

A family of nestling Amazon kingfishers. At the age of twenty-four days they are clad in handsome plumage, dark green and white, and much resemble their mother. They left the nest five days after they were photographed.

Kingfishers — Sovereigns of the Watercourses

By ALEXANDER F. SKUTCH

Photographs by the Author

THE KINGFISHERS long ago won a worldwide kingdom, which they continue to rule without fear of usurpation. Their ancient family has split into many branches, which divide among themselves the sovereignty of a large share of the world's waterways, in Asia, Europe and Africa, in America North and South, in the island continent of Australia, and in many lesser islands of the oceans. Their realm includes the mighty floods of the Amazon, the Mississippi, the Congo, and the Ganges, no less than infant streams across which a man can leap; it comprises brackish estuaries and arms of the sea, as well as mountain brooks of the purest sparkling water. Our watercourses would seem solitary and forlorn without their kingfishers, flying swiftly along in a business-like manner as though hurrying to keep an important appointment, or resting motionless and intent upon a bough that overhangs some deeper pool, as if time were of no consequence to them.

The kingfishers hold their empire so securely because they are admirably adapted to it, both in structure and behavior. Their strong wings carry them swiftly up and down their long, narrow domain, which they usually patrol flying low above the water and following every twist and turn of the channel. Occasionally some kinds, like the big ringed kingfisher, *Ceryle torquata*, rise high into the air and take a direct overland

course from pool to favorite pool. Their stout, compact bodies are built for plunging beneath the water's surface; their bills, long, stout, straight and sharp-pointed, take a firm grasp on their finny victims. Their dense, well-oiled plumage is impervious to the water, which after each immersion they shake off in a silvery spray. Their short legs are of little use for walking or hopping; but except to waddle in and out of their long nest-burrows, these aquatic birds have no occasion to travel over the ground. One toe is directed backward. The three forward-pointing toes are partially joined together — the outer two for more than half their length — as in the related motmots.

On narrow waterways kingfishers plunge for their minnows from the overhanging bough whence they have been patiently scrutinizing the pool beneath them; or the smaller kinds may dart in from a boulder rising above the channel. But if the river or lake is broad, the larger kingfishers often hover high in the air on rapidly beating wings until they have sighted their victim, then plunge arrow-like into the depths — a thrilling sight! Like other fishermen, they are not invariably successful in making a catch; and I have seen them try again and again before they emerged with something in their bill. When caught, the fish is carried to a convenient perch, against which it is beaten by strong sideways strokes of the bird's beak until its

struggles cease. Then it is swallowed, always head-first; for in this position the kingfisher is less likely to injure its throat or gullet with the sharp spines in the fins.

Although small fish comprise the bulk of the diet of the typical aquatic species of kingfishers, they do not disdain food of other sorts. If their stream dries up or there is a shortage of minnows, they may depend upon such food as they can capture on the land. The diet of the belted kingfisher, *Ceryle alcyon*, as reported by A. C. Bent, includes "crabs, crayfishes, mussels, lizards, frogs, toads, small snakes, turtles, grasshoppers, locusts, crickets, salamanders, newts, butterflies, moths, beetles and other insects, young birds, mice, and even berries." Some of the kingfishers of the Old World Tropics are forest-dwellers rather than haunters of streams, and subsist upon reptiles, insects, and other food they find in an exclusively woodland region.



Young ringed kingfisher, 29 days old and almost ready to fly. This largest kingfisher of the Western Hemisphere is blue-gray with white spots on the upper plumage. About the neck is a broad white collar, and the under plumage is rich chestnut. This species is widespread in tropical America and a rare straggler in southern Texas.

Kingfishers hold their watery realm so securely because, on the whole, they have little competition from birds of other families. They are highly specialized monopolists whose firm grasp on the inland waters has never been seriously threatened by feathered competitors. The oceans and their bays are fished by a multitude of birds, mostly bigger than the kingfishers. On broad, deep rivers, estuaries, bays, and ponds, there are terns, grebes, mergansers, ospreys, cormorants, and other excellent fishers. But on narrow brooks flowing through field and forest, and above all on tumultuous mountain streams whose hurrying, foaming waters pause only here and there in rock-rimmed pools haunted by wary fishes, the kingfishers rule supreme. The mountain torrent that flows by my house in Costa Rica is patrolled by three kinds of kingfishers, which reside here throughout the year. The only other avian fisher is the Brazilian cormorant, which, when

not engaged in nesting, comes up from the coast, rests on outjutting boulders, and dives into the rushing current for fish. Higher up in the mountains the dipper immerses itself in pursuit of tiny fish that would be disdained by kingfishers. Otherwise the kingfishers have the river to themselves; and this is typical of mountain streams over much of both of the American continents.

