Dues for 1938

ANNUAL DUES FOR 1938 ARE NOW PAYABLE

This is the Treasurer's first notice to all members that dues for 1938 are now due and payable to the Treasurer,

Mr. Samuel E. Perkins, III,
709 Inland Bldg.,
Indianapolis, Ind.

You are earnestly requested to remit at your earliest convenience, thus saving postage to the Club and much time to the Treasurer. A receipt will be returned only if requested.

Life Members	**$100.00**
Sustaining Members	**$5.00 Annually**
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The Club suffers a considerable loss each year by members dropping out without notifying the officers. In order to avoid this loss it seems necessary to restrict the mailing list of the BULLETIN to paid up members. However, members who find it inconvenient to remit before March may receive the March number by sending a card to the Editor indicating intention to continue membership. The Club values the support of every member, and every resignation is received with regret.

Members who may wish to assist the Club may bring the WILSON BULLETIN to the attention of the local Library or High School. All additions to our subscription list will aid in making a larger magazine.

In behalf of the officers of the Club the WILSON BULLETIN extends the greetings of the Season to all of its readers.

THE
WILSON BULLETIN

A Quarterly Magazine Devoted to the Study
of Birds in the Field
and the Official Organ of the

WILSON ORNITHOLOGICAL CLUB

T. C. STEPHENS, *Editor*

Volume L
1938

Published Quarterly
by the
WILSON ORNITHOLOGICAL CLUB
at
Sioux City, Iowa

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The Wilson Bulletin

A Magazine of Field Ornithology

Published by the
Wilson Ornithological Club
Sioux City, Iowa

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THE WILSON BULLETIN

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THE WILSON ORNITHOLOGICAL CLUB

Founded December 3, 1888. Named after Alexander Wilson, the first American ornithologist, and called the "Father of American Ornithology".

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THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY
Published by the Wilson Ornithological Club

Vol. L MARCH, 1938 No. 1

Vol. XLV (New Series) Whole Number 183

A STUDY OF THE HOME LIFE OF THE EASTERN BELTED KINGFISHER[1]

BY HENRY MOUSLEY

The present study of the Eastern Belted Kingfisher (*Megaceryle alcyon alcyon*) was made on the same ground as that of the Black Duck (*Anas rubripes tristis*)[2] in 1935, except that the position of the nest was to the north of the two large meadows mentioned, instead of to the south, as in the case of the Black Duck. In addition, the obstacles now encountered were far greater than those described in 1935, to say nothing of the length of time involved in watching, rather over ten weeks instead of four. To commence with, the birds had selected for their home the north bank of the most evil smelling stream it has ever been my misfortune to sit near, my hiding place behind a large tree being only thirty-five yards from the nest, and much nearer to the stream which made a bend at this point. In addition two large dumps, in the making, lay to the north and east of the nest, which was approached by several footpaths across the meadows. Two of these paths unfortunately passed in close proximity to the nest, and were used by men, women, and children whilst carrying old iron and other scrap materials from the dumps to their homes on the west side of the meadows. The boys, as might be expected, proved the greatest menace, since they persisted in loitering near the stream with their loads, climbing trees, lighting fires, shouting, and making things generably disagreeable, not only for myself, but for the birds as well, which fortunately were afraid to enter their nesting hole whilst they were about. Add to all this the fact that the nest had to be opened up at various times for the inspection of the young, and it is little short of a miracle how it escaped detection for over ten weeks.

The nesting site already mentioned was on the north bank of the stream, the entrance hole, Fig. 1, being three feet above the water level, and one foot below the top of the bank, which at this point was

[1]Read by title at the Annual Meeting of the American Ornithologists' Union, Charleston, S. C., November 17, 1937.

[2]Birth of a Black Duck Family, Auk, Vol. LIII, No. 4, 1936, pp. 377-80, 2 pls.

overshadowed by a belt of large trees on eaeh side of the stream, Fig. 2. There were no coek-burrows as are sometimes made by the male. I first diseovered the hole on May 11 (1937), the day on which boring operations were eommeneed, the hole on that day being excavated for about ten inehes, whieh length had been inereased to three and a half feet by May 16. This beame the total length of the burrow which was determined, possibly, by a large stone on the righ-hand side—as I found out later on. At this date I had some diffieulty in pushing a thin stick to the end of the burrow, the birds not having as yet bored out the hole to its full diameter of four inches, or eleaned out the soil they had loosened. This, as near as I eould tell, was eompleted by May 23, and the six eggs laid between that date and May 31, the day on which I judged incubation to have eommeneed, and whieh lasted until June 23, a period of twenty-four days, before the young hatched. On that day I was only able to spend about an hour at the nest, during which time the young were fed on an average of onee in every nine minutes, and this by the male alone. Meanwhile the female brooded the young, and left the nest only after the last visit of her partner. The day following, however, I spent seven hours at the nest, during whieh time the young were fed twenty times, or on an average of onee in every twenty-one minutes.

On one oeeasion the male remained five minutes in the nest after feeding the young, and on another, the female lingered for seven minutes, during which times it is possible the young were brooded by each parent. On one oecasion, they were both absent from the nest for sixty-one minutes. During the next two days I spent eleven hours with the birds, five on the 25th, and six on the 26th. The young were then fed thirty-three times, or on an average of once in every twenty minutes. On both these dates the parents were never in the nest for more than two minutes at a time, brooding apparently being practically abandoned. Twiee on June 26, both parents together were absent from the nest for ninety-seven minutes at a time. Up to this point it had struck me that the male was the most attentive as regards feeding his offspring, and I had ample proof of this on the 26th and again on July 4—referred to later on. On the former date, the feeding grounds of the male lay to the left, and those of the female to the right of the nest, and no deviation of this rule was made during my six hours of watehing, the male feeding on thirteen oecasions, and the female on five only, out of a total of eighteen.

It was on this date also that an amusing incident took place, when three cows came and stood up at the edge of the bank right over

Fig. 2. General view of Kingfisher Environment.

Fig. 1. Nesting Hole of the Belted Kingfisher.

the nesting hole, whilst two others contented themselves by lying down also right across the tunnel and nesting chamber. At first I thought of driving them off, but luckily decided to leave them alone and see what would happen on the return of the parents, both of which came back together. What happened then I shall not readily forget, as they made the grove ring with their united rattlings, so much so, that I was afraid the noise would attract some of the boys. First one and then the other would fly directly almost to the mouth of the hole, but instead of entering it, would rise up suddenly and fly over almost touching the backs of the three standing cows, in an endeavor to frighten them away, whilst rattling all the time to show their displeasure at this intrusion of their home ground. Thinking the noise might attract undesirable visitors, and seeing the birds would not enter the hole, I drove off the cows, when peace reigned once more and feeding operations were resumed. Later on, one of the cows decided to return and lie down right across the nesting chamber, and I let it remain to see what would happen. The birds on their return paid no attention to it whatever; so it must have been the three standing cows at the very edge of the bank and right above the entrance hole that annoyed the birds, and caused all the commotion in the first instance.

Regarding the approach to the nest, the birds would always give notice of their coming by a series of the well known rattling notes—which could be heard a long way off—before alighting on one of four perches in the grove of trees, prior to entering the nesting hole. Unfortunately, the favorite perch was not visible from my "hide out", so I lost many opportunities of exact sex determination, the birds entering and leaving the hole, always head first, so quickly that it was perfectly impossible to make sure of their sex, notwithstanding the fact that the female in this species, contrary to the general rule, is brighter colored than the male, having a second band (rufous) across the breast. The approach to the hole was always direct from whichever perch they happened to be on, except on one or two occasions which will be referred to later. But the exit, without exception, was always in the same direction, to the left flying low, just above the water, and round the bend of the stream (Fig. 2) out of my sight, after which they would rise up giving vent to their rattle as they left for the fishing grounds. When alighting on the perches and suspicious, the birds went through a nervous form of motion, best described as a slowly heaving up and down of the body with crest erected, not a rapid bobbing up and down motion like that of the Spotted Sandpipers.

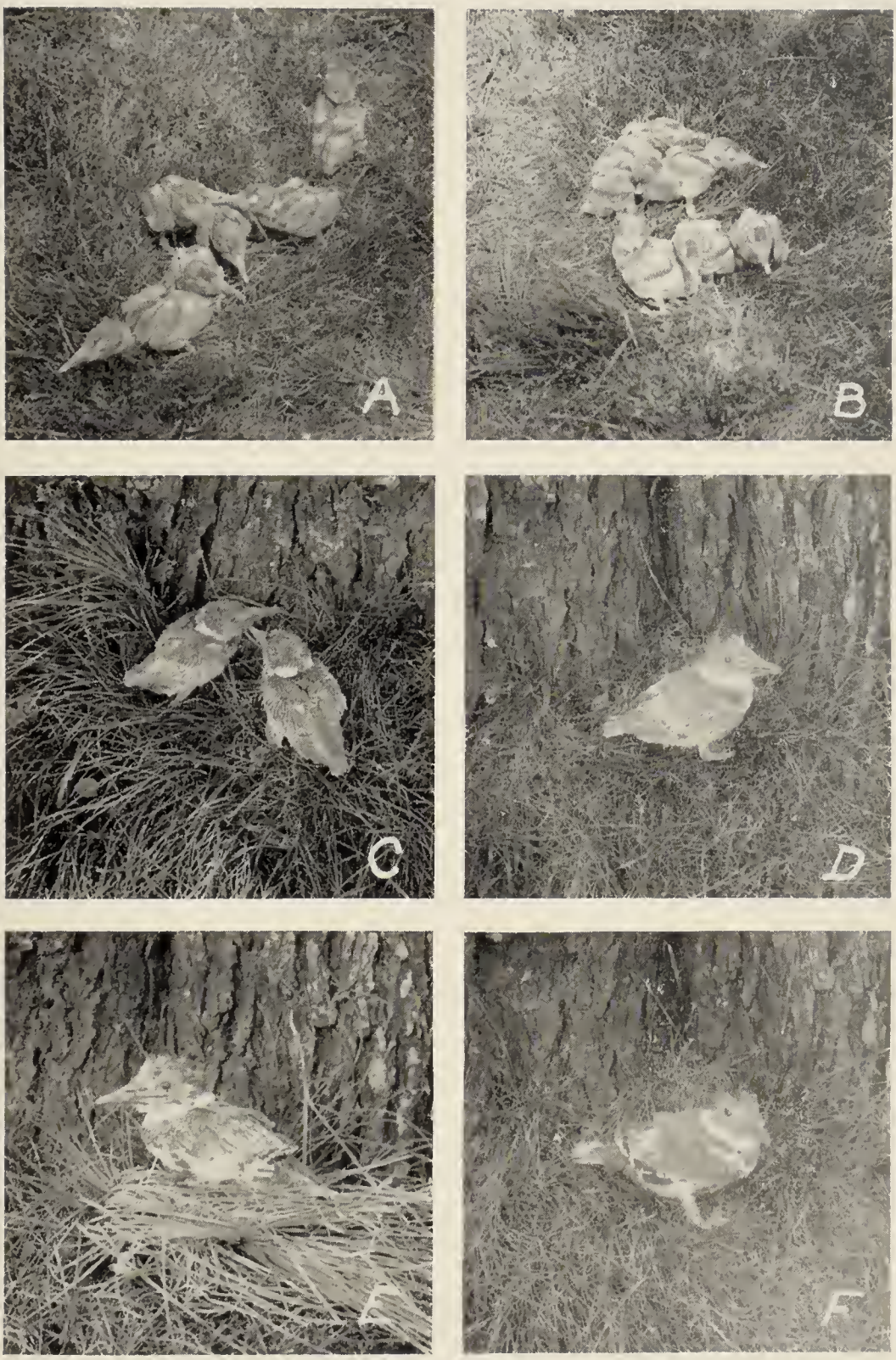

FIG. 3. Belted Kingfisher Nestlings. A and B, seven days old; C, 13 days old; D, 17 days old; E, 20 days old; F, 23 days old.

On June 28 I decided to see how late they were feeding the young, so remained at the nest from 6:15 to 8:30 P. M. (standard time). During this time the young were fed on nine occasions, or on an average of once every nine minutes. It was on this date towards the end of the sitting, when it was so dark I could hardly see the hole, that one of the birds—I think it was the male—flew low and directly up stream round the bend and subsequently perched on a large stone in the stream nearly opposite the nest, and from there entered the hole. This procedure was reverted to only on one other date, July 4, when the male instead of coming directly up stream and alighting on the stone, first flew to one of the four perches in the trees, and from there to the stone, and then into the nesting hole. This was in the morning, however, and not at night.

On June 29 I spent a little over three hours at the nest, two in the morning, and sixty-seven minutes in the afternoon, during which time the young were fed seventeen times, or at an average rate of once in every eleven minutes. Up to this point, I had spent nearly twenty-five hours at the nest, and had seen the young fed ninety-one times, or at an average rate of once in every sixteen minutes. The male had been definitely identified as feeding the young on twenty-one occasions, and the female on twelve. It was on this date, June 29, that with the help of Mr. J. D. Cleghorn, we opened up the nest for the inspection of the young, a somewhat hazardous undertaking, and one that had to be done as quickly as possible, in view of all that has been said regarding the risk of detection.

In view of the length of the hole (three and a half feet), we decided to cut out a sod about twelve inches square and six inches deep, one foot from the face of the bank, and then dig down to the hole. Arriving at this, we were able to push our arm to the end of the nesting chamber, which was roughly nine inches in diameter, the top being only six inches below the surface of the ground, and in which were found six young. Before replacing the sod, two pieces of sheet iron had to be placed over the top of the hole, the one nearest the nest bent upwards for half its width to prevent the soil which then had to be placed on top, from getting into the nesting chamber, the roof of which was five inches higher than the burrow. The sod could then be replaced at its proper level and easily removed again at any time we wished to examine the young. This device worked well and was never discovered by anyone although the nest was opened up some ten times. Moreover, it stood the full weight of cows both standing up and lying down—as will be seen later. As mentioned, the nest

contained six young, which as near as I could judge were seven days old. They were banded by my friend, a proceeding which, considering their somewhat tender age at this date, may, or may not, have been responsible for the dire disaster which came to light the next time the nest was examined.

At the present juncture, the state of the young reminded me very much of my experience when photographing the young of the Black-billed Cuckoo (*Coccyzus erythropthalmus*)[3] in August of 1930. They were naked, lacking even the natal down so characteristic of most young birds, and like young cuckoos they omit the juvenile plumage, the first feathers being those of the adult birds which, however, do not appear nearly as early as in the case of young cuckoos. The feather sheaths also do not break open until the feathers have nearly matured (about seven days in the case of young cuckoos) and their bodies in consequence seem to be incased in what has been described as coats of mail, (Fig. 3, A and B) referred to by some as the porcupine stage. They seemed to object to the light and shivered a good deal as they crawled about when placed on the grass. After taking their pictures, which show the feather-tubes and tracts, they were replaced in the nest and were not disturbed again for five days, or until July 5. I visited the site, however, the day previous, staying nearly two hours, during which time the young were fed five times, entirely by the male as already intimated, or at an average rate of once in every twenty-one minutes. I might here mention that from June 28 to the present date, and in fact to the end of the study, the exits and entrances of the parents to the nest were so rapid that it would have required a stop watch in order to have recorded them accurately, as they rarely exceeded fractions of a minute. We will now revert to July 5, the day on which the nest was opened up for the second time—a sad event. Four of the six young were found to be dead, with one of the remaining two not in very good condition. The nesting chamber naturally was in a dreadful condition, the smell from the dead birds and the unconsumed food being almost unbearable, and it is a wonder the remaining two were still alive. But they had grown out of the porcupine stage into one more resembling a feathered bird (Fig. 3, C). Apparently the four dead ones had not survived very long after their last replacement in the nest, there being no signs of any development in their case. After thoroughly ventilating and cleaning out the nesting chamber and tunnel, the two remaining young were replaced in their home,

[3]Reminiscences of the Home Life of the Black-billed Cuckoo, Canadian Field Naturalist, Vol. XLV, No. 4, April, 1931.

with grave fears as to one of them, at least, being able to pull through. These fears were well grounded, as on again visiting the nest four days later, July 9, we noticed one dead bird at the edge of the stream. Either it had come to the mouth of the tunnel and fallen out, or else the parents had removed it. On opening up the nest, however, we were glad to find the other youngster, now seventeen days old, in fine condition, having developed considerably, and with every prospect of eventually reaching maturity. Most of the feather shafts had partially split (Fig. 3, D), the plumage now being comparable with that of the Black-billed Cuckoo at seven days old.

Three days later, July 12, things were still going well (Fig. 3, E), and this was the case on July 15, the day on which we first heard this youngster, now twenty-three days old, give vent to its rattling call; up to then no sound had been made upon its removal from the nest. Several of the sheaths to the primaries had split for at least half of their length, and the tail was also developing nicely (Fig. 3, F). From now onward to the end of the study I had to do without the help of Mr. Cleghorn when photographing—no small matter when a lively young kingfisher was concerned. Four days later, July 19, when twenty-seven days old, it was almost fully fledged, with the exception that the center portion of the sheaths to the tail feathers had not as yet split, as well as the bases of three of the primaries (Fig. 4, G). It could flutter along the ground but could not yet fly. It rattled the whole time and bit my fingers vigorously. This biting habit is acquired early. I noticed it several times. One of my pictures at the seven-day period shows them biting one another as they huddled together when placed on the grass. The following day it was able to fly a few feet, the centers of the sheaths to the tail feathers, however, were still partly closed; but those of the three primaries had split open (Fig. 4, H and I). It was again very noisy and difficult to pose even for an instant, the instinct of fear having by now become well established. On the day after, July 21, it was still unable to fly far, but had improved a little, and was much quieter, allowing me to get a somewhat uncommon picture (Fig. 4, J). This picture shows one of the wings fully expanded, with all the white pattern clearly defined. Two days later, July 23, was the last time I handled it at the age of thirty-one days, when it made a flight of twenty-five feet or thereabouts. The male parent was on the ground when I arrived, and made a great fuss, flying about and rattling vigorously all the time, to which the young responded. After taking its picture on the ground (Fig. 4, K), showing its syndactylous foot as well as the band, No. 37-404052, on

FIG. 4. Belted Kingfisher Nestlings. G, 27 days old; H and I, 28 days old; J, 29 days old; K and L, 31 days old.

the tibio-tarsus, and another after its flight, when it landed on a large stone (Fig. 4, L), I replaced it in the nest and watched the male come and feed it once. After that the parent perched in a tree for a long time whilst preening its feathers before flying away. The day following the nest was empty, so the parent no doubt had enticed the young out of the nest either after my departure or on the following day, July 24, when it would be either thirty-one or thirty-two days old, as the case might be.

In conclusion, on summing up I find forty-two hours were spent with the birds (May 11-July 24), during which time the young were fed one hundred times, or at an average rate of once in every 25.2 minutes. Of course there were periods when the feeding was much faster, as for instance, once in every 8, 9, 13, 20, and 21 minutes respectively. Sometimes the parents were absent from the nest for long periods of time, such as, 150, 120, 105, 97, 93, 90, 85, 75, 70, and 60 minutes at a time, when of course the young were without food. It was after these long spells that the more rapid feedings generally took place. As already remarked, the male seemed to pay the most attention to this part of the business, for I find of those times when I was perfectly sure of the sex of the parent, the male fed twenty-eight times to his partner's fourteen, or just double. It was the male parent which was the last seen at the nest previous to the departure of the one surviving young—a male. The food for the most part consisted of small fish, crawfish, minnows, tadpoles, and probably beetles. I may say that after the finding of the four dead young, the remains of the uneaten food suggested that some of it was too large, and such a thing as injudicious feeding may after all have contributed to, if it did not actually cause, the early demise of these four youngsters. After the first few days the time the parents remained in the nest after feeding the young could only have been decided by means of a stop watch —so rapid were the exits and entrances of the parents.

And so ended my longest study, lasting as it did from May 11 to July 24, a matter of seventy-four days. And between now and next May I am left wondering whether the birds will come back and occupy the same nesting hole again. Should they do so they will find it all in order, as I cleaned it out thoroughly before replacing the sod and closing it up for the last time. Certainly, for their own sakes, as well as for mine, they will be wise in returning, since so much preliminary burrowing and digging will be spared for both parties concerned.

Montreal, Canada.

THE ALEXANDER WILSON MEMORIAL IN INDIANA

BY S. E. PERKINS III

Hidden for decades in the depths of a wooded ravine on the edge of a lapping brook; shaded both morning and evening by high hills that have been clothed with a delightful primeval forest of hardwoods and have been carpeted for ages with myriads of wild flowers, some of which, like the myrtle, furnish greenery the year round, stands vertically a five-foot pillar of native stone, unhewn except for a legend roughly carved thereon by one who was but an amateur chiselman. Though this legend is almost worn away, by chalking the shallow markings a profile of Wilson with long hair was brought out in life size near the top on the west side. Just below this were the initials, A. W. These letters were made with sweeping curves and were about four inches in height. About five inches below them was the word "Died" on somewhat smaller scale followed, near the bottom of the stone, by the date "1813". All lines of chiseling appeared to have been made with a rounded base chisel and not a pointed one.

Encircling and protecting this block of stone is an iron picket fence some four feet tall surrounding a space with a diameter of fifteen or eighteen feet. Both shaft and fence bear evidence of venerable age. The whole stands far back from even present day roads, near the picturesque entrance to Donaldson's Cave and away from the regular drives in what is now Spring Mill State Park near Mitchell, Indiana. The tract about it was formerly the "Beautiful Shawnee" and afterwards, Donaldson's Woods. Within the enclosure is a painted sign which recites:

In Memory of
Alexander Wilson
Father of American Ornithology.

This Monument Was Erected by
George Donaldson
His Fellow Townsman.

The genius for whom this stone was placed had left Scotland and the weaver's trade to round out in America a studious career. Though he arrived here with little of this world's goods, he first earned his living at teaching English. Soon his ambition to become a naturalist irresistibly asserted itself and untiringly he studied botanical forms and birds. He traveled far and wide in eastern United States between 1808 and 1813. To fix with permanence his knowledge, he painted the wild life specimens he saw afield. Thus he attracted the attention

of men of seience. He, himself, engraved in 1805 some of the plates from which his "American Ornithology" pages were struck. This completed work embraced 276 species of birds with descriptions of them, whieh he offered for sale at $120.00 per set.

He has left some very ereditable poems. In brief, this gentleman, by one and all of these varied aecomplishments, left a deep imprint upon the mind and heart of George Donaldson.

It seems that in September, 1865, George Donaldson, a Seotsman, polite and genteel, after extensive travels, wandered into the hills of Marion Township, Lawrence County, Indiana, where the unusual beauty of his surroundings eaptivated him. He approaehed James C. Lynn, a pioneer in those parts, asking to purehase of him 101 acres. Upon his aequiring the desired ground he named it "Beautiful Shawnee" as it

Fig. 5. Location of the Alexander Wilson monument in Indiana.

Fig. 6. Detail of carving on the face of the monument.

was reported to have been a eamp of that Indian tribe. In the woodland he at once built a home and proeeeded to add to his knowledge of the plant and animal life to be found upon his purehase. As he came to Indiana with a love for wild life, largely the result of the influence of Alexander Wilson, it is only natural that he should have, upon settling down there, promulgated edicts to his caretaker not to permit a snake to be killed, a butterfly to be eaught, or a flower or twig to be broken within his domain. For such an attitude toward nature he became known as an eceentrie. Today he would be called a conservationist. Here this kind soul resided, regularly walking to his Presbyterian Chureh, eneouraging relatives from far distances to become his guests often for as long as a year at a time. Donaldson obtained all that was to be had from his pleasant life of leisure until 1871 when he left Indiana and settled in the State of Alabama.

There is not mueh doubt that his admiration for Alexander Wilson took conerete form in the erection of this monument in 1866, the een-

tenary of the birth of the now celebrated naturalist, now generously and generally known as "The Father of American Ornithology". Wilson had been born in Paisley, Scotland, and died at forty-seven years of age in 1813, two years after Donaldson was born. Some forty years after the demise of Wilson, his influence on Donaldson was yet strong. He was still realizing that his joy in outdoor history of bird and beast was brought to fruition through Wilson's arguments expressed while afield: "From these barren and musty records, the author of the present work has a thousand times turned with a delight bordering on adoration, to the magnificent repository of the woods and fields—the *Grand Aviary of Nature.* In this divine school he has studied from no vulgar *copy;* but from the works of the GREAT MASTER OF CREATION himself; and has read with rapture the lessons of his

FIG. 7. The Alexander Wilson monument in Indiana, with fence enclosure.

wisdom, his goodness and his love, in the conformation, the habitudes, melody and migrations of this beautiful portion of the work of his hands. To communicate as correct ideas of these as his feeble powers were capable of, and thus, from objects, that, in our rural walks, almost everywhere present themselves, to deduce not only amusement and instruction, but the highest incitements to virtue and piety, have been the author's most anxious and ardent wish." . . .

". . . For to me it appears that, of all inferior creatures, Heaven seems to have intended birds as the most cheerful associates of man;

to soothe and exhilarate him in his labors by their varied melody, of which no other creature, but man, is capable; to prevent the increase of those supernumerary hosts of insects that would soon consume the products of his industry: to glean up the refuse of his fields, 'that nothing be lost,' . . ."

I can see Donaldson in my mind's eye, winding through the valley, delighting in its flowers and its bird life, enjoying its butterflies and beetles, and then all at once realizing that it was through Alexander Wilson that this appreciation of such phenomena had been engendered. What he would have missed, thought he, in culture, in understanding, in incentive to seek knowledge of the wild had this love of the outdoors not been his. Should he not in some way honor the memory of his mentor? Could he labor to attest his gratitude to Wilson, then gone to his reward? He would leave a monument in the place that brought him the greatest opportunity to learn of the things he had been inspired to ferret out. The ravine, where stands the shaft, was doubtless chosen thus.

Would that Donaldson had seen fit to remain for the remainder of his long life within the borders of our State. He did not, however. He came to feel that he would, some day, launch out again to learn of other lands, so he never even became a legal citizen of the United States. He had the spirit of a rover and after travels to other foreign lands returned to Ayrshire in his homeland for his last year of life. In September, 1898, he breathed his last and is honored by burial in the Old Necropolis at Glasgow, near where he was born.

Should not our State feel proud that a seventy-year-old monument to the self-taught, gifted Alexander Wilson (perhaps the earliest memorial to be erected in his honor in this whole country) continues to grace one of our most beautiful outdoor temples! It represents a most sincere tribute indeed to Wilson, for no blare of trumpets heralded its dedication, if any there was. It was not erected at a crossroads to conspicuously reflect more credit upon its maker than upon its subject. This was at the time a true, personal tribute. Donaldson's admiration brought him satisfaction through his visits to it where he could in quiet think upon the talents and character of Alexander Wilson, which had been such a stimulus to his own activities. We can not but feel that was the real purpose of the shaft, its conception and its execution.

Donaldson, as did John Lusk in saving the trees in what is now Turkey Run State Park, preserved in pristine wildness with its silva, flora, and fauna, an area out of which has been carved a park of rare beauty. Both these men deserve our unstinted praise.

Now, with the opportunity to visit this monument in the grand park at Spring Mill, we, the public, are pleased to have a share in attesting our admiration for both the nature-loving men, Donaldson and Wilson, whose names are linked with this unique tribute in stone.

Indianapolis, Ind.

THE 1937 WATERFOWL SEASON IN THE PRINCE ALBERT DISTRICT, CENTRAL SASKATCHEWAN.

BY O. C. FURNISS

The 1937 waterfowl season in the Prince Albert district has been far less favorable than those of former seasons. A remarkable decline in the number of broods has taken place even though conditions earlier in the year indicated that a successful season could be expected. Water levels reached their lowest in the fifteen years of observations carried on by the writer and in the lifetime experience of the oldest settlers.

The information in this paper is based on observations carried on during the migration, breeding, and post-breeding seasons on eighty-three sloughs and potholes south of the city. It does not pretend to be exhaustive, but may serve to show the influence of certain factors and the general trend of conditions as they exist in this area.

Locality

The Prince Albert district is on the dividing line between the typical Canadian and Transition Life Zones; and consists of rolling well-wooded country, the characteristic trees being aspens and willows, with numerous small sloughs and potholes. It is adapted to mixed farming and has been settled for the past fifty years. The area has a creek flowing through the middle of it which helped to maintain the level of some of the sloughs much longer than would otherwise have been the case. The locality may be considered as being very favorable for breeding waterfowl.

Water Levels

The water levels in the sloughs in this area depend for the maintenance of their levels upon spring run-off. The amount of water received from rainfall in the summer season does not make up for that lost by evaporation, a poor spring run-off lowers the levels. There has been a tendency toward lower levels for several seasons in the sloughs studied in this paper, but no sudden lowering was noted until the summer of 1936. The first survey of broods was made in 1931 when the area was mapped and the work started; levels at that time

were considered normal. Since the summer of 1934 many sloughs have disappeared except for a short time in the early spring, due to the very dry and hot summers of 1936 and 1937 and poor run-off from spring thaws.

The amount of spring run-off will vary with the snowfall and the coming of warm weather. Early thaws during late February and early March will cause the upper crust of the snow to soften and increase in density. When the total layer of snow has "packed" or increased in density, there will be a run-off at lower temperatures. This spell of warm weather never lasts beyond a few days but the result is always a poor run-off unless there is an added snowfall. When early thaws occur and the snow has become "packed", the winds during March evaporate much of the moisture from the snow even though the temperature may be sufficiently low to prevent any actual run-off. This happened during the springs of 1936 and 1937 and the result has been a tremendous lowering of water levels in this and adjacent areas. If the levels of the eighty-three sloughs and potholes studied were considered to be about normal during 1934, then there has been a complete drying up of at least fifty per cent and, with many, such a change in growth that a stranger would never realize that such places two and three years ago contained sufficient water to encourage Canvas-backs to nest and successfully raise their young.

In 1934 the eighty-three sloughs and potholes in the area contained water throughout the year or until late summer; this year (1937) all had some water during the early spring. Fourteen of these may be classified as "rest" sloughs, that is, while they provided plenty of food and were above average for the district in size, the surrounding cover offered no inducement for the concealment of nests. Large numbers of ducks could be noted on them at all times resting or feeding. During July, 1934, none of these sloughs was over twelve acres, the area being estimated by the amount of open water. Graph 1 shows the normal area in 1934 and the number and size of the sloughs. The decrease in size and number took place so rapidly during July in 1936 and 1937 that it would be impossible to list them in any graph.

Nesting Cover

The cover around the sloughs was listed as "good", "fair", and "poor", from the viewpoint of providing effective concealment for nests. Those listed as "good" had a heavy stand of *Typha latifolia* or *Scirpus validus* in the water and a heavy land cover such as *Scolochloa festucacea*. Those listed as "fair" had either a good stand of cover in the water and none on the land or vice versa. Those listed as "poor"

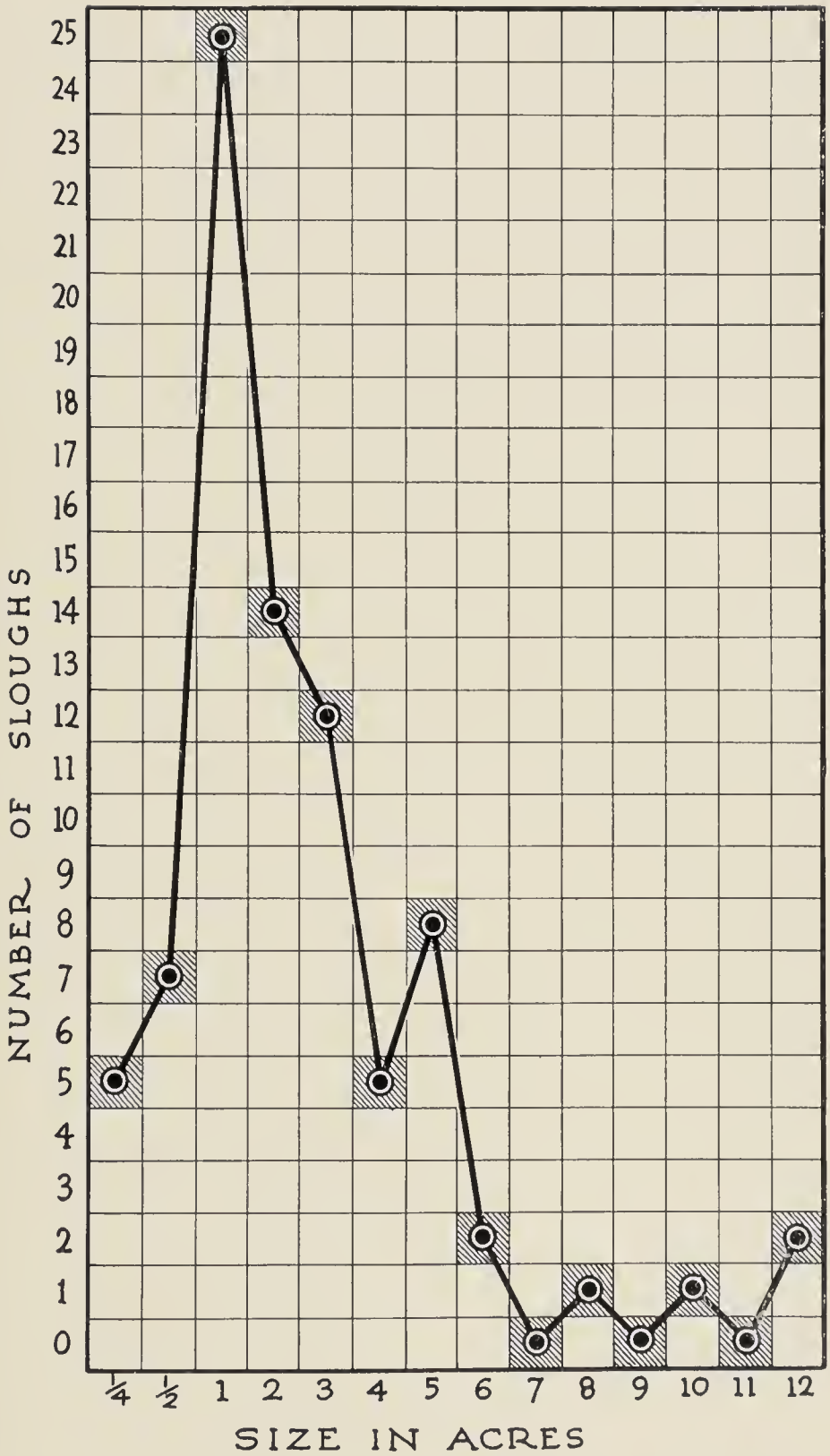

Fig. 8. Graph No. 1, showing the number and size of the bodies of water examined in 1934. Vertical scale indicates the number of sloughs; the horizontal scale, the size in acres.

were deficient in both types, or the growth was so slight that it could not be considered effective in nest concealment.

