

DAILY LIFE OF THE AMERICAN EAGLE: EARLY PHASE.

BY FRANCIS H. HERRICK.

(Plates XII-XIV.)

THIS record of observations on the development and behavior of the American or Bald Eagle (*Haliaeetus leucocephalus*)¹ was begun at Vermilion, Ohio, in 1922, and field-work at that point was brought to a close by the taking down of our steel tower (successor to that shown in Plate 1), in June, 1930.

My program, however, as it eventually developed, called for the artificial hatching of the eagle's eggs, and the rearing of the eaglets from the down to the juvenal stages. This was accomplished in 1929 and in the spring of 1931.

In earlier papers of this series² I have given an account of what was called an "Eagle Observatory,"—the structure erected at Vermilion in 1922,—of the nest and nesting habits, and of late activities at the eyrie, when the eaglets are in juvenal plumage and from six to ten weeks old.

Though compelled to 'put the cart before the horse' in those earlier years,³ I am now prepared to discuss the artificial hatching of the eggs of the eagle, the rearing of the eaglets in confinement, and the early phases of nest life under natural conditions.

¹ The 'Southern' Bald Eagle, as distinguished from the 'northern' sub-species, *H. leucocephalus alascanus* Townsend (cf. A. O. U. Check-List). Peters (Check-List of Birds of the World) considers that Linnaeus' name *leucocephalus* applies to the northern race and uses *washingtoniensis* Audubon for the southern bird. Eggs of the larger northern bird (average of 16 specimens) measured 73.5 x 57.5 mm. and those of the southern form 69 x 53.5 (average of 45 Florida specimens). See Allen, 'The Auk,' Vol. XVI, 1899.

² See "An Eagle Observatory," 'The Auk,' Vol. xli, 1924; "Nests and Nesting Habits of the American Eagle," *ibid.*, 1924 (republished in 'Rept. of the Smithsonian Inst.,' for 1923); and "Daily Life of the American Eagle: Late Phase," *ibid.*, Vol. xli, Nos. 3 and 4, 1924.

³ I wish to here express my indebtedness to Western Reserve University, that has sponsored this costly undertaking from the beginning, and to its officers who lightened my academic duties in 1928-1930 so that this research could proceed without further interruption; and I am particularly indebted to Mr. Sidney S. Wilson, Secretary-Treasurer of the University.

I wish to thank also the National Geographic Society for the use of four photographs in its possession or already reproduced in its Magazine.

For the past four seasons I have been ably assisted by Mr. Charles M. Shipman, and the photographs are the joint work of both of us during that time.



FIRST STEEL TOWER, 80 FEET TALL, WITH TENT IN PLACE ON PLATFORM, BEFORE NEST NO. 5, WHICH WAS DESTROYED WITH THREE EAGLETS IN STORM OF MAY 18, 1926.

When we had completely demonstrated that it was feasible to approach the eyrie of the Eagle by means of a high tower, and when the Great Nest at Vermilion was destroyed in March, 1925, we decided upon a more ambitious program of work than had been earlier contemplated, and to try the experiment of building a steel tower in front of that nest's successor in 1926. (Plate XII).

This work has been prolonged from many causes, chiefly from numerous reverses suffered, such as two nests crashed in storms, and loss of eggs through lack of fertilization, as well as from the desire to check over all activities at different nests, where we could work with different adult and young birds and in differing environments,—not to speak of adverse weather conditions, which often hampered us, and in some seasons rendered our efforts nearly abortive for weeks at a time. It is only fair to say, however, that we never stopped work on account of the weather, and the serious loss of the first steel tower in 1929, delayed, but did not put an end to, our efforts in that and the following year.

By means of the methods early adopted it has been possible to correct certain false impressions, and to weigh the significance of all our earlier observations with greater satisfaction and I hope with greater accuracy. This account, therefore, should be read in relation to what has gone before.

