

STURNIDAE. Starlings

LESSER GLOSSY STARLING (*Aplonis minor*).—A specimen of what was probably this species was collected by Dr. W. P. Stewart on September 23, 1945. It was one of several starlings in the crown of a coconut palm in a lowland area near Mercedes, Mindanao. Unfortunately, because the specimen was badly mutilated it was not saved. However, because of its small size, the strong violet iridescence of its plumage, and the lack of greenish iridescence, it very probably belonged to this species. It is regrettable that the specimen, regardless of its condition, was not saved, since specimens previously collected in the Philippines have come only from Mindanao's midmountain zone (Delacour and Mayr).

COLETO (*Sarops calvus*).—On August 11, 1945, a nest was discovered in a coconut palm at the San Pablo Airstrip, Leyte. The nesting hole was fifty feet from the ground, and was seven inches high, five inches wide, and circular in shape. The nesting material consisted only of coconut fibre. Two young birds were in the nest. Both were covered with dark pin feathers at about four weeks. The wattles were flesh colored. The young birds grew nicely, and, accompanied by their parents, left the nest on October 5, 1945.

NECTARINIIDAE. Sunbirds

YELLOW-BACKED SUNBIRD (*Aethopyga siparaja magnifica*).—Delacour limits this species to Cebu, Negros, Panay, Sibuyan and Tablas. For a period of three months (October–December, 1945) we observed this beautiful sunbird in most of the second-growth areas surrounding Tacloban, Leyte.

Zoological Society of San Diego
San Diego, California

NESTING BEHAVIOR OF THE POOR-WILL

BY ROBERT T. ORR

A GREAT deal of information remains to be gathered concerning the behavior of our North American caprimulgids, and few species, if any, have been the subject of intensive study. The Poor-will (*Phalaenoptilus nuttallii*) of western North America is one of those less known, although valuable contributions relating to its natural history have been published from time to time, in recent years notably by Elmer C. Aldrich (Condor, 37: 49–55, 1935). These have been admirably summed up by A. C. Bent (U. S. Nat. Mus. Bull. no. 176: 187–198,

1940). While the present account is brief, merely representing observations gathered incidentally during a two-week period of general avian field study at Lake Tahoe, California, in the summer of 1946, certain heretofore unrecorded facts pertaining to the behavior of this species are presented.

A Poor-will nest, if the pine-needle-matted earth on which two eggs were deposited may properly be referred to as such, was found by Gordon Kishbaugh, Ranger in charge of D. L. Bliss State Park, on June 10, 1946, and shown to the writer and his wife, Dorothy B. Orr, on the following day. Since it was within 100 yards of our camp, about one mile southwest of Rubicon Point, Eldorado County, it was possible to follow certain phases in the behavior of the nesting pair for the ensuing two weeks of our stay. Some difficulties developed during this period since the nest was very close to a public camp site, and on the several occasions that the camp was in use no observations were made.

The general region in which the Poor-wills were nesting was clothed with a high Transition forest, so characteristic of much of the lower western side of the Lake Tahoe basin, composed principally of Jeffrey pine (*Pinus ponderosa* var. *jeffreyi*), sugar pine (*Pinus lambertiana*) and white fir (*Abies concolor*). More specifically the locale consisted of a rocky knoll strewn with large granite boulders on the top of a long, broad ridge. Conifers of the species previously mentioned were scattered over the knoll but the nest itself was at the edge of a patch of huckleberry oak (*Quercus vaccinifolia*) in a small, log-strewn clearing. Clumps of brush, consisting of tobacco brush (*Ceanothus velutinus*), green manzanita (*Arctostaphylos patula*) and bush chinquapin (*Castanopsis sempervirens*), in addition to huckleberry oak, were scattered about the immediate vicinity.