In many instances those sloughs listed as "fair" had had the land cover destroyed by:

1. Grazing by livestock.
2. Burning by farmers.
3. Mowing for hay the previous summer.

The first two factors are particularly destructive to nesting cover especially for those species of ducks that nest on the uplands. Grazing destroys every vestige of cover on the edges and during dry seasons stock also break down the heavier stands of *Typha* or *Scirpus* in the water. If there has been a dry spring, stock wade through these stands of cover and destroy nests of such species as the Canvas-back and Redhead. Fire destroys mainly the land cover, but if the growth in the water is heavily lodged it will destroy it also. Mowing the land cover does not have the same direct effect; the haying season does not take place until well into July when most species have completed nesting, and if the cover is inadequate next spring, the birds will have a tendency to nest elsewhere.

The sloughs in the area were classified as follows:

Cover Good		Cover Fair		Cover Poor	
No.	Per Cent	No.	Per Cent	No.	Per Cent
22	26.50	42	50.60	19	22.90

Typha latifolia and *Scirpus validus* are the most common cover plants found in the sloughs in this district. Other aquatic plants occur such as various species of *Carex* and in a few sloughs small stands of *Scirpus americanus* may be found. The most common cover on the land edges of the sloughs is *Scolochloa festucacea*, a few sloughs have *Hordeum jubatum* and *Agrostis hiemalis*. *Typha latifolia*, *Scirpus validus*, and *Scolochloa festucacea* are the three most common plants and provide the best growth for effective nest concealment.

During the last two summers these rings of vegetation have been drawing gradually toward the centers of the sloughs as the levels dropped. This fact has given to the casual observer a mistaken idea as to the actual trend of levels and conditions. The layman, in the spring, sees the run-off well up and past last season's growth of *Typha* and the impression is one of good water conditions. If a careful note is taken, it will be found that there are other seasons' growth higher up on the shore to which the run-off never reaches and has not done for several years.

Food Plants

Food plants were noted as being common and ample food was found in all the sloughs examined. *Potamogeton* was very abundant particularly in the rest sloughs. *P. pectinatus* was the most common species although *P. pusillus* and *P. richardsonii* were also present. *Sagittaria latifolia*, *Ranunculus aquatilis*, *Lemma minor*, *Eleocharis palustris*, and *Sparganium eurycarpum* were the most common foods after the *Potamogetons*. *Ruppia occidentalis* was found in one slough.

Observations on Waterfowl: Methods

The area under observation consisted of twenty quarter-sections; and in order to arrive at comparable data on sex ratio and specific abundance the territory was divided into twenty divisions of one quarter-section each. Each division was covered once a week. A map of the whole area was drawn and the sloughs and potholes listed and numbered. A time-table was followed so that each division received the same attention and was examined the same time each week. In each inspection all the ducks on every slough, in the quarter-section to be visited, were listed specifically, sexually, and according to numbers. Ducks noted on adjacent areas were not listed until the time came to study that area. Some of the surface feeders flew up and there was the possibility that they settled on the next slough to be covered. When in the opinion of the observer such was the case, due allowance was made. However, this did not frequently happen as they usually flew to another area. Also out of a total of eighty-three sloughs and potholes it was most unlikely that they would fly to the next particular slough to be visited.

The nests of any ducks that were found were carefully noted as to position, concealment, number of eggs, proximity of possible predators, and numbered. A history of each nest was kept in an effort to arrive at the percentage of hatch for the whole area. Late in July a brood count was taken for comparison with other years.

Spring Migration

The earliest ducks to arrive in the spring reach here about the third week in April, depending upon the amount of open water, and are usually Mallards, Pintails, and some of the mergansers which, however, pass on as open water appears farther north. By the first of May the bulk of the migrants has arrived with the exception of the Blue-winged Teals, Shovellers, and Ruddy Ducks which increase daily. The White-winged Scoter, the last arrival, does not arrive until about May 21 and does not remain to breed but passes on to larger bodies of water.

Breeding Season Population

During the seasons 1935 and 1936 the census to determine the relative and specific abundance, as well as the sex ratio, of the ducks in the area under observation was started on April 27 and followed through until May 17. During the present year (1937) the count was started on May 2 and followed through until May 23. At the termination of this period Mallards, Pintails, and Canvas-backs were nesting in numbers and if the count had been continued would have shown an overwhelming excess of males over females. The work was started a little later this year because during the first two seasons the relative standings of such late arriving species as the Blue-winged Teal and Shoveller could not be determined. Tables 1 and 2 show the results obtained for the season 1937 and the average for the two previous seasons of 1935 and 1936.

Table 1. The average breeding season populations for the two seasons 1935 and 1936 as estimated from counts taken from April 27 until May 17.

Species	Total	Males	Females	Ratio of males to females
Mallard	120.5	73	47.5	1.53—1
Gadwall	3.5	2	1.5	1.33—1
Widgeon	37.5	20	17.5	1.12—1
Green-winged Teal	26.5	14.5	12	1.20—1
Blue-winged Teal	58	33.5	24.5	1.37—1
Shoveller	15	8	7	1.14—1
Pintail	41.5	32	9.5	3.36—1
Redhead	37	20.5	16.5	1.24—1
Canvas-back	127	70	57	1.40—1
Lesser Scaup	437.5	266.5	171	1.41—1
Ring-necked Duck	20.5	10.5	10	1.05—1
American Golden-eye	23	12	11	1.09—1
Bufflehead	13	8.5	4.5	1.88—1
Ruddy Duck	41	28.5	12.5	2.88—1
	1001.5	599.5	402	1.46—1

Table 2. Breeding season population for the year 1937 as estimated from a count taken from May 2 until May 23.

Species	Total	Males	Females	Ratio	Standing
Mallard	118	73	45	1.62—1	Decrease 2%
Gadwall	4	2	2	1.00—1	Increase 14%
Widgeon	51	27	24	1.12—1	Increase 33%
Green-winged Teal	73	42	31	1.35—1	Increase 175%
Blue-winged Teal	145	78	67	1.16—1	Increase 150%
Shoveller	61	32	29	1.10—1	Increase 306%
Pintail	75	44	31	1.41—1	Increase 80%
Redhead	61	31	30	1.03—1	Increase 65%
Canvas-back	133	76	57	1.33—1	Increase 4%
Lesser Scaup	267	163	104	1.56—1	Decrease 40%
Ring-necked Duck	14	8	6	1.33—1	Decrease 33%
American Golden-eye	20	11	9	1.22—1	Decrease 13%
Bufflehead	27	17	10	1.70—1	Increase 106%
Ruddy Duck	56	39	17	2.29—1	Increase 34%
	1105	643	462	1.39—1	Increase 13%

The relatively large increases in some of the later arriving ducks must not be considered as an actual increase over former years because as stated during the present season (1937) the count was started several days later and continued several days longer in the spring. This delay enabled these species to appear in Table 2 in more approximately their real position. The striking feature is the decline in the numbers of Lesser Scaups. This decrease may have been due to a movement farther north than during previous years, but this is only a conjecture as the brood count taken later in the summer (see Tables 6 and 7) showed a corresponding decrease. If, then, the increase of thirteen per cent is closely analyzed, it will be found that there has been no actual increase and possibly a decline. The increase in later arriving species, which have been here every year, will not make up for the loss in Lesser Scaups. The count as a whole, however, shows most species standing up fairly well in this area, particularly the threatened Redheads and Canvas-backs. As mentioned before, this district is very favorable for breeding waterfowl but the surrounding country is poor and ducks are more scarce. If, then, the conditions were so much better here, and they may be considered so, a large increase or a concentration of birds could be expected. Such was not the case, the inference to be drawn is that the scarcity of ducks is greater than generally realized.

Other species of waterfowl were also present for a few days during transit, American and Red-breasted Mergansers, and White-winged Scoters. These birds do not breed in this district and consequently were not included. The Greater Scaup, also, has been noted on rare occasions.

The sex ratio does not agree with that as given by some authorities. These records were derived from fewer numbers but taken from potential breeding birds in their breeding territories.

Many of the Mallards and Pintails had mated before they arrived in the early spring and it was only a very few days before they had established nests. Other species appeared to spend considerable time in pairs before actually nesting. This was particularly noticeable with the Lesser Scaups and the Ruddy Ducks.

Nesting Data

During 1937 histories of sixty-seven nests were obtained and compared with the histories of forty-one nests for 1935.

TABLE 3. Summary of hatched and destroyed nests for seasons 1937 and 1935.

Species	Season 1937 Nests	Hatched	Destroyed	Season 1935 Nests	Hatched	Destroyed
Mallard	18	14	4	15	11	4
Green-winged Teal	....	....	....	1	0	1
Blue-winged Teal	9	5	4	1	0	1
Pintail	1	1	0	1	1	0
Shoveller	2	1	1	....	....	....
Redhead	3	2	1	2	1	1(lost)
Canvas-back	26	22	4	14	12	2
Lesser Scaup	3	3	0	1	1	0
Ring-necked Duck	1	0	1	....	....	....
American Golden-eye	....	....	....	1	1	0
Bufflehead	1	1	0	....	....	....
Ruddy Duck	3*	1	1	5	3	2
	67	50	16	41	30	11

Percentage of hatch: 1937 = 74.33%; 1935 = 73.17%.

*One nest of a Ruddy Duck eventually turned into a community affair.

The agencies of destruction and the percentage of each for the two years are listed in Table 4.

TABLE 4. Agencies of destruction and percentage of each on nests under observation.

Agent	Nests destroyed 1935	Per Cent 1935	Nests destroyed 1937	Per Cent 1937
Crow	3	7.50	6	9.09
Skunk	....	.....	5	7.59
Deserted	7	17.50	2	3.03
Fire	1	2.50	....	.....
Cattle	....	.....	1	1.53
Unknown causes	1	2.50	2	3.03

Fifteen per cent of the total nests were parasitized by other ducks. This was most noticeable with the Redheads and Canvas-backs. The large number of desertions during 1935 may have been partly due to parasitization. Two Mallard nests contained eggs of other ducks (Lesser Scaup and Mallard). Five Canvas-back nests contained either other Canvas-back or Redhead eggs. One contained seventeen eggs of which only eight hatched. Another Redhead's nest contained fifteen Redhead eggs of which nine hatched. Several platforms were found in the dense stands of *Typha* containing several Redhead eggs. One Ruddy Duck nest eventually turned into a community nest with eleven eggs.

The extent of Crow destruction was far less than was at first expected. This may be partly due to the fact that there are far fewer

Crows here than are to be found in a more open type of country to the south. As previously mentioned, the nests were noted as to concealment, judged of course from human standards. With the classification of either "well-concealed" or "open" there appeared to be no difference in the amount of destruction by Crows, one group being destroyed as readily as the other. One nest of a Mallard was built in such a dense mass of lodged growth that the female had difficulty in extricating herself when flushed. This nest was subsequently destroyed by Crows. In marsh growth the Crow seems to work best when the lodged *Typha* or *Scirpus* enables them to walk and climb about, while if the growth is new or standing there appears to be little or no destruction.

During 1935 and 1937 nine Marsh Hawks' nests were found and a close watch kept on the young after hatching to determine if any young ducklings were being fed to them. Several visits to each nest failed to reveal any evidence to indicate that such may have happened.

Around one slough were found three Mallard's nests, one Marsh Hawk's nest, and one Crow's nest, all within a radius of fifty yards. All nests of the Mallards, the Marsh Hawk, and the Crow were successfully hatched. Other instances of close nesting could be related and in each case the duck's nest was successfully terminated.

The season of 1937 witnessed a large increase in the number of skunks and the very low water levels of late June and early July enabled these predators to forage around and destroy nests of Redheads, Canvas-backs, and Ring-necked Ducks.

The average egg clutches, determined by completed sets, for the two years are listed under Table 5.

Table 5. Egg sets for seasons 1935 and 1937.

Species	No. nests	Largest set	Smallest set	Average set
Mallard	31	11	5	8.56
Blue-winged Teal	9	12	9	10.20
Shoveller	1	9	9	9.00
Pintail	2	8	7	7.50
Redhead	3	10	9	9.33
Canvas-back	38	10	5	7.38
Lesser Scaup	4	11	9	9.66
Ring-necked Duck	1	9	9	9.00
Bufflehead	1	5	5	5.00
Ruddy Duck	6	8	2	6.00

Although there were certain indications pointing to the fact that some of the earlier nesting ducks may have had a second attempt at nesting, nothing definite could be proved.

Brood Data

The brood census taken during the third week in July revealed a decrease of 48.86 per cent in the number of broods when compared with the average for the years 1934 and 1935. This remarkable decline could not be attributed to any known cause unless it was the result of the extreme heat and drought of early July, or the fact that there was a decrease in breeding stock previously mentioned.

Tables 6 and 7 show the information obtained from this census and a comparison with the average of previous years.

Table 6. Brood census information averaged for the years 1934 and 1935.

Species	Ave. No. broods	Ave. No. per brood	Smallest brood	Largest brood	Ave. total young	Percentage of total young
Mallard	7.50	5.80	2	8	42	5.70
Wigeon	6.00	6.21	2	9	36.5	4.99
Green-winged Teal	1.50	4.75	2	7	7.50	1.00
Blue-winged Teal	16.00	7.21	3	10	115	15.91
Shoveller	4.00	7.26	5	11	30	3.98
Pintail	5.50	7.31	3	9	28.5	5.69
Redhead	4.00	6.20	4	9	26	3.43
Canvas-back	15.50	5.44	1	8	84.50	12.16
Lesser Scaup	24.00	8.42	1	15	180	24.83
Ring-necked Duck	.50	5.00	5	5	5	.01
American Golden-eye	1.50	5.75	4	7	8	1.15
Bufflehead	1.50	4.51	3	6	7.50	1.08
Ruddy Duck	26.00	5.54	2	11	145.50	19.82
	110.50	6.50	1	15	718.50	99.75

Table 7. Brood census 1937 and comparison with number of broods for 1934-1935.

Species	No. broods	Ave. No. per brood	Smallest brood	Largest brood	Total young	Percentage total young	Brood standing with previous average
Mallard	7	5.85	3	7	41	11.42	Decrease 6.66%
Widgeon	4	5.20	2	8	21	5.84	Decrease 33.33%
Blue-winged Teal	19	4.89	1	9	93	25.90	Increase 18.75%
Shoveller	4	6.75	5	8	27	7.52	Same
Pintail	8	4.25	1	7	34	9.46	Increase 45.45%
Redhead	2	5.00	4	6	10	2.78	Decrease 50.00%
Canvas-back	11	6.27	2	9	69	19.22	Decrease 27.09%
Lesser Scaup	4	8.00	4	10	32	8.91	Decrease 83.33%
American Golden-eye	1	9.00	9	9	9	2.50	Decrease 33.33%
Bufflehead	1	6.00	6	6	6	1.67	Decrease 33.33%
Ruddy Duck	5	3.40	1	5	17	4.73	Decrease 80.77%
	66	5.45	1	10	359	99.95	Decrease 48.86%

The earlier nesting ducks had the smaller broods as could be expected, while the later nesting scaups and teals had the larger. An indication of the percentage of mortality during the first five weeks

after hatching may be obtained by comparing the average egg clutch of Mallards, which runs (based on thirty-one nests) 8.56 and the average hatching date, June 15, with the average brood taken during the third week in July, which was 5.78 (based on twenty-two broods over a three-year period). Such a comparison indicates a mortality of thirty-two per cent for the first five-week period immediately following hatching. The same method will indicate the mortality, over the same period, for Canvas-backs, based on thirty-eight nests and forty-two broods, and runs 20.5 per cent.

Summary

A general summary reveals that until the late summer of 1936 conditions on the whole were very satisfactory when compared with other points, even though there has been a gradual lowering of water levels during the last fifteen years. The last two summers, exceedingly hot and dry, have dried up breeding sloughs and potholes, and any advantage that this district had when compared with other surrounding areas has almost disappeared. The decrease in waterfowl due to such predators as Crows and Marsh Hawks seems, as far as this area is concerned, to be greatly exaggerated. The oft quoted statement that as conditions in southern Saskatchewan and the northern parts of the United States became unsuitable for waterfowl they migrated and nested farther north appears unproved. Even when conditions here were nearly normal and conditions elsewhere much worse, there was no new influx of birds. The total number of young birds decreased this year (1937) by fifty per cent and the broods by almost the same figure. The decrease in the numbers of Lesser Scaups in the spring census is reflected again in the decrease in broods. The severe drought throughout the southern portions of the Prairie Provinces will not be off-set by the halting conservation policies at present in force and continued open seasons.

Prince Albert, Saskatchewan.

THE NORTHERN BALD EAGLE IN BRITISH COLUMBIA

BY J. A. MUNRO

In the spring of 1935 during a six-weeks visit to Graham Island, the largest of the Queen Charlotte group, opportunities to watch the actions of the Northern Bald Eagle (*Haliaeetus leucocephalus alascanus*) occurred almost daily. A report of these observations together with others made elsewhere in British Columbia is presented in the following paper.

The first three localities mentioned are on Graham Island; Departure Bay is on Vancouver Island, and the other localities referred to are in the interior of British Columbia.

At Tl-ell the local population of Bald Eagles was estimated to be twenty individuals comprising five adults and fifteen others of various ages. These frequented the Tl-ell River, which for some miles parallels the sea; the sea beach and, somewhat less commonly, an open wooded area between. None were seen in the muskegs nor in the heavy timber which covers the greater part of the district. It was reported to me that during the autumn Bald Eagles become much more abundant and feed largely on salmon which are then ascending the river on their spawning migration.

At this time, i. e., in the spring, it was indicated that most of their food is taken from the sea beach and from the boulder reefs exposed at low tide. Day after day during full tide periods Bald Eagles could be seen standing in one or another of the spruces on the outer, seaward edge of the spruce forest—once five birds occupied the same tree—on the logs which covered much of the upper beach or on the sand near the water's edge and there they waited motionless until the falling tide uncovered a large expanse of boulder reef. During half tide or low tide these same birds invariably occupied the reef, some standing on the higher boulders, others on the patches of sand between. Very often several birds hunted the extreme outer edge of the boulder area where they could be seen standing in water deep enough to wet their tibial plumes.

Dogfish drifted ashore in considerable numbers; at one time I counted thirteen on about a mile of beach and each of these had been partially eaten by eagles as could be told, in some instances, by the tracks around them. Several times eagles were seen feeding on dogfish and as they tore at the carcass one or more Glaucous-winged Gulls stood motionless a few feet away awaiting their turn at the carcass. On one occasion an eagle so engaged was attended by two Glaucous-winged Gulls and a raven.

A young Bald Eagle carrying a dogfish head in his claws was seen flying from the beaeh to the spruee trees where he alighted. Later on a large number of dogfish heads and tails were found under these trees where they had been dropped by eagles. Here also were found the feathers of a Pintail, the sternum of an unidentified duek, and the bones of a rabbit, all of which had been exposed to the weather for some months. The item oecurring most frequently was erab, broken chelae and carapaeeae being found under nearly all the trees along the beach.

One morning it was noticed that since the previous evening a doe deer had washed up on the beach and been nearly all consumed. Standing here and there around the carcass on drift logs and on the sand were eight eagles and three ravens—their immobility indicating repletion—while two Glaucous-winged Gulls pulled at the shreds of meat still adhering to the bones.

When flying along the river eagles sometimes put a flock of American Golden-eyes to flight but I saw no attempt to molest them. It was noted with surprise that Mallards on a small lake near the sea paid no attention to the eagles whieh sometimes flew over them not more than forty yards above the water, but these same ducks would take flight if I approached eloser than 150 yards. Neither did the Trumpeter Swan whieh frequented this same lake pay any attention to the eagles' presenee.

Eagles used the low trees surrounding this lake as resting places and were seen there daily. It was assumed they were attracted to these open woods by the introduced rabbits and Mongolian Pheasants of which there was an abundanee. But a diligent search revealed no "kills", and, although I passed through these woods at least once a day for three weeks and eaeh time saw eagles, at no time did I see them actually hunting. This seemed the more remarkable in view of the fact that rabbits nearly always were in view hopping across the open mossy glades. Pheasants were more plentiful in this limited area than in any other distriet of eomparable size in British Columbia aeeording to my observations. It seems doubtful that this species could have increased to such an extent, from the small stock introdueed about fifteen years ago, if eagles had preyed upon them consistently. No Sitka Grouse were in these open woods and according to the residents there never had been. This speeies frequents the semi-open muskegs and the timber adjaeent to these areas. I have never seen them in woods of the kind deseribed above either at Tl-ell or at other places on Graham Island.

A flock of sheep accompanied by a number of young lambs pastured these woods and frequently in their wanderings loitered and sometimes lay down within a few yards of trees in which eagles were perched. The eagles paid no attention to the lambs. For the past five years two settlers have run flocks of sheep in this area without suffering any losses through eagles.

During a stay of two weeks on the Sangan River I saw only two Bald Eagles, an adult and an immature bird. Both were seen daily, sometimes flying up the open lane which marked the course of the Sangan through the forest, or else on Chown Slough or on the sea beach at the river's mouth. The sea bottom here is entirely sand and gravel so that small sea animals are not abundant as is the case where low tides expose rocks and boulders. Consequently little food other than carrion and, in the fall, salmon is available for eagles.

Dr. Dunn, a resident on the Sangan River, informed me that usually three broods of American Mergansers are hatched on the river and that Bald Eagles reduce the number of young to three or four in a brood during the course of the summer.

An experience on this river suggests that mergansers recognize the Bald Eagle as an enemy. I was concealed in a dense thicket of salal on the edge of a steep cut bank along the river and looking down upon nine yearling American Mergansers that were in possession of a gravel bar almost directly below me and not more than fifty feet away. The ducks stood or lay in various positions of relaxation some with necks turned and bill buried in the feathers of the back. They were close enough so that I could see sexual differences in bill coloration and individual variation in the tint of their under parts. On either side of the narrow river giant spruces towered and in looking upward, as if from the bottom of a canyon, one saw only a narrow strip of blue sky. The water slipped past the edge of the gravel bar with a murmurous hum, otherwise the silence was complete. Suddenly a Bald Eagle—a shadow passing across the strip of blue sky—whistled and simultaneously, or so it seemed, each merganser became tense, alert and ready for instant flight. Some continued to stand where they were, others slipped into the water to revolve slowly with the current. The eagle cry was not repeated, neither did the bird reappear across the strip of blue, and in a few minutes all the mergansers again were relaxed on the gravel bar.

At the head of Massett Inlet about one hundred feet from the edge of the shore line forest between McClinton Creek and Bald Eagle Creek is a large Bald Eagle's nest fifty feet from the top of a heavily

FIG. 9. A Boulder Reef, at low tide, on Graham Island, B. C. A feeding ground for the Northern Bald Eagle.

FIG. 10. A Mud Flat, at low tide, in McClenton Bay, B. C., showing "dolphins".

foliaged, forked Sitka spruce, estimated to be 150 feet in height. During the last two weeks of April the female evidently was incubating eggs but could not be seen on the nest because of the intervening foliage which concealed its top. The male usually occupied a tall spruce near the end of a point which commanded a view up and down McClinton Bay. The two birds were seen together only once when they stood in a dead spruce one hundred yards or so farther back in the forest from the nesting tree. These eagles, observed almost daily for two weeks, were not seen hunting waterfowl. Mr. J. Stannard, of the Pacific Biological Field Station, at McClinton Creek, told me that the nest had been occupied for three years at least. Mr. Stannard also stated that he had seen Bald Eagles capturing young American Mergansers eventually taking all but one of a brood. This was in midsummer when the female merganser during high daylight tides led her brood from McClinton Creek out on the bay over the submerged tide flats, a habit of this duck when nesting near the mouth of a tidal stream.

At McClinton Creek the tide flat is the Bald Eagles' chief hunting ground and their lookouts are one or another of the six "dolphins" which are conspicuous objects on the bay and directly in front of the nest. These are tall piles driven into the flats for the purpose of mooring log booms but long in disuse with grass growing on their tops and barnacle-encrusted for a quarter of their height. From these perches, so Mr. Stannard stated, the eagles harry the young flightless mergansers.

The few Bald Eagles which frequent Departure Bay and vicinity during the winter months constantly are in sight of great flocks of gulls which have been attracted by the spawning of herring. For the most part the eagles completely ignore the presence of the gulls as do the gulls that of the eagles. This usually is so even at the time when gulls are feeding upon stranded herring spawn a short distance from a perching eagle.

But one incident contrary to this general behavior came under observation. In this case an adult Bald Eagle circled over a flock comprising one thousand or more gulls, which had congregated on a gravel bar at the water's edge, and put them to flight. Like a snowstorm of wings they milled about conspicuous against a dark background of forest while the eagle charged again and again into the thick of the flock. Possibly it was not intent on securing a meal and these actions were in the nature of play for later the eagle came flying, empty-clawed, along the shore.

FIG. 11. A resting place for Northern Bald Eagles, Tl-ell, B. C., with a Trumpeter Swan in flight.

FIG. 12. Nest and one young of the Northern Bald Eagle, Horse Lake, B. C.

No instanees of Bald Eagles attaeking diving dueks were noted at Departure Bay, but farther north at various places on Vaneouver Island this habit eame under observation. The method of hunting is to follow elosely the under-water progress of a duek whieh seeks to scape the eagle by diving. Eaeh time the duek emerges the eagle swoops down to the water so that dive follows dive in quiek suceession until finally the prey beeomes exhausted and is captured. Some, but not all, of the dueks taken in this manner are incapable of flight as the result of gunshot wounds or other injuries. No instanees of a Bald Eagle eapturing an uninjured surface-feeding duek has eome to my attention.

On the large lakes in southern British Columbia which remain open all winter it is eommon to see Bald Eagles harassing thc Coots whieh winter there. When attaeked the Coots eome together in a elose flock and move rapidly across the water with neeks outstretched; they do not dive. The pursuing eagle planes downward but eheeks its flight when a few feet above the mass of birds, aseends, circles over the floek. then again hurls downward with tremendous foree that again is suddenly brakcd. This maneuver may be repeated a dozen times without a capture being made and each time, terrified by the eagle's nearness, the Coots surge aeross the water. Apparently the eagle rarely takes a bird from the midst of the floek, although it would seem an easy thing to do, but pursues direetly any straggler, and almost invariably captures it. On the other hand I havc seen an eagle swoop down toward a eompaet flock twenty times or more and finally fly away without having captured a bird.

An example of different behavior was observed at Elk Lake, near Victoria, B. C., on January 8, 1926. One end of this small lake, which is a game reserve, was free of iee and crowded with Coots, Mallards, Baldpates, and a number of Red-breasted Mergansers. While I was watehing this throng of birds several floeks of dueks on the outcr edge of the gathering rose suddenly and cireled toward me, Mallards quacking and Baldpates whistling. Immediately afterward an adult Bald Eagle appeared, passed swiftly over the flying dueks, swung up wind and dropped into the midst of a flock of Coots. All dived exeept one, whieh perhaps was a sick bird; this one the eagle lifted from the water and earried to a fir tree on the shore. He had hardly reaehed his destination before most of the dueks were again on the water.

Western Grebes also are taken as has been determined by the finding of their remains under trees in whieh eagles pereh. The

Western Grebe is normally a vigorous and tireless diver, but each fall a number become weakened and emaciated and finally die from some complaint that apparently has not been diagnosed. It seems probable that it is these individuals which are taken by eagles.

At Horse Lake two pairs of Bald Eagles have eyries less than a mile apart near the east end of the lake. Until recently my knowledge of these birds was limited to occasional glimpses of them in flight and, on one occasion, the sight of two adults tearing at the carcass of a large fish which had drifted into the shallows.

Mr. Sigurd Larum, resident at Horse Lake since 1911, and a close observer of animal life, showed me the location of these nests and mentioned that one had been occupied each year from at least 1911 until 1931 when the tree holding it was blown down in a storm. The following year another nest was built about one hundred yards distant. In both cases the site was an old Douglas fir growing in thick woods on a mountain slope about one-quarter mile from the lake shore.

The second eyrie also was in a Douglas fir amongst more open wood and in clear view from the lake 200 yards below. Mr. Larum had first noticed this nest about 1931.

In August, 1936, I visited both nests in order to hunt for food remains in their vicinity. At this time one bird of the year hunted in the general neighborhood but the four adults, and whatever other young they raised, had moved elsewhere.

No remains of food were found near the first nest, i. e., the one farthest back from the lake. On the ground below the other nesting tree and under two Douglas firs close by were the following items: (1) headless and partly decomposed body of a half-grown Goldeneye, probably *Clangula islandica;* (2) skeleton of a Ruffed Grouse; (3) bones of one or more suckers; (4) tails and bones of two or more Kamloops trout.

This nest was photographed and while focusing the camera I remarked to my companion that it was unfortunate none of the eagles were at home. A moment later we heard an unmistakable whistle, a harsh rustle of wings, then a young Bald Eagle alighted on a bare branch directly over the nest!

The foregoing illustrates how local conditions and time of year modify the food habits of the Bald Eagle. At Tl-ell in the spring it is about as predatory as a Turkey Vulture; elsewhere it may prey upon diving ducks, coots, grebes, grouse, fishes, or carrion depending on the availability of the various foods.

Okanagan Landing, B. C.

BACHMAN'S WARBLER IN ALABAMA

BY HENRY M. STEVENSON, JR.

Alabama seems already to have been peculiarly blessed with records of Bachman's Warbler (*Vermivora bachmani*), both in the number of sight records and in being one of the few states in which the nest has been found. Yet the bird is sufficiently rare to warrant the publication of additional records, and it is with this paucity of records in mind that I present the known records of the bird in this state since the publication of Howell's book,[1] giving first, however, the records of the bird given in that manual, for the benefit of those who themselves have not had the opportunity of reading the book.

The first record for the State is that of a male taken by A. A. Saunders at Woodbine, March 20, 1908.[2] Howell, himself, discovered the second bird, another male, taken in a small swamp near Autaugaville, April 16, 1912.[3] Howell and Peters collected males at Sipsey Fork, near Mellville, May 2 and 3, 1914; in Bear Swamp, May 10, of that year; and on the Tensaw River, below Mount Vernon, on May 27.

While their unusual habitat suggests that some of these birds were belated migrants, others were almost certainly breeding.

L. S. Golsan reported the following records: an immature bird seen near Autaugaville, August 26, 1912; a female seen near Prattville, May 21, 1916, seemed to be nesting; a male heard singing at Longview, April 7, 1917. In Bear Swamp, near Autaugaville, May 25, 1919, Mr. Golsan and Ernest G. Holt discovered a nest containing four fresh eggs, this being the first nesting record for the State.[4] These eggs are now in the collection of Mr. Golsan, who adds that the males of this species were usually abundant in Bear Swamp from March 20 to May 1. He states that this condition prevailed till 1928 when, possibly due to the cutting away of some of the timber, the birds disappeared, or else their presence was not cleared by as diligent or thorough search then as it was when Howell, Peters, and Holt were visiting the swamp.

My first experience with Bachman's Warbler takes me back to Irondale (near Birmingham), Alabama, and the warm, bright afternoon of April 9, 1936, when, strolling through the woods, I suddenly became conscious that I had been listening to the song of some bird strange to me. The song must have been sung within ear-shot half-a-dozen times before it really commanded my attention. Even then I

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[1]Howell, Arthur H., Birds of Alabama, pp. 286, 287, 1928 (second edition).
[2]Saunders, A. A., Auk, Vol. 25, p. 481, 1908.
[3]Golsan, Lewis S. and Ernest G. Holt, Auk, Vol. 31, p. 231, 1914.
[4]Holt, E. G., Auk, Vol. 37, pp. 103, 104, 1920.

probably should have attributed it to a Chipping Sparrow, had it not come from the depths of a thick, damp woodland. Long before I had covered the fifty or sixty yards separating me from the tree in which the songster was performing, I felt reasonably sure of the bird's identity, as such phrases from the familiar manuals I have read as "short, buzzing trill", "without change of pitch", and "quality of the Parula" came ringing back to my mind during each interlude. Though it seemed much longer, it was really only a few minutes before I had located the singer, an adult male Bachman's Warbler, high in a sweet gum tree (*Liquidambar styraciflua*). This was the red letter day of the whole spring for me. Four days later Mr. H. E. Wheeler and I re-visited the spot and found the bird in a red maple (*Acer rubrum*), not fifty yards from the previously mentioned sweet gum. This time he sang from the lower limbs. Subsequent visits to the spot failed to reveal any trace of the bird, so I concluded that he had moved on with the other spring migrants, possibly to the Sunken Lands of southeastern Missouri.

That the bird would summer in the area where he was found, however, was hardly to be expected, as it was only a seasonal swamp, if indeed it might be classed as a swamp at all, even in winter and spring. Not many yards from his immediate territory flowed Shades Creek, varying in width from eight to fifteen feet at this stage of its course.

