between species supposed by some to be different, and by others identical. To give you some definite idea of what I would here impress upon your mind, I need only say that I have seen nests of the Barn or Chimney Swallow placed within buildings, under cattle-sheds, against the sides of wells, and in chimneys; that while some were not more than three inches deep, others measured nearly nine; while in some there was scarcely any grass, in others it formed nearly half of their bulk. I have also observed some nests of the Cliff Swallow in which the eggs had been deposited before the pendent neck was added, and which remained so until the birds had reared their brood, amidst other nests furnished with a neck, which was much longer in some than in others. From this I have inferred that nests are formed more or less completely, in many instances, in accordance with the necessity under which the bird may be of depositing its eggs.

HIRUNDO THALASSINUS, Swains. Syn. of Mex. Birds, Phil. Mag. for 1827, p. 365.

VIOLET-GREEN SWALLOW, *Hirundo thalassina*, Aud. Orn. Biog., vol. iv. p. 597.

Bill narrower than in the preceding species; wings extremely long, extending far beyond the tail, which is emarginate. Upper part of head deep green, gradually shaded into the dark purple of the hind neck; back rich grass-green, rump and upper tail-coverts carmine purple; a line over the eye, cheeks, and all the lower parts pure white, excepting the wing-coverts, which are light grey. Female with the upper part of the head and hind neck light greyish-brown, glossed with green; the back as in the male, the rump greyish-brown; lower parts white, anteriorly tinged with grey.

Male, $4\frac{1}{2}$, wing $4\frac{6}{12}$.

BANK SWALLOW OR SAND MARTIN.

+HIRUNDO RIPARIA, Linn.

PLATE L.—MALE, FEMALE, AND YOUNG.

Imagine, reader, how delighted I was when, in East Florida, in the winter of 1831, I found thousands of Bank Swallows gaily skimming over the waters, and along the shores of the rivers and inlets. So numerous indeed were they that I felt inclined to think that the greater part of those which are in summer dispersed over the United States, and the regions still farther north, must have congregated to form those vast swarms. The first time I

saw them was before sunrise, when I stood by the side of Lieutenant PERCY of our Navy, on the deck of the United States' schooner the Spark, then at anchor opposite St. Augustine. The weather though warm, was thick and drizzly, so that we could not see to a great distance; but as probably some hundreds of thousands passed close to the vessel, in long and rather close flocks, I was well enabled to assure myself that the birds were of this species. On expressing my surprise and delight at beholding so vast a concourse, Lieutenant PERCY assured me, that he had seen them on all the streams which he had visited south of where we then were. The weather cleared up in a few hours, the sun shone brightly, and the little creatures were seen all around, dipping into the water to wash themselves, gambolling close over its surface, and busily engaged in procuring insects, which in that country are always abundant. In the course of the same season I also observed a good number of our Green-backed and Barn Swallows—but few compared with what are seen about New Orleans.

We can thus account for the early appearance of the Bank Swallows in our Middle Districts. That species always arrives there sooner than the rest, sometimes preceding them by a fortnight, and keeping equally in advance as far northward as its range extends. The Green-backed Swallow, *Hirundo bicolor*, follows closely after it; then the Purple Martin, *Hirundo purpurea*; after which are seen the Barn Swallow, *Hirundo rustica*, and lastly, on our eastern Atlantic coasts, the American Swift, *Cypselus Americanus*. It is probable that these species extend their autumnal migrations southward in a degree proportionate to the lateness of their appearance in Spring. I have likewise observed the arrival of the Bank Swallows on the waters of the Serpentine River and those of the Regent's Park, in London, to be in the same proportion earlier than that of the other species which visit England in spring, and have thought that, as with us, the first mentioned species retire to a less distance in winter than the rest.

The Bank Swallow has been observed on both sides of North America, and in all intermediate places suited to its habits. This is easily accounted for, when we reflect how easy it is for these birds to follow our great water-courses to their very sources. Even the ponds and lakes of our vast forests are at times visited by them; but no person seems to have been aware of the existence of two species of Bank Swallows in our country, which, however, I shall presently shew to be the case.

