

# THE AUK:

## A QUARTERLY JOURNAL OF

### ORNITHOLOGY.

---

VOL. XLI.

OCTOBER, 1924.

No. 4.

---

#### THE DAILY LIFE OF THE AMERICAN EAGLE: LATE PHASE. (*Concluded.*)

BY FRANCIS H. HERRICK.

*Plates XXIX-XXXII.*

#### VII. BRINGING LEAVES, STICKS AND MATERIALS OTHER THAN FOOD TO THE EYRIE.

THAT the Eagle on certain occasions brings to the eyrie a motley array of grass, stubble, leaves, sticks, and whatnot, in place of food, is a curious, and at first sight rather puzzling fact; but the records of behavior in this and related species are suggestive if they do not afford a key to the puzzle.

The records for the American Eagle can be given briefly as follows: June 22, 1922; 5.47 A. M. A large cluster of oak twigs, bearing green leaves, was brought to the eyrie and at a time when the larder was far from empty, two fish having been twice delivered that very morning, at 5:24 and 5:27 o'clock. There was the usual excitement attending the arrival of the parent, but the leaves failed to arouse any interest in the Eaglets, and what were presumably their shrivelled remains were found when the nest-tree was ascended on the twentieth of July.

June 23. An old Eagle arose from the field directly north of the nest-tree, and but a few rods away, bringing in her talons a bunch of dry grass and stubble with a plentiful mixture of dust; the young, now hungry and excited, tore the mass apart with their beaks; and jumping on it and clutching it rose with parts of it in



1. FEMALE ALIGHTING ON STUB-PERCH: EAGLET BELOW HER WITH STICK IN ITS BILL.
2. FEMALE HAS LANDED WITH FISH: EAGLET RESPONDS WITH RAISED WINGS INSTEAD OF CROUCHING AND SPREADING.

their talons; the old bird simply dropped the mass and hurried off. No previous visits with food had been recorded for that day.

June 16, 1923; 5:56 A. M. As already noticed, at this first visit of the day a cluster of twigs of the pin oak, bearing green leaves, was deposited on the eyrie, but failed to excite anything more than languid curiosity in the Eaglets, who only casually pecked at them or tossed them about in play.

Macpherson's<sup>1</sup> experience with the Golden Eagle was in some respects similar; at half past seven o'clock one morning the female entered the eyrie, rearranged a few sticks, whose positions he had altered, and departed; in a few minutes she was back with a large stick, which was carried in the beak, and having placed it she proceeded to give the nest a thorough cleaning, removing successively a bunch of heather and old skeletons of hares and rabbits with other refuse. Again, when the Eaglet was a month old, and "infuriated" by long fasting, his mother brought in her bill a bunch of heather, and deposited it beside him, while shortly after she reappeared with a mass of coarse grass which was duly laid upon the ledge. "The Eaglet," said the writer, "was still crying for food, and it almost seemed as if she were trying to appease him by offerings of heather and grass. Probably, however, her real object was to rebuild the nest, which had become quite flat from the continual trampling of the bird's feet. This interpretation is hardly adequate since the observations were not continued long enough to ascertain whether such actions were ever carried to a conclusion. It might be that cleaning the nest, which involves the removal of various objects, is linked with a tendency to replace them with the result of spreading a fresh bed for the young.

Before considering the case of the Eagle farther it will be instructive to examine the equally striking and analogous behavior in Hawks. Allen<sup>2</sup> found that the Ospreys at Plum Island occasionally brought in masses of wet seaweed, which it has been suggested might assist in keeping the nest cool, but the more recent and detailed observations of Abbott<sup>3</sup> show that such a cooling theory

---

<sup>1</sup> *Op. cit.*, pp. 26 and 36.

<sup>2</sup> Charles Slover Allen: "Breeding Habits of the Fish Hawk on Plum Island, N. Y." 'The Auk,' Vol. IX, pp. 313-321. New York, 1892.

<sup>3</sup> Clinton G. Abbott: 'The Home-Life of the Osprey.' London, MCMXI.

will have to be abandoned. Except from incidental wettings in rain the water supply of young Eagles and Ospreys comes solely from their food. Abbott records that at 7:40 A. M., when the Ospreys were two-thirds grown, the female brought a stick in her talons, and slipped in with it while the observer's attention was directed away, but she was not seen to place it.

A nest of the Red-tailed Hawk, which I once examined early in June, in New Hampshire, contained two young with heads still capped in gray down; and lying beside them, to my surprise, besides a half devoured frog, was a fresh spray of hemlock bearing green cones; hemlocks were all about in the woods, and in fact one of the young Hawks, which was frightened at my approach, jumped out of the nest, and in falling caught in the branches of one of these trees, where it hung, head downward, until shaken to the ground. What use the hemlock might solve in a family of half grown Hawks I could not comprehend, but in the following summer the mystery seemed to have been solved by an examination of the regurgitated food-pellets of a family of the closely related Red-shouldered Hawks. The rejected pellets, besides containing bones, feathers and hair, were composed of the half digested leaves of this evergreen; so it was suggested at the time that the young Hawk might take its "bitters" in this form. Remembering the case of the Hawk I made a microscopical examination of the food-pellet ascribed to the Eagle and noticed in the preceding section; it proved to be a felted mass of small leaf-fragments, vegetable fibers and the hairs of various small mammals which I did not identify.

It is certain that the Eaglets did not eat the fresh oak-leaves brought to the nest by their parents, and that Hawks will devour the foliage of a conifer must be regarded, I now believe, as a purely incidental occurrence, since when hungry they might be expected to test and taste anything available in the nest. Whether the leaf-fragments in the Eagle's pellet were primarily taken by the eater or the eaten cannot, of course, be definitely known; though if young birds will swallow leaves old ones might perhaps be expected to yield to the same temptation.

By the process of exclusion we seem to be brought face to face with at least two questions,—whether the strange acts described

represent only a recrudescence of the tendency to freshen the nest which, as I have recently ascertained, is very marked in the American Eagle at an earlier time when its young are about two weeks old; or, whether in such acts we see only a freak of emotion on the part of the old birds, acts which are thoroughly incongruous with any end to be attained of which the field of behavior could supply many examples.

