

pair may be found nesting with the white species, as a rule they are found by themselves.

The black-footed albatross is somewhat larger than the white species, and when seen on the wing is instantly recognized as being far superior as an aviator. Birds of this species followed our ship all the way from the Hawaiian Islands to San Francisco. They nest like the Laysan albatross, and feed their young in the same manner. Likewise, they have a dance, as does the white species, but in their case it is much more elaborate, and the figures are more slowly and gracefully executed. Instead of lifting one wing they raise both, while the notes uttered are much softer, and the whole performance ends with a sound which seems to come from deep within the bird's body and suggests the stroke of a bell under water. Although they nest separately, black albatrosses are very neighborly with the white species. We often saw them visiting a white colony, and sometimes even trying to perform with them. On such occasions, however, the rapid pace set by the white bird was rather too much for his more deliberate cousin, and in each instance the affair ended disastrously.

During the latter part of August, when the young albatrosses are strong enough to fly and to feed themselves, they all leave the island and live on the sea until the return of the nesting season.

THE CEDAR WAXWING (*BOMBYCILLA
CEDRORUM*) DURING JULY AND
AUGUST, 1916.

BY KATHERINE C. POST.

A. INTRODUCTION.

This work was done at the University of Michigan Biological Station, Douglas Lake, Michigan, under the direction of Dr. R. M. Strong. Mr. R. F. Hussey gave me the facts regarding the building of the second nest and the dates for laying the eggs. Misses R. M. Hall, S. M. Moiles and M.

Boland also made observations. In this paper I have used Miss Hall's notes for August 6, 4:30-8:30 A. M., Miss Boland's for July 12, 8:15-9:15 A. M., July 22, 3:30-4:30 P. M., July 27, 4:30-5:30 P. M., and on July 30, 4:00-6:00 P. M.; Miss Moiles' for July 24, 1:30-2:30 P. M. July 26, 4:00-4:30 P. M., and August 6, 1:30-4:30 and 6:00-6:30 P. M.

Insect larvae and any other animals resembling a grub or worm are called "worms" indiscriminately in this paper as it was not practicable for me to distinguish them. Insect imagos are called "insects."

Three Waxwing's nests were found within the limits of the camp. One of these was in a pine tree at the edge of the lake, about nine feet high, and was not accessible for study. A second one in a Norway pine, at the edge of the lake was seven feet from the ground. My observations of nest building were made on this nest. The third nest was completed and the eggs laid before I personally observed it. (This paper deals with the nesting habits of two Cedar Waxwings, and the various activities connected with the rearing of the young birds.) As Cedar Waxwings show no difference in plumage for the sexes, I shall speak of the members of the pair as the first and second bird, I shall use the word "chirped" to describe the peculiar squeaking sound uttered by the young waxwings.

B. PERIODS OF NEST BUILDING.

On July 9, 1916, we noticed a cluster of needles and string on a pine limb so placed that we thought it the beginning of a nest. The next day we saw two waxwings carrying pine needles to the tree. The first bird flew upon the nest bringing more needles. It noticed us and flew away.

July 12, 8:15-9:15 A. M.

When we arrived the second bird was standing within the nest and seemed to be weaving the inside with its bill. The first bird was on a nearby limb and at 8:25 it chased away

a vireo which passed the nest, the waxwing flying at the vireo rapidly and uttering a single note. At 8:28 the waxwing flew back to the nest, whereupon the second bird left it, and two minutes later flew to a tree close by, and noticing a string caught around a tree about three yards from the nest, it pulled the string with its bill very vigorously for a minute. Two minutes later the first bird, which had returned to the nest, came to assist it. They both took holds and pulled repeatedly at different points. Three minutes later they had released the string and the first bird brought it to the nest. The string was over a yard long and there was some difficulty in getting it to the nest, as it was twisted around a small limb. The second bird was on the nest waiting for the string and when it was brought, wove it into place. At nine o'clock a third waxwing appeared, but was chased away by the first bird, which flew rapidly at it several times. Five minutes later both birds left the nest and the first bird tried to loosen a piece of string which had been brought to the tree at an earlier time and was caught around a limb. It took hold of the string at several points, but was unable to remove it. At 9:07 both birds flew off. The first one flew to a ten rope about thirty feet away. It stood on the rope and tried to seize the fibres and loosen them. The second bird left the nest and also tried to loosen fibres. Both flew then to the top of the rope, where it was frayed. They pulled out some fibres, which they took back to the nest, where the second bird wove the fibres into the nest. A hermit thrush approached and the first bird flew towards it rapidly, whereupon the thrush flew away.

