

killed for five years, displacing the Green-winged Teal in its supremacy of the previous thirteen years, but for the whole period of nineteen years the Ruddy ranks only as the third most abundant duck. If it continues to increase in the near future as it has in the recent past it will have to be classed with the Green-winged Teal and the Mallard as an abundant Colorado duck. The Ruddy reaches its maximum abundance at the Kennicott station during the second week of October.

Geese.—Eighteen Geese have been killed at this station during nineteen years, to-wit, eleven Canada (*Branta canadensis canadensis*), six Hutchins' (*Branta canadensis hutchinsi*), and one Snow Goose, presumably the Lesser (*Chen hyperboreus hyperboreus*). This number does not however correctly reflect the abundance of Geese in the area, for the annotations to the record show that many Geese were seen on the lake at various times but none secured. Such notes as these illustrate this point:—"Seventeen Geese on the lake" March 11th., 1900, and "more than 60 geese on the frozen lake" March 17, 1919. It is uncommon for these shy birds to pass so close to a blind that they are within gunshot, which helps to account for the small numbers shot. No Hutchins' Geese have been killed at this Club since 1901.

Swans.—The Kennicott Duck Club has on its list but one Swan since 1899, presumably a Whistling Swan (*Cygnus columbianus*); however "four swans" were seen on the lake ice on March 17, 1919.

1159 Race St., Denver, Colo.

AN EAGLE OBSERVATORY.

BY FRANCIS H. HERRICK.

Plates X—XII.

THE domestic life of the White-headed Eagle (*Haliaeetus leucocephalus*) has never before been subjected to close scrutiny and accurate record, in spite of its wide distribution, its commanding appearance and its great notoriety. Although for upwards of one hundred and forty years the emblem of the courage, the power and the authority of a free and sovereign people, the national aegis has not always afforded it adequate protection: decried by some for the ignoble qualities which it too often displays, it has been ravished and persecuted on every hand: from the days of the Indian intrepid climbers have repeatedly reached its nest, if only to rob it of its eggs or young. It should be noted, however, that greater consideration has sometimes been shown when those young

have been taken to save them from the wrath of an outraged farmer in whose eyes the tame villatic fowl would better grace the dollar than this bold depredator of his poultry-yard.

The eagle was adopted as the national symbol of the United States by Act of Congress, June 20, 1782, when a design for a national coat-of-arms, or in the language of heraldry, for an "armorial achievement and reverse," was approved. The immediate need was for an official sign of sovereignty, to be used as a seal, and it was intended that the device for this should be the same as that for a national coat-of-arms. The principal figure in the obverse was thus described in the report of William Barton and Charles Thomson, Secretary of Congress: "The Escutcheon placed on the Breast of an American (the bald-headed) Eagle, displayed proper, holding in his Beak a Scroll, inscribed with the Motto, viz., "E pluribus Unum"—and in his dexter Talon a Palm or an Olive Branch—in the other a Bundle of 13 Arrows; all proper." It was particularly noted that the eagle was to be "displayed," that is represented in heraldic fashion with wings and talons extended, and that it was to be the American "bald-headed" or White-headed Eagle.¹

Franklin's poor opinion of our "Bird o' Freedom," which I do not share has sometimes been quoted with approval: in a letter to his daughter, Mrs. Sarah Bache, dated at Passy, France, January 26, 1784, he said: "For my part, I wish the Bald Eagle had not been chosen as the representative of our country; he is a bird of bad moral character; he does not get his living honestly; you may have seen him perched on some dead tree, where, too lazy to fish for himself, he watches the labor of the fishing-hawk; and, when that diligent bird has at length taken a fish, and is bearing it to his nest for the support of his mate and young ones, the Bald Eagle pursues him and takes it from him. With all this injustice he is never in good case; but, like those among men who live by sharpening and robbing, he is generally poor, and often very lousy. Besides, he is a rank coward; the little King-bird, not bigger than a Sparrow, attacks him boldly and drives him out of the district. He is therefore by no means a proper emblem for the brave and honest

¹ See particularly the excellent monograph of Gaillard Hunt; *History of the Seal of the United States*, Department of State, Washington, 1909.

Cincinnati of America, who have driven all the *king-birds* from our country; though exactly fit for that order of knights which the French call *Chevaliers d'Industrie*."