A fairly plausible case could be made for the latter view; there is normally the strong impulse to hunt and seize the prey; and having seized it there are conflicting impulses to satisfy their own immediate hunger or to carry it at once to their young. In this struggle of impulses one usually gets the upper hand; but an Eagle will sometimes compromise by eating part and bringing what remains to the nest. Now when the impulse to seize is strong as ever, and for the time prey is lacking or for any reason they fail in their quest of it, the bird might seize any convenient object, a stick, leaves,—anything. If the distance from the nest be great we should expect that the object would soon be dropped because the original impulse would not then be reinforced by the sight, “feel” and perhaps taste of prey. Were this the case many sticks, bunches of leaves, grass and the like, would be seized only to be dropped long before they reached the eyrie because of the lack of that reinforcement to which I have just referred. If we look for an analogy we might possibly find it in the behavior of an old Eagle at the nest, as earlier noticed, when she had the impulse to feed on the prey which she had but recently brought. She advanced towards it, but an Eaglet was already in possession and warned her off. What did she do? Still acting under an impulse to seize, but which was not strong enough to cause her to dispossess the youngster, she grabbed a stick and dragged it about. Emotion had to find an outlet, and a stick was ready at hand, but the stick was not taken with an “object in view” any more than were the bunches of oak leaves which were tossed on the eyrie towards the close of nest-life.

Whether such acts as we have here described represent a fading or dying instinct exclusively,—the echo merely of an action which comes into full play at an earlier stage, or whether they are mere freaks of emotion, in support of which we have only uncertain

analogies to offer, cannot be decided until continuous studies have been made upon the whole life at the nest.

#### VIII. ACTIVITIES OF YOUNG EAGLES.

The activities of the Eaglets at the nest proved quite as interesting as those of the old birds since they show us in nearly every case the model in simple form on which heredity has molded the behavior of the adult. Aside from preening, the major activities during the last month of life in the eyrie center about feeding, mutual response, or their reactions to one another and to the parents, flying exercises and play, the last two being related at many points.

On May 31, 1923, I was considerably disturbed upon finding only one Eaglet in the nest, and on June 11 when we erected the tent-blind, and scrutinized the top of the eyrie with particular care, still but one bird could be detected; when, just as we were trying to resign ourselves to so serious a loss, and the carpenters had arrived to make some necessary changes, suddenly the missing bird arose, like a Phoenix from its ashes, and stood upright on the nest-front. The Hawk mentioned in the previous section as having bolted from its nest and, in falling, having seized a branch to which it clung suspended until shaken off, was back again in its place on the following day, having been returned, no doubt, by its parents; but the Eaglet had not fallen from the nest; it had probably found a depression in its ample top to which it could retire and remain for hours perfectly concealed.

From the first of June onwards the young Eagles became daily more acute to their surroundings, more strenuous in their play and more bold and masterful in all their actions. When their eyrie had been explored for the hundredth time they began to take perches along its edge, and they would then gaze at objects on the ground and peer into the sky; not only would they detect their parents when coming from a distance with food but also when high overhead. If hungry they never failed to make known their desires by their peculiar cries while their heads would be extended eagerly in the direction of a parent whether approaching or leaving the nest. The hum of the mail-aeroplane, which twice daily passed

their nest-tree and often high above it, seldom failed to attract their notice no less than did a true bird even if not larger than a Swallow.

The various activities of the young, like those of the adults, are more or less chained or interlocked, which is characteristic of instinctive actions generally. A bird that had been feeding would often jump sidewise to the margin of the nest and begin to flap its wings, a first step in the flight-exercises, and after keeping this up for a minute or more it would pause for a few seconds; then, raising the hinder part of its body with the head correspondingly depressed, it would "shoot" over the side (Pl. XXXI.). Muting usually followed feeding, as in other birds, and the excreta being liquid do not commonly foul the nest, but when favored by the wind may be shot for a distance of twenty feet until a whitened circle is formed about the nest-tree below.

In such flying practises the Eaglet often exercises its feet by a treading or trampling movement, and after grasping sticks, sidestepping and prancing about it may bring such a *tour de force* to an end by a broad jump to the side of the nest, there to settle for a period of rest broken by the ever recurrent attentions to its toilet. Such activities commonly last from two to five minutes, and it sometimes happened when one reacted promptly upon the other, or when both were simultaneously stimulated by the wind, that they were flapping and jumping together and the eyrie then presented the liveliest scene.

When the young are not hungry they manifest little excitement at the parent's approach and if a fish is landed they will only peer or peck at it rather gingerly; there is no eagerness, no squealing, no seizing the prey and spreading over it, the customary response which only hunger can evoke. Indeed, on June 22, a record day of the present season, when the old Eagles had eight fish to their credit, the young were so thoroughly sated that once nearly an hour passed before either bird ventured to touch the food. The flapping which commonly precedes the act of muting may sometimes follow it and at intervals of every few seconds, to be ended, perhaps by clutching and treading the prey even when it has already been reduced to bare bones.

We often watched the behavior of the young Eagles at the dawn

of their active day, and though never quite uniform it was always essentially the same: the following account is transcribed from Mr. Myers' notes: on June 15, 1922, he reached the base of the ladder at 3:30 A. M., while it was still dark and a Screech Owl was calling in the woods. Upon making the ascent an object could be dimly discerned at the far side of the nest; but as the light increased this was gradually resolved into the two Eaglets, which were standing close together with bodies apparently touching, and dozing if not sound asleep; they were perched on a stick at the margin of the nest and were facing outward. Suddenly at a few minutes after four o'clock they seemed to awaken and moved a few steps apart, with backs to the observer, as before; then the bird on the left began to flap its wings until it faced west, when the other also turned, such fortuitous movements bringing them in tandem, one directly behind the other, and standing thus they continued flapping for four minutes together; this exercise over, one of the Eaglets walked up to a carcass of the previous day and began pulling at it with its bill, and after renewed flapping it mewed over the side of the nest. After a brief pause the stretching and flapping began again, to be repeated at minute or half-minute intervals, until they finally came to rest; in twenty minutes from the time of awakening both Eaglets were standing close together and in the same place where they were first seen.

At 4:20 A. M., before there was enough light for reading, one of the young Eagles began to preen and ten minutes later, while the other was trying to extract some nutriment from the bones of a fish, it started upon a lively tour about the eyrie, jumping and flapping; and now the feeding bird, as if stimulated by its nest-mate would occasionally pause, flap its wings and go through the characteristic treading movements with its feet, much as in later life all Eagles do when rending their prey. At 4:45 o'clock one of the youngsters began to caper around with the wings raised above its back, as when held in readiness for immediate use; with a broad jump it cleared the eyrie from side to side and upon landing knocked down so many loose sticks that they fell in a shower to the ground.

