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---

LIFE HISTORIES OF  
NORTH AMERICAN CUCKOOS  
GOATSUCKERS, HUMMINGBIRDS  
AND THEIR ALLIES

---

ORDERS PSITTACIFORMES, CUCULIFORMES  
TROGONIFORMES, CORACIIFORMES, CAPRIMULGIFORMES  
AND MICROPODIIFORMES

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they were feeding. After a succession of heavy showers which occurred at this place early in July they suddenly and wholly disappeared. At San José del Cabo a few were seen at intervals through the autumn up to November 11, and several were observed near Santiago on December 3. \* \* \* It seems fair to assume that the December instance \* \* \* was not exceptional, and that at least a few birds regularly winter in the Cape Region. Mr. Frazar obtained a set of two eggs, slightly incubated, at Pierce's Ranch, on July 20.

We have no reason to think that the habits of the San Lucas night-hawk differ materially from those of the closely related form found farther north.

The measurements of 9 eggs average 25.6 by 18.8 millimeters; the eggs showing the four extremes measure 27.4 by 18.8, 26.0 by 19.8, 23.1 by 18.1, and 25.6 by 18.0 millimeters.

## Order MICROPODIIFORMES

### Family MICROPODIDAE: Swifts

#### NEPHOECETES NIGER BOREALIS (Kennerly)

#### NORTHERN BLACK SWIFT

#### PLATES 40-43

#### HABITS

I prefer to follow Ridgway (1911) in the use of the above common name. The name black swift properly belongs to the type race, *Nephoecetes niger niger* (Gmelin), which is found in the West Indies. Moreover, Baird (1858) and some other early writers called it the northern swift. The range of the northern black swift, as now understood, extends from southeastern Alaska to southern Mexico, including much of the Rocky Mountain region, Colorado, New Mexico, Nevada, and California. It breeds wherever it can find suitable rocky cliffs in which to nest, but as these are widely scattered its distribution is naturally spotty; however, its marvelous powers of flight carry it over a large expanse of country, far from its nesting area.

The northern black swift is somewhat larger than the type race, but it is apparently similar to it in coloration.

Baird (1858) states: "This remarkable swift was first indicated as North American by Dr. Kennerly (1857), in the proceedings of the Philadelphia Academy, where it is described as *Cypselus borealis*. It was obtained in the northern part of Puget's Sound, at Simiahmoo bay, the locality of the main camp of the Northwest Boundary Survey. A large flock was seen one day sailing about the camp, but, owing to the height at which the birds flew, only one specimen could be procured.



"It seems very remarkable that so large a swift could have remained unnoticed in North America until the present day."

J. K. Lord (1866) next reported it from British Columbia, saying: "Amongst the earliest of these visitors I noticed the Northern Swift (*Nephocætes Niger*, Baird). It was a foggy day early in June, and, the insects being low, the birds were hovering close to the ground. I shot four. The next day I searched in vain, but never saw the birds again until the fall of the year, when they a second time made their appearance in large numbers—birds of the year as well as old ones."

On June 23, 1868, Ridgway (1877) "found it abundant" in the valley of the Carson River, Nev.; "they were observed early in the morning, hovering over the cotton-wood groves in a large swarm, after the manner of Night-Hawks. \* \* \* They were evidently breeding in the locality, but whether their nests were in the hollow cotton-wood trees of the extensive groves along the river, or in crevices on the face of a high cliff which fronted the river nearby, we were unable to determine on account of the shortness of our stay."

Frank M. Drew (1882) discovered this swift at Howardsville, Colo., and collected a series of ten birds in 1880 and 1881; he says that "they always hunt in flocks, range far above 13,000 feet and breed up to at least 11,000 feet." During the next two decades it was noted as a migrant in New Mexico and in California; but the mystery of its nesting habits was not solved until 1901, nearly 45 years after its discovery as a North American bird.

*Spring.*—It is as a spring and fall migrant that the northern black swift is usually observed, as it covers a wide expanse of territory in its movements to and from its more restricted breeding grounds, often occurring in large scattered blocks, feeding more or less on the way, and giving an interesting exhibition of its great powers of flight. Samuel F. Rathbun (1925) has published in detail his numerous observations on the migrations of this swift in the vicinity of Seattle, Wash., to which excellent paper the reader is referred. He writes:

During the vernal migration in the region about the Sound the first Black Swifts will be seen sometime between the fifteenth and the twenty-fifth of May. Quite frequently during the latter half of this month there will occur a spell of foul weather, and the arrival of the birds seems to be coincident. When this fact was first noticed it was regarded as incidental, but as it occurred with a degree of regularity our attention became attracted to it and we then gave the matter especial attention. Soon after the first of May we began to closely follow the weather conditions of this region and also those existing far southward, and after a time a good idea was obtained as to when to expect the arrival of the Swifts. In fact, on several occasions our expectations were confirmed almost to a day. \* \* \* From what we have seen of this spring movement it appears to be soon completed, not lasting much more than ten days.

*Courtship*.—The courtship of the black swift and apparently copulation also are accomplished on the wing. Mr. Rathbun (1925) says:

Black Swifts appear to mate in June. There is no sign that this has taken place when they arrive in May, as then the birds are always seen in companies and not in pairs as is subsequently often the case. But soon after they have become distributed in colonies about the region and begin to make the daily flight to and from the lower country, indications of mating are seen. All may be gliding about when suddenly—perhaps from a far height, a Swift will dash at one beneath, this followed by erratic flight actions on the part of both and their disappearance in the distance. This dive I have seen made with such speed that the eye could scarcely follow it, and during the time that the birds are darting and twisting about it is a common thing for them to descend almost to the ground.

