

OBSERVATIONS ON THE NESTING OF THE RUBY-THROATED  
HUMMINGBIRD (Archilochus colubris)

Helen Prockiw  
Detroit, Michigan

A report of an original field study and reference readings conducted as a requirement for Advanced Ornithology (Zoology 119), at the University of Michigan Biological Station.

August 7, 1940

## CONTENTS

Introduction-----	1
Classification-----	1
Description-----	2
Range and Distribution-----	3
Migration-----	4
Discovery and First Observations-----	4
Territory-----	5
Song-----	6
Nest-----	7
Eggs-----	8
Incubation-----	8
Hatching-----	9
Young-----	10
Food-----	14
Relation to Other Birds-----	15
Summary and Conclusions-----	16
Bibliography-----	18

## RUBY-THROATED HUMMINGBIRD

## INTRODUCTION

This paper includes a study of the nesting activities and reference readings on the life history of the Ruby-throated Hummingbird, Archilochus colubris. The nesting activities were observed from June 29 to July 22, 1940, at the University of Michigan Biological Station, located at Douglas Lake, Cheboygan County, Michigan. I wish to express my appreciation for the help and guidance given to me by Dr. Olin Sewall Pettingill, Jr., and also Dean Odina Olson for the discovery of the nest.

## CLASSIFICATION

The birds of the Family Trochilidae, to which the hummingbirds belong, are characterized by their long, slender bills and brush-tipped tongues which are split in two. The feet and legs of the hummingbird are very weak with long curved nails which are used mainly for perching. The tarsus and toes are scutellate. The wings are pointed, narrow, and very light and rigid, being adapted to the rapid motion characteristic of the bird. The postnuptial molt of the adults occurs between autumn and spring. The juvenal plumage is shed at the postjuvinal molt beginning in October. In the spring the first nuptial plumage is acquired, and looks a great deal like that of the adult.

The flight of the hummingbird is especially characteristic. The bird can fly forwards, backwards, remain stationary, or fly sideways. The speed of the wing beat has been estimated at 55 miles per second, according to Cooke in Flight Speed of Birds (1937, p. 8). In order to achieve this unusual flight the keel of the sternum is immensely deepened to give support to the great muscles that move them. Cooke has estimated the speed of the hummingbird as being 30 to 50 miles per hour.

#### DESCRIPTION

The hummingbird is the smallest bird present here, measuring less than four inches in length. The wing measures from 1.62 to 1.87 inches; the tail is 1.00 to 1.25 inches; the bill is .56 to .69 inches. The female is always larger than the male. The male is metallic bronze and green above, with black cheeks, chin, and lores. A small white spot is back of the eye. The throat of the male is a brilliant red, and a broad white collar is present on the neck. The abdomen and under tail coverts are white, and a white stripe runs through the center of the breast. The sides of the body are green, and the wings are brown. The tail is forked except the middle pair of feathers, and the feathers are narrowed at the tips. The bill of the hummingbird is especially characteristic, being long, straight, and narrow. The bill and the legs are black. The female is less green than the male and has no ruby-colored

throat. The sides and under tail coverts of the female are buffy colored. The tail is shorter than that of the male and the outer three feathers on the side have white tips. The juvenile hummingbird is of less brilliant coloring than the female adult, but otherwise resembles it a great deal in coloring. The juvenile male has a slightly dusky coloring on his throat, while the female juvenal bird has a pure white throat.

#### RANGE and DISTRIBUTION

According to the American Ornithologists' Union's Check List of North American Birds, the Ruby-throated Hummingbird, Archilochus colubris, has a breeding range from Alberta, Central Saskatchewan, Manitoba, and Cape Breton Island south to the Gulf coast and Florida, west to North Dakota, Nebraska, Kansas, and central Texas. The winter range is from middle and southern Florida and Louisiana through southern Mexico and Central America to Panama; casual in Cuba and Bermuda in migration.

The family of hummingbirds constitutes over 500 species, and are found only in America and nearby islands. There are eighteen species in the United States, but only the Ruby-throated hummingbird is found in eastern United States. According to Todd, in Birds of Western Pennsylvania, (1940, p. 309), "the hummingbird has been able to accommodate itself to the changing conditions of environment, and is probably as numerous today

as it was in the past."