The kingfisher of Europe and the British Isles, which gave its name to the entire family, is a short-tailed bird not much bigger than the English sparrow. One wonders how so small a bird won for itself the title of *king*. Doubtless this name was bestowed in part because of the elegance of its plumage — metallic blue, green, chestnut, and white — and in part because of its regal way of carrying off small fry from the rivers. Some of the kingfishers of the Old World Tropics, especially those of the East Indian Archipelago, are splendid creatures, clad in such brilliant colors that they are among the world's most beautiful birds.

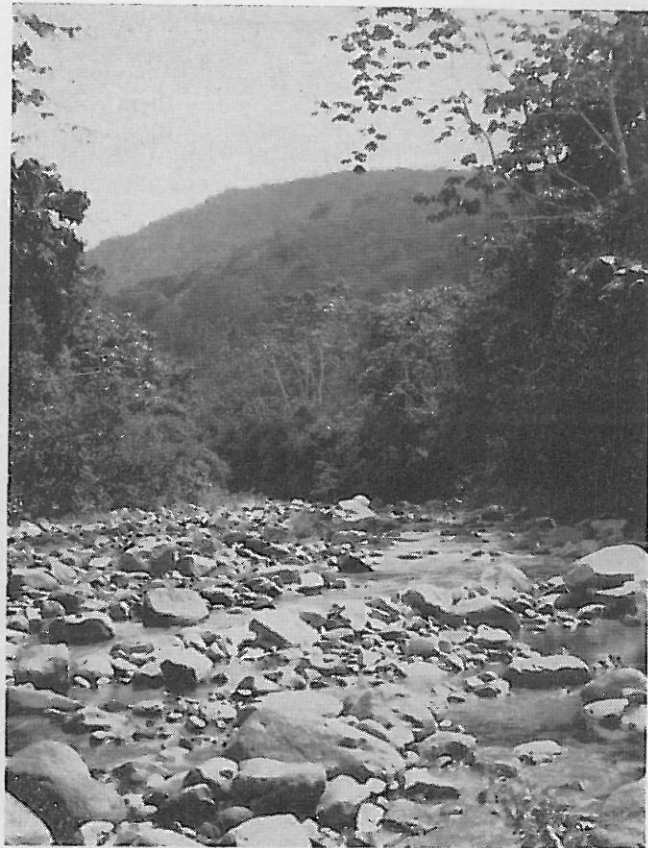
Of the approximately ninety species of kingfishers, only six belong to the New World. One of these, the highly migratory belted kingfisher, nests as far north as Canada and Alaska. Another, the green kingfisher, *Chloroceryle americana*, breeds along the southern border of the United States. A third, the ringed kingfisher, is on rare occasions met in the valley of the Rio Grande. Our New World kingfishers range in size from the tiny but elegant least green, *Chloroceryle aenea*, only five inches long, to the imposing ringed kingfisher, fifteen inches in length. Although not so gorgeous as some of their Old World relatives, our American kingfishers are handsome, crested birds. The big kingfishers of the genus *Ceryle*, which includes the belted kingfisher, are blue-gray spotted with white on back and wings, white and chestnut on the under parts. The smaller birds of the genus *Chloroceryle* are metallic bronze-green spotted with white on the upper plumage, white and chestnut or rufous or orange-tawny below. The sexes are unlike in plumage; and in all but one of the American species the more colorful male has a greater area of chestnut or rufous on his under parts than the female, who may be quite lacking in this color. In the migratory belted kingfisher, strangely enough, the female alone wears chestnut on her breast. The mark of sex has been reversed!

Kingfishers are no more musical than their relatives the motmots. Common utterances of the belted kingfisher and its close relation, the ringed kingfisher, are a loud *kleck* and a resounding rattle. In the smaller American kingfishers, as the least kingfisher, the rattle is reduced to a low ticking, at times hardly more than a buzz. The Amazon kingfisher, *Chloroceryle amazona*, has a more musical voice, yet could hardly be called a sweet songster. Its call sounds like *joy-joy-joy*

joy-joy-joy-joy, the clear notes first rising, then falling in pitch. But of the British kingfisher Coward states: "From February onwards the male has a sweet trilling song, a modulated repetition of many whistles."