At this time the badge of the Order of the Society of the Cincinnati was being made in France, and Franklin, who objected to all orders for Americans, remarked that its displayed Eagle looked more like a Turkey, and added; "in truth, the Turkey is, in comparison, a much more respectable bird, and withal a true original native of America."¹

On the other hand the Eagle has appealed to the poets of every age as the embodiment of superior courage, power and authority, through its keenness of vision, its habit of soaring to great heights, its defiance of the storm and the wild grandeur of its natural abodes. Allusion to the American Eagle, says Phil Robinson, occur with tolerable frequency. "You can always tell when you are coming upon an Eagle when you find particularly big hemlocks growing up in forests, or when the mountains around begin having 'splintered' peaks. You can cry 'warm,' as in the children's game, when you touch a poet's favorite poet, and 'hotter and hotter' if you find thunder and lightnings in the neighborhood of mountains. Depend upon it, you will hear a 'scream' or a 'shriek' before you are a stanza or two older. Even if the whole bird itself does not come hurtling through the heavens, there will be such a generally eaglish flavor to the imagery that, like a good spiritualist, you will go away satisfied of manifestations of decidedly aquiline phenomena."²

The comings and goings of our national bird, still too commonly known as the "Bald Eagle," have been zealously noted by every local ornithologist. The young are frequently captured and can be reared as readily as those of any Hawk,—indeed in one instance have been hatched and reared in confinement,—and Eagles, both old and adolescent, can be studied without difficulty in captivity.

In rare instances the nest has been found placed upon the ground, as in certain remote islands where isolation would seem to afford all needed protection. According to rule, however, the White-

¹ See Bigelow: *The Works of Benjamin Franklin*, vol. x, p. 279, New York, 1904.

² See Lippincott's Magazine, vol. vi, n. a. 1883.

headed Eagle establishes its great eyrie in lofty trees, in the wilderness often, but not infrequently in the neighborhood of man, at a common height of eighty feet, or it may be even one hundred and fifty feet from the ground, and in this part of the country the choice may fall as readily to a dead as to a living tree; with no attempt at concealment the Eagles go boldly about their business, relying upon circumspection for their own safety, and upon the inaccessibility of their eyrie for that of their eggs and young. To such conditions we must attribute the fact that the nest-life of our Eagle has hitherto escaped that close scrutiny which alone can satisfy the student of animal behavior.

The statements just made are believed to be generally true, but further qualification would be needed to do justice either to individual differences or variations which might be expected from the same individual under different conditions, as will be fully explained in a later paper.

The Golden Eagle (*Aquila chrysaetos*) which ranges over a large part of the northern hemisphere and is perhaps the more characteristic species west of the Mississippi, commonly nests on high cliffs or on ledges of the mountain-side. Ornithologists have fared better in attempting to approach it, although like its near relative it occasionally skies its nest in lofty trees. If preference for a certain locality is a prime consideration with this species, a lack of suitable trees, under such circumstances, may have drawn it to ledge or cliff; but whatever the origin of the habit, it has been possible, by erecting a blind in close proximity to the nest,¹ to observe its domestic life, and to record with the camera the successive stages of its growth from egg to Eaglet fully equipped for flight.

When attempting to learn something of the nesting habits of the American or White-headed Eagle at North Springfield, Ohio, near Girard, Pennsylvania, but with little success, it occurred to me that the difficulties might be overcome, provided the nest-tree and other conditions were favorable, by use of the tent-blind, either by erecting a tower or by making use of a tree for support.

¹ See particularly Macpherson, H. B., 'The Home-Life of the Golden Eagle'. London, MCMIX; Cameron, E. S., 'Nesting of the Golden Eagle in Montana'. 'The Auk' vol. xxii, 1905; and Finley and Bohlman, 'American Birds,' Chap. xxi. New York, 1907.



OBSERVATORY TREE AND NEST TREE, FROM THE NORTH-EAST, BEFORE UPPER PLATFORM WAS ADDED. TOP OF NEST, 81 FT., AND PLATFORM RAIL 85 FT. FROM GROUND.

The conditions at North Springfield, however, were all unfavorable; the old nest had gone down in a storm during the previous winter, and the new one which replaced it was practically inaccessible, being in a living sycamore and surrounded by obstructing branches which spoiled every prospect of approaching it from the south side.