Birds found not far distant from the Bachman's are: *Dryobates p. pubescens*, *Cyanocitta cristata florincola*, *Baeolophus bicolor*, *Hylocichla mustelina*, *Vireo g. griseus*, *Vireo olivaceus*, *Vermivora pinus*, *Dendroica v. virens* (migrant), *Wilsonia citrina*, *Setophaga ruticilla*, *Richmondena c. cardinalis*, *Spinus t. tristis*, *Pipilo erythrophthalmus* (subsp.?), and *Zonotrichia albicollis*—all more or less typical of the sort of territory in which *Vermivora bachmani* was found. Later field trips resulted in the discovery of the following additional species typical of the region, some of which are migrants: *Centurus carolinus*, *Empidonax virescens*, *Dumatella carolinensis*, *Vireo flavifrons*, *Protonotaria citrea*, *Helmitheros vermivorus*, *Vermivora peregrina*, *Compsothlypis a. americana*, *Dendroica caerulea*, *Dendroica fusca*, *Oporornis formosus*, *Agelaius p. phoeniceus*, and *Piranga r. rubra*.

At this place, as well as at Irondale, the bird's song was studied carefully and found to recur at intervals of from twelve to twenty-two seconds—more often fifteen seconds. It most nearly resembled in composition the trill song of the Chipping Sparrow (*Spizella passerina*), but seemed to be even drier, weaker, shorter, and less musical, the

quality being nearer that of the Parula Warbler (*Compsothlypis americana*). Indeed, anyone but an ornithologist might take the song to be that of an insect, especially if it were heard at a distance. Yet the song so closely resembles that of the Chipping Sparrow that if the two birds chose the same habitat positive identification of either by its song would be next to impossible. There is also a slighter resemblance to the songs of Worm-eating, Orange-crowned, Pine, and Tennessee Warblers, and to the "exhale" part of the Blue-wing's song. And were it not for the upward inflection in one of the trills of the Parula, here would be a quite accurate replica of the Bachman's song. But in the last analysis it may be stated that the song, well heard, should not be confused with that of any other swamp-loving species of bird, except possibly the richer, more musical song of the Worm-eater.

Retracing a bit, the second Bachman's Warbler the writer has ever seen was discovered in a swamp near Tuscaloosa—oddly enough, exactly a year from the date of the first record, April 9, 1936. It is the only time I have ever been fortunate enough to locate this species without first hearing its notes. During the few minutes that I had this individual under observation he sang half-heartedly from the top of a sweet gum only once or twice, and I have since suspected that nest-building activities were going on at the time. However, the cool and cloudy weather conditions may have discouraged his singing.

As this territory looked like a favorable breeding ground, Wheeler and I returned to it on May 1, 1937, another cool and cloudy day, with rain in the afternoon. Hardly had we reached the spot when we discovered the male, with food in his bill, on the lower limbs of a sweet gum. Eagerly we watched as the bird, after a few minutes of nervous hesitation, dropped to the edge of a thicket not twenty yards distant, remained a few seconds, then re-appeared and flew off. We lost no time in getting to the spot to search the bushes, but found no nest. Thinking that the bird might have dropped to a spot some distance from the nest, we thoroughly searched the thicket, but still found no nest save that of a White-eyed Vireo in a small holly. This nest contained four fresh eggs. The tour of the thicket completed, I was again at the starting point when the male once more flew down to the first spot visited. This time I marked the spot well and found the nest quickly. The difficulty in finding it before lay not so much in the seclusiveness of the hiding place as it did in the inconspicuous nature of the nest, and in the fact that it contained three young less than a week old rather than shiny white eggs. This fact would probably indicate that the birds had already commenced nesting activities when

the male was first discovered on April 9, about 100 yards from the spot.

The nest was a bulky and loosely constructed affair, owing its protection largely to the fact that, as already indicated, it might be mistaken for a cluster of half-decayed leaves accidentally lodged in the bushes about a foot from the ground. Besides half-decayed leaves of undetermined species, the nest consisted of the leaves of *Magnolia glauca*, some skeletonized, and various grasses, neither amounting to a very considerable part of the nest. Besides these materials, it was lined with some kind of black rootlet, mentioned also by Arthur T. Wayne as being present in all the nests he found. Wayne states that this "peculiar black fiber . . . may be the dead threads of the Spanish moss (*Dendropogon usneoides*) or a black rootlet".[5] In the case of the present nest, however, it could not well be Spanish "moss", as that plant probably does not grow within seventy-five miles of the spot.

The general location of this nest was in a thicket between two branches of an unused logging road, the trail dividing near the nest to re-unite farther on, leaving in between an isolated thicket about thirty yards long and seven or eight yards wide at its greatest width.

The nest was supported by one or two stems each of *Arundinaria tecta*, *Rubus floridus* (?), and *Vitis rotundifolia*, while high overhead hung the limbs of a fairly large elm, probably *Ulmus alata*, and scarcely ten feet away grew a medium-sized specimen of *Prunus serotina*, possibly the only one of its kind in the swamp. It was in this latter tree that the birds almost invariably alighted when coming to feed the young. The nest was also about fifteen feet from the nest of a White-eyed Vireo (*Vireo griseus*) mentioned above. Farther down the trail, incidentally, a nest of the Yellow-throated Vireo (*Vireo flavifrons*) containing three slightly incubated eggs was found in another holly in almost exactly the same sort of location as the first vireo's nest. It is interesting to note also that the warbler began nesting considerably earlier than these two vireos, comparatively early nesters themselves.

Descriptions and pictures of this warbler are numerous, but we may call attention to a few interesting features in that respect. The description calls for a light yellowish shoulder patch in both sexes, though it may be left off in some paintings, e. g. Howell's "Florida Bird Life", facing page 418. This feature was clearly observed in both sexes and the black noted on the breast of the male, which marking seemed not to extend so far down as is usually portrayed. Another error in some paintings of the bird was noticed in the color of the

[5]Wayne, Arthur T., Birds of South Carolina, p. 156. 1910.

female's breast. Instead of being a decided yellow, it was scarcely more so than the breast of Swainson's Warbler (*Limnothlypis swainsoni*), which is not very yellow. There was no opportunity to observe the rump patch in the female, but, as previously indicated, the shoulder patch was obvious. The young were hardly old enough to distinguish from the young of most other warblers.

During the domestic activities I was surprised to find that the female was much shyer than her mate. In fact she allowed us but one good look, and that from a distance of about thirty feet. In the case of most birds I am convinced that the female is the tamer on the nesting grounds. In this case the male was so confiding on one occasion as to feed the young while the observers looked on not more than fifteen feet away.

When the birds approached the nest bearing food they uttered a sharp, rapid, chipping note, very like that of the Chipping Sparrow, but somewhat weaker. The song was not noted on this occasion, as the parents were too busily occupied in supplying the young with food. They seemed always to be of a nervous, active temperament (like all Bachman's of my experience), not slow and easy-going (like the Blue-winged Warbler) as they have sometimes been described. There has been some controversy as to whether the birds range high or low in the trees—away from the nest, of course. In nearly every case the ones I have found inhabited the upper branches, but occasionally picked a tree that was not very tall. This applies particularly to the singing individual observed in Bear Swamp and discussed above.

The nesting records of this species in Alabama may serve to throw some light on a problem in Wayne's mind when he wrote, "Although I practically lived in the swamp from April to June 19, in order to determine whether the birds raise two broods, I am convinced that only one brood is raised, for this species is a very early migrant after the breeding season . . ." (recorded by J. W. Atkins, Key West, July 17).[6] I am inclined to disagree with Wayne on his supposition, and I believe that a study of some nesting dates will support my contention that the birds raise two broods a year, though the question will never be settled until someone has observed the same pair for a whole season, and that seems never to have been done. First let us consider Wayne's own nesting records, only the extreme dates on the occupied nests being mentioned. After twenty-five years of searching, Wayne finally discovered two nests of this bird in a swamp near Mount Pleasant, South Carolina, April 17, 1906, and the following spring he found

[6]Op. cit., pp. 155, 156.

a nest with four fresh eggs on March 30, and one with five incubated eggs on April 3. In both these latter examples, then, the nests contained full complements of eggs by the last of March. In Alabama the recent nest at Tusealoosa must have contained the full complement by April 12, and the young must have left the nest by the middle of May, in good time for a second set to have been laid by the end of that month. This leads me to observe that the nest found in Bear Swamp, at least sixty miles farther south than Tuscaloosa and comparable in climate to Mount Pleasant, S. C., contained four fresh eggs on the date of the discovery, May 25, 1919. However, if the birds do raise two broods a year, are both nests constructed in the same general locality? The bird is known to be irregular in its movements, appearing at one place one year and elsewhere the next, but is it possible that a second brood may be raised by a pair of birds many miles from the site of the first locality of that year? These questions can be settled only by future observations. I spent hours searching for the Tuscaloosa birds on May 29, and days in search of more of the birds in Bear Swamp in early June, without finding another trace of any of them. The cutting out of timber may have been responsible for the Tusealoosa nesters' evacuating their territory, as one large tree lay only a few feet from the nest itself, and the surrounding territory was scarcely recognizable as the same place where the birds had nested.

Summarizing, Bachman's Warbler is still rare—and its nest much rarer. Dr. Otto Widmann, discoverer of the first nest, found one other in southeastern Missouri, and Arthur T. Wayne found eight nests in South Carolina, three of which had been deserted. Logan found a nest in western Kentucky, and the list is completed with the addition of the two Alabama records. Probably less than a dozen tenanted nests have been found, and there is yet much to be learned about the birds' nesting habits. If this article can in any way stimulate further research and promote our knowledge of this second rarest of the North American warblers, the writer will feel repaid.

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SOME OBSERVATIONS ON FALL AND WINTER FOOD PATCHES FOR BIRDS IN SOUTHERN MICHIGAN

BY DURWARD L. ALLEN

For a number of years the Michigan Department of Conservation has taken an active interest in the testing of various grain-producing plants that might be useful in plantings to produce winter food for wildlife in Michigan. The data here presented result from two winters' study [1] of experimental plantings at the W. K. Kellogg Farm and Bird Sanctuary and the W. K. Kellogg Reforestation Tract near Battle Creek. Both areas are owned and operated by Michigan State College. This report deals only with the mechanics of winter food production. The need for winter food patches in southern Michigan will not be discussed.

Characteristics of a Good Food Plant

To best subserve the purpose for which it is intended a food patch plant must provide *an adequate and readily available supply of acceptable grain at the time when other foods are most scarce.* This means that fall flocks of migrant grackles or sparrows will not have eaten it. It means that the fruits must be persistent (that is, that the grain will remain on the stem). It means also that despite deep snow, high winds, or other weather conditions, the grain will be where birds can reach it. Of course it is essential that the food must be acceptable to the species for which it is intended.

Land that is available for wildlife plantings is usually that which is undesirable for agriculture. The best plant would be one that would grow in any type of soil under conditions of extreme dryness or wetness and produce a crop regardless of a good or poor growing season.

A Seed Mixture Recently Recommended for Wildlife

On the Williamston Coöperative Game Management Project[2] a mixture of crop seeds was developed for the purpose of providing winter food for wildlife (English, 1935). This mixture was recommended for several years by the Department and was quite widely used in Michigan and elsewhere. Following is a list of the seeds used in the mixture and the amounts of each per hundred pounds:

[1] In connection with graduate studies in vertebrate ecology.

[2] An Ingham County project (1931-1933) sponsored by the University of Michigan Department of Forestry and Conservation, the Michigan Department of Conservation, and other agencies.

Sudan grass	14.0 lbs.
Buckwheat	12.6 lbs.
Cowpeas, New Era	8.4 lbs.
Flax	8.4 lbs.
Hemp	8.4 lbs.
Corn, Golden Glow	7.7 lbs.
Millet, White Wonder	4.5 lbs.
Millet, Common	4.5 lbs.
Millet, Tennessee German	4.5 lbs.
Proso, Hog Millet	4.2 lbs.
Kaffir Corn (Milo Maize) or Sorghum, Early Amber	4.2 lbs.
Hegeri	4.2 lbs.
Soy Bean, Manchu	4.2 lbs.
Soy Bean, Ito San	4.2 lbs.
Feterite	3.2 lbs.
Sunflower, Mammoth Russian	2.8 lbs.

It was recommended that the mixture be scattered broadcast (about twenty pounds to the acre) and harrowed in. The seed bed was to be prepared as for corn.

It was desirable to learn whether the value of this type of food patch as originally indicated at Williamston would be borne out by further experimentation on other areas. Accordingly, as a part of a Department of Conservation wildlife research project, nine plots varying in size were planted on the Kellogg Farm in June, 1935. Two of these were on dry, sandy, upland areas considered undesirable for cultivated crops; six were on low ground of a moisture content varying with the different localities; one occupied a three-acre field of good agricultural land. The soil of the area is a sandy loam. The farm is a sanctuary but is considered to be submarginal from the standpoint of game birds. As the 1935 growing season was an excellent one it was a very good opportunity for this mixture to show what it would do under favorable climatic conditions on the best and poorest soils and situations of this area.

In the fall it was apparent that the amounts of grain produced by the various plots varied in a marked degree. Those in dry soil contained small quantities of buckwheat and millet. This soon disappeared, and as winter food patches they were of little consequence. In the other seven patches the plants grew well and each of them had a good crop of some of the grains. On low moist ground the hemp flourished, and on dryer soil buckwheat had the advantage. On the whole, the amounts of grain in the patches at this season were satisfactory.

Songbirds were very appreciative of the food patches. Flocks of migrant grackles visited them in September. Later the bulk of the

grain was taken by Tree Sparrows and juncos. At various times goldfinches, redpolls, chickadees, and siskins were found using the food.

By January hemp was all that remained in quantity. What millet and buckwheat was left in some patches was gone by the end of that month or was covered by snow. In February the snow reached a depth of twenty-six inches and almost nothing could be gleaned from the ground. In some of the patches hemp projected above the snow and in one instance was used by quail for several weeks.

Although pheasants were flushed from the patches at times during the fall, the food did not appear to have much attraction for them. This was due, doubtless, to the very large quantities of natural foods that had resulted from the bounteous season. There were very few records of the presence of pheasants in the food patches during the winter after snow came.

The results of similar experiments in 1936 were much the same. The very dry season, however, prevented more of the plots from producing in quantity. Plots on low, moist ground showed a good growth, but those on dry soils were very nearly a total loss. There was little snow during the following winter season and what grain remained, after the inroads of fall migrants, was available through April. However, as both quail and pheasants were, through movements, nearly absent from the 500-acre area, this winter provided a poor test of use by these species.

In summary:

1. The plants in the mixture grew well in *good* soils but not in poor ones.

2. On good and intermediate soils in a favorable growing season a good crop of grain was produced. In a dry season the crop was much reduced on all but very low situations.

3. The grain produced was used by songbirds in the fall, which greatly reduced the potential winter supply. Pheasants used the patches at times during fall and early winter but were not conspicuously attracted by them.

4. When snow was deep and other foods most scarce, the only food patch plant that was available was hemp, and only the well-watered plots on good soil offered this.

These experiments indicated that under favorable growing conditions the food patch mixture would produce a good variety and quantity of foods for granivorous birds in fall and early winter. However it is not well adapted to poor soils and dry situations, and evidently is not a dependable source of food for pheasants and quail in late winter emergencies.

Standing Corn

Corn is the one grain which needs little if any further trial. It is well known that unharvested corn will remain available throughout the winter. Both pheasants and quail will use it regularly and it provides more or less cover for the feeding birds. Songbirds will not exhaust the supply in the fall and yet a cornfield is an excellent place for them to feed. The ragweed (*Ambrosia elatior*), foxtail (*Setaria lutescens* and *S. viridis*), lamb's quarters (*Chenopodium album*), redroot (*Amaranthus retroflexus*), and other ruderals that grow among the corn furnish very good food for all ground-feeding birds as long as the supply lasts and snow is not deep.

On the Kellogg Reforestration Tract of Michigan State College a two-acre field was prepared in the spring of 1936 and planted to corn. In this very dry season the crop gave little promise of coming to maturity. August rains revived the plants, however, and although the average height of the corn was not over three feet, a surprisingly good crop resulted. The plot was not cultivated and gave rise to growths of foxtail and ragweed which added to the food supply. These two acres of corn and weeds, even though growing on very dry and rocky soil, constituted a good food patch. The yield would be considered very poor from the agricultural viewpoint, but was quite sufficient for the birds. We have little fear of error in unreservedly recommending corn as *the* plant patch plant, if and where winter food patches are wanted for quail and pheasants in southern Michigan.

Weed Patches

Any investigator into the food habits of winter birds is at once impressed with the high percentage of the fall and winter food of some species furnished by our most common garden weeds (Judd, 1898). Some of the most important have already been cited. The tremendous dependence that is placed upon the ragweed by songbirds, pheasants, and quail is probably not generally appreciated. Horned larks, quail, pheasants, and large flocks of Tree Sparrows, Song Sparrows, and juncos fed avidly upon ragweed at the Kellogg Farm in the winter of 1935-36. The disappearance of the flocks of songbirds from the area in February was correlated directly with the almost total exhaustion of the supply of what ragweed still protruded above snow level.

Ragweed, lamb's quarters, and tumbling pigweed (*Amaranthus graecizans*) are among the first plants to appear on newly broken soils in this locality. The reason for this is easily explained. In germination tests using random samples of Woburn barley soil, Brenchley

and Warington (1930) found 150 viable seeds of *Chenopodium album* per 8⅔ square feet. The weed seeds present in arable soils were clearly demonstrated in this work. That weed seeds are present even in soil long covered by sod was shown by Chippindale and Milton (1934). It was found that in the soils of pasture lands there is often little "relationship between the vegetation of the area and the seed flora of the soil". Any disturbance of the soil serves immediately to increase the numbers of common annual weeds. They further state, "It is clear that were the existing sward to be destroyed the flora of this field would immediately become typical of arable land." Among the seeds commonly found were those of *Prunella*, *Chenopodium*, *Polygonum*, *Rumex*, *Plantago*, and *Trifolium*. Although this work was done in England, we find all of these genera represented in Michigan and plants belonging to at least five of them produce food used by winter birds. If similar work were done here, ragweed "seeds" undoubtedly would be found to be present. An experiment started by W. J. Beal in 1879 and continued by H. T. Darlington indicated that seeds of some of the common weeds may remain buried and viable for at least fifty years (Darlington, 1930).

Summary

These studies have shown that where it is desired to produce a supply of food that will be available to pheasants and quail throughout the winter, corn is probably the only grain in which we can place complete confidence at present. Where fall and early winter foods for all birds are wanted, a mixture of small grains was found satisfactory, but cultivation without planting is probably the most economical method for the results obtained.

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E. B. WEBSTER, PIONEER ORNITHOLOGICAL PUBLISHER

BY FRED J. PIERCE

Birds do not change through the years; they seem never to grow older. Fifty years ago in Howard County, Iowa, Red-winged Blackbirds sang from swaying cattails in the marshes, Meadowlarks built their arched nests in the grasslands, Song Sparrows trilled gaily from the banks of the streams, Crows and Jays assailed the Great Horned Owl from the depths of the woodland—and other activities in the bird world went on much as they do today. There was the same call of the outdoors for the young person who had ears to hear it—the same thrill of discovery was offered the budding ornithologist.

A Howard County youth heard the call of the outdoors. We do not know when he became interested in birds, nor what feature of the outdoors first attracted him. Nature is only a step away from the country town resident, and if he has a spark of interest in natural history, an enthusiasm is likely to be kindled. In this youth an interest was aroused early in life. Ample fuel was provided by rambles into the country surrounding Cresco, and his fire of enthusiasm burned brightly throughout his life.

This young man was Edward Barton Webster. He was born at Cresco, Howard County, Iowa, on October 29, 1868, the son of Mr. and Mrs. W. B. Webster. The father was a newspaper man, engaged in the publication of a pioneer Iowa newspaper, the Cresco *Republican*. Young Webster attended the Cresco schools, helped his father in the printing shop after school hours and during vacation days, and spent as much time as he could in the woods and fields in a search for birds and other objects of natural history in which he had come to take a keen delight. In his advanced 'teens he had taught himself the art of taxidermy, had made extensive nature studies and, vocationally, had learned the printing trade.

Most young bird students sooner or later desire expression through the printed page. Their observations have been intensely interesting to them, their records have seemed to be important and, therefore, to justify publication. They seek a publisher. Ornithological journals, both major and minor, have always contained proof of this. The youth of a half century ago was no different from the youth of today. Young Webster wished to express himself ornithologically. He did not send his articles away to be published. He would publish his own bird magazine! For a boy who knew the printing trade, who had access to a printing plant, and who had grown up in a publishing environment, this decision is not to be wondered at.

The late eighties had seen the rise and fall of numerous minor natural history serials, among them the *Acadian Scientist*, the *Agassiz Companion*, the *Collectors' Science Monthly*, *Field and Forest*, the *Hawkeye Observer*, the *Milwaukee Naturalist*, the *Sunny South Oologist*, and the *Young Ornithologist*. Unlike present times, when a mimeographing outfit is the chief requisite for projecting a small bird magazine, these serials had been brought out laboriously through the medium of hand-set type. Careful thought and much energy had gone into their making; but the going had been rough and the ventures had been discontinued.

Early in 1888 young Webster was ready to publish his magazine, and *The Hawkeye Ornithologist and Oologist* was born. At this time the *Auk* was four years old, the *Oologist* was the same age, while the *Wilson Bulletin* and *Bird-Lore* were not in existence. Research shows the field of natural history magazines to have been quite well crowded at that time; many journals were published in various parts of the country, and many more were to be started during the following decade. The careers of nearly all these publications were brief, though they indicated a fairly widespread interest in natural history subjects among the young people of that period. It is decidedly to the credit of E. B. Webster that his product soon attained a limited national circulation and he was able to attract a clientele of sincere young students, a number of whom developed into well known scientists and achieved distinction in later years. Begun in a country town in Iowa, by an unknown young man, the new ornithological magazine was well received from the first. It exerted a good influence in the cause it espoused and clearly justified its existence.

The first issue of *The Hawkeye Ornithologist and Oologist* appeared under date of January, 1888. We find this announcement on the editorial page: "We've Commenced. Magazines have been published for the suppression of evil, for the diffusion of general knowledge, for the interests of fashion, for the benefit of the needy, for the good of various causes, for the advancement of business interests, for the advocacy of certain principles, for the defense of the innocent, for the justification of wrongs, for the comfort of the afflicted—this magazine is published for 50 cents per annum."

The name of F. D. Mead appears with that of Webster as co-publisher. The extent of his coöperation is not well outlined, and we do not know his age or much else about him. He dropped out of the venture with the September issue of 1888. The editorial page states that it is "A Monthly Magazine Devoted to Ornithology and Kindred

Edward Barton Werster, 1868-1936

Subjects, and Geology." There is a table of subscription and advertising rates, and the address of a "General Agent" in New York City is given. It is a neat little magazine. The format is very similar to the *Oologist* of the same year. The January issue has sixteen pages of text and a rather attractive pink cover. The page size is about 6x9 inches; the type page is approximately 4½x7 inches, double-column in 8-point type with occasional display headings and a few woodcuts. It was printed on single sheets, two pages on a side, which were folded in the middle to make four pages; four of these sections stapled together with cover made up the sixteen-page issue.

The initial number contains bird articles by Oliver Davie ,Wm. L. Kells, L. O. Pindar, E. G. Ward, H. W. Davis, and the editor. H. F. Hegner begins a continued article on "Home Science". L. W. Stilwell writes of the geology of the Bad Lands of Dakota, and there are articles on egg-collecting, taxidermy, and the taking of leaf photographs. An article on the Bobolink is reprinted from *Forest and Stream*, and there is an item on the Audubon Society which had been sponsored by the same magazine not long before. Three poems round out a varied and interesting issue. An advertising page is headed by this advice: "He who by his biz would rise must either burst or advertise." Advertisements from four states follow, and a full page is devoted to Davie's *Egg Check List and Key to the Nests and Eggs of North American Birds.* Young Webster and Mead had purchased the entire remainder of the second edition of this book and were selling it for one dollar a copy.

The little magazine progressed steadily. The February issue had twelve text pages, the March issue had twenty-two, the April issue had sixteen. The articles were well written and contained good ornithological material. The printing was carefully handled. Considering the great amount of hand-set type required for a magazine of this size, it is remarkably free from typographical errors. No doubt the youthful editor set most of the type himself, and this work on his own magazine was much nearer his heart than the work on his father's newspaper. Beginning in March the pages were sewed together, evidently on a sewing-machine, instead of being stapled. Occasional articles were reprinted from other publications, and we find "filler" items in the corners of many pages; letters from various parts of the country complimenting the new bird magazine from the Hawkeye State were given a few pages of space. This filler item will bring a smile: "How many sticks go to the building of a Crow's nest? None; they are carried to it." Three lines of type were needed to fill a column; the young compositor with a sense of humor decided that this would

do; the column was filled, he had stuck to the text, his purpose was served. The patronage of advertisers continued to be generous, and most of the issues devoted two or more of the cover pages to advertising the various things offered to nature students in those days—birds' eggs of all kinds, embalming fluid for bird specimens, books, Indian relics, fossils, caged song-birds, and nature magazines. A page of exchange notices with requests for books, postage stamps, and old coins has quite a modern ring. The advertising is nearly as interesting reading as the text pages.

In the May issue of 1888 a change was made in the size of the magazine. The type page was increased to 5½x8½ inches. The double-column arrangement was retained, but larger type was used. The margin on the sheet was widened so that the magazine was about 9x12½ inches in size. It was now necessary to print on single sheets, one page on each side, which were sewed or stapled together. The new format carried an engraving of the Snowy Owl on a greenish-blue cover, while the title of the magazine was abbreviated to "H-O-O!" and printed just below the owl as though it were an exclamation from this bird. The editorial statement now informed readers that it was "A Monthly Magazine Devoted to Ornithology, Oology, Taxidermy, Conchology, Mineralogy and Natural History." Subscription rates remained at fifty cents a year, sixty-five cents to foreign countries, and five cents a single copy. Advertising rates were "Made known on application. Send for estimate. They will pay." A second-class mailing permit was granted by the Cresco post office beginning with the June issue of 1888. The number of pages varied from eight to twelve in the new size. November and December were combined into one issue and closed the first volume with 134 pages, covers not included. The enlarged size was used until the end of 1888. Volume II (1889) was begun in the former small size, though a single-column page was used.

There is not sufficient space here to review the various bird articles that appeared in the *Hawkeye Ornithologist and Oologist.* A glance at the titles and authors will suggest the varied contents, and a partial list is given below. "Canadian Flycatchers", Wm. L. Kells; "Bird Nesting in the North of England", Walter Raine; "Carolina Wren", J. W. Jacobs; "Habits of Some American Grebes", Oliver Davie; "Notes on Some of the Passers of Fulton Co., Ky.", L. O. Pindar; "The Traill's Flycatcher", James B. Purdy; "The Bobolink", Frank L. Burns; "American Woodcock", Will C. Brownell; "Foot Movements in Birds", R. M. Gibbs, M. D.; "The King Penguin", W. H. Winkley; "The White-rumped Shrike in Western New York", Neil F.

Posson; "Nesting of the Sharp-tailed and Seaside Finches", C. S. Shick; "Nidification of the Osprey", Walter Raine; "Nesting of the White-breasted Nuthatch", J. Warren Jacobs; "Crow Nesting", Ulysses R. Perrine; "Birds of Greenbrier Co., West Va.", Thaddeus Surber (an annotated list of 121 species); "Notes from Charleston", J. Drayton Ford; "Nesting of the Maryland Yellow-throat in Southwestern Pennsylvania", J. Warren Jacobs; "Birds of Summerville, S. C.", J. D. Ford; "Nesting of the Kentueky Warbler in Southwestern Pennsylvania", J. Warren Jacobs; "My First Owl's Nest", W. C. Brownell; "The Red-Tail Hawk as a Pet", Fred Jones; "The Birds of Miner Co., Dakota", Frank A. Patton; "My First White-winged Crossbill", W. S. Johnson; "A Snipe Hunt", J. Claire Wood; "The Northern Shrike", Neil F. Posson. The editor conducted a bird migration department, and migration tables were given for Cresco, Iowa (Webster); Bernadotte, Illinois (Dr. W. S. Strode); Medina, New York (Neil F. Posson); Chicago, Illinois (W. E. Pratt); St. Paul, Minnesota (Charles Sonnen); Waynesburg, Pennsylvania (J. W. Jacobs); Jackson, Michigan (Carleton Gilbert). The departments devoted to taxidermy, geology, and other nature subjects had regular contributions in the form of long and short articles, though the theme of ornithology occupied the greater portion of the magazine.

Editor Webster was anxious that his subscribers be treated honestly by persons or firms advertising in his columns, and he kept a vigilant watch, so far as possible, over various transactions. When anyone was found guilty of unethieal practices, woe to him, for he would likely find his name and his shady dealings set forth glaringly on the printed page. The editor did not always comment on these matters, but he let his subscribers say what they wished about persons who had played the game unfairly, and he evidently printed their letters verbatim! Several exposures of this sort appear in Webster's magazine, and we find a number of caustic but very sincere characterizations, such as these: "We have the name of —— on our dead-head, snide list . . . After proving he was a liar . . . His promises were worthless and from our experience with him we brand him a liar and a scoundrel." "I have written him several letters since sending scalpel, to which he pays no attention. I guess I am out about $16.00 in eggs. So you see he is an all-around cheat and scoundrel." These excerpts are taken from two different issues and are portions of letters addressed to the editor.

In the February issue of 1889 (Vol. II, No. 2) a new cover design took the place of the "H-O-O!" of the Snowy Owl. The new en-

graving shows a raptorial bird (European Buzzard taken from Coues' *Key*) sitting on a post, with shocks of grain on either side and a shield-shaped frame around the drawing. Above the shield is the title, *The Hawkeye O. and O.* Below the shield are shown three swallows in flight, a large egg, and a nest containing eggs. Openings were left in the engraving for the insertion of the publisher's name and address. subscription rates, volume number, and month. Inside the cover we find it stated that it is "The leading ornithological journal of the Western States . . . Successor to the 'Geologists' Gazette' of Elkader, Iowa. Geological Department a leading feature . . . Papers desiring to suspend can have their lists filled by us at very low rates." The hopes of the editor were high. He says: "Our support has been far better than we expected, fully ample to warrant continuance through coming years and we commence the second volume with the feeling that we can present the bird students of the Western States with more and better reading matter for the money than any other publisher."

The magazine had run through the September issue of 1889 (with a total of 84 pages for the year) when disaster struck. A fire swept through the section of Cresco where the Webster printshop was located. destroying the shop and equipment, young Webster's small museum. and his ambitions for continued publication. "The fire that destroyed that part of the town wherein I had my shop seemed at the time to be the blow that almost killed father", he wrote in later years. The task of re-establishing the newspaper business proved so great that the suspension of the *Hawkeye O. and O.* became permanent, and the Iowa bird magazine of the eighties passed out of existence. No doubt the stock of back numbers was also destroyed in the fire, which may account, in a small degree, for the excessive scarcity of complete sets of this magazine. Today the *Hawkeye O. and O.* is a rare collectors' item, for which there is considerable demand. There appear to be only a few complete sets in existence. And I have heard of perhaps a half dozen sets that lack a few issues of completeness; my own set is in this class. Webster's only further connection with ornithological printing seems to have been in 1895-96 when the Webster firm printed several issues of *The Iowa Ornithologist* for the Iowa Ornithological Association.

After the fire young Webster was engaged in the newspaper business and continued to live at Cresco until 1900. He married Miss Jessie Trumbull of Cresco. Their children were a son, Charles, and daughters Dorothy Ann, Beth, and Mae. In 1900 the Webster family moved to Port Angeles, Washington, where they lived two years. The

next two years were spent at Port Townsend, and for a time Webster published a small weekly magazine known as *Webster's Town Topics* at that place. Returning to Port Angeles in 1904, he joined with his father in purchasing a newspaper in that city. During the rest of his life he participated actively and successfully in the newspaper business in Port Angeles; for many years he published the *Evening News*, a daily, the owner of which he remained until his death. In a reminiscent vein he wrote to me of the old *Hawkeye O. and O.* in 1933: "I had a lot of fun getting it out and made a number of very good friends through the work. It was issued monthly, usually 12 pages, and, believe me, that was a task in those days of hand-set type and a 'two-pages-at-a-time' job press. I often think, when I step into the shop where there are five linotypes and six presses and a bunch of men each of whom earns as much in a day as we did in a week in the old days, that I surely was one of those that were 'born thirty years too soon'. At that, I remember I wasn't anywhere near as tired of the work as I might have been . . ." Continuing, he wrote: "I have never lost my interest in birds. As a matter of fact, I think seeing my first Purple Finch in a patch of heather on a mountain ridge, and my first Hepburn's Rosy Finch at the edge of the ice at the top of a glacier, gave me fully as much pleasure as did the Swallow-tailed Kite I collected in Iowa or the first pelicans I saw in Dakota."

Webster did not let his newspaper work in Washington interfere with the outdoor pursuits that he so much enjoyed. He was active in organization work, was a charter member of the Pacific Northwest Bird and Mammal Society, and one of the founders of the Klahhane Club, which through his publicity and personal direction became one of the leading mountain-climbing organizations in the Pacific Northwest. The club established a headquarters lodge at the first rise above Heart o' the Hills, and fifty or sixty members were often present on week-end trips. Later, the club took over the operation of a tract on Lake Crescent, which Webster developed into beautiful Klahhane Gardens containing an abundance of mountain flowers and plants. A peak on Mount Angeles was named in his honor, and a flower, *Senecio websteri*, found only on Mount Angeles, was named for him. At the time of his death he was working on the Klahhane Museum, which he had been instrumental in establishing. The Webster tract near Mount Angeles was somewhat of a showplace and illustrated admirably the things in which its owner was most interested. There, in a small valley at the foot of the mountain, he had a natural rock garden in which he had planted over a thousand varieties of mountain and prairie

plants. A mountain stream crossed his place from a lake of six acres; at this lake he kept many species of wild ducks in summer, and it contained over five thousand trout. The first step up the mountainside began beside his door, and the scenery there was of the finest. He did much entertaining, and fortunate were those who were privileged to enjoy the hospitality at this mountain retreat. Artists used the wild ducks on his lake as living models for their drawings, botanists came there to study the abundant flora, biologists, ornithologists, and mammalogists came to accompany him on his trips. "You see," he said, "it is an easy matter for me. They have merely to drive out to my place at the foot of the mountain, five miles from the water-front to the peaks of Mount Angeles, 7,000 feet elevation, and stay overnight. In the morning the packs are put on the ponies and we take the four-mile zigzag trail to the top, when, by means of 3500-foot grass ridges connecting the various mountain tops, we can travel all summer, if we wish, and not retrace our steps."