Since it will be necessary to refer to different nests, it may be best to restate the remarkable history of the six successive Vermilion eyries of this eagle, which covers nearly a hundred years, or from early in the nineteenth century to the present time. The first three, about which but little is now known, were occupied from about 1830 to 1890, but there were probably others before that era since there is documentary evidence of eagles in the same neighborhood in the last quarter of the eighteenth century. Nest No. 4, the greatest and most famous of all, is often referred to in what follows as the "Great Nest," and was, perhaps, the largest on record. When measured in 1922, it was 12 feet tall, 8½ feet across its top, and when on the ground its weight was estimated at upwards of two tons. It was destroyed in its thirty-sixth year, in a storm of March 10, 1925. Nest No. 5, which immediately followed this, and before which our first steel tower was erected in 1926, lasted but two years; while Nest No. 6, which I have assumed

belongs to this series, and is just over the eastern town-line in Black River, has been occupied six years (1927 to the present).

When nest No. 5 was wrecked we transported our eighty-foot steel tower eighty miles to another nest at Geneva, in another county, but all to no purpose, since the eggs were apparently not fertilized, and after they had been incubated for nearly six weeks they were destroyed, and as we now believe, by the eagles themselves.

We then moved the tower eighty miles back to Vermilion, and set it up beside nest No. 6, where it remained until up-rooted in the destructive storm of May 2-3, 1929. A second tower, 96 feet tall, and containing four tons of steel, was immediately built to replace it, and at this site all motion pictures were made and later observations conducted. Because of the many delays already referred to, we decided to take the chance of erecting this tower at once, although in that late season the eagles' eggs were then about due to hatch. Fortunately our equipment had not been installed in the tower which fortunately also had fallen away from the eagles' tree. The workmen were directed to begin operations on the new structure at nine o'clock in the morning and to stop work at four in the afternoon, but when it appeared that their presence did not keep the old birds from going to their nest, the work went forward continuously. With the concrete foundations laid, this tower was completed in one week's time, and when on May 23, our observations began, the eaglets, that were then in gray down and about three weeks old, did not appear to have suffered in the least from the noisy operations that had been going on for upwards of seven days close to their nursery door.

2. Sexual Union and Remating.

In mid-March, during the building of eyrie No. 5, which succeeded the Great Nest, sexual union of the eagles was observed by watchers, and their account agrees with what I had previously seen on a number of occasions. When I climbed the wooden tower on April 25, 1924, the brooding bird, identified as the male, joined his mate on what we then called the "tall east perch," at that time the highest point in the grove. This bird then dropped down on the back of the female, and remained for a minute or two, with

of the left leg. After this event the bereft eagle left the neighborhood, and was not seen in Vermilion again for eleven weeks, or until February 12, when she returned with a new partner, and with him began to build up the top of the old nest. Eggs were laid and incubation was under way, when the nest crashed in the storm of March 10, as already recorded.

Again, in October, 1930, some irresponsible person shot the male of this Vermilion pair, but did not recover its body, which was found² beneath one of their perching trees on the Buehring farm. This eagle, as was later determined, was shot by a 32 caliber rifle bullet, which entered the back and came out below the breast without touching a vital organ. It was an old bird that weighed but little over eight pounds, and it had gone a long distance probably after it was struck. As in the former case, the female, which to my knowledge has had four different mates, namely in 1924, 1925, 1928, and 1931, left the region, and after an absence of fourteen weeks returned with a new protector on February 17, 1931. Together they resumed work at nest No. 6, first occupied in 1927, and from which they successfully reared a brood in the present year (1932). Had the female, instead of the male, been the victim, in such a case, I think it probable that he would have remained, taken on the duties at the nest, if there were any, and waited for a possible mate to enter his territory. This might depend, however, upon the strength of association which the male bird had formed with neighborhood and nest.

3. Building and Refitting the Nest.

Two nests have been built at Vermilion since this work was undertaken, in March, 1925, and in the winter and spring of 1927.

