesting in thick tangle of bushes and a few small trees, all leafless, and killed by the inundation of a large tract on the Marienburg sugar estate (Commewijne District). On 12 February I spent the day watching the nesting birds in the bushes bordering a



Figure 1. The nesting colony at Marienburg, Surinam, in February 1967; on the left the marsh where the birds hunted, on the right the bushes and trees where they nested.

lagoon where many kites were hunting snails. About 200 birds were present; I counted 51 nests, and many birds were still nest building. In March Mr. Renssen counted about 90 nests.

Nest building.—Both sexes took part in nest building. All over the area birds perched on the bushes breaking off dead twigs with their bills. On the small platforms of many unfinished nests pairs sat close together. On two low trees bordering the water were 5 nests with sitting birds at a height of 8 to 10 meters. All nests were in the open and not in the least concealed among the leafless branches.

Copulation.—I saw many copulations take place on the nest, on the small platforms of unfinished nests, and on nearby branches. When the male alighted on the nest rim, the female called and threw her head upward and backward and pecked a few times toward the male's head. The male stood with wide open bill uttering a gurgling or rattling call behind its mate and when the female rose, it hopped on her back.

A few times I saw a male in fine adult slaty plumage alight on the nest rim with a snail in its bill and present it to its mate. The female rose, took the snail in its bill and then between its feet, and pecked once or twice into the snail; the empty shell fell down and the snail was swallowed in one or two gulps. Then the male hopped on her back and copulated.

Incubation.—Both sexes took part in incubation, and I often saw the changeover at the nest. Usually the male arrived with a stick in its bill. The female rose, took the stick, and worked it into the nest rim and left. Then the male settled down. Once a male arrived without a stick and the female did not rise. The male after some effort removed a stick from the nest rim; the female rose, took it, laid it down on the nest rim, and left, whereupon the male settled down.

Display flight.—Numbers of kites constantly circled over the colony. Males sometimes dived downwards steeply and then shortly upwards.

Plumage.—The plumage of the incubating birds varied greatly. Some females had very pale heads with a distinct broad streak over the eyes, resembling miniature Ospreys. The color of the soft parts also varied greatly in intensity, the cere and the feet varying from pale yellow to bright orange. Among the males I saw incubate, change over, and copulate were individuals with dark brown upperparts and brown underparts with a varying amount of white.

At my request Mr. Renssen collected on 5 March two birds in immature plumage, an incubating female, and a male near its nest. The female (weight 393 g, ovary greatly enlarged) had brown upperparts with broad pale edges to the feathers, its forehead was white and the sides of the head very pale with a distinct white streak over the eyes. Its cere and feet were pale yellow.

The male (weight 360 g, testes greatly enlarged, the left one 2 cm, the right one a little less) had very dark uniform brown upperparts with no trace of the slaty adult color and brown underparts mixed with white. Its cere was yellow, its feet orange. Both birds match the description of the subadult plumage by Friedmann (1950) and the immature plumage by Brown and Amadon (1968). So it is clear that both sexes are capable of breeding before they attain full adult plumage.

Two birds I collected near Paramaribo, one on 25 December 1958, certainly a male but missexed as a female, the other on 27 November 1969, a male with testes not enlarged, are in a plumage not mentioned either by Friedmann or by Brown and Amadon. Both lack any trace of the slaty color of the adult male, and are dark chocolate-brown above and below; the upper and under tail coverts and base of the tail are white, the secondaries and the tail are broadly tipped with buff, and the thighs are barred rufous.

Feeding.—Birds flew constantly to and from the adjoining lagoon, where many were hunting snails. Now it came as a surprise to me that the snails were eaten in a different way from that reported by Murphy (1955) whose graphic description I knew well. As soon as a bird lifted a snail from the water with one foot, it alighted on a branch, took the shell between both feet, and delivered one or two pecks into the lid of the shell, whereupon it dropped the empty shell and swallowed the snail in one or two gulps. They *never* waited for a voluntary relaxation by the snails, and seemed to have no difficulty in freeing them from the shell. Stieglitz and Thompson (1967) report the same. From my observation post I could not see how the birds removed the operculum or whether they swallowed it. In the hundreds of empty shells I have examined (Haverschmidt, 1962) the operculum was always missing.

The weight of a complete snail averages 21 g, the weight of the empty shell 14 g, so the actual morsel eaten is about 15 g. I further noticed that the kites do not always capture snails by coursing low over the water, but often by pouncing down from a lookout at the top of a bush or a clump of rushes. Murphy further states that feeding is concentrated in the afternoon when the snails come to the surface, but I have watched kites feeding all through the day and in bright sunlight.