Webster achieved a reputation as a botanist. He had a herbarium of some 2500 sheets, which represented plants from all the mountains of Washington. He also had a considerable collection of mammal skins. As a writer he was always in his element. Besides numerous articles on nature studies, he produced three books. One was "The Friendly Mountain", an intimate word-picture of Mount Angeles, another was "Fishing in the Olympics", composed of a group of fishing anecdotes, and the third was "The King of the Olympics". The last named book resulted from his serious study of elk and other mammals of the Olympic peninsula. It is an authoritative book of 225 pages and fifty illustrations, and the edition was soon sold out.

E. B. Webster died at his home at Port Angeles, Washington, on January 7, 1936, following an illness of three months. During his lifetime he made a particular effort to show others the beauties of the world of nature—first through the medium of the *Hawkeye Ornithologist and Oologist*, and later through his books, his zoological gardens and museum, and his excursions with friends. His acquaintance was an inspiration to all whom he met; his friendly teachings were invaluable aids to those who wished to learn more of nature. The accompanying photograph is very typical and shows him in one of his happiest rôles, gathering wild flowers on the summit of Mount Angeles—the friendly man on "The Friendly Mountain".

Winthrop, Iowa.

EDITORIAL

The Twenty-third Annual Meeting of the Wilson Ornithological Club was held in Indianapolis on November 27-28, 1937. As predicted, it proved to be the largest meeting we have ever held. We hesitate to say it was the best, simply because we have had many excellent programs in the past, and comparison would be difficult. Plans for the meeting had been very carefully laid, and everything connected with the meeting moved along with smoothness and precision. Much of the success of the program was doubtless due to the fact that our officers had arranged for the rental of our own projection apparatus, which was constantly on hand and ready for use.

The following figures give a statistical summary of the organization for the past five years:

	Columbus 1932	Pittsburgh 1934	St. Louis 1935	Chicago 1936	Indianapolis 1937
Local Attendance	92	49	24	62	60
Out-of-town Attendance	65	129	88	70	178
Total Attendance	157	178	112	132	238
Dinner Attendance	69	72	70	54	100
Titles on the Program	35	39	38	26	41
Honorary Members	7	6	6	5	5
Life Members	10	12	11	11	9
Sustaining Members	75	44	42	40	41
Active Members	175	154	189	212	187
Associate Members	469	507	538	640	596
Total Membership	739	721	784	906	838
New Members Added	113	112	141	170	150
Pages in Bulletin	256	288	318	336	320
Total Income	$2191	$2230	$2494	$2222	$2212
Fiscal Balance	$547	$842	$767	$581	$395

Since we have no reviews in this number, we take the liberty of mentioning the new work by Dr. Witmer Stone entitled "Bird Studies at Old Cape May", issued in January, 1938, though dated 1937. The work consists of two volumes, totaling 942 pages, 120 plates, and many text figures, and sold for $6.50 postpaid. Besides being a record of the occurrence of species along this portion of the Atlantic coast, the pages abound with Dr. Stone's observations on the habits of the birds, many of which occur in other parts of the country.

Erratum. The date of birth of John Maynard Wheaton was May 13, 1840, rather than May 18, as erroneously stated in the Wilson Bulletin of December 1937, page 276. This was a typographical error. Those who preserve their Bulletins are invited to make this correction.

GENERAL NOTES

Conducted by O. A. Stevens

Eastern Warbling Vireo in Colorado.— The Eastern Warbling Vireo (*Vireo gilvus gilvus*) is a breeding bird in southeastern Colorado (Trinidad, Las Animas County, and Manzanola, Otero County) and occurs at Holly, Prowers County in migration, according to Dr. Harry C. Oberholser. The specimens listed below, identified by Dr. Oberholser, are in the collection of the Colorado Museum of Natural History.

No. 2190—♂ Trinidad, Las Animas County, May 24, 1910, L. J. Hersey.
No. 2844—♀ Holly, Prowers County, May 16, 1913, F. C. Lincoln.
No. 6160—imm. ♂ Holly, Prowers County, September 12, 1916, F. C. Lincoln.
No. 13889—♂ Manzanola, Otero County, June 17, 1904, H. G. Smith.
No. 13893—Cresswell, Jefferson County, June 9, 1887, H. G. Smith.
No. 14725—♀ Manzanola, Otero County, June 17, 1904, H. G. Smith.

—Alfred M. Bailey, *The Colorado Museum of Natural History, Denver, Colorado.*

A Prairie Falcon and American Rough-legged Hawk Fight.—An interesting battle between a Prairie Falcon (*Falco mexicanus*) and an American Rough-legged Hawk (*Buteo lagopus s. johannis*) was witnessed by the writer on the Crescent Lake Waterfowl Refuge in Garden County, Nebraska, January 31, 1937. For several weeks each bird had occupied a rather definite feeding territory, the two areas being contiguous; but on this day the smaller but swifter falcon attempted to drive away the other bird. One might expect him to win but it wasn't a short battle at all. The falcon would fly up above his larger relative, to seek the same position of advantage that one airplane wants over another in war, but instead of raking with bullets at each sweep he intended to do it with his powerful talons. The rough-leg, however, trained in war for his own existence, met each swoop by skillfully turning over on his back in mid-air, maintained his upside-down attitude with hovering wings and met the falcon's talons with ones even more powerful. It was a pretty battle between two expert aviators! Time after time the falcon attacked, and time after time the rough-leg repulsed, until the former gave up and flew northward to his own feeding grounds leaving the latter to proceed leisurely on his own food quest. His precious territory had been saved!—Walter W. Bennett, *Ellsworth, Nebr.*

A Plucking Experiment with White-crowned Sparrows.—The two common post-juvenile plumages of the White-crowned Sparrow (*Zonotrichia leucophrys*) are characterized by black and white crown stripes in the one case, brown and buff in the other. The former is generally recognized as characteristic of birds past the first prenuptial molt, the latter of birds in their first winter plumage. At Davis, California, the immature type of crown in *Z. l. pugetensis* is replaced by black and white feathers between February 25 and April 10. A similar though somewhat extended season of crown molt is described by Law (*Condor*, 31, 1929, pp. 208-212) for *Z. l. gambeli* in Southern California.

In handling some 366 live specimens of *Z. l. pugetensis* at Davis during the winter seasons of 1935-36 and 1936-37, it was noticed that a large percentage of

the brown-crowned individuals possessed a scattering of black feathers in the head stripes. Since these were particularly noticeable in the regions of heaviest wear, it was assumed that they were replacements growing where the normal immature feathers had been lost through accident. As a check on this assumption, the feathers of the right coronal stripe were removed on three brown-striped (immature) birds taken on October 27, 1936, and on three taken on November 22, 1936.

Banded birds with asymmetrical black and brown crowns were noticed in the vicinity of the traps on December 21 and were seen on numerous occasions during

Fig. 14. Dorsal view of the heads of winter specimens of Puget Sound White-crowned Sparrows (*Zonotrichia leucophrys pugetensis*) taken at Davis, California. The first is a normal immature bird, with a few black feathers in the crown; the second, an immature bird in which the right crown stripe had been plucked; and the third, a normal adult bird.

January and February. One of these (37-120625), collected on February 10, 1937, proved to be one of the plucked birds banded October 27; another (37-120652), trapped and liberated on February 17, was originally taken and plucked on November 22. In both cases the plucked brown feathers of the immature type had been replaced by jet black feathers indistinguishable from those found in typical adult birds. The contrast between the normal brown stripe on the left and the artificially induced black stripe on the right was very striking (Fig. 14). "Bicolored" birds were seen on three subsequent occasions before March 20 when the normal crown molt had practically obliterated these artificial marks of identification.

This simple experiment suggests that the physiological or genetic factor which determines the plumage type (whether immature or adult) is potentially present in the White-crowned Sparrow by the time the bird has reached five months of age, and will produce typically adult crown feathers at least four months before the first prenuptial molt would normally exteriorize it.—John T. Emlen, Jr., *Division of Zoology, University of California, Davis, Calif.*

Mockingbirds in Western Iowa.—Two Mockingbirds (*Mimus polyglottos*) were observed at Luton, Iowa, about five miles east of Brown's Lake in Woodbury County on August 5, 1937. They first attracted my attention by their song, which I mistook for that of a Catbird. When the buzzing song of a Grasshopper Sparrow issued from the same spot I decided to investigate. The birds were found perched in full view in the top of a box elder tree. The second bird was not singing nearly as much as the first. My brother and I followed the first bird for about half an hour during which time it imitated the Mourning Dove, Red-headed Woodpecker, Bob-white, and Blue Jay, as well as the Grasshopper Sparrow which is quite common in the pasture adjoining the feed lot trees where these birds were seen. I uncovered three nests of the Grasshopper Sparrow while mowing the pasture the week of June 21-26. One Mockingbird was seen again in the afternoon and while it sang many notes which we could not identify with those of any other bird, it did no imitations that we had not heard that morning. The next day they could not be found.—Wilfred D. Crabb, *Sioux City, Iowa.*

Unusual Shore Birds in Jefferson County, West Virginia.—The Federal Fish Hatchery at Leetown, West Virginia, has some forty acres of breeding ponds. During late August these ponds are drained, leaving an expanse of mud quite suitable for shore birds. Migrants that are unusual, or rarely seen in the surrounding country, are often quite common on the mud flats at the hatchery. A rather heavy and varied migration of shore birds was noted here this fall. Three species seem worthy of note:

Red-backed Sandpiper (*Pelidna alpina sakhalina*). One was seen October 14, 1937, feeding in company with Pectoral Sandpipers (*Pisobia melanotos*). From October 15 to 17, two individuals were seen. The only other record for this species in the state is a bird found dead at Weston, Lewis County, in November, 1914, which was identified by E. A. Brooks.

Eastern Dowitcher (*Limnodromus griseus*). Two individuals stayed at the hatchery from October 14 to 17, 1937. They were observed each day, and often were feeding with the red-backs. So far as I know the only other records are: P. C. Bibbe saw several at Lake Terra Alta, Preston County, on May 5, 1926; and Maurice Brooks saw large flocks in Barbour County on September 5, 1935.

Wilson's Phalarope (*Steganopus tricolor*). I collected a male of this species at Leetown on September 4, 1937. It was feeding in company with Lesser Yellowlegs (*Totanus flavipes*). The specimen is now in the museum of West Virginia University. Other records for the state are: A. S. Morgan collected one along the Great Kanawha River in August, 1930; the group at Oglebay Park in Wheeling reports having seen an individual in the Northern Panhandle on May 4, 1935. —J. Lloyd Poland, *Martinsburg, W. Va.*

The White-rumped Sandpiper in Illinois.—Because the White-rumped Sandpiper (*Pisobia fuscicollis*) is regarded as a rare migrant throughout most of Illinois, the writers consider it worth while to summarize the following unpublished records of this species in Illinois, peculiarly significant in that all were noted in 1936.

Frank Bellrose, of Ottawa, observed some twenty-five individuals on the mud flats of Sawyer Slough along the Illinois River several miles below Lacon on June 6, 1936; these were intermingled with a large flock of Semipalmated and least Sandpipers.

Richard Allyn, of Waverly, reported seeing two individuals of this species on the mud flats of Lake Springfield at Springfield on August 29, 1936.

For the Chicago region, season-report records of the Chicago Ornithological Society list three records for 1936 (none for 1937), which are as follows: Waukegan, May 17 (Pitelka); Lincoln Park, August 15 (Clark and Black), and October 10 (Clark and Dreuth).

Through the kind permission of Albert J. Franzen, of the Field Museum, Chicago, the writers include the record of a specimen, a female White-rumped Sandpiper, which he obtained on August 30, 1936, at Lake Calumet, Cook County, Illinois.—Frank A. Pitelka and Frank C. Bellrose, *University of Illinois, Urbana, Illinois.*

Coot Swallowed by Fish.—It is an accepted fact that fish are at times consumed by ravenous birds—much to the annoyance of the fishermen. That birds are at times the prey of fish is a novelty of which we know little. An example of the latter case occurred at Lake Apopka, Florida, on November 18, 1937, when Messrs. Charles Helin and Irving Short were fishing for big-mouthed bass. Mr.

Fig. 15

Short was doubly surprised when he hooked a twenty-four inch bass with the legs of a freshly swallowed full-grown Coot still protruding from its mouth. In reporting this unusual incident, Mr. Helin wrote that the bass weighed eight pounds with the Coot and six and three-fourths pounds without it. The Coot was seventeen inches long (from beak to out-stretched legs) and weighed one and one-fourth pounds. (See photo). It was probably captured head first while diving for food.—Clarence Cottam, *U. S. Biological Survey.*

Song Sparrow Records from the Grand Canyon in Northern Arizona.—With reference to Mr. Monson's note on the Song Sparrow in Arizona, (Wilson Bulletin, 1937, p. 295) I wish to call attention to the fact that in my "Check-list of Birds of Grand Canyon National Park", published in July, 1937, by the Grand Canyon Natural History Association, it is stated that Song Sparrows have been seen on the North Rim, South Rim, and in the Canyon Bottom, as well as in Toroweap Valley in Grand Canyon National Monument. A specimen of the Mountain Song Sparrow (*Melospiza melodia fallax*) was collected by A. E. Borell at Neal Springs on the North Rim on September 16, 1934 (Grand Canyon Collec-

tion, No. B-129). Dr. Oberholser states that the canyon is in the range of *fallax*, thus no other subspecies is believed to be in that region. However, Song Sparrows *lighter* in color than the Borell specimen have been frequently observed in the Canyon Bottom and have been known to breed there. It is very likely that this is the Desert Song Sparrow (*M. m. saltonis*), but specimens must be secured for complete identification.—Russell K. Grater, *National Park Service, Denver, Colo.*

The Canada Warbler Breeding Near Toledo, Ohio.—On July 10, 1937, at the eastern bank of a small valley in the "Oak Openings", Swanton Township, Lucas County, I found a male Canada Warbler (*Wilsonia canadensis*) feeding a fledgling a few days out of the nest. Because of the heavy foliage I was unable to collect the young bird and therefore did not take the parent. The fledgling was not seen again, but on July 18 I found the adult female.

This evidence of nesting was not entirely unexpected as I had found singing males in Lucas County on June 20, 1931, in Swanton Township; on June 24, 1931, in Springfield Township; and on June 16, 1935, at the same location in which the breeding bird was found. This last individual was seen and heard by several members of the Cleveland Bird Club who were with me at the time.

According to Dr. Lawrence E. Hicks this species is known to breed otherwise in Ohio only in Ashtabula County ("Distribution of Breeding Birds of Ohio", 1935).—Louis W. Campbell, *Toledo, Ohio.*

Nesting of the Least Tern in Iowa.—Some question has been raised relative to the status of the Least Tern (*Sterna antillarum*) in Iowa. The fourth edition of the "A. O. U. Check-List" records it as breeding "...on islands in the Mississippi and Missouri river systems (formerly at least) to South Dakota and Iowa..." DuMont, in his "Birds of Iowa", says, "An uncommon summer resident...with reports of former breeding in Cerro Gordo and Pottawattamie Counties and probable nesting in Lee County.... Youngworth (Wilson Bulletin, XLII, pp. 102-103) recorded the breeding of this tern in the Sioux City region..." Youngworth saw young terns flying with adults but did not actually find the nests. Circumstances, however, led him to believe that the young were hatched near by.

With T. C. Stephens and W. W. Trusell I have been able to make some interesting observations on the breeding of the Least Tern in Woodbury County, Iowa, and Dakota County, Nebraska. During July and August, 1937, we found a total of fourteen nests, twenty-nine eggs, and two fledglings on the sandbars of the Missouri River. Eleven of the nests were in Dakota County, Nebraska, and three were in Woodbury County, Iowa. We took some thirty or forty photographs besides collecting two eggs and two adult terns.—Bruce F. Stiles, *Sioux City, Iowa.*

Whooping Cranes in Southwestern Missouri, 1937.—On October 19, 1937, Mrs. Fred A. Cahill of Branson, Taney County, Missouri, wrote to Mr. I. T. Bode, Director of Conservation, concerning a large bird which, with two young, had spent the summer along Roark Creek, a stream entering the western end of Lake Taneycomo. Mr. Bode sent me the letter, and subsequent correspondence with Mrs. Cahill has convinced me that her birds were an adult and two young Whooping Cranes. In view of the unusual nature of this record, it seems best in the following account to quote rather extensively from her letters.

A single large, pure white bird with black wing-tips was first seen in late May or early June; the exact date was not recorded. It was seen thereafter by

Mr. and Mrs. Cahill and several neighbors; the wing-spread was estimated at from five to seven feet. On one occasion, the bird "flew into the very top of a dead tree where I could see her perfectly, silhouetted against a green hill beyond. The head is not large—about in proportion of a swan's head to its body. The neck is long and is S-curved—very graceful—the beak is yellow and not much longer than the depth of the head. It flies with the neck extended straight out."

Its calls were of two kinds: (1) A very loud, "rhythmic and rather musical trumpeting—'Tooooo-t-to-toooo' (pause), then repeated with the last note on a descending scale." (2) A savage cry "like the fighting challenge of the grandfather of all fighting tom-cats. Their snarling cry is the one they make when stationary, and the continuous musical trumpeting seems to be their flying note. The snarling cry never changes position or direction and is not very frequently made. We could place the bird by that note; then when it flew we could follow it by the continuous rhythmical trumpeting, which was always from the hatchery west up the creek, anywhere from midnight to three or four o'clock in the morning."

The two young birds were not seen until "after the wheat had been cut", which according to our College of Agriculture was after July 20, 1937, in Taney County. They were first seen by Mr. Cahill one morning at daylight in a wheatfield: he reported that they were "about the size of a good big hen and able to fly". Thereafter they regularly accompanied the old bird on nightly trips to the state fish hatchery, "squawking and trying to imitate her cries".

"After the young birds could fly, we heard the mother bird fly west, evidently from the fish hatchery, where we could hear her give her savage, snarling cry.... When she flew upstream she kept up her rhythmic trumpeting, seemingly almost in time to her wing-beats, there was such regularity about it. The young birds were some distance upstream, because loud as her note is the sound would fade away in the distance and be lost. Then in fifteen minutes or so it would come faintly within hearing again and increase in volume as she approached, and with her the young squawkers. She evidently parked them in a hideaway somewhere upstream and took them each night to the hatchery to feed.... But in the early fall (September) she and the young birds deserted their hideaway seemingly, and made headquarters somewhere on the (White) river farther away, though still where we could hear all three trumpeting and whooping every evening."

The adult and at least one young bird were still about on November 25, and the adult was last heard at 6:15 A. M., December 2.

Such an occurrence as this calls for some theorizing. If the young birds were hatched on their Canadian range (egg-dates May 9 to June 2, according to Bent, 1926, pp. 220-224), they must have migrated south before the middle of July. In view of their size when first seen, this is highly unlikely; also, the old bird was seen and heard for over a month before there was any evidence of the presence of young. If, however, the birds were hatched at or near their summer location, much still remains to be explained. Why only one adult? Why did nesting take place here at all?

The following theory, some points in which were first suggested by Mrs. Cahill, is presented as the only one that appears to the writer to fit the facts: Mating occurred during the spring migration; one of the adults was wounded, stopping the northward journey; nesting began and the wounded parent died, leaving the other (probably the female) to incubate the eggs and rear the young.

There are no extensive marshes in this part of the Ozarks, but the streams are subject to floods and frequently change their courses, leaving temporary and local overflow marshes in one of which a nest-site may have been found.

Word of this unusual occurrence was not received until November, when it was impossible for the writer to make the 225-mile trip to investigate it. Consequently no search for the abandoned nest was undertaken, and under the circumstances it is entirely unlikely that the birds will return next year. Meanwhile the known facts constitute a valuable record, and one can only be thankful that these birds escaped the perennial warfare of state fish hatchery employees against fish-eating birds.—Rudolf Bennitt, *Professor of Zoology, University of Missouri, Columbia, Mo.*

The English Sparrow and Highway Mortality.—On an automobile journey from Albany, New York, to Iowa City, Iowa, and return, August 28-31 and September 7-10, 1937, a round-trip distance of 2117 miles, the writers again tabulated the vertebrate casualties on the highways due to passing motor cars. The data here presented pertain only to our observations on highway mortality with reference to birds in general and the English Sparrow in particular.

On the entire trip we identified a total of 613 English Sparrow (*Passer domesticus*) carcasses on the highways, an average of .289 casualties per mile for this species. For each state or province in which we traveled the recorded number of English Sparrow casualties ranged as follows: Iowa, 55 for 117 miles; Michigan, 110 for 309 miles; Illinois, 125 for 359 miles; Ontario, 170 for 521 miles; Indiana, 57 for 205 miles; New York, 96 for 606 miles.

In addition to the 613 English Sparrows, we recorded the freshly killed carcasses of 22 native birds representing 13 species, 76 domestic fowls, 1 Ring-necked Pheasant, 1 domestic pigeon, and 277 undetermined birds. It is our opinion that a large proportion of the latter were really English Sparrows. For each state or province in which we traveled the number of avian casualties ranged as follows: Iowa, 79; Indiana, 80; New York, 148; Michigan, 154; Illinois, 216; Ontario, 312.

The total number of avian highway casualties recorded was then, 989, an average of .467 per mile. For the five states and the single Canadian province the average avian casualty rate per mile was: Iowa, .675; Illinois, .601; Ontario, .598; Michigan, .498; Indiana, .390; New York, .244.

Several reasonable conclusions may be drawn from these earlier observations presented by the senior writer (Wilson Bulletin, XLVIII, 1936, 276-283) on this subject.

1. In spite of the apparently excessive highway mortality rate among English Sparrows, at least in the territory covered by our records, their actual number of casualties here recorded exceeds by more than five times those cited by us for this bird on any previous trip through practically the same region. Our figures show an average of one dead sparrow for each 3.4 miles traveled on this trip.

2. So far as the section of the country traversed on this journey as well as on our previously recorded ones is concerned, our counts of highway casualties indicate that the greatest density of English Sparrow population lies in the agricultural sections of the Mid-west and southern Ontario. Of the five states and the single Canadian province mentioned in the present account, New York State ranks last in English Sparrow population on the basis of highway mortality counts.

3. Our observations lead us to believe that the heaviest highway toll among English Sparrows is taken not from the individuals feeding on or near the roads

but from the young and more or less inexperienced birds that fly *across* the thoroughfares. Becoming bewildered by the heavy two-way traffic, they often decelerate their flight speed to avoid a car approaching from one direction and are struck by a car speeding in the opposite direction.

4. The greater number of cars now on the highways together with the increased speed at which they are driven is responsible for an ever-ascending rate of avian mortality. The figures cited herein are much higher than we have obtained previously for this particular route or for any other extended motor trip. Our figures show an average of one dead bird for each 2.1 miles traveled on this trip.

5. It is obvious that the highway mortality rate among birds as well as other animals varies seasonally, indeed, probably from day to day. The large number of avian casualties here recorded no doubt was due, in some measure at least, to the heavy traffic associated with the Labor Day (September 6) holiday activities.—Dayton Stoner, *New York State Museum, Albany, N. Y.*, and Lillian C. Stoner, *Albany, N. Y.*

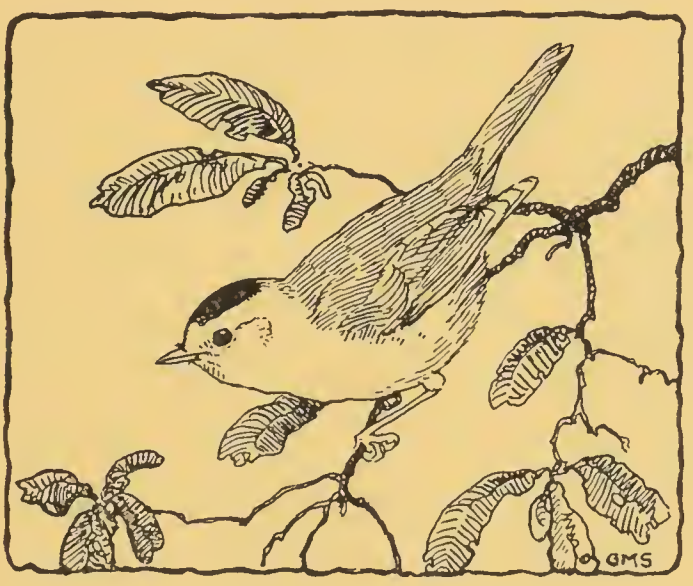
Records of the Woodcock in Iowa.—On November 18, 1937, I found a pair of American Woodcocks on Glover's Creek, near West Union, in Fayette County. And on November 19, 1937, several Woodcocks were noted on the Cramer farm near the Volga River seven miles southwest of Elkader, in Clayton County. Mr. Cramer told me on that date that he had counted as high as twenty Woodcocks along this spring branch near his house.—W. W. Aitken, *Iowa Conservation Commission, Des Moines, Iowa.*

Interrupted Egg-laying of a Marsh Hawk.—On May 12, 1929, in Jerusalem, Lucas County, Ohio, I found a typical nest of a Marsh Hawk (*Circus hudsonicus*) containing four eggs. I marked the spot and on returning on June 29 found two young almost able to fly skulking in the grass at the side of the nest. These I banded. In the nest were two eggs, and supposing them to be addled, I idly broke one with a stick. Much to my surprise it contained a large embryo indicating that it would have hatched within a few days. The other egg I left untouched but was unable to return again to the nest.—Louis W. Campbell, *Toledo, Ohio.*

Four Ohio Records of Golden Eagle.—The rarity of the Golden Eagle (*Aquila chrysaëtos*) in this section is of enough interest to record the following occurrences. Two were caught in Highland County in December, 1934, one in November, 1937, and one in Adams County in November, 1937. The first, with a wing spread of more than seven feet, was captured on the Herbert Shaffer farm near Lynchburg by Albert Chaney. It was caught by the toes in a trap set for a hawk and six inches away in another trap was a Marsh Hawk (*Circus hudsonius*). The second bird, caught by Bob West on his farm, had an injured leg and a wing spread of eight feet. The third eagle was caught by Bert Campbell along the side of the road on Blue Creek in the southern part of Adams County. Its wing spread was six feet and six inches. The fourth was captured by Mrs. Maude Matthews at Butler Springs. She surprised it in a chicken raid and wounded it with a shotgun. Its wing spread was seventy-six inches. It is illegal to kill the Golden Eagle in Ohio and the four birds were turned over to the proper authorities.—Katie M. Roads, *Hillsboro, Ohio.*

The Wilson Ornithological Club

Twenty-third Annual Meeting



INDIANAPOLIS, INDIANA

December 27-28, 1937

HEADQUARTERS AT THE ENGLISH HOTEL

SESSIONS IN THE BALL ROOM OF THE
COLUMBIA CLUB

Visitors Are Welcome

PROGRAM

Monday, December 27

9:00 A.M.

Registration, Vestibule, Ball Room of the Columbia Club

When registering on this day members are urged to purchase tickets for the Annual Banquet on Tuesday evening. These may be obtained at the Registration Desk.

9:30 A.M.

Opening Session

Address of Welcome.
Richard Lieber, President, National Conference on State Parks.

Business Session. This occasion will involve the reading of the minutes of the previous meeting, reports of officers, appointment of temporary committees, and the election of members.

1. The Contributions of Life History Studies to Taxonomic Ornithology. 15 minutes.
   Miles D. Pirnie, *W. K. Kellogg Bird Sanctuary, Battle Creek, Michigan.*

2. Interesting Bird Observations at Lexington, Virginia. 10 minutes.
   J. Southgate Y. Hoyt, *Lexington, Virginia.*

3. The Sense of Smell in the Turkey Buzzard. 15 minutes.
   Victor Coles, *Laboratory or Ornithology, Cornell University.*

4. Woodcock Nesting Studies in Maine. (Lantern Slides). 15 minutes.
   Gustav Swanson, *Division of Entomology and Economic Zoology, University of Minnesota.*

5. Effects of Drouth on Wild Life. (Lantern Slides). 10 minutes.
   Douglas E. Wade, *University of Wisconsin.*

6. Remarks on Vernacular and Subspecific Names. 10 minutes.
   O. A. Stevens, *North Dakota Agricultural College.*

7. Recording Sounds of Wild Birds, Its Study and Uses. (Lantern Slides and Phonograph). 20 minutes.
   Albert R. Brand, *Laboratory of Ornithology, Cornell University.*

12:30 P.M.

Luncheon Hour

Suitable places for noon lunches near the Columbia Club are the *Canary Cottage,* one square away on Monument Circle, the *Betsy Ross Candy and Tea Shop,* one square away on Ohio Street, the *Russet Cafeteria,* one square away on Washington Street, near Meridan, and several department store tea rooms one square away.

2:00 P.M.

Afternoon Session

8. Konrad Lorenz and Bird Behavior. 20 minutes.
   MARGARET MORSE NICE, *Chicago, Illinois.*

9. Recent Observations on the Greenland Wheatear in Baffin Land. (Lantern Slides). 10 minutes.
   JOHN RIPLEY FORBES, *Ithaca, New York.*

10. Mississippi's Quail Conservation Program. 15 minutes.
    FANNYE A. COOK, *State Game and Fish Commission, Mississippi.*

11. Further Notes on the Nesting Habits of Spotted Sandpipers. (Lantern Slides and Motion Pictures). 15 minutes.
    THEODORA NELSON, *Hunter College of the City of New York.*

12. Behaviorism of the Murre in Relation to Gull Damage on the Nesting Ground. (Motion Pictures). 20 minutes.
    R. A. JOHNSON, *State Normal School, Oneonta, New York.*

13. Sandhill Crane Studies in Michigan. (Lantern Slides and Motion Pictures). 20 minutes.
    LAWRENCE H. WALKINSHAW, *Battle Creek, Michigan.*

14. Tropical Birds. (Motion Pictures). 15 minutes.
    P. J. REMPEL, *University of Southern California.*

15. Bird Islands of Peru. (Motion Pictures). 15 minutes.
    P. J. REMPEL, *University of Southern California.*

Tuesday, December 28

9:00 A.M.

A Symposium on Alexander Wilson

16. Alexander Wilson as an Ornithologist.
    ALBERT F. GANIER, *Nashville, Tennessee.*

17. Alexander Wilson as a Poet.
    GORDON WILSON, *Western Kentucky State Teachers College.*

18. Alexander Wilson as an Artist. (Lantern Slides).
    GEORGE MIKSCH SUTTON, *Laboratory of Ornithology, Cornell University.*

10:00 A.M.

Morning Session

19. Variation in the Abundance of Birds in Northern Ohio. (Lantern Slides). 15 minutes.
    S. CHARLES KENDEIGH, *University of Illinois and Baldwin Bird Research Laboratory.*

20. Factors Involved in the Economic Status of Predatory Birds. (Lantern Slides). 15 minutes.
    FREDERICK M. BAUMGARTNER, *Department of Conservation, Game Division, Michigan.*

21. Nocturnal Bird Vocalization in a Beech-Maple Forest. 5 minutes.
    J. C. PLAGGE, *Department of Zoology, University of Chicago.*

22. Shore Birds Attracted to Streams Polluted with Sewage. 5 minutes.
    EDWIN LINCOLN MOSELEY, *Bowling Green State University, Ohio.*

23. Social Hierarchy in the Canary. 15 minutes.
    HURST H. SHOEMAKER, *Department of Zoology, University of Chicago.*

24. Individual and Specific Reaction to Color among Birds. 15 minutes.
    A. L. PICKENS, *Paducah Junior College, Kentucky.*

25. Does Castration Affect the Migration of Birds? 10 minutes.
    HARRY W. HANN, *Zoology Department, University of Michigan.*

26. Traveling with the Migrant Birds. 10 minutes.
    FRED T. HALL, *Crawfordsville, Indiana.*

12:30 P.M.

Luncheon Hour

At the beginning of the Luncheon Hour a group photograph will be taken. All members are urged to be present.

2:00 P.M.

Afternoon Session

27. Experiments in Feather Marking of Tree Sparrows for Territory Studies. (Lantern Slides). 15 minutes.
    A. MARGUERITE BAUMGARTNER, *East Lansing, Michigan.*

28. Birds of an Earthquake Lake. (Motion Pictures). 20 minutes.
    KARL H. MASLOWSKI, *Cincinnati Society of Natural History.*

29. Some Minnesota Birds. (Motion Pictures). 15 minutes.
    W. J. BRECKENRIDGE, *Museum of Natural History, University of Minnesota.*

30. An Ornithological Survey of Oklahoma. (Lantern Slides and Motion Pictures). 20 minutes.
    GEORGE MIKSCH SUTTON, *Laboratory of Ornithology, Cornell University.*

31. Ornithological Work at Little America, Antarctica. (Lantern Slides and Motion Pictures). 30 minutes.
    ALTON A. LINDSEY, *Biology Department, American University.*

32. A Season with Camera and Microphone. (Sound Motion Pictures). 30 minutes.
    ARTHUR A. ALLEN, *Laboratory of Ornithology, Cornell Universiy.*

Final Business Session. This occasion involves the reports of temporary committees, election of officers, and adjournment.

6:30 P.M.

Annual Banquet

The Annual Banquet of the Wilson Ornithological Club will take place in the Columbia Club, the exact room to be announced. Tickets must be obtained at the Registration Desk before Tuesday noon. Price $1.75 each. Dress will be informal.

After the Banquet Mr. Cleveland P. Grant of the Baker-Hunt Foundation will show his motion picture film entitled: "Birds of Prairie and Woodland."

