# THE NESTING OF THE GREAT HORNED OWL.

BY L. L. GARDNER.

*Plates III–V.*

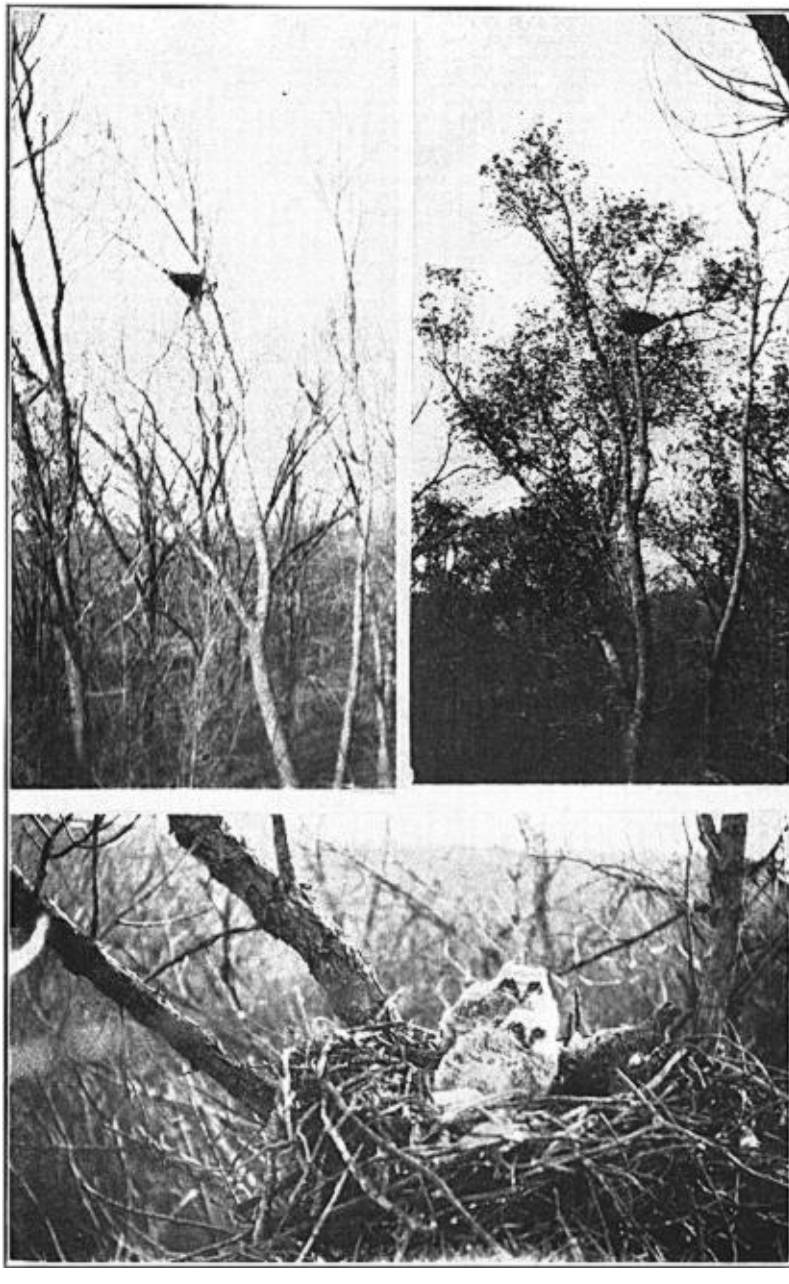
ON March 19, 1926, the nest of a Great Horned Owl (*Bubo virginianus pallescens?*) was found in one of the thickly wooded canyons on the military reservation, Fort Riley, Kansas, which presented an unusual opportunity for intimate study of the nest life and growth of the young from very early in their life history until the leaving of the nest.

The terrain consists of rolling grass-covered hills cut by rather precipitous tree-grown gullies with rocky rims and low underbrush. The particular canyon in question is in an isolated area at the western boundary of the reservation four and one-half miles from the buildings of the military post, two miles or more from the nearest farm house and about the same distance from the Republican and Kansas Rivers. It is shaped like the letter Y with east and west branches, is thickly tree-grown, with elms, cottonwoods, hickory, locusts, and small oaks and considerable tangled underbrush. A small intermittent flow is found along the stream bed. The canyon had the added advantage of being behind the rifle range, ricochet bullets from the low intervening ridge occasionally passing over with menacing whistle and keeping unwelcome meddlers away.

