

OBSERVATIONS AT A RUFIOUS HUMMINGBIRD'S NEST

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Plate 26

So precarious is the nursery life of birds that the completion of a nest study at a chosen nest is altogether uncertain, if not indeed improbable. In the present instance the observations came to a premature end; they relate to the last two days of incubation and the first twelve days of nestlinghood. The notes were made in the summer of 1914, at a nest of the Rufous Hummingbird (*Selasphorus rufus*), in the western foothills of the Rocky Mountains, near Belton, Flathead County, Montana. The nest was found on the 15th of July. Rufous Hummingbirds had previously visited the flowers in the small clearing surrounding the Forest Ranger's cabin; and on that morning, when the sun came up invitingly over the foothills, I was seized with a desire to find a hummer's nest. Entering the woods at the Ranger's spring, I started to climb the steep hill which rises there, but had proceeded scarcely twenty paces when a startling hum arrested me. Among the lower branches of a birch, close at my side, a young balsam fir had crowded its way upward; and in this small fir, some five feet from the ground, was the object of my excursion. When I had seated myself at a little distance, the bird hummed around her premises for a short time and then returned to her two eggs. It was plain that she was not in any great fear of man.

The nest was visited every day from the 15th to the 27th of July, sometimes for several hours of watching, sometimes only for brief inspection.

Nest.—The nest was composed of soft, cottony, plant materials, felted together, and thickly covered exteriorly with lichens held in place by cobwebs. It measured: inside, diameter one inch at the rim, depth seven-eighths of an inch; outside, diameter one and seven-eighths inches at bulge, depth one and a quarter inches. Its situation, as previously mentioned, was about five feet from the ground in a small balsam fir, at the bottom of the steep slope of a foothill. The foothills of the vicinity were variously wooded, chiefly with larch, spruce, hemlock, fir and cedar, with a growth of birch particularly on this slope.

Last days of incubation.—On the morning of the 16th the bird remained in the nest while I cautiously approached, and permitted me to examine her at a distance of eighteen inches and less for the greater part of a minute. When she took wing she flew to a twig in a dead windfall and sat there perfecting her toilet. I retreated to a little distance, to watch with the field-glass, and soon the bird returned to the nest. She approached it in a series of dashes, and poised for a moment just over the nest cup—her wings

humming, her iridescent feathers glistening in the shafts of sunlight—then dropped suddenly and accurately into the nest, disdaining to touch its walls with her feet. She drew herself well down into the deep cavity; and for a little while squirmed, and tossed her head from side to side. Meanwhile her breathing was heavy and her tail beat time, moving up and down very slightly, with a frequency of three or four cycles per second.

She was off the nest when I arrived in the afternoon and remained off for more than an hour. She would go away occasionally, for rather long periods, only to return to a twig on a dead tree, where she seemed more concerned with preening her plumage than with the temperature of the eggs. The day was cool, but the warm sun was shining on the nest nearly all of this time. She was incubating when I left, about 6.30 p. m.

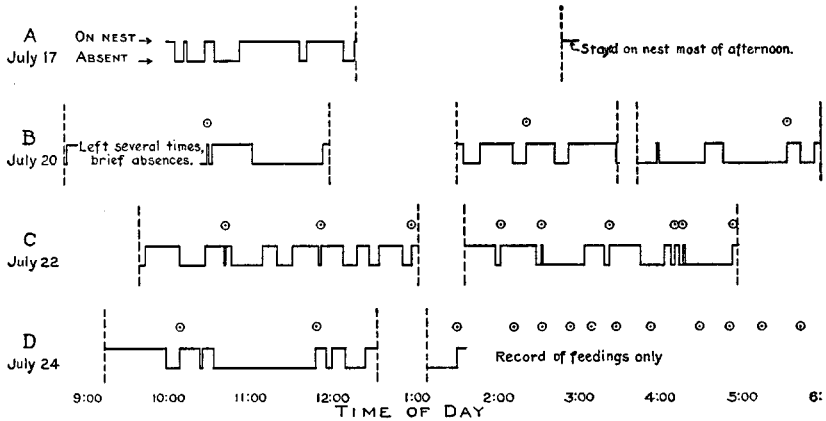
Upon arriving at the nest on the 17th, I found that one of the eggs had dried and most of the shell had fallen away, leaving the lining intact but shriveled. The pieces of shell were in the nest. It had been noticed the previous morning that at least one-fourth of this egg was occupied by an air space. A photograph was taken at 9.30 a. m., and when that disturbance was over, the voluntary goings and comings of the bird were watched from a little distance (see chart, Text-fig. 1).