Alternate Papers

The following papers will be given as substitutes for vacancies that may occur on the program:

The Role of the Amateur in Bird Geography. (Lantern Slides). 15 minutes.
Josselyn Van Tyne, *Museum of Zoology, University of Michigan.*

1937 Explorations on the Missouri River. (Lantern Slides). 10 minutes.
T. C. Stephens, *Morningside College, Iowa.*

Peregrines of Percé. (Motion Pictures). 25 minutes.
Cleveland P. Grant, *Baker-Hunt Foundation, Covington, Kentucky.*

The Birds of Machias Seal Island. (Motion Pictures). 20 minutes.
Olin Sewall Pettingill, Jr., *Department of Zoology, Carleton College, Minnesota.*

A Late Summer Adirondack and New England Coast Bird Trip. 15 minutes.
William C. Baker, *Salem, Ohio.*

The Rate of Growth of English Sparrow Fledglings. 15 minutes.
Richard Lee Weaver, *Laboratory of Ornithology, Cornell University.*

A Unique Shorebird Population in Northern Ohio. (Lantern Slides). 15 minutes.
Lawrence E. Hicks, *Ohio State University.*

Officers of the Wilson Ornithological Club

President, Josselyn Van Tyne, *Museum of Zoology, Ann Arbor, Michigan.*

1st Vice-President, Margaret Morse Nice, *5708 Kenwood Avenue, Chicago, Illinois.*

2nd Vice-President, Lawrence E. Hicks, *Ohio State University, Columbus, Ohio.*

Secretary, Olin Sewall Pettingill, Jr., *Carleton College, Northfield, Minnesota.*

Treasurer, Samuel Elliott Perkins, III, *709 Inland Building, Indianapolis, Indiana.*

Editor of *'The Wilson Bulletin,'* T. C. Stephens, *Morningside College, Sioux City, Iowa.*

Additional Members of the Executive Council

Albert F. Ganier, *Nashville, Tennessee.*
Alfred M. Bailey, *Colorado Museum, Denver, Colorado.*
S. Charles Kendeigh, *University of Illinois, Champaign, Illinois.*

The Local Committee

Samuel Elliott Perkins, III, *Chairman*
Grant Henderson Frank Johnson Margaret R. Knox Ralph M. Krieber
Harold A. Zimmerman

INDIANAPOLIS ATTRACTIONS

The home of Benjamin Harrison, former United States President, is located at Delaware and Thirteenth Street, and is now remodeled as a shrine. James Whitcomb Riley's long-time home is to be seen on Lockerbie Street. Other points of interest are the John Herron Art Institute, Henry Smith Library, and the State Historical Building. Members wishing to visit the Woollen's Gardens of Birds and Botany, ten miles northeast of Indianapolis, may secure directions from any member of the Local Committee.

PROCEEDINGS OF THE WILSON ORNITHOLOGICAL CLUB

By Olin Sewall Pettingill, Jr., Secretary

The Twenty-third Annual Meeting of the Wilson Ornithological Club was held, for the first time in its history, at Indianapolis, Indiana, on December 27-28, 1937. Headquarters were located at the English Hotel and the sessions convened in the Ball Room of the Columbia Club. The Wilson Ornithological Club was one of the many organizations meeting in affiliation with the American Association for the Advancement of Science.

Short business sessions were held Monday morning and Tuesday afternoon. The Executive Council met on two occasions, once at the Treasurer's home on the evening of December 26, and again on Monday evening. The program sessions were four in number, there being one each morning and afternoon. The Annual Banquet took place in the Columbia Club on Tuesday evening.

Business Sessions

The short business sessions were called to order by President Josselyn Van Tyne on Monday morning at 9:45 A. M. and on Tuesday afternoon at 4:45 P. M. The minutes of the previons meetings were approved without being read since they had been published previously in the Wilson Bulletin. The reports of the Secretary and Treasurer were read and approved. The Secretary's report showed a total membership of 838. Altogether 150 new members were obtained during the year. The increased interest of members in the organization was shown by the large number of requests for program positions and the satisfactory returns from the questionnaires recently submitted to members. The Treasurer's report announced total receipts from November 25, 1936, to December 24, 1937, of $2,212.31 and total disbursements during this same period of $1,816.97, leaving a balance of $395.34. The total endowment fund of the organization now stands at $2,343.65. This figure is considerably larger than heretofore, the Club having received from the Leon Otley Pindar Estate the stated amount of $843.88. The Editor gave his report making numerous worthwhile recommendations for future issues of the Wilson Bulletin and relating interesting accounts of his various duties during the past year. The report of the Librarian was read in his absence by the Secretary.

The President appointed three temporary committees. They were:

Resolutions, George M. Sutton, O. A. Stevens, Miss Theodora Nelson.

Auditing, W. J. Breckenridge, Lawrence H. Walkinshaw.

Nominating, Lynds Jones, Mrs. H. J. Taylor, Jesse M. Shaver.

The Resolutions Committee presented the following resolution which was adopted by motion:

Resolved, that the Wilson Ornithologieal Club expresses its gratitude to Mr. Samuel E. Perkins III, of Indianapolis, for his unselfish and untiring activities as Chairman of the Local Committee of Arrangements, to Miss Margaret R. Knox, also of Indianapolis, for her assistance as a member of the Local Committee, to the Indianapolis Chamber of Commerce, the gentlemen of the Press, and the officers of our Club for their generous coöperation in making this, the 1937 meeting, a memorably successful meeting of the Wilson Ornithological Club.

The Nominating Committee offered the following report:

President—Margaret M. Nice, 5708 Kenwood Avenue, Chicago, Illinois.

First Vice-President—Lawrence E. Hicks, Ohio State University, Columbus, Ohio.

Second Vice-President—George Miksch Sutton, Cornell University, Ithaca, New York.

Secretary—Olin Sewall Pettingill, Jr., Carleton College, Northfield, Minnesota.

Treasurer—S. E. Perkins III, 709 Inland Building, Indianapolis, Indiana.

Editor—T. C. Stephens, Morningside College, Sioux City, Iowa.

Additional Members of the Executive Council—

Albert F. Ganier, Nashville, Tennessee.

S. Charles Kendeigh, University of Illinois, Champaign, Illinois.

Miles D. Pirnie, Kellogg Bird Sanctuary, Augusta, Michigan.

The report of the Nominating Committee was accepted by motion and the Secretary was authorized to cast one ballot for the nominees, thus electing them officers of the Wilson Ornithological Club for the ensuing year.

An amendment to Article III, Section 4, of the Constitution was proposed allowing all past presidents of the Wilson Ornithological Club to serve as *ex-officio* members of the Executive Council. The section, as amended, would read: "The officers and past presidents of the Club and three additional members, who shall be elected from its voting members by the Club, shall constitute an Executive Council. The business of the Club . . ." This amendment will be voted upon at the next Annual Meeting.

Meetings of the Executive Council

Numerous important matters were discussed and passed upon during the meetings of the Executive Council.

The Museum of Zoology at Ann Arbor, Michigan, was chosen as the place of the next Annual Meeting. It will be held on Friday and Saturday, November 25 and 26, 1938.

Dr. Emil Witschi, of the University of Iowa, was appointed Council Delegate of the Wilson Ornithological Club to the Ninth International Ornithological Congress at Rouen, France, from May 9 to 13, 1938.

The Secretary was instructed to send out the program of the next Annual Meeting to each member of the Club a week or ten days in advance. This innovation will necessitate mailing the annual letters to members much earlier than heretofore and will require members to submit titles for papers at least three or four weeks prior to the meeting.

The President was authorized to appoint a Program Committee whose primary function will be that of aiding the Secretary in selecting papers and in arranging the various details of the annual meetings. The President was also given authority to appoint an Index Committee to direct plans for publishing an index to the Wilson Bulletin.

Program Sessions

The program sessions began on Monday morning at 9:30 A. M. with an address of welcome by Colonel Richard Lieber, President of the National Conference on State Parks. This was followed by a response on behalf of the Club by President Van Tyne.

Altogether thirty-one papers were presented while four others were given at the Annual Banquet and six others were read by title. An outstanding feature of these sessions was a Symposium on Alexander Wilson led by Mr. Albert F. Ganier, Dr. Gordon Wilson, and Dr. George Miksch Sutton, who discussed ad-

mirably the relative merits of Wilson as ornithologist, poet, and artist, respectively. A large portion of the morning papers were technical; some were illustrated by lantern slides, one by phonograph. The majority of the afternoon papers, on the other hand, were popular in nature and were illustrated with remarkably fine motion pictures in black and white, in color, and with sound.

The program of papers, together with brief abstracts, is given below in the order presented. Due to last-minute changes in the program, the order of papers and the times allotted each paper differ somewhat from the original printed program.

Opening Session, Monday Morning

1. The Contribution of Life History Studies to Taxonomic Ornithology. (8 minutes). Miles D. Pirnie, *W. K. Kellogg Bird Sanctuary, Augusta, Michigan.*

   The values of life history studies were enumerated; and ornithologists should feel a greater appreciation of the work of taxonomists.

2. Interesting Bird Observations at Lexington, Virginia. (7 minutes). J. Southgate Y. Hoyt, *Lexington, Virginia.*

   A report of some rather unusual birds recorded at Lexington, Virginia, containing (1) observations on migration with special attention to numbers of birds passing before the moon at night, and (2) observations on the courtship of a pair of Whip-poor-wills.

3. The Sense of Smell in the Turkey Buzzard. (14 minutes). Victor Coles, *Laboratory of Ornithology, Cornell University.*

   Studies on the senses of sight and smell have been going since the time of Audubon. This author presented the results of his own experiments at Cornell University. (1) Food was presented in a natural set-up. (2) Food was hidden by boxes, newspapers, etc. (3) Food disguised in models. (4) Food hidden in a maze. Results of the experiments seemed to show that (a) the sense of smell is not strong in Turkey Buzzards; (b) both sight and smell aid the Turkey Buzzard in obtaining food, but sight predominates.

4. Woodcock Nesting Studies in Maine. Illustrated by Lantern Slides. (23 minutes). Gustav Swanson, *Division of Entomology and Economic Zoology, University of Minnesota.*

   The Woodcock is a common nesting bird in Eastern Maine where these studies were carried on under the auspices of the University of Maine, the Maine Division of Inland Fisheries and Game, and the U. S. Bureau of Biological Survey. The studies in 1937 of a total of 24 nests and over 50 singing fields of the male resulted in interesting contributions to our knowledge of (1) Woodcock breeding habits, and (2) predation upon Woodcock.

5. Remarks on Vernacular and Subspecific Names. (8 minutes). O. A. Stevens, *North Dakota Agricultural College.*

   The relative stability of common names of birds has been a great satisfaction. Changes have been made from time to time and probably will and should be made. Correlation of subspecific characters with distribution, climate, etc., is an important field of study, but the use of subspecific names, either vernacular or scientific, adds little if not based upon accurate determinations and often is objectionable.

6. Recording Sounds of Wild Birds, Its Study and Uses. Illustrated by Lantern Slides and Phonograph. (31 minutes). Albert R. Brand, *Laboratory of Ornithology, Cornell University.*

   A description of the apparatus and technique of bird sound recording. The following matters are discussed: (1) The methods used in microscopic study of the vibrations of bird song; (2) the educational uses or sound recording, *i. e.*, combined with motion pictures, reproduced on phonograph records and

records for the blind; (3) the "storage" value of sound recording, *i. e.*, making records of disappearing species so that their sounds will be preserved even though they become extinct.

7. A Late Summer Adirondack and New England Coast Bird Trip. (19 minutes). William C. Baker, *Salem, Ohio.*

An ornithological account of visits made to such interesting points as Mt. Marcy, Machias Seal Island, and Monomoy Point. A total of 142 species were observed.

Monday Afternoon

8. Konrad Lorenz and Bird Behavior. (15 minutes). Margaret Morse Nice, *Chicago, Illinois.*

Lorenz's basic principle is the following: All especially striking colors and forms of plumage and special behavior patterns are releasers of instinctive behavior in other members of the species. This is the only hypothesis to explain that combination of simplicity and improbability which is their commonest and most striking characteristic.

9. The Rate of Growth of English Sparrow Fledglings. Illustrated by Lantern Slides. (18 minutes). Richard Lee Weaver, *Laboratory of Ornithology, Cornell University.*

Two topics are considered: (1) The appearance of the young during the fifteen days in the nest. Slides made from photographs show the different stages of development. (2) A statistical analysis of the rate of growth with comparisons of families and individuals by means of graphs and charts reproduced on slides.

10. Mississippi's Quail Conservation Program. (7 minutes). Fannye A. Cook, *State Game and Fish Commission, Mississippi.*

Quail were found nesting in all but two counties. Ten thousand quail were banded and distributed, one pair to each forty acres.

11. Further Notes on the Nesting Habits of Spotted Sandpipers. Illustrated by Lantern Slides and Motion Pictures. (33 minutes). Theodora Nelson, *Hunter College of the City of New York.*

A discussion of certain recently observed details such as time of arrival on nesting grounds, distinction in plumage as well as in size between males and females, early spring behavior (*i. e.*, flocking, playing), mating and selection of territory, egg-laying and nest-building, and the behavior of the male at this time, time when female incubates, evidences of second nestings, decrease in the weight of eggs and its significance to one studying nests.

12. Behavior of the Murre in Relation to Gull Damage on the Nesting Ground. Illustrated by Motion Pictures. (26 minutes). R. A. Johnson, *State Normal School, Oneonta, New York.*

A colony was studied from a blind. Emphasis was placed on the psychology of behavior. Full paper to be published in the Wilson Bulletin.

13. Sandhill Crane Studies in Michigan. Illustrated by Lantern Slides and Motion Pictures. (18 minutes). Lawrence H. Walkinshaw, *Battle Creek, Michigan.*

The studies include observations on migration; the sizes of nests and the materials to be found in them; the sizes and weights of eggs and their decrease in weight during incubation; nesting dates; measurements, weights, and color of young; spring, summer, fall, and nesting behavior. A discussion of the probable future of the species is presented.

14. Tropical Birds. Illustrated by Motion Pictures Obtained during the Hancock Pacific Expeditions. (21 minutes). P. J. Rempel, *University of Southern California.*

Excellent motion pictures showing the courting dance of the Galapagos Albatross, the Flightless Cormorants of Albemarle, the Boobies from Hood Island, and the Man-o'-war-bird, Flamingo, and Yellow-crowned Night Heron.

15. Bird Islands of Peru. Illustrated by Motion Pictures obtained during the Hancock Pacific Expeditions. (14 minutes). P. J. Rempel, *University of Southern California.*

Remarkably fine motion pictures of the famous Guanayes nesting on some of the islands off of the Peruvian Coast.

Tuesday Morning

A Symposium on Alexander Wilson

16. Alexander Wilson as an Ornithologist. (13 minutes). Albert F. Ganier, *Nashville, Tennessee.*

17. Alexander Wilson as a Poet. (21 minutes). Gordon Wilson, *Western Kentucky State Teachers College.*

The poetry of Wilson falls into two natural divisions, (1) that written in Scotland, and (2) that written in America; but all his work is related in being full of accurate observations of nature and also full of the good-humored, canny sense of the author. His most important Scottish poem is "Watty and Meg", which ranks with "Tam o' Shanter" in Scotland as a faithful picture of low life. The peddler poems, though not up to Wilson's standard as literature, are "episodes in an unwritten chapter of our history," the history of peddling. The satires against the manufacturers of cloth are part of the literature of the struggle between capital and labor and are interesting in the life of Wilson as being the immediate cause of his leaving Scotland for America. The three poems recited at the Pantheon were the means of introducing Wilson to the literary circles of Edinburgh, while one of them, "The Laurel Disputed", ranks with Wilson's best poems written in America.

Scattered all through his poems are references to nature that show Wilson's love of the out-of-doors and his accuracy of observation. His best nature poems written in Scotland are "The Disconsolate Wren" and "Lochwinnoch". Though Wilson wrote many poems after arriving in America, his best work is found in "The Invitation", "The Solitary Tutor", "A Rural Walk", the bird poems, and "The Foresters". Of these "The Foresters", his longest poem, represents most completely his ideas as a poet. The poem is a natural-history journey through typical American scenes and is designed to show a representative view of American life. All of his American poems are intimately connected with his journeys, his teaching days, and his masterpiece, the "American Ornithology". As a poet Wilson ranks in Scotland among the second group of poets, the one just below Burns and Ramsay; in America he had only one contemporary rival, Philip Freneau.

18. Alexander Wilson as an Artist. Illustrated by Lantern Slides. (37 minutes). George Miksch Sutton, *Laboratory of Ornithology, Cornell University*

Wilson was the first man to undertake a more or less complete set of paintings of American birds, and while his drawings are to be considered charts rather than artistic designs, they are nevertheless of great scientific and historic interest. Not much concerning Wilson's problems and methods as an artist appears in his numerous letters, but we know that the engraver, Alexander Lawson, had a good deal to do with the appearance of the final plates.

It is a surprising fact that Wilson showed no particular bent toward bird drawing, or indeed toward any kind of drawing, during his childhood. Not happy as a weaver and as a peddler of fabrics, he came to America as a young man, did not succeed very brilliantly as a teacher, and suddenly, at the suggestion of his friend, William Bartram, turned to bird painting. The germ of the artist was there all the while, of course, but adverse circumstances and bitter disillusionment were required to develop it.

19. Variation in the Abundance of Birds in Northern Ohio. Illustrated by Lantern Slides. (22 minutes). S. Charles Kendeigh, *University of Illinois and Baldwin Bird Research Laboratory.*

A consideration of the following matters: (1) Yearly variations in the breeding population of the House Wren and other nesting birds at the Baldwin Laboratory, and in the wintering population of the Bob-white and common birds of forests and open country. (2) Yearly variations in respect to cycles and sunspots. (3) Differences in absolute abundance of birds with change in habitat. (4) Methods of calculating bird abundance using different census methods.

20. Factors Involved in the Economic Status of Predatory Birds. Illustrated by Lantern Slides. (21 minutes). Frederick M. Baumgartner, *Department of Conservation, Game Division, Michigan.*

Based on the study of the food habits of the Great Horned Owl. The economic status of this bird varies in the eastern and western parts of its range. In agricultural areas these owls eat injurious rodents, and balance the harm they do to poultry. Status of predators should not be decided until we are able to balance their good qualities against their harmful ones.

21. Nocturnal Bird Vocalization in a Beech-Maple Forest. (4 minutes). J. C. Plagge, *Department of Zoology, University of Chicago.*

The nocturnal vocal activities of birds were studied in a beech-maple forest near Smith, Indiana, May 29 and 30, 1937. The order in which various species of birds stopped singing in the evening and then began singing in the morning was determined.

22. Shore Birds Attracted to Streams Polluted with Sewage. (4 minutes). Edwin Lincoln Moseley, *Bowling Green State University, Ohio.*

Several kinds of shore birds on returning to Ohio after nesting farther north found good feeding grounds along a small stream just below where sewage entered. The birds continued to use these feeding grounds year after year until a sewage disposal plant was constructed and began operation. These birds have not since returned.

23. Social Hierarchy in the Canary. (20 minutes). Hurst H. Shoemaker, *Department of Zoology, University of Chicago.*

The relation between social hierarchy (peck order) and territory, breeding season, sex, and other factors is shown. Family organization within the flock is demonstrated. Comparison is made with social hierarchy in other species.

24. Individual and Specific Reaction to Color Among Birds. (16 minutes). A. L. Pickens, *Paducah Junior College, Kentucky.*

1. A geographic factor apparently figures in color in many families; for example, the luminous colors of the Trochilidae appear in sequence from polar to equatorial regions as if one were working around an artist's color wheel. 2. Some species appear to be influenced more strongly by certain colors in nature: other species by a different set, but the red side of the color wheel seems to best attract attention. 3. A difference, however, is indicated between individuals of the same species for some show a preference for red, others for a bluish violet, etc.

25. Does Castration Affect the Migration of Birds? (6 minutes). Harry W. Hann, *Zoology Department, University of Michigan.*

In the year 1933 and in 1934 the speaker carried out a series of experiments in the castration of male birds in an effort to find out, if possible, what effects it would have on their migration. The birds used were trapped at a banding station, operated on in the laboratory under an anesthetic, and released at the station usually on the following day. Both testes were removed from twenty-nine White-throated Sparrows, five Red-eyed Towhees, and three Slate-colored Juncos. Most of these birds remained around the station, coming into the

traps frequently for food until the incisions healed, then left. One Red-eyed Towhee returned two years later. The experiments indicate that the presence of testes is not necessary for the migration of male birds.

TUESDAY AFTERNOON

26. Experiments in Feather Marking of Tree Sparrows for Territory Studies. Illustrated by Lantern Slides. (26 minutes). A. MARGUERITE BAUMGARTNER, *East Lansing, Michigan.*

A comparison of the effectiveness of various dyes and color combinations experimented with in feathering Tree Sparrows at Cornell University and an analysis of the winter range of a flock of eighty-one winter birds marked so that individuals could be recognized in the field.

27. Birds of an Earthquake Lake. Illustrated by Colored Motion Pictures. (24 minutes). KARL H. MASLOWSKI, *Cincinnati Society of Natural History.*

The speaker in company with Peter Koch, of Cincinnati, spent several weeks in June, 1937, photographing and studying the birds of the Reelfoot Lake region of Tennessee. Beautiful motion pictures of such birds as the American Egret, Ward's Heron, Double-crested Cormorant, and Least Tern show many of the interesting results obtained.

28. Some Minnesota Birds. Illustrated by Colored Motion Pictures. (14 minutes). W. J. BRECKENRIDGE, *Museum of Natural History, University of Minnesota.*

A delightful series of motion pictures of such birds as the Least Bittern, Yellow-headed Blackbird, Pigeon Hawk, and Wood Duck.

29. An Ornithological Survey of Oklahoma. Illustrated by Colored Lantern Slides and Colored Motion Pictures. (24 minutes). GEORGE MIKSCH SUTTON, *Laboratory of Ornithology, Cornell University.*

John B. Semple, Karl W. Haller, Leo A. Luttringer, Jr., and the speaker made a state-wide survey of the bird life of Oklahoma during the spring of 1937. Beginning in the southeastern corner of the State they spent some time collecting in McCurtain County, the Arbuckle Mountains, the Wichita Mountains, Roger Mills County, Ellis County, the extreme Western Panhandle, the eastern edge of the Panhandle, and at several points in the northern and northeastern part of the State. They added several forms to the State List, found an amazing concentration of hybridization in the southwestern section, taking a series of what appeared to be hybrid orioles, some hybrid buntings, and other birds not easily identifiable because of intergradation. On May 21 the party was caught in a black-dust storm at Kenton.

30. Ornithological Work at Little America, Antarctica. Illustrated by Lantern Slides and Motion Pictures. (35 minutes). ALTON A. LINDSEY, *Biology Department, American University.*

An account of the ornithological work during the Second Byrd Antarctic Expedition. Particularly outstanding were the splendid motion pictures of the Emperor and Adélie Penguins and the Snow Petrels.

31. A Season with Camera and Microphone. Illustrated by Sound Motion Pictures. (31 minutes). ARTHUR A. ALLEN, *Laboratory of Ornithology, Cornell University.*

Six papers were read by title. They were:

Effects of Drouth on Wild Life. DOUGLAS E. WADE, *University of Wisconsin.*

Recent Observations on the Greenland Wheatear in Baffin Land. JOHN RIPLEY FORBES, *Ithaca, New York.*

Traveling with the Migrant Birds. FRED T. HALL, *Crawfordsville, Indiana.*

The Rôle of the Amateur in Bird Geography. JOSSELYN VAN TYNE, *Museum of Zoology, University of Michigan.*

1937 Explorations on the Missouri River. T. C. Stephens, *Morningside College, Iowa.*

A Unique Shorebird Population in Northern Ohio. Lawrence E. Hicks, *Ohio State University.*

The Annual Banquet

One hundred members and friends attended the Annual Banquet on Tuesday evening. President Josselyn Van Tyne served as toastmaster and introduced the four speakers of the evening. Dr. Lynds Jones, a Founder of the Club and for many years Editor of the Wilson Bulletin, told in a delightfully amusing manner some of the early struggles of the Club and many of the difficulties of financing and publishing the first numbers of the Bulletin. Dr. R. M. Strong, also a Founder of the Club and for many years its Secretary, spoke briefly on the progress being made with his bibliography of birds, an undertaking of no small proportions. It is gratifying to learn that a part of it is now in galley proof. Mr. Cleveland P. Grant, of the Baker-Hunt Foundation, showed some of his expertly taken motion pictures. Titled "Birds of Prairie and Woodland", they depicted intimate glimpses of such elusive birds as the Prairie Chicken, Ruffed Grouse, and American Woodcock. At a special request he presented his more recently taken film, "The Peregrines of Percé". Those persons present who had visited Percé Rock on the Gaspé peninsula appreciated many of the technical difficulties with which Mr. Grant was confronted while obtaining his remarkable shots of the Duck Hawk against a background of Gannets, Spotted Sandpipers, and Herring Gulls. Dr. Olin Sewall Pettingill, Jr., of Carleton College, showed a portion of his colored motion picture film, "The Birds of Machias Seal Island", featuring particularly the nesting habits and general behavior of the Arctic Terns and Atlantic Puffins.

Attendance

The total attendance at the Indianapolis meeting was the largest in the history of the organization, the next largest meeting being that of the Pittsburgh meeting in 1934 when 178 persons registered. Altogether 238 persons were present. They included 2 Founders, 84 members, and 154 visitors. The group photograph contained 81 of the persons in attendance.

Particularly pleasing was the large local attendance of 60 persons and the total Indiana attendance of 93 persons. Representatives from 26 states and the District of Columbia were present. Next to Indiana the state with the largest representation was Kentucky with 21 persons.

Thirty-five universities, colleges, and normal schools or teachers colleges were represented. They were:

Universities—American, Bowling Green State (Ohio), Chicago, Cornell, Georgia, Illinois, Iowa, Johns Hopkins, Loyola, Michigan, Minnesota, Missouri, Nebraska, Ohio, Ohio State, Purdue, Southern Methodist, Vanderbilt.

Colleges—Carleton, College of St. Catherine, Goshen, Hunter College of the City of New York, Morningside, North Dakota Agricultural College, Oberlin, Principia, Sweet Briar.

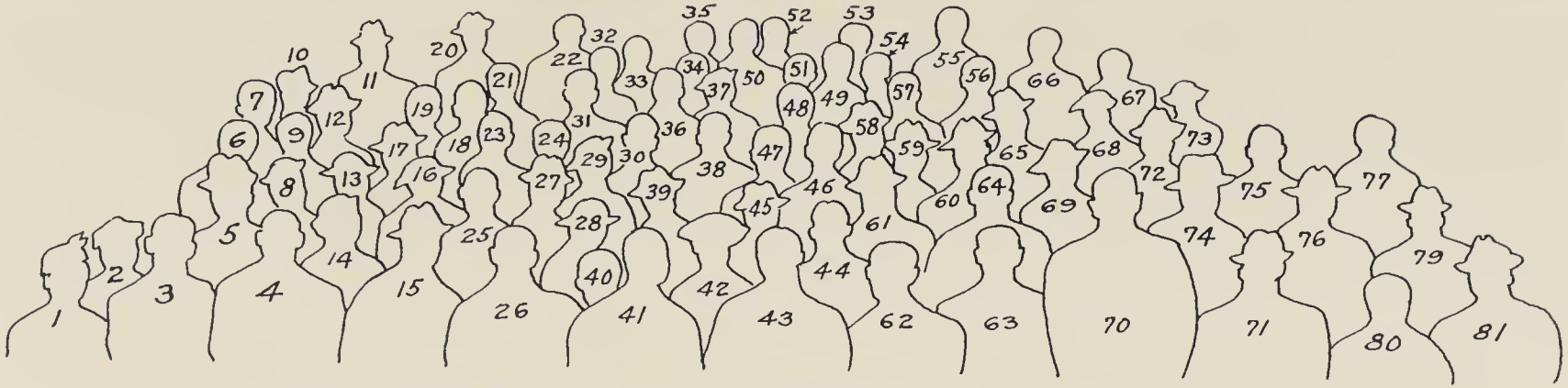
Normal Schools or Teachers Colleges—Concordia Teachers College, Western Kentucky State Teachers College, State Teachers College of Morehead, Kentucky, Western Michigan State Teachers College, State Normal School of Oneonta, New York, Asheville Teachers College of North Carolina, Peabody Teachers College of Tennessee.

The register of attendance follows:

From Arkansas: *Visitor,* 1. From California: *Member,* 1—Mrs. H. J. Taylor, Berkeley. *Visitor,* 1. From Colorado: *Visitor,* 1. From Connecticut: *Member,* 1—Miss E. E. Wagner, Danbury. From Georgia: *Member,* 1—J. Fred Denton, Athens. From Illinois: *Members,* 11—Margaret M. Nice, L. B. Nice, R. M. Strong, H. H. Shoemaker, Chicago; C. W. G. Eifrig, River Forest; A. F. Satterthwait, Mrs. A. F. Satterthwait, S. C. Kendeigh, Urbana; Mrs. C. I. Reed, Villa Park; G. B. Happ, Elsah; Miss M. A. Bennett, Macomb. *Visitors,* 8. From Indiana: *Members,* 12—S. E. Perkins III, Mrs. L. G. Peavey, Miss M. R. Knox, Miss A. E. Taft, Indianapolis; Grant Henderson, Greensburg; S. W. Witmer, Goshen; L. A. Test, West Lafayette; L. L. Bohning, Knox; H. A. Zimmerman, Muncie; Mrs. H. P. Cook, Anderson; F. T. Hall, Crawfordsville; A. M. Grass, Linton. *Visitors,* 81. From Iowa: *Member,* 1—T. C. Stephens, Sioux City. *Visitor,* 1. From Kentucky: *Members,* 10—B. L. Monroe, J. B. Young, Miss Evelyn Schneider, Miss Mabel Slack, H. B. Lovell, Louisville; Gordon Wilson, Bowling Green; R. J. Fleetwood, Madisonville; W. A. Welter, Morehead; A. L. Pickens, Paducah; C. P. Grant, Covington. *Visitors,* 11. From Maine: *Visitor,* 1. From Maryland: *Member,* 1—C. M. Herman, Baltimore. *Visitor,* 1. From Massachusetts: *Member,* 1—Miss Claudia Schmidt, West Springfield. *Visitors,* 2. From Michigan: *Members,* 8—Josselyn Van Tyne, H. W. Hann, M. B. Trautman, Ann Arbor; M. D. Pirnie, Augusta; L. H. Walkinshaw, Battle Creek; F. M. Baumgartner, Lansing; R. E. Olsen, Pontiac; F. J. Hinds, Kalamazoo. *Visitors,* 7. From Minnesota: *Members,* 4—W. J. Breckenridge, K. D. Morrison, Minneapolis; Gustav Swanson, St. Paul; O. S. Pettingill, Jr., Northfield. *Visitors,* 7. From Mississippi: *Member,* 1—Miss F. A. Cook, Jackson. *Visitors,* 2. From Missouri: *Member,* 1—Rudolph Bennitt, Columbia. *Visitors,* 5. From Pennsylvania: *Member,* 1—Miss M. L. McConnell, Pittsburgh. *Visitors,* 3. From Nebraska: *Member,* 1—G. E. Hudson, Lincoln. From New York: *Members,* 6—A. A. Allen, A. R. Brand, G. M. Sutton, R. L. Weaver, Ithaca; Miss Theodora Nelson, New York City; R. A. Johnson, Oneonta. *Visitors,* 5. From North Carolina: *Member,* 1—Miss E. B. Finster, Asheville. From North Dakota: *Member,* 1—O. A. Stevens, Fargo. *Visitor,* 1. From Ohio: *Members,* 9—L. E. Hicks, D. W. Jenkins, D. L. Leedy, Columbus; Victor Coles, K. H. Maslowski, Cincinnati; Lynds Jones, Oberlin; W. C. Baker, Salem; E. L. Moseley, Bowling Green; H. T. Gier, Athens. *Visitors,* 6. From Tennessee: *Members,* 5—A. F. Ganier, J. M. Shaver, G. R. Mayfield, Mrs. F. C. Laskey, Nashville; Miss C. C. Counce, Memphis. From Texas: *Member,* 1—Mrs. E. D. Cheatham, Dallas. *Visitors,* 2. From Virginia: *Members,* 3—J. S. Y. Hoyt, Lexington; C. N. Crook, Jr., Williamsburg; Miss F. S. Hague, Sweet Briar. *Visitors,* 2. From Wisconsin: Visitors, 3. From Wyoming: *Member,* 1—W. J. Scott, Cheyenne. *Visitor,* 1. From Washington, D. C.: *Members,* 2—Clarance Cottam, A. A. Lindsey. *Visitors,* 2.

Summary of Attendance: Total Registration, 238 (Members, 84; Visitors, 154). Total from Indianapolis, 60 (Members, 4; Visitors, 56). Total from Indiana, 93 (Members, 12; Visitors, 81). Total outside of Indiana, 145 (Members, 72; Visitors, 73). Maximum number at each program session: Monday morning, 75; Monday afternoon, 115; Tuesday morning, 113; Tuesday afternoon, 205. Number at the Annual Banquet, 100. Number of persons in group photograph, 81.

Fig. 16. Group at the Annual W. O. C. Meeting, Indianapolis, 1937.