We were at the nest from 11:30 until 12 A. M., but the birds did no work. It was rainy and warm. We were there again from 3:00-3:30 P. M. At 3:20 the second bird flew to the nest and turned around several times. It flew to the rope and pecked at the end, but flew away again.

July 14, 8:00-8:30 A. M.

The first waxwing flew to a tree about ten feet away. It

flew round the nest twice, then went to where the second bird was perched. The first bird held something in its beak, which it brought to the other bird. At 8:10 the second bird flew away, the other followed it and neither returned during our stay. On Saturday, July 15, we found one bird sitting upon the completed nest. The third nest was in a little maple tree, five feet, seven inches from the ground and on a horizontal branch a foot from the trunk. This tree was only about twelve feet from one of the laboratories, and as people were continually passing by the birds became accustomed to them. The nest was bulky and rough looking on the outside. It was made of grass, fibres, roots, and string not smoothly woven together. The inside of the nest was carefully and securely woven. It was built upon a forked branch. It measured six inches on the outside and three and a half on the inside and was a little longer than it was wide. The nest was begun on June 26, and finished on June 28.

C. PERIOD OF INCUBATION.

The five eggs were laid on July 1, 2, 4, 5 and 6. My observations were begun on July 9, when one of the waxwings was upon the nest. I watched for an hour in the morning and in the afternoon of July 10, 11, 12 and 14, but did not see the bird leave the nest unless I frightened it away, in which case it returned in from one to three minutes. It was possible that the first bird may have been on at night and that the second bird began early in the morning. Any way the waxwings did not change at short intervals. My observations made me think that the brooding may be done very largely by one bird.

D. NESTING PERIOD.

July 17, 8:00-9:45 A. M.

On July 17, there was one little bird with eyes closed and seemingly without feathers. The parent bird returned one minute after I frightened it away and remained on the nest the rest of the hour.

July 18, 8:00-11:10 A. M.

The next morning I saw a second little bird still partly in the shell. Again the adult bird returned to the nest within a minute. At 9:45 the first parent bird brought food to the second and then flew off again.

July 19, 8:00-11:10 A. M.

The following day a large wooden box was placed so that I could sit on it and look within the nest. The second bird allowed us to approach with the box and did not leave the nest until I gave a quick jerk to the limb. There were four little birds, and one egg which did not hatch, and was gone from the nest the next day. On careful scrutiny, numerous feather germs were seen, although at a casual glance the nestlings appeared naked. When touched near the mouths, the little birds opened them wide, showing a brilliant red and orange throat. At 9:07 the second bird was back and brooded the nestlings. The thermometer registered a maximum of 100 degrees and probably on account of the heat the bird kept its mouth open.

Three minutes later the first bird approached the nest directly with an insect and put it in the second bird's bill. This food was regurgitated, but this process could not be observed as well as a little later on, when berries were fed. Both birds fed the young together. Each perched on the side of the nest. All the feedings I observed the first few days were given by both birds together. At 9:13 the first bird uttered a note and flew away, when the second bird sat upon the nest again. The first bird flew beyond the tree and then upon a branch at the other side of the nest at 9:30. This was one of the few times that the waxwing did not fly directly to its nest. It may be that the bird was frightened by my presence. Both birds perched on the rim of the nest. The first bird gave the food to the second and then each put its bill in the little birds' mouths, but I could not see any food.