On the evening of our arrival, June 10, the call of a Poor-will was heard intermittently between 7:30 p. m. and 8:30 p. m. to the west of camp and in the general direction of the nest. The next morning, at 3:45 a. m. a Poor-will was again heard calling. This was approximately at dawn and about five minutes before the Western Tanagers began to sing. Early that afternoon the nest was seen by us for the first time. Its situation was such that the sun only shone on the site at this time of day and even then the rays filtering between the small oak leaves cast a pattern so similar to that of an incubating bird that was present that, even when the exact position of the latter was known, it was impossible to distinguish it at a distance of more than fifteen feet. As we approached closely the adult flew up and disappeared behind a small group of boulders. Almost immediately it was

heard to call about six times. The eggs, two in number, were in a very slight depression on a carpet of pine needles, partly beneath the overhanging foliage of the oak bush.

On our returning to the nest several hours later, an adult was again seen on the eggs. That evening an individual of this species was heard calling regularly between 7:50 p. m. and 8:35 p. m., and again at 9:35 p. m. The number of times the *poor-will* call was repeated during any one period of vocal activity varied from three to twenty-five and the interval between successive calls averaged about one and one-half seconds. When calling commenced at dusk, the time between these series of vocal outbursts was of short duration, frequently only a few seconds. As it became dark, however, the periods of silence became increasingly longer. Judging from the utterances, which were believed to come from one bird, this individual ranged over a distance of several hundred yards along the course of a small 'draw' that circled the northern and western sides of the knoll on which the nest was situated.

At noon, on June 12, an effort was made to photograph the eggs. The incubating bird allowed us to approach within two feet before flying, then fluttered over the same clump of boulders as on the preceding day and was lost to sight. This time no call was uttered. An examination of the nest at 3:00 p. m. showed the bird to be absent. That evening a Poor-will was heard to give several calls at 8:20 p. m.

No observations were made on this species on June 13. The evening was exceedingly windy and no Poor-will calls were heard. The following day was equally windy and the presence of picnickers curtailed any observations. A brief glimpse at the nest, nevertheless, showed an incubating bird present at 3:00 p. m. At 8:15 p. m. the call of this species was heard from the same general vicinity as before. It continued intermittently, however, for only a few minutes.

On the evening of June 15 the call of a Poor-will was heard at 7:52 p. m., which was just before dusk. An immediate visit to the nest showed the eggs to be warm but unattended at the moment.

The presence of a camping party within twenty yards of the nest deterred us from examining it on June 16 and 17. The first evening call notes were heard at 7:53 p. m. and 7:48 p. m., respectively, on these dates.

On June 18 an incubating bird was flushed from the nest at 5:00 p. m. It allowed Mrs. Orr to place her hand within one foot of it, however, before it flew. After alighting between some rocks about twenty feet away, within plain sight of us, it called several times, then fluttered its wings as though to attract our attention or more probably to distract us from the eggs. The latter were as yet unhatched. While

the bird was performing, an Audubon Warbler, presumably one of a pair that was nesting in a near-by sugar pine, flew down to investigate. When the warbler came within about three feet of the Poor-will, the latter rapidly fanned its wings, thrust them far forward, then froze in a definitely defensive posture facing the smaller bird. The warbler retreated and, so as not to cause further disturbance, the observers did likewise. A brief glimpse at 5:50 p. m. revealed a bird on the eggs. The first Poor-will call was heard at 7:50 p. m. that evening.

Our absence on June 19 prevented any observations that day. On our flushing an adult from the nest at 3:00 p. m. the next afternoon, however, one of the eggs was found to have hatched; the two halves of the shell were lying about six inches from the young. The latter was fairly well covered with buffy down, possessing a slightly vinaceous tinge. It lay motionless, close to the unhatched egg, with the neck outstretched and the head resting on the ground. The eyes were closed and the young bird was silent. The adult flew to essentially the same spot as had the bird on June 18. After fluttering its wings for a few moments it rapidly protruded and retracted its large, dark, fleshy tongue a number of times. After this it flew up and over the rocks out of sight, although it was heard calling several times a moment later.