He says, in some notes sent to me: "On one occasion the latter part of June, I saw a pursuit by one black swift after another that lasted a full 15 minutes. This was the longest of any we ever observed, and we have seen many of them."

*Nesting*.—The honor of discovering the first nest of the northern black swift belongs to A. G. Vrooman (1901), who relates the historic incident as follows:

On the morning of June 16, 1901, I, with a companion, started out with the intention of taking a few sets of Cormorants' eggs on the cliffs a few miles west of Santa Cruz, California. On reaching the locality, I noticed a pair of Black Swifts flying about over the cliffs, much lower than they usually fly. One bird rose high in the air and struck off in a bee line, at the rate of a mile a minute. I then resumed my search for the Cormorants, which I found on the face of the cliff, where shore line turns sharply inland and about where the Swifts had been seen. \* \* \*

After moving my ladder a little, I proceeded to reach out and down for a more distant set of Baird's Cormorant eggs when suddenly, right from under the pole and not more than three or four feet from my hand, a Black Swift flew out and down toward the water and passed around the angle toward the ocean. It did not rise above the cliff, in the immediate vicinity, as my companion above the cliffs did not see it at all, though I called to him to watch if it came above.

I then moved my ladder a little closer and went down farther so that my face was about a foot and a half from the egg which the Swift had just left. It was placed on a shelf or crevice in the lower edge of a projection standing out perhaps four or five feet from the main wall and about ninety feet from the breakers below. This crevice was four or five inches high, five or six inches deep, and about twenty inches long, very narrow at one end, and about thirty feet from the top of the cliff, twenty feet of which is earth sloping back to the level land above. This portion of the cliff was wet and dripping constantly, causing tufts of grass to grow here and there, where there was earth enough to support the roots. It was just behind one of these tufts of grass, in a slight depression in the mud, formed no doubt by the bird, that the egg was laid. I did not disturb the egg or nest, not going nearer than a foot and a half, intending to return a week later to get possibly a full set, which I did, but found things just as I had left them a week before and no Swifts were in sight. I took the egg, and peeled off the nest, grass and all, and have it in my collection.



Mr. Vrooman's report of finding the black swift nesting in crevices in sea cliffs and laying only one large egg was received with incredulity by many ornithologists. The generally accepted theory was that the bird would be found nesting in cliffs in the mountains, as indicated by Major Bendire's observations on the upper Columbia River in 1879; here, he reported (1895) "quite a colony nested in a high perpendicular cliff," which "was utterly inaccessible, being fully 300 feet high." Others had seen the swifts in similar localities elsewhere, where they were doubtless breeding, but no one had ever actually seen a nest. The incredulous ones thought that Mr. Vrooman must have found an egg of some small petrel, rather than that of the swift. Mr. Vrooman remained silent over the skepticism but kept steadily at work every season, sometimes without success, and eventually collected enough eggs to convince his critics. There are six eggs and one nest of this swift in the Thayer collection in Cambridge, all from Mr. Vrooman, including the type egg and nest; the latter is a clod of mud, rather deeply hollowed, and now dry and hard, with the tuft of dried grass in front of and partly surrounding it.

Many years passed before we learned anything about the inland nesting habits of the northern black swift, and, strangely enough, the first report came from a locality that is not included in the Check-list range of the species. This report came to me in a letter from Clarence E. Chapman, who discovered a nest in Johnson Canyon, near Banff, Alberta, on September 2, 1919. He describes the incident so clearly and convincingly that there can be no doubt about it. His letter states: "A walk of a mile brought us up through a lovely, small canyon to the falls; the upper canyon, just below the falls, was crossed by a high footbridge. While I was standing on this bridge, my attention was attracted by a bird flapping its wings under and against the overhanging rock wall. Mrs. Chapman and I each had high-power glasses (8 diameters). We saw a young black swift, not quite ready to fly, and close watching showed that it was exercising and strengthening its very long wings; it could not fly, as its feathers near the base were still covered with the scaly sheaths. The nest was built in a niche in the overhanging wall; the niche was about 18 inches long, 18 inches high, and 8 inches deep at the lower part; it was evidently made by a bit of rock being broken out by frost; the bottom of the niche sloped downward. The nest was a semicircle, not much more than a dam to prevent the egg from rolling out; we could not determine what the nest was made of, but considerable mud was used."

The nest was within 20 feet of Mr. Chapman's face, and within 30 feet of the fall, close enough to have the spray blow over it in certain winds. The single black young, clinging to the rock wall and to the

edge of the nest, and flapping its long wings, which projected well beyond the end of its tail, could hardly be anything but a black swift.

The next account comes from Charles W. Michael (1927), who, on July 6, 1926, discovered a colony of northern black swifts, containing at least six pairs, nesting in a canyon in the Yosemite Valley, Calif. He writes:

In the inner chasm of the Tenaya Gorge a hundred paces beyond the "wedged boulder", where vertical walls rise two hundred feet or more, the swifts had chosen a nesting site. The nest was placed on a bit of projecting rock which presented a level space of perhaps four by six inches. The projection was located within the shelter of an overhung wall, thirty feet directly above a deep pool in the creek. Towering above the nest the cliff rose sheer for a distance close to two hundred feet. The inner chasm is here very narrow; the vertical walls stand not fifty feet apart. The channel is dark and cool; in the long summer days the sun lights its depth for but a brief hour. And at no time or season does the sun ever play on the nest of the swift—cramped quarters, I should say, for birds of the wide skies.