#### MIGRATION

According to Roberts in The Birds of Minnesota, (1932, p653,VI), the spring migration of the Ruby-throated Hummingbird is from May 13 to May 20. The fall migration is from September 3 to September 9. On September 1, 1931, M. B. Trautman noted thirty-two hummingbirds within a distance of three miles on Buckeye Lake, Ohio, apparently migrating southward. In the regions along the Atlantic coast the hummingbird appears to migrate earlier in the spring and later in the fall. Witmer Stone, in Bird Studies at Old Cape May, (1937, p.650), states that the hummingbird appears around April 23 in the spring, and migrates south about October 9. In general the hummingbird is delicate and therefore a late migrant, usually migrating north from April 25 to May 21. Twelve seasons of observation in Pennsylvania by Todd shows an average being May 13. The majority of hummingbirds flock together to feed in August, and migrate south in the middle of September. The male usually comes in advance of the female. They travel 2000 miles over land and sea. The flight is swift and direct, and they generally fly comparatively high over the trees. According to Chapman, (1909,p350), they spend comparatively small part of the time upon the wing.

#### DISCOVERY and FIRST OBSERVATIONS

The Ruby-throated Hummingbirds are fairly abundant in

the Douglas Lake region. In July they are most often found in the open forests, and in August they frequent the blossoming fireweed which covers the open plains.

On July 29, 1940, the first hummingbird nest was found at the Biological Station. The nest was found after observing the female hummingbird concentrating around a white birch tree. The nest was discovered, and upon examination was found to contain two eggs. The hummingbird, at this time, was observed leaving the nest about twice every hour. The bird would always fly directly from the nest, away from the tree, and to a nearby resting place. When the bird returned to the nest it would flit from limb to limb and up and down the tree for about a minute, and then it would carefully fly to the nest.

#### TERRITORY

During the summer of 1940 two hummingbird nests were found in the neighborhood of the Biological Station. Nest A was discovered by Dean Odina Olson, and was situated in a white birch tree in Ladyville. The tree was between the two buildings occupied by Dean Olson. This tree was about thirty yards from the lake and about 10 yards from the road. This nest was studied in detail.

The other hummingbird nest was placed in a sugar maple tree in Manville. This nest was discovered with two young birds,

and one of these young was raised and studied in the laboratory. This nest was placed directly above the road, and in front of Cabin 14. This tree is located about a block from the lake.

Both nests were placed on horizontal limbs which bent slightly downward. The nest in Ladyville was on a limb which has a  $5/8$  inch diameter, while the Manville nest was on a limb with a  $3/8$  inch diameter.

As stated above, both nests were located near the lake, one was directly above the road, and the other a few yards from the road. Both nests were in a region where a quantity of many garden flowers, especially pinks, were located and which partly served as food supply for the hummingbird.

Hummingbird nests are generally located near open spaces, near water, or in woods bordering a field or road. The area is also characterized by an abundance of flowers from which nectar can be collected. According to Bendire, in Life Histories of North American Birds, (1897, p. 193, V.2), the oak is the favorite tree of the hummingbird. The hummingbird apparently returns to the same spot year after year, but it generally builds a new nest.

#### SONG

Since the Ruby-throated Hummingbird has no real song, the male substitutes a courtship flight, and swings back and forth over the head of the female in a sort of pendulum style. A tsit, or often tsidit, tsidit, tsidit, call is used in flight or when the bird is frightened. A high pitched squeak followed

by a lower buzzy roll, often repeated several times in rapid succession, is sometimes used when the birds are together in a group. This squeal is also used when the hummingbirds attack each other.

#### NEST

The tree which the hummingbird selects for its nest is of various types such as sugar maple, birch, beech, spruce, and hemlock trees. The bird also likes to nest in orchards, according to Barrow, in Michigan Bird Life, (1912, p. 387).

The nest is generally placed from five to eighteen feet from the ground, although Howell, in Florida Bird Life, (1932, p. 303), claims the nest is placed from six to fifty feet from the ground. F. W. Woodruff found a nest thirty feet from the ground. The nest in Ladyville was placed seventeen feet from the ground, six and one-third inches from the trunk, and thirty-nine inches from the end of the limb. The nest in Manville was about twelve feet from the ground.

The nest of the hummingbird is one of the most beautifully constructed nests. The lining of the nest is composed of a thick bulk of soft down made of silky filaments from willows and poplars, and milkweed down. The outside of this soft, thick lining is made up of lichens which are fastened to the down by spider silk. One nest was held together by two tiny twigs which were stuck through the sides of the nest. Howell,

in Florida Bird Life, (1932, p. 303), states that the lichens were glued to the lining by saliva secreted by the bird. Todd states that it is not unusual for the hummingbird to build a nest over the remains of an earlier one. One hummingbird nest was found constructed among the vines on a porch.