Although the kingfisher's nest is typically in a burrow in the earth, numerous other sites have been reported. The forest-dwelling kingfishers of the Old World breed in holes in trees. Even the American belted kingfisher, usually a nester in banks, may on occasion lay its eggs in cavities in dead trees and stumps. This condition is most likely to prevail in low-lying regions where extensive swamps interrupted by canals or ponds provide an abundance of food, but suitable banks are lacking. Since the kingfishers can not, like woodpeckers, carve into soft wood, if a ready-made cavity can not be found, the eggs may be hatched and the young reared on the top of a stump, which provides little shelter or concealment. According to Hume, the kingfisher of the Nicobar Islands in the Indian Ocean breeds in a chamber dug into the center of a big termites' nest attached to the trunk of a large tree or coco palm, from four to twenty feet above the ground. The hard nests of termites are in various parts of the world also used as nest sites by trogons, puff-birds, parrots, and other birds. Ledges and niches on rocky banks and cliffs may serve as sites for the nests of kingfishers that can find no convenient bank for burrowing.

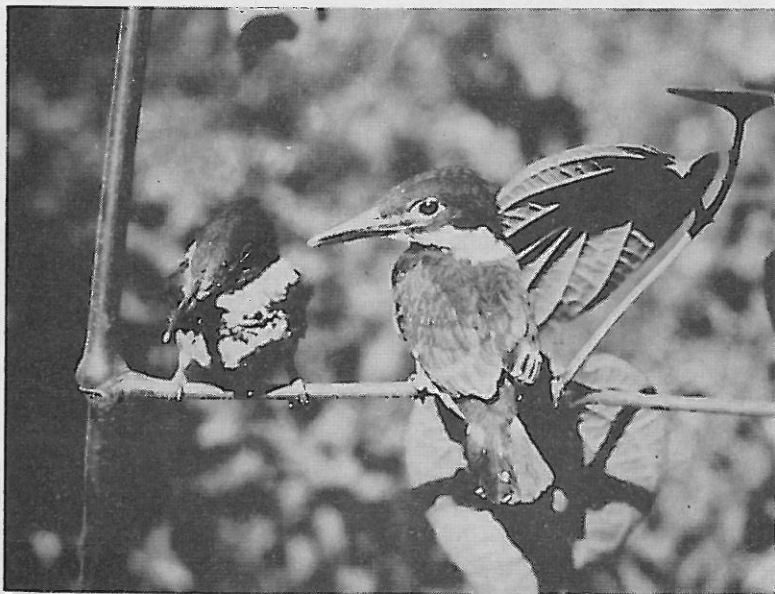
A vertical bank of stream or lake, not too hard or rocky, is the preferred nesting site of kingfishers; but if the shores of their fishing area are low and bankless, the birds may go far from water to take advantage of a suitable earthy wall: the cut bank of railroad or highway, the side of a gravel pit, or a steep slope in a sand dune. The length and diameter of the burrow varies with the kind of kingfisher; and with a single



Mountain stream in Honduras, home of Amazon and green kingfishers.

species the length also varies greatly with the character of the soil and the obstacles it opposes to digging. It tends to be longest in banks of sand or soft loam, shortest in hard clay or stony soil. The belted kingfisher's burrow may be as much as fifteen feet in length, although from three to six feet is more usual. Where they meet no obstacles, such as roots or rocks, kingfishers dig a nearly straight tunnel, with just sufficient curvature to make the nest at the end invisible to one looking in at the mouth. In stony soil, the burrow may have several sharp twists and turns. Nearly uniform in diameter for most of its length, at the inner end it widens into a low-vaulted chamber where the eggs are laid. In rocky banks where digging is difficult, the kingfishers may use the same burrow year after year; as happened with a pair of Amazon kingfishers nesting beside the river in front of my house. In low, sandy banks subject to erosion, they usually dig a fresh tunnel each year.