On the day after the destruction of their masterpiece in the former year both eagles were flying about the grove, and, as might have been expected, in a state of great excitement. As their screams resounded among the leafless trees they even ventured to fly down in a menacing way at people standing by the great pile of loam and faggots, which represented the ruins of their old home. They were also seen to alight in the tops of the tallest trees, as if in search of a

² By Mr. Edward Cleaver, through whose aid and that of Mr. Moses Ranney, the bird's body was obtained for the preservation of its skin.

place to rebuild. The new nest was actually begun ten days after the downfall in the truncated top of a great oak, upwards of four hundred feet to the southeast of their former nest-tree, and in what was probably the oldest denizen of the grove, for its trunk, when afterwards cut for lumber, showed three hundred and twenty-five rings of annual growth. Neither they nor their observing neighbors could then have foreseen that the spreading arms of this aged monarch were but hollow reeds which a storm would soon rend asunder.

On March 21 both birds were active in gathering sticks, mainly off the ground, and the following day was one of even more strenuous labor when one of the birds was often seen standing on the chosen site, receiving and placing the sticks, or treading down the straw, which were brought in the talons of the mate; but all this action stopped when any one moved up to their tree for a closer view. After the third day their building impetus slackened, and by the end of the fourth the work of construction was virtually completed. The new nest appeared to be about five feet in diameter and four feet tall, but, as the sequel showed, it was fortunate that no attempt was made to reach it and apply the measuring tape.

As already noticed this tree, which was ideal from our point of view, proved unfortunate for all concerned, for the main supporting branch was a fragile shell; and in a storm of May 18, 1926, the entire tree-top was sent crashing to the ground with nest, eaglets and all. The heart of the leader had been invaded by the larvae of a beetle, and successive broods of the insect had gnawed away and reduced to powder the foundations of this new castle of the kings of the air.

In mild seasons the Vermilion eagles begin to rebuild or refit their old eyrie in the first days of February, or, as we might say, they build a 'new nest' atop of the old, for the building impulses are purely instinctive, and the eagles' eyrie is virtually a composite affair, being made up of the consolidated increments of as many years as it has seen service. In winters severe enough to cut off their usual sources of food, and to prolong their absence from their customary haunts, the seasonal building activity may be delayed until the first of March, but with both birds working this labor can be performed in a few hours or days.

After from ten to twelve weeks of daily use the top of the eyrie is apt to be trodden flat, its surrounding sticks scattered and its straw bedding ground to powder. The old eagles in each following year build a new rampart of sticks, about a foot high, and fill up the intervening area with a thick layer of dead grass or straw. This building fever is apt to recur with diminishing force during the first weeks after the young are hatched, and their ardor gradually wanes until it is finally satisfied by bringing only an occasional stick, a wisp of dry grass, or a spray of oak leaves or of pine. Whole stalks of field corn, and often still bearing their yellow ears, were commonly a late addition, and all the more noticeable when draped over the sides of the nest. A farmer who was working in his field at the back of the tower said that on February first of that year an eagle came down within two rods of where he was standing, seized a stalk of his corn and bore it away; and a number of years ago an eagle was seen at Vermilion by one of my students making for its nest with twenty-five or more feet of rope dangling from its talons.

On a number of occasions I have seen one of the eagles, presumably the male, after coming to the nest, take a stick in his bill, carry it a few steps and then lay it down again. This, no doubt, represents a kind of activity which Siewert frequently noticed in his Screaming Eagles, with whom division of labor is much more sharply defined than in the American birds. What he calls 'decoration' of the nest, or bringing occasional branches of pine, fir and birch to line the eyrie or to bed the eggs, has its counterpart in the actions of our birds which I have described in an earlier paper. No doubt they represent, as already noticed, an aftermath of the building instinct,—the last feeble movements of the 'pendulum' before it settles to rest. Where this instinct of building is stronger than that of either brooding or feeding the young, the mere sight of the usual nesting materials, whether at the eyrie or away from it, may be the only stimulus necessary to arouse it. If in the forest, the eagle may break off a branch, and perhaps let it fall, without any concern over the usefulness of its actions,—and this, one of Siewert's Screaming Eagles was actually seen to do. Similarly at the nest the stick may be seized, but only to be quickly dropped. This is what Siewert would call 'symbolical' nest-building, but the bird may rise above such symbolical behavior to actual nest-build-