It was the wild, erratic wingings of a lone Black Swift, as he whizzed back and forth through this narrow flight lane, that first attracted my attention. \* \* \* While I watched, the bird suddenly swooped and fairly seemed to plaster himself to the wall not fifty feet from where I stood. Then, with fluttering wings the bird moved upward—not straight upward, however, but in an angling course across the face of the cliff. As I followed the movements of the swift the nest was suddenly descried. The swift paused, clinging to the projection that held the nest, and I thought at first that he was feeding young. After a moment he scurried on upward a few feet, fell backward, and then twinkling wings carried him away down the channel. \* \* \*

As for the nest itself, as best I could see it, it resembled in form and construction that of the Western Wood Pewee; but in size it appeared larger. Also it reminded me of certain cormorant nests I have seen plastered to the ledges above the sea. The general appearance of the structure, its apparent adhesion to the shelf, and the droppings plastered to the granite immediately below, led me to suspect that the nest may have been occupied through several nesting seasons. The rock wall roundabout was absolutely bare and dry. There was not a growing plant within ten feet of it.

Of a later visit, July 11, he says:

Beyond the "wedged boulder" I moved cautiously, but before I had come within sight of the nest a swift was seen to leave the wall and dash down the canyon. I was afraid that I was not to find the swift at home, but as I came opposite the site, there was the bird in plain sight. She sat on the nest with her tail appressed against the wall and with one long wing drooping over the side. Her body rested in a horizontal position and she appeared much too large for the nest.

While I was watching the bird a second nest was discovered. The second one was tucked away in a niche and, but for the droppings below, it would hardly have been noticed. The nest was a little round cup, shallow, and composed, apparently, of some soft, brown material like dry leaves; the rim was tinted slightly green. On a later visit, with assistance and encouragement from "Big" Con Burns, I managed to climb to a point within eight feet of the nest. And then it was learned that the nest was composed of the delicate pinnae of the five-fingered fern. Great banks of these ferns hung from neighboring walls,

and it would be quite possible for the swifts to procure material while on the wing. Perhaps, though, the swifts may gather nesting material while clinging to a wall, as I have often seen swifts alight on a ferny ledge above Vernal Fall. In any event, this nest was rimmed with fresh green leaves.

Another nest was later discovered near these two, all three within a radius of three feet. Three other nests were discovered later in the same canyon. Summing up his experiences, he says:

I now feel that I have the system for locating Black Swifts' nests. Knowing the precise requirements demanded by a nesting swift, the thing to do is to find the locality that approximates these requirements. \* \* \* What really simplifies the problem is the scarcity of suitable nesting localities for Black Swifts. There must be cozy niches in which to place the nests, and these niches must be so situated as to afford complete protection against rain, wind, and sunshine. Perhaps, too, there should be many of these niches, that nesting swifts may have nesting neighbors.

Then comes Emily Smith (1928) with her report of finding three nests of black swifts close to and behind Berry Creek Falls in a not very remote canyon in Redwood Park, Santa Cruz Mountains, Calif. The first nest seen "was not behind the falls, but a little to one side in a niche twenty feet above the pool which lies at the base of the sheer seventy-foot cliff. \* \* \* I could not get closer than the edge of the pool, but from there the nest thirty feet away was in plain view, a thick, round mat of moss and possibly some mud, set in an almost square little niche in the rock wall. The wall roundabout, covered with mosses, five-finger ferns, and other moisture-loving plants, was dripping wet."

The other two nests were behind the falls, one only 8 feet above the pool, and the other much higher up and "hardly more than ten inches back from the main stream of the falling water. Some of the moss of which the nest was constructed appeared green and living, giving the nest a cushiony look."

Joseph S. Dixon (1935) records the first nests found in the southern Sierra Nevada:

We found three nests, but there probably were others in the vicinity, since over a dozen Black Swifts were seen. The three nests were located within a linear distance of twenty feet, so that the species might reasonably be said to have colonial nesting habits, at least in this instance. The nest site was located in the deep granite gorge of the Marble Fork of the Kaweah River. All three nests were located in a shallow cave that had been formed by the falling of a section of the cliff, leaving a broad arch about thirty feet in height. The bare, wet, dark granite wall rose precipitously above a deep pool beside a waterfall, spray from which kept the entire surroundings drenched with mist.

In all three instances the swift nests were made of green resurrection moss, pressed down but not stuck together with saliva, and were placed on and supported by a clump of fragile five-fingered ferns. The first nest was a firm, mossy cup placed about eighteen feet above the water. This nest measured outside 3 by 4 inches in diameter and was 3 inches high. The trampled-down shallow cup was empty, the young bird evidently had just left the nest [August 7].



The latest nesting record comes from Albert Ervin Thompson (1937), who found a nest "near the western boundary of General Grant National Park in Fresno County, California, in the Transition Life Zone at an elevation of five thousand two hundred feet above sea level in the Sierra Nevada Mountains." He says further:

The narrow mountain gorge in which the nest was found is forested with tall sugar and yellow pines, white fir, incense cedar, and giant sequoia, and, because of a steep slope to the northwest, receives very little direct sunlight except during a brief portion of the afternoon. At other times only random shafts of light find their way among the trees.

The nest was built in a hollow of a granite wall, sheltered by an overhanging projection of rock. It was about six feet above the bed of a mountain brook and not more than twelve feet removed from a rushing cascade that boiled down a chute from a cliff above. Because of the smoothness of the sheer face of the rock, the situation was inaccessible to snakes and small mammals. The nest was formed by moist mossy material, imbedded in a natural growth of the same plant. Seeping water and spray from the waterfall kept the site continually moist. For this reason the nest was at first mistaken for that of a water ousel. One egg was laid, but after it hatched the young bird mysteriously disappeared, perhaps devoured by an enemy.