Upon visiting another nest of the White-headed Eagle, at Vermilion, Ohio, on November 22, 1921, it seemed to me that the conditions there might warrant an attempt to carry out a long contemplated plan. My desire was to bring the home-life of this Eagle under the same conditions of exact observation and record as had been repeatedly done for a considerable number of the representative birds of the country, by means of the observation-tent, the use of which was first described in 1901.¹

This great nest, the history of which may be most conveniently given here, stands in the leaning top of a shell-bark hickory (see Plate X), in an open grove in the township of Vermilion, at a point thirty-eight miles due west from Cleveland, and about three quarters of a mile south of Lake Road, which parallels the shore of Lake Erie; the nest-tree has a diameter of barely two feet at the base; its growth and vigor had long been checked, and there were signs of decrepitude about the great conical nest in its broken top. As noted later the life of this tree practically went out in the spring of 1923. A line dropped from the margin of this nest to the ground on July 20, 1922, measured exactly 81 feet; the nest itself was then 12 feet high, and its circular top, which was very symmetrical, had a diameter of $8\frac{1}{2}$ feet; and according to our estimates its weight was approximately one ton. The nest-tree is bent to the eastward fifteen feet out of line with the perpendicular, not because it is topped by so heavy a weight, I believe, but owing to the prevalent north-westerly winds or to some other cause affecting it at an early age. Four upright branches now support the nest on the east, north and west sides, leaving the southeily sector clear, an advantage the importance of which we could not fail to appreciate; all these branches, which were broken off at heights of from four to ten feet, bore scant foliage in 1922; the stump of still another branch, which once completed the circle on the south side, was buried well down in the nest-structure; the importance of the

¹ See 'The Home-Life of Wild Birds', New York, 1901, 1905.

smaller branch, a mere stub, which rose a few feet from the north-east margin of the eyrie, was not fully recognized until the following year.

This nest, the fourth known to have been built and occupied successively in that part of Vermilion, was started not later than 1890, and has been in continuous use by young and old birds for upwards of thirty-four years. The history of the four nests,¹ so far as can be now ascertained, takes us back to about 1840, and thus covers a period of over 80 years. Since the Eagles are mated for life, and form a self-perpetuating partnership, we may assume that the same pair, or their several successors in the union, have held to the same locality and as long as was possible to the same nest, for the greater part of a century.

The first of these four known nests was situated in woods two miles east of the present one, and was occupied from about 1835 to 1863; in the latter year the Eagles moved a little farther westward, and established their eyrie in a dead tree on the farm of Mr. L. Braun; moving again, owing to the destruction of their nest-tree, they built a third nest on the present Riston farm, one-half mile east of the fourth and last, which as we have seen was started about 1890; twice the blow which felled their nesting-tree was from the hand of nature, a penalty which overfondness for dead trees must inevitably entail, and once from the hand of a farmer wielding an axe.

One hundred and seven feet southeast from the nest-tree rises a great elm, the present monarch of the grove, fourteen feet in circumference at its base and over one hundred feet tall, but already showing marked symptoms of decay; at forty feet its great arms begin to spread about a more central broken shaft. This great pillar seemed at once to provide a possible support for an observatory, which if placed in the very crown of the tree, would be partly concealed, at least from below, and would afford us a wonderful view of the nest itself and of the activities of the Eagles, old and young, of which for so long it had been the focus. Standing to the southerly side of the nest-tree and in a line nearly at right angles to the course of the sun, it seemed likely to offer a good

¹ I am indebted to Mr. and Mrs. Otto Buehring, and to Mr. Adolph Braun, an old resident of the township, for the data given above.

vantage-point for both observation and photography. We thought that a platform could be so placed as to bring the observer and tent to between eighty and ninety feet from the front of the nest; this distance was the only drawback in our calculations, for it was about double that which we had regarded as a minimum; however, we were dealing with large objects, and all other conditions were exceptionally favorable; after all, observations were more important than photography, the difficulties of which could be certainly lessened, if not completely overcome.

In company with a colleague,¹ to whom I am indebted for calling my attention particularly to this nest, we visited the site again in December, with the superintendent of construction at Western Reserve University,² an iron-worker and a carpenter; after studying the ground again we decided that the experiment was practicable, and upon receiving the kind permission of the owners, Mr. and Mrs. Otto Buehring, we decided to go ahead.

Would these Eagles leave the neighborhood according to their usual schedule, and permit our work to go forward without disturbing them; or, would they so resent an intrusion into their domestic affairs that every tie would be broken, and their great eyrie abandoned; or again would the publicity certain to follow any unusual undertaking of such a kind tend to hamper and perhaps defeat us in the end? As none of these questions could be answered with assurance we could only await the result.

We had hoped to erect the platform and ladder while the Eagles were away, leaving them undisturbed during the earlier and more critical period, and to devote our attention during the first season to the later and possibly more interesting phases of nest-life. We could not afford to take any chances with these birds until we had learned more of their particular habits and idiosyncrasies, knowing full well that any serious indiscretion on our part might well spoil the game at any moment. As it happened, the winter of 1921-22 was one of the mildest on record; the Eagles were absent from the neighborhood for only about a fortnight in the first part of January, and our work had to go forward while they were still

¹ Dr. H. S. Booth, of the Department of Chemistry, Western Reserve University.