At 9:33 the first bird left and the second took its place on the nest again. Half an hour later it stood upon the edge of

the nest with its mouth open and remained in this position for five minutes. At 10:15 the first bird returned and gave some animal food to its mate. As before, both birds sat on the edge of the nest and placed their bills within the little ones' bills. Both parents kept their bills in motion all of the time. At 11:04 the first bird flew off without any sound. The second bird remained on the side of the nest for a minute and then sat on it, remaining there when I left.

July 20, 7:00-8:15 P. M.

The second bird was on the nest and did not move when I approached. Two minutes later the first bird flew to a limb three inches from the nest. It was perfectly still for a quarter of a minute and then gave what looked like a worm to the second bird. They both put their beaks in the mouths of the nestlings. At 7:25 the first bird flew away, and from then on until eight o'clock the second bird was on the nest. I reached out toward the nest and almost touched it before the parent flew off. The four young birds still looked very naked. One was a little larger than the other three. At 8:02 the second bird flew towards the nest with wings outstretched as if trying to drive me off.

July 22, 7:30-8:15 A. M., 3:30-4:30 P. M.

I found the four little birds with their heads up over the nest and their eyes closed. Later when food was brought they opened their eyes—the first time that I saw them open—and raised their heads, opening their mouths. At 7:55 the second bird brought amelanchier berries, and the little birds stood up and nearly fell out of the nest. They uttered a single monotonous note, which I shall call a chirp, and kept opening and shutting their mouths and moving their wings a little. In the afternoon, the birds opened their mouths as the observer climbed upon the box and they continued doing this for several seconds. The second bird flew by and at four o'clock came to the side of the nest, while the first bird flew to a tree about one hundred yards away. A few minutes later the first bird returned with a small worm and gave it to the

second bird, which fed the little birds. At 4:10 the first bird left while the second bird sat on the side of the nest with its mouth open. The station thermometer registered 86 degrees that day. At 4:30 the parent preened the feathers on its breast.

July 23, 8:30-10:40 A. M.

The sun was very bright and warm, the temperature reaching 90 degrees in the shade. At 8:35 the parent bird was not on the nest. The nestlings had downy feathers on their breasts and showed definite feathers an inch long on their wings and tail. On their backs the apteria showed plainly. At 8:50 the second bird returned with an insect, which it gave to the little birds. At a noise from the laboratory it flew off, uttering one shrill note and was absent until 9:15, by which time the little birds had become very much excited. When the second bird approached it showed no food in its bill, but soon regurgitated two blue berries. Several people approached and the birds seemed excited, but it remained on the nest. At 9:40 the little birds kept stretching their necks upwards with their mouths wide open and two minutes later the second bird brought several blue berries, which it fed to each of the young, and then perched on the nest. It was still there at 10:35, when the first bird returned with a worm, which was first given to the second bird, who swallowed it and later gave a part to each little bird.

July 24, 10:30-11:30 A. M., 1:30-2:30 P. M.

As I approached the first bird came with food, which it regurgitated and gave to each bird. It perched on a limb near the nest, where it stayed for three minutes. At 11:03 it returned with a worm, which it first placed on the side of the nest and pinched apart with its beak. Then it swallowed the worm, which was regurgitated after a minute and fed to the young, each receiving some food, although perhaps not all a piece of the worm. At 11:08 the bird flew away, but was back in two minutes and fed each bird twice and then the parent perched on the side of the nest for five minutes. In

the afternoon the young birds were quiet from 1:45 to 1:53, when the second bird returned and twice fed each bird with some animal food. It remained on the nest until 2:15, when the first bird came and fed the young, after which both parents flew away.

July 25, 10:00-11:10 A. M.

The first thing I noticed was that one little bird tried to stand, and for ten seconds succeeded, holding its body up above the nest. At 10:45 a parent bird arrived and the young stood up in the nest, leaning against each other. They were fed blue berries, and then the old bird left and I examined the little ones. They were larger than when I saw them last: on their breast the downy feathers seemed full grown, while on their backs the naked areas were smaller and the tail feathers were a quarter of an inch long. Two little birds stood and flapped their wings, while one pecked at its wing feathers as if to preen them. The four birds filled the nest so completely that some nestlings were on top of the others. At 10:54 the second bird fed the young with blue berries, regurgitating them. At 11:06 the first bird brought a worm and fed it to the little birds and then offered a berry which seemed whole, to a nestling which refused to swallow it, so the old bird took it out of this one's mouth and gave it to another.