ing, as when it not only gathers the stick or the stubble, but places them on the nest. Whenever such an act serves to decorate, refresh, cool, or build up the eyrie, the result is purely incidental, for purpose and understanding clearly can have no part in it.

The most extensive rebuilding or refurbishing of the nest, which I noticed at Vermilion began on about April 25, when the young were in their third week, and lasted three or four days. It began by the addition of an occasional faggot and culminated in the bringing of several bushels of dead grass. Towards noon on April 28 of that year, as I was preparing to leave the tent, the male eagle sailed in with a great bunch of brown grass in his talons and trailing, in a smart breeze under his body. Upon seeing me on the ladder he wheeled about and flew to the tall tree perch where sat his mate. In making the difficult landing most of his precious load floated off on the wind, but he held on to the remnant and probably delivered it at the eyrie as soon as I was out of the grove.

4. *Contents of the Great Nest.*

In August, 1925, a report was broadcast that, according to complaints of farmers in Brownhelm and vicinity the Vermilion eagles were committing unheard of depredations, and were destroying large numbers of chickens, turkeys, and even lambs. An investigation was immediately ordered by the Fish and Game Commission of Ohio, and it was feared that, if the charges were sustained in any considerable degree, the lives of these outstanding birds might be declared forfeit to the State, since the eagle is a bird of prey, and although our national emblem, it does not, I am sorry to say, as yet enjoy the protection of federal statutes. It is, however, a migratory bird, in most parts of the United States, and on that ground alone it can rightfully and legally claim the protection of the National Government, and in my opinion it should receive it.

Friends of our rapidly vanishing wild life became deeply interested in the fate of these eagles, and offers of coöperation and support in seeing full justice done in their case, came from many parts of the state and nation. I was convinced that, so far as these particular eagles were concerned, as so often happens, the reports had been grossly exaggerated, and that their destruction would be a lasting disgrace. It was suggested that, if necessary, a fund should be raised



EAGLE FAMILY AT GREAT NEST, WHILE ENGAGED IN FEEDING THEIR YOUNG.
BOTH BIRDS SUDDENLY COME TO ATTENTION. FEMALE, WHICH IS
THE LARGER, AT THE RIGHT. APRIL 28, 1924.

to indemnify all persons for genuine losses incurred; and one of our Ohio congressmen, who declared that "to have these eagles captured or destroyed would be a tragedy," offered to contribute to such a cause. The president of the Rock River Chapter of the Isaac Walton League of America, and the executive secretary of this organization, representing one hundred and twelve Chapters throughout the country, were prompt in offering their aid, the latter saying that "even though the eagles might have carried off a lamb or two, it would be far better to reimburse any for the losses claimed than to destroy these interesting and beautiful birds."

Not only was it shown that the reports of the losses incurred had been greatly magnified, but I was able to offer in support the results of direct observations upon the food-habits of these particular birds, as well as the strong and impersonal testimony afforded by the contents of the Great Eyrie itself. This had preserved the solid remnants of these eagles' repasts, and gave us a remarkable cross-section of their food-habits for upwards of a third of a century.

The dark voluminous loam of the solid core of this nest was sprinkled with feathers, and with the scales and bones of fishes, the eagles' principal food; and we did not find a single bone of a turkey, nor of any domestic fowl larger than a chicken, and not a bone of a mammal greater than a rabbit. These eagles had never been known to systematically clear away the carcasses of their prey, but they had often been seen to cover them up, so it seemed that the contents of their eyrie spoke with authority and told the truth.