² Mr. H. A. Headline, to whose skill and oversight in carrying this work to a successful issue I am greatly indebted.

on the ground. Owing to interruptions, the painting of the structure was not completed by the first of March and, as nesting of these Eagles is due to begin early in that month, this detail was partly neglected. It was soon found that the Eagles had accepted the platform, and were using it as a perch; as circumstantial evidence of this a characteristic "casting" was found on the floor under the railing.

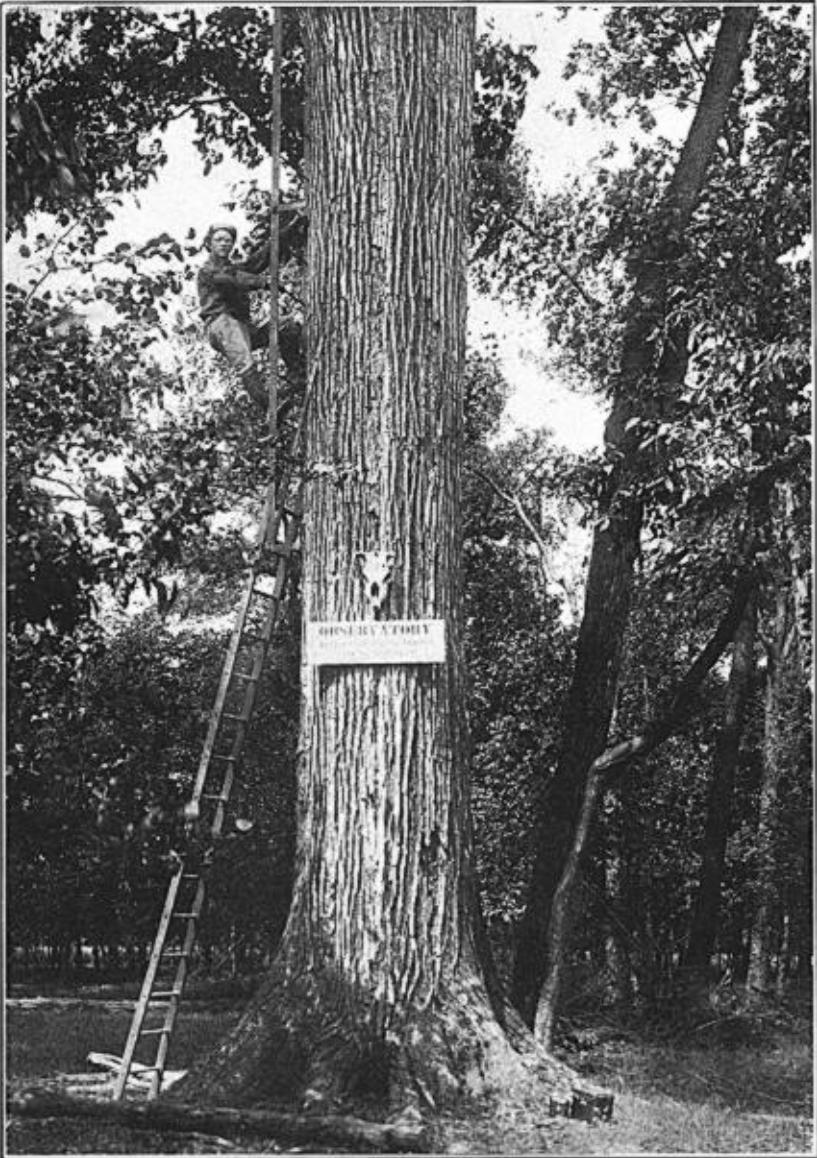
In the account which follows¹ the reader is reminded that what we desired was not merely a temporary shelter for snapshot photography, but a lookout which would be safe, easily accessible, and suitable for continuous observation for many weeks, which would outlast the season, and therefore would be strong enough to endure the fierce storms which on occasion rage over the region of the Great Lakes.

The platform, which was to hold our tent (see Plate X), was ten feet square, and stood 82 feet from the ground; this was surrounded by a broad board base, and a strong rail four feet high. The top of the rail, the level at which a camera would ordinarily be set, was exactly 85 feet 7 inches from the ground, and over 4 feet above the margin of the nest.² Although the inside of this nest was but slightly depressed, the depth being not over four or five inches, it was impossible at this height and distance to see to the bottom of it; accordingly early in 1923 we added a second platform and carried it as high as practicable (see Plate XII.)

