

MORE OBSERVATIONS ON THE NESTING OF THE
ALLEN HUMMINGBIRD

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On reading Mr. Robert T. Orr's excellent article on the nesting of an Allen Hummingbird (Condor, vol. 41, 1939, pp. 17-24) the writer was prompted to review his own notes, made at about the same time, on the nesting of a bird of the same species (*Selasphorus alleni*) at his home in Piedmont, about 15 miles east of, and 300 feet higher than, the scene of the first bird's activities.

Although, geographically, the two sites are not far apart, one should bear in mind the essential truth of the remark attributed to the late President Wheeler of the University of California, that there are, in this state: "49 'door-yard' climates within 49 miles of any given point," and that the area about the writer's home is one from which the primitive, natural growth has not yet entirely disappeared.

The two sets of observations were independently made without the knowledge on the part of either observer that the other was similarly engaged. As will appear later, the two birds showed both parallelisms and divergencies in their behavior; but a complete analysis of the situations thus created will not be attempted here, because the writer is not a technical student of bird habits, merely one who is interested in their companionship.

On June 1, 1938, a female Allen Hummingbird was seen occasionally fluttering about the end of a drooping branch of a live-oak (*Quercus agrifolia*) growing close to the north wall of the house, about on a level with the sill of a large window at the stair-landing. During the next day or so it was seen that this bird was placing nesting material at this point and a filmy platform could be descried. She appeared to work only in the early forenoon and then only in casual fashion, sometimes not being seen for an hour or more in the vicinity of the nest. Little progress was made on the nest until June 7, when she became more actively engaged. Arrangements were then made to take colored motion pictures with a 4½-inch telephoto lens from the stair-landing, the camera being placed about 9 feet from the nest and at a little higher elevation. (It could not be used any nearer because the lens would not focus sharply on objects closer than 8 feet.) The taking of notes at somewhat irregular intervals began at this time, and it was anticipated that a complete pictorial record could be obtained to accompany them, covering the whole cycle; but this was not to be.

It was found that a single leaf, to the stem of which the nest was attached at one point, obstructed the camera's "view"; so an arrangement was rigged up, consisting of pruning shears lashed to the end of a bamboo pole, with a cord running through eyelets by which the shears could be worked. This clumsy implement was used to cut off the leaf, a rather ticklish operation, at 7 feet distance, without injuring the nest or bird.

However, while the bird was away for more nesting material, the affair was put into operation; but before anything could be accomplished, she returned, buzzed in my face for a few seconds, then plumped herself firmly in the nest while the shears were still in contact with it. Her body must have been actually in contact with them. At this point the notes say:

Compare Dawson's statement (Birds of California) in reference to this species: "... of our seven species, Allen's is consistently the most retiring and secretive, as well as the wildest when found."

The bird did leave the nest before the operation was finished, but she returned immediately afterward and resumed work as if nothing had happened. The notes now say (still under date June 7):

It was possible to view the building operation from a distance of about 6 feet, and it was at once seen that, at the present stage of construction, when the nest has but a slight depression representing the future bowl, the bird shapes the outside by sitting inside and reaching out and under the nest with her bill and pressing the latter against the outer wall while drawing the bill upward. Further, to my astonishment, it was seen that, during this action, the tongue was fully extended and was used in a manner which suggested irresistibly that the bird was applying saliva, or perhaps some adhesive secretion, to the exterior as a binder or cementing material. She also rubbed her cheeks (as a brush?) around and a little below the periphery, heightening the suggestion.

Still later, on returning and carrying nothing visible to the eye, she entered the nest, raised her head, opened her bill widely and made what appeared to be an effort to disgorge something. However, I could see nothing issuing from her mouth; but as soon as the action ceased, she immediately applied her bill and tongue to the exterior of the nest as already described. As there would seem to be no particular object in returning to the nest carrying nothing, this action not only supports the inference of the use of binding material, but suggests that she brought in her mouth something especially adapted to exterior application. One can only speculate at this point. She might have had a mass of cobwebs in her gullet, there to be treated with some secretion of her own, or she may have obtained some glutinous or pitchy matter of vegetable origin.

About 7 feet from her nest there is a nest of the bush-tit from which the brood has left. She frequently uses this as a source of supply. It would seem to contain everything she needs, but her visits elsewhere are more frequent and she can be seen carrying spider-webs, some of which become entangled with her head and the surroundings of the nest. At present she is giving most of her attention to the outside of the nest, applying the spider-webs there; but she also stabs the parapet of the nest with her beak with nothing visible in her bill. (Injecting a binder or merely compacting the structure?)