The nest was that of a large Hawk, one of a group of three, in the east fork. It was situated at the edge of the woods close to the limestone outcrop that forms a ledge of rim rock around each canyon. From this ledge the young could easily be seen in the nest. It was built in the highest fork of a hickory tree, 43 feet from the ground and, during the winter season, due to the size and exposed position, was very conspicuous.

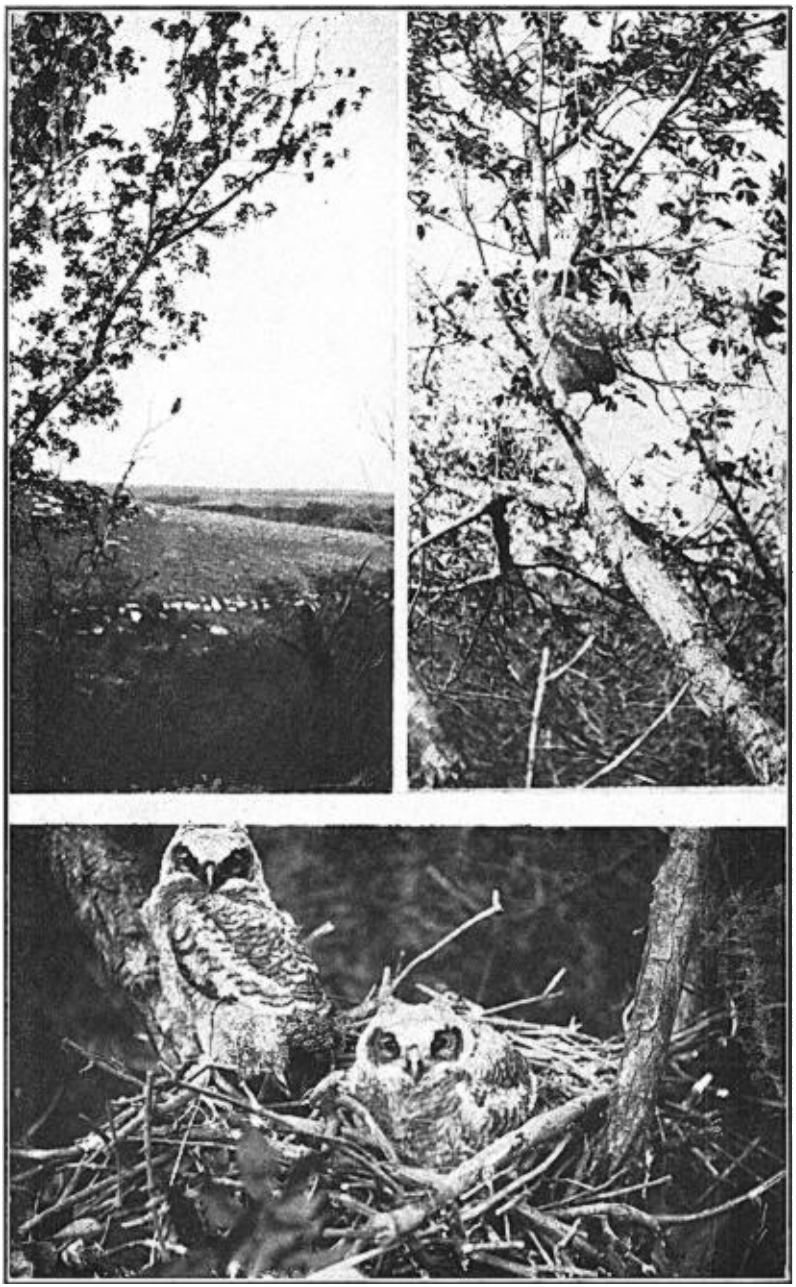
From April 7 to May 15, practically without break, daily observations were made, either early morning or late afternoon, the ascent to the nest being made with pole climbers, and the evolution of the young watched with keen interest.

On May 2, a catastrophe that threatened to be of major pro-



GREAT HORNED OWL.