The superstructure was painted a dull olive gray, but as already intimated the nesting season was upon us before this could be

¹ I wish to express here my appreciation of the financial aid and encouragement in the conduct of this work, which I have received from Western Reserve University, through the interest of its Treasurer, Mr. Sidney S. Wilson, who has aided me in every way in his power. I would also acknowledge my indebtedness to the Ohio Academy of Science through Dr. T. C. Mendenhall, Chairman of Trustees of the Research Fund for an appropriation in 1922 towards the expenses of this enterprise.

² The curious reader may be interested in the following structural details: the sills of the framework which supported the platform were laid in triangular form, each side being built up double of 2 × 6 inch pieces; the three sides were bolted together, and engaged at the angles to the branches of the tree by specially designed steel hangers; the vertical posts, which rested on the sills and directly supported the platform were also of 2 × 6 inch pieces, doubled, and strengthened by braces, which were placed at various angles and were engaged to the tree by bolts; the joists of the platform were also of the same material, laid double, and the floor was of Georgia matched pine, double-laid.



IN MAKING THE ASCENT A STEEL LADDER, BEGINNING 17 FT. FROM THE GROUND, WAS REACHED BY MEANS OF A WOODEN LADDER.

completed. An iron ladder,¹ beginning 17 feet from the ground, led up to a trap-door on one side of the platform; this trap came to be regarded as the only danger-point in the situation, and was always closed by an observer upon entering the platform and always locked upon leaving it. To make the ascent a small wooden ladder was held in readiness at the base of the observatory-tree, and this was kept locked when not in use (Plate XI).

Owing to the novelty of our activities, within sight of a much travelled highway we anticipated that publicity through the newspapers might seriously interfere with our plans, and our fears in this direction were fully justified, for the Vermilion Eagles, which had hitherto pursued the even tenor of their lives with little molestation, suddenly entered upon a fame not at all to their liking and snap-shots of these Eagles and their eyrie were published in various parts of the country; curious sight-seers, photographers and other interested observers began coming from nearby towns and occasionally from a distance, bent on seeing the sights supposedly visible from the ground or of obtaining pictures; although we posted warning notices in the grove, it was impossible to keep these people away; they could not, of course, understand that little or nothing was to be seen from a station on the ground, or that the normal activities of the Eagles at the nest ceased the moment a stranger appeared in the neighborhood. Fortunately these Eagles learned to submit to adversity, and with the advance of the season the curiosity of the public gradually wore off.

On June 7 the observatory was completed by screening the railing and placing in position on the platform a commodious *A* tent specially designed to suit our needs.² The tent-material of khaki

¹ Eighteen inches wide, and the first section made up in three sections, of 84 rungs, one foot apart, the parts being bolted together, and secured against the tree; the second section led across the center of the tree and the last ascended direct to the trap.

² The dimensions of the tent, over all, were as follows: height, 6½ feet; length, 6 feet; and width, 4 feet, 8 inches. The frame was of Georgia pine, and consisted of two center poles, four uprights (of 4 ft. 8 in.), at the corners, two upper and two lower side-poles, running lengthwise, the former engaging with the uprights at the angles, and the latter joined to them at the floor level, for the purpose of keeping canvas of tent-sides under control, especially during heavy winds; two lower end-poles served a similar function. All uprights and lower side-poles were engaged to the floor of the platform by means of angle-irons; the upper side-poles were engaged to the tops of the posts at each corner, and to a cross-piece of wood behind; to keep the front of the tent more free for observation and

shelter duck answered our purpose admirably, being light, inconspicuous, and so far as our experience went, absolutely impervious to water; grommets at the corners permitted the use of strong guy-ropes, which were lashed to the platform-rail. The last piece to be adjusted was an outer ridge-pole of wood extending ten inches from each side of the peak, and designed to protect our tent from a wire screen, this in turn to save it from injury in case the Eagles should take the fancy of using it for a perch; the tent was entered by a fly in front, which was laced up to keep out the weather.

The problem of securing adequate ventilation, in case of excessive heat, was completely solved by a screen of the same material on the railing. As a matter of general interest we kept daily temperature records, and only twice were we obliged to raise the sides of the tent; at such times by means of the screened rail we were able to maintain the integrity of our blind unimpaired. Contrary to my expectations it was ordinarily cooler on our lofty perch than upon the ground, and with the usual north wind setting fresh from over the lake we were grateful for all the protection which could be secured.