(The notes are rather full and, although the observation periods were irregularly spaced, they tell the full story, including speculations made at the time: So excerpts from them will form the bulk of this article.)

June 8. (Sunrise 4:47; sunset 7:30.) The Allen hummingbird's nest is growing slowly. The bird works actively for half an hour to an hour, then absents herself for like periods. Most of her attention is still given to the exterior, and the bowl is still rough and irregular, although she occasionally shapes it by bobbing up and down in it and "shimmying." This perhaps also compacts it.

She was seen again today apparently disgorging something over the edge and down the side of the nest, following the action by rubbing with her bill and tongue; but nothing could be seen issuing from her mouth. She gives little heed to spectators, not allowing her work to be interfered with, although she occasionally comes to peer at them.

The male has been seen only once in the vicinity of the nest, and then he did no work, buzzing off shortly. At present the nest, in horizontal plan, is elliptical in form, not circular.

6:10 p.m. Mr. Grinnell, after seeing the bird at work this afternoon, for one brief interval, suggests that, if the bird is using something to bind the structure, it may be plant nectar—possibly from the *Diplacus* (monkey flower) of which the bird is very fond. There is a lot of this shrub growing wild in the garden and this is the time of its maximum bloom.

June 9. At about 5:45 a.m. the Allen hummer was not working; but I watched only a few minutes. A few glances at the nest between then and 6:30 a.m., when I left, failed to reveal her presence.

On my return about 4 p.m. it was found that she had raised the parapet of the nest in the meantime, perhaps half an inch, with what looked like cotton irregularly applied, leaving the rim and the enclosed bowl in rough condition. She was not seen working later than this today, but the nest was not watched closely.

June 10. Noon. This has been an overcast, chilly morning. The hummer has been observed a few times working on the nest and seems to show increasing tendency to sit in it longer after each addition of material or period of active shaping.

The walls of the nest are beginning to show what ship-builders call "tumble-home," that is, they are inclining in toward the center as they rise in height, so that the inside diameter of the cup at the top is less than at the bottom.

June 11. 9 a.m. The hummingbird is at work now, "licking" the outside of the nest and jiggling up and down in it.

2:30 p.m. The Allen hummer is putting "moss" (an alga?) on the outside of the nest. I watched her at 5 feet distance with 3x glasses. She still gets some material from the bush-tit nest. She sat quietly in the nest and began to doze, her *upper* eyelids gradually creeping down to meet the lower. While dozing, the male appeared, buzzed about for a few seconds, inspected me, departed.

The female slackened work about 5 o'clock, visiting the nest rarely after that. She does not stay in it at night.

June 12. The Allen hummer worked in casual fashion, mostly applying material to the outside of the nest and compacting the structure, which is now more nearly circular in plan, but looks "too small" for the bird, as most of her is visible when she sits in it. The parapet does not appear to have been raised during the day.

June 13. 9 a.m. At about 8:15 a.m. it was seen that the hummingbird has one egg in the nest, but she continues to work on the outside, probe the parapet and "jiggle." No egg there, 6 p.m., 12th. She also sits quietly on the egg for several minutes at a time, but does not hesitate to leave it exposed for long periods.

9:20 a.m. She has just attacked a brown towhee—not actually striking him—but buzzed about him threateningly until he left the tree.

The hummingbird's attitude toward the nest during the rest of the daylight hours seemed little changed by the presence of the egg: New material was added and there were frequent long absences. Between 5 and 7 p.m. the nest was observed fairly often, but the bird was seen to visit it but once. At the time, it was thought that this meant that she would not cover the egg during the night; but an observation made at 11 p.m. revealed her presence in the nest.

The question now arises as to whether night occupancy constitutes "incubation" and, if not, when does that action begin?

June 14. (Sunrise 4:46; sunset 7:33.) At 5:25 a.m. the hummingbird was sitting in the nest. At 6 she was away, and it was seen that there was still but one egg. Between that time and 8 a.m. she was seen to add more material from the bush-tit nest and absent herself for periods of several minutes. Only one egg.

The outside of the nest is, at present, decorated with an alga—the fibrous sort, such as grows in pools. From the side from which observations are made (S.W.) only one flake of lichen can be seen. (A nest of the Allen hummingbird in Redwood Canyon, which is being watched, is liberally spotted with lichen, the effect being—after the nest is once located—to make it conspicuous instead of the opposite.)

During the rest of the day the bird here was frequently away from the nest for extended periods, but occupied it during the night.

June 15. At 6:25 a.m. the hummer was in the nest. At 7:30 she was out and two eggs were visible. Therefore one day intervened between the laying of the eggs.

