# FROM FIELD AND STUDY

**Sunning of Bank Swallows and Cliff Swallows.**—Sunning behavior and its associated postures in birds have received considerable attention recently. Hauser (Wilson Bull., 69, 1957:78–90) has described sunning in 33 species of North American birds and recognized four levels of response to the sun. The function of sunbathing in birds is unknown, but its frequent occurrence suggests that it is adaptive or has evolved from a behavioral precursor that was or is adaptive. Nicolai (Jour. f. Ornith., 103, 1962:125–139) noted similarities between sunbathing, waterbathing, and dustbathing in doves and wrens and suggested that dustbathing evolved from bathing in water.

Simple descriptions of sunbathing are lacking for most species of birds and little has been reported concerning sunning behavior in swallows. Johnston and Hardy (Wilson Bull., 74, 1962:243–262) described the sunning posture in Purple Martins (*Progne subis*) and suggested that sunbathing in that species is an individual effort and not a group or socially oriented behavior. We observed social sunbathing in large, post-breeding flocks of Cliff Swallows (*Petrochelidon pyrrhonota*) and Bank Swallows (*Riparia riparia*), as well as unusual sexual behavior associated with sunbathing and aggressive social interactions.

Between 4 p.m. and 5 p.m. on July 28, 1960, at the Quivira National Wildlife Refuge, Barton County, Kansas, two of us (Barlow and Lenz) observed a mixed flock of over one thousand Bank Swallows and Cliff Swallows. Some birds were perched on telephone lines, while others were sitting on the deck of a bridge surfaced with loose sand. The temperature at this time was 95° F., the humidity was high, and the sky was clear. The activities of the birds that had alighted on the bridge were interrupted five times by passing automobiles, but in each instance the swallows began returning to the bridge within two or three minutes. Most of the swallows assumed sunning postures soon after landing.

Typically, a Bank Swallow landed, spread both wings and then relaxed them in such a manner that the wings were held slightly away from the body. At the same time the feathers of the body were ruffled and the bird gaped. "Ruffling" is here used to denote the erection of the feathers so that the body presents a ragged outline (Morris, Behaviour, 9, 1956:75–113). Subsquently, the bird rolled over on one side and slightly raised the uppermost wing. Although Bank Swallows sometimes raised the wing higher after several seconds, the primaries were seldom spread. The head feathers were fluffed at this time and often, in full posture, the head was turned to one side. "Fluffing" as it is used here means the erection of the feathers so that the outline presented is smooth (Morris, *loc. cit.*).

Bank Swallows often leaned against the timbers of the bridge for support, thereby allowing the birds to tilt their bodies sideways at angles as severe at 90°. This maximum angle was usually adopted within three to five seconds after initiation of sunning behavior.

Cliff Swallows adopted the sunning posture more slowly, usually within five to fifteen seconds. These swallows tended to cross their wings above their backs when tilting, instead of raising the uppermost wing as did Bank Swallows, and remained more nearly vertical dorso-ventrally than did Bank Swallows, seldom tilting at an angle of more than 30°. In other respects the sunning posture of the Cliff Swallows resembled that of the Bank Swallows. The postures described above closely resemble the "compulsory level III" of Hauser (*op. cit.*:83) wherein "the crown is elevated, wings drooped, tail fanned, body plumage fluffed fully and the bird leans to one side and settles, with bill opened, and eyes open, the upper eye staring at the sun."

Cliff Swallows assumed postures that included some elements of the "compulsory level IV, exaggerated sun position" of Hauser (*loc. cit.*). In so doing, a bird alighted, crouched and leaned forward on its breast, and cocked its spread tail upward at an angle of 45° from the horizontal. Some Cliff Swallows remained in this "lean-forward" sunning posture for from thirty seconds to two minutes. By comparison, the "lateral-tilting" posture of other Cliff Swallows or Bank Swallows was maintained for as long as five minutes, with the birds seemingly near a sleeping state.