The bird, while incubating, had faced toward the south, which was the open exposure, but I found her facing north at the beginning of the afternoon of the 17th. She stayed at her post almost continuously through that long, warm afternoon, facing now in one direction, now in another. About mid-afternoon she was absent for a minute or two. Soon after her return, the hot sun began to shine on the nest through a gap in the foliage; then she stood up in the nest, stretched to her full height, her back toward the sun, protecting the eggs with her tiny shadow. She continued to stand, panting with the heat, until a tree shadow relieved her; then she went away. She was gone but a few minutes, however, and had returned to the nest, settling into it as usual, before the tree shadow had passed.

Before my arrival the next morning (July 18) the sound egg had hatched and the parent had removed the shell from which the chick had emerged. The shell-lining of the dessicated egg was standing on end beside the young nestling, and the pieces of shell which had fallen from it were still in the bottom of the nest. The dried lining was removed by the writer on the 20th; it was then about two-thirds empty, but was found to contain an embryo in an early stage of development. It is possible that the hummingbird was unable to remove this; yet it may be significant that she did not remove the fragments of shell which fell from it.

First day of infancy.—The parent was brooding the newly hatched nestling when I arrived at nine o'clock (July 18); and she returned to the nest as soon as I moved away. She continued to brood, most of the time, during

the remainder of the forenoon, excepting an absence of some twenty minutes before ten o'clock. But during that absence, a large black and yellow fly (resembling a bee) appeared, and buzzed around the nest. It went repeatedly to the nest rim and finally disappeared within. Hurrying to the rescue I found the helpless nestling squirming as best it could, with the fly, as large as itself, fastened to it. Failing to catch the fly, I drove it away. The young bird, now on its back, continued to squirm until it succeeded in



TEXT-FIG. 1—Graphical record of brooding periods and feeding intervals.
Graph A—July 17; last day of incubation.
Graph B—July 20; nestling two days old. Day mostly cloudy, temperature moderate and pleasant; thunder-shower at noon; very windy afternoon.
Graph C—July 22; nestling four days old.
Graph D—July 24; nestling six days old.

The upper horizontal lines in each graph indicate duration of brooding periods; the lower horizontal lines indicate duration of absences from nest. Short vertical lines, connecting the upper and lower horizontal lines, mark the times of arrival and departure of parent bird. The time of each feeding is indicated by a dot, circumscribed with a circle. Vertical broken lines mark the beginning and end of continuous watching.

righting itself. Examination disclosed a slight wound at the nape of its neck. When the parent returned, a minute or two later, she first perched in a fallen tree to preen her feathers; then settled into the nest without stopping to inspect its contents.

She left again about eleven, going toward the spring and the clearing, but was gone only about two minutes. Returning, she alighted on the edge of the nest and sat there perhaps ten seconds, poking into the interior of the nest with her bill. Though I could not see exactly what was going on, I surmised that the nestling was receiving its first or possibly its second meal. During the next ten or fifteen minutes the mother bird left the nest twice, for brief absences, going in the same direction. She flew around me upon her return from the first of these excursions, and sat for a moment in

a tree, before settling into the nest. The next time, she settled at once. Late in the day I again examined the bird at very close range; once when I became too inquisitive, she left the nest and flew around me, chirping; but as soon as I had backed away she alighted on the nest rim and sat there for several minutes looking down at the minute black infant. She then flew off, for less than a minute, and returning to the other side of the nest fed the nestling by regurgitation. I could discern some preliminary movements of her throat, and, during the intervals between pokes, movements of her bill and tongue. After prodding about in the nest several times, she clambered down into it with all the awkwardness of an old hen, and sat there, brooding.

Observations from the balsam cloak.—In order to watch the procedure more closely, without introducing extraneous distractions, it was planned to masquerade as a tree. A costume had been prepared for the occasion by attaching balsam boughs, shingle fashion, all over the outside of an old gray-brown bath-robe. The perambulating tree was crowned with an old felt hat trimmed with boughs which hung down all around the observer's head, but which permitted him to see through the interstices of the foliage. Under this disguise, observations were made July 20 from 2.14 to 2.45 p. m., and July 22 from 9.00 until 9.30 a. m.