July 26, 12:30-2:15 P. M., 4:00-4:30 P. M.

When I began my observations the second bird was standing at the side of the nest. Seven minutes later, the first bird flew to a limb below the nest, where it stood for nearly a minute with a blue berry showing in its mouth. It gave the blue berry to the second bird, which broke it up and fed it to the young. The first bird took no part in the feeding. At 12:40 the little birds seemed to be sleeping and the second bird sat still on the edge of the nest. Two minutes later the young birds raised their heads and opened their mouths. At 1:06 they stood up in the nest and the second bird flew away, but returned in two minutes. The nestlings chirped as the parent

approached and stretched their necks in its direction with their mouths wide open. At 1:20 the first bird was back with a worm, which it broke up, placing a small piece in each mouth and then flying off at 1:22. Eight minutes later, the second bird also flew off and I leaned forward toward the nest to observe the little birds more closely. They noticed the movement of my finger. Their feathers were developing, showing lighter feathers around the crown and yellow on the end of the tail. At two o'clock the first bird returned with an insect which it broke up and divided among them, leaving after two minutes. The first bird flew back at 2:11 with berries, which it regurgitated, feeding each little bird one berry. At 4:00, the first bird flew directly to the nest and fed the young, remaining for three minutes, when it flew to a nearby bush, giving a few calls, which were not answered by the nestlings. The largest of these held its head out of the nest for five minutes, but the others lay quiet. At 4:20 one of the parents brought food directly to the nest. As the bird appeared, the young birds raised their heads and opened their mouths. Again the berries were regurgitated and food was given to each little bird twice. The old bird sat on the edge of the nest for a minute. At 4:25 the little birds were quiet in the nest and did not move again, while I was present.

July 27, 4:00-5:30 P. M.

The parent birds were not near the nest when I approached. The young now seemed as well feathered as adult birds, except in the length of the wing and tail feathers. The largest of the four lay on top with its head on the side of the nest, while the other three were underneath. All had their heads on the opposite side and seemed to crowd one another. As I touched the nest they raised their heads and opened their eyes, but not their mouths. One preened his feathers and I could detect no signs of fear. At 4:50 they all became restless, standing up and opening their bills. They chirped as the old bird approached with berries, which were regurgitated

and fed to them. The parent remained on the side of the nest until five o'clock. At 5:03 the little birds were again quiet and remained so until 5:15 when one of them stood up and moved its wings.

July 28, 7:45-9:45 A. M., 1:00-2:15 P. M.

When I arrived I found only three young birds. The largest had disappeared, probably having fallen from the nest, at any rate I was unable to find any trace of it. Of the remaining three, two were nearly the same size and the third a little larger. Their wing feathers were an inch long and their tail feathers an inch and a half. The tail feathers showed the yellow terminal band. At eight o'clock a parent bird called, and the little birds answered. It flew to the nest over my box, flying so close to my face that I ducked my head instinctively. This frightened it so that it flew off, but remained away only a half minute. It brought blue berries and fed each bird. When the parent left, the nestlings raised their heads, but did not try to fly after it. At 8:06 the largest of the young birds stood up, moved its wings and pecked its feathers. Suddenly all of the nestlings stood up and opened their mouths very wide. I heard no sound, but they seemed to know that one of the old birds was approaching. When a parent came to the nest at 8:08 they pushed one another aside, to get a part of the worm it brought. The old bird left at 8:09 and for another minute the nestlings remained standing, each giving a chirp. At 8:13 a parent was back at the nest with a worm and the young stretched their necks for it and each received a piece. The parents fed them at 8:20 with blue berries, which were regurgitated rapidly. It seemed as if each little bird received two blue berries. Fifteen minutes later the nestlings began to preen their feathers, especially under the wings. At 8:48 a parent returned with food, which it gave so rapidly that I could not see what it was. Blue berries were fed to each bird at 8:50 and after feeding the young, the parent sat on the side of the nest half a minute. When it left, the little