Wherever, throughout the United States, sand-banks or artificial excavations occur, there is found the Bank Swallow during the breeding season, in greater or smaller numbers, according to the advantages presented by the different localities, not only along the shores of our rivers and lakes, but also on the coasts of the Atlantic, and not unfrequently in inland situa-

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Bank Swallow?

tions, at some distance from any water. High banks, composed of softish sandy earth, on the shores of rivers, lakes, or other waters, suit them best, and in such situations their colonies are far more numerous than elsewhere. The banks of the Ohio, and some parts of those of the Mississippi, called "Bluffs," have appeared to me to be most resorted to by this species in our western and southern districts, although I have met with considerable numbers in every State of the Union.

In Louisiana this species begins to breed early in March, and generally rears two, sometimes three broods in a season. In our Middle Districts it commences about a month later, or about the period at which it lays in Kentucky, and there produces two broods. In Newfoundland and Labrador, it rarely begins to breed before the beginning of June, and lays only once. Dr. RICHARDSON states, that he saw "thousands of these Swallows near the mouth of the Mackenzie, in the sixty-eighth parallel, on the 4th of July," and from the state of the weather at that period supposed that they had arrived there at least a fortnight prior to that date, but no specimens were brought to England, and the description given in the *Fauna Boreali-Americana* is a mere transcript of that which in itself is quite imperfect. Indeed, there is not in any work with which I am acquainted an account of the Sand Swallow sufficiently minute and accurate to characterize in an adequate manner that very common species.

The sociability and gentleness of these birds, the lightness and vigour with which they perform their various evolutions, the low and unobtrusive twittering of their voice, in short, all their actions and economy, are delightful to contemplate. Their flight is exceedingly graceful, light, yet firm, and capable of great continuance. They seem indeed as if created for the purpose of spending their time on wing, for they alight less often to rest when full grown than any other of our species, when not sitting on their eggs, and are seen abroad searching for food later in the dusk, retiring for the night as late, I think, as our Swift, *Cypselus Americanus*. As they procure their food more commonly than the other species along the margins or over the surface of pools, lakes, rivers, or even the sea, their flight is generally performed at a small elevation, which is the case with others only when the wind blows smartly, or the atmosphere is damp and chill. The movements of their wings are those common to the family of Swallows, which flap these members less frequently than perhaps any other small land birds. The wings act on the hinge formed by the carpal joint, opening and closing like the blades of scissors. Their sailings, though frequent, are not extensive, and their tail appears to be of great service to them, as you observe that on the least deviation from a straight course, it becomes suddenly more or less closed or inclined upward, downward, or sideways; and when you see some

hundreds of pairs about their breeding places, passing, repassing, and crossing each other in various ways, you almost wonder that they never come into collision with each other. The slightest movement in any direction seems sufficient to enable them to overtake and secure their prey; and they less frequently than any other species follow an insect upward to any great distance. Like all other Swallows, they drink and bathe on wing.

Their migrations are performed by day, although perhaps continued by night, and their movements are more desultory and rather slower than those of other Swallows. It is rare to observe them in great flocks at that time, their associations not being apparently formed until they reach the countries in which they spend the winter months. Their flight, when they are thus travelling, is continued rather low over the land or the water; and as in America they retire to a less distance southward than our other Swallows, they are not unfrequently seen to linger behind the rest. In South Carolina, indeed, I have seen some in November.

In summer and autumn they roost in the holes excavated for their nests; but in winter, at least in the Floridas, they always repose at night among the tall grass of the salt marshes, making choice of situations sheltered by the winds and not liable to be overflowed. At this time they keep together in large bodies while searching for food. I have several times accidentally crossed their roosting places, which I at once recognised by the quantity of their dung attached to the blades, and lying on the ground, and from which I infer that they rest clinging to the plants.