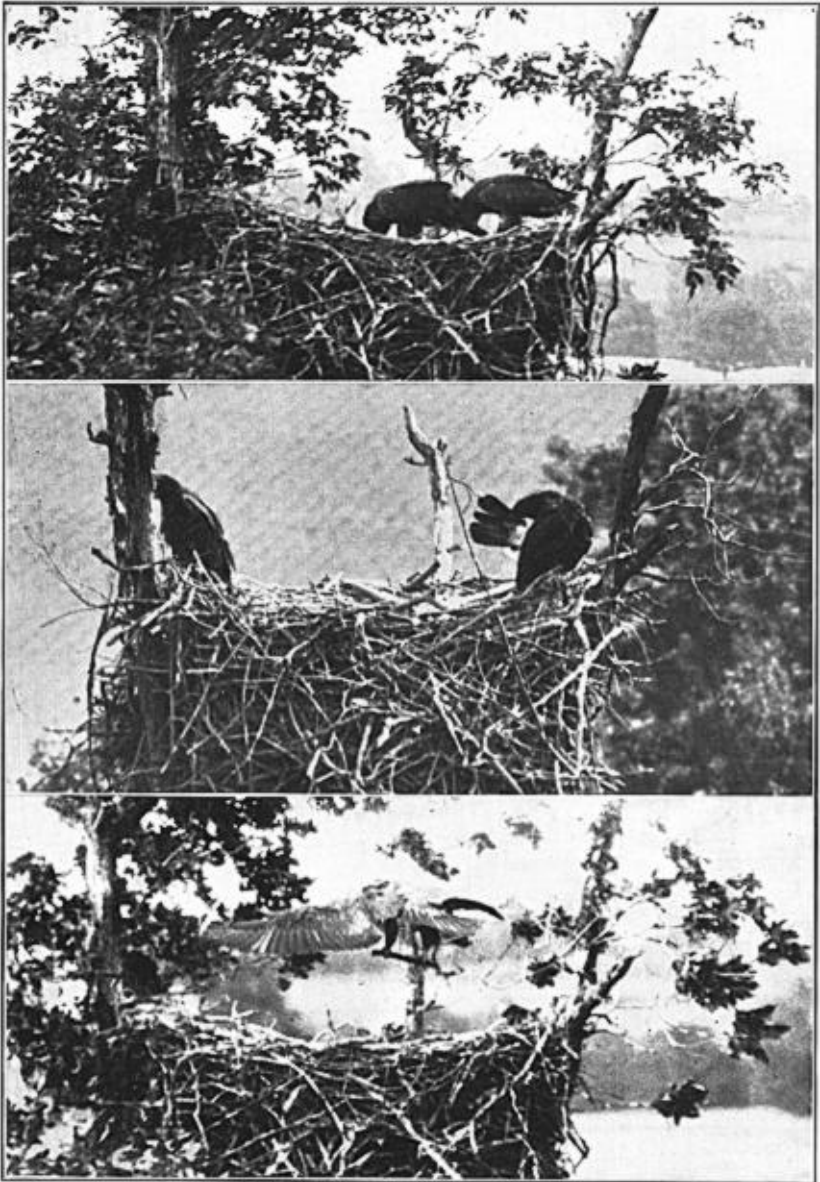
Shortly after the sun's disc was clear of the horizon, at 5:05 A. M., Bob-white gave his first call in the fields below, as if to tell



the world that he was also awake; meantime both Eaglets lay flat in the nest, and so quietly that a querulous *yeep* but rarely escaped them; for over an hour they were hardly seen to move, and were not aroused by even the scream of one of the old Eagles who at this early hour reconnoitered the nest and then moved off to the southeast, probably to resume its perch. Shortly after six o'clock one of the Eaglets stretched first his right then his left wing, the other following suit while still lying prone; after a further brief rest one and then the other jumped up to enter upon the next flying exercise of the day, which likewise ended in muting and rest.

The Eagles' larder was now empty, and both Eaglets peered curiously about, now and again turning an eye skyward, as if looking for their parents; one was seen to stoop, pick up something in its bill and pass this bit of material to its nest-fellow, which received it quite as it would take food from the bill of an old bird; it then *yeeped* like a young chicken and, as if overcome with ennui, yawned. Such querulous notes are a sign of uneasiness, but not necessarily of hunger, for after having uttered them continuously for over twenty-five minutes I have seen a bird walk up to a fish, which had been lying on the eyrie in plain sight, and tearing off pieces of the flesh, swallow them with evident relish; but when hunger is intense or the excitement is greatest, such calls pass with rising inflection into a squeal and at a later time into a shrill scream. Quite often the "yeeper" will be seen to pause, and if stirred by a contrary impulse begin to preen or proceed to examine other small objects in the nest. We have also heard a peculiar chuckling note from the young and also, as we thought, from one of the adult birds when perched in the grove.

Thus the round of aquiline activities, beginning at dawn, proceeds through the long summer's day, all actions, as we have seen, being more or less linked in serial fashion, with constant repetition, but with endless variation in all the minutiae of detail. Certain of these acts, as in particular the flying exercises, gain fuller expression from day to day, so that however stereotyped any given performance may appear, complete uniformity is never realized. One Eaglet frequently reacts upon the other and occasionally both will respond simultaneously to the same stimulus, whether it be the parent, the sight of prey, hunger, heat



1. COMMON FEEDING ATTITUDE, BUT UNUSUAL IN SHOWING BOTH BIRDS FEEDING AT THE SAME TIME.
2. BIRD ON RIGHT DRAWING BILL OVER INDIVIDUAL TAIL-QUILLS.
3. EAGLET PLAYING WITH MOCK PREY; FLYING UP WITH STICK IN ITS TALONS.

or the wind, but it rarely or perhaps never happened that both would begin the jumping and flying practices at precisely the same time; and since the internal states of any two birds for the moment at least can hardly ever be the same, we should expect to find an alternation or an overlap in all their major activities. It was common for one bird to begin a period of exercise and be followed in from three to five minutes by the second; one would take food and a little later its fellow would follow suit, and while there might be an overlap in these operations it was quite unusual to see the two birds feeding simultaneously; accordingly the "forbearance," so often exhibited by one Eaglet when the other is spread over the prey must be set down as due in part to a difference in their internal states; when, on the other hand, hunger is keen in both and no other factor interferes, a struggle over the prey is inevitable and this happened from time to time.

Preening must certainly be rated as a major activity, and the instinct responsible for this act is on hand in some of our altricial birds before a single feather has appeared on their bodies. On May 10, 1922, the two Eaglets when at the age of about three weeks were in gray down stippled with the brown contour-feathers, and their hazel eyes and dusky bills still gave the head that dark appearance so noticeable at an earlier age. They kept to the center of the great nest, spent much of their time in preening when not lying down, and though awkward on their feet, they would occasionally rise, stretch and slowly move their wings, the quills of which had emerged to about half their normal length. A week later, when a month old, their heads were still gray-capped, but the whole body was freely sprinkled with the sprouting contour-feathers and the wing-quills were well advanced; while we watched them they were nestled close together on the eyrie, and would rise to work their wings, or bill and peck each other in a friendly way.

