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NOTES ON THE ROAD-RUNNER AT FORT WORTH, TEXAS *

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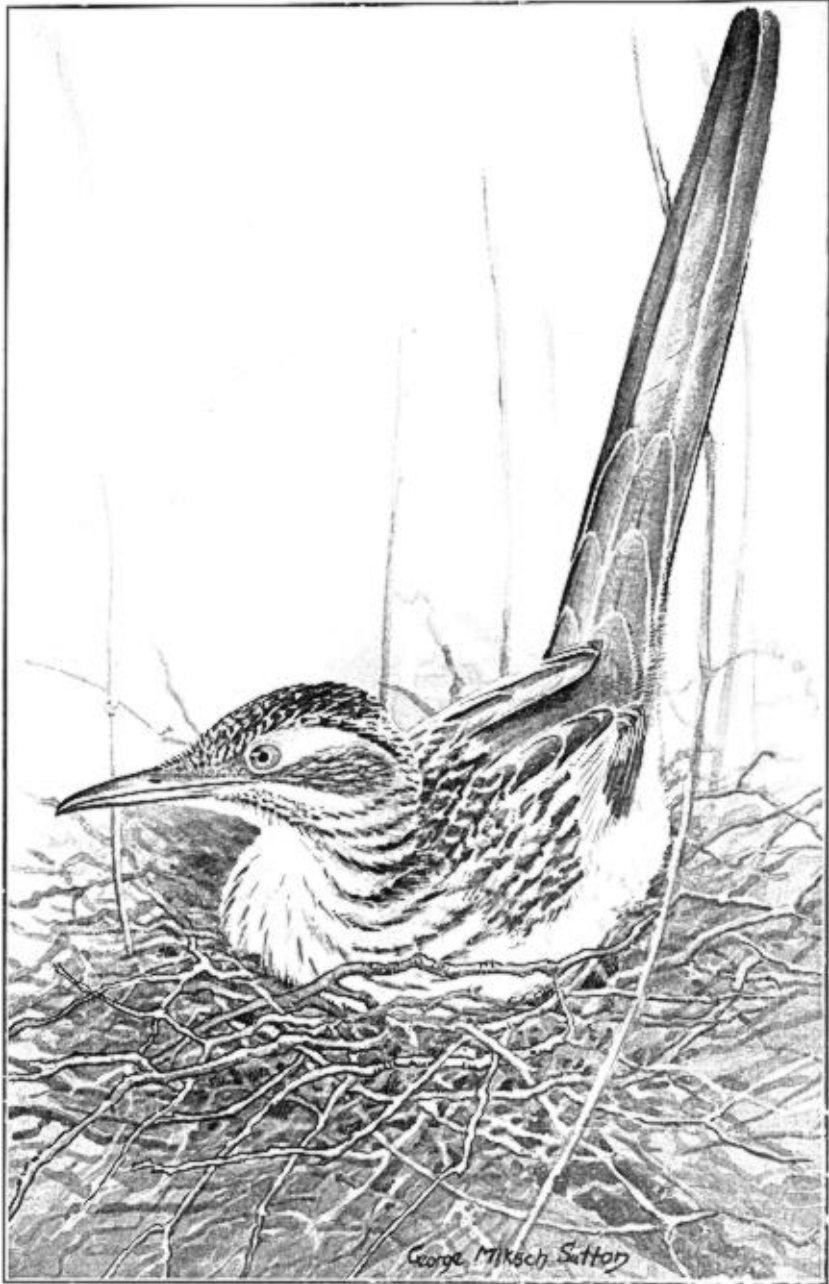
More or less extensive notes on my experiences with pet Road-runners have appeared elsewhere †; but since these only partly cover the ground of my experiences with this exceptionally interesting species, I feel it to be worth while to record some additional observations on the tame birds, as well as other notes, unpublished before, on the bird in its wild state.

My residence in Fort Worth, Tarrant County, Texas, was from July, 1911, until July, 1914. During this time one of the most interesting birds encountered, and at the same time one of the most difficult to study in its wild state, was the Road-runner (*Geococcyx californianus*). Though the bird is well known locally, in fact one of the best known birds in that region, it is not an easy bird to locate, and a number of people who volunteered to show me the "Chaparral-Cocks" failed in many attempts. And so it was some time before I had a chance to become intimately acquainted with the birds in question.

The country about Fort Worth offers a pleasing variety; it is somewhat rolling, with suggestions of bluffs in places, back from the banks of the Trinity River. Part of it is rather heavily wooded with deciduous trees and occasional bunches of live oaks. Suggestive of more arid conditions are frequent bunches of Prickly Pear Cactus which sometimes cover large areas, and Yucca, whose charming flowered spikes are among the most graceful of the prairie's features. The wooded areas are almost without exception along the streams, which are for the most part rather intermittent, due to a rather fickle climate. We were fortunate in living at the edge of the settlement for most of the time, and my notes on the wild Road-runner are

* Thanks are due Mr. W. E. C. Todd, who has kindly offered valuable suggestions and criticisms.

† Bird-Lore, Sept.-Oct. 1913, and Jan.-Feb. 1915.