Having observed no more than one adult so far on any occasion, we decided that evening to learn more about the rôle enacted by both members of the pair. At 7:50 p. m., therefore, we concealed ourselves at the base of a large sugar pine about 100 feet from the nest. Our view of the latter was blocked by a fallen log and several small boulders but the top of the huckleberry oak bush, three feet above the nest, was visible. Five minutes later a Poor-will was seen to fly from the immediate vicinity of the nest, taking the same course as had been customary when an incubating individual was flushed from here in the daytime. It did not stop at the group of boulders about 20 feet to the north, however, but sailed between them, then turned to the west and headed down the 'draw' and alighted on the ground about 150 feet away. The *poor-will* call was repeated several times, after which the bird sallied a few feet into the air, seemingly after an insect, and returned to the ground near by. The call note was then repeated 25 times. Following this the bird flew about 50 feet to the southward and again alighted on the ground. A few moments afterwards it flew farther south along the side of the 'draw,' following the contour of the ridge, and was lost to sight. Several seconds later it was heard calling about 300 feet from us. The time was then 8:00 p. m. so, believing the nest to be unattended at the moment, we decided to determine whether or not the other egg had hatched. On approaching within

five feet of it in the fast waning twilight, we were surprised to flush an adult. This bird flew up from the nest, sailed about 25 feet away, and alighted on the ground where it fluttered its wings. Both in flight and after alighting it gave a soft, low note which might best be described as *quoit*. No sooner had this taken place than a second adult appeared, presumably the one that had been observed a few minutes earlier. Both birds appeared very alarmed at our presence and kept repeating the same note. They continually made short excursions into the air, frequently passing low over our heads and momentarily alighting within twenty feet or less of us, sometimes on the ground, sometimes on boulders or even fallen logs. Their eyes shone orange-red whenever the beam from a flashlight was turned upon them. A rapid examination of the nest revealed the one young and the remaining egg, as yet unhatched. The head of the young was raised this time. The remains of the egg shell that had been present earlier in the day were gone. We left immediately after our inspection, but the two adults escorted us for about 250 feet. They would fly a short way ahead, alight on the ground, and wait until we came to within a few feet of them, then repeat the performance. Their alarm notes, however, became less and less frequent the farther away we went.

The following day, June 21, we flushed an adult from the nest at 11 a. m. It alighted on the ground about 20 feet away, then flew to the top of a small boulder 10 feet farther on, where it rhythmically swayed its body from side to side. The eyes of the young were partly open. They probably could have been opened wide if necessary, but even adult Poor-wills, when disturbed in the daytime, rarely open their eyes more than half way. The remaining egg was pipped and a faint 'peeping' sound could be heard coming from it. As soon as we left, after taking a photograph, the parent was heard giving the characteristic *poor-will* call. The alarm note was never heard in the daytime.

That evening, at 7:40 p.m., we again concealed ourselves, this time behind a large rock 75 feet from the nest. A brooding bird was visible from this point. After a lapse of between 15 and 20 minutes, a patch of white was seen moving toward the nest. It was about three feet from the latter when first noticed and appeared to have come from the edge of an adjacent patch of huckleberry oak. Careful scrutiny in the dim light soon revealed the white object to be the throat patch of a Poor-will which was slowly waddling over the ground. When it reached the brooding bird one of them flew up and over the boulders to the head of the 'draw' about 100 feet away where it gave several calls and then was silent. This was believed to be the individual that had been incubating. In any event the remaining adult settled down

on the nest. No movements nor call notes were detected for the ensuing ten minutes. At the end of this time a slight motion on our part resulted in the appearance of the departed adult which sailed low over our heads, giving the alarm note, then alighted on a large rock about ten feet from us.