At this stage preening was the order of the day and for a week or more the young "bird o' freedom" presented a most ragged and disreputable appearance. When thus actively engaged, and with the eyes often closed, the light down was sent flying to the breeze; gray fluffy sprigs of their natal covering were clinging to all parts of the nest, to neighboring trees, and when the wind

was right at a later time, some of it even floated into our tent. A pair of House Sparrows, which were then nesting in the side of the eyrie, were most diligent in collecting this treasured down, and in early June one would see these little vagabonds steal up to the edge of the nest, snatch a few coveted sprigs and hurry back to their retreat. They seemed to have an unnecessary fear of the Eaglets, and only once did I see a Sparrow tarry long enough to pick up a few scraps of food. At another time, however, the bolder Red-headed Woodpecker alighted on the eyrie and freely helped himself.

At the five weeks' stage (May 24), the brown juvenal plumage was fairly well developed, though strands of gray still lingered in the less accessible parts of the head and neck; but the preening process still went on apace, and seemed to gain momentum with the passage of the days, for there were abundant stores of down below the surface yet to be routed. This process, so important for young and old, as the life of each plumage is short at best, must go on, not only to the time of flight but to the very end of life itself. When the sixth week has been attained the Eaglets are brown all over and sleek as a new silk hat. The top of their eyrie by this time has been trodden quite flat and its sixty square feet of surface offers an excellent arena for the exercise of their growing powers. In making their toilet at that age the young Eagles usually preferred a perch at the edge of the nest, but in 1923 the nest-perch eventually became their favorite station; and thereon for a number of days we watched the *repertoire* of these contortionists, as they diligently combed over their wings, spread the tail-fan at right angles to the body (See Pl. XXX.) and ran the bill over each quill in succession, from base to apex, with the well known vibratory movement of the mandibles; or, pressing the oil-gland with the bill they proceeded to anoint the body and indirectly the head by rubbing it on the parts already treated. The operation was frequently brought to a close by partially erecting the feathers and shaking them out (See Pl. XXXI.) and when on the nest they would raise the wings and take a jump or two, the more effectively to dislodge the last sprigs of loosened down.

In stretching, the wing of one side is spread out to the full, but the corresponding leg, instead of moving simultaneously as in a

Gull or Crow, lags behind and the toes are clenched. They will sometimes stretch a wing when lying prone as if too indolent to rise and it may be some time before wing and leg of the opposite side are put through the same exercise. The Eaglets doze or sleep intermittently throughout the day, grasping some firm stick as they stand on the edge of the nest or lying flat with the head down, and the eyes may close but are certain to open at frequent intervals; they like to stand or lie close together, and the direction of the wind can be exactly gauged by their position, for they always face it.

We have spoken of the variation to be noticed in the nesting scenes which the following incidents, concerned mainly with the feeding habits of the young, will serve to further illustrate: June 27, 6:58 A. M., a half-plucked chicken was brought in by an old Eagle, who remained less than a minute and departed for her perch; both Eaglets crouched and clamored lustily, but only one of them seized the fowl while the other was romping about and flapping its wings; this one clutched at sticks, pecked at them and more than once attempted to secure the appropriated chicken. After a repast of a quarter of an hour the first Eaglet gave way to the other bird which laid hold of the prey with one talon, dragged it aside and set to work; not feeling satisfied, however, the first bird went after the chicken again, but was immediately warned off. For two minutes they stood, with wings raised, facing each other, like fighting cockerels, until the bird which had taken first chance by an adroit thrust snatched the chicken with one talon and, dragging it to the opposite side of the nest, began treading it with both feet; after each hasty mouthful it glanced around to watch its nest-mate. The robbed bird stood still, as if dazed, for some moments, and after having flapped a few times settled down to watch for another opening; with lowered head it moved very slowly towards the feeding bird, following its every movement intently, and now an interesting thing happened: the Eaglet that was feeding tore out pieces of the flesh and intestines and thrice offered them to Eaglet number two who received them in bill and deposited them at his feet without swallowing a morsel. He was not to be thus beguiled, however; watching his chance, he seized the whole carcass and having deposited it beside the prof-

ferred pieces went to feeding in earnest. When sated with food the Eaglet will often jump to one side, wipe its bill on a stick and proceed to pick off any particles which may have adhered to its feet.

At 7:59 on the same morning, the female Eagle brought in another chicken, but cleaner plucked than the last; and while her young were crouched and squealing she flapped her wings eight or ten times, then hopping to the front of the nest fairly faced our tent, much of the time uttering a peculiar mewling or "yeeping" note, suggesting that so often emitted by the young; her mouth and tongue were smeared with blood and a few white feathers still adhered to her bill. Whether stimulated by this parental call or not, both Eaglets immediately pounced on the chicken and struggled and screamed over it for some minutes; when by a sort of mutual consent both had settled down to feed, we noticed that every moment or so they would throw up the head and glance about for assurance precisely like an old bird. On another occasion when both were feeding on the same chicken we saw one of them tear off a leg and try to bolt it whole, but failing in this it managed to disjoint and swallow it piecemeal. At a little later time the most eager or responsive bird, which was always first to seize the prey, would sometimes grip it in its talons and, as it had done many times before with sticks, rise with it five feet or more in the air; but this was possibly only an effort to make sure of the quarry for upon dropping back to the nest the bird would go to feeding at once.

On June 30, 1922, there developed a series of scenes apparently similar to those just described, but upon a close analysis they will be seen to differ at nearly every point. The female Eagle was bringing in still another chicken, and the young greeted her with shrill screams when she was a hundred feet away. For some unexplained reason she was in great haste and after dropping the prey she cleared the nest with a bound, came to attention for an instant on the opposite side and made off for a tree-perch. The two young stood close together, and with heads extended, gazed at their retreating parent, as if she were an unexplained apparition, but after three minutes had passed one of them attacked the chicken while the other began racing about, clutching at sticks

and furiously flapping its wings; then with lowered head it approached the feeding bird in a half serious, half playful manner, but only to make a feint at attacking, to sidestep and caper off again, reminding one strongly of two puppies at play; it then picked up sticks in its talons and rose with them in the air. Even the feeding bird was induced to pause at such extraordinary outbursts of activity and without withdrawing its feet from the prey, for full six minutes it watched its prancing, leaping, flapping nest-mate before resuming the meal. But the incident was not closed, for after ten minutes of this astonishing activity the attack upon the feeding bird was renewed, now less in the spirit of play; the bird in possession then spread over the chicken and pecked at the intruder whenever he came within reach. After eight minutes of give-and-take in this passage-at-arms the persistence of the hungry Eaglet was rewarded in being allowed to taste of the coveted food, and as the first bird withdrew he had the whole carcass to himself. To conclude, the satisfied bird went to the nest-margin and cleaned its bill, snipping off a number of green leaves in the process; a vigorous jumping and flapping exercise followed and a few minutes later it was peacefully napping with eyes closed and face to the wind. When in the course of ten minutes the second Eaglet had taken nourishment enough, he joined his fellow who was on the rim of the nest, and for one hour and thirty-four minutes they stood together, facing us and the camera, for the breeze was then from the south; meantime they might preen their feathers, drop a wing, or sweep the horizon or the sky by a turn of the head, but their feet, as if anchored to the perch, seldom moved.