ADULT ROAD-RUNNER ON NEST IN STRETCHBERRY TANGLE
(*Geococcyx californianus*)

limited to a region including about six square miles, stretching from the Texas Christian University Campus northeast to the borders of Forest Park on the one hand, and west to the banks of the Trinity River on the other. Included in this area are some fair-sized hills, a number of runs or "branches" (tributaries to the Trinity), and several small ponds or puddles. The region worked most was to the west of Texas Christian University, along the banks of a little stream known as "Howard's Branch" at that time, and further west, over a bold divide to the valley of a larger stream—this region known (to me at least) as the "second woods." These woods were very wild and dense in places, and sheltered such forest-loving species as the Barred Owl, Chuck-will's Widow, and Red-bellied Woodpecker. The region in and about Forest Park was largely more or less open, with large areas covered with stretch-berry tangles and small open groups of trees. I am sure there are regions about Fort Worth more ideally adapted to a study of the Road-runner, but these I did not know about, or at least did not take advantage of at the time.

My first "close-up" of a Road-runner was of a crippled bird. A friend called me, saying he had "one of those birds I had been looking for." The bird—a full adult—had been a little too confident in human nature, and for some reason had run into town, and been shot through the side with a 22-calibre bullet, so that it was naturally somewhat under the weather. I remember vividly my amazement, when I first held the weird-looking bird in my hands, at its light weight. It seemed to be all feathers and sinew, and the tibiae seemed to be heavier than the breast. This individual was very savage, and bit at my hand viciously. Though he was utterly unable to run on account of an injured femur, he was very vivacious, and would surely have been able to capture food enough to live on, had he been freed. But I kept him for study. It must be borne in mind that I knew absolutely nothing of Road-runner nature when I acknowledge that with all good intent to both parties I put my new captive in the same cage with a Painted Bunting! "Why not?" thought I, "a Road-runner is really a Cuckoo, and perfectly harmless." As a result I came out a few seconds later to find the Bunting in the Road-runner's mouth, and his feathers flying. I rescued the little victim; but the mauling and beating he must have received proved fatal in a short time. Thus I learned, with attendant regrets, that the Road-runner is a carni-

vore. Since then I have wondered how I ever could have considered him anything else, for I have found him to be the most rapacious and ever hungry of all my bird acquaintances.

From this time on I kept constant lookout for this species. It is apparently very keen of sight, and must also have very acute hearing, for rarely did I ever succeed in surprising one; more often it turned out that I was discovered first. Usually I succeeded merely in catching a glimpse of a fleet, graceful, slender creature gliding noiselessly away, perhaps never to be encountered again that day, even after prolonged search. There was one point of a hill where I frequently observed one, and where there may have been a nest. It was here that I had the one experience of actually *flushing* a Road-runner. Apparently there was no escape for him, save flight. With a mighty leap he threw himself several feet into the air, and without a flap sailed into the valley below on stiffly set little wings. The primaries curved up visibly during this unique act, and one could easily tell that he was resorting to methods not commonly used. I endeavored to find some reason for this bird's flying here, but could not; though it was apparently more difficult for a Road-runner to run down a rough hillside than to progress over level stretches. I often found the birds running stealthily along a beaten path, or at the edge of a road; and individuals were often bold in hunting in the most open fields and prairies, though they always kept at a safe distance. My closest glimpses of wild Road-runners were always secured on or near the nest; but I once had the rare pleasure of seeing a bird steal down to a quiet woodland pool, take a long drink, and steal away again—as quietly as the shadows among which he moved. Several times have I heard the characteristic rattling noise, made by rolling the mandibles sharply together, when no bird was ever seen, though seemingly the noise was close at hand. This noise may be very sharp and alarming in quality—and is learned very early in life, since I have often heard young in the nest rolling their vindictive anathemas at the intruder. This performance in the immature birds is, of course, softer in quality, due to the unhardened condition of the mandibles. Another note given by the adult bird is a coarse and rather reptilian grunt, with a suggestion of a hissing squeal, which is apparently indicative of anger, since I have heard it particularly when I was at the nest. I have yet to hear the chicken-like noises referred to by various authors; but the adult birds occasionally make the

insect-like buzzing noise of the immature, accompanied by actions similar to those of the young when begging for food. My first experience with the rattling note of this bird was at the first nest I discovered. After I had forced my way through a dense tangle of vines, and reached the loose pile of twigs that composed the nest, I was almost shocked at the fierce visage of the brooding bird, and the sharp incisive rattle. Though she left the nest at once, and quietly, she gave me the impression of having some sinister purpose in doing so.

I do not know whether both parent birds incubate, as the sexes are quite indistinguishable in the field, and I never tagged any birds at the time. However, it was often possible to come very near the sitting bird, and on one occasion I very nearly touched the tail of a bird brooding in a thicket of stretchberries.