It is to the solid core of this nest that I wish to call particular attention, since it concealed the bones and other remains of innumerable aquiline dinners. Just as the ashes and soil on the floors of caverns, once occupied by palaeolithic man, have preserved not only his implements, but have yielded a rich store of the bony fragments of all those animals which he habitually hunted for food, so it had been with these eagles. Like primitive man, too indifferent to sweep house, or content merely to refresh it with occasional layers of straw or stubble, their eyrie had become in time a sodden mass of vegetable decay, in which bones, scales, feathers, and hair had been preserved for a long period.

Here, in brief, is what was found in the ruins of the eyrie immedi-

ately after its destruction, the principal objects¹ of which were tabulated, and are here named in the order of their general interest:

(1). Bones of an eagle, a juvenal that had possibly been killed at the nest, but representing a part only of the entire skeleton. Those actually recovered from the shoulder, wing and leg of the left side, show that they came from a young bird of adult proportions, the ulna of the wing measuring $9\frac{1}{4}$ inches.

(2). Bones and feathers of the domestic fowl, but in numbers small relatively to those of fishes.

(3). Bones and feathers of a number of wild birds, including the Crow, Grebe and possibly a Plover.

(4). Bones of small mammals, as the rabbit, muskrat, rat and squirrel.

(5). The entire central mass was liberally sprinkled with the skeletal remains of fishes of many kinds, representing those species which are commonly brought in alive from Lake Erie or are found washed up on its shores.

(6). Miscellaneous objects, such as buttons, small pebbles, worn fragments of grass or porcelain, which might have come from the gizzards of fowl, or from turf and stubble gathered along the line of a beach. Two celluloid poultry markers, one still encircling the shank-bone of a chicken, on which it had been placed by its owner many years before, were also turned up, together with old eggshells from which eaglets had once emerged, as well as those of the new eggs which were shattered in the fall.

On the Great Eyrie, as well as in nest No. 6, which succeeded it, lay sprays of the white pine, for which and other kinds of foliage, all eagles, for some unknown reason, seem to have a strong predilection. The ruins of this last nest contained, besides the remains of fish and domestic fowl, the feathers of the Flicker, Meadowlark, Robin, Bob-white and Crow.

The Bald Eagle thrives in the extensive marsh region of Ottawa county near the mouth of the Sandusky River, where the trapping of muskrats is a lucrative industry; and the eagles levy toll from both the muskrats and the trappers, no less than fourteen steel traps, according to report, having been recovered from the ruins of a nest that was demolished in that section not long ago.

¹ These are now a part of the Eagle Exhibit at The Cleveland Museum of Natural History.

A nest in the same region in the township of Ripley, near Urlin, and four miles northeast of Fremont, on the farm of Urban A. Meyer, is remarkable for having been built in late October and early November, or four months before the usual nesting activity of eagles in those parts. It stands in a pin oak, but fourteen inches in diameter at base, at a height of perhaps fifty feet, on the edge of a cornfield and not over three hundred feet from a travelled road. When I first visited the nest on July 10, 1927, it contained but one young eagle, the only one reared that year, and then about ready for flight. Mr. Meyer had seen one of the old birds in June fly over a clover field and gather up all the 'fodder' it could hold in its talons, and when he saw them collecting alfalfa in the same way, he was convinced that they were going to have 'greens for dinner.' No doubt that young eagles, which I have known to swallow considerable amounts of excelsior on the floor of their cage, in playing with such green 'fodder' do actually eat a little of it now and then, but I have never seen them welcome it as they do their usual fare. When building their nest he saw the eagles take sticks from the ground, and also fly against a dead branch and seizing it in their talons, break it off without descending to the ground. The eagles had been seen daily in the neighborhood up to January 5, when they were absent for about a fortnight, their usual habit, when not engaged with young, being to leave for the lake at about nine o'clock in the morning and to return towards four in the afternoon. One day a third eagle, probably an unmated bird, joined them but when they reached the nest, the pair fought the intruder and drove it off at high speed.