The nest in Ladyville measured  $1 \frac{5}{8}$  inches outside diameter,  $1 \frac{1}{16}$  inches inside diameter,  $\frac{7}{8}$  inside depth, and was more or less triangular in shape. The nest in Manville measured  $1 \frac{5}{8}$  inches outside diameter,  $1 \frac{1}{16}$  inches inside diameter,  $\frac{1}{2}$  inch inside depth, and was round and cup-shaped.

The nest is always well sheltered above by leaves. The fact that it is placed on a small, downward sloping limb and is of such a small size serves to protect the bird from any possible tree-climbing enemies, storms, or other birds.

#### EGGS

The hummingbird lays two eggs which are plain white without any sort of markings. The eggs are equal-ended and are about the size of small beans. The eggs are not always laid in consecutive days, one or two days often elapse between the laying of the first and second eggs.

#### INCUBATION

The incubation of the eggs was done entirely by the female. The male was absent during the incubation period.

The Ladyville nest was first observed during the end of the incubation period. On June 30 the actions of the female were observed. The bird would sit on the nest for five minutes, leave and preen her plumage on a nearby telegraph wire for three minutes, return to the nest for two minutes and then go to ~~the~~ wire again. The bird would always be extremely cautious before she would re-enter the nest, and would buzz from one limb to another of the tree before she would light on the nest again. On July ~~the second~~<sup>2</sup> the tower was put up, and on July ~~the third~~<sup>3</sup> one egg hatched. Since the nest was discovered near the end of the incubation period, the time of the incubation period was not recorded. According to Forbush, in Birds of Massachusetts, (1927, p. 319, V. 2), the incubation period of the Ruby-throated Hummingbird is from 13 to 14 days.

#### HATCHING

The young which hatched from ~~the~~<sup>5</sup> the egg on July 3 was blind and almost entirely naked but for a little natal down covering the head and wings. The bird made no sound of any kind. The mother bird was very much excited this day and she would buzz about the blind and would stop right before me and stand in mid-air with her wings buzzing and her bright steel-like eyes peered at the blind. The mother bird would perch at the end of the nest, feed the young, and then sit on the nest. She would breathe very rapidly while on the nest, and her entire body would quiver.

She would sit on the nest for ten minutes, and then would leave the nest directly and with a quick flash. She returned in about thirty seconds, but this time without any food. The mother bird would always leave the nest when I entered or left the blind, or when anyone passed near the nest. On July fourth the second egg hatched, and the nest contained two young hummingbirds which barely took up any space in the small nest.

#### YOUNG

When the mother bird would approach the nest the young apparently heard her, for their mouths were opened even before she entered the nest. The young made no sound when they were two days old. On July fifth when I entered the blind the mother bird left and did not return for ten minutes. She sat on the nest for two minutes and <sup>then</sup> left again. She would always leave the nest as soon as she heard anyone in the vicinity of the nest. The bird would return and feed the young by means of dropping drops of liquid down their throats. The feeding was entirely by regurgitation.

On July sixth the bird was very much disturbed when I came up <sup>to</sup> the blind and looked into the nest. She buzzed by my head, came around and looked at the blind, flew around for twenty minutes, and then sat back on the nest for ten minutes. The bird left for five minutes and then returned and fed the young. Within the next ten minutes the bird left the nest twice. When the mother fed the young she would sit at the edge

of the nest, stretch her long neck, tilt her head and beak directly downward, and thrust two-thirds of her long beak down the throats of the young. The young would stretch open their wide yellowish beaks and lift them up to be filled. They would leave their beaks open even after the mother had left the nest. After the mother finished feeding the young she would fly directly to the blind and look in. Then she would return to the nest after about thirty seconds spent examining the blind. After five minutes the mother would again leave the nest. Often times she would not bring food when she returned to the nest.

July sixth

time of feeding	time on the nest	time off the nest
9:20	3 minutes 4 minutes	2 minutes 16 minutes
9:45	4½ minutes	24½ minutes
10:15	2 minutes	15 minutes
10:50	15 minutes	5 minutes
11:20	1 minutes 5 minutes	15 minutes 10 minutes

On July ninth one of the young birds was gone from the nest. It apparently had died and had been thrown out from the nest. At this time the young bird which remained in the nest filled the entire cup-shaped nest.

On July thirteenth the young bird was able to stick its head out of the nest. It would open up its mouth for a long

time before the mother came. This was the first day the mother hummingbird was heard giving her queer squeaky cry note. The mother would often come into the vicinity of the nest during the hour, but did not go to the nest to feed the young bird. The times of feeding for this day were: 8:45, 9:20, 10:05, 10:40, and 11:15. The young bird scarcely moved in the nest, except for a wiggling of the tail. The young bird would give a thin squeak while it was being fed, and especially after the mother quit feeding it.