We passed two nights in the tent and weathered some bad storms, but our valuable photographic equipment, which remained in the observatory during the entire period of our work, was never touched by the rain or in any way disturbed. When the tent was finally in place and the necessary openings for the lenses and peck-holes were made, following our usual caution, we left the Eagles to their own devices for four days. Systematic observations were begun on June 13, and some anxious hours were passed on that first morning, when from six o'clock until noon neither of the old Eagles had ventured to approach their eyrie. Meantime the sporadic activities of the Eaglets, their preening, spreading, play with sticks and occasional attacks upon the carcasses left upon the eyrie all inclined me to believe that their larder had been stocked before six o'clock; yet we could not help asking—when would they be fed again? Would the old Eagles shrewdly refuse to enter their eyrie

photographic purposes, the crosspiece was replaced by a V-shaped steel rod, the angle of the V (inverted) engaging with the ridge-pole, and the ends with the forward upright posts.

while the observer was in his tent, or would they entice their young to prematurely leave the nest and would all our labors be rewarded only with defeat and chagrin? As we well knew, a few hours would give the answer. The very grandeur of the scenes then spread before our eyes seemed for the moment to mock our efforts; the dominating object was the great eyrie, which never ceased to fascinate us; its circular top appeared at this height barely at sky-line, and often suggested a stage, on which the two Eaglets, now grown to nearly adult proportions were the actors; it was their gymnasium, dining table and sleeping quarters; the scenery was ever changing with the shifting of the lake-mists, the clouds and sun; below farmers were cultivating their well-ordered fields, now green or brown; and beyond were spread the blue fields of Lake Erie, the shores of which could be followed with the eye from Lorain Bay and Point on the east to near the town of Vermilion on the west. As we looked directly down into the tops of the hickories and oaks we would catch a glimpse of the Red-headed Woodpecker, while his "barbaric yawp" was often sounded close to the tent; and from the ground itself, all about us, rose the friendly calls of Bob-white with little intermission.

Glad of an excuse to leave a spot where every prospect but that most to be desired seemed to please, we closed our observatory,¹ and left it for the space of two hours; in passing through the grove we killed a large spotted snake and turned its light belly up to the sun; two hours later it was gone; Eagles are well known enemies of the serpent, and as we reached the grove again at two o'clock one of our birds was circling overhead with a large object in its talons; if not our snake it was probably a fish. The Eagle's movements were too rapid for us to determine this, but we could certify to a fact of far more importance; the Eagle carried its quarry to the eyrie, where it spent full four minutes and left only upon our approach; the questions of the morning had been answered; the Eagles had accepted the situation and their young were receiving an abundance of food.

¹ I wish to acknowledge my indebtedness to my former students, Mr. Everett C. Myers and Mr. Elbert J. Humel for their assistance during the summers of 1922 and 1923 respectively; through our united efforts we were able to keep the nest and its occupants under continuous observation over a period of 36 days, and total working time of 420 hours; their notes have been incorporated with my own, and without their efficient aid my record would have been far less complete.

As the event proved, in the season of 1922, we had three weeks of close observation of the nest-life of these Eagles, and witnessed forty-nine visits by them to their eyrie, at which the time spent varied from a few seconds to nineteen minutes. Finding that the feeding activities were very irregular, and that they ceased altogether after dark we divided the day into four shifts, my assistant and I taking alternate periods, which extended from about 5 A. M. to 7 P. M., being assured that only in this way could our records be made fairly complete and reliable. The daily visits, at which food was brought, varied from two to six in number, the earliest recorded being at 5:24 A. M., and the latest at 6:48 P. M., they might occur early or late, might be scattered through the day or crowded into any part of it. Four visits by both birds were once made in the space of twenty-three minutes. There was no bill-to-bill feeding, except upon one or two occasions, but the food was merely placed on the eyrie and left there for the Eaglets to help themselves.¹

Many and curious were the exciting scenes to which we were witnesses by eye and ear. The record of our work with some account of those scenes will be given later. During the coming season I hope to fill in some of the gaps and to improve the photographic results.

II

The previous account was written in 1922, after our first season with the Vermilion Eagles; and now that it has been possible to profit by that experience I will describe the methods adopted and the conditions which prevailed in the following year.

Another story was added to our observatory in March, 1923, and carried us 13 feet higher, which was as far as we dared to go (Plate XII); the second platform, essentially a duplicate of the first, was supported by vertical posts at the corners only, but was strengthened by steel wires stretched crosswise between the upper and lower floors; our aim being to attain a sufficient degree of strength but to avoid too great rigidity. Though severely taxed by high winds which delayed the builders, the work was completed on March 20, the proximate date of the beginning of incubation.

¹ But no inference should be drawn from this fact without consulting our experience in 1923, as given below.



OBSERVATORY WITH SECOND PLATFORM ADDED IN 1923, 95 FT. FROM GROUND.
STEEL LADDER PASSES FROM MAIN TRUNK THROUGH EACH PLATFORM.