Between 3 p.m. and 4 p.m. on July 20 and 24, 1961, two miles northwest of Lakeview, Douglas County, Kansas, one of us (Klaas) recorded similar behavior in a large flock of Cliff Swallows and Bank Swallows congregated on a short stretch of secondary road paved with asphalt, and in adjacent fields. Although the temperature of the road surface was not recorded, the surface was so hot that we could not keep the palms of our hands on the asphalt for more than five seconds. For these dates air temperatures and humidities as recorded by the weather observation station eight miles away at

The University of Kansas were as follows: July 20—maximum temperature, 95° F., minimum temperature, 69° F.; relative humidity, 8 a.m., 81 per cent; relative humidity, 5 p.m., 50 per cent; July 24—maximum temperature, 93° F., minimum temperature, 66° F.; relative humidity, 8 a.m., 99 per cent; relative humidity, 5 p.m., 65 per cent.

Groups of swallows ranging in number from five to several hundred were sunning on the road, on corn tassels in adjacent fields, and on nearby power lines. The sunning postures of the birds on the surface of the road were like those described previously, although perching swallows assumed slightly different postures. These birds spread the feathers of the wings which were then dropped below the body, ruffled the body feathers, and gaped. No distinction was made between sunning postures of Bank Swallows and Cliff Swallows at the site in Douglas County.

Hauser (*op. cit.*:80–90) suggests that involuntary compulsory response to the sun may be more a response to light and to high humidity than a response to high temperature. On the other hand, Lanyon (Wilson Bull., 70, 1958:280) regards "a sudden warming of the bird's immediate environment as being extremely important in the motivation of sun-bathing behavior." The latter interpretation is more in keeping with our own observations. Possibly birds flew to the road to pick up bits of gravel or sand, an activity we saw frequently at both sites, and were subsequently stimulated into sunning postures by sudden warming from the surface of the road.

Aggressive interactions were characteristic of the aggregations of swallows at both sites but aggressive behavior by Bank Swallows was not observed in Douglas County. Cliff Swallows acted aggressively toward both Bank Swallows and other Cliff Swallows. Aggressive Cliff Swallows gave a "head-forward" threat display. The wings were drooped and quivered, the beak was opened, the neck and head feathers were ruffled, and the body was horizontal to the surface of the road. When Bank Swallows (usually birds that had just landed) approached within three to four inches of Cliff Swallows the latter gave the "head-forward" threat display. The Cliff Swallows then usually advanced two or three steps toward the Bank Swallows and the latter flew away. Aggressive interactions occurred when a resting Cliff Swallow was approached by another Cliff Swallow showing an aggressive attitude. When an intruding swallow (usually one recently landed) approached to within three to four inches of the resting swallow, one or both birds gave the "head-forward" threat and then both birds flew off. In aggressive interaction of this type among Cliff Swallows, as many as three or four birds often acted aggressively toward each other at the same time. The inter-flock aggressiveness by Cliff Swallows landing on the road resulted in a spacing like that described by Emlen (Auk, 69, 1952:160–170) for swallows on wires.

Any resting Cliff Swallow that had assumed a sunning posture was not displaced by a threat display by an intruding bird. In such an instance, the intruding swallow often made abortive attempts at copulation with the sunning bird. Such attempts resembled those mentioned by Emlen (Auk, 71, 1954:16–35), except that no seizing of the crown or nape feathers by mounting birds was seen. The aggressive display-attempted copulation sequence is described as follows. An intruding bird landed three or four inches from a bird in the "lean-forward" sunning posture and walked slowly around the sunning bird, giving the "head-forward" threat display described above. This display lasted from ten to fifteen seconds, during which time the sunning bird showed no response. The "aggressive" bird would then attempt to mount the reclining bird by quickly jumping on its back. Such attempts were observed more than 25 times and as nearly as we could see were "unsuccessful." Most copulatory attempts lasted only for a brief instant after contact was made and usually resulted in the quick departure of both birds; however, several such mountings lasted up to four or five seconds. In some instances birds that had mounted were immediately repulsed by an abrupt raising of the wings by the reclining bird.

As early as 1898, Brewster (Auk, 15, 1898:194–195) reported simultaneous copulatory and mud-gathering behavior in a flock of Eave Swallows (presumably *P. pyrrhonota*) in late August in New Hampshire. He noted that all the birds engaging in sexual behavior were young birds and he stated (p. 195) that "the remarkable behavior of the birds which alighted in the road was simply an expression of premature development, in the young, of the instincts and passions of . . . procreation." Twelve specimens were taken at the site in Douglas County; six were adults and six were young of the year. It could not be determined whether the described sexual behavior involved only young birds. In any event, gonads of all adult birds were regressed, presumably precluding significant hormonal stimu-

lation. The act of mounting in copulation possibly is a stereotyped neural pattern stimulated by a soliciting posture resembling that seen in sunning Cliff Swallows. Certainly there are similarities in gross motor behavior between the "lean-forward" sunning posture and that of a sexually soliciting female. It is suggested that in instances involving swallows that we observed, the resemblance between the "lean-forward" sunning posture and that of a female soliciting copulation evoked "real" copulatory behavior.