Kingfishers are monogamous, and male and female share rather equally all the domestic cares. Once, in Guatemala, I watched a pair of big ringed kingfishers excavate their burrow in a low, sandy, riverside bank at the edge of a banana plantation. Male and female took turns, each working inside for about four or five minutes, while the mate rested close by,



Young green kingfishers, ready to leave their burrow in the bank of a Guatemalan river. This tropical species reaches the southern border of the United States in the valley of the Rio Grande.

uttering from time to time a harsh *kleck*, which was answered by the other, hidden in the ground. The earth at the head of the shaft was apparently loosened by the birds' big, strong bills. I never saw them come to the entrance for the special purpose of pushing out the loose material. But each time one went in for a spell of digging it kicked back vigorously, using its legs alternately, and sending outward a double jet of sand. Doubtless the kingfisher continued this backward kicking as it shuffled up to the head of excavation, and thus the earth loosened by the bill on previous visits was gradually pushed out of the tunnel.

The kingfishers of the New World apparently never line their nests with soft material, but lay their eggs directly upon the bare earth at the back of the burrow. There are

reports of grass and leaves being found in their nests; but such material was probably carried in by hopeful swallows, which often investigate kingfishers' burrows before the digging is finished, and take possession for nesting as soon as the young kingfishers fly forth. Some of the Indian kingfishers are said to make nests of moss at the ends of their burrows.

Kingfishers' eggs are pure white and blunt at the ends, often nearly round in outline. In the United States the belted kingfisher lays sets of from four to eight eggs. The British kingfisher produces six, seven, or more in a set. But, as in so many other families of birds, tropical species lay fewer, usually between three and five in Central America. In both North and Central America, a single brood is raised each year.

As they shared the work of making the burrow, so male and female kingfisher divide the task of incubation. With a pair of Amazon kingfishers that I studied in Guatemala, the female covered the eggs each night; but the male was responsible for the nest most of the day. Arriving at about seven o'clock in the morning, he would, with a low *ket ket*, call forth his mate, who had been on duty since the preceding evening, then enter the burrow for a session of two or three hours. The remainder of the morning was taken up with shorter shifts on the eggs by both sexes. The male then incubated for most or all of the afternoon. One day he sat for nearly four hours; but the next day he entered the burrow at 11:40 a.m. and stayed at his task for six hours and five minutes without interruption. The female came to relieve him at about sunset. This left him little daylight to fish for his supper; and sometimes I saw him plunging for fish in the dusk after other diurnal birds had gone to rest.

A pair of green kingfishers arranged their periods on

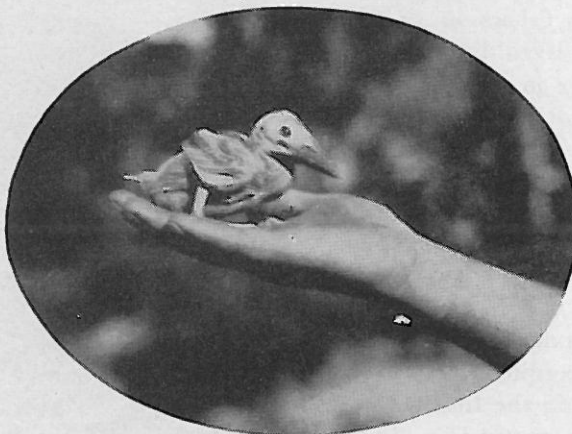
the eggs much in the fashion of their larger relatives the Amazon kingfishers, the female taking charge by night, the two alternately through the day. A pair of half-collared kingfishers, *Alcedo semitorquata*, which R. E. Moreau studied in tropical Africa, had a rather

similar schedule of incubation, but with more frequent shifts. The parents shared the work about equally, sitting usually an hour or two at a stretch, and performing their task so faithfully that the eggs were left uncovered less than ten percent of the time. But a pair of ringed kingfishers to which I gave much attention had a quite different pattern of incubation, and one rare among birds. They alternated in the burrow once in twenty-four hours, so that one day and night the male was on the eggs, and the next day and night the female was solely re-

sponsible for keeping them warm. They replaced each other every morning, between seven and ten o'clock. Each afternoon the incubating partner broke its long and solitary session in the dark burrow, emerging for a recess that lasted from half an hour to an hour, while the eggs remained unattended. What patience they had!

Kingfishers are devoted to their nests. In burrows that I had prepared for study by making an opening at the rear of the nest-chamber they would sometimes sit resolutely on their eggs or newly hatched young while I uncovered the opening and touched them with my finger-tips. Sometimes I could even pick them up. My private entranceway was, of course, carefully closed and concealed after each visit of inspection, lest marauders take advantage of it to harm the nest. During the course of incubation the indigestible fish-scales regurgitated by the sitting birds accumulate in the nest and are compacted into a hard layer beneath the eggs. It is most difficult to learn the period of incubation of kingfishers; for they usually desert if their burrow is opened for inspection before incubation has begun. But at one fortunate nest of the Amazon kingfisher, I was able to determine the dates when the eggs were laid. These eggs hatched twenty-two days after the last of the set of three was deposited.