*Eggs.*—The single egg of the northern black swift is usually, in the six specimens that I have examined, elliptical-ovate in shape, though some are nearly elliptical-oval. The shell is smooth but without gloss. They are dull, pure white in color, but one is somewhat nest-stained. The measurements of 34 eggs average 28.6 by 19.0 millimeters; the eggs showing the four extremes measure **31.5** by 18.3, 28.0 by **20.6**, 24.5 by 19.5, and 28.5 by **17.8** millimeters.

*Young.*—Nothing seems to be known about the period of incubation or to what extent the two sexes assist in incubation and the feeding of the young, though it seems to be assumed that the female does most of the brooding and feeding. All observers seem to agree that the young swift is fed at infrequent intervals, mainly early in the morning and late at night. Mr. Michael (1927) says: "Most young birds receive food every few minutes, but here we find young birds that go for hours without food. Raking the skies all day long, the old swifts probably return in the evening to pump their young full of concentrated nourishment." Many hours of patient watching yielded very little information on this point, but on August 15—

at 12:30 an old bird arrived. She flew up the canyon and alighted directly on the edge of the nest. Clinging here with her tail appressed and one long wing spread out across the surface of the wall she apparently pumped food into the young bird. She appeared to fairly stuff the young one, pumping food into him ten times in twenty seconds with but slight pauses between times. At first the young one was very eager and squirmed with delight while being fed. Soon, however, he was full and had to be coaxed to take the last two or three helpings.

When through feeding her young one, the mother bird crawled up onto the nest and the young one squirmed and twisted until his head was quite snuggled

under his mother's breast. Not an audible sound was uttered during the meal, but just before the parent bird departed she uttered two sharp, squeal-like notes; and then three more as she tumbled backward into space to speed off down the canyon. The young bird stretched and preened and once more settled down. \* \* \* I believe that the female takes upon herself all the duties of incubation and of the feeding of the young.

Miss Smith's (1928) observations at Berry Creek Falls corroborated Mr. Michael's statement that the young birds can, and do, go long hours without food. She writes:

On each visit my chief interest was in finding out how often and when the young birds were fed. Unfortunately, I was not able to spend a whole day with the swifts until August 25, and then the youngest bird was more than two weeks old. I had not seen Primus (so named because he was first discovered) fed during my four previous visits with him. I had, however, seen Secundus fed at about four o'clock in the afternoon, and again the next morning at half past nine. I suppose being a very young bird he was fed more than once on each of these two days. But August 25 they all were fed only at nightfall. That day my sister and I managed to cover the four and one half miles from camp to the falls before a quarter past five o'clock in the morning. As we approached we heard soft, low cheeping notes, and then in the dim light saw birds circling and darting about in the small amphitheatre in front of the falls. It was impossible for the eye to follow them or count them, they flew so swiftly and the light was so faint. One could be seen chasing another, and then we could see several fluttering up the cliff and disappearing behind a log, and almost immediately half a dozen swept by us. By half past five, before it was light enough to see clearly, every bird had left. From then until sunset not one of the swifts returned.

Just before sunset Primus backed out of his nest, and clinging to the threshold of the niche, exercised his long wings. Seven times he vibrated them, with short intervals of rest during which his wonderful wings were stretched wide against the rock. Suddenly, a swift, surprisingly light gray in color, "plastered" itself against the wall below Primus, and motionless watched us for fifteen minutes. Primus, seeing no reason for concern about us, scrambled back onto the nest and waited patiently for his meal. Finally the old bird fluttered up and for two minutes in the fading light we could see it feeding the young one by regurgitation. Then the other parent arrived, darker and seemingly larger, and immediately we guessed it was the mother. She fed the young bird for four minutes with only very short pauses, while the father looked on.

Mr. Dixon (1935) says of the young swift that he observed in Sequoia National Park: "The outstanding feature of the young swift was his aversion to light. He always turned around in the nest so as to face the darkest corner. Another feature was the ease and tenacity with which he clung to the nest with his sharp, strongly-curved claws. When placed against a vertical granite cliff, he had no trouble clinging by one foot, but tucked his head down to avoid the bright light."

*Plumages.*—Mr. Dixon (1935) says that a recently hatched chick was "bluish black in color. Its eyes were closed, and there was not a bit of natal down on its body." An older young bird, found dead



in a nest on July 25, 1912, and now in the Thayer collection, is completely covered with long, soft down, "dusky drab" to "blackish brown"; the down is longest on the back and rump and shortest on the head; the wing coverts are growing, and the primaries have burst their sheaths for over a quarter of an inch.

Frank M. Drew (1882) estimates that four years are necessary for the black swift to acquire its fully adult plumage, which hardly seems likely. Based on a study of ten specimens, collected in Colorado, he describes the succession of plumages as follows:

A young male of the year, taken Sept. 17, was marked as follows. General color dull black, every feather tipped with white, scarcely appreciable on upper back and throat, broader on upper tail coverts and rump. Crissum almost pure white. In birds of the second year the general plumage has a brownish cast; feathers of back tipped with brown, the head whitish, belly feathers yet broadly tipped with white. The third year the color is black, with a very faint edging of white on under tail coverts. In the fourth year pure black, forehead hoary, neck with a brownish wash.