When the Eaglets were lying down or standing together, if the spirit moved them, they would make friendly passes at one another with the bill and less frequently "bill" one another, when one would hold its head up to the other and their bills would remain in contact for perhaps half a minute or more. The "passing" is certainly play, but the "billing" has probably another origin, that of habit, engendered by a long course of receiving food directly from the bills of the parents. As in other nestlings, the Eaglet does not always discriminate, especially if hungry, and we shall see that it will often react to its nest-fellow precisely as

if it were the true parent bringing food; it will crouch before its companion, erect its feathers, hold up its bill and, squealing, beg for food. On still another occasion when both were feeding on the same carcass, one was seen to hold up its bill with a morsel of food as if about to swallow it, when the other reached up and took it; but if it were a case of stealing there was no protest. Such incidents might very well help to reinforce the billing habit when once established.

It was very interesting to find the young Eagles such excellent exponents of the theory and principles of animal play, particularly as defined and expounded by Groos,<sup>1</sup> the ablest and wisest student of this difficult but fascinating field. The young Eagle or Hawk that jumps on a stick, tosses it about, spreads over it or flies up with it in the air, is impelled by an irresistible impulse, precisely as is a kitten which runs after a rolling ball, or if no other object offers, tries to catch its tail. All such impulses, as Groos has convincingly shown, are favored by a superabundant store of energy and are premonitions of later and more serious activities; thus by exercising its powers in certain definite ways which are strictly determined by its hereditary equipment, does the young animal become their master, and when it is later required to use them with serious intent it will do so as a matter of course. This feeling of abounding energy finds expression in different animals in certain very definite ways, but the expression is similar only in those forms with like hereditary endowment. Thus, the Eagle and the Red-shouldered Hawk will seize a stick and spread over it in much the same way, but slight differences may be noticed; so far as I have observed, the Eagle covers the object less completely with its wings, sometimes not at all, and it may not spread the tail. Heredity, in large measure, determines all such acts.

A surplus of energy in the young animal is always a favorable condition for play, but it is not its direct or underlying cause; in demon instinct we touch the real fount and cause of play, and here as in so many other cases, the instinct anticipates the animal's serious needs. When the accumulation of nervous energy is such that some discharge of it becomes necessary, the instinct will be

---

<sup>1</sup> See Karl Groos. 'The Play of Animals.' Transl. by Elizabeth L. Baldwin. New York, 1898.



expressed at the slightest provocation; a stick or a clump of grass will stir the play-instinct of an Eaglet almost or quite as readily as a fish or any real food, just as the kitten seems to derive as much satisfaction from any rolling object as from a real mouse. Play is the parent, not the child, of work, and as Groos says, animals do not play because they are young, but are endowed with youth because they must play. The biological end of play is thus to fit the animal for the ready performance of those activities which will be most needed in after life.

We have already given a number of incidents which illustrate this instinct of play in the Eaglet, such as seizing and spreading over a stick or clutching it with both talons, flapping the wings in an attempt to rise with it in the air, which they will later succeed in doing to admiration (See Pl. XXX.); all clearly anticipatory of their later methods of dealing with actual prey; or, playing with leaves or any other small objects, gripping a stick with claws or bill and dragging it about, pecking or "passing" at one another with the bill, and the like. I once saw a young Eagle rise to a height of several feet with what looked like a piece of skin from a plucked chicken and one day Mr. Myers witnessed what might be described as a "tug-of-war," when both Eaglets seized the same stick with their bills and struggled over its possession. Again, when other convenient objects were lacking, I have seen an Eaglet pick up a white feather and a corn-cob and toss them about; at another time when one of the birds was jumping and flying up from the nest it landed squarely on the back of its companion, who was lying down, but only started a friendly game of "passing" or sham-fighting. The cases which have just been mentioned represent either "hunting plays," where the animal is dealing with lifeless mock prey, or, perhaps, "fighting plays," in which the tilts and rivalry between the two birds is of a friendly character.

The flight-exercises which become so marked a characteristic of late aquiline nest-life really begin quite early; their first expression is perhaps seen in raising and spreading the wings, with jumping later added, and with more and more vigorous flapping as time passes. After a while a simple routine is established,—raising the wings until they seem to touch over the back, taking a few strokes and jumping; the flapping gradually

comes to take their feet above the floor of the eyrie and at eight weeks of age they may be able to rise two feet or more in the air; this ability attained, they are liable to go higher and higher and in a fairly stiff breeze, which helps to sustain if not to stimulate them, they begin to soar and hover. In 1922 we said "good-bye" to the Eaglets more than once before knowing the long practise they required to produce that perfect coordination of muscles and nerves which was necessary for confidence in the air. During the last week of regular eyrie life in that year they would sometimes rise to a height of fifteen feet, and soar for a full minute, going even beyond the confines of the nest and always with talons down to facilitate landing upon their return.

In our first season with the Eagles the young seemed disinclined to leave their eyrie, and were finally starved out and lured away by the old birds. A single chicken only was delivered on July 1 and but one fish on the day following; the first Eaglet went off unobserved by us after noon of the second, but on July 3 the old Eagles thrice reconnoitered the nest with fish, showing it to hungry Eaglet No. 2, but without delivering it. On the morning of the Fourth of July, the hunger of the last bird having become desperate, the following action, as observed by Mr. Myers, took place in the course of about three minutes: at 5:15 A. M. the female Eagle appeared with a fish in her talons and, as she approached the nest, began to circle about it coming ever nearer and nearer. (The male, during this time, as was later ascertained, was perched nearby in the grove; Eaglet No. 1, which had gained its freedom two days before, was flying about, pursued by a King-bird, and tried repeatedly to take the tall east perch but without success.) At 5:18 as the old Eagle with the fish was circling just above the nest the Eaglet was jumping with legs rigid and flapping frantically; suddenly it leaped into the air, and for a second seemed to hang, as if poised over the eyrie; at that moment the circling Eagle began to scream, and swooping down at the hovering and now screaming youngster passed him within six feet; a minute later the Eaglet, still holding to the air, drifted fifteen feet or more beyond the margin of the nest; with vigorous wing-beats it began to move eastward, following the mother bird with the fish and made a full mile in its first independent flight; it finally landed in



1. FEMALE WHILE FEEDING STOPS TO SCRATCH HER HEAD: YOUNG WATCHING CLOSELY ARE LATER FED BILL TO BILL.
2. EAGLET ON NEST MARGIN TO RIGHT SHAKING OUT FEATHERS AFTER PREENING.
3. EAGLET ON LEFT 'SHOOTING' FROM MARGIN OF NEST. OTHER ONE LYING FLAT AND NEARLY CONCEALED.

the branches of a tree on the edge of a strip of woods and doubtless was there allowed to feed on the tantalizing fish.