For the first watch my eyes were only twelve or fourteen inches from the nest and looked down into it. I had stationed myself while the parent bird was away. Soon she returned and alighted on the farther edge of the nest, facing me. The young nestling raised its head and opened its small mouth, and the parent inserted her long bill to half its length. There was very little motion of her bill. She moved it slightly up and down, and the movement of her throat was noticeable as she continued to regurgitate. The nestling twisted its head back and forth around the mother's bill—conveying the uncomfortable impression that the youngster might drill a hole through some vital part of its organism. This lasted several seconds; then the mother withdrew her bill and the nestling dropped its head back into the nest. The parent protruded her tongue several times, and examined the young and the interior of the nest, touching both the nestling and the nest lining in several places with the tip of her bill. Then she took wing with a sudden hum, poised above the nest, and dropped accurately into it, facing me; but soon she began to squirm and turn about in a restless manner, and this she continued until she was facing in the opposite direction.

Unaware of my presence, the little mother continued to brood until my rôle became very wearying. After a time I endeavored very cautiously to back away a few inches. My feet must have made a noise on the ground, for my friend craned her neck and turned her head to one side to look and listen. Not wishing to alarm her, I continued to await her pleasure, until both trunks—for I was a bifurcated tree—seemed on the verge of collapse.

With a persistence resembling perversity, I thought, the little bird stayed complacently in her nest, now and then twiddling her mandibles, and occasionally throwing her head from side to side in a dominant, swaggering manner, with the shining green feathers of her crown ruffled. Her manner seemed the expression of a fearless nature overflowing with mother pride as she felt her offspring beneath her. It was a picture of satisfaction quite pleasant to behold.

But I was finding a deep sympathy with trees. Whenever a breeze stirred the branches of my sylvan brothers I indulged in a little motion also. Eventually the brooding mother relieved me. With a sudden hum she lifted her body and went buzzing away.

There was an intervening day of windy weather; then the morning of the 22d turned propitious and I again donned the cloak and stationed myself beside the nest. On this occasion, however, I was more obtrusively planted than before, being at the open side of the nest, separated from the branches of the living tree; and the hummingbird could not easily accept such an innovation. When she returned she refused at first to go to the nest, but buzzed all around me, chirping her alarm and examining the details of my make-up very minutely. She came close to my nose and ears, hovering before them as before a flower and peering at them through the foliage. I quickly learned how formidable is the boom of her wings at close quarters. Once she seemed to alight in the top of my crown. After this examination she went to her nest for a few moments, only to resume her investigation. Twice she left the nest before settling herself to remain there.

Two insects, crawling on nose and eyebrow respectively, made perfect immobility on my part quite difficult; and when one of them attempted to bite through the "bark" I transgressed the bounds of tree propriety by swaying in an imaginary breeze, and twisting my trunk, in an effort to lift the off-side hand. The bird in the nest stretched out her neck and eyed me sharply from the crown down. It was asking too much of her. Finally she left the nest again and flew around me close to the ground, examining my boots, wherein I was conscious of many shortcomings. Perhaps she finally appraised me as a clown; anyhow she went away.

Before she returned I had made all readjustments, with eyes ten or twelve inches from the nest. The whole body of the nestling was now plainly visible. It was not long until the parent alighted on the left-hand edge of the nest and proceeded to feed the nestling by regurgitation. It was larger and stronger than on the previous occasion, being now four days old, and accepted the parent's bill for almost its entire length. The motions of the mother's throat were plainly visible, and her bill moved slightly up and down, but the young bird did not screw its neck around her bill so vigorously as before. Having withdrawn her bill for a moment, the parent repeated

the feeding, the little one opening its mouth again when she touched it with her bill. (Its eyes had not yet begun to open.) When the second regurgitation had been finished she repeated it once more, making three separate regurgitations in all. Then she touched the nestling and the lining of the nest in several places with the tip of her tongue, and, vibrating her wings, fluttered into the nest and settled her plumage for brooding. She did not take excreta from the nest, nor did the nestling emit any.