KEY TO THE W. O. C. GROUP PHOTOGRAPH AT INDIANAPOLIS, 1937

1, Mrs. F. C. Laskey. 2, Dr. Cynthia C. Counce. 3, K. D. Morrison. 4, A. L. Pickens. 5, C. W. G. Eifrig. 6, Woodrow Goodpaster. 7, Peter Koch. 8, Constance Nice. 9, R. A. Johnson. 10, A. Marguerite Baumgartner. 11, G. B. Happ. 12, K. H. Maslowski. 13, Mrs. A. F. Satterthwaite. 14, Mrs. R. J. Fleetwood. 15, Willard N. Clute. 16, Mrs. H. J. Taylor. 17, W. C. Baker. 18, Gustav Swanson. 19, C. P. Grant. 20, S. E. Perkins III. 21, O. A. Stevens. 22, Leo Deming. 23, L. H. Walkinshaw. 24, Mrs. L. H. Walkinshaw. 25, R. J. Fleetwood. 26, L. E. Hicks. 27, F. J. Hinds. 28, Mrs. Lynds Jones. 29, Mrs. Victor Coles. 30, Victor Coles. 31, W. J. Breckenridge. 32, H. K. Gloyd. 33, G. E. Hudson. 34, M. B. Trautman. 35, John Frees. 36, F. C. Huggit. 37, Clara M. Moore. 38, A. A. Lindsey. 39, Theodora Nelson. 40, Mrs. A. D. Morse. 41, Lynds Jones. 42, Mrs. Margaret M. Nice. 43, R. M. Strong. 44, Frank Manz. 45, Emilie Yunker. 46, T. C. Stephens. 47, S. C. Kendeigh. 48, Clarence Cottam. 49, H. P. Cook. 50, H. H. Shoemaker. 51, Frank Johnson, 52, Robert McKinley. 53, Edwin Ross. 54, F. B. Ebersole. 55, F. T. Hall. 56, R. A. Huggins. 57, G. M. Sutton. 58, A. M. Grass. 59, H. W. Hann. 60, J. B. Young. 61, B. L. Monroe. 62, A. F. Ganier. 63, O. S. Pettingill, Jr. 64, Gordon Wilson. 65, Grant Henderson. 66, F. M. Baumgartner. 67, Mrs. H. H. Coburn. 68, Mrs. H. P. Cook. 69, Evelyn J. Schneider. 70, J. Van Tyne. 71, J. S. Y. Hoyt. 72, P. A. Davies. 73, Margaret R. Knox. 74, W. A. Welter. 75, D. L. Leedy. 76, A. R. Brand. 77, D. W. Jenkins. 79, M. D. Pirnie. 80, Mabel Slack. 81, A. A. Allen. Copies of this 1937 group photograph may be obtained for sixty cents each by addressing Mr. S. E. Perkins III, 709 Inland Building, Indianapolis, Indiana.

REPORT OF THE TREASURER FOR THE YEAR 1937

Receipts for 1937

Balance in Bank November 24, 1936		$ 581.02
From Membership Dues:		
Associate	$ 802.13	
Active	413.00	
Sustaining	160.00	
Total received from membership dues		1,375.13
From Subscriptions:		
Total received from subscriptions		119.64
Miscellaneous Receipts:		
Sale of back numbers of the Bulletin	37.00	
Contributions to publication fund	94.52	
Re-deposit of one returned check	5.00	
Total miscellaneous receipts		136.52
Total receipts, including old balance		$2.212.31

Disbursements for 1937

Printing four issues of the Bulletin	$1,215.96	
Cost of halftones, cuts, etc	128.06	
Other expenses in Editor's Office	81.71	
Total publication costs		$1,425.74
Expenses in Secretary's Office	165.74	
Expenses in Treasurer's Office	56.46	
Printing	131.14	
Refunds, miscellaneous costs, etc	37.84	
Total general costs		391.23
Total disbursements (itemized in report)		1,816.97
Balance on hand December 24, 1937		395.34
Total		$2,212.31

ENDOWMENT FUND

Total Endowment Fund, shown by Report on November 24, 1936		$1,479.59
Received during the past year:		
Interest coupons on U. S. Postal Savings 2½% Coupon Bonds due January 1, 1937, and July 1, 1937	19.50	
Interest received on amount on deposit in Fletcher Trust Company, Indianapolis, payable May 1, 1937, and November 1, 1937	.68	
Received from Leon Otley Pindar Estate, Bequest under the terms of his Will	843.88	
Total Endowment Fund as of December 24, 1937		$2,343.65

Including:

Bonds in safety deposit box of Fletcher Trust Company at Indianapolis in sum of	$1,455.00	
Balance in cash in savings account in the Fletcher Trust Company, Indianapolis	888.65	
		$2,343.65

Respectfully submitted,

S. E. PERKINS III, *Treasurer.*

Indianapolis, Indiana, December 24, 1937.

REPORT OF THE LIBRARIAN FOR THE YEAR ENDING OCTOBER, 1937

I have the honor to present herewith the seventh annual report of the Librarian of the Wilson Ornithological Club.

With the aid of Works Progress Administration workers I have been able to clean shelves and books and check the arrangement of the books on the shelf to insure more efficient service for the patrons of the library. Also we have rearranged the stock of the WILSON BULLETIN. We kept out as a working stock twenty-five numbers, or less if there were not that many, and are storing the remainder in cartons. We were able to enlarge the storage space for other Museum publications in this way.

PUBLICATIONS: During the past year the library has continued to receive Natural History, a journal of the American Museum, Bird-Lore, Archives Suisses d'Ornithologie, and Proceedings of the Iowa Academy of Science.

EXCHANGES: We have been able to get some of the older numbers of the WILSON BULLETIN by exchanging the later numbers for the Bulletin. We have also received as a gift some of the numbers of the Bulletin, especially the older ones.

SALE OF THE BULLETIN: There have been a large number of requests asking about the price of the Bulletins. It would seem to indicate that individuals and libraries are sensing the importance of having complete sets of the Bulletin on their shelves. As yet there has been no large sale. There do not seem to be enough requests for any one number to justify the reprinting of the out of stock numbers.

GROWTH: The library continues to grow. We received this past year two bound volumes and 113 unbound pieces of material plus the periodicals listed above.

DONORS: There have been a large number of gifts this past year. A list of the donors follows: Leon Kelso, Washington, D. C.; G. E. Hudson, Lincoln, Nebraska; Ralph Beebe, Ecorse, Michigan; Stuart T. Danforth, Puerto Rico; Samuel M. Herriott, New York, New York; George M. Sutton, Ithaca, New York; Paul L. Errington, Ames, Iowa; Francis Harper, Swarthmore, Pennsylvania; Harriet Williams Myers, Los Angeles, California; Norman Asa Wood, Ann Arbor, Michigan; O. A. Stevens, Fargo, North Dakota; L. Roy Hastings, Seattle, Washington.

Respectfully submitted,

F. RIDLEN HARRELL, *Librarian.*

REPORT OF THE SECRETARY FOR 1937*

To the Officers and Members of the Wilson Ornithological Club:

On March 1, 1937, the Secretary received from his predecessor in office, Dr. Lawrence E. Hicks, official correspondence obtained during the latter's five years of service together with the membership card files, newly printed stationery, and other necessary materials. In addition, Dr. Hicks presented him with a well thoughtout work-book wherein the monthly secretarial duties were concisely outlined. Thus, as far as the Secretary is aware, the office has continued to function through the year in an unbroken pace.

*Revised through December 31, 1937.

A major part of the Secretary's duties during the year has been concerned with the solicitation of members. His office has sent out 2300 letters largely to persons enrolled as members of other natural history organizations. Approximately 150 of these letters have been sent to likely candidates at the direction of our own members. The Secretary has not been alone in this important work of membership solicitation. Dr. Hicks kindly volunteered his services in sending out 600 additional letters while other officers and members have gone out of their way to contact interested persons. Altogether the number of membership solicitation letters sent out by the Wilson Ornithological Club approaches 3,000.

This year 150 new members have been obtained, 4 are classified as Sustaining, 17 as Active, and 129 as Associate Members. During the year 76 members have dropped out, either by death or failure to pay dues. We have thus had a net gain in membership of 74 members. We now have 838 members classified as follows: Honorary, 5; Life, 9: Sustaining, 41; Active, 187; Associate, 596.

The total distribution of members by states, provinces, and foreign countries is given below. The figures in parentheses indicate the number of members *new* to the organization in 1937.

Alabama	1	New York	54 (13)
Arizona	6 (1)	Ohio	100 (17)
Arkansas	4 (2)	Oklahoma	7 (2)
California	47 (4)	Oregon	6
North Carolina	7 (1)	Pennsylvania	34 (11)
South Carolina	2	Tennessee	23 (5)
Colorado	8 (1)	Texas	19 (2)
Connecticut	7 (2)	Utah	8 (1)
North Dakota	11 (3)	Virginia	18 (3)
South Dakota	5	West Virginia	9 (2)
Delaware	3	Vermont	1
Florida	5	Washington	5 (3)
Georgia	11 (1)	Washington, D. C.	25 (2)
Idaho	3 (1)	Wisconsin	32 (6)
Illinois	56 (5)	Wyoming	5 (1)
Indiana	27 (8)		
Iowa	39 (4)	Alberta	1
Kansas	7 (2)	British Columbia	3 (1)
Kentucky	15 (1)	Manitoba	5 (1)
Louisiana	11 (3)	Ontario	20 (5)
Maine	7	Quebec	3
Maryland	10 (3)	Saskatchewan	1
Massachusetts	32 (9)	Cuba	1
Michigan	51 (6)	England	1
Minnesota	28 (7)	Finland	1
Mississippi	4 (3)	Germany	1
Missouri	22 (2)	Holland	1
Montana	5 (1)	Italy	1
Nebraska	12 (1)	New Zealand	1
New Hampshire	4	Porto Rico	1
New Jersey	12 (3)	Switzerland	1 (1)
New Mexico	7	Virgin Islands	1

The total figure of 838 members for 1937 is lower than the total figure for 1936. This difference is due not to any loss of membership, for we have actually gained members. It is due to the fact that only paid-up members are included. The total figure of 906 members for 1936 included 123 non-paying members for that year.

Another part of the Secretary's duties has been concerned with correspondence with members. Early in October a post card announcing briefly the Annual Meeting was sent to 600 members residing in the Mississippi Valley and neighboring states. Later in November the annual letter to all members was placed in the mails. This letter contained the following enclosures: a "Christmas Suggestion", a detailed announcement of the Annual Meeting, an application blank for hotel accommodations and program positions, a three-page questionnaire, a nomination blank, and a return envelope. The number of responses to these enclosures may be of interest.

Five members gave an Associate Membership for Christmas. The number of applications returned was 48. In these applications 47 program positions were requested requiring altogether 804 minutes. The number of questionnaires returned was 240. The number of nomination blanks returned was 56 with 162 persons listed.

The arrangement of the present program of the Annual Meeting has been entrusted to the Secretary. This third part of his duties has been not only a terrific responsibility but has proved to be both a heartache and headache. He has had to ask many members to shorten the times needed to present their papers and to take positions on the program that they did not prefer. Worst of all he has had to relegate some papers to alternate positions and omit others. This unhappy task has been due to the great number of requests for program positions and the relatively short space of time during each of the four sessions. Actually the sessions total only 480 minutes and 804 minutes were requested!

The Secretary could not fail to be impressed with the sincerity and care with which the members filled out the questionnaires. He now has before him a wealth of valuable opinions and criticisms of the Wilson Ornithological Club and its official organ, the Wilson Bulletin. The substance of these questionnaires will be reported fully in a forthcoming Bulletin. On reading this material you will agree with the Secretary that the venture of submitting questionnaires to members has been worthwhile.

At this time the Secretary wishes to express appreciation to those members who nominated for membership numerous persons interested in birds and to the members below who obtained new members:

Ben B. Coffey, Jr.—4 members. Miss Mabel Slack and Miss Pirna M. Stine—2 members each. C. W. G. Eifrig, G. B. Spawn, F. M. Baumgartner, Miss Theodora Nelson, R. B. Wallace, M. B. Skaggs, Gordon Wilson, Maurice Brooks, W. C. Starrett, M. E. Foote, K. D. Morrison, G. M. Sutton, S. P. Jones, M. R. Knox, F. A. Stebbins, K. E. Bartel, Robert Overing—1 member each.

The Secretary wishes to express his appreciation also to his fellow officers who were responsible for obtaining 66 of the 150 new members.

Respectfully submitted,

Olin Sewall Pettingill, Jr., *Secretary.*

December 27, 1937.

TO OUR CONTRIBUTORS

Our members are urged to submit articles for publication in the BULLETIN. Short items are desired for the department of General Notes, as well as longer articles pertaining to life-history, migration, ecology, behavior, song, economic ornithology, field equipment, methods, etc. Local faunal lists are desired, but limited space makes slower publication inevitable. In preparing such lists for publication in the BULLETIN follow our existing style, and use the nomenclature of the fourth edition of the A. O. U. Check-List.

THE MANUSCRIPT. The manuscript, or copy, should be prepared with due regard for literary style, correct spelling and punctuation. We recommend the *Manual of Style*, of the University of Chicago Press, as a guide in the preparation of manuscripts. Use paper of good quality and of letter size (8½x11). Avoid the use of thin paper. Write on one side only, and leave wide margins, using *double spacing* and a reasonably fresh, black ribbon. The title should be carefully constructed so as to indicate most clearly the nature of the subject matter, keeping in mind the requirements of the index. Where the paper deals with a single species of bird it is advisable to include the scientific name of the species in the introductory paragraph. If the author will mark at the top of the first page the number of words in the paper, a little of the Editor's time will be saved.

ILLUSTRATIONS. To reproduce well as half-tones photographic prints should have good contrast with detail. It is best to send prints unmounted and untrimmed. The author should always attach to each print an adequate description or legend.

BIBLIOGRAPHY. The scientific value of some contributions is enhanced by an accompanying list of works cited. Such citations should be complete, giving author's name, full title of the paper, both the year and volume of the periodical, and pages, first and last. In quoting other works care should be taken to carry over every detail, *verbatim et literatim*.

PROOF. Galley proof will be regularly submitted to authors. Page proofs will be submitted only on request. Proofs of notes and short articles are not ordinarily submitted, unless for special reason. All proofs must be returned promptly. Expensive alterations in the copy after the type has been set must be charged to the author.

SEPARATES. The club is unable, under present financial conditions, to furnish reprints to authors gratis. Arrangements will be made, however, for such reprints to be obtained at cost. A scale of costs, based on the number of pages, is given below. If a blank page is left in the folding it may be used as a title page, which will be set and printed at the rate indicated. If a complete cover with printed title page is desired it may be obtained at the rate shown in the last column. Orders for reprints should accompany the returned galley proof on blanks provided for that purpose.

Copies	2	4	8	12	16	20	24	28	32	36	40	Cover
50	$1.40	$2.20	$3.85	$5.25	$6.60	$8.25	$9.35	$10.75	$12.10	$13.50	$14.85	$2.75
100	1.65	2.50	4.15	5.50	6.90	8.55	9.65	11.00	12.40	13.75	15.15	3.05
200	2.20	3.05	4.70	6.05	7.45	8.80	10.20	11.55	12.95	14.30	15.70	3.30
300	3.05	3.85	5.50	6.90	8.25	9.65	11.00	12.40	13.75	15.15	16.50	4.40
400	3.60	4.40	6.05	7.45	8.80	10.20	11.55	12.95	14.30	15.70	17.05	5.50
500	4.15	4.95	6.60	8 00	9.35	10.75	12.10	13.50	14.85	16.25	17.60	6.60

Repaging—25c per page extra.
Title Page—$1.25.

Annual Meetings of the Wilson Ornithological Club

	Retiring President
1914—Chicago. February 5.	
1914—Chicago. December 29-30.	
1915—Columbus. December 28-29.	
1916—Chicago. December 27-28.	
1917—Pittsburgh. January 1-2, 1918.	
1919—St. Louis. December 29-30.	
1920—Chicago. December 27-28.	
1921—Chicago. December 26-27.	
1922—Chicago. October 26	T. L. Hankinson
1923—Cincinnati. Dec. 31, 1923-Jan. 1, 1924. With the A. A. A. S.	T. L. Hankinson
1924—Nashville. November 28-29-30. Peabody College	A. F. Ganier
1925—Kansas City. December 28-29. With the A. A. A. S.	A. F. Ganier
1926—Chicago. November 26-27. Chicago Academy of Sciences	A. F. Ganier
1927—Nashville. Dec. 30, 1927-Jan. 1, 1928. With the A. A. A. S.	Lynds Jones
1928—Ann Arbor. Nov. 31-Dec. 1, 1928. Museum of Zoology	Lynds Jones
1929—Des Moines. December 27-28. With the A. A. A. S.	Lynds Jones
1930—Cleveland. December 29-30. With the A. A. A. S.	J. W. Stack
1931—New Orleans. December 28-29. With the A. A. A. S.	J. W. Stack
1932—Columbus. November 25-26. The Ohio State Museum	Jesse M. Shaver
1934—Pittsburgh. December 28-29. The Carnegie Museum and A. A. A. S.	Jesse M. Shaver
1935—St. Louis. December 29-30-31. With the A. A. A. S.	Josselyn Van Tyne
1936—Chicago. November 27-28. Chicago Academy of Sciences.	Josselyn Van Tyne
1937—Indianapolis. December 27-28. With the A. A. A. S.	Josselyn Van Tyne

Vol. L JUNE, 1938 No. 2

The Wilson Bulletin

A Magazine of Field Ornithology

Published by the
Wilson Ornithological Club
Sioux City, Iowa

CONTENTS

THE WILSON BULLETIN

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All articles and communications for publication, books and publications for review, exchanges, and claims for lost or undelivered copies of the magazine, should be addressed to the Editor.

The current issue of the Wilson Bulletin is printed by the Verstegen Printing Company, Sioux City. Iowa.

Entered as Second-class Mail Matter, July 13, 1916, at the Postoffice at Sioux City, Iowa, under Act of March 3, 1879.

THE WILSON ORNITHOLOGICAL CLUB

Founded December 3, 1888. Named after Alexander Wilson, the first American ornithologist, and called the "Father of American Ornithology".

The officers for the current year are:

President—Margaret Morse Nice, Chicago, Ill.
First Vice-President—Lawrence E. Hicks, Columbus, Ohio.
Second Vice-President—George Miksch Sutton, Ithaca, N. Y.
Treasurer—S. E. Perkins III, 709 Inland Bldg., Indianapolis, Ind.
Secretary—Olin S. Pettingill, Jr., Carleton College, Northfield, Minn.
Editor—T. C. Stephens, Sioux City, Iowa.

The membership dues are—sustaining membership, $5.00; active membership, $2.50; associate membership, $1.50 per year.

THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY
Published by the Wilson Ornithological Club

Vol. L JUNE, 1938 No. 2

Vol. XLV (New Series) Whole Number 184

THE AMERICAN COOT IN IOWA

BY CHARLES E. FRILEY, JR., LOGAN J. BENNETT, AND GEORGE O. HENDRICKSON

For major studies in waterfowl, rail, and shore bird problems the natural lake and marsh region of northwest Iowa is proving to be highly valuable. This region lies in the Wisconsin glacial drift area which enters the state at its northern boundary and extends southward to Des Moines, the state capitol. Approximately twenty-one counties of northern and central Iowa, representing about one-fifth of the state's area, are covered by the Wisconsin glacial drift of boulders, sand, silt and clay.

The Wisconsin drift area is bordered on the east by the older and well-drained Iowa glacial drift. To the west is found the well-drained region of deep Missouri loess, wind-blown soil from the far West, and to the south lies the thinner Southern Iowa loess. Underlying these uppermost soils is the Kansas glacial drift material generally known as blue clay, indicating the characteristic color and texture of the unweathered components.

In the nearly level Wisconsin drift area the underlying blue clay of the Kansas glacial till forms the tough and impervious bottom for numerous lake, marsh, and pothole sites, many of which have been drained. With miles of dredged ditches and with many more miles of underground drain tile much of the accumulating surface water is carried quickly away from the Wisconsin drift. Where proper drainage is feasible a stable general agriculture is established because in many cases the original high costs of drainage were met during the first twenty years of this century, a period of increasing demands for cereal and animal food products and consequently higher prices and profits to the farmer.

But even during the period of highest prices some of the lakes, marshes, and potholes could not be drained profitably. Particularly near the edges of the Wisconsin drift characteristic glacial morainic hills make possible a number of deep clear water lakes such as Spirit, Okoboji, Clear, and Storm Lakes that are well known for fishing and

other forms of lake recreation. These recreational values are so high that the deep water lakes are quite safe from man's drainage proclivities. The Iowa State Conservation Commission has jurisdiction over sixty-five of the large natural lakes and most of these are in the Wisconsin glacial region. In addition several hundred lakes and marshes and several thousand potholes under private ownership remain to attract waterfowl and other water life. Most of these bodies of water are valued highly in the recent years of drought, and their wildlife products yield profitable returns.

Now it appears evident that these lakes, marshes, and potholes are to be available for better management of wildlife throughout many years to come. From them some economic returns to the state and to individual owners are possible, and immeasurable recreational values are apparent. Characteristic of our present civilization is the general acceptance of original investigation and research to enhance economic returns and other values in all pursuits and fields of human endeavor. Hence the proper utilization of the water bodies of the lake region of Iowa presents numerous problems around each form of wildlife and in the inter-relations between the many living forms.

Intensive research is underway with several of the more valuable animals of this region, and many casual observations are made with other forms of wildlife. Characteristic of the marshes is the American Coot (*Fulica americana americana* Gmelin). Without devoting long periods of time to observation the authors during several past years have accumulated some data which will be of value in the management of the Coot.

In 1933, the spring migration flight was observed closely by Bennett at Mud Lake, Clay County. The first Coots arrived March 10 and the last ones apparently were in by April 15. In total, it was estimated that 20,000 Coots rested for a time on this one marsh, then of about 350 acres in area. No noticeable decline in numbers of migrating Coots was apparent in this particular region during the past four years.

Next of particular interest was the number of Coots remaining to nest at particular marshes and the nesting capacities of these bodies of water. In late June, 1932, Mud Lake, of about 350 acres in area and with water to a depth of about two feet, showed less than 10 per cent of its surface as open water. The remainder was hidden by vegetation of which the sedge (*Carex riparia*) and the bulrush (*Scirpus fluviatilis*) were dominant species. On June 25 of that year 189 Coots' nests were counted on one-fourth of the marsh; no count nor estimate was made

of the numbers of nests in the remaining three-fourths. In the summer of 1935 approximately 100 pairs of Coots were resident on the same marsh. In that year the depth of the water had inereased to three feet and about one-third of its surfaee was open. The dominant plants of the remaining two-thirds were the bulrushes (*Scirpus occidentalis*. *S. validus* and *S. fluviatilis*). During the same summer thorough search revealed only eleven Coots' nests on Goose Lake. Hamilton County. of eighty aeres in area and with about one-third of its area in open water; the bulrushes (*Scirpus occidentalis*. *S. validus*), the cattail (*Tyha latifolia*). and the arrowhead (*Sagittaria latifolia*) were dominant emergent plants. The largest number of Coots seen in a single day on Goose Lake was twenty.

The small number of nests on Goose Lake was thought to be due in part to the elogging of parts of the marsh by islands of deeaying vegetation aceording to Hendriekson (1936). Also the old proeumbent stems among the new growth in many plaees made a very dense eondition in which it was very difficult for the female to build. One was observed to start a nest in sueh a plaee. but it was not completed. Eight nests were in a small area of less dense vegetation. some in eattails and some in bulrushes: three nests in July were built in the stand of arrowhead and the fresh leaves and stems of the plant were used in the nests. At Mud Lake. 1932 and 1935, the nests were built ehiefly with stalks of sedges and bulrushes. At neither season was Mud Lake so elogged with debris as Goose Lake in 1935. It would appear that a dense deposit of old stems of marsh vegetation which interfered with anehoring the nest to new vegetation prevented more satisfactory nesting.

The dimensions of the nests were about fourteen inches in diameter and about eight inches of material above the water. eonforming with observations reeorded by Bent (1926). Many of the nests had ramps of stems to enable the Coots to aseend to and descend from the nest. Fresh growth of rushes elogged with mueh old submerged material would not permit of building sueh ramps readily. Five to eight inehes of eaeh nest were below the surface of the water. and the nest was generally anehored to fresh vegetation. Such nests moved up and down with wave action and consequently did not become wet far above the water line. And thus also. drifting and submergenee were prevented with sudden rises in the lake sueh as the 10-inch rise of Mud Lake on July 17 and 18. 1935. following a rainfall of 2.5 inehes. Most of the nests rose with the water and remained safely anehored. Perhaps a balance between proper water depth for bulrushes. eattails.

nesting Coots, other marsh nesting birds, and muskrats may be aseertained. The muskrats of the correet number would prevent elogging of the marsh with execssive quantities of old stems of water plants, and help to provide open areas of water for feeding and other activities of Coots and dueks.

Data concerning the nesting dates and number of eggs were not so easily obtained. On June 25, 1932, twenty-two of the 189 nests on Mud Lake eontained eggs, varying from one to twelve eggs in a nest and with a mean of between five and six eggs per nest. In 1935, during late June and July, Friley observed forty-two nests that had 292 eggs, a mean of between six and seven eggs per nest; the number of cggs per nest varied from four to eleven. At the same time eleven nests were found on Goose Lake, a marsh of eighty aeres, and only three of them contained eggs, in number per nest three, four, and seven (Hendrickson, 1936). The mean number of eggs in a nest for all sixty-seven nests lies between six and seven.

In 1935 the latest date of hatehing at Mud Lake was July 24, whereas on Goose Lake the latest date was probably in early August for a nest of four fresh-looking eggs was seen July 15 and the ineubation period is twenty-one or twenty-two days as given by Bent (1926).

Reeords of the hatching from forty-two nests on Mud Lake, 1935, showed that approximately as many days were required for hatehing of a single brood as there were eggs in a nest. For example, from one cluteh of seven eggs thc first ehick hatched July 17 and the last on July 21: a freshly hatched ehick appeared on each day except one. Thc adults were over thc eggs regularly during the hottest hours of the day and at night. Perhaps they warmed the eggs during cooler hours and kept them cooler during thc hottest hours in order to insure a rather uniform temperature of incubation. The hatehing rate in 1935 reached the high point of 98 per cent among 292 eggs of forty-two nests.

Although the freshly hatehed Coots usually remained on the nest until they were dry, a number of times young were seen to crawl out and fall into the water very soon after hatching. These birds started to swim immediately. Thc very young Coots appeared to be head-heavy and they intentionally dived very frequently and easily, if not at times accidentally. After several eloscly repeatcd dives, the young bird either lost its fear of the observer or becamc too nearly exhausted to dive again; or perhaps, as it often came up covered by plant material, the chick may have considercd itself to be hidden. Although the hatching of larger broods was common the highest number of young ever seen on the water with a single adult was five, and two to four

were often observed as a probable brood. Perhaps accidental drowning accounted for a part of the high mortality among the chicks for in 1932 two very young Coots, after diving, became entangled in vegetation and might have drowned if they had not been freed by the observer.

Observations on the feeding of the captive young Coot were made in June, 1935, and Hendrickson (1936) told of the bird's preference for whitish food materials and demands to be fed rather than find and pick up food for itself. Later in the summer of 1935 Friley continued observations on feeding of the young in the open on Mud Lake. Adults with young around them were observed to dive and bring up blanched portions of vegetation. As soon as the adult came up the young rushed to take the food from its bill. Sometimes a tug-of-war followed the seizing of a large morsel by two chicks. Occasionally a young Coot dived and brought up food for itself, but as often the dive appeared to be unsuccessful. To what age the young continued to be fed by parents was not learned, but several broods known to be at least three weeks old were seen to take food regularly from the bills of adults.

The loss of Coots to predators was studied somewhat. Among several thousand Great Horned Owl pellets gathered in the vicinity of Mud Lake and other marshes of northern Iowa, Mrs. F. N. Hamerstrom found Coot remains in only twenty-two pellets, of which nineteen contained evidence of adult Coots and the others showed bones of young Coots. There was no direct evidence that muskrats were destructive to Coots though muskrats were occasionally seen to use Coots' nests as feeding stations. But it was not learned whether or not the eggs or young had been destroyed by muskrats. Bennett observed remains of young Coots in mink feces frequently in the vicinity of Mud Lake, during several recent summers.

The inter-relations between Coots and other marsh nesting birds were observed to some extent. In the summer of 1935, Mud Lake carried, in addition to about 100 pairs of nesting Coots, a colony of nesting Eared Grebes, over sixty pairs of nesting Pied-billed Grebes, at least twenty pairs of nesting American and Eastern Least Bitterns, ten Ruddy Ducks' nests, eleven Redheads' nests, numerous nesting King and Virginia Rails and Soras, numerous nesting Florida Gallinules, many nesting Forster's and Black Terns, many nesting Prairie and Short-billed Marsh Wrens, many nesting Yellow-headed Blackbirds and Red-wings, and numerous nesting Swamp Sparrows. A fairly heavy population of muskrats was supported on the lake that summer.

In the summer of 1932 there were at least twice as many Coots on the marsh, but no diving ducks, no Eared Grebes, and other species of birds were less numerous. Forster's Terns were seen often to attack Coots and drive them from the vicinity of terns' nests and young.

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Department of Zoology and Entomology,
Iowa State College, Ames, Iowa.

BACHMAN'S SPARROW IN THE NORTH-CENTRAL PORTION OF ITS RANGE

by Maurice Brooks

Scope of the Study

The latest (1931) edition of the A. O. U. Check-List gives the breeding range of Bachman's Sparrow (*Aimophila aestivalis bachmani* Audubon) as "Upper and Lower Austral zones in central Illinois (locally to southeastern Iowa), southern Indiana, southern Ohio, extreme southwestern Pennsylvania, and central Virginia south to central Texas, Louisiana, Mississippi, Alabama, and northwestern Florida." The present paper attempts a survey of this species as it occurs in West Virginia, southwestern Pennsylvania, and southeastern Ohio, with some notes on its occurrence in Virginia, Maryland, Kentucky, and Tennessee. It will be seen that this territory occupies a position in the north-central portion of the bird's breeding range, roughly midway between central Virginia and central Illinois. In the Check-List West Virginia is not specifically mentioned as within the breeding range, being included by implication only, nor is there any mention of Maryland. Data hereinafter included will show the regular (sometimes common) occurrence of Bachman's Sparrow in West Virginia, and its occurrence, at least occasionally, in western Maryland.

History

Within the territory covered by this paper the first record for Bachman's Sparrow was made in southeastern Ohio. Dr. Lawrence Hicks (in mss.) supplies the following data: "The first Ohio record was a specimen taken by Rev. W. F. Henninger on April 23, 1897, with others observed on May 3 and 6 of the same year, near South Webster in the Portsmouth region. The species was not heard from again until a specimen was taken by C. M. Weed August 18, 1900, at

Columbus. Next Miss Laura Gano found the species on April 25 and 27, 1901, near Cincinnati and subsequently obtained many sight records on Grosbeck Hill, Avondale, and College Hill, near Cincinnati. On April 23, 1903, Dawson collected a specimen on Rose Hill, near Cincinnati, in company with Miss Gano. This specimen is now in the Cincinnati Museum of Natural History.

"On June 10 and 11, 1903, Dawson found a nest of pure white eggs, and caught a juvenile bird near Sugar Grove, Fairfield County. From 1905 to 1915 there are no published records on the species, as there was practically no ornithological work done in the Ohio territory which this species occupies. Since 1915 much information on the species has been obtained, almost entirely by the various members of the Wheaton Club of Columbus."

In another paper Hicks (1935) states, ". . . it seems reasonably certain that this species has invaded the State [Ohio] from the south and southwest during the last half-century."

Writing in the Wilson Bulletin in 1936, Miss Katie M. Roads records a nest with four eggs, pure white in color and presumably those of Bachman's Sparrow, which was found and called to her attention in Marshal Township, Ohio, in the spring of 1898.

In West Virginia Bachman's Sparrow made its first recorded appearance in Wood County, along the Ohio River, in late summer of 1903. Rev. E. A. Brooks (1912) states: "My first record of the occurrence of Bachman's Sparrow in West Virginia was made in Wood County, in late summer 1903. Since then it has become quite common in the northern and central parts of the State. Many were observed at Waverly, Wood County, from 1903 to 1907."

During the summer of 1907 individuals of this species were recorded in Upshur and Lewis Counties, near the central part of the State, and in Monongalia County, adjacent to the Pennsylvania border. F. E. Brooks found the bird at North Mountain, Berkeley County, in the Eastern Panhandle, on June 22, 1910, and A. B. Brooks records it from White Sulphur Springs, Greenbrier County, on May 15, 1913. The first West Virginia nest was discovered by Mr. Duffy Hornbeck, near Hinkleville, Upshur County, in July, 1913.

Speaking of the status of Bachman's Sparrow in Pennsylvania, Mr. W. E. Clyde Todd (in mss.) writes: "I added the species to the Pennsylvania list in the spring of 1910, when I secured an adult male specimen about a mile north of the town of Beaver. However, a nest with one egg, supposed to belong to this species, but never fully identified, had been taken near Waynesburg on May 16, 1909, by Mr. J. B.

Carter. Later research and travel by Dr. S. S. Dickey has revealed Bachman's Sparrow as a regular, even if not common, summer resident in various other parts of Greene County, while Mr. B. H. Christy has traced it to Allegheny and southern Beaver Counties."

Prof. W. W. Cooke (1914) records the occurrence of the species in southwestern Pennsylvania, and states that it reaches even northern Ohio. The first definitely determined nest of the species discovered in Pennsylvania came as a result of work done in Greene County by Dr. Dickey. Here he collected, on May 20, 1916, a set of five eggs. Two birds were collected by him, also in Greene County, in 1916. These are now deposited in the Academy of Natural Sciences at Philadelphia.

The data given above present strong evidence that Bachman's Sparrow reached the territory covered by this paper through an invasion from the south and southwest, following roughly the valley of the Ohio River. It may well be that birds moving northeastward from the Ohio into central West Virginia moved down the valley of the northward-flowing Monongahela, reaching Monongalia County, West Virginia, and Greene County, Pennsylvania, by this route.

Hicks, as has been stated, considers that the movement into Ohio was an invasion, although he believes that the species might have been overlooked for a number of years. Cooke (*loc. cit.*) speaks of the northward movement of the species as an "invasion". In central West Virginia, particularly in Upshur County, competent field workers covered the territory for twenty years before Bachman's Sparrow was discovered, and it seems impossible that they would have overlooked so outstanding a songster. A glance at the accompanying map will show the regular northeastward progression of the discoveries made in the territory covered by this paper.

There are evidences which point to a more general northward movement of the species during the early years of the twentieth century. Eifrig (1915) found several individuals near Chicago, Illinois, in May, 1915, and he is sure that the birds had not been previously overlooked. Leopold (1923) states, "The latter [species, Bachman's Sparrow], a southern form, has only recently been found to nest at River Forest, near Chicago, where its numbers increase each year." Mr. W. E. Saunders (in Canadian Field Naturalist, XXXIII, No. 6, p. 118) records the first specimen of Bachman's Sparrow ever taken in Canada, a male from Point Pelee, Essex County, Ontario, Canada's most southern extension.