Many old nests were discovered before finding one in use. Invariably they were placed some feet from the ground, nearly always in trees, and with an apparent preference for a horizontal bough or crotch, true to Cuckoo custom. I could not see that they favored any special species of tree, and nests were often placed in rather open situations, where they were not especially difficult to see or approach. The first occupied nest I found was built about seven feet from the ground in the midst of an almost impenetrable thicket growing at the edge of the "second woods." Here from a distance I saw the iridescent tail of an incubating bird sticking up, parallel with and in front of one of the limbs upon which the nest was built. The bird was eyeing me all the time, and when I came too close she (?) raised her head, put up her crest and left the nest in great haste, though with wonderful poise and grace. In the nest were ten eggs, all apparently somewhat incubated, or at least more or less clouded and dirty. This nest was situated in a crotch, and was not at all symmetrical, being about eighteen inches one way, and only eleven inches the other, and a large part of the foundation material bulged out in a careless and overbalanced way. The material used was largely twigs, and the lining of the nest looked as though it had dropped in by chance from the surrounding vegetation rather than placed there by the parent birds. This nest was found on April 13, 1913. The next day two birds were hatched, and the following day a third, until on the 17th there were eight birds, and I presume, two eggs. In my former account of this nesting * I stated that there were two

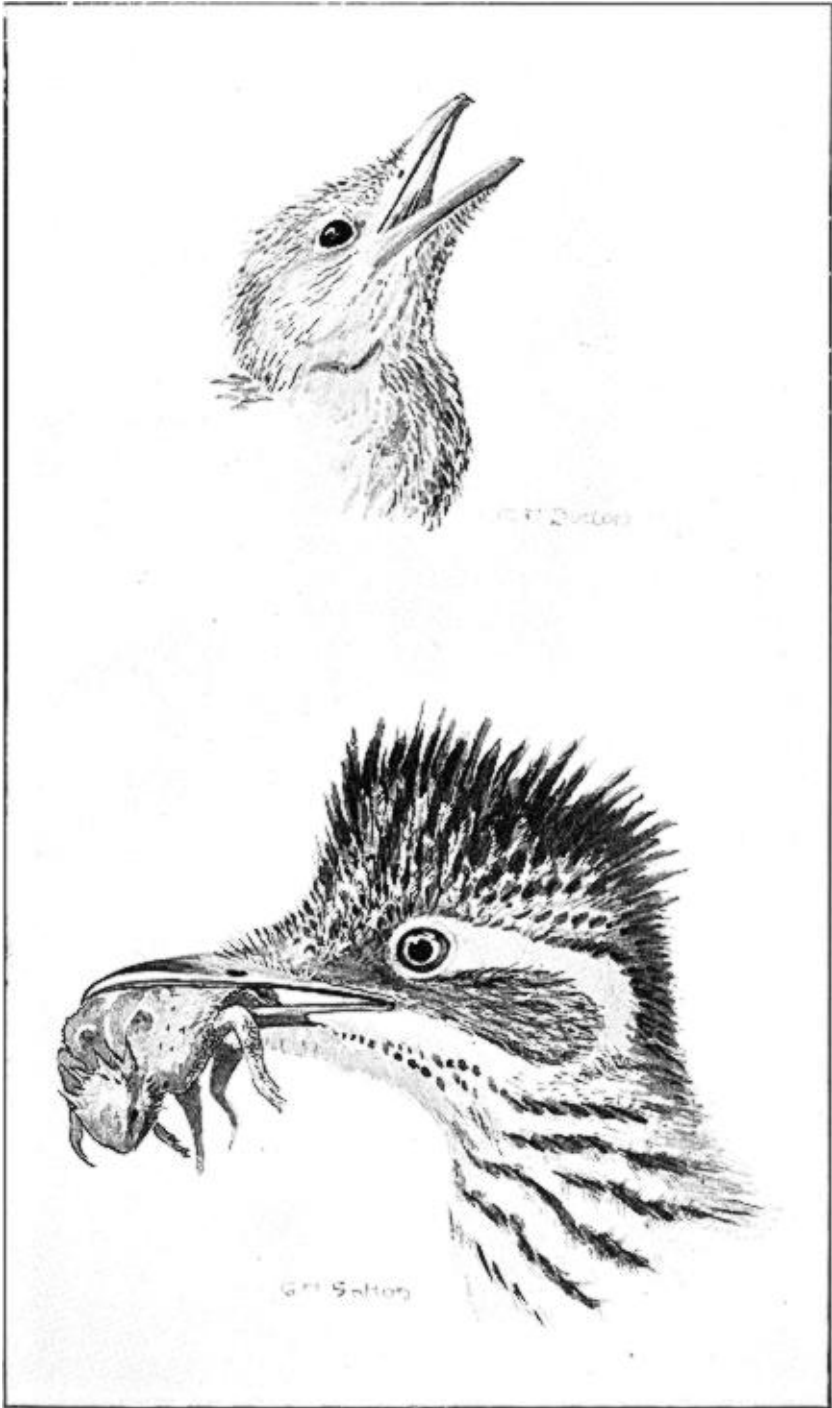
* Bird-Lore, 1913—Sept.-Oct.

eggs, but this may have been, and probably was, surmise, since I distinctly noted that I did not remove all the young birds from the nest, and I cannot say whether the eggs were actually there, covered by the bodies of the young birds, or had been destroyed by rolling out of the nest. What a sight this nestful of young birds was: smooth, and dark of skin, with long white hairs covering their bodies, and an indefinable reptilian look about them! Those of the lot that were hungriest tried to swallow my finger; others merely looked up with that innocent, contented look which means that they have just been fed. The cry made by the young bird is rather loud and incessant, and reminds one of a vast throng of winged insects humming inside the bird. When next I visited this nest — about a week later — but two birds remained, and one of these I took home to raise. He proved an interesting and delightful pet.