5. Egg-laying and Incubation.

In 1925 the eggs of our eagles were laid before March 10, for on the night of that day the nest crashed in a storm and fragments of the shattered eggs showed plainly that incubation was not far advanced.

My estimates for the laying of the eggs in other years, which are based mainly on behavior, are not to be regarded as accurate, and may be in error two days either way. They vary from March 6 to the end of April. The eggs are externally dull white, but the shells are light blue on the inside. They vary in number from 1 to 4, and

are about the size of those of the domestic goose, one set of two from Florida (see note at beginning of paper) measuring 2.50 x 2.12 and 2.62 x 2.06 inches. Two may be taken as the average number, but two sets of four eggs have been reported from Canada, and two other sets of the same number are known to me, one in the admirable collection of Mr. Herbert A. Brandt, and the other from a Pelée Island nest, was taken for experimental purposes in 1929. The eggs are not always or commonly laid in daily succession, and judging from our incubation experiments and the relative sizes of the eaglets at the time of the hatching of the last egg, an interval of three, four or more days between successive layings may sometimes occur. Usually, and probably always, in freezing weather, incubation begins with the appearance of the first egg, and lasted at Vermilion, on the average, from 34-35 days. The Golden Eagle is said by Seton Gordon¹ to require full five weeks to bring her two or three eggs to the hatching point, but in Dr. F. A. Crandall's Bald Eagles, which bred in confinement at the Buffalo Zoological Garden the incubation time varied from 31 to 46½ days. Siewert studied but one nest of the Schreiadler in East Prussia, and as the second egg (laid May 11) proved addle, but a single eaglet was reared. The incubation time, or the time which elapsed from the laying to the hatching of the first egg (May 1-June 13), was 43 days; and it should be added that although the brooding pauses were numerous and long at both the beginning and end of this period, they did not have any injurious effect upon the embryonic development.

Three eggs were laid at Vermilion in 1924 and 1926, and two only in other years, but it is probably a rare event for more than two eagles to be reared. In three instances known to me in which a bird lost its eggs through robbery or the hazard of storms, early in the season, another set had been forthcoming and in the same nest when this was intact. One bird robbed of her three eggs repeated with three, while another losing four came back with two.

The eagle is a notorious place-holder, and the tenacity with which certain individuals cling to their home and chosen hunting grounds is astonishing. There is the outstanding case of these Vermilion birds holding to the same territory for nearly a century,

¹ See "Days with the Golden Eagle," London, 1927.

in spite of all the reverses they have suffered, or any interruptions of their domestic affairs by the building of our towers, which were gradually advanced until they stood less than forty feet from their doors. Quite as exceptional, possibly, is the following case: from a certain Canadian nest two young eagles were taken when in gray down, in 1929, and reared to adult size; four, and later two eggs were taken from the same nest in the spring of the following year. The same pair was again robbed of a first set of three eggs in March, 1931, but how many, if any, then followed I did not learn.

Notwithstanding such occurrences, it must be remembered that individual variability is a factor always to be reckoned with, and I have known a nest and neighborhood to be abandoned when once the eggs failed to hatch, another site at Kelley Island, Ohio, to be deserted when a storm wrecked the nest, and still another nest on the same island to be reoccupied after it had been vacant for a number of years.