At the first appearance of spring they leave their winter quarters in pairs, or singly, or in very small flocks; but they follow each other so closely in this manner as to form an almost continued line of march. I had the pleasure of observing this to be the case with the Barn Swallow also, whilst I was proceeding toward the Texas, when that species was advancing in a contrary direction.

Although small, the Sand Swallow is a rather hardy bird; for I observed that the transient cold weather that at times occurs in the Floridas at night, seldom forces them to remove farther south. On one occasion, however, when the ice was about the thickness of a dollar, many were found dead along the shores, as well as floating on the water, whilst the rest appeared in great perturbation, wending their way in a hurried manner toward the warmer parts of the country, and taking advantage of every spot that afforded them more warmth, such as the borders of woods, and high banks of streams. I am, however, of opinion that the inclemency of the weather at times proves to be the greatest evil these birds have to encounter, especially when in early spring they are moving northward, and occasionally meet with a sudden change from temperate to cold. Even in the places selected for

their summer residence, great numbers die in their holes, and many have been found there in a state bordering on torpidity.

Their food, which consists of small insects, principally of the hymenopterous kind, even during winter in the Floridas, is procured on wing. They very seldom approach walls or the trunks of trees to seize them, but frequently snatch them from the tops of grasses or other plants on which they have alighted. They also seize small aquatic insects; but, although I suspect that they disgorge in pellets the harder parts of these, I have no proof, obtained from actual observation, that they do so.

The holes perforated by this species for the purpose of breeding require considerable exertion and labour. They are usually bored at the distance of two or three feet from the summit of the bank or surface of the ground, to the depth of about three feet, but sometimes to that of four or even five. They are near each other or remote, according to the number of pairs of Swallows that resort to that place, and the extent of the bank. In one situation you may find not more than a dozen pairs at work, while in another several hundreds of holes may be seen scattered over some hundreds of yards. On the bluffs of the Ohio and the Mississippi there are many very extensive breeding-places. While engaged in digging a sand-bank on the shore of the Ohio, at Henderson, for the purpose of erecting a steam-mill, I was both amused and vexed by the pertinacity with which the little winged labourers continued to bore holes day after day, whilst the pickaxes and shovels demolished them in succession. The birds seemed to have formed a strong attachment to the place, perhaps on account of the fine texture of the soil, as I observed many who had begun holes a few hundred yards off abandon them, and join those engaged in the newly opened excavation. Whether the holes are frequently bored horizontally or not I cannot say, but many which I examined differed in this respect from those described by authors, for on introducing a gun-rod or other straight stick, I found them to have an inclination of about ten degrees upwards. The end of the hole is enlarged in the form of an oven, for the reception of the nest, and the accommodation of the parents and their brood.

When the birds have for awhile examined the nature of the bank, they begin their work by alighting against it, securing themselves by the claws, and spreading their tails considerably, so as, by being pressed against the surface, to support the body. The bill is now employed in picking the soil, until a space large enough to admit the body of the bird is formed, when the feet and claws are also used in scratching out the sand. I have thought that the slight ascent of the burrow contributed considerably to enable the bird to perform the severe task of disposing of the loose materials, which are seen dropping out at irregular intervals. Both sexes work alternately, in the

same manner as Woodpeckers; and few ornithological occupations have proved more pleasing to me than that of watching several hundred pairs of these winged artificers all busily and equally engaged, some in digging the burrows, others in obtaining food, which they would now and then bring in their bills for the use of their mates, or in procuring bits of dry grass or large feathers of the duck or goose, for the construction of their nests.