Tail in young of first year, rounded; in second year, slightly rounded; in third year slightly emarginate, feathers becoming more acute. In adult, forked, outer feathers three-eighths of an inch longer than inner.

I have never seen a young black swift, with "every feather tipped with white," but I am inclined to believe that Mr. Drew is correct in describing this as the juvenal plumage. The juvenal plumage apparently has never been described in the manuals, and probably there are no specimens in young juvenal plumage in collections. The downy young, described above, has the incoming feathers of the wing coverts, and the remiges tipped with white. Enid Michael (1933) had a young black swift brought to her on August 10, 1932, that had fallen out of a nest and was unable to fly; from what she had previously learned from her study of young swifts in their nests, she estimated that this bird was about five weeks old; and she says: "Every feather on its back, tail, wings and crown was daintily tipped with white. The tiny feathers of its crown and forehead, being fringed with white, gave its crown, and especially its forehead, a frosted appearance." Mr. Rathbun has sent me the following description of a young black swift picked up dead in the Willamette Valley, Oreg., September 20, 1924: "Seemingly an immature bird—not in good condition of preservation. Back and abdominal feathers tipped with grayish white. Head from bill to crown also with grayish-white-tipped feathers. Primary wing feathers edged in grayish white. Length 7 inches." From the above descriptions, and from what shows in the few published photographs of the young swifts in the nests, it seems fair to assume that the juvenal or first plumage is characterized by the white tips of the body plumage, above and below, and by the white-tipped primaries. How long this plum-

age is worn, or how soon the white tips wear away, we do not know; but evidently this plumage is worn until after the birds leave for the south.

Considerable discussion has occurred and much has been published on the plumages of the black swift, particularly on the significance of the white spots on the under parts, as sex characters or age characters.

Mr. Ridgway (1911) evidently considered this a sex character, for he says: "All the sexed specimens examined by me, from whatever locality, show that all those with white-tipped feathers on posterior under parts are females and all those without these white-tipped feathers are males." This is not so in a series of 42 specimens, of various ages and sexes, that I have examined. More than one-third of all the birds that showed conspicuous white spots, or more or less white tips, on the feathers of the abdomen and under tail coverts are sexed as males, and less than two-thirds are sexed as females. Perhaps this character is more persistent in females than in males.

Mr. Drew (1882) implies that the sexes are alike in all plumages, and says: "In birds of the second year the general plumage has a brownish cast; feathers of back tipped with brown, the head whitish, belly feathers yet broadly tipped with white." He seems to be substantially correct on both of these points. The white-spotted birds that I examined were collected mainly in June, though two were taken in May, two in July, and one in August. All these birds have square, or slightly emarginate, tails; and none of them white-tipped remiges, which are characteristic of the juvenal plumage, as indicated above. They could not be young birds of the year, for the young birds of the year were still in the nests at the time nearly all of these birds were collected. They agree perfectly with Mr. Drew's description of the second-year bird, and I am inclined to think that that is what they are. They are numerous in collections, as perhaps immature birds may be easier to collect than adults. If this assumption is correct, then the conspicuous characters of the second-year plumage are the absence of white tips on the remiges and the presence, in varying degrees, of white spots or tips on the feathers of the abdomen and under tail coverts. This assumption has been made after giving due consideration to all that has been published on the subject and a lot of data from and correspondence with my friend S. F. Rathbun; he has made an extensive study of the black swift for many years and is inclined to agree with Mr. Ridgway; but it seems to me that all the evidence fits into the theory advanced above and agrees with Mr. Drew's (1882) idea of a second-year plumage.

Mr. Drew's statement, that "four years are necessary for them to acquire their complete plumage," seems open to question. He says

that in "the third year the color is black, with a very faint edging of white on under tail coverts." There is great individual variation in the amount of white on the under parts of immature birds, probably due to wear or earlier or later molting in different individuals. It seems fair to assume that the "very faint edging" referred to by Mr. Drew may be only evidence of further advance in second-year birds. Apparently these swifts molt their contour plumage, perhaps their wings and tails, during the early summer. Mr. Rathbun tells me that he has always noticed that summer specimens "appear to have almost fresh plumage"; and Harry S. Swarth (1922) says that the birds he collected in the Stikine region, between August 19 and 30, "had entirely finished the annual molt and were all in the new plumage."

In the adult plumage the sexes are very much alike in coloration, though females average somewhat paler and browner on the under parts, and the female tail is not so deeply emarginate as that of the male. Mr. Drew (1882) says that in the adult the outer tail feathers are three-eighths of an inch longer than the inner feathers, giving the tail a forked appearance; this is undoubtedly true of fully adult males, and perhaps of some very old females. Mr. Rathbun tells me that he can usually distinguish the two sexes in flight by the extent to which the tail is emarginated. In the series that I have examined all the young white-spotted birds have square or slightly emarginate tails, all the adult males have deeply emarginate tails, and all the adult females have only slightly emarginate tails. Major Brooks, who probably has handled more black swifts than anyone in North America, wrote to Mr. Rathbun: "Swarth and myself, together with another observer in the last century, have carefully recorded that some females, probably about 10 percent, are absolutely indistinguishable from the adult male in every external character, emargination of tail, absence of white spots, etc." In a series of black swifts, collected by Mr. Swarth (1912) in southeastern Alaska in June and July 1909, "there is one female that in color and markings is indistinguishable from the males. \* \* \* Like the others, however, it differs from the males in having a square, rather than a forked tail." This particular female contained an egg, almost ready to be laid, so that there was no doubt about the sex.