The second nest of these birds I found in a tangle near Howard's Branch. This nest was about six feet up, and was much more neatly constructed than Nest 1. It has occurred to me that the first nest may have been an old one re-used, though I know of no well-established such case. The parent bird in the case of this nest was quite wary, and I rarely ever saw her. Once I discovered that she left the nest by one leap, without the unfolding of her wings, and sped away along the near-at-hand creek bottom. Once, and only once, I saw her creep stealthily back to the nest with a large striped race-runner lizard (*Cnemidophorus sexlineatus*) in her bill. I never saw the two parent birds together. Some accident, such as human interference possibly ruined this nest, with all its interesting prospects, and I saw no more of the birds as far as I know, though this same pair may have built nests found later.

The next nest I discovered on April 27 in a dense, but closely confined tangle on the very banks of Howard's branch, on the horizontal main trunk of a fallen, dead hackberry tree. This nest had five young birds, rather well along in development. These birds all left the nest without mishap; and it is remarkable that I never knowingly saw one of these young birds again through the season. Another new nest, which was unused, I found on a well-wooded, rather steep bank about a half mile further up the stream, and but a very short distance from the hole of a Burrowing Owl.

I should have been scientific enough to have observed the actions of these birds about their nests that season by patient



NESTLING ROAD-RUNNER BEGGING FOR FOOD
IMMATURE ROAD-RUNNER WITH HORNED LIZARD

watching, hour by hour, but my time was actually so taken up with the feeding of the pet bird, and also with school work, that this phase of the study was left quite undone. However, I had the good fortune to observe one or two Road-runners each day regularly for some time, in the wild state, and of course the tame one was the source of a good deal of interest. Aside from being a confiding and fearless companion, the bird was extraordinarily amusing, and one could never know from one hour to the next what to expect. This bird has been discussed more or less at length in other published notes, and I will not tax the reader with further discussion of it here as an individual at least, though there are many points well worth discussing. These will be taken up in speaking of the two birds secured the following year.

After the period of nesting which according to my observations seems to end normally about the last of June, the birds are less in evidence than ever. It is extremely doubtful if they migrate at all, even for very short distances (comparatively), as it would be absolutely impossible for them to fly anywhere; and yet my notes show a marked decrease in the number of individuals observed during the winter months. Of course, my captive bird seemed to suffer no great hardship, since he was regularly attended, and for the most part had plenty to eat, but the apparent absence of the wild birds through the winter could not but make me wonder what took place. Of course occasional individuals were seen from time to time throughout the year but such is sometimes the case with Meadow-larks, and other species in the north — birds which are regularly migrants. This point, it seems to me, is open for settlement.

At any rate, in April of 1914 the birds once more became evident and even more so than in the previous year, perhaps partly because I was better acquainted with their habits. On April 29, after searching the surrounding territory for about two weeks, I found a nest containing five young and one egg in a small clump of trees which I had passed regularly for several days. The nest was a well-made one for this species, and was placed in a thick tangle of wild grape vines, above a brush-pile thickly overgrown with weeds, grass, and a patch of cactus. From this nest I took the two oldest birds, intent upon raising them, since I had succeeded so well with last year's bird. One of them looked a trifle sick, and refused to squeal for food, so I naturally wondered what was the matter. The problem was solved, how-

ever, when I found his neck to be literally packed with a striped race-runner, whose broken off tail was now forming part of the lining of the nest. Thanks to the assistance of kind friends, I was able that season to raise the two young birds, attend school, and also make observations on Road-runners in the field—which, taken altogether was rather a full program.

On May 2 I observed two birds at a distance which may have been going through courtship antics, though I shall possibly never be sure of this. At any rate, early in the morning, just as the sun was bringing things into sharp contrast, golden yellow, against deep shadows, I came upon an adult Road-runner in the very top of a dead tree, a perch I had never before seen used. His wings were spread, and he may have been preening and taking a sun bath, but circumstances have led me to think otherwise. Now and then he bowed, and affected a close examination of his feet, only to raise his head again, drop his wings, lift them again, and spread his tail. I was so interested in him that I forgot myself, approached a bit too close, and before I knew it was discovered. He looked at me a brief instant, and then, without wings spread, leaped from the dead branch to the next lower one, whence on outstretched wings he sailed to the ground. I rushed up to where he had been, and was surprised to see two birds scuttling rather noisily off through the vines, and up to the higher portions of the hill. I firmly believe that I missed what would have been a rare sight — courtship antics of the male Road-runner before the female. And now I have never seen them! The sun bath is a common practice with this bird, however, if one may judge from their actions in confinement. With the young birds scarcely a day passed that they did not open their wings, lift their scapulars, and give their backs a sun bath. The attitude is rather ridiculous.