Newly hatched kingfishers bear not a trace of down upon their tender, pink, translucent skin. Two black bumps, projecting above the forehead, indicate the points where the sightless eyes lie hidden beneath the skin. The tip of the lower mandible projects beyond that of the upper, giving them undershot jaws. Decidedly they are not pretty babies! Soon after hatching they can stand and even toddle about unsteadily, supporting themselves on the (Continued on page 500)



Nestling Amazon kingfisher, nine days old, its eyes already open and its pin-feathers pushing out.

KINGFISHERS — SOVEREIGNS OF THE WATERCOURSES

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pot-belly and the feet. The heels are covered by a callous-like pad of skin roughened by numerous small tubercles, which protect them from abrasion on the sandy floor of the dark nursery where they remain many days.

The parents share rather equally the task of nourishing the young. My pair of Amazon kingfishers brought their little ones, so far as I saw, only fish, which were nicely adjusted to the increasing size of the youngsters. At first the minnows were so small that they were difficult to detect in the parents' bills. Gradually they became bigger; and after the nestlings were feathered the parents brought many that were larger than their own bills. These were always carried lengthwise in the bill, head pointing inward. The nestlings swallowed them whole.

In common with motmots and many other hole-nesters, the parent kingfishers make no effort to keep the nest clean. When the burrow is in fairly dry, sandy soil, this absorbs the rather liquid excreta of the youngsters and prevents the chamber from becoming disgustingly foul. But the decaying nitrogenous wastes generate enough ammonia to make a man's eyes smart when placed close to an opening in the back of the chamber. Indigestible bones and scales regurgitated by the nestlings add to the accumulation already begun by the parents, and maggots infest this debris. Moreau's burrow of the half-collared kingfishers in Africa became so foul that liquid filth constantly oozed out of the entrance. The old birds disliked this; and when they emerged after feeding their half-grown young, they invariably plunged into the water to bathe. Usually they immersed themselves four or five times, but once eighteen plunges were recorded. At one nest of the Amazon kingfisher I saw the parents bathe in this fashion after visits to their nestlings; but I failed to observe this behavior at other burrows which were in lighter soil.

Young kingfishers never acquire any nestling down; but at the age of a week or so, when their eyes are opening, their pink bodies bristle with dark, horny feather-sheaths. These pin-feathers become quite long before they split and release the soft feathers that develop within them. Kingfishers linger within the burrow for a week or more after they are completely feathered. Since the tunnel may be situated high up in a vertical bank, or face a wide expanse of open water, a fluttering, incompetent departure might be fatal to the young fisher. I once watched a ringed kingfisher emerge from its natal burrow and cover two hundred feet, with a rise of about thirty, on its first flight. Since there is no space for wing exercises within the burrow, it is

evident that the young kingfisher's wings can bear it aloft the very first time they are fully expanded. The kingfisher's period in the nest varies with the size of the species. The nestling period of the medium-sized Amazon kingfisher is about thirty days, but the big ringed kingfishers linger in their dark nursery until about thirty-five days old. Despite the often filthy state of their nest, young kingfishers greet the outer world in bright, fresh plumage, usually resembling that of their mother.

Not only can young kingfishers fly strongly as soon as they quit the nest, they can even dive. Within four hours of their emergence from the burrow where they had hatched, half-collared kingfishers plunged repeatedly into the pond, as though practicing the art of kingfishing! Once they have tasted the sunshine and the sweet outer air, kingfishers never return to their natal burrows.

Anglers often look upon kingfishers as competitors, and persecute them cruelly for taking the food which was their birth-right long before men learned how to fish with hook and line. But recent studies have proved that kingfishers and other fish-eating birds perform a useful function in thinning out the small fry, which are produced in such multitudes that all could not possibly find enough food to grow to a size that would make them attractive to anglers. Thus in any body of water that is not polluted and not drained of its breeding-stock of mature fish by hordes of greedy fishermen, such birds improve rather than spoil the fishing. The concentration of vulnerable small fry at fish-hatcheries often attracts fishing birds, which zealous keepers shoot, or catch with cruel pole-traps. But it is now being discovered that it is on many scores better economy to screen the fish nurseries than to slaughter the visiting birds.