The flight of the first Eaglet from the eyrie in 1923 was far less spectacular, owing possibly to the new conditions introduced in that year by the presence of a nest-perch. The preliminary hovering over the nest was less frequent also and the birds never rose to a height of over four or five feet. On the morning of June 27 I noticed that one of the Eaglets was flapping and moving about in its usual restless fashion; presently, at exactly 10:35 A. M., I photographed him as he had risen a few feet in the air (See Pl. XXXII.); and as I stooped to change the plate-holder, he went off very quietly and was seen perched at various points in the grove during the next two days. There was no starving or luring of this bird, food having been twice delivered before he left, at 5:50 and 7:28 o'clock in the morning and after his departure at 5:42 in the afternoon. His subsequent maneuvers and those of Eaglet No. 2, who was then at freedom, will be given in detail in the following section.

The young Eagles move about freely in the neighborhood of their nest after their flying ability has been proved, and may be seen perched beside their parents, or trailing after them when not going independently from point to point. They also form the habit of returning to their old home, either alone or with their parents, for more or less protracted visits; but it may be doubted if they ever receive food at the nest after having once gained their liberty. On July 5, 1922, the second day after the last bird was on the wing, both were back on the eyrie for a brief stay; and on the same day at Danbury, Ohio, where we visited another Eagle family and were told the young Eagles had been flying for a week, one of them was seen sitting on its nest while an old Eagle occupied a perch just above it. That they are eventually driven forth from the home-neighborhood by their parents and compelled to shift for themselves, as has often been asserted, is highly probable, although I have no direct observations bearing on this point.

#### IX. RECORD OF THE LAST TWO DAYS OF LIFE AT THE EYRIE.

The following record of events, which brought the aquiline drama to a close at Vermilion in 1923, is transcribed from our

notes for June 29 and 30. The life and behavior of young Eagles at the nest follows a rather definite routine, as in all other birds, though as will be seen, the lines in the picture may be variously shaded, and even new ones added, from day to day and from hour to hour.

June 29, 5:40 A. M. The remaining bird (Eaglet No. 2) flies to a branch on the east side of the nest, but finding it difficult returns and begins to flap and again rises into the air; in five minutes he tries the nest-perch, but is still restless and is back in a moment.

5:50 A. M. He takes the nest-perch again, but still finds balancing difficult and now helps himself, parrot-like, with his bill; he then straightens up, flaps a few times and starts to preen which proved to be the beginning of a long and elaborate operation.

6:40 A. M. Becoming bold while still on the nest-perch the Eaglet rises into the air, which he holds for a minute and then drops back to the eyrie, landing on its very edge, but saves himself from falling by vigorous flapping.

6:44 A. M. He now tries for a branch on the west side of the eyrie, three or four feet up, but misses his footing and falls back landing on his head.

7:30 A. M. After repeatedly hearing the scream of the first Eaglet, which for two days has been circulating about in our neighborhood, we see him perched very comfortably on a division of the north fork.

7:48 A. M. Eaglet No. 2 takes the nest-stub very easily this time and is quite as much at home there as on the nest (Pl. XXXII.); he preens again, anoints his feathers with numerous applications of oil and spreading out the tail and turning it to one side goes over each feather in succession.

8:17 A. M. The young Eagle screams as one of its parents reconnoiters the nest by flying directly over it, but its excitement dies quickly and the preening function is resumed with ardor.

8:45 A. M. He drops back to the nest which is explored for food, and upon finding a carcass to his taste goes to work at it.

9:05 A. M. Eagle No. 1, who has won its freedom, goes over the nest rather high up and the feeding bird pauses long enough to follow him with curious if not eager eyes.

9:30 A. M. No 2 is on the stub again, where attentions to his toilet are renewed.

9:45 A. M. Eaglet No. 1 is screaming to the east of our observatory and we see him as he flies very easily over the south side of the grove and takes a perch in a dead tree, his wings going up at the moment of alighting to maintain his balance in regulation fashion. Three minutes later he was on the wing again, and flying between the nest and the observatory took a perch low down in an oak tree five hundred feet away.

11:14 A. M. After spending one hour and forty-four minutes on the nest-perch the Eaglet came back to the eyrie, but almost immediately returned, helping himself with bill when his balance was lost; he was evidently restless and would gaze off into the distance and down upon the ground as if the inborn impulse to fly might master his fears at any moment. What holds him to the nest is, I believe, the satisfaction derived from his ability to circulate freely between it and that stub of a perch, though but a few feet away.

11:25 A. M. To my great surprise and delight Eaglet No. 1 comes screaming to his old nest, from which he had now been absent almost exactly two days and, strange as it might seem, the second bird which had dropped back from its perch, behaved towards him precisely as if he were the parent bringing food; he crouched, squealed, went to his former nest-fellow and putting up his bill begged to be fed; but the first bird was a seeker after food, not a purveyor of it; he was soon spread over the remains of a fish and with quick jerks of his head was extracting any morsels of nourishment that remained. Having received no satisfaction from the visitor, No. 2 retired to his stub-perch.

11:53 A. M. No. 2 drops to the nest, and behold! The tables are turned, for he has now become the "parent," and the first bird spreads before him, squeals, and trailing after him repeatedly holds up his bill for food; but, receiving no more satisfaction than he had been able to give when conditions were reversed, he stood on the edge of the nest, and in high-pitched, squealing cries for full twenty minutes proclaimed his hunger to all the world; finally when the world had paid no heed to his signals of distress, he settled down on the eyrie and sprawling out quite flat went to

sleep on his old bed. Meantime No. 2, who had retired for the sixth time to his favorite nest-perch, was engaged in an elaborate preening operation which lasted until long after noon.

1:15 P. M. Shortly after noon, Eaglet No. 2 having come back from the perch, both birds were playing with sticks, seizing them in the bill and dragging them about, but are now lying quite still, side by side as they have done many times before.

At this hour the sun shines full upon the whole front of the massive nest, throwing every bleached protruding stick into sharp outline; all colors seem to be intensified by the very clarity of the air and even the dull brown coats of the Eaglets seem to reveal a reddish tinge about their heads which was not noticed before.

2:10 P. M. Both birds try for the stub-perch, but the second bird, who has had more practise in the feat, gains the coveted spot and the other goes back to the nest for another siesta; for two hours the second Eaglet circulates between the perch and the eyrie and when not preening plays with sticks, jumping and prancing.

4:25 P. M. The female Eagle, which had taken her station on the tall east perch some minutes before, suddenly leaves, reconnoiters the nest and returns to the same point; leaving it again after a brief rest she is off to the eastward and makes direct for the lake.