After watching the mother bird a few minutes longer, I began to sway very gently from side to side, meanwhile edging slowly away. Again the hummingbird watched with rapt attention. The tree I personated moved almost imperceptibly at first, but finally, with all due dignity, turned upon its roots and proceeded to a respectful distance. It would be difficult to guess what degree of primitive wonderment possessed the little hummer. She stayed on her nest and watched the miraculous phenomenon, seemingly with amazement and misgiving, her neck craned up to an almost incredible height. I left the premises at once. When I returned the hummer was away.

Brooding periods and feeding intervals.—At two o'clock on the 19th, the mother bird was standing in the nest with her back toward the sun, though the nest was then partly in shadow. That afternoon she remained at her post during the hour that I watched, excepting an absence of about one minute. She stood up in the nest when the sun shone on it, and sat when in the shade of foliage. She was absent at 8.45 that evening, but returned in a few minutes and was brooding when I left at 8.55. The daylight was then beginning to fade rapidly.

Absences and brooding periods observed on the 20th, 22d and 24th are indicated by the graphs (Text-fig. 1). At 8.45 p. m. of the 20th, the bird was absent, but she returned within five minutes, very swiftly, describing a letter *S* through the foliage and settling into the nest without any preliminaries. The air was rather cool, and it was cloudy and getting dark.

From the 25th to 28th the parent was absent much of the time during the mornings, though usually brooding at the time of my first visit. In the afternoons she had to shelter the nestling from the sun. In the evening of the 26th she fed the nestling at about eight o'clock, just after sunset, then stayed away until darkness was coming on.

In Text-fig. 1 the time of each feeding is indicated by a dot circumscribed with a circle. When the nestling was two days old it was fed only three times during seven and one-half hours of actual watching. When four days old it was fed nine times in six and three-quarters hours, the seven known intervals averaging about forty-four minutes. When six days old, although fed only twice during nearly three and a half hours before noon, it received eleven feedings in the afternoon before six o'clock. The average of eleven known intervals, for the whole time watched that day, was thirty-two

minutes. From the 25th to the 28th it was fed very little between eight o'clock and noon, but the afternoon feedings were, as before, more frequent, while the parent also had to shelter the nestling from the sun.

Mode of entering and leaving nest.—The hummer's usual method of entering the nest from the air, during incubation, has been described. After the egg had hatched she continued to settle into the nest in the same manner if returning to brood without feeding the young. When feeding she stood on the rim of the nest, and afterward often remained there for a little while before entering the nest to brood. After feeding the youngster the first day, she was seen to clamber down, awkwardly, as already mentioned, in striking contrast to the usual method of entering from the air. This method of stepping down into the nest was noted several times subsequently; but frequently after feeding she took wing and dropped into the nest, as observed from the balsam cloak (July 20 and 22). One day the parent came to the nest and fed the nestling while I was focusing the camera, and I watched her image on the ground glass. This time she hopped into the nest, catching herself with her chin on the opposite side of the rim.

In leaving the nest she sometimes executed a very pretty and graceful preliminary movement by lifting her wings and stretching them up vertically until they almost met above her back. She paused thus for a moment; then a hum and she was off. At other times she took wing from the nest so quickly that it was impossible for the eye to follow any preliminary movement of the wings.

Process of feeding and brooding young.—It was usual for the parent to pause a few seconds on the edge of the nest, upon arriving, before proceeding with the business of feeding the youngster. So far as my ears could detect, no vocal sound was ever uttered by the parent as a signal to the nestling when she came to the nest rim to feed or to brood. Under ordinary circumstances she seemed to use her voice very little, although she chirped when much agitated, as previously mentioned. When the nestling was two days old, I heard the mother chirping for a moment from the branch of a fallen tree not far away, whence she came to the nest and settled into it. During one of the feedings, when the youngster was six days old, it hung its head over the edge of the nest before its mother was through; she pecked it on the back of the head, it pulled back into the nest with alacrity, and she fed it once more.

On the 20th, during the 10.30 feeding, there was no pushing up and down. The youngster's head was raised high and the mother's bill was inserted a long way into its throat; then she seemed to pump the fluid by just the slightest visible motion of her own throat. But at 5.35 the same day she poked rather vigorously while regurgitating; and two days later the poking was extremely vigorous. When four days old the nestling received almost

all of the parent's bill; and at the age of five and a half days, responding very vigorously, it took the entire length of her bill into its throat.