The upper platform, standing at a height of 95 feet, brought the observer's eye 100 feet from the ground and 19 feet above the top of the nest; this gave us at all times the great advantage of being able to see into the eyrie, to note the condition of the family larder and to observe how the Eagles, old and young, reacted to their prey. That additional thirteen feet also conferred another advantage almost as great; it enabled us to overlook the grove and the entire countryside for miles in every direction, not to speak of the shore of Lake Erie in the back-ground to the north, and thus to follow the activities of the old Eagles with great precision.

Our experience of last year showed that the daily life of the adult Eagle, during the period of young, consists of a round of activities, repeated at irregular intervals from about five o'clock in the morning until about seven at night; these activities consist of (1) the search after and securing the prey; (2) bringing this food to the eyrie and there serving it to the young or, if hungry, helping themselves; and (3) standing guard on the perch, where they preen at leisure, but where they are seldom or never caught napping; very rarely do they leave the perch and return to it direct or go to the eyrie empty handed.

The full significance of the perch in the nest-life of these birds will be considered at a later time. Since the old Eagles frequently occupy the same perch-tree, often sitting close together, and since the female is the larger of the pair, we could usually distinguish the sex of the visiting bird.

In 1922 the top of the nest-tree at Vermilion was too much obstructed by foliage which hindered us greatly; accordingly at the close of the season the offending branches were all cut away. Now on the northeasterly side of the nest, or the far side as viewed from our station, a stub, as already noticed, rose to a height of three or four feet and then bent away from the nest-margin, to be broken off abruptly after reaching a nearly horizontal position. The lateral branches of this stub were also removed at this time, a seemingly trifling act, but full of significance as the sequel showed. That stub was adopted this year as a perch, thereby changing the activities of nest-life and greatly enhancing the interest of the nesting scenes. After serving food to its young, an old Eagle, instead of repairing to a distant tree-perch, would hop on this branch and

there remain for hours at a time, being virtually on the eyrie itself. The Eaglets also acquired the same habit of using this stub when they were about ready to fly, and possibly for this reason there was no luring of the young from the eyrie, as occurred in 1922. On the contrary, the Eaglets of the present season were supplied continuously with an abundance of food until the day and hour when they left the nest; but what surprised us the more, in view of last season's experience, was that occasional bill-to-bill feeding took place up to the very end of nest-life, a good commentary on the need of continuous and repeated observations in order to understand the real habits and powers of these adaptable birds. Moreover, one of the Eaglets, after having taken to the air, returned in two days to its old home and for twenty-seven hours circulated between the stub-perch and nest. In addition to the changes enumerated above almost the entire nest-tree, as before intimated, was bare of foliage in the present year.

Accordingly we decided to repeat from these new vantage-points our observations upon the late phases of nest-life made in 1922. We discarded the long focus and telephoto lenses, which had served us rather poorly the first season, and relied entirely upon a Press Graflex 5 × 7 plate camera and a Taylor-Hobson Cooke telephoto lens, of 15 inch focus, and having an *f* value of 5.8. This lens gives slightly less amplification than the Cooke Telar telephoto lens, but it has remarkable depth of focus and more speed, both qualities of the first importance for our success. Working at a fixed distance of about 85 feet with Graflex plates we were able in most cases to stop the motion of the Eagles, and in all to obtain fully timed negatives, under the excellent light-conditions which usually prevailed, with exposures of 1/365 or even of 1/435 second. Our photographic work was also greatly facilitated by a well-equipped dark-room, which we were kindly permitted to install at the home of Mr. F. E. Ranney.

As in 1922, we worked in three-hour shifts so as to cover the entire period of daily activity of the Eagles, from five o'clock in the morning until seven in the evening. Though always certain to get plenty of action at some time during the day we could never tell when it would come; accordingly it was necessary to stand by the camera at the tent front, with an eye at a peek-hole, and

with binoculars within reach; there were now no visible activities of old or young Eagles which our camera could not record. Aside from keeping hourly temperature-records, we noted as a matter of personal interest all bird-notes which rose to our ears from the grove below, and all avian visitors which ventured near the eyrie, or which came to inspect our tent; if we relaxed too often, or left the peek-hole to write up our notes, quite as likely as not we would miss something of interest; and when the old Eagles came we were busy enough.

Sixty visits of the Eagles to their eyrie were recorded in 16 days in 1923, and the daily number of visits with food varied from two to eight; the earliest visit recorded being at 5:39 A. M., and the latest at 6:57 P. M.