Upon going again to the nest from which I had taken the oldest young, I found the three remaining birds in good condition, and the egg still unhatched. From a nearby vantage-ground I patiently waited for over two hours for the coming of the adult birds, and though I am sure that one or both returned to the vicinity, I never saw either, and fearing that the welfare of the young birds might be endangered, I retired quickly. Shortly thereafter I returned to find one adult stealing rapidly up to the nest along a horizontal branch. Upon seeing me again it swallowed what it had in its mouth, and dashed away. The young birds were certainly hungry when I

went up to them and they looked as though they would readily have devoured me had they been large enough to do so. Eventually I hit upon a plan whereby I was enabled to watch these birds, though at considerable discomfort to myself. By striking the creek about half a mile above the nest, I crept down its banks to a little shaded bend, where from an overhanging bank I could look up through the brush to the nest, not very far distant. The Road-runner in repose is a different creature from what one would imagine from the fleeting glimpse one gets of it on the run. The bird is dignified, and the face takes on an almost meditative expression, especially when it is directly at the nest. Upon one occasion I was delighted to see one of the adults capture one of the brown scaled swifts, (*Sceloporus*) which, as I attest, are very difficult indeed to catch. The chase up the trunk of the tree was exciting and speedy. But the capture of the lizard, actually in mid-air, where it had leaped rather than face its pursuer, was almost thrilling. An observer now and then gets some such dramatic glimpse if he be patient enough. These scaly lizards are, of course, always swallowed whole, and perforce head first. But where the birds secured all the food for their young remains a mystery, and it will always remain a mystery how they accomplish so much without being observed more. Never, while I was watching, did both birds come to the nest at once, though visits were quite frequent most of the time, and with widely irregular intervals between. The large excrements from the young birds, which were discharged after each feeding, were removed regularly by the adult birds, in the bill. This excrement was covered with a rather firm jelly-like substance which kept the mass intact, and allowed the parent to take it some distance in the mandibles without its breaking. There was no sign of any pellet composed of fur, feathers, scales or bones disgorged, and all such substances must have been digested by the powerful gastric juices of the young birds. Possibly this matter will bear a good deal of further investigation, however, since a very large amount of utter waste matter is taken with each animal swallowed whole. It will always be a source of regret that I did not see the young in the family under discussion as they were leaving the nest; and particularly interesting would it be to watch their first lessons in capturing prey, but since I have assumed the role of a parent Road-runner to a degree, I know a little about the intelligence of the average baby "Ground Cuckoo."

On May 6 I found yet another nest, with a strange company of occupants: one bird, which left the nest the next day; one very young bird, possibly hatched the day before; and two infertile eggs. Here is another case where I might have discovered something, had I had the time. How interesting it would have been to see one set of parents attending the youth as he left the nest, and another set of parents attending the baby left in the nest! For I firmly believe, that if more than one pair of Road-runners ever use the same nest, such was the case here. During the week following the finding of this nest I saw many adult Road-runners, but my time was largely taken up with the young birds at home, now fast growing into adults, and so interesting and so eternally hungry that it was only natural that they claimed major attention.

On May 31 I found another nest with three fresh eggs (my latest date for fresh eggs) in a stretchberry vine growing about a dead tree at the brow of a small bluff, less than a block from a small creek. This nest was not supported by any limb of a tree, being loosely swung — if such could be — in the tangle of vines. The nest and sitting bird were quite easy to see from the creek, and it is surprising that someone had not molested her. I was able to approach her closely, and the accompanying sketch will give some idea of the interesting face that looked out at me through the lattice-work of the thorny vines. That this nest contained but three eggs as a complete set caused me to wonder considerably, especially when I remembered the huge set in my first nest. However, this last set of eggs probably represented the set of only one bird, and it is also possible that it was the second and therefore smaller set for the season. This set and nest I collected for I feared the open situation would only invite its destruction from other sources.

A short history of the development of two young birds secured on April 29 will not be out of place here, though it repeats to a certain degree former published notes. The nestling bird, be it ever so young, has an unmistakable cuckoo-like expression in its face, though its eyes, upon which a good portion of the facial expression depends, are quite different from those of the adult, being of a deep dull brown with a bluish pupil, as in the case of the young of many other species. The eye-lashes are small, in fact scarcely apparent. Its whole external appearance is very sombre, and rather dirty-looking, as though the creature had been bathed in some unrefined oil, which had not