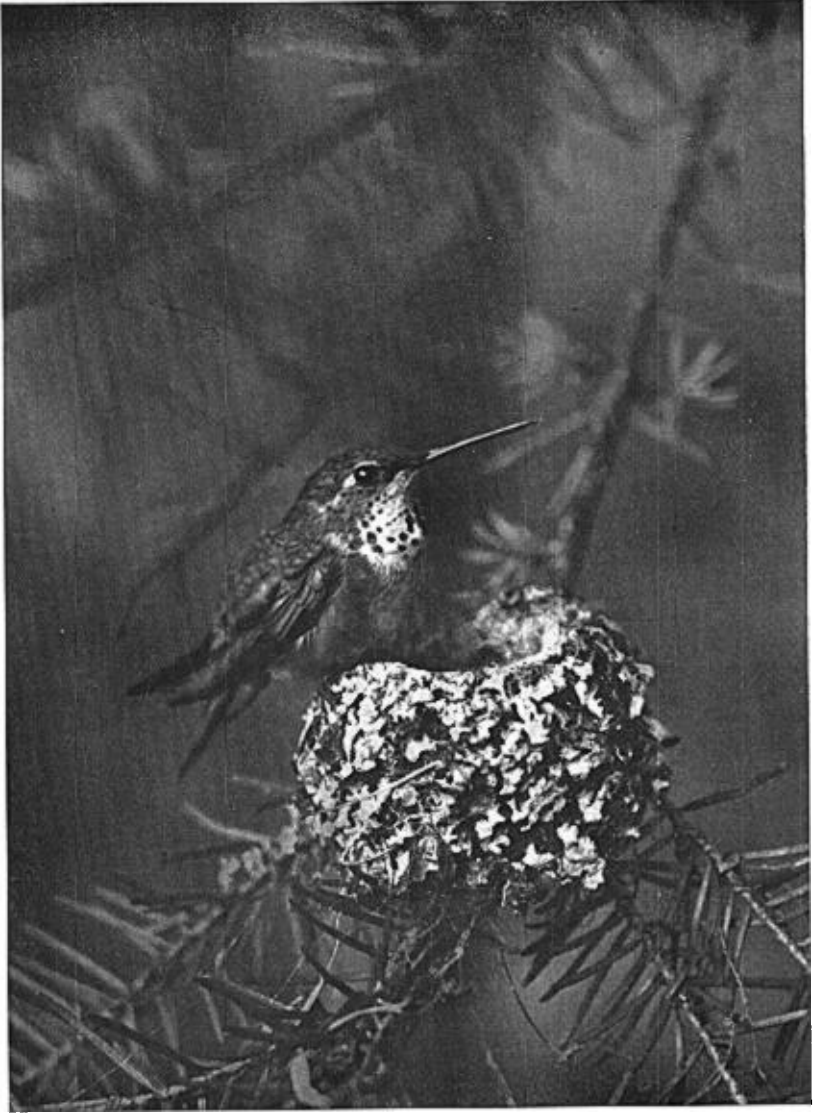
The young bird's head moved up and down with the mother's bill (as noted particularly on the 24th). During one of the feedings I could see the liquid welling up in the young bird's mouth. At the approach of noon on the 26th, I presented a twig about the size of the mother's bill, which the nestling took into its throat to the extent of three-fourths of an inch. The following day it accepted a grass stem carrying a drop of diluted honey, to about the same extent, afterward sticking out its tongue and smacking its mandibles.

The number of regurgitations for each feeding varied from two to five. Two pumpings were noticed at a morning feeding on the 24th. The parent regurgitated five times, just before noon on the 22d; and at the one o'clock feeding she regurgitated four times, poking very vigorously. The total time occupied for the five pumpings and subsequent examination and tidying of nest, was somewhat less than one minute. Often, after feeding the nestling, the mother touched the nest with her bill or tongue, in one or more places, before she entered it to brood. In the afternoon of the 22d (4.55) she stood on the edge of the nest for four minutes after feeding, before entering it.