1. THE ORIGINAL NEST.
2. THE RECONSTRUCTED NEST, WITH BIRD VISIBLE.
3. YOUNG, THREE AND A HALF AND FOUR AND A HALF WEEKS OLD. PRAIRIE CHICKEN AT RIGHT.



GREAT HORNED OWL.

1. FAVORITE OBSERVATION PERCH OF ADULT.
2. PREPARED FOR FIRST FLIGHT.
3. YOUNG, SIX AND SEVEN WEEKS OLD.

portions overwhelmed the family. Two soldiers casually riding by on horseback along the rim rock espied the young, now grown large and bold and sitting up prominently in the nest. One of them ascended the tree, threw one of the Owls to the ground, tore the nest out of the tree and carried the other fledgling down clinging to his coat sleeve. Having photographed the pair they were about to dispatch them,[1] when by an extraordinarily fortuitous chance the only other officer, Major C. C. Hillman, to whom I had shown the nest, rode by and rescued them. He brought them in to me and I hastened out to the nest tree in an effort to rehabilitate the family.

Nothing was left of the original nest, not a twig in the tree. It then seemed feasible to remove one of the other large Hawk nests and replace it in the nesting tree. Consequently one was tied with ropes, lowered to the ground and carried up to its new position where it was securely lashed. This was not done without considerable material damage to the nest, necessitating several trips up and down the tree for reinforcing twigs as well as bark and grass to line the interior. About two hours were consumed in this precarious labor at the end of which time my respect for avian architects in general and this one in particular was prodigious.

During this time the two nestlings sat on the ground beneath the tree and watched the entire procedure interestedly with their great yellow orbs fastened on the nest. Occasionally they stretched their wings in a contented manner or walked around slowly. They were then replaced in the nest. There was no protest on the rough passage up but immediately on being replaced in their new home rewarded this kindness by thankless hissing and aggressive hostility. No adults were seen during this entire performance, the outcome of which appeared dubious. An inspection the next morning, however, showed the young to have been fed and the life of the family continued on the even tenor of its owlish way. To guard against another such mishap an order protecting the nest was obtained from the Commanding General of the post.

[1] In this regard it is interesting to note the remarks of E. H. Eaton, Birds of New York 1914, page 124, to the effect that it is now almost impossible for Great Horned Owls to raise a family in an open nest, due to the almost certainty of destruction.

*The Nests.*—The hygiene of the nest was poor, but odor due to rapid desiccation was surprisingly little. Pellets of fur and feathers, fragments of bird and mammal bones, carcasses, corn and insect remains from the intestinal contents of prey, together with the excrement of the owls themselves, carpeted the floor of the nest and gradually sifting down through its interstices formed a dense matted nucleus.

The dry grass lining of the new nest was not welcome and was soon disposed of. The inside rapidly accumulated a flooring of ejecta.

*Behavior of the Adults.*—An unsuccessful attempt to climb the tree, in full uniform and boots, was made on its discovery. From the action of the adult and the fact that later it was possible to see the young in the nest, it was judged that the nest contained unhatched eggs. The incubating adult remained on the nest until ascent of the tree had commenced, when it flew very quietly into the woods to return promptly when the tree was left. It was seen to gently arrange the eggs and settle down on them while being watched, in full view, from a distance of about fifty yards.

The first part of April was marked by a blizzard and snowstorm and the Owls were not visited until the 7th of this month. One adult was standing on the edge of the nest but flew as the tree was approached.

It was possible to drive an automobile over the hills to the edge of the canyon. An adult could be seen on the nest each time with binoculars, but it soon came to recognize the car and flew at increasingly great distances. The last time one was observed at the nest was on the 15th of April, when it was seen to leave while the automobile was still a full half mile away. Thereafter so acute was the Owl's vision that the sound of Crows mobbing it on the far side of the canyon was the only sign that it had flown.

As the tree was climbed one or both adults usually returned to the immediate vicinity, in response to the cry or beak snapping of the young, and hooted softly. They were readily distinguishable by the hoots, as one had a higher pitched and shorter call than the other. This bird was very much more aggressive than

its mate, often coming into an adjoining tree to glare and hoot and frequently swooping at me, snapping its mandibles like castenets. A favorite position was the top of a dead tree about fifty yards away where it sat and watched the nest alternating this with rotating the head in a general reconnaissance (Pl. IV, fig. 1).