11 a.m. The hummer seems to alternate incubation with continued work at the nest—still adding material to it. There are now a half dozen or so conspicuous flecks of lichen on the S.W. side (toward the window). (The Redwood Canyon nest is much greater in bulk. It also has a "tumble-home" to the sides and the one youngster in it is secured against falling out.)

Nothing in the foregoing notes gives us with certainty the precise time at which either of the eggs was laid, but it seems fairly safe to assume that one of them received two nights of incubation before the other was laid, and perhaps two days may be counted as its incubation period to date. But there is nothing certain about either supposition.

June 16. The Allen hummingbird continued to incubate and add to the structure. The material included spider-webs, lichens and something looking like cotton.

(Little attention was given to the hummer's affairs on this day because the thrashers were having trouble with the Argentine ants' swarming over their nest and young and crawling in the eyes of chicks and parents. This involved removing parents and all, spraying nest and surroundings, and restoring the occupants, of which one had disappeared.)

June 17. At 6 a.m. the hummer was on her eggs. At 7:45 the hummer was seen to add material to the parapet of her nest (presumably raising it?). The outside is now fairly well covered with lichens. She still compacts the structure by "jiggling." It is possible to distinguish between this action and that of rubbing herself down upon the eggs.

June 18 and 19. The hummer on both days added material to the nest, both outside and inside. Outside mostly spider-webs; inside cottony stuff, usually inside the rim as if increasing the bulge inward there. The exterior is now well covered with lichen and "moss." She continues to drive other

birds out of the tree, having now added a thrasher and a house wren to her list of undesirables. Unlike the thrashers, she leaves the eggs uncovered frequently.

June 20 and 21. During this period affairs remained static. The hummer continued to add material to the nest occasionally.

June 22 to 25, incl. I was absent during this period, but Julio [my man-of-all-work] says that the Allen hummer was seen to add material to its nest.

June 26 and 28. During this period I was frequently away for several hours at a time. Allen hummer still incubating, but not infrequently leaving the nest for a minute or two. The male was seen for the third time near the nest for a few seconds.

There is no certainty that the male hummer referred to in these notes was the mate of the nesting bird. No records were made of the latter on June 29 and 30. The notes continue:

July 1. About 9 a.m. I looked into the hummer's nest for the first time today. There was at least one chick. I saw none yesterday. The first egg was laid on June 13, the second on June 15. Dawson says that, counting from the laying of the second egg, incubation lasts 12 days. On this basis, one egg should have hatched on June 27.

There is an implication here that either the first egg receives so little incubation, or that the second is so much "easier to hatch," that both will hatch on the same day, notwithstanding that, as he says, they are laid on "alternate" days. (Dawson, *op. cit.*, p. 928.) If by being "deposited on alternate days" he means that no egg is laid the day following the laying of the first, this agrees with the above observations, but not with Orr's. The implied hatching of both on the same day agrees with Orr's findings, but not with the writer's. The former found a period of 15 days.

If we take Dawson's starting point of reckoning: The laying of the second egg, the first Piedmont egg hatched in 16 days, and the second in 17, as witness the following excerpt:

July 2. The hummer now has two chicks in the nest this morning.

The writer is not informed, unfortunately, whether or not there is any agreement amongst ornithologists as to what behavior on the part of the bird shall be considered as constituting incubation and fixing the time from which reckoning shall be made. He doubts very much that birds will allow themselves to be confined within the framework of a rigorous mathematical formula and feels that, as shown by the two cases under consideration, no specific incubation period can be assigned to any free-living, wild bird. It seems only reasonable that, in the case of the Piedmont bird, the two nights of sitting on the first egg and the two days of irregular occupancy of the nest which followed, must be given some weight if the object is to determine the actual time required to hatch the eggs, and not a conventional "incubation period." In this case, therefore, the actual period during which the eggs were being subjected to the heat of the mother's body would appear to be something of the order of 17 or 18 days for the first egg and probably 17 for the second.

The notes for July 2 continue:

I began a continuous watch of the Allen hummer lasting from 3:30 to 4:54 p.m. The log follows:

- 3:30. Female on the nest after a short absence. (Male was not seen at all during this period.)
- 3:40. After a short absence—time of leaving not taken—she returned and fed both chicks, each being fed alternately, with strict impartiality, twice.
- 3:45. She flies from the nest.
- 3:48½. Returns, but does no feeding.
- 3:56. Flies away again.
- 3:59. Returns, but does no feeding. As before, covers chicks immediately—in fact lands *in* the nest.
- 4:06. Leaves again.
- 4:11½. Returns, feeds both chicks while she sits on the rim of the nest. At first feeding observed, the bill was thrust deeply down the throat of one young and not so deeply down the other. This time the "skewering" was less deep.