On July seventeenth the young bird was beginning to take on definite hummingbird characteristics. The bird was entirely covered with feathers except along the center of the ventral side from the region of the throat down the entire length of the body. The feathers at this time were mostly dark brown on the body and speckled with tannish marks down the back. The wing feathers were of a darker brown and also had some white streaks scattered among the dark colored feathers. The primaries were now  $\frac{3}{16}$  inches out from the quills. The bird was able to spread its wings, but there was little motion in flapping. The eyes of the bird were very alert, and the bird issued forth numerous peeps when it was removed from the nest. The bill was  $\frac{1}{4}$  of an inch long, was very narrow, and gave the bird a characteristic hummingbird look. The bird, at this time, occupied almost the entire nest.

On July nineteenth the young bird was able to turn itself completely around in the nest. The beak of the young was tilted

at an angle so that it pointed directly up to the sky.

The mother bird would always squeal when she came around the blind or nest at this time.

The measurements of the young on July twentieth, two days before it left the nest, were as follows: length  $2\frac{1}{2}$  inches, wing measurement  $1\frac{1}{4}$  inches, beak  $5/16$  of an inch, first primary  $7/8$  of an inch. The color of the bird at this time was a rich brown color, with the back mostly intermingled with bright metallic green feathers. The throat of the bird was pure white. The wings of the bird at this time were very strong, and it was able to flit its wings very rapidly as characteristic of the adult.

On July eighteenth Nest B, which was located in Manville, was examined. The nest contained two birds. On that afternoon the birds flew from the nest. One of the young birds was caught and brought into the laboratory and put into a cage. This bird was kept for three days. The bird was fed from a medicine dropper which the bird would lick by sticking out its long, thin, two-parted tongue. The bird would start its feeding by opening its beak up wide, but after a few drops, the rest of the food was obtained by licking with the tongue. When the medicine dropper was first put into the cage the bird would sometimes give a faint squeal. The medicine dropper was probably the only way to feed the young hummingbird, but it was unsatisfactory in that much of the food dripped off and down the front of the bird, giving it a sticky appearance. The actual

time of feeding of the bird was from ten to twenty-five minutes. The bird was fed every thirty minutes the first day, and after that it was feed every hour during the day. The weights of the bird were as follows: July 18, 3.7 grams; July 19, 3.55 grams; July 20, 4.0 grams. The measurements of this bird were  $2\frac{1}{2}$  inches long, and the wing was  $1\frac{1}{2}$  inches long. The bird lost some weight the second day probably because of the change of food and habitat. The young bird was not very active in the cage, and often remained in the position on the perch for a couple of hours. The bird died at the end of the third day, probably because of lack of food or because of wrong diet. The bird was fed milk, honey, and sugar.

The weights of the bird from Nest A were as follows: July 6, .85 grams; July 10, 3.02 grams; July 17, 4 grams; July 19, 4.4 grams. The exact time that the young remained in Nest A was nineteen days. According to Forbush, (1927, p. 320, V. 2), the bird generally remains in the nest from 14 to 28 days in New England. In the south the bird remains in the nest from 6 to 18 days. probably because there is more food in the south and the bird grows faster.

Nest sanitation was not necessary for the hummingbird, for the young sent their droppings over the sides of the nest.

#### FOOD

The food of the hummingbird consists mostly of nectar from flowers. The bird also eats plant lice, small flies, beetles, gnats, and widges. The bird generally catches insects

in mid-air. The hummingbird is also very fond of sap from trees. I observed it feeding on sap of a black spruce tree. It often feeds on sap which sapsuckers have fed upon. Late in the summer the Ruby-throated Hummingbirds feed a great deal on jewel weed and the giant fireweed. Since it is impossible to detect exactly which small insects the hummingbird eats, it is difficult to measure accurately the benefits or destructions this bird may cause. Some of the large insects which they eat are spiders, leaf hoppers, black flies, and plant lice. Howell, in Florida Bird Life, (1932, p. 303), tells of hummingbird stomachs being examined and finding the following data; 45% spiders, 36% leaf hoppers, and 2% gnats. Some of the flowers which the hummingbird gets its nectar from are the scarlet salvia, azalea, fuchsia, geranium, larkspur, tiger lily, morning glory, and gladiolas. The hummingbird is believed to favor flowers which are red in color. The brush-like tongue of the hummingbird aids in gathering of nectar and insects. It had been observed by A. R. Sherman, in her experiments, that the nectar often intoxicates the bird if it feeds on too much of the nectar at one time.