Rarely neither adult was seen and it was noted that this occurred on days of high wind. Occasionally only one appeared and this invariably the more aggressive. On one occasion the mate was missing five days but thereafter appeared almost daily. After the young were somewhat grown the adults did not occupy the nest tree but remained in concealed positions in the woods where they were often found after a quiet approach. On one such occasion both were found evidently fast asleep, as they remained in the trees motionless until approached to within fifty feet when they were startled by a noise and left precipitately.

On flying, both adults would soar out of a tree close to the ground and rapidly disappear among the trees in a most inconspicuous manner.

Call notes were the familiar hoot and an anxious imperative nasal grunt best represented by one of the French nasal sounds as that for the syllable *ain* or the symbol *ē*. The clapping of the beaks of the young usually brought an echoing clap from the adults and this sound from the depths of the woods was often the first hint that the old ones were about. Both parents were faithful and solicitous and showed great concern for the welfare of their progeny.

*Crows.*—Crows were nesting in the other forks of the canyon and the appearance of the owls was a signal for merciless mobbing that went on day after day. On crossing open areas, with the owls flying low, Crows delighted in diving on their backs between the wings and giving vicious pecks. When in a tree the owl kept its gaze fastened on its tormenters and would clap its beak and raise its feathers in a threatening manner on too close approach. Crows never molested the young as was suggested by Holland,[1] although they were repeatedly observed to fly directly over the nest. So characteristic a note was the Crow call that a

[1] Holland, Harold M. Who Would Have Thought It of Bubo. Bird Lore, Jan.–Feb. 1926, Vol. 28, No. 1, pp. 1–4.

second Bubo nest was found in a distant canyon later in the season through this means.

*Growth and Development of the Young.*—The growth and development of several young Great Horned Owls has been painstakingly described by Reed.[1] The evolution of the two nestlings followed along similar lines but was very much faster, no doubt due to the fact that normal conditions prevailed throughout.

When first observed (April 7) both young were in soft white down plumage without feathers, although unsheathed pinfeathers were just beginning to appear in the wings. They were weak and helpless and unable to raise their bodies from the floor of the nest. One was considerably larger than the other. The irides were olive brown, pupils clouded and white and the abdomens inordinately large. The weight was not more than a few ounces each and from the appearance it was judged that they were about four and eight days old respectively.

Growth was remarkably fast in the first two weeks of observation. On the 11th, or four days after discovery, they weighed eight and fifteen ounces respectively. They could almost be seen to grow and within three more days (April 14) had increased to thirteen and twenty ounces and had begun to unsheath a few feathers on the back and wings so that the white nestling down was slowly being replaced by a soft ochraceous buff fluffy plumage. About this time the larger began to show faint tufts in the place of the horns. Thereafter plumage and growth developed more slowly, the smaller one being a few days behind until later, when imperceptibly it was observed to have overtaken its nest fellow.

By the 29th of April the larger Owl had unsheathed its wing feathers to about two inches, while the tail feathers were approximately one and one-half inches in length. The smaller one had wing feathers an inch to an inch and a half long, while no tail had as yet developed. They were still unable to get around much and had not left the nest at any time to perch on the branches of the tree. On this same date, however, a well grown Bubo was caught in another canyon that was nearly fully developed

[1] Reed, Bessie P. Growth Development and Reactions of Young Great Horned Owls. Auk, Vol. XLII, No. 1, Jan. 1925, pp. 14–31.

and that confirmed my opinion that the pair under observation were from a rather late nesting. This new bird was well able to fly, measured eighteen inches in length, forty-seven in spread, weighed 1335 grams (approximately forty-six ounces), and had well developed tail and wing feathers in marked contrast to the nestlings.

On May 2, the date of the destruction of the nest, when the fledglings were the estimated age of four and four and one-half weeks, the physical status was as follows: The larger weighed thirty-six ounces, spread thirty-six inches, and measured fourteen inches in length. The smaller weighed two pounds, spread thirty-three and one-half inches, and was twelve inches long.

The iris gradually took on more yellow and the pupil cleared up, although there was still a slightly milky cornea in the smaller Owl at the time of leaving the nest in the middle of May.