Juvenal Cliff Swallows (identifiable by their yellow mouth linings, their plumages, and in part by specimens taken) were noted to solicit adults, presumably for food, by crouching, quivering their wings, gaping widely, and directing the head slightly upward. Solicitation for food was directed toward both adult Bank Swallows and Cliff Swallows and was ignored by adults of both species.

Emlen (1952) has theorized that positive and negative forces are operating in social flocks. He proposes that gregariousness is the "positive force" which brings birds together in flocks and that various forms of social intolerances and independence are the "negative forces" that regulate and determine the flocking pattern. Flocking usually occurs at localized centers of attraction such as sites for mud-gathering, nest building, or loafing. The gregarious nature of the various kinds of behavior witnessed by us is evidence of a localized center of attraction, in the above instances a "sunning surface." In our experience, after a flock was disturbed, one or two swallows returned to the surface almost immediately and these were quickly followed by other birds; these possibly were attracted to the site as much by the first arrivals as by the site itself. As more birds arrived the flock became more dense and "negative forces" in the form of inter-specific and intra-specific strife became increasingly manifest. Eventually an equilibrium was reached resulting in a more or less regular spacing of individuals in the flock resting on the surface of the road. The speculations by Emlen seem to be a good interpretation of flocking behavior in swallows and are supported by our observations.—JON C. BARLOW and ERWIN E. KLAAS, *Museum of Natural History, University of Kansas, Lawrence, Kansas,* and JOHN L. LENZ, *Jackson Memorial Laboratory, Bar Harbor, Maine, February 7, 1963.*

**First Breeding Record of the Spotted Owl in British Columbia.**—Laing (Condor, 44, 1942: 175–181) reported taking a male of a nesting pair of Spotted Owls (*Strix occidentalis*) at Huntington, British Columbia, on May 31, 1927, but did not state how he knew the birds were nesting. Several other Spotted Owls have been reported or collected in British Columbia, but to the author's knowledge the following observations constitute the first breeding record of the Spotted Owl in this province. The area occupied by the family of Spotted Owls which I watched was limited to approximately one acre of forest on the north-facing slope of the Skagit River Valley, 5.4 miles west of Allison Pass on the Hope–Princeton Highway, in Manning Park, British Columbia. The forest was a mature mixed stand of *Tsuga heterophylla, Thuja plicata, Pseudotsuga Menziesii, Picea Engelmannii,* and *Abies amabilis* with very little underbrush. A few hundred yards to the south and east of the forest where the owls were seen was a burned area of several thousand acres.

Evidence that the owls were nesting in the area was first obtained on May 16, 1962, when an adult owl flew toward the author and his wife and landed in a tree 20 feet from them. An adult owl gave further evidence on June 7 when it struck the author a glancing blow on the shoulder with its talons.

On July 28 Gordon Orians and Christopher Perrins accompanied the author in a search for the owl's nest and for owl pellets. Two fledged young and one adult owl were seen. The young owls were able to fly but were a little awkward in regaining a perch. They had downy feathers on their heads and breasts at this time. On July 29 Perrins saw both adult birds.

The owl pellets found in the area contained the remains of the following mammals: five *Glaucomys sabrinus,* five *Peromyscus* sp., two *Zapus* sp., two *Ochotona princeps,* and one *Phenacomys intermedius.* There was evidence of one bird, *Loxia* sp.—CHRISTOPHER C. SMITH, *Department of Zoology, University of Washington, Seattle, Washington, December 10, 1962.*

**The Vocal Apparatus of Two South American Owls.**—In earlier studies of the vocal apparatus of American owls (Miller, Condor, 36, 1934:204–213; 37, 1935:288; Auk, 64, 1947;132–135) the syringes of eleven species of nine genera were examined. In 1958 I had the opportunity to preserve for dissection the syringes of the Mottled Owl (*Ciccaba virgata*) and the Andean Pigmy Owl (*Glau-*