Upon returning from an absence for the purpose of brooding without feeding, the first day, she alighted in the nest facing in the direction of her flight to it, and did not turn around after getting settled. But on the 20th, when she had properly examined the nest after feeding, she went into it at once, ruffling her feathers, squirming, lifting herself with humped back, and stretching her body lengthwise as though enlarging the nest. She turned around in the nest, making more than a complete rotation before finally becoming quiet. While she was brooding, an ant crawled along a twig near the nest and she stretched out to get it; but it was beyond her reach and crawling away, so she let it go.

In the afternoon of the 19th the parent thumped her body up and down in the nest as though intent upon stimulating the bodily functions of the young one.

Sanitation of nest.—The alvine discharges of the young hummingbird were forcibly ejected in a manner to render nest cleaning unnecessary—at least after the nestling was a few days old. When closely observed from the balsam cloak (July 22) the nestling did not emit excrement after being fed. On the 23d, while the parent was absent, I observed the method employed by the nestling, then five days old. Following a slight shaking of the nest, it struggled to reach the top of the nest wall. The great depth of the nest made this very difficult, but the young bird accomplished it, standing literally on its head, braced against the wall of the nest. The discharge was projected to a distance of several inches beyond the nest.



FEMALE RUFIOUS HUMMINGBIRD ON EDGE OF NEST

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Examination revealed discal specks of black matter, white at the middle, in several places on top of the nest rim. These were shown by a magnifying glass to be excreta, seeming to indicate that in earlier infancy the nestling had not always been completely successful in clearing the rim. With two birds in a nest it would probably be less difficult. Some of the specks were found on twigs and fir needles, at the height of the nest, as far as six inches away.

The powers of the adult in this respect had been noted while the bird was incubating; she had been seen to discharge excrement to a distance of eight or ten inches (at nest level) by merely lifting the body slightly.

Food-getting, drinking, bathing and preening habits.—On the morning of the 24th I watched this or some other hummingbird feeding in a novel manner over the small garden in the clearing. She was about thirty feet in the air, now poised on vibrating wings, now darting here and there like a dragonfly, evidently engaged in catching small insects on the wing. Sometimes, upon returning to her nest after an absence, she protruded her tongue to an extent almost equal to the length of her bill. She paid no attention to a red-clover blossom which I dipped in diluted honey and hung on a branch near the nest.

On one occasion, when I saw her drinking at the spring (July 22), she hovered above the pool as she would above a flower, dipping her bill into the water several times. On the 27th I saw her getting water at the spring in a different manner. She stood, for a second or two at a time, in the film of water which flowed over a board, and dipped her bill into it several times. When she left the spring she went directly to the nest.

About three weeks previous to the finding of this nest I had seen a hummingbird bathing at the spring. Its method was in no way different from that of passerine birds.

On the second day of my acquaintance with the nesting bird, after I had flushed her from the nest, she sat on a twig flicking her tail, sticking out her tongue, scratching herself with one foot, and shaking her plumage after the manner of a bird just emerged from a dust bath. In order to perform the feat of scratching her head she held out one wing and thrust her foot through the space between wing and body, reaching over the wing in this manner, close to the shoulder joint.

Behavior in relation to other species.—Once, during the afternoon of July 17, while the hummingbird was incubating, an Olive-backed Thrush inadvertently came too close to the nest. The little bird darted after it so suddenly and violently that she made it squawk; and it lost no time in leaving the neighborhood. Another intruder was a chipmunk. It was searching for huckleberries—running on the ground and climbing in the small bushes—and at length this occupation brought it almost beneath the

hummer's nest. She darted at it, evidently filling it with terror; for it beat a hasty retreat, squealing lustily as it ran.

Behavior in relation to man and unprecedented occurrences.—On the second day, when the camera had been placed on a tripod near the nest, the hummer did not seem much afraid of it. She examined it thoroughly several times and from all sides. She would go away for long intervals only to return to a twig in the dead tree, where she seemed more concerned with preening than with the camera or the eggs. On the second day of her acquaintance with the camera she indicated her indifference by sitting part of the time with her tail toward the instrument.

On the 18th when I came too near while examining her markings, she left the nest and flew around me, chirping; but as soon as I backed away she alighted on the edge of the nest and sat there for several minutes, looking down into it with the air of a proud mother.