been properly administered. The white hairs, each of which marks a coming feather, all lie in rows and look as if they had been rudely combed into place. The rather large, pale blue-gray feet are strong in the toes, but very weak at the heel, so that the birds cling to the fingers or the twigs of their nest with some power, but are quite unable to rise. Whenever there were many young birds in the nest they presented a peculiarly scrambled appearance, due, I believe, to the constant disturbance at feeding time more than to restlessness, for they usually lie quite still. By May 1 feathers were appearing rapidly on my young birds, first on the top of the head, back, and wings, and then on the belly, tail, and throat. Once the blood-quills had started to burst, development was very rapid. On May 4 the birds were quite well feathered, the tails being one and one-half inches long, and they were able to walk about unsteadily. It is at this period, or a little before, that the young leave the nest, though there must be innumerable dangers for the rather weak-legged creatures. Several times I have come across young birds able to run well, but still in trees, which leads me to believe that the young may, like young Green Herons, spend a portion of their early active life climbing about from branch to branch. This opinion seems the more plausible when it is known that my notes show no record of a young Road-runner encountered on the ground, though they certainly spend some of their time there, as they gradually become accustomed to it. On May 5th I took careful note of the young birds' plumage. The white hair-tips of the feathers had left the flanks, tail, primaries, and most of the scapulars, in succession. These tips apparently leave the region of the head last of all, and a well developed bird, with tail seven and one-half inches long, taken on May 26 (10395, Col. Carnegie Mus.) still has the little white tips on a large percentage of the crest feathers, though these tips in this case are much worn and are disappearing rapidly. My notes, written on May 5, state that the tibiae were quite bare of feathers, but since none of my sketches show this to be the case, I am inclined to doubt the accuracy of the written observation; but the tibiae are not well feathered in the younger birds. When the immature bird's tail becomes fairly long the bird assumes almost every aspect and habit of the adult. Strength comes to the legs; the rolling of the mandibles takes on the sharp, clacking quality; the eyes become brilliant and more serpentine than ever; and the wings are able to be used somewhat in sailing

from a perch to the ground. By this time the bird is able to run rapidly, though not with the grace and certainty of the full adult. In July, 1913, while hunting lizards in a small group of trees near Forest Park, I was surprised to find two young Road-runners, at about this stage of development, resting in the lower branches of a hackberry tree. They saw me, but were not much frightened, and having sailed to the ground started to run down the valley at a temptingly loitering gait. I, with my collecting box in my hand, started the chase. The birds kept close together, and increased their speed, just as I did. They ran about two hundred yards, sailed across a small brook, which I waded, ran on another space, and probably would have got away, had they not suddenly had to climb the steep grade of a car-track, where, after several futile attempts, I finally captured both of them and took them home. The birds were exceedingly wild when put in the cage, and dashed themselves against the wires frantically. During the night, or possibly early next morning, they both got away, probably through the rather coarse meshes of the wire. They were not to my knowledge ever seen again. By the recital of this apparently easy capture I do not wish to give the impression that one may run down Road-runners when he will! Very many utter failures to catch them I have left untold!

Changes come over the fleshy parts also in the development of the young bird, notably in the color of the mouth, and of the bare portion around and back of the eyes. The mouth of the nestling is quite brilliant, even somewhat poisonous-looking, being spotted and mottled in an odd design with reddish and dusky. These spots lose their brilliance of color as the bird ages, until in the adult there are only very faint indications of them remaining. The bare space around the eyes, however, becomes gradually brighter as the bird develops, from the dull blackish of the nestling, through the bluish of the fledgling, to the brilliant blue and orange of the adult. The color of the feet remains approximately the same, though there is gradual upturning of the outermost bone of the outer hind toe, which takes place shortly after the bird leaves the nest. This peculiar circumstance I cannot in any way account for.

By May 16 the birds were small editions of the adults, and were ever active and hungry. From now on their hunting instincts came to the fore rapidly, and frequently one would be seen sneaking along stealthily behind a stone wall, or through

the weeds, stalking grasshoppers, their most formidable quarry thus far. I should judge, from the quantities of grasshoppers I saw the birds eat, that these insects form a large part of the food of the adult in the wild state in this part of the State of Texas. They ate them literally from morning to night, and even after swallowing such food as mice and lizards till they should have been full, there was apparently always room for one more grasshopper. The birds first captured the nymph grasshoppers and the large wingless forms (*Tenaocerus*) which were very common in the yard, and especially in the road in front of the house. From the very first the clicking noise of a large, green cave cricket (*Stipator*) attracted the attention of the birds, and whenever they heard the noise they at once lowered their heads, and sneaked toward it. It was some time before they succeeded in capturing this variety, and a still longer time till they caught the large, showy, yellow and coral-winged fellows (*Pseudotrimerotropis* and *Pardalophora*) along the road. Usually the small grasshoppers were merely picked up and swallowed, without so much as a second pinch from the mandibles, but the larger long-winged varieties were beaten on a stone or on the ground considerably before being swallowed. It was interesting to watch them stalking the big flyers. Having watched a grasshopper settle on the ground after a flight, the bird sneaked up usually from the rear, and rushing in with wings and tail spread, startled the grasshopper, which was thereupon captured by the bird in the air, sometimes as much as four or five feet from the ground. I have seen the birds pass by many perfectly obvious wingless grasshoppers, intent upon the larger flying ones, apparently for the pure fun of catching them; and it is no wonder, in a way, for the bird is very graceful about it. A widely ranging species of black-winged grasshopper (*Dissosteira carolina*), which sometimes made a rather loud noise in its courtship flight, was always difficult to capture for some reason, and many of them got away entirely. Sometimes a big grasshopper, frightened by the bird, flew so high that the Road-runner refused to leap for him, in which case the bird ran nimbly along under him, merely waiting for him to descend. Thus have I seen a Road-runner pursue a grasshopper for a hundred yards or more. How different from the tactics of a hawk; in fact quite the reverse.