6. *Care of the Eggs in Incubation.*

On April 19, 1926, when, according to my estimate, the eggs were close to the hatching point, I set one of the tents on the ground two hundred feet from the eagles' tree, in order to watch closely the activities at the nest without disturbing the actors. When we were set for observation at 11:20 A. M., the male eagle was standing guard on one of his tree-perches, while his mate was on the nest. One hour later the male suddenly left and moved off to the south-east. At about this time also the mother eagle began ducking her head and stirring up the nest-materials in lively fashion. She was covering her eggs, and in a few minutes rose, shook her up-lifted wings, and was off in the direction her mate had but just taken, but quickly returned. She alighted on a side of the nest, and stood there for a moment as if to make sure that all was well, and then, flying in the same direction as before was soon out of sight. Absent this time exactly two minutes, she returned direct to the eyrie, and half a minute later was followed by the mate. The female eagle then walked deliberately to the middle of the eyrie, while the male stood on one side, and began at once to make the grass and dirt fly as she uncovered her treasures, pausing only to shake her bill and mouth clear of any annoying dust-particles. Then, as she gave a

sharp chitter the male walked up with alacrity and took his turn at brooding the eggs.

The female thus relieved at 12:41 P. M., spent a short time in walking around and nibbling at scraps of food in the nest, before taking a nearby tree-perch.

When he had brooded for half an hour, the male eagle stood up, and after picking for some minutes at objects beneath him, settled down again. Presently a chitter, but now coming from him, was heard, precisely like the signal which had been previously given by his mate. The female, who at the moment was facing the wind and away from the nest, heard his sign, but, without changing her position, turned her head around and looked straight at the nest: otherwise she did not move. The male rose to his toes again, and having made further adjustments of the nesting materials, settled down, and so low that only his yellow bill could be seen through the circular rampart of sticks.

Now, at 2:37 P. M., the female suddenly left her perch, went off in the same direction as formerly, and after a stay of three minutes, came back to the nest, from which she had been absent nearly two hours and took a position at its side. She stood there for twenty-five minutes without making any move, but once or twice we heard a mild chitter, which might have come from her, but if so, it evoked no response in her sitting mate.

The male eagle took his turn off duty at 3:04 P. M., or after having brooded for two hours and twenty-four minutes, and a moment later was on the tree-perch which he habitually used. The female then walked slowly and cautiously to her station over the eggs. On this shift the male was absent one hour and twenty-three minutes, but returned to one of the upright branches of their nest-tree, and presently with a signalling chitter dropped to the eyrie. The female was off in a minute and at once flew out over Lake Erie, while the male, after searching for stray crumbs of food again took his place over the eggs. He was still brooding when we closed the tent at 4:45 P. M., and the female, who had returned, was on her former perch.

The preceding notes have been given in circumstantial detail in order to show how complete coöperation in the matter of brooding the eggs may be, when behavior is free, and how closely a fairly

definite formula may be followed when no disturbing elements intervene. In the five or six hours during which the activities of these birds were kept under close observation, no food was brought to the nest, which tended to confirm our inference that no young had yet appeared. In that season of 1926 incubation, according to my estimate, lasted thirty-five days.

7. *Enemies of the Eagles' Eggs.*

Like all 'birds of prey,' the eagle suffers much annoyance from many other members of the bird-world, in which he is anything but popular. The crow hates the eagle, and the eagle despises the crow, but to say that the eagle *fears* the crow, or hawks, or the little kingbirds, or the more diminutive gnatcatchers, or any other who may pester him at times, or assail his hours of repose, is altogether irrational.

When the eagle is too much bored or preoccupied, too lazy, or not in a pugnacious mood, and when there are no eggs or young to be defended, he may suffer almost any indignity, short of a direct attack, but the impudence of a tormentor can be carried too far, and all counterfeit marks of fear can be suddenly laid aside.

A singular incident, which illustrates what has just been said, occurred during a recent sojourn at Vermilion. The mother eagle had but just dropped a fish on the eyrie, and taken a favorite perch one hundred feet from our tower and from a Blue Gray Gnatcatcher's nest that was affixed to the lofty branch of an elm just below the tent. The eagle was beset by this pair of indignant gnatcatchers, which buzzed about her like so many angry wasps. I could see one of the eagle's wings drop, as she started to relax, but there was no peace for the tired bird, and after ducking her head time and again at the thrusts of her pigmy assailants, she left this perch and went to one farther away in the forest. Those fiery little gnatcatchers, which do not much exceed a hummingbird in size, had just brought out a brood close to our tower, and were plainly outraged that their big neighbor should have the temerity to trespass on their domains. It was evident that the eagle, like the patient ox, found it easier to seek another refuge in the shade than to drive the 'flies' away.