On the eighth day of our acquaintance the bird fed her young while my head was under the focusing cloth; but when I moved my hand to adjust the focus she flew from the nest chirping and making a great ado about this new imposture. Later she entered the nest for a moment while I was standing uncovered at the side of the camera. She had but little fear of me in my proper rôle.

The bird's reactions to the balsam cloak have already been described. On the 23d I stood by the nest with only the bough-trimmed hat for a covering. Although evidently suspicious, she returned twice to the nest, brooding each time without feeding. On the 24th I flushed her while setting up the camera; but after a little humming about, and remonstrance expressed by chirping, she went away seemingly confident that I would do no harm.

The resourcefulness of the hummingbird was tried by covering the top of her nest with cotton. At first she attempted to tuck the cotton into the nest wall, but eventually she lifted and pulled it from the nest and let it fall on a bough near by. (For details see 'An experiment with a Rufous Hummingbird,' *Condor*, 25: 157-159, Sept. 1923.)

Other psychical manifestations.—About mid-afternoon of the 22d the wind died down and left a drowsy stillness everywhere. Nature was taking a peaceful nap. The brooding mother closed her eyes at intervals and dozed, until the chirping of a chipmunk made her suddenly alert. A little later, after dozing awhile, she was wakened by an insect flying swiftly past her. This so startled her that she jumped almost out of the nest.

No doubt the smallest of the feathered tribe are subject to irritation and lapses of patience. One morning (July 24) when I purposely flushed the hummer to get her to change position for a photograph, she chased a good-sized bird away from the neighborhood though it had not been close to her

nest; then returned to her task of brooding. Later the same day, while tidying the nest after feeding, the mother bird brought out a tiny fluffy feather which adhered to the end of her bill. Having gotten into the nest to brood, she tried to wipe off the feather on the rim of the nest, but it stuck fast. Then she protruded her tongue two or three times, and the feather was carried off on the end of it but adhered again to her bill each time her tongue was drawn in. Raising her head suddenly, as high as she could reach, with a sharp crook of her neck, she jabbed her bill downward into the inside of the nest wall—and there the feather stayed!

The male hummingbird was never definitely seen. At one time another hummer was sighted sixty or seventy feet away while the female was incubating; and again on the 22d I caught a fleeting glimpse of a hummingbird while the mother was brooding; but apparently she paid no attention to either of these.

Development and behavior of young.—Soon after it had hatched, the nestling was about as large as a worker honeybee. It was nearly black and quite naked except for two slight tracts of grayish down extending longitudinally along the back. It did not raise its head or open its mouth while I was present at the nest.

One day old:—Natal down has grown perceptibly longer. My arrival at nest during parent's absence (8.45 p. m.) caused nestling to hold up its black head, and when I touched its bill it opened its small mouth.

Two days old:—Growing rapidly. Body nearly half an inch long; head about three-sixteenths inch in diameter. Some brownish-buff filaments in the dorsal tracts are approximately three-sixteenths inch in length. Skin seems even blacker than before. Nestling responds by lifting its head and opening its mouth if I chirp faintly by sucking air through teeth; and sometimes when I scratch on a branch.

Five days old:—Body as large as a Chipping Sparrow's egg; still blind, black, and naked excepting the two tracts on the back where the down has grown somewhat longer. Strong enough to respond very vigorously when fed, and takes whole length of the parent's bill into its throat.

Six days old:—Pin feathers just becoming visible on the sides and along the posterior edge of the wing; also in a row where the tail is to grow. A slit is becoming noticeable in the eye-covering. When stretching up its neck, with open mouth, it utters faint ticking sounds, every second or two.

Seven days old:—The 'pins' have come through quite conspicuously on the sides. The nestling nearly covers the bottom of the nest.

Eight days old:—Some filaments are appearing on the top of the head, and the hair-like pin feathers on the sides have grown to a length of perhaps a thirty-second of an inch. The little cracks of eyes, partly opened, show the glistening eyeballs.

Nine days old:—Body now as large as a Song Sparrow's egg. Prominent feather tracts starting along sides of belly. Voice getting stronger and notes more rapidly uttered. Fascinatingly ugly at this stage.

Eleven days old:—Rather well covered with sprouting pin feathers; those in the tail about one-eighth inch long. Wings are well sprouted. Eyes have opened to an ellipse half as wide as long. When the nestling's back was rubbed with a finger, it squirmed around in the nest, closed its eyes, and moved over from one side of the nest to the other, evidently wanting to be rubbed on both sides. At the same time it kept its mouth partly open and uttered the little clicking notes.