This invasion apparently reached its limits in our area about 1915; the period of maximum abundance, at least in West Virginia and Pennsylvania, being reached between 1915 and 1922. From that time until the present, a number of observers have noted marked decreases in Bachman's Sparrow populations. Dickey (as quoted in the manuscript of Mr. Todd's forthcoming "Birds of Western Pennsylvania") states: "In recent years (i. e., since 1922), however, although I have often been afield (in Greene County), I have failed to meet with this species. Either it has dwindled in numbers, or I have completely overlooked it."

Professor E. R. Grose, of Glenville State Teachers College, in conversation with the writer, states that he has not been able during the last few years to find the birds in places in Upshur and Gilmer Counties, West Virginia, where fifteen years ago they were common.

Professor C. R. Bibbee (1934), in collecting work done for the West Virginia University Museum during 1923-26, failed to find the species at all, although much of his work was done in Wood County where the original discovery in the State was made.

The writer (1934) records sharp decreases in numbers of the birds in Upshur County, and similar observations have been made in other parts of the State. Conclusions of A. B. Brooks and Fred E. Brooks, both with wide experience in West Virginia, are along similar lines.

During recent years Haller and the writer have found the species in small numbers in Monongalia County, West Virginia, and Haller has collected a specimen in Ohio County, West Virginia, in 1934, and another in Wayne County, West Virginia, in 1937. A single individual was heard singing in Upshur County during 1935. Christy has in some recent years found small numbers of the birds in Beaver County, Pennsylvania.

It seems reasonable that a similar recession in numbers has occurred in Ohio, but Dr. Hicks makes no mention of it, and the writer cannot find positive evidence to support such a conclusion. Perhaps the best indication that such may have been the case is found in the fact that in only a very few Ohio counties does Hicks consider Bachman's Sparrow even tolerably common at present. While I have no similar Ohio evidence. it is certainly true that the species was common to abundant in some West Virginia counties fifteen years ago.

Range

Hicks (1935) says of Bachman's Sparrow in Ohio, "It now occurs in numbers locally in 32 counties of southern and eastern Ohio (mostly

unglaciated Allegheny Plateau)". In a latter paper (1937), and in correspondence, he furnishes data from seven additional counties, so that the Ohio county list would now read as follows:

Hamilton, Clermont, Brown, Adams, Scioto, Lawrence, Butler, Warren, Clinton, Highland, Pike, Jackson, Gallia, Montgomery, Greene, Fayette, Ross, Vinton, Meigs, Pickaway, Hocking, Athens, Washington, Franklin, Fairfield, Perry, Morgan, Noble, Monroe, Licking, Muskingum, Guernsey, Belmont, Knox, Coshocton, Tuscarawas, Ashland, Holmes, and Wayne.

Only one of these, Wayne County, where Baehman's Sparrow is regarded as very rare, lies entirely outside the unglaciated Allegheny Plateau. Most of the territory occupied by the species would be referable to the Carolina faunal zone, with here and there a hint of Transition conditions.

Distribution of the species in West Virginia (at least so far as we now know it) offers a far more irregular picture. The list of counties where breeding birds have occurred is as follows:

Wayne, Cabell, Putnam, Kanawha, Fayette, Greenbrier, Mason, Jackson, Roane, Clay, Nicholas, Wood, Wirt, Calhoun, Braxton, Webster, Ritchie, Gilmer, Lewis, Upshur, Randolph, Doddridge, Harrison, Barbour, Taylor, Marion, Monongalia, Preston, Hardy, and Berkeley.

Of these counties, most are in the western portion of the State, near the Ohio River, but there are a number of interesting exceptions. Through the valleys of the Great Kanawha River, and its tributaries, the New and Greenbrier Rivers, the species under consideration has been able to cross the State from the Ohio River to a point (White Sulphur Springs) very close to the Virginia line. In northcentral West Virginia the species came into the valley of the Monongahela River, and apparently used it for a northward movement. The higher ranges of the Allegheny Mountains seemingly serve as an effective barrier to eastward movement, and we have but two records from the eastern slopes of these ranges. Of these one was made by Fred E. Brooks at North Mountain, Berkeley County, on June 22, 1910; the other was made by the writer at Wardensville, Hardy County, on July 6, 1925. Both of these points lie within, or close to, the Shenandoah Valley. Dr. J. J. Murray and others have found Bachman's Sparrows somewhat farther south in the Valley, and it may be that these were birds which had moved north by that route rather than having crossed the mountains. Naturally, these are but surmises.

Perhaps the most striking feature of the bird's range in West Virginia is to be found in the altitudes to which it has attained. Near

Freneh Creek, Upshur County, where much intensive work has been done, the species was positively eommon at elevations of 1700 feet. In Webster County a number of individuals were observed at altitudes around 2500 feet. Reeent observations in Monongalia County have been at nearly 2000 feet, while individuals have been noted in Preston County at elevations well above 2000 feet. Both these latter eounties are adjacent to the Pennsylvania line. The altitudinal reeord for the State, so far as I am aware, was made near Piekens, Randolph County. Here, on Turkeybone Mountain, at elevations around 3000 feet, the

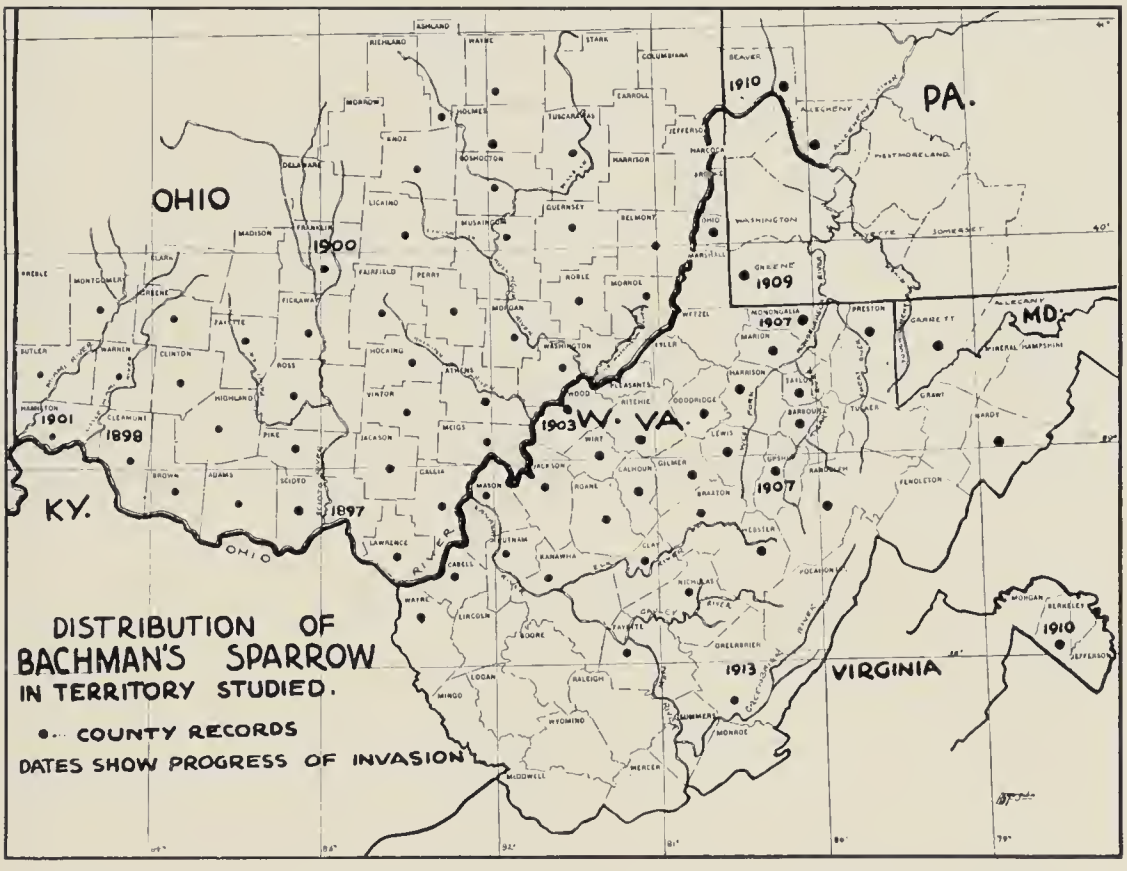

Fig. 17. Map of the area treated in Mr. Brooks' paper on Bachman's Sparrow.

birds were found in 1920, and perhaps in other years. The territory thereabout lies within the "Spruce Belt", the natural growth of Red Spruee (*Picea rubens*) which followed the higher Allegheny summits. At the time the Baehman's Sparrows were found, the area had, of eourse, been cleared, but Winter Wrens, Veerys, Magnolia and Cairns's Warblers, Juneos, and Red-breasted Nuthatehes all nested nearby.

Robert L. Mason in his "Lure of the Great Smokies" (p. 312) reeords Pine Woods Sparrow (*Aimophila aestivalis aestivalis*) from the open areas atop some of the Great Smoky Mountain peaks, but I ean find no reeorded instances of Bachman's Sparrow breeding at high alti-

tudes elsewhere than in the territory covered by this paper. Mr. H. P. Ijams states (in correspondence) that in his experience in eastern Tennessee he does not know of the bird outside the Carolina Life Zone.

Freer (1933) tells of finding individuals of this species on some of the Blue Ridge summits in Virginia, but assumes that they were migrants. Bruner and Field (1912) found Bachman's Sparrow in the Transition Zone (2000-5000 feet elevation) in western North Carolina, but no evidence is presented that the birds were breeding there.

In this connection mention should be made of an observation on Bachman's Sparrow made in Garrett County, Maryland. The author found in June, 1923, and recorded (1936) a male in full song near Oakland. This is on that part of the Allegheny Plateau known locally as the "Tableland", and has an elevation of about 2600 feet. Garrett County forms the extreme western extension of the State, and is near enough the Monongahela Valley (being in part within that drainage system) so that stray birds might have found their way there from points of lower elevation.

Whatever its range and habitat may be elsewhere, there can be no doubt that in West Virginia at least Bachman's Sparrow has been at times a common breeding species in many regions which have been placed in the Transition Zone, and has invaded regions definitely within the Canadian Zone.

Two regions of seeming promise in West Virginia await further study. There is in the southwestern portion of the State, along the Big Sandy River and its tributaries, a considerable territory which is, biologically speaking, virtually unexplored. Dr. Murray quotes Mr. F. M. Jones as saying that Bachman's Sparrow is "a summer resident in restricted areas in southwestern Virginia". Since the West Virginia territory mentioned above is directly adjacent to southwestern Virginia, the need for field work there is strongly indicated. Another area which had virtually no ornithological attention during the time when Bachman's Sparrow was most common in the State is the tier of counties along the Ohio River north from Wood to Brooke (where Dr. George M. Sutton failed to find the species during his extensive observations there). No records for the species (save Haller's recent one in Ohio County) exist in this area.

According to Mr. Todd's studies, the known Pennsylvania range for this species is a somewhat discontinuous one. Dr. Dickey and Mr. J. Warren Jacobs have noted the bird in Greene County, and Mr. Todd and Mr. Christy have found it in Allegheny and Beaver Counties. There are, apparently, no records from Fayette and Washington Coun-

ties, although the presenee of the birds there might be expeeted. The strong probability suggests itself that the Pennsylvania invasion may have taken plaee through the Monongahela, rather than through the Ohio Valley. The faet that there are no Ohio reeords along the river north of Belmont County; the apparent absence of the speeies in Washington County, Pennsylvania*; and the point mentioned that Sutton has failed to find the birds in the Northern Panhandle of West Virginia (along the Ohio River), all suggest the Monongahela route, partieularly when it is known that the speeies was fairly common in Marion and Monongalia Counties, West Virginia, and in Greene County, Pennsylvania. That no Fayette County, Pennsylvania, reeords exist may be due to laek of field work there. Mr. Todd (in mss.) eoncludes as to speeies, "Its loeal range in our region will probably be found to approximate those of sueh speeies as the Moekingbird, Carolina Chiekadee, etc."

Migration

From the records available, it seems that Bachman's Sparrow arrives in our territory fairly early in the spring, and leaves during late summer or early autumn. Cooke (1914) lists the following spring arrival dates from Ohio: Cieninnati, two years; average April 24, earliest April 23, 1903; Cedar Point, May 14, 1909.

Hicks (in correspondenee) writes as follows: "Our Wheaton Club records for the Columbus region, whieh ineludes some of the Sugar Grove hill eountry near Laneaster, have eleven years of spring migration reeords on the speeies. The earliest spring date is April 10, 1925, although I have taken it at Portsmouth as early as April 2. The median spring arrival date is April 22. The median fall departure date is August 17, and the latest known date of departure August 28, 1931, although again I have taken it in Adams County in southern Ohio as late as September 2."

From West Virginia, E. A. Brooks (1912) gives the median spring arrival date of the speeies at Waverly, Wood County, for five years (1903-07) as April 25. At Freneh Creek, Upshur County, spring arrival dates for ten years are available. The earliest is Mareh 27, 1921; the median date is April 11; and the latest is April 22, 1926. Conditions for observation here were exeeptionally favorable, sinee

*Mr. Bayard H. Christy, of Sewickley, Pa., informs me in correspondence that on July 21, 1935, he found a singing male Bachman's Sparrow in Hanover Township, Washington County, Pa., just across the line from Beaver County. Revisiting the area two days later, he again found the singing male, and another bird which he took to be the female. She had dried grass in her beak, but no further indications of a nest or young birds could be found.

one or more observers were in the field every day in country frequented by the birds. Regular departure data were not gathered at French Creek, but I can find no mention of the species in field notes after September 1. In view of the late nestings (recorded further on) young birds must have taken their departure very soon after sustained flight was possible.

Pennsylvania migration records are few, but Mr. Todd notes that Dr. Dickey found two singing males (probably new arrivals) near Waynesburg, on April 15, 1922. He thinks also that the bird which he secured at Beaver, on April 29, 1910, may have been a new arrival.

The following spring arrival dates given by Cooke (1914) are for points near enough our territory to be of interest: Lynchburg, Virginia, April 7, 1901. Washington, D. C., two years; earliest date of arrival, April 26, 1914; average date of arrival, April 27. Rockwood, Tennessee (near), three years; earliest date of arrival, April 3, 1884; average date of arrival, April 7. Eubank, Kentucky, seven years; earliest date of arrival, March 20, 1889; average date of arrival, April 6. Bicknell, Indiana, four years; earliest date of arrival, March 19, 1908; average date of arrival, March 25. Bloomington, Indiana, four years; earliest date of arrival, April 6, 1884; average date of arrival, April 11.

Habitat

Every observer from North Carolina and Tennessee northward would agree, I believe, that Bachman's Sparrow is decidedly local in its distribution, highly selective in the places it chooses for breeding territory. I quote at some length from the excellent notes pertaining to this species in Ohio furnished by Dr. Hicks: "The Bachman's Sparrow is a most interesting species. I have it on my list of twenty species on which I have been doing special ecological distribution work. There are few, if any, Ohio breeding species which are as fascinating.

"A person acquainted with the ecology of the species can readily find twenty-five birds for every one located by the 'hit and miss' method. The species could hardly have existed in Ohio before the white man came, except about a few prairie openings, the only extensive ones of the Bachman's type being in Adams County. The cutting of the forest, soil erosion, and the abandoning of farms have favored the species. It is practically never found in a field until at least four years after cultivation has ceased. Also, it is practically confined to hill country, although it occurs in a few areas where the hills are relatively low—practically never in valleys or on the lower slopes. Usually

it is found on those ridge tops which drop away sharply in a divide to either side.

"The choicest locations are about fifty to one hundred yards down from the ridge tops in old deserted fields. A typical territory is a circle 150 feet each way from an eroded gully which has healed and is now well covered with miscellaneous trees, shrubs, and particularly blackberry brambles. The territory is more attractive after about five per cent of the open grass lands adjacent to the gullies are dotted with blackberry briers. Usually the center of the territory is close to the upper end of the gully, and the abundant plants are the dry soil goldenrods and asters, wild oat grass (*Danthonia spicata*), and various other grasses, composites, and miscellaneous weeds typical of dry eroded slopes. A good water supply, with humid and fertile soil, soon produces a vegetation set-up too dense for this species.

"The species occurs in some sites like the one described above where seedling pines also occur, but there is no indication that pines add anything to the attractiveness of the habitat.

"Another common vine in these areas is *Smilax glauca*, and other shrubs include three species of sumac" (*Rhus typhina*, *Rhus glabra*, and *Rhus copallina* (?) auth.).

In West Virginia both E. A. Brooks and A. B. Brooks make mention on numerous occasions of finding the birds in fields partially grown up to briers and shrubs. In the Upshur County territory with which I am most familiar, the habitat picture for the species is almost an exact duplicate of that described by Hicks as typical. One field where several nests were found occupied both slopes of an eroded ravine, the vegetative cover including as principal species beard grass (*Andropogon*), goldenrods, asters, daisies, fleabane (*Erigeron*), and other composites, greenbriers (*Smilax*) of several species, blackberry, and such shrubs as sumac, crabapple, hawthorne (*Crataegus*), and flowering dogwood (*Cornus florida*). Black walnut, white oak, tulip poplar, and red and sugar maples were beginning a forest invasion. In this field of approximately twelve acres there were at least four singing males during the summer of 1920, and two nests were found in the same area in the summer of 1925.

The experience of Miss Eva Fling and Harold Roush in Marion County is apparently somewhat different. Writing from Fairmont, West Virginia, in 1916, they say, "Found this sparrow [Bachman's] in a large grassy cove. . . . Fairly common in open fields all during the summer." In other notes made the same year they state, "We found this bird inhabiting large grassy fields and 'coves' on the road to

Smithtown, about four miles from Fairmont. Tolerably common in this locality."

Since West Virginia has no prairie land, and had, before the coming of the settler, almost no open lands of any description, it is obvious that this species could not have found here, prior to clearing operations, territory suited to its peculiar needs. This fact will be of assistance in explaining the invasion which apparently took place.

Mr. Todd (in his manuscript of "Birds of Western Pennsylvania") quotes as follows from Dr. Dickey's notes on the Pennsylvania habitat of Bachman's Sparrow: "In southwestern Pennsylvania it is partial to open, scattered groves of white, red, and black oaks, and to waste fields grown up to poverty grass (*Danthonia spicata*), intermixed with briers, saplings, small shrubs, and herbage.

"My first experience with this sparrow was in the summer of 1913, when with two companions I was engaged in trying to locate some old Indian trails across Greene County. On July 29, southwest of Kirby, a new bird song attracted my attention. It came from an open grove of old white oaks where the ground beneath was covered with poverty grass. After some maneuvering I contrived to spot the singer, which was perched on some dead branches, and to identify it satisfactorily as a Bachman's Sparrow. During the next two days our journey took us across hills and valleys into the general vicinity of Brock and Rosedale, and two more males were encountered—one in a waste-field grown up to poverty grass, briers, and saplings, on the north side of the valley of Dunkard Creek; the other in a rolling pasture about four miles west of the Monongahela River and only a half-mile from the West Virginia line.

"Later experience with this sparrow has confirmed its observed liking for sterile fields and open oak groves. It thus occupies an ecological niche which is, generally speaking, otherwise unattractive to bird life."

From observers in areas near to the territory covered in this paper come pertinent notes on the habitat of Bachman's Sparrow, most of them in general agreement with observations already quoted. Mr. Harold H. Bailey, in his "Birds of Virginia" speaks of his bird as "inhabating the more open pine woods, where it places its nest on the ground, well concealed by low vegetation". Dr. Murray also speaks of it in Virginia as "frequenting open, scattered pine woods, as farther south". Mr. Ijams, writing of this sparrow near Knoxville, Tennessee, tells of a field where some years ago a few pairs could be found during the breeding season. He describes the territory as "rocky hill pasture,

FIG. 18. Nest of Bachman's Sparrow near Hinkleville, Upshur County, West Virginia. Note the open construction, with no doming or arching.

FIG. 19. Nest of Bachman's Sparrow parasitized by a Cowbird. The nest is completely open. French Creek, Upshur County, West Virginia.

with thorny shrubs and blue grass". Dr. Jesse M. Shaver, writing from Nashville, Tennessee, says, "This species occurs with the Field Sparrow in old fields, especially those which have much broom grass (*Andropogon*), or many shrubs forming an early stage of shrub invasion". From the region of Bowling Green, Kentucky, Dr. Gordon Wilson, of Western Kentucky State Teachers College, speaks of this species as "found only in very restricted areas".

Nesting

The pure white eggs laid by Bachman's Sparrow make its nest an object of special ornithological interest. Ground-nesting passerine birds are not, generally speaking, given to laying white eggs, and most ornithologists in the territories where these birds breed will search long and diligently for a nest. Even where the birds are fairly common, however, nests are by no means easy to find. From my own experience I think of them as being in the same category (so far as difficulty of detection is concerned) as the nests of Grasshopper or Savannah Sparrows. Since all of the habitat notes quoted in the last section apply to breeding birds, it is obvious that much of the information there given is also pertinent at this point.

No other person in our territory, so far as I am aware, has had opportunities for studying the nesting of this sparrow that have come to Dr. Hicks, both through his own observations, and through the activities of the Wheaton Club. I quote again from his voluminous notes: "I have found about twenty-six nests in all, *only two of which seemed to me to be clearly domed* [italics the author's] as the nest of the Meadow Lark would be, although about one-half were built somewhat higher on one side. Many of the nests found have not been followed up, but I have survival data on most of them, and find that the percentage of success is distinctly higher than that which Mrs. Nice has found for the Song Sparrow, and which I have found for the Field Sparrow and the Vesper Sparrow.

"The causes of predation losses we now know to be rather complex, and not so easily explained as being due to the color of the eggs. I doubt very much if the species' nesting success would be significantly altered if the eggs looked like those of the Vesper Sparrow."

In West Virginia I have had opportunity to observe eight nests, and have received partial data on two more. In every case the nests found have been in such territory as is described under "Habitat". Most of the nests were found by accident, although at least one was discovered by watching the parent birds.

Perhaps the most striking feature of all the nests which I have seen is that not one of them has been distinctly domed or arched. Bendire (1888) states that *all* nests of this species are domed and cylindrical, and later writers have generally followed him in this description. The nest of Pine Woods Sparrow (*Aimophila aestivalis aestivalis*) is described by Bendire as "not arched over in any way, perfectly round, with the sides or rims everywhere of equal height".

Hoxie (1910) tells of finding a nest in Chatham County, Georgia, which (from the singing of the bird) he assumed to be that of Bachman's Sparrow. When the nest was examined, however, it proved to be open, not domed, and he concludes that it must have been the nest of Pine Woods Sparrow, although he raises a question as to the breeding of the two birds in the area. The first record which I can find of an undomed nest definitely ascribed to Bachman's Sparrow is one mentioned by Simons (1915). He tells of finding a nest of this species near Buffalo Bayou, Texas, on April 25, 1914, and speaks of it as "not arched or roofed over".

Whether or not it may be a peculiarity of those birds which come farther north to breed, Dr. Hicks' experience, together with my own, seems to indicate that domed nests in our territory are distinctly unusual. I have seen several nests that were built higher on one side, but none of them could be fairly referred to as "cylindrical". Reference to the accompanying photographs will show the open character of most of the nests which I have seen.

I quote from the correspondence of Dr. Paul R. Cutright, now of Beaver College, Jenkintown, Pennsylvania. Writing from Hinkleville, Upshur County, West Virginia, in July, 1914, he says: "I went over yesterday evening (July 10) to see the Bachman's Sparrow's nest, but it had been destroyed. It was near the place where the Hornbeek boys found a nest last summer. The nest was in good shape, and one of the eggs was found a few feet from it. One side of the egg was broken, and we could not save it. The nest was practically all formed from grass, with a few horse hairs in the lining. Like the one last year, it was on the ground in a bunch of broom sedge, and open, although Chapman says the nest is domed. I believe that it could be compared in size with the nest of the Song Sparrow. There were four eggs in each nest."

The first nest found in West Virginia (referred to above) was the discovery of Mr. Duffy Hornbeek, near Hinkleville, in July, 1913. After the eggs had hatched a single infertile egg was collected and placed in the collection of Mr. Orr King, Weston, West Virginia. It

measured .75 x .60. Another nest, with four eggs, was found in the same loeality by Mr. Hornbeck, and was photographed by F. E. Brooks on July 19, 1918.

Nests with eggs were found near Freneh Creek on the following dates: May 27, 1919; May 30, 1922; June 11, 1925; July 17, 1925; and July 2, 1926. All eontained four eggs save one (see aeeompanying photograph) which eontained three eggs of Baehman's Sparrow and one Cowbird egg. Of the eight nests, the first, found by Mr. Hornbeek, was sueeessful, except for the one infertile egg mentioned; the second, as deseribed by Dr. Cutright, was destroyed; the third (1918) was sueeessful; the fourth (1919) was destroyed; the fifth (1922) was parasitized by a Cowbird, and the parents abandoned the nest after the Cowbird's egg was removed; the sixth (June, 1925) was suecessful; the seventh (July, 1925) was destroyed; and the eighth (1926) was destroyed, by a blaeksnake in this instanee. Thus three nests were suecessful, or partially so, and five were destroyed or abandoned. These data are not sufficiently numerous to justify any conclusions as to predation, and it must remain for further study to determine whether or not pure white eggs are a handicap to this ground-nesting bird.

The fact that two nests were found in May and five in July would seem strongly to indieate that in our territory at least many pairs have two broods annually. Bendire (1888) believed this to be true of the birds farther south as well. No banding was done in our studies, but singing males oceupied the same territory, so far as we eould determine, from April until July or August. In view of the fact that observers are in agreement as to the early southward migration of the speeies, it would seem that late July broods would be somewhat hurried in their activities.

As mentioned previously, at the height of their abundanee in the Upshur County territory four pairs (possibly five) oceupied a field of approximately twelve acres. One male whose nest was diseovered had a favorite singing pereh in a small walnut tree about fifty yards from the nest. The birds were not erowded in their territory, and we found some points from which habitual singing was carried on at distanees of seventy-five to one hundred yards from the nest.

Brooding birds were found to sit very closc, allowing themselves to be approaehed within a few feet before flushing. When flushed, the bird would frequently drag its wing, flutter along the ground, and, in general, go through a performance that we have come to think of as "injury-feigning". I write this with fear and trembling in view of the fact that observers with many times my experience have stated that

they have never noted a clear case of "injury-feigning" in a passerine bird. Nevertheless, I have noted a performance similar to that described above from Vesper, Grasshopper, and Lark Sparrows, as well as from the species under discussion. I do not insist that this is necessarily "injury-feigning", but it is much like the performance of a Killdeer in leaving her nest.

Parent birds do not fly directly to the nest, but, in common with some other ground-nesting sparrows, drop inconspicuously into the grass and weeds from low perches at some distance from the nest, making their approach in such a manner that it is very difficult to follow them. In one case where we found a nest by watching the birds the habitual approach was from an old rail fence about thirty feet from the nest. Bushes along the fence-row gave us some concealment, and we watched for a long time until we became reasonably certain of the approximate location of the nest. Both parents were carrying insects to the young birds, and they were shy and secretive. When the nest was located (it contained four young birds) both parents nervously flew from low perches in weeds and grass to the ground, remaining within sight for very brief intervals. Presently one of the adults (the male?) flew away, and he did not return so long as we were in the vicinity of the nest.

Dr. Dickey (as quoted by Mr. Todd) writes of his experience in Greene County, Pennsylvania: "Some four years before I personally met with the species (1909), however, Mr. J. B. Carter had stumbled across a strange nest in a hillside field adjoining an oak copse, close to Waynesburg. It had somewhat the appearance of a nest of the Grasshopper Sparrow, and was tucked in a tussock of dead grass near a thicket. It held but one egg, pure glossy white in color, which measured .74 x .53. The discovery of this nest gave me some pause. It was apparently deserted, but seemed not to belong to any species with which I was then familiar. Subsequent disclosures, however, pointed to its being the nest of Bachman's Sparrow—the first actual case of the breeding of this species within our borders.

"On May 10, 1916, while traversing a grove of white oaks just north of town—I saw a small brown bird fly up from the ground into a tree, and burst into a song that at once disclosed its identity as a Bachman's Sparrow. Soon his mate joined him, and the pair dallied about the grassy plots and then went into a nearby pasture with scattered hawthorne shrubbery. Returning to the spot two days later, I found the female gathering material for her nest, the location of which was thus betrayed—in a clump of dry poverty grass in a wide aisle of

the grove. On May 20 I again returned and collected the nest with a set of five fresh eggs. The nest was a *dome-shaped* [italics the author's] affair with a foundation of dry grass-stems and blades. It was rather loosely arched over, and was lined with finer grasses and horsehair. The eggs were white with a faint bluish cast, and were slightly glossy in texture. The parent birds divided their time between the oak trees and the ground, feeding in both: they repeatedly perched in plain sight, manifesting little fear."

Dr. Shaver, Mr. Ijams, Dr. Wilson, and other observers in nearby territory testify to the difficulties involved in finding nests. Dr. Wilson states that he has never been able to locate a nest of this species in Kentucky. Mr. Ijams does not mention seeing a nest in eastern Tennessee, and Dr. Shaver says that he has seen very few in that State. In a list of seventeen records from the vicinity of Washington, D. C., and from nearby points in Virginia and Maryland, furnished me by Dr. H. C. Oberholser, there are few if any mentions of nests having been found.

Four eggs seem to be the usual number in our territory, all the nests which I have seen, save the one parasitized by a Cowbird, having that number. Nests with three eggs have been noted, however, and Dickey in Pennsylvania and Bailey in Virginia record occurrences of five eggs.

Song

Many writers have paid tribute to the musical ability of Bachman's Sparrow, but few persons who are acquainted with it will believe that any verbal description, or transliteration, will do it justice. Those who have been so fortunate as to hear Dr. A. A. Allen's recent recordings of the song of Pine Woods Sparrow will have a better idea of the almost identical Bachman's Sparrow notes. No recording, however, can catch all its qualities and variations, or bring out the whispered notes that add so much charm to the efforts of the singer.

Dr. Frank M. Chapman (in "Handbook of Birds of Eastern North America", Second Rev. Ed.) writes of Pine Woods Sparrow: "When singing it seeks an elevated perch" [by no means always true in the case of Bachman's Sparrow. Auth.]. "In my opinion its song is more beautiful than that of any other American Sparrow. It is very simple . . . but it possesses all the exquisite tenderness and pathos of the melody of the Hermit Thrush; indeed, in purity of tone and in execution

I should consider the Sparrow the superior songster. It sings most freely very early in the morning and late in the afternoon, when the world is hushed and the pine trees breathe a soft accompaniment to its divine music."

Writing this time of Bachman's Sparrow, the same author quotes Ridgway as finding its song somewhat like the "plaintive chant of the Field Sparrow, but as far sweeter and louder, the modulation, as nearly as can be expressed in words, resembling the syllibles *théééééé-thut, lut, lut, lut,* the first being a rich, silvery trill, pitched in a high musical key, the other syllable also metallic, but abrupt, and lower in tone".

Such a transliteration as that given above might well represent one common variant of the song, but it is far from telling the whole story. A much fuller, and, to the ears of this author at least, a much more precise description is that given by Strong (1918). He records: "The bird sang with only short rests, and the duration of the song which was very variable, was about two to three seconds. Usually the song started with a single long note followed by a group of short notes in a tempo so fast that we could not be sure of our count. So far as we would determine, the bird had seven to twelve notes in this group, usually about ten. As a rule, they were of essentially uniform pitch, but not of the same pitch as the long opening note. The pitch was sometimes lower than that of the first note and sometimes higher. A few performances had two or three opening notes not so long as the usual, single one. On one occasion, the song was repeated or rather one song followed another with no interruption or pause, both being a little shorter than usual.

"The quality was remarkably variable, but it tended to be fairly uniform in a single song. Sometimes the series of rapid notes was thin and resembled somewhat the song of a Junco. At other times it was relatively rich and full. Intermediate grades of quality occurred."

To me, the most notable quality of this sparrow's song is its wide variation. A person hearing a single song might, as many persons have, compare it with the song of the Field or Vesper Sparrow, even with one two-note song of the Chewink, but not from them would come this change in pitch, arrangement, tempo, and modulation. Definitely, there is a song-sequence, no two sequences being exactly the same, but each with a recognizable pattern. Each may contain ten or more separate songs, showing five, six, or more variations. The louder songs are

not uncommonly interspersed with "whisper songs", so low that they are inaudible to a person at a little distance. Frequently there are broken twitterings between the more ordered songs as well. As with many of our fine songsters, individual birds show wide variations in their vocal abilities.

A. B. Brooks writing of this bird from Morgantown, West Virginia, in May, 1907, observes: "He was near the same place where we had heard him singing before. The field where he stays is covered over with little tufts of weeds and brush. After I had listened to his song as long as I wanted to, I followed him for a while. He would hide in these tufts of weeds and grasses, and would allow me to walk up within two feet of him. He can beat any sparrow by half that I have ever heard when it comes to singing. I give some marks which will illustrate the song of the bird as I heard it. I took these down as he sang." (Here follows a diagrammatic representation of the song-sequence which shows seven variations given in a series of twelve songs). "When I approached a little nearer he discovered me and changed his song into a fine, mixed-up combination of slurs, whistles, and thrills."

At French Creek, Fred E. Brooks notes that on the evening of April 15, 1923 (the recorded date of arrival for the species at that place), he heard a whole series of songs given on such a high pitch that they were almost inaudible. He also mentions hearing a "whisper song" a number of times.

Mr. Todd, in conversation, tells of first hearing the song in Florida in 1903, and of recognizing it instantly when he unexpectedly heard it again near Beaver, Pennsylvania, in 1910. He also quotes Dickey to the effect that the song carries so well as to be audible, under favorable circumstances, at distances of half a mile. Earle A. Brooks speaks of the song as unforgettable, once heard.