4:36 P. M. Six minutes later she drops a fish on the eyrie, and as Eaglet No. 2 leaves the stub she at once takes his place; the first Eaglet, with his advantage of position, promptly grabs the fish and spreads over it, but the other bird is also hungry and a strange mix-up follows, until he finally yields the struggle to his more experienced companion.

After a brief rest on the stub the old Eagle returned to her tree-perch, which she had left but ten minutes before, and was immediately assailed by a doughty Kingbird but she was plainly too much bored to pay him more than casual attention.

5:09 P. M. The male Eagle sails in at high speed from the north-east, drops a fish on the nest and looking very keen and wary hops at once to the stub; in two minutes he was resting on the tall perch below his mate. Although No. 2 was on the stub when this fish appeared he manages to reach it first and with free

use of his bill is able to keep the other bird away, but not without a tussle.

June 30, 5:55 A. M. Just as we reached the upper platform the female Eagle delivered a large sheepshead, but upon seeing us, made off directly and took a new perch, which we had not seen occupied before, just north of the horizontal fork.

6:30 A. M. When we left the observatory last night one of the Eaglets was perched on a projecting stick on the right side of the nest, and one is there now; both have had a turn at the fish last brought; the female still holds the perch taken half an hour ago and the male is on the north fork.

The lake at this hour is hardly distinguishable through the haze which with the clear sky overhead promises a perfect day. A Tufted Titmouse is calling and Red-headed Woodpeckers are busy as usual all about our tent drumming and squawking.

7:25 A. M. The male, who had shifted to the tall east perch, has left, and in five minutes we see him coming direct from the shore flying very low; when about twenty feet away he rises, poises for an instant and drops with a thud on the eyrie; he carried his fish which was probably a mullet or small pike in the right talon, tarried hardly more than a minute and made at once for the tall tree-perch which he had so recently left. Eaglet No. 1 secures the fish without difficulty and after a repast of ten minutes retires to his perch on the projecting stick, while No. 2, who was evidently not ravenous, was content to play with sticks and when he approached the remains of the fish only pecked at it rather casually while holding it in one foot. A little later, when both old birds were on their perches, the young were also at rest lying flat on their nest.

8:15 A. M. The female has left her station on the north fork; twenty-eight minutes later, as I was adjusting the camera, a squealing chorus called my attention to the nest, on which she had just landed with a plucked chicken. She planted her feet on the prey and began to rip it up at once. The scenes which followed were typically aquiline. She would pull off a large mouthful with a jerk, and as each was swallowed bring up her head for a moment for a cautious glance about; both Eaglets were crouched, with wings and tail half-spread, and the feathers over the rest of



the body partly erect while uttering incessantly their peculiar squealing cries; as one ventured to approach she would feed him, passing the food from bill to bill although this proved to be the last day of life at the nest. At this, the third visit before nine o'clock, five minutes only were spent on the nest and nest-perch when she left for the taller and more favored post beside her mate in the grove, but well down in the shade.

10 A. M. Eaglet No. 2, who has been working for the past ten minutes on the fowl last brought, can be seen drawing out the intestines, some of which lie untouched by his side, and stripping the flesh off one of the legs, which as we can see wears a yellow boot.

10:14 A. M. Both of the Eaglets of a sudden begin to squeal, and cocking their heads to one side gaze up into the sky; upon drawing the canvass at the peek-hole nearer to my face I can see two Buzzards circling aloft like black aeroplanes some hundred feet or more above the nest; but, as it appeared, they were being watched by other and more jealous eyes; in an instant one of the old Eagles is in the air and makes post-haste for its eyrie which it encircles and then reconnoiters the entire neighborhood; at the same moment the Buzzards, which seemed to have suddenly lost whatever interest they may have had in the nest and its contents, begin to rise, and soaring ever higher and higher until at a safe distance of a mile or more from the earth, we could see the black pair, now joined by others, veer and move off to the west.

12:35 P. M. The Eaglet, which we have called "Number 2," has now passed two hours continuously on the nest-perch (See Pl. XXXII.), and during this time he has been mainly concerned with repeated attentions to his toilet. Would his behavior have been essentially different had he occupied a more distant and loftier tree-perch? I think not and am inclined to attribute his willingness to remain at the eyrie and the continued visits of the old Eagles with food to the presence of this convenient perch and the free use of it made by every member of the family. Accordingly I believe that the thread which has now held the first bird, in the rôle of visitor, for twenty-five hours to its old home, can be no other than this same stub; but how much longer the thread will hold can only be known when it snaps.

Ten minutes later both old Eagles leave their perches in the

tall tree as my assistant, Mr. Humel, passes them on his way to lunch.

1:10 P. M. The young flap and rise from the nest, No. 1 making a height of only three feet, and after "shooting" and flapping again retires to his corner. The second Eaglet now takes the perch and "rests himself" on one leg, while the other goes to feeding, to be joined in a moment by his fellow and together they search for any scraps of food they can find in the larder.

1:28 P. M. Both birds are again hunting about the nest for food, but No. 2 soon hops back to the perch and begins to preen; shortly after, when Mr. Humel returned with my lunch, neither of the old Eagles were on any of their habitual perches.

2:50 P. M. The first Eaglet without any warning takes to the air, and for the second and last time leaves his old home, after an hour of unusual quiet and after a visit of over 27 hours; and so we return to the conditions of three days ago with only one Eaglet (No. 2) in the nest.

After examining all the trees in our neighborhood we were convinced that in its second flight from the nest Eaglet No. 1 moved eastward nearly a quarter of a mile to an elm where ten minutes later, one of the old birds, probably the male, was seen perched. The lone Eaglet spent most of the afternoon on his stub, squealing emphatically at rather frequent intervals.

6:09 P. M. The male is seen to leave the tall east perch, which he has occupied for the last quarter of an hour, and flies over the Ranney place to the lake. With the glasses we can follow him far out over the water and see him drop down, turn and almost skim along towards the shore. In six minutes he returns with a big sheepshead, over a foot long and perhaps weighing three pounds, in his talons; having dropped it in a hurry, he stayed but a minute for inspection and then was off for the perch which he had left but seven minutes before; that fish, we may be sure, was picked off the beach. Now the reactions of the lone Eaglet were rather curious; at the moment of the parental visit he was on the nest-perch and, as often happens in the presence of food, he seemed to "freeze" in his position; though unable to reach the fish, he must nevertheless go through the regular reaction-formula, squealing, erecting his feathers and half spreading his wings, which being