Eggs.—At my request Mr. Renssen collected five sets of eggs on 24 February, two of two eggs (one of them heavily incubated) and three with three eggs. Though the sample is small, no clutch of four eggs was found. The 13 eggs average 44.6×34.6 mm, the largest 46.3×35.1 and 44.5×36.4 , the smallest 43.9×34.2 and 45.2×32.6 mm. The weight of eight fresh and unblown eggs was 25.9–29.5 g, the average 27.6 g.

The breeding season.—In various years nesting in Surinam has now been recorded in mid-January, with nestlings in mid-February, eggs in February and March, nest building in May, incubating birds in June, and eggs in July. So the nesting season is the first 7 months of the year, which coincides with the rainy season.

The erratic behavior of the nesting birds even when the nesting habitat remains unaltered is shown by a nesting colony Mr. Renssen and I found 6 June 1960 in a permanent water reservoir at Marienburg. Having no boat we could not reach the colony, but we could see several nests with sitting birds in low trees and bushes in the water. Though this place remained unaltered it was never again used for nesting in later years.

Relations with other birds.—On 6 June 1960 I saw, directly below a nest on which a Snail Kite was incubating, a nest of a Striated Heron (*Butorides striatus*) with a sitting bird. Though birds have nothing to fear from Snail Kites, on 1 September 1963 I watched a number of Gray-breasted Martins (*Progne chalybea*) harassing Snail Kites that were coursing over a lagoon at Maastroom (Commewijne Dist.). On 21 May 1963 a Snail Kite chased and harassed a Savanna Hawk (*Heterospizias meridionalis*) with a small mammal in its talons when it crossed the Surinam River. The clumsy hawk found it difficult to outfly the more agile kite.

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Black-whiskered Vireo in Surinam.—On 17 December 1967 I collected near Phedra on the Surinam River, Surinam, a juvenile female Black-whiskered Vireo (*Vireo altiloquus*). It weighed 24.8 g and the gizzard contained a number of seeds of *Bixa orellana* and insects (Coleoptera). The specimen is preserved in the Leiden Museum; G. F. Mees assigned it to the nominate race *altiloquus*. Neither Meyer de Schauensee (The species of birds of South America and their distribution, Narberth, Pennsylvania, Livingston Publishing Co., 1966) nor Blake (*in* Check-list of birds of the world, vol. 14 (R. A. Paynter, Jr., Ed.), Cambridge, Massachusetts, Mus. Comp. Zool., 1968) include Surinam within the winter range of this bird. I am indebted to G. F. Mees for his help and to D. C. Geyskes for identifying the gizzard contents.—F. HAVERSCHMIDT, *Wolfskuilstraat 16, Ommen, Holland.*

The Black-crowned Night Heron as a predator of tern chicks.—In the course of a study of the terns nesting on Great Gull Island, Suffolk County, New York, during the summers of 1967 and 1968, many banded chicks of both the Common Tern, *Sterna hirundo*, and the Roseate Tern, *S. dougallii*, disappeared within a few days of hatching when they were still too small to have wandered far. This was particularly noticeable in 1968, when at least 33 chicks less than 3 days old disappeared from study plots encircled by low wire fencing. No mammalian predators inhabit Great Gull Island and no avian predators are resident there. An occasional Sparrow Hawk, *Falco sparverius*, passed over the island and small numbers of Herring Gulls, *Larus argentatus*, and Great Black-backed Gulls, *L. marinus*, were often present on off-shore rocks and pilings. Redwinged Blackbirds, *Agelaius phoeniceus*, which nest on the island occasionally destroyed some tern eggs (Pessino, 1968). Detailed information about this tern colony and the studies in progress is presented by Cooper et al., 1970.

The consensus of the several investigators studying this colony was that these losses might be the result of predation by Black-crowned Night Herons, *Nycticorax nycticorax*. Night herons were heard flying over Great Gull Island almost nightly, although they did not nest there and only occasionally roosted on the island. The intense mobbing reaction of both species of terns directed at any night heron flushed from a diurnal roost on the island supported the view that they were chick-predators. On such occasions a closely bunched flock of 60-70 terns immediately swirled about the heron as long as it was in flight or in sight, with some individuals continually diving at it. The reaction was comparable in intensity to that shown to Sparrow Hawks passing over the island. Proof of the predatory habits of these herons was obtained on 13 July 1968 when an adult male was collected on Great Gull Island at approximately 07:00. Its stomach contained the nearly digested remains of three small fish (Cottidae ?) and one Roseate Tern chick estimated to have been 2-4