birds changed positions in the nest. At 9:05 a parent returned with berries and the nestlings stood up and were very anxious for food. In a minute the bird was off again. As it approached the nest at 9:15, a goldfinch flew into a tree nearby. The waxwing flew at it and seemed much disturbed. When any bird flew near the nest the waxwings were much agitated, but the presence of people seemed to frighten them very little. During the summer I had observed a catbird, robin, thrush and junco and they were all much more excited by the presence of people, than the waxwings were. It is possible that the pair I studied were unusually courageous, and they may have become used to people gradually. Nevertheless, it was remarkable how little disturbed they were by my presence on the box near the nest. When the waxwing returned from chasing the goldfinch, a bird's song seemed to disturb it. The young chirped loudly, evidently disappointed at not getting food. At 9:30 a parent brought blue berries, regurgitating them very rapidly, while the little birds stretched their necks, moved their wings and were much excited. Ten minutes later they were fed again, but they were calmer, and when the bird flew off (at 9:42) they settled down to sleep.

At 1:15 a parent flew to a tree south of the nest and remained there for five minutes, uttering low calls, which the young answered. Fifteen minutes later it flew to the young, but did not feed them until a minute later, when it placed an unbroken blue berry in the bill of one of the young birds, and then removed it, as the nestling was unable to swallow it whole. The parent then broke the berry up and gave them parts of it. Two minutes later both parents flew past the nest and called to the nestlings, who opened their mouths, but did not answer. At 1:47 a parent brought more berries to the young, and again at 1:55. One of the young stood upon the edge of the nest and flapped its wings. A minute later the nestlings were fed more berries. At 2:10 one of the young birds pecked at a leaf above its head. Five minutes later they were fed more amelanchier berries and became quiet.

July 29, 2:00-4:00 P. M.

The day was very warm, a maximum of 100 degrees occurring at 2 P. M. The young birds were quiet in the nest. They seemed completely feathered and almost full grown. Their tail feathers measured fully two inches. At 2:15 the nestlings opened their mouths and kept them open, but this seemed more on account of the heat than because of hunger. Ten minutes later a parent brought some berries, the little ones chirping vigorously. It flew away again in half a second. The nestlings chirped after the bird left. At 3:08, as a parent approached, each young bird opened its mouth and answered the parent's call. In five seconds each was fed and the parent left. At 3:25 all the young were fed with amelanchier berries. After the parent left they again kept their mouths open, because of the heat. Five minutes later one nestling became restless and chirped several times.

July 30, 9:30-11:00 A. M., 4:00-6:00 P. M.

This was the warmest day during my observing, the thermometer registering 102 degrees. At 9:45 I found the nestlings with mouths open, lying still. Five minutes later a parent came with berries and the young were fed very quickly, for the parent flew away again in less than a half minute. The little ones chirped and two stood up as if they would like to go after it. The birds were restless for the next three minutes, opening their mouths and uttering a loud chirp. The inside of their mouths was not so brightly colored as a few days before. At ten o'clock a parent brought blue berries and in its eagerness to get its share one nestling lost its balance and fell back into the nest. The parent left at 10:03 and two minutes later the little birds stood up and moved their wings with their bills wide open, but no parent appeared. At 10:10 the largest of the young held its head and wings stretched clear out of the nest. Five minutes later the parent brought an insect which the young eagerly devoured and half a minute later the old bird left. In the next

ten minutes the birds quieted down, but kept their mouths wide open. At 10:28 the parent returned with white berries and first tried to give an unbroken one to a nestling. But when it failed to swallow the berry the parent broke it up and gave it in pieces. Probably three berries were fed in two minutes. Thirteen minutes later a parent bird with a blue berry showing in its bill flew to a nearby tree, where it stayed a minute, the nestlings chirping vigorously all the time. At 10:45 they preened their feathers and moved their wings, while one appeared about to leave the nest. After eight minutes they settled down in quiet, but kept their mouths open. In the afternoon I found them apparently very warm and very restless. They did not seem afraid of me, but at 4:12 some noise frightened them and they were very still. At 4:20 the largest bird stood on the edge of the nest as if ready to fly, but five minutes later dropped back into the nest. The parents did not return to the nest during the rest of my stay.