The teeming prairies offered abundant food for the pet birds, which spent most of the day running at large about the house,

and by the time they were a month old they were capturing really worthy quarry, such as the swift striped race-runners, horned-lizards, or "Horny Frogs" (*Phrynosoma cornutum*), and tarantula spiders. Once one of them chased a striped lizard a great distance only to have the intended victim dive into a hole. When I came up the bird was standing behind a bull-nettle, watching that hole like a hawk, and panting almost audibly. I felt so sorry for the unsuccessful bird that I began digging a little about the hole, during which process the intelligent bird leaped about with all the enthusiasm of a fox-terrier, rushing in for an instant, and then begging me for food by scuttling along the ground with fluttering wings, and urgent hissing cries, just as baby Road-runners always do. When finally the lizard was forced out, he was captured in an instant, beat upon a rock until quiet, and then swallowed whole. As the Road-runner and I went back to the house he had such a dignified, self-satisfied air, that it was really humorous. The smaller gray lizards (*Callisaurus draconoides*), were usually captured more easily, unless they reached a hole; but the large scaled swifts often had the best of the situation, and got away. I remember especially one old lizard of this variety which lived in a large wood-pile. He could be found out sunning himself almost any time, and the Road-runners, though they made a hundred attempts to get him, were never, so far as I know, successful. He was always too quick, and dived between the logs just as his pursuer dashed past. It was often, however, a very close call for the lizard.

One day I was surprised that one of the birds had stopped behind me, and refused to come further. He seemed interested in something on the ground near him, so I returned and found him standing near a Grasshopper Sparrow, lying on its back and panting, apparently unable to move. It is still a question whether this bird was wounded by the Road-runner or not, but it is noteworthy that the Road-runner had not eaten his victim, and also that when I picked up the sparrow, the Road-runner did not beg for it. Occasionally, however, the birds would make a rush for some bird on the ground, though while in Texas I never saw them actually capture one. Also, though we were at many nests of ground birds, they never ate any eggs. They ate young English Sparrows one day which were washed out of an cave-pipe, and still alive; and, of course, when fed by me, they never refused a bird.

Near our home there were not a great many snakes, though

one was occasionally captured by the birds. One rather large one, a little under three feet long, was harassed and pecked at for over fifteen minutes, before becoming so nearly dead that he could be swallowed. The incidents following this were amusing. Naturally both Road-runners could not begin swallowing the same snake, head foremost. There was a long period of fighting during which time both birds swallowed the snake part way. Finally, strange to say, they left the snake in apparent disgust, and went after grasshoppers. Later in the evening, I cut the snake in two. One bird, with the tail-end, got his portion down pretty well, and went about for some time with a snake tail protruding from his mouth. The other one, after several attempts to swallow the snake, left it, and because I was too lazy to hunt further food, I cut it up, and fed part of it to a Sparrow Hawk, part to two Screech Owls, and the rest to the Road-runner. I never had the opportunity to test the truth of the tales concerning this bird in its attacks on the Rattlesnake. The only time we knowingly had a rattlesnake near the birds were unable to find him in the mass of wild gourd vines. Probably the snake went into some hole.

Seemingly painful but apparently easy enough, was the swallowing of horned lizards. These are not difficult to capture, and though they are hard to kill, when once discovered, they never get away. Very small ones, the same as young grasshoppers, are merely nibbled at and swallowed alive; older ones are beaten until quite numb, and the tough adults are often hit upon a stone a long time before being swallowed. These lizards always flattened out, raised up on their legs, and swayed backward and forward in a threatening attitude when confronted by their enemy, but the Road-runners never paid any attention. Once a horned frog was swallowed in a manner unsatisfactory to the bird, and, with a violent toss of the bird's head, thrown up. It was still quite alive; perhaps the bird had felt it moving. In a short time he was swallowed again, however, and this time he remained. Similarly, a crippled English Sparrow which was swallowed alive was tossed up, thoroughly killed and then swallowed again in a short time. Again, a young chick, dead presumably from some disease, was fed to one of the birds which was still too young to run about much. Though the chick went down fairly easily, the Road-runner was somehow dissatisfied with it, tossed it up, and did not swallow it again. These incidents tend to show the following facts or probabilities:

First, that though the bird often swallows food alive, it is in such state uncomfortable. Second, that though a spiny horned frog is swallowed head first, he may nevertheless be coughed up in such a manner as not to hurt the lining of the throat. Third, in the case of the chick, while the Road-runner was still quite undeveloped, it may be that the sense of choosing proper food is located in the crop or gullet, rather than in the mandibles, as it undoubtedly is in the older birds, if indeed, the young have power of choosing their food under abnormal circumstances.