Mr. Rathbun (1925) writes: "The males are larger and darker than the females. As a rule their sooty underparts from the breast down lack any trace of light tipping on the feathers, and when this does occur the tips are of a brownish tint and very faint. In all our males the under tail coverts are tipped with brownish, rather well defined though much obscured in some individuals. There is a large variation in the amount of hoariness on the forehead."



He tells me that this swift has a complete molt during summer and is in full fresh plumage before leaving in fall.

*Food.*—The northern black swift feeds entirely on the wing, where it is very successful in catching the flying insects, on which it feeds exclusively; it captures a great variety of insects, and anything in the way of aerial insect life seems to be acceptable to it. Mr. Rathbun (1925) publishes a detailed list of the contents of six stomachs, collected by him near Seattle between June 22 and September 7 and reported on by the Biological Survey. The list is too long to be included here. The stomachs were reported as all full and all containing 100 percent animal matter. Prominent among the contents were caddisflies, Mayflies, crane flies and various other flies, a variety of beetles, many termites and flying ants, numerous plant lice, leafhoppers, treehoppers, wasps, and a few moths and spiders.

Clarence Cottam has sent me the following notes on the contents of 36 stomachs of this swift, as analyzed in the laboratory of the Biological Survey:

"Both in frequency of occurrence and in total percentages of volume, ants, bees, and wasps (Hymenoptera) appear to be the dominant food items taken by the black swift. Ants of the genus *Lasius* were consumed by 6 of the 36 birds here considered and comprised 90 to 100 percent of the total content, averaging about 150 individuals per stomach. The paper wasps (*Vespula*) were ingested by one-sixth of the birds and formed 51 to 87 percent of the food. Traces or small percentages of the Ichneumonidae, or parasitic wasps, occurred in the majority of the stomachs.

"Flies (Diptera) were a close second in importance and formed at least a trace in most of the stomachs; in many they made up 70 to 95 percent of the total content. The principal types met with were the long-legged flies (Dolichopodidae), flesh flies (Sarcophagidae), root maggots (Anthomyiidae), crane flies (Tipulidae), midges (Chironomidae), Ephydriidae, and the grass-stem maggots (Chloropoidae). In a series of six birds from King County, Wash., flies of nine genera made up 100 percent of the contents.

"Many species of beetles (Coleoptera) were encountered in the food items, but most of them made up only minor percentages or traces, and in only a few cases did they amount to as much as 6 percent of the total. The chief families of Coleoptera taken were the ground beetles (Carabidae), rove beetles (Staphylinidae), weevils (Curculionidae), leaf beetles (Chrysomelidae), click beetles or wireworms (Elateridae), and scarab beetles (Scarabaeidae).

"Large termites, or white ants (*Termopsis angusticollis*), also known as Isoptera, were the principal items consumed by four of

the 36 swifts and comprised 70 to 99 percent of the contents, with numbers per stomach varying from 15 to 90 individuals. Mayflies (Ephemeridae) and caddiceflies (Trichoptera) were also taken at times and formed 5 to 35 percent of the content."

*Behavior.*—Mr. Rathbun (1925) writes admiringly of the powers of flight exhibited by the northern black swift:

In all its flight actions this Swift shows a power and an easy grace that win our admiration. It seems to live upon the wing, and to restrict its flight most of the time to a considerable elevation, the height being seemingly influenced by the character of the weather. It is generally the case that during the continuance of a low atmospheric pressure the Swifts will not fly very high, but when this condition ceases they then ascend. At the time of high pressure the Swifts are often at a great height and it is not uncommon to see them gliding at the very limit of vision. At such times so high are some of them that even with the aid of field glasses they show but faintly against the sky. It would be mere surmise as to the height that they attain, several thousand feet certainly, and as some have even disappeared from view, when the glasses were in use, one has no knowledge of the height to which they go. On a bright summer day to see these dark birds circling far above is always captivating. Should the sky happen to have clouds some of which are white and shining, the Swifts as they wheel across their glistening surfaces, are plainly outlined, but seem to fade insensibly from view when in turn they cross the open spaces of the sky. At such times it is the constant shifting view with the seeming change in distance of the gliding Swifts that adds to our interest when watching them. \* \* \*

But this bird has also the power of very rapid flight. Infrequently it happens near the close of day that some will be seen hastening to their mountain retreats, at such times being widely scattered and flying rather low. With strong and rapid wing beats an almost direct course is followed, and but a few seconds elapse from the time one is first seen until after passing it fades from sight in the distance. And when thus observed in full flight, the power shown for fast flying never fails to impress the beholder.

The position of the Black Swift's wings as it glides or circles is dihedrally down. We have never seen any variation from this, and in this respect a contrast is shown by our *Chaetura*, whose wings are often highly elevated when sailing short distances or on entering their nesting places or roosting resorts. This wing position of the Black Swift seems worthy of mention, although it may be possible that it varies at times under conditions with which we are not familiar.

He mentions in his notes an occasion on which the swifts were flying low; he was crossing Lake Washington in a row boat on a rainy day in June: "While crossing, we noticed very many of these birds flying about at quite a low height above the water. Two were taken, and then we proceeded on our way. It was not long before a heavy rain began to fall and this hastened our return; but, when we reached the spot where first the swifts had been observed, suddenly on all sides of the boat were numbers of the birds hawking about quite close to the water's surface, some flying past not more than fifteen or twenty feet away."



Referring to the summer movements of the swifts, about Seattle, Wash., he writes (1925):

The Swifts that remain in this region undoubtedly nest far within the Cascade range, and each morning from their chosen retreats make a trip to the lowlands where they seem to stay most of the day. \* \* \*

By the middle of June, the Swifts instead of associating in such large numbers seemed to have separated into colonies of varying sizes, each of which, during the summer months, appears to follow a certain more or less defined route every day, which the birds used each morning when flying from their mountain resort to the lower country, returning over it with equal regularity as the evening drew near.