Mrs. Orr left our place of concealment at this time to investigate the nest while the writer remained hidden. When she approached to within a few feet of the brooding adult it flushed. A brief examination showed the second young to have hatched. The egg shell was close by and part of it was collected. Following this the observer left in the direction of our camp. One of the adults followed her, giving the alarm note and repeatedly flying up, then alighting on the ground ahead. Its behavior was similar to that participated in by both the Poor-wills on the previous night. The bird ceased calling and following her when she was approximately 200 feet away. After a brief pause she started to return part way to the nest to see what reaction might result. A Poor-will almost immediately appeared and the same alarm behavior was re-enacted. Meanwhile a flashlight, which had earlier been focused on the nest, was turned on, in so far as was possible without any perceptible motion or noise on the part of the writer. Within thirty seconds of the departure of the first observer and one of the birds, the other Poor-will was seen on the ground 15 feet from the young. It approached to within five feet of them by a series of hops, each one carrying it about one yard. The last five feet were accomplished by a slow clumsy waddle. Not wishing to further disturb the birds that evening, the writer quietly left.

A careful search of every square yard of the ground within a radius of 75 feet of the nest the following morning failed to reveal the presence of any Poor-will other than the incubating bird and the young. It was concluded that the second adult, if in the immediate vicinity, was more than 75 feet from the others.

That afternoon while I was trying to photograph the brooding adult, the subject flew up and fluttered to the usual place among the rocks near by. The young were six inches farther in under the overhanging cover of brush than they had been in the morning. After securing a photograph the observer concealed himself back of the same rock that had been used for this purpose the previous evening. In about five minutes the parent bird was seen to fly up suddenly, then drop to the ground in a zig-zag manner, landing in the shadow of a clump of chinquapin approximately 15 feet from the young. So rapid was this action that the bird could easily have been taken, by a casual observer, for a leaf being carried in a gust of wind. Furthermore, its coloration

blended so perfectly into the background that as soon as it alighted it seemed to disappear. Five minutes later, however, a slight movement was discerned beneath the edge of the chinquapin bush, about eight feet from the young. Although it was extremely difficult to see, it proved to be the adult slowly waddling back. It finally reached its goal and quietly settled down to brood.

That evening, at 7:45 p. m., we concealed ourselves much closer to the nest site. Mrs. Orr was about 20 feet north and the writer 32 feet west of young and brooding adult. We were both well hidden by low, sweeping branches of small white fir trees but at the same time were afforded full views of the nest site and immediate vicinity, each from a different position. At 7:55 p. m., a Poor-will flew in from a westerly direction and alighted on the ground three feet from the brooding adult. It remained motionless for several seconds, then looked around rapidly as though to determine whether or not any danger was near. Seemingly satisfied it then proceeded to bob its head up and down rapidly as it faced its mate. Each time the head went upward the white throat patch was prominently revealed, appearing almost like a signal. After bobbing about six times this individual waddled toward the brooding bird. The latter flew up when the approaching bird was within a few inches and disappeared over the boulders to the north. The new arrival then appeared to regurgitate food and transfer it to the young which could distinctly be heard calling. After each of the young had been given food several times, the parent settled down on top of them. Within six minutes the other adult returned, alighting on top of a large boulder about 25 feet away. During the next minute it sallied forth several times after near-by insects, returning in each instance to the same rock. Following this it circled over the nest, uttering three or four soft calls similar to the alarm note, then alighted on the ground close to the other. Waddling up to the brooding individual it proceeded to regurgitate and pass it food, then left. Within a few seconds it was heard to repeat the *poor-will* call nine times near by. Silence then prevailed for the following three minutes after which the bird returned, alighting on a rock for a few moments, then flying to the ground within a foot or two of the others. Again it went to its mate and seemed to regurgitate food. By this time the visibility was so poor that it was necessary to turn on a flashlight. This caused the pair to look about in a rather bewildered manner. The shine from their eyes was so bright that it was difficult to distinguish the outlines of their bodies. After a lapse of several minutes, the Poor-will that had returned with food waddled six feet away, then flew off. A slight motion on the part of one of the observers shortly