Rarely did I ever see a Road-runner refuse to eat anything in the insect line. Whenever I overturned a flat rock, everything in sight was eaten, save the ants, which I believe were passed by on account of their small size. Scorpions, after their tails and bodies had been thoroughly bitten, were swallowed with a peculiar hollow gulp, as though the bird were merely swallowing air. Centipedes were always thoroughly killed before being swallowed, and tarantula spiders had all the legs snipped off before the body went down. Snails were often eaten, shells and all, though the shell was sometimes crushed. These snails were often very common on the prairie vegetation, and were ordinarily passed by, on account of abundance of other food. Never did I see a Road-runner eat cactus fruit, or in fact any vegetable matter save once some bread soaked in milk, and once a piece of grass—swallowed apparently in play. Wasps, however, were not sought at all, nor were bees. Though one was eaten when fed to the bird, it was not swallowed until after a prolonged beating, mauling, and inspection.

One day one of the birds captured a cotton rat (*Sigmodon*), as it ran between some stones in a cactus clump. The rat, probably bitten severely, was tossed some feet by one bird, picked up by the other bird and whacked with a sullen thud on the ground, before he knew what had happened. Every action of the birds was so quick that there was no time for escape. This rat, when finally killed, was swallowed entire by the smaller bird, and the hind feet and tail stuck out of the bird's mouth for some time, before finally disappearing. At such a time the bird assumed a very erect and stilted attitude, no doubt to maintain its balance.

The fact that these birds occasionally indulged in orgies of mud eating has caused considerable speculation. Mrs. Alice Hall Walters (*Bird-Lore*, Vol. XVII, No. 1, p. 61) states that this may be due to the bird's need for gravel, but I am inclined to doubt this, since, as she states, it is not customary for carni-

vorous birds to need gravel in their digestive processes. It seems to me more likely that the mud had an attractive odor, possibly of snakes and lizards, since near this particular puddle of water many reptiles of various sorts had been killed to feed the birds. I realize that this opinion involves a discussion of the birds' olfactory powers, and probably I should not offer it at all; but it is the safest venture I can make at present.

The young birds did not apparently often drink water, but a large amount was consumed at each drinking. During the act the bill was held parallel with the surface of the water, and was opened only slightly. The throat and breast feathers were nearly always dampened because the bird stooped so low. The large swallows of water were visible going down the neck as in the familiar barn-yard cases of the horse and cow. Dust baths were frequent; baths in water, however, were not. During slight showers the birds usually sought no shelter whatsoever, but during the heaviest of the shower lifted their wings and straightened the body out so that the water ran off easily. The plumage of the bird (especially of the young) is not at all oily, and the birds often become soaking wet. Immature birds spent part of the hottest portions of the day lying about in the shade, during which time they did not eat much. Then, apparently without warning, they were apt to saunter out to the road, begin capturing grasshoppers in a leisurely fashion, and possibly return shortly for another rest.

Adults in a wild state roosted high up in wild grape vines and tangles of other vegetation. It would be interesting to know whether they roost in similar places in the desert, for if such is the case large numbers might be found roosting together. From my experience, however, I should say the birds never roost in flocks. The young birds always selected the highest point possible for roosting in their cage, and stuck their heads under their scapulars as is the case with most birds, I believe. On rare occasions the birds became causelessly frantic, and dashed about from one side of the cage to the floor, merely touching their feet, and bounding backward and forward as though crazy. On such occasions I let them out quickly. They always stepped out in a gingerly fashion, walked to the back porch stone steps, and lay down in a cool spot. If they needed exercise why did they not now take their chance?

If, for any reason, a bird was not hungry, and was offered food, his actions were always laughable. He shook his head

slowly as though saying, "Much as I'd like to, I dare not," accompanied by a half-hearted beating of the wings, and a penitent creeping about on the ground, like a whipped dog. Such occasions were rare, however, for the birds were nearly always hungry.

Being very keen of sight, they were able to pick out the most distant vultures sailing in the sky, and I was amused one day at their concern over several bunches of milkweed-down floating by. The birds were distrustful of these new birds of prey, and seemingly could not judge how far away they were.

But of all the characteristics of the Road-runner, famed through every region where the bird abounds, nothing so excites comment as his wonderful ability to run. The immature bird has an easy loping gait when passing through grass or weeds; when on the road it is much more regular, and the body swings from side to side a trifle. When the bird attains its greatest speed the tail is much lowered, and the bird seems rather to be treading air than pushing its body along, for the feet seem to be always ahead of the body of the runner. I have seen a dog of the neighborhood chase one of my Road-runners; and apparently both enjoyed the sport. There was nothing particularly strained about the Road-runner's actions, and he seemed to be keeping merely a safe distance. Occasionally he would dive under a large weed, to mislead the dog, or perhaps dash under the porch through a hole the dog could not enter.

One bird (apparently an individual trait) was rather pugnacious. My small sister kicked at him one day, while wearing a pair of brown sandals. Whenever after that she wore these shoes, the bird flew at her in a rage, pecked at the sandals savagely, and occasionally jumped on her person, and pulled at parts of her clothing or the lobe of her ear, so that she learned to respect and rather hold at a distance the formidable pet.

On the whole, what I have learned of this interesting species has so whetted my desire to know it more thoroughly that I look forward eagerly to further acquaintance with it in regions similar and otherwise.