Twelve and one-half days old:—The eyes have become well opened.

The voice of the nestling was first noticed when it was six days old. I thought I heard faint clicks or ticking sounds as it stretched up its open mouth; and by placing one ear snugly over the nest, as though it were a telephone receiver, I could hear them distinctly. It repeated its faint tick every second or two. When it was nine days old its notes, repeated with greater frequency, could be heard by attentive listening to a distance of twenty-four inches.

Description of adult female.—It remains to record impressions of the hummingbird's plumage as she appeared in life, in such detail as could be noted during several examinations at very close range. It is believed that such descriptions possess a degree of interest despite numerous shortcomings. A dried skin also has its limitations, and is often an object of quite different aspect from the living bird.

Upper parts: Bright green on the back, nape and wing coverts (a shining green in the sun), but with some gray or fuscous edgings showing. The green nape seems to merge into the more gray or fuscous crown; but when the crown feathers are erected they appear bright green also. The primaries are black, or nearly so.

Under parts: Rusty brown on the sides; white (or whitish) on breast and belly. Pure white on throat, extending almost around to eye. The lower throat is marked with a patch of gray-brown spots; these are fine dots anteriorly, but larger blotches posteriorly, merging into each other on the lower throat or upper breast. The spots are less prominent toward the sides, but they extend across (transversely) and backward, forming a faint wreath across the upper limit of the breast. Close inspection also shows lines of very fine dots radiating from the chin downward, on the upper throat. In certain angles of sunlight the throat patch and dots show brilliant structural colors, sometimes bronze or green, sometimes a bright glistening ruby. In the shade they usually show no definite color.

Head: A rather buffy gray line over the eye, and above this a very narrow obscure dark line (hardly noticeable). Cheek, gray-brown with lighter

(more whitish) streaks extending through it nearly parallel with bill. An obscure whitish curved line (same tint as cheek streaks above mentioned) extends upward from neck and terminates at its upper end in a small distinct white spot back of and joining eye. This spot is scarcely half the diameter of open eye. The curved line separates the face patch from the green of the nape. The bill is black.

Tail: Upper surface of tail, blue-green along middle portion (central feather) merging into blackish tip; rather bright green at base. Broad central feather tapering but rounded at tip. When the outer feathers are slightly spread, as the bird sometimes sits on nest, the end of the tail resembles three blunt spear points of equal length. Outer edges rust-brown on basal half, merging into blackish terminal half, with narrow obscure whitish margin at tip.

The under surface of folded tail is white or greenish white, except tip and the edges near tip. Black at tip, and a black blotch on each edge near the end but separated from the black tip.

Schedule of watches.—July 15, preliminary observations. July 16, cool day; short morning visit; afternoon until 6.30. July 17, most of the day; first photograph 9.30 (Graph A). July 18, from about 9 a. m. until 12.15; other visits early afternoon and at 5 p. m. July 19, brief visit 8.30 a. m.; watch 2 to 3; also 8.45 to 8.55 p. m. July 20, first visit 8 a. m.; principal watches as in Graph B; last visit 8.45 to 8.50 p. m. July 21, very windy; brief visits only (8.00 a. m., 12 m., 5.20 p. m.). July 22, balsam-cloak observations 9 to 9.30; long watches as in Graph C, followed by experiment until about 7 p. m. July 23, short morning visit; others about 4.40 p. m. and in evening. July 24, first observations 7.30 a. m.; continuous as in Graph D; experiment after 5.45; last visit at 8.50 p. m. July 25, shower in forenoon; watched for some time. July 26, much of day, and in evening until dark. July 27, part of both forenoon and afternoon.

On the 28th the observer was called into fire-fighting service, an occupation sufficient in itself. Hasty observation the following morning showed the hummingbird to be brooding; but that evening she was absent and failed to return. The nestling survived the cold night of the 29th, in the felted nest, unbrooded. It begged ravenously for food next day, and special efforts were made to feed and shelter it, at every possible opportunity, but it died within two days.

The mystery of the little mother's disappearance could not be solved with certainty; it is pertinent, however, that a weasel had been seen, six days before, peeping out from the rocks at the spring.

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