From four to five weeks of unremitting watchfulness, conceal-

ment or strong arm methods for keeping the rascally crow and other potential enemies at a safe distance, is the price the eagles must pay to insure the safety of their two or three large and conspicuous eggs. When the incubational strain is over, though ever solicitous of the welfare of their tender young, the eagles allow themselves a little more freedom. At such a time they would sometimes leave the nest together, if only for a turn over the woods, or a brief sortie to the shore of the lake.

Crows caused the eagles more annoyance during this critical period of their domestic affairs than all other thievish neighbors combined. My notes are prolific in observations relating to these impertinent rascals, and go to show that the attitude of the eagles towards them varies very considerably with the season. The crows may often clamor and trail after the 'king of birds' to their heart's content during most of the year, but their folly will not be tolerated during the danger period of eggs or young. Heckling the eagle may be great sport for the crow at other times, but it is a perilous business then.

One day the mother eagle, when brooding her callow young, then in their natal down, was surprised by a crow that flew directly over her, but she had probably only sensed some object above her in the air. She was on her toes in a flash, and with wings raised was prepared for any emergency. The apparition vanished in a moment, and perhaps before its true nature was clearly perceived, for the old eagle dropped her wings and settled to her brooding again.

When, upon my entering the grove on the morning of March 18, a flock of crows came flying over, and spied the male eagle taking his ease on a tree-perch, the whole company set up a great clamor, as if to warn the countryside of the presence of a common enemy; but this was a time when our eagle had no stomach for trifling, since not far away sat his mate probably on her first egg that may have been laid that very morning. He went after them at once and at full tilt, driving now at one, now at another, until he had put them all high up in the air, and he chased the stragglers until all were well out of his neighborhood. At that period every crow that ventured near, was driven helter skelter from the vicinity, but I noticed that when it was too hard pressed it would often take refuge by diving to the ground. Later in the season any crow could



FEMALE EAGLE STANDS ON FISH, TEARING OFF PIECES AND PASSING THEM TO EAGLET ON RIGHT. THE OTHER EAGLET SEEMS TO BE SATIATED. A FISH MINUS HEAD LIES IN THE FOREGROUND.

trail after the eagle, or even pester him on his perch with much greater impunity, but at the first sign of resentment it was off. It is true that the eagle sometimes appeared to be nervous when the crows were above him, but the moment he ascended and tried to drop on them, they beat a hurried retreat to the ground.

A Herring Gull, one day, as related to me by the farmer of the adjacent property, in flying low over the woods, passed directly above the eagles' nest, and one of the big birds gave immediate chase, the gull mounting rapidly with the eagle close on its heels. The eagle was perhaps only doing to the gull what the gnatcatcher had tried to do to him, for he seemed more interested in driving off the intruder than in overtaking him, and after both had reached a considerable height, the eagle returned to his eyrie.

The eagles seemed rather indifferent to hawks, whether large or small, and sometimes, when one appeared, they would only chitter or work their mandibles, as if muttering to themselves; but when in a different mood they would go after the hawk and give it a long chase. The lunges of the hawk at the eagle were always feints, for he never came close, but at the first menacing stroke of his master the game for the hawk was up, and it made its escape as best it could. On a certain occasion when a Cooper's Hawk came into the eagles' territory, and darted towards one of the birds at rest on a perch, the response was only a chitter. The plucky hawk then made another feint at the eagle, and, as if to vindicate its independence, encircled the eyrie before making off.

(to be concluded.)

Cleveland Heights, Ohio.