#### RELATION TO OTHER BIRDS

According to Forbush (1927, p. 319), the hummingbird fights a great deal during the nesting season. The males attack larger birds, as well as fight among themselves. The kingbird and English sparrow are both known to give in to the hummingbird, but the woodpecker refuses to let this small bird chase it away. The bird is also a

fighter with moths and bees which are often in their territory where they obtain nectar from the flowers. During mating the hummingbirds are always fighting and chasing each other. They rely on small size and fastness to escape from the larger birds they attack. They often chase bees away from the flowers they obtain nectar from.

There has been one report taken from The Ornithologist and Oologist, Vol. XVI, No. 7, July 1891 which claims that a nest of the Ruby-throated Hummingbird was found to contain one egg of the Cowbird which completely filled the nest. This report, however, was third-hand information and was not recorded until a year after the nest had been discovered.

#### SUMMARY and CONCLUSIONS

1. The speed of the wing beat of the Ruby-throated Hummingbird has been estimated to be 55 times per second.
2. The Family Trochilidae constitutes over 500 species, and <sup>is</sup> ~~are~~ found only in America and nearby islands.
3. The Ruby-throated Hummingbird migrates about 2000 miles over land and sea.
4. Hummingbird nests are placed on horizontal limbs which usually bend slightly downward.
5. The hummingbird nest is always well sheltered by leaves, and is placed on limbs less than an inch in diameter.

6. The incubation of the hummingbird eggs is done entirely by the female.
7. The female hummingbird would not incubate for a long period at a time. The incubation periods were brief, and interrupted by frequent preenings on a nearby wire.
8. The female bird was always easily frightened away from the nest by the sound of voices or cars.
9. The young were fed every half hour the first few days, but after a week the feeding periods became fewer and farther apart.
10. The female hummingbird did all the feeding, but was absent from the nest a great deal after the young were a week old.
11. Young hummingbirds send their droppings over the edges of the nest.
12. The hummingbird eats nectar, small insects, and sap from maple and spruce trees.
13. Hummingbirds are quite pugnacious during nesting season, and often attack larger birds, moths, and bees.

## BIBLIOGRAPHY

American Ornithologists' Union, 1931, Check List of North American Birds, Lancaster, Pennsylvania.

Baker, B. W., 1939, Observation on the Ruby-throated Hummingbird, Jack Pine Warbler, January.

Barrows, Walter Bradford, 1912, Michigan Bird Life, Lansing, Michigan.

Bendire, Charles, 1897, Life Histories of North American Birds, Washington, D.C.

Chapman, Frank M., 1909, Handbook of Birds of Eastern North America, New York.

Cooke, M. T., 1937, Flight Speed of Birds, Washington, D. C.

Coues, Elliott, 1903, Key to North American Birds, Boston.

Forbush, E. H. , Useful Birds and Their Protection, 1907, Norwalk, Massachusetts.

Forbush, E. H., 1927, Birds of Massachusetts, Norwalk, Massachusetts.

Friedmann Herbert, 1929, The Cowbirds, Springfield, Illinois

Howell, Arthur, H., 1932, Florida Bird Life, New York.

Mc Atee, 1926, Relation of Birds to Woodlots in New York State, Roosevelt Wild Life, October.

Pickwell, Gayle, 1939, Birds, New York.

Roberts, Thomas S., The Birds of Minnesota, 1932, Minneapolis, Minnesota.

Saunders, Aretas A., 1936, Ecology of the Birds of Quaker Run Valley, Allegany State Park, New York, New York.

Saunders, Aretas A., 1935, A Guide to Bird Songs, New York.

Sherman, Althea, R., Experiments in Feeding Hummingbirds During Seven Summers, Wilson Bulletin, December, 1913.

- Stone, Witmer, 1937, Bird Studies at Old Cape May, Philadelphia.
- Stoner, Dayton, 1932, Ornithology of the Oneida Lake Region, Roosevelt Wild Life Annals, Vol. 2, Nos. 3 and 4.
- Taverner, P. A., 1922, Birds of Eastern Canada, Ottawa.
- Todd, W. E. C., Birds of Western Pennsylvania, 1940, Pittsburg.
- Trautman, Milton, B., 1940, The Birds of Buckeye Lake, Ohio, Ann, Arbor, Michigan.
- Wood, N. A., 1916, The Summer Birds of the Douglas Lake Region, Cheboygan County, Michigan, Ann Arbor, Michigan.
- Wood, N. A., 1908, Notes on the Spring Migration at Ann Arbor, Michigan, The Auk, Vol. XXV., No 1.
- Woodruff, F. M., 1967, The Birds of the Chicago Area, Bulletin VI, Natural History Survey.