So industrious are the little creatures that I have known a hole dug to the depth of three feet four inches, and the nest finished, in four days, the first egg being deposited on the morning of the fifth. It sometimes happens that soon after the excavation has been commenced, some obstruction presents itself, defying the utmost exertions of the birds; in which case they abandon the spot, and begin elsewhere in the neighbourhood. If these obstructions occur and are pretty general, the colony leave the place; and it is very seldom that, after such an occurrence, any Swallows of this species are seen near it. I have sometimes been surprised to see them bore in extremely loose sand. On the sea-coast, where soft banks are frequent, you might suppose that, as the burrows are only a few inches apart, the sand might fall in so as to obstruct the holes and suffocate their inmates; but I have not met with an instance of such a calamitous occurrence. Along the banks of small rivulets, I have found these birds having nests within a foot or two of the water, having been bored among the roots of some large trees, where I thought they were exposed to mice, rats, or other small predaceous animals. The nest is generally formed of some short bits of dry grass, and lined with a considerable number of large feathers. They lay from five to seven eggs for the first brood, fewer for the next. They are of an ovate, somewhat pointed form, pure white, eight-twelfths of an inch long, and six-twelfths in breadth.

The young, as soon as they are able to move with ease, often crawl to the entrance of the hole, to wait the return of their parents with food. On such occasions they are often closely watched by the smaller Hawks, as well as the common Crows, which seize and devour them, in spite of the clamour of the old birds. These depredations upon the young are in fact continued after they have left the nest, and while they are perched on the dry twigs of the low trees in the neighbourhood, until they are perfectly able to maintain themselves on wing without the assistance of their parents.

In Louisiana, or in any district where this species raises more than one brood in the season, the males, I believe, take the principal charge of the young that have left the nest, though both sexes alternately incubate, all their moments being thus rendered full of care and anxiety respecting both their offspring and the sitting bird. The young acquire the full brown plumage of the adult by the first spring, when there is no observable difference be-

tween them; but I am induced to think that they keep apart from the old birds during the first winter, when I have thought I could yet perceive an inferiority in their flight, as well as in the loudness of their notes.

This species has no song, properly so called, but merely a twitter of short lisping notes. In autumn it at times alights on trees preparatory to its departure. On such occasions the individuals, often collected in great numbers, take up the time chiefly in pluming themselves, in which occupation they continue for hours.

I must conclude with assuring you that in my opinion, no difference whatever exists between the Bank Swallow of America and that of Europe. The birds from which I made the drawing for my plate were procured on the banks of the Schuylkill river in 1824.

BANK SWALLOW or SAND MARTIN, *Hirundo riparia*, Wils. Amer. Orn., vol. v. p. 46.

HIRUNDO RIPARIA, Bonap. Syn., p. 65.

HIRUNDO RIPARIA, SAND MARTIN, Swains. and Rich. F. Bor. Amer., vol. ii. p. 333.

BANK SWALLOW or SAND MARTIN, *Hirundo riparia*, Nutt. Man., vol. i. p. 607.

BANK SWALLOW or SAND MARTIN, *Hirundo riparia*, Aud. Orn. Biog., vol. iv. p. 584.

Tail slightly forked, margin of first quill smooth, tarsus with a tuft of feathers behind; upper parts greyish-brown, lower whitish, with a dusky band across the fore part of the neck. Young with the feathers of the upper parts margined with reddish-white.

Male, 5, 11. Female, 4 $\frac{7}{8}$.

ROUGH-WINGED SWALLOW.

† *HIRUNDO SERRIPENNIS*, Aud.

PLATE LI.

On the afternoon of the 20th of October, 1819, I was walking along the shores of a forest-margined lake, a few miles from Bayou Sara, in pursuit of some Ibises, when I observed a flock of small Swallows bearing so great a resemblance to our common Sand Martin, that I at first paid little attention to them. The Ibises proving too wild to be approached, I relinquished the pursuit, and being fatigued by a long day's exertion, I leaned against a tree, and gazed on the Swallows, wishing that I could travel with as much ease and rapidity as they, and thus return to my family as readily as they could

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Audubon, John James. 1840. "Bank Swallow or Sand Martin, *Hirundo riparia*, Linn. [Pl. 50]." *The birds of America : from drawings made in the United States and their territories* 1, 187–193. <https://doi.org/10.5962/p.319163>.

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