The last two weeks in the nest were marked by increase of vigor of the young, together with readiness to wander over the branches of the tree and perch for considerable lengths of time. At the time of the first flight, however, neither the wings or tail were fully developed and it seemed as though this venture would surely fail.

The temperature of the nestlings was interesting. There was a gradual rise from the time of the first observation until the young were ready to fly. In the case of the smaller owl this amounted to an increase of two and four-fifths degrees. All temperatures were taken by rectum. The first temperature recorded for the smaller bird was 102⅕ degrees on April 19 and the last was 105 degrees on May 17. The larger Owl showed a rise from 102⅖ degrees on April 20 to 104⅘ degrees on May 5. This rise in body temperature of these nestling altricial birds coincident with age and development is in accord with a series of some 400 observations made on other species during the current nesting season. The state of body temperature and thermic control is subject to several important factors in nestling birds which constitutes a study of considerable interest. These observations are to be reported in a separate communication.

*Behavior of the Young.*—On the first observation both young were very weak, scarcely able to lift their heads from the nest.

The smaller one made no protest on handling, while the larger snapped its beak in an indeterminate manner. Two days later they both cried on being handled, a shrill rapidly repeated *che che che* to which the adults answered by hooting. It was not until some days later that the characteristic hissing was added to the beak clapping. These early maneuvers were pure bluff, for if a finger was thrust between the beak no attempt was made to bite nor did the claws grip with any vigor. The vision at this time was very poor, no response was made to waving the hand in front of their eyes but both turned instinctively and hissed when twigs were snapped.

Winking of the eyes was produced either with the nictitating membrane or the upper lid at will, frequently with alternating eyes and after each time the pupil rapidly contracted and dilated spasmodically.

The smaller one throughout the nesting period showed less vigor than the larger, and in its younger days crawled shivering under the larger at every attempt to separate them. When put on the edge of the nest both instinctively gravitated to the center. They liked to have the head stroked. This had a quieting influence and caused them to lie down in the nest and become still. On being fed they closed their eyes, stretched their necks to the full extent and gulped.

Later the youngsters took a great deal of interest in happenings on the ground, sitting up prominently to miss nothing and watching the approach to the tree or departure with fixed gaze, moving around the nest for a better vantage point. They were able to discern a human and follow his motions for at least 200 yards. As the ascent to the tree was commenced they both invariably started clapping their beaks and occasionally peered over the edge of the nest to watch the procedure. On being handled with any firmness they usually cried.

April 24 was a stormy day, the nest swayed tempestuously in the wind while the owlets crouched low. Two weeks later another windy day occurred, but this time the more vigorous young sat up prominently and shook out their feathers, rocking in the wind in evident enjoyment.

The instinct for self-defense gradually became more definitive

GREAT HORNED OWL.

1. YOUNG AT REST.
2. FIRST DAY IN NEW NEST.
3. HOSTILE ATTITUDE.

so that the nestlings came to rush across the nest and strike viciously with the bill or if caught to flop on the back and clutch powerfully and painfully with the claws. In order to be more terrifying a very impressive attitude was struck with wings raised and feathers spread (Pl. V, fig. 3). They never failed to resent the daily intrusions and became fiercer with increasing age.

A few days before leaving the nest they would very deliberately walk out on a limb as the tree was climbed, teeter uncertainly on the slender branches and hop insecurely across to others in a most distracting manner. On several of these occasions the smaller developed a new call, a faint *yeep yeep* much like that of a small chicken and possibly the same note referred to by Reed as having appeared at four to five weeks of age. While in the nest they usually sat on their hocks with claws closed. When perching it was noted that instead of three toes directed forward one was in its reversed position so that there were two directed backward.

*Food.*[1]—An unusual opportunity was presented to follow the daily fare of the young, to make an estimate of the food requirements of these large owls and the amount of destruction to life indulged in. A very varied diet was consumed. In the beginning the partially eaten bodies of the prey were found daily in the nest. As the demands of growth increased, however, only a few bloody feathers, fresh bone fragments or drops of coagulated fresh blood were left to give mute evidence of the night's repast. In every instance the body was devoured commencing with the head. Consumption was complete, including such indigestible fare as rabbit skulls and ducks feet—on all of which the young Owls throve vigorously.