July 31, 8:15-10:20 A. M., 1:20-2:25 P. M.

On July 31 it was much cooler. The maximum was only 79 degrees and there was a heavy wind. I think that the wind may have prevented the birds from leaving on this day. Their mouths were closed and they appeared more quiet and comfortable than on the day before.

At 8:20, when I pointed my pen toward them, they opened their mouths. Ten minutes later one little bird stretched its wings. At 8:45 a parent brought blue berries. The nestlings chirped when it approached, but were less excited than on the day before. The parent regurgitated several berries and fed them slowly, remaining on the nest till 8:51. Then the wind seemed to frighten the young, who settled down on the nest. Fifteen minutes later the nestlings chirped and one stood on the edge of the nest preening its feathers and stretching its wings. They chirped loudly as a parent approached with some insect or worm. At 9:16 the parent left and the little birds were quiet. Two minutes later they flapped their wings and two of them stood on the edge of the nest. At 9:30 the

nestlings were wide awake, but settled down as much as possible on account of the wind. Fifteen minutes later they raised their heads and chirped and in a minute a parent flew to the tree with blue berries. In half a minute it flew away, but it was back in three minutes with more berries and each nestling received one. After this feeding the young birds seemed more active. They stood up and preened their feathers, opening their mouths and stretching their heads out from the nest.

In the afternoon the young birds were sitting up as if expectant. At 1:30 I called to some one passing and they opened their mouths. Three minutes later a parent approached and fed them with amelanchier berries. It flew off, but was back in a minute with blue berries. The young birds pushed against each other in their eagerness so that the parent flew to the other side of the nest in order to feed them all. At 1:50 a nestling stood on the edge of the nest. When a parent approached with blue berries, fifteen minutes later, it had hardly room to get on the nest. I broke two blue berries and placed pieces on the bills of the young birds. One ate its piece and I gave it another, which it swallowed eagerly. At the first trial the other two did not eat. After that they seized the berries so quickly that they almost bit my fingers. They did not seem at all afraid, but seemed willing to eat as long as I could supply them with berries.

At seven o'clock on August first I found the three nestlings still in the nest, but one flew off at my approach. On its first attempt it flew about twenty feet, and then flew to a tree twelve feet away. In the next hour it was fed more frequently than the other two birds, which remained on the nest.

E. OBSERVATION OF TWO YOUNG BIRDS IN A CAGE.

In the afternoon the two remaining nestlings were taken from the nest and put in a bird cage, which was placed on a window sill of one of the Laboratory Buildings. The large window was kept open and the parent waxwings came to feed the young regularly. At first a parent would fly to the win-

dow ledge and slowly approach the cage if I kept perfectly still and remained several feet away from it. A few days later a parent approached while I was fastening the cage, and fed them in spite of my proximity. We did not succeed in getting a parent to feed a young bird held in the hand.

August 2, 10:15-11:15 A. M., 1:15-2:45 P. M.

I sat down a few feet from the cage in which the young birds were perched close together. At 10:15 they began to chirp vigorously, and a parent flew to the window sill and then flew away without feeding them. Three minutes later it gave each little bird a blue berry. When the young were first in the cage they did not seem to know enough to get their heads within reach of the parent, but a few attempts were sufficient for them to learn. Their later difficulties arose from eagerness. They kept close together on the perch and pushed against each other as if in the nest. At 10:45 the juvenals began to chirp loudly and flap their wings when a parent approached with amelanchier berries, which it gave them. After they had swallowed the berries they flew against the sides and top of the cage. It seemed as if the parents were trying to get the young birds out of the cage, for a parent flew back with berries, but did not give the juvenals any at first. After it found that they could not get away it flew back again to the cage. At 10:18 it fed them each a berry. The young birds were back on a perch close to each other at 10:50. Ten minutes later a parent flew by to a neighboring tree, but returned with amelanchier berries, which it gave to the young, the process taking only fifteen seconds. At 11:02 the juvenals were fed blue berries and the parent bird was back again with more blue berries in half a minute. In the afternoon I found the young birds on their perch, moving their wings back and forth and preening their feathers. At 1:25 they chirped vigorously and a parent flew to a nearby tree where the third young bird was. A minute later the parent brought amelanchier berries to them and returned with more a minute later. At 1:34 a parent was back again with blue berries, and after the young birds ate these, they were quiet for a long time. At 2:05 a parent called