The weather conditions were the reverse of those experienced in the summer of 1922, but proved very favorable for our work. We did not escape the heat-wave which enveloped the greater part of the country and lasted eight days, from June 18-25; and although one side of the tent was raised to let in the air the temperature at three o'clock in the afternoon, the hottest period of the day, at a point three feet from the floor, ranged from 104°-113° F.; but being shielded from the sun's direct rays we stripped on occasion and passed this period very easily. The Eaglets, now deprived of nearly every vestige of shade, probably suffered more than we did; they would lie quite flat, even turning over on their sides for a change of position, and gaped almost continuously, as did the old birds when on the stub-perch. The most noticeable effect of the heat upon the old Eagles, however, was to drive them from their lofty perch in the grove to the shade of branches lower down in the tree; but that they were not napping even then we had abundant evidence from day to day.

After ten days of brilliant weather with hardly a wisp of cloud ever visible in the heavens, we passed through two severe storms, and once I was on the point of descending for the purpose of safety; our tent was put to the severest test which it had yet endured. The young Eagles at first stood on the front of their eyrie doggedly facing the storm, but as the gusts became too strong for them they lay down in the center of the nest, and so flat that they were with difficulty distinguishable. On June 28 another stiff blow was

encountered, now from the north and accompanied by torrents of rain, but with less danger to our equipment as the wind-pressure was steady and without those terrific gusts which we had endured two days before; on the whole we felt justified in having made our construction strong and elastic enough to meet such emergencies, for had the tent gone down the steel ladder would undoubtedly have held the platforms in place.

At the level of the first platform the top of the eyrie stood close to the horizon line, while at 95 feet, the upper limit at the present time, nest and birds were seen projected against a ploughed field, which this year was planted to corn and extended to the edge of the grove. When gazing upon the scene for the first time from this elevated point I was amazed at the remarkable contrasts which it presented to the eye; the Eagles and their great eyrie seemed like a survival from the past,—a touch of wild untameable nature, hemmed in like an islet in the sea,—with the evidences of man's civilizing efforts all about it; there every form of modern transportation was daily or hourly witnessed; as the eye rested on the broad expanse of Lake Erie, the waters of which meet the horizon at the north, passenger steamboats or larger freight vessels were ever and anon passing between Cleveland and other lake ports; trains on a great railroad, close to the shore, thundered along at stated intervals. Again, paralleling the railroad, ran an electric line for express and passenger service, connecting Cleveland with western points; still closer to the eye along another artery of pleasure and commerce, the Lake Road, ran automobiles and trucks, bound east or west in unending streams. Turning eastward the eye caught in succession the harbor and city of Lorain, and farther southward a forest of chimneys of the great steel works there, the smoke and gases of which often reached us; with a complete turn about we looked down upon the village of Braunhelm through which passed an even greater and more famous railway line; at regular intervals too, morning and afternoon, the thud of an approaching aeroplane, which often passed directly over tent or nest, announced the carriage of the mails and rarely failed to awaken the close scrutiny of the Eagles. At one time even a dirigible airship sailed directly over the eyrie and gave its human occupants a good view of the astonished Eaglets from above.

Many times each day the wary Eagles passed over these busy lines of traffic to reach the Lake, their principal source of food, rising from the field to avoid the many wires strung from poles, apparently undismayed by the sights and sounds with which they had come to be familiar. Strangely mingled indeed were the wild screams of the Eagle with the strident voices of the steam siren and whistle, while a photographic plate which caught the monarch-bird bringing in a fish or serving it to its young, might also register a farmer afield ploughing with team of horses or cultivating his corn. It would be hard to find, and perhaps unreasonable to expect, greater adaptability than this among diurnal birds of prey.

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THRAUPIS SAYACA AND ITS ALLIES.

BY MRS. E. M. B. NAUMBURG.

A STUDY of the series of specimens (181 in all) of *Thraupis sayaca* and its allies in the collections of the American Museum of Natural History from the Guianas, Brazil, Paraguay, Bolivia, and Argentina shows that certain changes in the systematic arrangement of the group is desirable. It is the object of the present paper to bring these proposed changes to the notice of other ornithologists as well as some other matters which have a direct bearing on the subject.

Thraupis sayaca belongs to the Tanagers (Tanagridae), a family closely related to the Finches. In fact, up to the present moment it is impossible to draw any sharp line between them. Even when the anatomical structure is known, it is doubtful whether it will be possible to define satisfactory family limits.

Thraupis sayaca may be described as a small, fruit- or insect-eating Oscine, with nine primaries and a short rather thick Finch-like bill. The bill shows a varied proportion in some of the genera of this family. The Tanagers are as closely related to the Finches as they are to the Warblers, but these purely New World families are weaker types than the more widely ranging Finches according to remarks of Professor W. K. Parker, the anatomist, and this bears