The following menu is a record of the fare indulged in as found in the nest. This represents the minimum requirements, as there was reason to believe that on some of the days on which no food is recorded the young had actually entirely devoured the night's repast as was evidenced by a few drops of fresh blood or bits of stray feathers and fur not present at the previous inspection.

[1] See also The Food of the Western Horned Owl. H. H. Pittman, Bird Lore, March–April, 1925, Vol. 27, No. 2, pp. 92–96.

Only when parts of a carcass were positively identifiable as new was it recorded as such. Dates listed below are inclusive and indicate the length of time taken to consume the major portion of a given carcass. There was naturally a little overlap so that frequently a new body was found in the nest while the feet of the previous one was still uneaten.

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|---|---|
| April 9 and 10 | Blue-winged Teal (*Querquedula discors*), female. The river was full of migrating ducks. |
| April 11 and 12 | Cottontail rabbit and feet of teal. |
| April 13 and 14 | Cottontail rabbit, fresh. (Pl. I, fig. 3.) |
| April 15 | Mallard (*Anas platyrhynchos*), male. (Pl. II, fig. 1.) |
| April 16 | No visit. |
| April 17 and 18 | Cottontail rabbit. |
| April 19 | Cottontail rabbit, fresh. |
| April 20 | Three gophers. |
| | One Mourning Dove (*Zenaidura macroura carolinensis.*) |
| April 21 | No food. |
| April 22 | Cottontail rabbit. |
| April 23 | One large gopher. |
| April 24 | No food—stormy day. |
| April 25 | Prairie Chicken (*Tympanuchus americanus americanus*). (Pl. II, fig. 2.) |
| April 26 | No food. |
| April 27 | Two small cottontail rabbits. |
| | One large gopher. |
| April 28 | Small domestic chicken. |
| April 29 | Coot (*Fulica americana*), female, body without head or wings. |
| April 30 | No food. |
| May 1 | Introduced a freshly killed rabbit early in the morning which was received with relish. |
| May 2 | Legs of rabbit remain. |
| May 3 | New nest. Fresh coagulated blood in floor of nest. Unable to identify source. |
| May 4 | Cottontail rabbit—fresh fragments—pelvis. |
| May 5 | Cottontail rabbit—fresh skull. |
| | One-half pound of beef left in nest and this was also eaten. |
| May 6 | Cottontail rabbit—fresh forelegs. |
| May 7 | Cottontail rabbit—fresh hindquarters. |
| May 8 | No visit. |
| May 9 | No food. Floor of nest littered with many grains of partially digested corn possibly from the crop of a domestic chicken. |

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|---|---|
| May 10 | Cottontail rabbit—hindquarters. |
| | Coot—many feathers. |
| May 12 | Mourning Dove—many feathers. |
| | Cottontail rabbit—fresh vertebrae. |

In this period of approximately five weeks there was, therefore, the following total recorded:

| | | | |
|---|---|---|---|
| Rabbits | 14 | Doves | 2 |
| Gophers | 5 | Prairie Chicken | 1 |
| Ducks | 2 | Domestic Chicken | 1 (2?) |
| Coots | 2 | Beef, one-half pound | |

*Leaving the Nest.*—Early on the 15th of May, as the automobile drew up at the edge of the canyon, the larger fledgling gravely vacated the nest and deliberately walked far out on a limb where it sat and calmly watched me as the usual inspection of the nest was made. The younger bird remained in the nest and showed the usual hostility to these intrusions. The older Owls were mobbed by the Crows which unwittingly came very close as I was hidden in the branches of the tree. They made off very rapidly on discovering my presence. As I left the tree the adult Owls also disappeared. The owlet out on the limb showed no signs of returning to the nest but suddenly became very restless and hopped from branch to branch circling the tree. It then abruptly and boldly launched into the air and flew waveringly to a tree some thirty yards distant, where to my surprise an adult, having returned from its retreat, was leaning far out from a branch encouraging the attempt with great solicitude.

By mid-afternoon the smaller Owl had left the nest and was sitting disconsolately alone in the outer branches of the tree. Next morning this one also had made its initial flight.

The young were observed, in company with the adults, a number of times subsequently. In six days they were one-quarter of a mile from the home tree and were in the opposite fork of the canyon. Within eleven days they were capable of remarkably sustained flights.