and the juvenals answered, jumping against the sides of the cage. An old bird brought amelanchier berries and it was back again with more at 2:10, 2:20 and 2:40.

August 4, 8:00-9:40 A. M., 1:15-2-15 P. M.

The maximum temperature on August 4 was 90 degrees. At 8:00 the birds were peeping loudly and being answered. A parent approached with a blue berry two minutes later, but flew off without giving it to them. The juvenals flew against the side of the cage and kept on calling, while one raised its crest. At 8:05 a parent approached with amelanchier berries, which it gave them and left, returning with more berries, the two feedings taking less than half a minute. By 8:08 the birds were quiet and preened their feathers, each placing its bill under its wings and tail. At 8:10 the larger young bird began to chirp again, but I heard no answer. A parent brought blue berries five minutes later and each young bird ate one. The juvenals were fed again by a parent at 8:18 and then I cleaned the cage. When we touched the young birds they showed no signs of fear. At 8:25 they were back on their perch and eight minutes later a parent bird brought two amelanchier berries. Half a minute after it fed them it was back with more. At 8:38, after shaking out their feathers and pecking at the bars of the cage the juvenals settled down to sleep and remained so until 8:45, when they picked at their wings. A parent gave them each a berry at 8:55 and then dropped a large one at the bottom of the cage, which a young bird picked up and ate. This was the first time I noticed the young feeding themselves. After this they showed this ability constantly, putting their heads through the bars to reach a berry dropped outside. At 8:58 and 8:59 they were fed amelanchier berries by a parent. The young birds rubbed their bills against the bars of the cage as if to clean them. Five minutes later they were dozing, close together on the perch. At 9:30 the parent brought a large insect of some kind. This was the first time that I had seen animal food brought by a parent since we caged the young birds. At 9:32 a parent brought blue berries and flew back again for more,

but on returning to the cage, some noise frightened it, so it flew away without giving any berries, much to their disappointment which they expressed by flying against the side of the cage and flapping their wings. At 1:15 they were photographed, the cage being moved a few feet into the sunlight. A noise made in setting the shutter was followed by their chirping as if they expected food. In a minute a parent came but flew off at sight of the camera. The young birds flew against the side of the cage and at 1:18 the parent bird fed them blue berries in spite of the nearness of the camera. The young birds were in the sun and seemed very warm. At 1:40 a parent fed them again. The noise of the camera caused it to fly off, but it returned in five minutes and gave the young three blue berries. At 2:00 we replaced the cage.

August 6, 4:20 A. M.-8:15 P. M.

Before dawn came it was damp and foggy, but by noon it became very warm and reached a maximum of 99.2 degrees in the afternoon. At 4:25 the young birds were sleeping with their heads under their wings. No birds were stirring except the night hawk and the whip-poor-will. The young birds stirred whenever a sound was made, but did not awaken until 5:24. Four minutes later they stretched their wings and tried to fly. During the day they ate the following food brought by the parents:

5:24 A. M.—2 pin cherries	12:25 P. M.—2 service berries
6:12 A. M.—1 cherry	1:00 P. M.—2 blue berries
6:14 A. M.—2 cherries	1:15 P. M.—2 cherries
6:21 A. M.—1 blue berry	1:25 P. M.—2 cherries
6:42 A. M.—1 amelanchier berry	2:16 P. M.—1 cherry
6:59 A. M.—1 amelanchier berry	2:28 P. M.—1 cherry
7:11 A. M.—1 amelanchier berry	2:35 P. M.—1 blue berry
7:53 A. M.—1 blue berry	3:25 P. M.—1 blue berry
8:00 A. M.—2 blue berries	3:39 P. M.—2 blue berries
8:28 A. M.—2 cherries	3:43 P. M.—1 blue berry
8:30 A. M.—3 cherries	4:30 P. M.—2 cherries
8:32 A. M.—1 amelanchier berry	4:40 P. M.—2 cherries
8:50 A. M.—1 blue berry	4:44 P. M.—2 blue berries
8:52 A. M.—1 amelanchier berry	4:55 P. M.—2 blue berries
8:58 A. M.—1 blue berry	5:12 P. M.—2 cherries

9:45 A. M.—2 amelanchier berries	5:15 P. M.—3 blue berries
9:55 A. M.—2 blue berries	5:28 P. M.—2 cherries
10:06 A. M.—2 blue berries	6:00 P. M.—3 cherries
10:41 A. M.—2 pin cherries	6:02 P. M.—2 blue berries
10:45 A. M.—1 cherry	6:45 P. M.—2 blue berries
11:40 A. M.—2 cherries	7:20 P. M.—2 blue berries
11:59 A. M.—3 blue berries	7:52 P. M.—1 cherry
12:05 P. M.—2 blue berries	

As accurately as could be observed the birds ate forty-two pin cherries, thirty-nine blue berries and twelve amelanchier berries. I picked the same number of these of average size and found them to weigh seventeen grams. The birds were not given any other food. On many occasion during the day a parent bird brought food up to the cage and flew away without leaving it. At first we thought that the bird was frightened at something, but the repetition of the performance on occasions when we could discover no cause for fright convinced us that the parent was trying to get the young to leave the cage and when its efforts failed it came back and fed the young. The juvenals were active during the day; they seemed to be on the perch less than on the day before. They became excited when a butterfly flew past, and one tried to catch a fly which came within the cage. They rubbed their bills in the sand and also against the side of the cage. They also preened their feathers a great deal and flapped their wings. As night approached they gradually became less active, although they were fed at 7:52, when it was quite dusk. At 8:15 they were asleep on their perch.

After this we kept the birds in the cage for eleven days and observed them each day for eight days, but there was little change in their behavior. The parent birds became accustomed to the cage and would bring food even if someone were so close that he could have touched the birds by stretching out a hand. Nevertheless the young birds became more excited at every feeding and beat their wings against the cage in their efforts to get away. The last few days the old birds stopped feeding them, but came to the cage once every day as long as we observed. The juvenals seemed well and lively during their entire time in the cage.

F. SUMMARY.

My observations of the cedar waxwing showed that the male and female build their nest together, one bird bringing most of the material and the other bird constructing the nest. The second nest was completed on June 28th. Three days later the first egg was laid and the other three were laid on the three following days. On July 17, sixteen days after the first egg was laid, the first bird was hatched, and by July 19 the four birds had hatched. As the young birds did not all hatch on the same day, they showed considerable variation in size and development.

The first sound from a nestling was heard the fourth day after the first bird was hatched and from this time on they usually chirped when a parent approached.

As to food, I found that the young waxwings were fed with food which the parents first swallowed and then regurgitated, until the nestlings were nearly old enough to leave the nest. On the first four days I saw only animal food, worms or large insects, and both parents took part in the feeding process. On the fourth day they were fed amelanchier berries, and after this their food was partly berries and partly bugs and worms. In the cage they were fed almost entirely on berries. The amount of time between feedings varied very much. In the middle of the day they were fed more frequently than toward night. On a hot day they were fed less often than on a cooler one. During an entire day we found that two young birds in a cage ate 93 berries and cherries. I picked the same number and found them to weigh seventeen grams.

Within the cage the two juveniles were fed at about the same intervals as before. They became more active every day, flying against the sides of the cage, chirping and preening their feathers. The fourth day in the cage a young bird was seen to pick up a berry. After this both birds picked up fruit whenever any was dropped within their reach. In the cage, as in the nest, the young birds kept close together and appeared to be fond of each other. When they were released they seemed well and strong.