afterward caused the brooding bird to fly up, giving the alarm note. At this point Mrs. Orr left for camp and was followed by one of the birds for several hundred feet. Within a minute or so of her departure, one of the Poor-wills returned, circled over the flashlight, giving the alarm note, then landed on a near-by boulder. After a few seconds had elapsed, the other adult appeared and alighted on the ground about ten feet from the young. During the next five minutes the Poor-will on the ground regularly bobbed its head up and down, at the same time peering in all directions. The bird on the rock kept repeating the alarm note every few seconds, and occasionally flew about over the flashlight only to return each time to the same boulder. Finally all was silent and the adult on the ground flew to within two feet of the young, then waddled to them and settled down to brood. No activity, other than constant peering on the part of the brooding individual, was noted for the next 15 minutes. Following this the observer left.

Near-by picnic parties hampered observation on June 23 which was our last day. At 5:40 p. m., however, a brief inspection was made of the young. A brooding adult was flushed when an approach was made within four feet of it. This bird flew north toward the boulders and alighted on the ground 20 feet away. Here it extended its wings, occasionally fluttering them. This position was maintained until we left about one minute later. The young seemed definitely larger and gave the appearance of being more heavily clothed with down. One of them, when touched, opened its eyes and pecked lightly at the observer's finger.

SUMMARY

Observations extending over a period of two weeks were made on the nesting behavior of a pair of Poor-wills. The eggs, two in number, were in a slight depression on pine-needle-covered ground beneath the edge of a small bush in a forest clearing. They hatched on successive days, perhaps indicating that incubation begins with the laying of the first egg. The attending parent did not flush until approached very closely in the daytime, then usually flew a short way off and fluttered its wings to attract attention from the nest. Defensive posture was noted on one such occasion, when an Audubon Warbler came close. The young were fairly well clothed with buffy down at time of hatching and could open their eyes, at least partly, when one day old, possibly sooner. They were only observed being fed on one occasion and in this instance the food appeared to be regurgitated by the parent. The adults took turns at incubating and brooding. This exchange in regard to domestic duties was noted at dusk. The first evening meal

was administered by the newly arrived parent while the bird that tended the nest in the daytime gave the first evening *poor-will* call and seemed to assume the task of securing food for its mate. Although not observed, it seemed probable that the latter transferred food to the young. When one or both parents were disturbed at the nest at night, a soft alarm note was uttered and the intruder, upon departing, was followed for a distance of several hundred feet. In no instance was either of the parents seen to fly directly to the nest. The last few feet were accomplished on foot by means of a waddling walk. When the bird was returning in the daytime after being disturbed, the approach on foot was very slow. After dark it was made more rapidly and the distance traversed on the ground was frequently less. On one occasion all but the last five feet were covered by short hops. The white throat patch was seen to be displayed by at least one of the adults. The exact significance of this display is not known but it could have been for purposes of recognition. No attempt was made to distinguish the sexes of the adults.

California Academy of Sciences
San Francisco, California
October 25, 1946

THE FLIGHT OF SWALLOWS

BY CHARLES H. BLAKE

It has long been known that each of our swallows has its own distinctive manner of flight. The best comparative descriptions I have found (Chapman, 1932, and Bent, 1942) give rather correct impressions but are a bit lacking in circumstantiality. In these notes I attempt to put down the rate of wing flapping during coursing (the ordinary feeding sweeps), the duration and attitude of gliding, and the usual geometry of the feeding maneuvers for the six northeastern swallows. For part of the species I have data on other styles of flight. The method of measurement and the definitions of terms will be found in a previous note (Blake, 1947: 619-620). The figures of the gliding attitudes (Text-figure 1) are simply diagrams, not to scale and not pretending to any artistic merits.

I hope the material given here may serve as a stimulus, not only to further investigation in the swallows but in other families as well.

TREE SWALLOW, *Iridoprocne bicolor*.—The flight of the Tree Swallow is especially marked by its custom of sailing in rather small circles, 20 to 100 feet or more in diameter (*cf.* Chapman, 1932: 383). The