These journeys have the appearance of being long excursions, but the wide distances mean little to this Swift with a power of flight to which there seems but little limitation. The valley of the Middle Fork of the Snoqualmie River, some thirty miles almost due east of Seattle, is one such route that we have noticed the Swifts following; and here at various times during several summers we have watched the daily flight of a colony of these birds that numbered nearly one hundred and fifty.

In a valley of one of the mountain rivers, on an afternoon in June, Mr. Rathbun observed a flight behavior, which he describes in his notes as follows: "No swifts were seen until about 5:30 p. m., when a few flew by widely scattered. At 6:30 p. m., more swifts began to straggle past. While watching them, I noticed a dark, dense cloud moving slowly toward where I stood. I expected to see some swifts in company with it. I was not disappointed. There were about 50, and it was of interest to see them gliding around in advance of and below the cloud. By their actions it looked as if they were feeding, and all kept pace with the slow movement of the cloud. None of the swifts were below 400 feet, some much higher. As the cloud passed the swifts kept company with it; and then followed an interval when none were seen. Half an hour or so later another of the heavy clouds rolled up from the west. Only a short distance in front of it were more swifts circling, these soon followed by others gliding about beneath the cloud. In this flight were at least 60 of the birds, and, as in the first instance, they moved along with the cloud until lost to our sight."

M. P. Skinner has sent me the following notes on a flock of swifts that he watched at the Vernal Falls in the Yosemite Valley: "After circling once or twice around at the falls, they flew down the canyon below for half a mile with great swiftness, then whirled in a circle and came back. They repeated this over and over again. They kept in the early morning shade as long as I watched them. Periods of wing beating alternated with gliding on set wings, and both periods varied very much in length."

Ralph Hoffmann (1927) says: "The flight of the Black Swift is amazingly swift; it includes sudden sharp turns, steep downward

plunges and hurried upward flights. The long, narrow wings at times 'twinkle' rapidly, or when the bird is sailing, are either held uplifted over the back or curved downward with the tips well below the body. The tail is very slightly forked but in flight it is constantly spread and appears fan-shaped when the bird makes a sudden turn."

I can find no evidence that the northern black swift has ever been seen perching on a tree or wire, or resting on the ground; its regular resting places seem to be the steep, rocky walls, often dripping with moisture, such as they choose for nesting sites. Though their feet are small and light, they have very sharp claws, and are able to cling to the rough surface for long periods. Mrs. Michael (1926) has seen them clinging to the wet walls behind the Vernal Falls and near it. "From the distance of fifty yards the birds appeared to stick as limpets do to the wet rocks of a sea shore." But, on closer examination, she found that "they were not sticking to the wall as limpets, but their bodies were held slightly away from the wall, with not even their tails touching." With one bird, she noted that "his strong toe nails were hooked to some tiny support and his entire tarsus rested firmly against the wall, thus holding his body and tail free." Later (1933) she says of a young black swift that she had in captivity: "When climbing up a sheer surface the swift used its wings, feet, tail and sharply hooked bill. When in repose it lay flat on its belly in the manner of a poor-will. \* \* \* The legs seemed to have swivel joints, and it was strange to see the bird reach up its foot between the body and wing to comb its back and crown feathers."

*Voice.*—There is not much to be said about the voice of the black swift. All observers agree that it is generally a silent species; its note is seldom heard, except during the mating season and on its breeding grounds. Mr. Rathbun (1925) writes:

During its spring migration and shortly following, a period when the birds are associated in numbers, we have watched them for long spaces of time and always a perfect silence seemed to prevail among them. And this apparently is the case until the time comes when by their actions they show that they are mating. Even now their chatter-like note is but seldom heard, although invariably it is given at the time when one dashes at another, and this often proves the case when a pair may happen to fly in close company. During the midsummer we have heard their rapid notes as the birds passed in flight near the close of day, and in the autumnal migration when rarely one would make a quick dash at another. But these instances are uncommon and the species can properly be regarded as quite silent, being very different in this respect from the Chaeturine Swifts whose shrill twitterings are so frequent as they fly about. And the chatter of the Black Swift somewhat resembles that of the smaller ones; it being as rapid, but smoother in quality and more rolling, in fact rather pleasing to hear.

Grinnell and Storer (1924) describe its note as "a high-pitched twitter, not so shrill or long-continued as that of the White-throated Swift."

*Field marks.*—The black swift can be recognized by its size and coloration. It is the largest of the three western swifts. The white-throated swift, which most nearly approaches it in size, differs from it in having a well-marked and conspicuous pattern of black and white on the under parts, as well as the white rump patches, which show from above. The black swift appears wholly dark, except under certain conditions of reflected sunlight; the white markings on the immature bird are not conspicuous, except at close range. Vaux's swift is the smallest of the three and does not show in flight the slightly forked and fan-shaped tail of the black swift. Mr. Hoffmann (1927) suggests that "the beginner may take the much commoner Purple Martin for a Black Swift; the deeply notched tail, never spread like a fan, the habit of perching on stubs, the loud, musical notes and the difference in the sexes should readily identify the Martin." Grinnell and Storer (1924) state that, in the black swift, "the fore margin of the two wings as viewed from below is a double convex, and not a single continuous arc as in the White-throated Swift; moreover, the movements of the wings are more deliberate than in that species."