The hand of man is against these magnificent birds because of their destructiveness, which is in point of fact far less than that of their accuser and the greatest destroyer of all—man himself. It was, therefore, a real satisfaction to see this family fulfill its destiny in growth and maturation.

*Supplementary.*—Another young Owl about eight weeks old was captured April 29 and held for study.

The Great Horned Owl has been characterized, with certain exceptions, by Dr. A. K. Fisher as untamable. Two Owls of Dr. Coues were gentle and quiet and other cases have been recorded, such as the female Great Horned Owl reported by Holland[1] that for many years has been kept in captivity, raising an annual brood of domestic chickens in defense of which she is very fierce but which during other seasons of the year is complacent and tame if not affectionate. Another tame Owl is reported by Coleman.[2] Others[3,4] have made the attempt with varying degrees of success. My Owls proved to be very fierce throughout the period of observation.

The captive spurned all advances and remained as fierce and untamable on the day of its release after four weeks of care as on the day of capture. It would unhesitatingly attack animals many times its size; one could not but admire such an unfettered and audacious spirit.

It was kept in a dark room but preferred the light and was to be found sitting on the window ledge most of the day or on top of a high cabinet where it spent many morose hours. The chief method of defense was with the powerfully curved beak supplemented by the talons in close infighting. When the Owl heard anyone approaching it responded by rapid clapping of the mandibles, later ruffling the feathers of the wings over the back and hissing and finally, as the intruder came close enough, by vicious slashes with the bill that were capable of penetrating to the bone of a finger. If the wings were tied the Owl threw itself on the back and struck with its talons with a grip commensurate with that of a strong man. One can appreciate how inexorable is the issue when this silent death, drifting through the night on muffled wing, closes with steel-springed claws on the hapless

[1] Holland, Harold M. Who Would Have Thought It of Bubo. Bird Lore, Jan.–Feb. 1926, Vol. 28, No. 1, pp. 1–4.

[2] Coleman, Dell. Billy a Great Horned Owl. Bird Lore, Nov.–Dec. 1921, Vol. 23, No. 6, pp. 293.

[3] Baerg, W. J. Trying to Tame a Great Horned Owl. Auk, April, 1926, Vol. 43, No. 2, pp. 214–217.

[4] Reed, Bessie P. Growth Development and Reactions of Young Great Horned Owls. Auk, Jan. 1925, Vol. 42, No. 1, pp. 14–31.

victim. If the feet were tied together and the wings free the Owl, like the shorn Sampson, lost its pugnacity and became passive. It could then be readily handled and weighed, nor did it attempt to escape. The strength of the Great Horned Owl is remarkable, exceeding that of Hawk or Buzzard, and it has been recorded[2] to have partially lifted a collie dog from the ground and carry it for some distance.

The weight of my bird at the time of capture was 1335 grams, increasing to 1480 two weeks later. Length was eighteen inches, spread forty-seven inches. The respiratory rate was forty per minute and the cardiac rate was 239 to 253 beats per minute as taken by a stethoscope to the chest wall. The variations in the pulse rate were very rapid, the response to external stimuli being extremely sensitive. The arrival of a newcomer in the room caused instantaneous acceleration with almost as prompt a remission without a movement on the part of the Owl.

The oxygen requirements of birds with their great activity, high temperature and consequent rapid body metabolism must of necessity be greater than that of other warm-bodied animals, including man. It is of interest, therefore, to investigate the oxygen-carrying units of the blood. Contrary to expectations the erythrocytes were far less in number per cubic millimeter than in man, being approximately 2,500,000 or one-half the number found in humans. The red cells were of course nucleated and very resistant to hemolysis. Two per cent acetic acid or twice the strength required to dissolve the blood of man had no effect.

The appetite of this Owl was good, one meal a day was consumed regularly. No gentleness or tractability was shown even at this time, but when the meat was offered on an instrument a ferocious attack was launched at the approaching object which often dislodged the food. After getting a taste of the meal the subsequent morsels were accepted more quietly and with some show of relish, the bill being clapped with gusto after each mouthful.

After four weeks of fruitless endeavor to tame the Owl it was banded with number 419471 and released, May 26, at the site of capture.

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