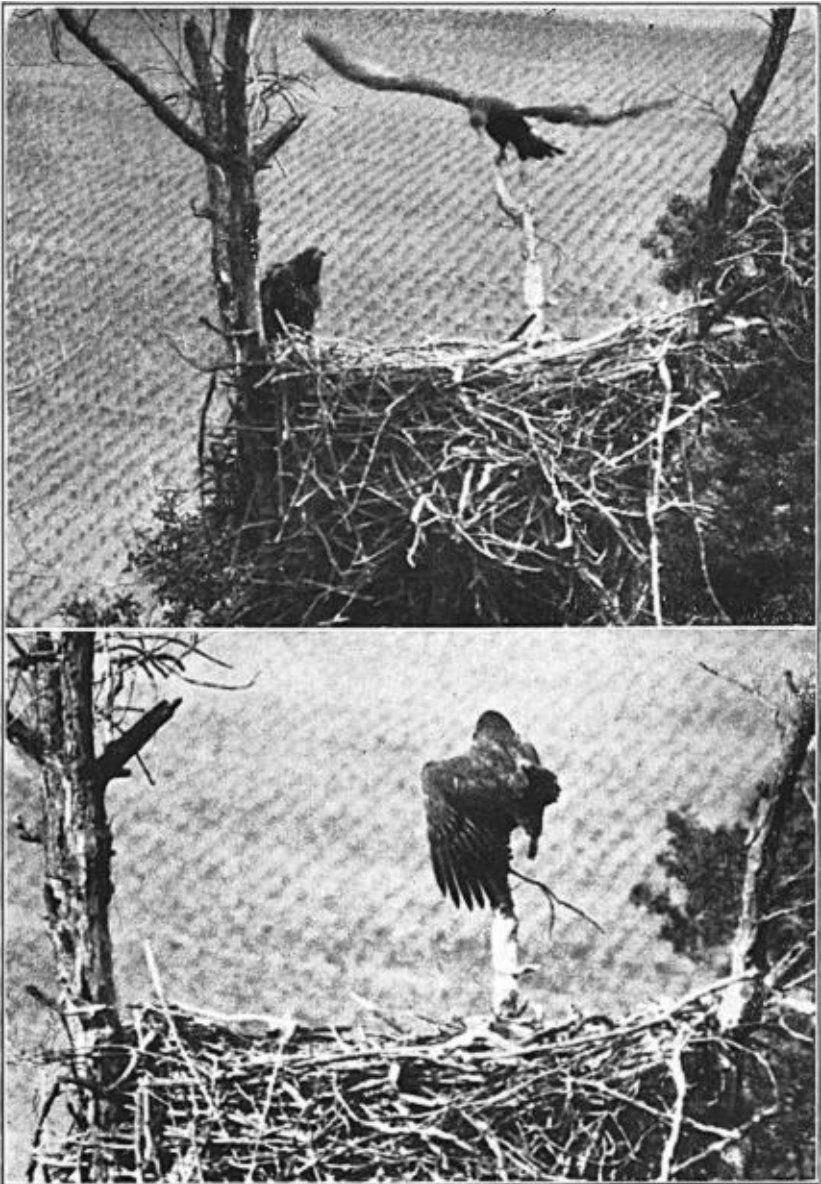
now deprived of any support, hang down at his sides. Although that fish was lying in plain sight on the eyrie but a few feet below him, its white belly glistening in the strong sunlight, and must have "beckoned" to him, he seemed disinclined if not quite powerless to move; for fifteen minutes, squealing much of the time, with his head turned around towards the nest and buried in the feathers of the back, he cut a strange figure on his perch. When he finally dropped to the nest he walked very deliberately up to the fish, planted one foot on it and began to peck rather casually at its head. Satiety may thus have been the impelling element in his peculiar behavior.

6:41 P. M. The male, after resting 25 minutes, was off for the lake once more, and in 16 minutes returns, and flying low over the cornfield adjoining the grove, rises to drop a small fish in the center of the eyrie. Something seems to have gone wrong or to have aroused his suspicions more than usually, for after coming to attention, he stood as if perplexed between two stools,—whether to go for the fish or to beat an immediate retreat; moving very cautiously and turning his restless wary eyes from side to side at every step, he walks slowly to the edge of the eyrie and with his right foot advanced and grasping a stick, before finally leaving, stands there for twelve minutes, ready to jump off at the least suspicious sight or sound.

7:30 P. M. When we closed the tent the lone Eaglet was still on his perch.

On the following day, July 1, as we were coming down the lane at 5:20 A. M., and were anticipating still further and perhaps more interesting events, the binoculars revealed our solitary bird very clearly as he stood upright at the side of the nest. As we entered the grove one of the old Eagles quietly left its favorite perch, but upon nearing the nest-tree we found that our last Eaglet had taken its maiden flight and given us the slip. Shortly after, a young Eagle, perhaps this one, was detected in the same elm tree, a quarter of a mile away, in which the first had been seen after his final flight from the eyrie on the afternoon of the day before.

The last day, June 30, had proved the most interesting of all; for thirteen hours we had watched the old and young Eagles



1. EAGLET NO. 1 IN AIR, MAKING ITS FIRST FLIGHT FROM NEST.  
2. EAGLET NO. 2 ON NEST PERCH, THE LAST DAY OF ITS LIFE AT NEST,  
STANDING ON ONE LEG AND BALANCING WITH STRETCHED WING ON SAME  
SIDE.

continuously and had been able to observe the curious interplay of their mutual reactions, to witness five visits of the old birds to their eyrie, and to make a long series of photographs selected as a record of successive events. There was no ringing down of the curtain. It had fallen silently and the play was over.

*Western Reserve University,  
Cleveland, Ohio.*

---

---

## MIMICRY OF VOICE IN BIRDS.<sup>1</sup>

BY CHARLES W. TOWNSEND.

THERE are some birds that are noted for their imitations of other birds' voices—of their various call and alarm notes and of their songs. This mimicry may be conceived to be conscious or intelligent, on the one hand, or unconscious, that is mechanical, on the other, or not mimicry at all, but merely an accidental resemblance.

For example, that particular scream of the Blue Jay which resembles so closely the scream of the Red-shouldered Hawk that one can not be sure of the identity of these two birds by the voice alone, may be either an accidental resemblance or a conscious or unconscious imitation. If it occurs among Blue Jays which have never heard a Red-shouldered Hawk scream or whose associates or ancestors have never heard this scream, then we must say that the resemblance is merely accidental. Some Blue Jays breed in northern regions where Red-shouldered Hawks are unknown, but they all in migration may hear the scream of this Hawk or the mimicked cry of other Blue Jays. Hence, although it still may be an accidental imitation, it may, on the other hand, be a conscious or an unconscious one. Those who believe that beasts and birds are merely "machines in fur and feathers" would say that, if the mimicry were not accidental, it must be unconscious or mechanical. When, however, one observes a human infant endeavoring to imitate sounds, or observes a bird, after listening to

---

<sup>1</sup> Read at the Meeting of the American Ornithologists' Union in Cambridge, October 9, 1923.