*Fall.*—Mr. Rathbun says in his notes: "The autumnal migration straggles over a more or less extended period. In the Puget Sound region it begins to take place soon after September 1, and it lasts three weeks or slightly more. I have observed this for many years, and the swifts do not pass by in the large groups that one will see in spring. Day after day in fall they straggle by in small numbers. Very often we have noticed that these groups were in multiples of three, which in our opinion would represent the parent birds with their single young. Invariably associated with the black swifts were the Vaux's swift, and if either was seen you could expect to see the other. And quite often, in company with both species of swifts, would be violet-green and barn swallows, all straggling past at odd times throughout the day."

In the Stikine region Mr. Swarth (1922) observed: "At Sergief Island, August 17 to September 7, black swifts were abundant, though seen only in cloudy or rainy weather. Then large flocks appeared, as many as seventy-five or a hundred being in sight at once flying over the marshes, the individuals moving about in wide circles, and the flock as a whole moving in a definite path. The birds sometimes flew very low, occasionally skimming along just over the tall grass. A flock would appear, circle about overhead awhile, and then vanish. About fifteen or twenty minutes later, others, or perhaps the same flock, would come in sight again."



## DISTRIBUTION

*Range.*—Western North America; closely related nonmigratory races are found in southern Central America and in the West Indies.

*Breeding range.*—The breeding range of the black swift extends **north** to southeastern Alaska (Portage Cove); and northwestern British Columbia (Telegraph Creek). **East** to British Columbia (Telegraph Creek, Hazelton, and 158-mile House); southwestern Alberta (Banff); probably western Montana (Libby, Glacier National Park, and Stryker); and southwestern Colorado (Howardsville). **South** to southwestern Colorado (Howardsville); and southern California (Cerro Gordo, Sequoia National Park, and Santa Cruz). **West** to California (Santa Cruz, Berry Creek, and Yosemite Valley); western Washington (Seattle and Bellingham); British Columbia (Chilliwack and Okanagan Landing); and southeastern Alaska (Boca de Quadra and Portage Cove).

*Winter range.*—Unknown. Despite repeated statements that this species spends the winter season in southern Mexico, an examination of the available data fails to substantiate the assertion, the dates of observation or collection being entirely within the seasons of migration. Accordingly, while it is possible that these birds do winter with the resident form in southern Central America, factual evidence is at present lacking.

*Spring migration.*—Early dates of spring arrival are: Baja California—San Telmo, April 30. California—Haywards, April 19; Grapevine, April 24; Yosemite Valley, May 11. Washington—Seattle, May 16; Simialmoo, May 27. British Columbia—Chilliwack, May 8; Courtenay, May 15; Lulu Island, May 25; Alberni, June 9.

*Fall migration.*—Late dates of fall departure are: Alaska—Sergief Island, September 7. British Columbia—Hazelton, August 29; Errington, September 20; Okanagan Landing, September 26; Courtenay, September 29. Washington—Bellingham, September 1; Seattle, October 7. Oregon—Albany, September 22. California—Santa Cruz County, September 13; Haywards, October 1.

*Casual records.*—Among the records of occurrence of the black swift outside the range as above outlined are the following cases: New Mexico, reported from Willis in September 1883 and noted at Lake Burford, on September 28, 1904; Arizona, seen at Flagstaff on August 18, 1920; eastern Colorado, two seen on July 8 and three on July 10, 1910, in Estes Park, several seen near Trinidad, July 8–14, 1892, while a specimen in the collection of George B. Sennett was labeled as taken at Denver on June 26, 1884; and Idaho, taken or observed on the Malade River on August 13, 1834. A specimen came

on board the S. S. *Antigua* on September 20, 1933, while the vessel was 84 miles off the coast of Guatemala.

*Egg dates.*—California: 27 records, June 16 to July 29; 14 records, June 24 to July 9, indicating the height of the season.

## CHAETURA PELAGICA (Linnaeus)

## CHIMNEY SWIFT

## PLATES 44-46

## HABITS

CONTRIBUTED BY WINSOR MARRETT TYLER

From its unknown winter quarters, somewhere in Central America or on the South American Continent, the chimney swift comes northward in spring and spreads out over a wide area, which includes a large part of the United States and southern Canada.

Individually the swift is an obscure little bird, with a stumpy, dull-colored body, short bristly tail, and stiff, sharp wings, but it is such a common bird over the greater part of its breeding range and collects in such enormous flocks, notably when it gathers for its autumnal migration, that as a species it is widely known.

The birds also have the habit of continual flight during the hours of daylight throughout the summer, and therefore keep always before our eyes when we look up at the sky. They exemplify speed and tireless energy; they sail and circle on set wings, then with flickering wing beats they are off in a burst of speed, shooting like an arrow through the air, chattering their bright notes as they race along—little arrows “cutting the clouds” over country, town, and woodland.

*Spring.*—Swifts move up into the northern latitudes only when spring is rather far advanced, not until their aerial insect food is plentiful well above the ground. Therefore their arrival varies a good deal from year to year.

Kopman (1915) reports that the average date of appearance in New Orleans is about March 18. In New England, in an average year, we do not expect the birds for fully 30 days after this date; hence we may infer that they spend a month in moving across a dozen degrees of latitude.

A daylight migrant, solely, so far as is known, we see the first arrivals of this swift commonly in the afternoon, sailing in small companies—perhaps only a single bird—often high in the air. As they fly along, they give an occasional chatter, or a few rather feeble chips, but with none of the energy and volubility characteristic of the breeding season. On cloudy days in spring, when the swifts dip down