- 4:29½. Leaves again.
 4:32½. Back in nest again—no feeding.
 4:42½. Leaves.
 4:46. Back in nest again—no feeding.
 4:52. Away again.
 4:53. Back—feeds both.

This ended the period of continuous observation, but she was seen to feed both again at 5:15—no observations having been made in the meantime.

At no time during this period was it possible to see anything in her bill at 6 to 8 feet distance using 3x glasses. Feeding was apparently by regurgitation, the action being slow and deliberate, requiring 20 to 30 seconds to feed the two chicks.

It will be noted that she made two or three trips abroad between feedings—presumably to get enough food to feed both and perhaps to allow partial digestion to take place. [This comment does not allow for feeding herself—an oversight.] She did not feed them except immediately on returning from an absence, that is, after one feeding she had to go away for more food; so apparently the period during which the food was subjected to the action of her own digestive apparatus (if any such action occurred) could not have exceeded the length of her absences. (This is pure speculation based on insufficient material.) At no time was she seen to add to the nest structure.

Yellow-jackets are occasionally seen buzzing about the nest, but not landing on it, seeming to be more interested in the nearby leaves. Hence, if this bird used any adhesive material in binding the nest structure, or applying the outside covering, it probably was not the nectar of flowers.

July 3. A motion picture was taken of the Allen hummer feeding her young at 4 p.m. Only one chick was seen to respond and it may be that one is dead or missing. At the time yesterday's record was made it was seen that one chick was smaller than the other. When she returns from an absence there is usually an accumulation of pollen on her mandibles. In feeding the chicks, much of this is wiped off.

July 4. Absent most of the day. Hummer was seen feeding *one* chick before I left.

July 5. The Allen hummer was observed a few times only. Each time she returned from abroad—except when she immediately sat in the nest—she reached down into it as if to feed a young bird, but there seemed to be no response; she then entered the nest and sat there.

July 6. The hummer continued to sit in the nest, absenting herself occasionally and, on returning, was not seen to feed her chicks, although she made the same futile gestures recorded above. This was during the forenoon and part of the afternoon.

About 4:30 p.m. I reached down from a window above and parted the leaves above the nest with a fishing rod. The parent had just left. All I could see at about 8 feet distance was a dark blotch in the bottom of the nest and nothing moving. I got a long ladder and went up to investigate, finding both chicks dead. One was completely desiccated and about the size of a blue-bottle fly. The other, somewhat larger, had not yet stiffened. It would appear from her actions up to this time that the mother bird has been unable to comprehend that her offspring are past all aid. It is thought that the larger chick died last, and on the 5th. I removed both. She was not again seen at the nest, even up to 10 p.m.

July 7. The hummer was not seen to visit the nest all day; but at about 3 p.m., as three of us were looking at the nest from the landing, two hummers (species unidentified) skirmished through the nest tree and quickly disappeared. (This female and mate renewing courtship?)

There is no further notation on this subject until:

July 10. Allen hummers are occasionally seen in the vicinity of the abandoned nest, but not seen to enter it. Hummers are as numerous here now as I have ever seen them, perhaps more numerous. They are all Annas and Allens and seem to be "all" females or immatures.

Up to the present date the nest has remained vacant. It is being left there in order to determine whether it shall be used again this year, as is often the case, at least as a base.

One circumstance during the closing scene perhaps deserves further emphasis and that is that the parent undoubtedly tried to feed the dead chicks, and that repeatedly. Such an act is completely at variance with the generalization made by N. Tinbergen, Lector in Experimental Biology, University of Leyden (Bird-Lore, vol. 40, November-December, 1938) in the article entitled "Why Do Birds Behave as They Do?" in which

he cites (p. 391) experiments with young cuckoos as showing "that the parents' feeding behavior is released only by gaping young in the nest," and later in the same paragraph, he says that he has taken for an example a "Cuckoo-in-the-nest, but the conclusion about the parents' behavior holds true for all birds that feed their young." In other words a parent bird is moved to feed its young only by that young bird's opening its mouth! An extraordinary statement which, to refute, will lead us too far from the hummingbirds; but, although the present writer may have misinterpreted the behavior of the female hummer, he can not forbear mentioning the fact that, in the case of *every one* of the 15 or 20 nests of the California Thrasher which he has had under observation at his home, at "reading distance," there have been innumerable instances of one or the other of the parents' persistently trying to induce a totally unresponsive chick, by cluckings and bill-proddings, to open its mouth to receive food.

Piedmont, California, January 28, 1939.