Apparently the birds are well within their song-cycle when they arrive in our territory. Singing begins immediately, and is continued frequently until well along in July. Dickey notes a singing bird on July 29. I have heard their songs, given infrequently, a few times in August. Early morning and late afternoon seem to be preferred as singing times, but one of my most acute boyhood recollections has to do with the song of this bird, together with that of the Field Sparrow, coming to me through the heat as I picked blackberries under a blazing July sun.

The singing bird usually chooses a low perch, frequently a rail fence or a clump of bushes. I have heard the song given from perches thirty to fifty feet above the ground, and I am reasonably certain that I have heard it given a few times directly from the ground. There is a possibility, however, that in these cases the singing bird may have hopped up on some low weed as the song was delivered.

The hill country of which we are writing frequently has periods of chilly weather, with occasional heavy snows, after Bachman's Sparrows arrive in the spring. As with other birds, these sparrows frequently interrupt their singing during these cold spells. I have known singing to cease for a period of nearly two weeks, but I have several times heard songs, usually given spasmodically, when the temperature was near the freezing point.

Like Field Sparrows, these birds frequently sing on moonlit nights, the richness and beauty of the music intensified by the attendant circumstances.

General Notes

As a general rule, my experience with Bachman's Sparrow would lead me to regard it as a shy bird, difficult to observe. It has well developed the sparrow habit of dropping from some low perch when approached, and skulking away in the grass and weeds. Were it not for the unmistakable song, I can well realize how it might be overlooked in any given territory for a long time. Dickey, however, mentions finding the birds easy to observe about their nests, and, as already quoted, A. B. Brooks tells of a male that allowed approaches within two feet.

I have recorded briefly elsewhere (1934) a most unusual opportunity for observing the birds which came to us on our Upshur County farm during May, 1925. Much to our surprise, a pair of the birds, evidently nesting in a nearby brushy field, began frequenting one of our window feeding shelves. No similar circumstance had come to our attention, and we tried a variety of foods with the birds. They took raisins freely, but, like so many birds which we have fed, seemed to prefer the kernels of black walnuts to any other food which we could offer them. They also took coarse corn meal, cornbread, particles of cracked corn in ordinary poultry feed, and "cracklings" left from the "trying-out" of lard.

Both birds fed at the small shelf at the same time, and, once they had come, manifested little fear. They would sometimes remain for periods of five minutes or more, feeding both on the low shelf and on the ground where particles of food had been scattered. Visits continued for about three weeks, but, whether or not they were giving full attention to the problems of nesting, the birds came more and more infrequently. We did not see them at the shelf very early in the morning or late in the evening, the times when singing was most in evidence.

Stoddard (in "The Bobwhite Quail", p. 58, 1931) speaks of the frequency with which bird dogs "false point" Bachman's Sparrows. Dog handlers, he says, commonly refer to these birds as "stink birds". Since these sparrows are not found in our territory during the open season on quail, and particularly in Ohio, where quail hunting is prohibited by law, such observations by hunters in this section would necessarily be infrequent. I have heard dog trainers in this area speak of their dogs pointing "ground sparrows", and it is possible that the present species was the bird meant.

Bendire (1888), in the first lengthy account of Bachman's Sparrow, quotes Dr. William C. Avery, of Greensboro, Alabama, as having noted peculiar actions from the birds when flushed from the nest. He states that the flushed bird invariably runs (not flies) away from the nest, and that it imitates the movement of a snake, even giving at this time a distinct hissing note. While the present author has not heard the hissing note mentioned, the actions described by Dr. Avery correspond closely with those described as apparent "injury-feigning" in this paper. Dr. Avery also speaks of flushing four juvenile birds which flew like a covey of miniature Bobwhites, rising with an audible whir of wings, and he has noted this same sound from adult birds when they were flushed suddenly.

When distinctly domed nests are built this method of construction would seem to present difficulties to Cowbirds seeking to parasitize the nests. As mentioned earlier, however, one of the nests which came under my observation held a single Cowbird egg, and Woodruff (1907) tells of finding a nest in Carter County, Missouri, which held two eggs of Bachman's Sparrow, and three eggs of the Cowbird.

Specimens of Bachman's Sparrow from a part of the territory covered by this paper (West Virginia and Pennsylvania) have been examined by Dr. H. C. Oberholser, U. S. Biological Survey, Washington,

and have been found by him to be identical with examples from the South-Atlantic coastal regions. Various Ohio museums have a number of specimens taken in that State; Mr. Todd mentions the example taken by him near Beaver, Pennsylvania, in 1910, now in the Carnegie Museum in Pittsburgh, and there are two specimens taken by Dr. Diekey in Greene County in 1916, now in the Academy of Natural Sciences, Philadelphia. In West Virginia, Fred E. Brooks took a specimen at French Creek in 1911, the skin now being in the Carnegie Museum collections, and Karl Haller has two West Virginia specimens in his collection, one taken in Ohio County in 1934, the other taken in Wayne County in 1937.

Acknowledgments

The author wishes to make grateful aeknowledgement to a number of persons who have assisted in the preparation of this paper. Mr. W. E. Clyde Todd, curator of ornithology at the Carnegie Museum, Pittsburgh, graciously allowed me to see, and make wide use of materials in the manuscript of his "Birds of Western Pennsylvania". Miss Ruth Trimble of the same institution, also gave valuable assistanee. Dr. Lawrenee E. Hicks, of the Ohio Biologieal Survey, Columbus, allowed me to draw freely from the monumental accumulation of data at his disposal. For West Virginia material I relied largely on the notes of Rev. Earle A. Brooks, Newton Highlands, Massachusetts. Dr. Harry C. Obcrholser, of the U. S. Bureau of Biological Survey, Washington, examined and made determinations of specimens submitted to him, offered many valuable suggestions, and furnished many rceords from the Washington territory. Dr. Witmcr Stone, of the Aeademy of Natural Sciences, Philadelphia, allowed the loan of two specimens of Bachman's Sparrow in that institution, and Mr. Karl Haller, Short Creek, West Virginia, and Mr. Todd loaned specimens in their possession.

Valuable notes were furnished by Mr. J. Warren Jacobs, Waynesburg, Pennsylvania; Dr. Gordon Wilson, Western Kentucky State Teachers Collegc, Bowling Grcen, Kentucky; Dr. Jesse M. Shavcr, George Peabody College for Teaehers, Nashville, Tennessee; Mr. H. P. Ijams, Knoxvillc, Tennessee; Mr. Bayard H. Christy, Sewicklcy, Pennsylvania; Dr. James J. Murray, Lexington, Virginia; and Professor E. R. Grose, Glenville State Teachers Collcge, Glenville, West Virginia. Mr. A. S. Margolin, West Virginia Univcrsity, Morgantown, West Virginia, kindly furnished the map which accompanies this paper.

Summary

1. The paper attempts a survey of Bachman's Sparrow (*Aimophila aestivalis bachmani* Audubon) as it occurs, or has occurred, in southeastern Ohio, West Virginia, and southwestern Pennsylvania.

2. Evidence is presented to show that this species invaded the territory under consideration from the south or southwest during the latter years of the nineteenth and the early years of the twentieth centuries, the invasion reaching its northern limits, and the bird its maximum abundance from 1915 to 1922. In general, the valleys of the Ohio and Monongahela Rivers were followed in this movement. A distinct recession in numbers over a large part of the territory since 1922 is recorded.

3. Data are presented showing widespread distribution of the bird in southeastern Ohio, and in West Virginia west of the Allegheny Mountains, with a limited distribution in southwestern Pennsylvania. In West Virginia at least, the birds invaded the Transition Life Zone, and even reached the Canadian Life Zone.

4. Habitat notes show the species to be practically restricted in breeding range (in the areas under consideration) to brushy hillsides or wooded borders on fairly steep slopes.

5. The conclusion is reached that, in this territory at least, most of the nests are not domed or distinctly arched, although some nests of this type have been found. Four eggs is the usual complement, with three and five occasional. There is reason to believe that many pairs raise two broods annually.

6. The song-sequence is described, and notes on the high vocal abilities of the bird are presented.

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A PREDATOR-PREY RELATIONSHIP BETWEEN THE SHORT-EARED OWL AND THE MEADOW MOUSE

BY L. L. SNYDER AND C. E. HOPE

An influx of Short-eared Owls (*Asio flammeus*) to the Toronto region occurred in the late winter and early spring of 1936, coincident with a plague of meadow mice (*Microtus pennsylvanicus*). In reporting on this occurrence, it is pertinent to review the local status of this owl. This is made possible through the information compiled by Mr. Murray Speirs for the fifty-year period, 1887-1937, from the occurrence file in the Royal Ontario Museum of Zoology.

The Short-eared Owl has not been known to summer in the Toronto region. It is to be expected in autumn, principally during October, after which it usually disappears. It is again to be expected during February and March. Its absence during December seems fairly definite since it has been recorded only twice on the annual Christmas census of birds taken for the past thirteen years, once in 1930 and once in 1934. The species is thus a transient, which moves into the Toronto region in the autumn, passes on probably to more southerly stations and returns again for the late winter and early spring period.

There is considerable variation from year to year in the number of Short-eared Owls observed. During some years it has not been discovered. A total of thirty to sixty individuals seen during a season indicates that the species is prevalent. The first influx in such numbers occurred in the early winter of 1889-90; next in the falls of 1895 and 1896. Late winter and early spring records for 1896 and 1897 suggest a return of numbers following the fall influxes. The next period which definitely shows large numbers was not until the fall of 1909, and this was followed by a return of many birds in the early months of 1910. The last period of large numbers was in the late winter and early spring of 1936. Our records for periods between certain of those mentioned above suggest the probability that there were other years when Short-eared Owls were comparatively common, but the information is too indefinite to be useful. The most that can be said is that the species is numerous at certain periods, in the Toronto region, and at other times scarce, or entirely absent.

In February, 1936, reports of the presence of Short-eared Owls were received from several outlying sections adjacent to the city. Casual walks through one suitable habitat during the period from February 23 to March 22 led to the observation of from one to five individuals. Incidentally, it was noted that meadow mice were particularly abundant; scurrying mice and their nests were conspicuous.

Early in April another resort of this owl was discovered. Through the tell-tale signs of owl pellets, it became known that owls were, or had been, roosting in the ornamental evergreen plantings about the York Downs Golf Course in considerable numbers. This situation had not been previously regarded by local observers as a particularly likely place to find Short-eared Owls. However, during the second week of April, from one to eight individuals were noted frequenting the location. By the end of the second week they had disappeared. Roosts in the evergreens were inspected, and approximately one-half bushel of pellets, disgorged by Short-eared Owls, was picked up for examination. More than one thousand individual meals were represented by the recovered pellets. We did not attempt to explore the whole district for other roosts which may have existed. The pellets recovered gave a basis for a rough estimate of the owl population which had resorted to the scattered evergreen plantings covering perhaps eight or nine acres. Assuming that the owls had spent sixty days in this section, and had disgorged one pellet each day, the 1,078 pellets recovered gave evidence that eighteen owls had been located there. Inquiry was made of local residents and an attendant of the golf course informed us that as many as twenty-two owls had been present earlier in the year. Without doubt, there had been here an unusual concentration of Short-eared Owls during the late winter (1935-36).

Further inquiry made in the district elicited complaints from gardeners and property owners to the effect that mice had caused considerable damage to young trees and shrubs. Many young evergreens on the golf course had been girdled and a near-by nursery sustained heavy losses of stock. By motoring along the road fronting the golf course, one could see whole clumps of young trees and shrubs completely peeled of bark below the winter's snow line. Inspection of adjacent fields, uncultivated for many years except for the cutting of hay crops, disclosed that they constituted an extensive habitat for a heavy meadow mouse population. Locally there had been a veritable meadow mouse plague.

A summary of the situation is as follows: Meadow mice in the Toronto region generally, in the winter of 1935-36, were at a peak of numbers. Coincident with the large number of mice, unusual numbers of Short-eared Owls were present. The most notable concentration of owls occurred in the exact situation where meadow mice were sufficiently numerous to constitute a plague population. The relationship of the two species is revealed by the results of the pellet examinations given below.

Table 1. Results of Pellet Examination in 1936.

	Number	Percent
Pellets examined	1,078	
Individual animals represented	1,647	
Meadow Mice	1,181	71.7%
Deer Mice[1]	450	27.3%
House Mice	1	.1%
Birds (8 Snow Buntings, 2 English Sparrows, 1 Horned Lark, 4 unidentified)	15	.9%

During the late winter period of the next year (1937) Short-eared Owls were again present in the Toronto region but they were not as numerous as in 1936. Meadow miee were generally regarded as less numerous and damage in the locality of the golf eourse eeased. Studies of Short-cared Owl pellets eolleeted during this period were undertaken, however, although sueh material was relativcly searee. A seareh was made in the same evergreen plot as the ycar before and a satisfaetory number seeured. The results for this period are as follows:

Table 2. Results of Pellet Examination in 1937.

	Number	Percent
Pellets examined	252	
Individual animals represented	415	
Meadow Mice	389	93.7%
Deer Mice[2]	22	5.3%
Birds (2 Snow Buntings, 1 Horned Lark, 1 unidentified)	4	1%

It will be noted from a eomparison of this table with the first that the pereentage of meadow miee was inereased, while there was a reduction of other kinds of miee eaten. The ratio of all kinds of miee to birds taken as food rcmaincd approximately the same. It may be interpreted that the numerieal ratio of Short-earcd Owls to meadow miee was altcred by the seeond year; that is, although both speeies were less common, there werc relatively more meadow miee available to eaeh owl prcsent. Or it may be interpreted that a disappearance of deer miee increased the pressure on meadow miee.

The faets here presented indieate the eonverging of a predator on a definite area to feed on a lesser form, the population of whieh had attained plaguc proportions. The quantitative pellet analysis diseloses the fact that a large numbcr of prey animals from a rcstrieted arca were consumcd. Heavy prcdation in 1936 oeeurred during late winter, a season when the reproduetion of mcadow mice was normally low. Thus the predator must have had a considcrable effeet on the numbers of mice loeally.

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[1]No distinction has been made as to the forms of deer mice discovered in pellets, at least two spccies probably being involved.

[2]Probably of two species.

FOOD HABITS OF BUTEO HAWKS IN NORTH-CENTRAL UNITED STATES[1]

BY PAUL L. ERRINGTON AND W. J. BRECKENRIDGE

The data comprising the basis of this paper have been derived chiefly from recent studies in Iowa, Minnesota, and Wisconsin. While many stomachs have been sent in to us from various sources at different times, we have purposely avoided, except as otherwise indicated, the inclusion of data from material more than a few years old or from material not handled by ourselves personally. Our main objective has been to present a contemporary picture of the food habits of Buteo hawks in localities characteristic of north-central states environment.

We believe that stomach examinations have given us the most reliable data on the feeding habits of this genus of hawks, although we have supplemented stomach examinations whenever possible by field observations. Pellet analyses have been of some aid, but the usefulness of this technique in the study of Buteo is limited; bones of most prey animals withstand the digestive processes of these birds imperfectly if at all under ordinary conditions, and hence the pellets are not of the greatest value for quantitative work (Errington, 1932).

A particular effort has been made to distinguish between killed prey and food evidently eaten as carrion[2], but we have no way of knowing just what progress we have made in this respect. It is apparent that hawks of comparatively clumsy types, including Buteos, frequently feed on carcasses of one sort or another which they find dead in the first place. In view of the economic importance of certain species (poultry, game birds, etc.) that are known to be killed in large numbers by traffic and are well represented in the diets of some of our principal flesh-eaters, a clearer differentiation between foods eaten in connection with predation or with scavenging is much to be desired.

Aside from examination of rather complete carcasses retrieved from the possession of hawks in the field, some idea of the relative proportion of prey to carrion may be gained through careful examination of the contents of stomachs and gullets, especially of the latter in which the food is likely to be nearly in the same condition as when

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[2]We use the word "carrion" in this paper as denoting animal material which had been dead for some time before having been eaten, though not necessarily putrid.

eaten. Parenthetically, it should be pointed out, however, that the identification of a given item of food in a hawk stomach as carrion does not answer the question of whether the hawk had returned after a time to prey that had been killed or whether it had merely found a carcass acceptable as food; an investigator frequently has to weigh evidence according to probability and in the light of field experience.

In practice, we find that the portions of an animal eaten are useful in indicating whether the food represents probable prey or carrion. Gullet contents consisting of large quantities of skin, feathers, nearly meatless skeletal fragments (especially hindquarters or such bones as the sternum and synsacrum of large birds), with very little fleshy substance in the whole mass before digestion has taken place, suggest that there wasn't much left of the carcass at the time that the hawk started its meal. The presence of eggs or larvae of blow flies or sarcophagous insects of similar habits may be significant. Killed prey may often be suggested by heads and other parts of a victim usually eaten first by specific raptors, by solid masses of flesh (such as the upper breast meat of medium-sized birds), or by material comparatively free from dirt but mixed with particles of clean, incidentally ingested vegetation.

Red-tailed Hawk—*Buteo borealis*

Data from the wooded and hilly dairy and agricultural lands of south-central Wisconsin.

The following generalization by Errington (1933a) is based upon the examination of 105 items of fresh prey retrieved from nests or from field feeding places, 7 gullet contents of juvenals, 15 stomachs of adults, and 17 pellets of superior quality.

"A composite of the redtail's food habits might be compiled from the 165 individuals of prey tabulated as quantitative data: cottontail (*Sylvilagus*) [including 8 or more juvenals], 18; arboreal squirrel (mainly *Sciurus niger rufiventer*), 11; Franklin's ground squirrel (*Citellus franklini*), 3; striped ground squirrel (*Citellus tridecemlineatus*), 49; chipmunk (*Tamias*), 3; Norway rat (*Rattus norvegicus*), 1; meadow mouse (*Microtus*), 42; deer mouse (*Peromyscus*), 4; house mouse (*Mus*), 1; weasel (*Mustela*), 1; shrew (5 *Blarina*, 1 *Sorex*), 6; young horned lark (*Otocoris*), 1; domestic pigeon (young?), 1; domestic chicken (all young but 2), 18; gallinule (*Gallinula*), 1; snake (1 *Heterodon*, 1 *Pituophis*, 2 *Thamnophis*), 4; frog (*Rana*), 1."

Errington goes on to conclude that the amount of damage redtails may do to barnyard flocks "varies with the individual hawk and with the degree of exposure of the fowls and their ability to look out

for themselves. Old redtails that distrust man keep away from habitations where most poultry is congregated; these wary ones rarely get chickens except a few that wander far out in coverless fields. Juvenals, awkward hunters, seem to be the boldest raiders, but adults unusually tempted may lose some of their caution."

In the latter connection, and having a bearing on the popular supposition that hawks "once chicken killers, always chicken killers", we may again quote relative to studies of a redtail nest (Errington 1933a): "I was unable to obtain many real quantitative data . . . but judging by the masses of feathers always in sight and by the pellets from the youngsters, I feel safe in stating that this family of redtails lived almost exclusively upon young domestic chickens from the last of April to the forepart of June. From June 8 to about June 20, the diet was cottontail and ground squirrel, with some chicken. From the last third of June to July 9, the pellets of the tethered[3] juvenal showed little except cottontail, ground squirrel and mouse." In another nest (also with tethered young), observed from May to July, chickens occurred most prominently from May 21 to June 5, sparingly both before and after these dates.

From the evidence, it then appears that the redtail's depredations upon domestic chickens are more a matter of convenience of access at times when and in places where the chickens are most vulnerable as prey. We suspect that preference plays a minimal rôle in governing the food habits of any of the Buteos, though plainly the hunting habits of individual birds may be modified by experience. Indeed, the readiness of the redtail to turn to the fresher grades of carrion when that is easier to get than live prey leads us to question that this hawk cares especially what it eats as long as the food is acceptable and may be secured with apparent safety.

Additional Wisconsin data on the feeding of the redtail represent mainly those recorded from winter field observations: carrion pig, 1; cottontail (including one that was carrion), 3; meadow mouse, 5; striped ground squirrel, 1; carrion domestic chicken, 1; cock ring-necked pheasant (*Phasianus colchicus torquatus*), 1; starving bob-white (*Colinus virginianus*—see Errington, 1933b), 2. One stomach contained carrion domestic chicken.

A number of probable redtail winter pellets were picked up at random in the field but not systematically examined: these usually consisted of cottontail and mouse fur, and frequently of domestic

[3]Fastened for study on the ground near the nest: for discussion of technique of tethering see Errington, 1932.

chicken feathers. Domestic chickens eaten at this season largely represented carrion, of which an abundance was made available to redtails and other scavenging predators through the farm practice of scattering carcasses of many sorts over the fields with manure. One pellet was noted to contain remains of a mole (*Scalopus*), and another, remains of a small mink (*Mustela vison*).

By way of comparing the redtail's food habits in south-central Wisconsin with the food habits of this species in southern Michigan, we may quote English (1934) on the prey brought to a nest he had under observation: "The following specimens of vertebrate prey were brought into the nest by the adults during a period of seventy-four days, between May 2 and July 15: Avian prey: Pheasants, 7; Hungarian partridge, 3; quail, 2; flickers, 3; starlings, 2; and sparrows, 2. Mammalian prey: moles, 7; Microtus, 7; cottontail (juvenile), 5; weasels, 5; fox squirrel, 5; red squirrel, 1; and spermophile, 1. One milk snake was also brought in. Some of the smaller animals, especially *Microtus*, were eaten immediately and left no trace. For this reason they could not be recorded from remains found in the nest. Pellet analyses disclosed, however, that many animals were eaten which were not observed as fresh prey. On the basis of the ninety-four pellets analyzed, *Microtus* runs up to sixty-two and small birds to fifteen."

Data largely from the open farming country of "Corn Belt" Iowa.

Nine stomachs, principally the contributions of Mr. Walter Thietje, of the University of Iowa Museum, for the fall and winter of 1933-34, contained cottontail in 4; meadow mouse (total of 3) in 2; Franklin's ground squirrel in 1; domestic chicken, 3; goose (?), 1; garter snake (*Thamnophis*), 1. Of these items, all three of the domestic chicken representations were judged to be carrion; likewise, the Franklin's ground squirrel and one of the cottontails. A considerable quantity of grasshoppers (*Melanoplus*) was found in one stomach, and another hawk had eaten nothing but crickets (*Gryllus*).

Food items noted in the course of field observations: cottontail, 3; *Microtus*, 1; *Peromyscus*, 2; unidentified mice, 2; Franklin's ground squirrel, 1; young domestic chicken, 1; ring-necked pheasant (a young cock and a carrion hen), 2; traffic-killed Hungarian partridge (*Perdix perdix*), 1; bob-white (including one bird weak from an undetermined cause), 2.

Thirty-two pellets were examined between the fall of 1933 and the spring of 1936. Twenty were predominantly of cottontail; 11 of mice, representing a total of about 55 *Microtus* and *Peromyscus* in approximately equal proportions; one, domestic chicken.

Data largely from the prairie agricultural lands of southern Minnesota and eastern South Dakota.

Forty-four stomachs of various races of redtails were examined, from hawks sent in to Breckenridge by individual cöoperators during the fall and spring of 1932-33. Five of these were empty.

Representation of food items: carrion hog (?) in one stomach; cottontail (judged to be carrion in three instances), 8; juvenile Leporidae, probably cottontail, 2; meadow mouse, 7; deer mouse, 3; harvest mouse (*Reithrodontomys*), 1; pocket gopher (*Geomys*), 1; Franklin's ground squirrel, 2; striped ground squirrel, 4; short-tailed shrew (*Blarina*), 2; domestic chicken (judged to be carrion in three instances), 4; ring-necked pheasant (including 4 young and 4 apparently carrion), 12; song sparrow (*Melospiza*), 1; mourning dove (*Zenaidura*), 1; toad (*Bufo*), 5; frog (*Rana clamitans*), 1; salamander (*Ambystoma*), 1. Two stomachs contained small amounts of unidentified feathers; and one held a mass of badly disintegrated unidentified feathers, probably carrion.

Insects were represented in ten stomachs, of which one stomach was gorged with grasshoppers. The chief insects eaten were grasshoppers and crickets, with one *Calosoma* and some other Coleoptera, and one moth.

Twenty of this lot of stomachs are recorded as from adult hawks and twenty-one from juvenals. The carrion feeding propensities of adults and juvenals did not seem to differ significantly, as the stomachs of three adults and four juvenals revealed material considered to be mainly carrion. Four of the five empty stomachs were juvenals, however, as well as the one stomach filled with grasshoppers.

As Breckenridge (1935) has pointed out, the unusually heavy representation of ring-necked pheasants in stomachs of redtails, rough-legs and other hawks shot in western Minnesota during the fall migration may at least in part be explainable in terms other than those of direct predation. Due to the large numbers of young and inexperienced pheasants normally to be found in the fall in good pheasant country, the high traffic toll upon them at this time makes pheasant carrion an especially available source of food for the migrants. The fall hawk flights, moreover, seem to be concentrated in this area, and pheasants lost or crippled in connection with the hunting season (for a discussion of crippling losses of game birds, see Errington and Bennett, 1933) are doubtless acceptable also to about whatever hungry predators are able to find or to capture them, including raptors of clumsy types.

Red-shouldered Hawk—*Buteo lineatus*

Data from the densely wooded Wisconsin River Bottomlands of south-central Wisconsin.

"May, 1930, gullet contents of nestlings: snake (probably *Thamnophis*), 1; frog (*Rana*), 1. Fresh prey in nest: meadow mouse, 1. Nest litter contained feathers of a red-winged blackbird (*Agelaius*), considerable quantities of pellet mouse fur, snake scales, and crayfish (*Cambarus*) exoskeleton fragments." (Errington, 1933a).

The Red-shouldered Hawk is fairly common in Iowa, but we find that we have practically no data enabling us to make an original contribution on its food habits. The general impression we have gained from field experience is that its food habits do not differ so very much from those of the Broad-winged Hawk, except that it may exert a little more pressure upon small mammals.

Broad-winged Hawk—*Buteo platypterus*

Data from a lake-side tract of almost virgin woodland in south-central Wisconsin.

"July, 1929, material from one nest: chipmunk, 1; meadow mouse, 1; shrew (*Blarina*), 4; red-winged blackbird, 1; garter snake, 1; unknown quantities of insects (largely *Phyllophaga* and other Coleoptera)." (Errington, 1933a).

Data mainly from the partly wooded portions of eastern Iowa and southern Minnesota.

The seventeen stomachs examined were chiefly those sent to Errington by Thietje and to Breckenridge by Minnesota cöoperators. Most of the hawks were taken either in May, 1933, or in September, 1934.

Except for one stomach which was empty, all but one of this collection contained few to many insects, these comprising the principal contents of eight stomachs and being well represented in five more. Five hawks had swallowed large quantities of mud and three much plant material, apparently in connection with their feeding on animals inhabiting low, wet places. In one instance, the mud and vegetation were mixed and the mass had the general aspect of sod; the associated prey animals were two Carabid larvae and an earthworm.

Vertebrates listed in the analyses: cottontail (including carrion adult and one very young individual), 3; carrion striped ground squirrel, 1; small snake (*Storeria*), 2; unidentified snake, 1; toad (*Bufo*), 5; frog (*Rana*), 4.

Insects listed include wood ants (*Formicidae*), 8; May beetle (*Phyllophaga*) larva, 1; *Geotrupes*, 2; *Canthon*, 6; click beetle (Elateridae) larva, 1; ground beetle (*Harpalus*), 2; unidentified Carabid larvae, 12; Coleoptera debris, unknown number of genera and individuals. One stomach contained a mass of Diptera larvae and Lepidoptera larvae mixed. Of ten individuals of Lepidoptera larvae distinguished in other stomachs, five were Noctuids (cutworms and armyworms). Orthoptera were most heavily represented, the records showing counts of 113 grasshoppers (*Melanoplus*), 3 meadow grasshoppers (*Conocephalus*), and 1 cricket (*Gryllus*). Other invertebrates were a spider (Araehnida) and the previously mentioned earthworm (*Lumbricus*).

Swainson's Hawk—*Buteo swainsoni*

Data from western Minnesota.

Two of three fall stomachs (one was empty) sent in to Breckenridge by cooperators contained nothing except insect material, almost wholly Orthoptera, with one beetle and one Noctuid larva.

Data from the vicinity of a nest in the timber of a dry creek, Haakon County, western South Dakota.

On August 23, 1934, Errington found one grown juvenal still staying about the nest, and collected seventeen fresh and recent pellets. The nest debris was of Leporidae, meadowlark, and snake remains, with a scattering of insect fragments.

Representation of prey: juvenile Leporidae (including 3 questionably identified as young jack rabbits and 2 as young cottontails), in 6 pellets; deer mouse, 1; prairie dog (*Cynomys*, including at least 1 young), 11; meadow lark (*Sturnella*, including traces in 2 pellets), 8; unidentified small birds (probably Fringillidae), 4; snakes (including only traces in 7 pellets), 16; insect remains (usually present in comparatively small quantities) in 16. A certain amount of vegetation was found, especially burdock (*Arctium*) seeds which we suspected of having been the stomach contents of the meadowlarks.

The high representation of both prairie dogs and meadowlarks is surprising to us, but the terrific drought season of 1934 may have in some way rendered these species unusually available. The snake identifications, made by Mrs. F. N. Hamerstrom, Jr. and the late Professor J. E. Guthrie for thirteen of the pellets, indicate that garter snakes (*Thamnophis*) and blue racers (*Coluber*) were eaten in about equal proportions.

We were surprised, too, by the rather incidental representation of insects in the pellets, even after the young had doubtless been hunting

"on their own" for some time. Those insects eaten were mainly *Melanoplus* and Carabid beetles , of which *Chlaenius* and *Harpalus* were identified. Grasshoppers were sufficiently abundant so that one would have expected them to have been taken in greater numbers; Errington has frequently observed the Swainson's Hawk in this region feeding in the manner described by Taverner (1926, p. 196): "It varies its rodent food with grasshoppers it catches on the ground with clumsy gravity, making heavy hops with waving wings and short runs hither and thither as it grabs the nimble insects with talons that look absurdly big and formidable for the purpose."

American Rough-legged Hawk—*Buteo lagopus sancti-johannis*

Data from wooded, hilly agricultural lands of south-central Wisconsin.

"Falls of 1929 and 1930, stomach contents of 5 Rough-legged Hawks shot by hunters and farmers: meadow mouse, 8; shrew (*Sorex*), 1; a few insects, mainly crickets (*Gryllus*)." (Errington, 1933a).

Data predominantly from prairie farming country of central Iowa, southern Minnesota, and eastern South Dakota.

The twenty-three stomachs examined were mostly sent in to Breckenridge by Minnesota and South Dakota cöoperators during the fall, winter, and spring of 1932-33.

Items listed: Carrion jack rabbit (*Lepus*), 1; cottontail (at least two of which were known to be carrion), 8; juvenile Leporidae (probably cottontail), 3; *Mus* (all in one stomach), 5; *Microtus*, 42; *Peromyscus*, 8; unidentified mice, 2; Franklin's ground squirrel, 1; striped ground squirrel, 2; domestic chicken (including one carrion and one young), 3; ring-necked pheasant (including two young individuals and three evidently carrion), 7; unidentified small bird, 1. One stomach contained remains of a grasshopper and two others small quantities of crickets.

A comparison of the stomach contents of redtails and roughlegs would indicate a decided similarity in their food habits, but our field observations on the two species suggest some distinct differences. The Rough-legged Hawk, while larger in appearance, is in our opinion actually much less formidable as a predator than the redtail. The roughleg has impressed us as being slower and weaker than the redtail and even more prone to feed upon carrion. We have noted the former hawk picking away at the remains of traffic victims along highways, as well as at miscellaneous carcasses in fields, and to this extent its food habits correspond to those of the redtail. We have few observa-

tions, however, which lead us to think that the roughleg is often disposed to attack prey of a size greatly exceeding that of a ground squirrel or a young cottontail. It is to be suspected that the poultry and pheasant remains in the stomachs may represent mainly carrion feeding, with the possible exception of the more immature individuals eaten.

Concluding Remarks

As a genus, the Buteos are stocky and rather clumsy hawks, varying in size, strength, and habitat. They may be frequently seen soaring over woods and fields and show a partiality for such perching places as the tops of dead trees, telephone poles, and fence posts. With respect to temperament and intelligence, there is considerable variation with the species, the redtail in our estimation being the most spirited, the most tameable, and the most generally adaptable.

We have little reason to believe that preference for some type of prey influences the food habits of the species herein discussed to any conspicuous extent, although the "education" of each individual bird and its resulting routine of hunting undoubtedly does. What a redtail or any other Buteo eats is largely a matter of what is to be had without too much trouble; what is conspicuous enough to be readily seen by a hungry bird; what is within the bird's power to capture and to handle; or what is already available in the form of a carcass beside a highway, along a lake shore, or in a field or a woodlot. The feeding of all midwest Buteos upon rodents, snakes, invertebrates, and whatever else they may recognize as eligible food and can readily get claws on, reveals a conforming to ecological pattern that combines, as well as is controlled by, the elements of naturalness and necessity.

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NEST LIFE OF THE BANK SWALLOW

BY LEONARD K. BEYER

The Bank Swallow (*Riparia riparia* (Linnaeus)) is the smallest of our six species of swallows in eastern North America, and while not as brilliantly colored as most of the others it is in some ways the most interesting, particularly in its habit of nesting in colonies, sometimes of hundreds of pairs, in sand and gravel banks. Intrigued by the grace and charm of this bird, and by its cleverness in excavating a nest burrow far into the vertical sides of a hard bank, I determined to make it the object of a detailed study as a part of my graduate work in ornithology at Cornell University.

In June of 1932 I located three small colonies of Bank Swallows nesting in sand banks near Milton, Northumberland County, Pennsylvania. These banks were being worked on a small scale for commercial purposes. I was told by residents of this section that years before, when the sand bank owners were prospering and shipping out sand by the carload, Bank Swallows nested there by the hundreds. The sand at this place is coarse in texture and rather loosely packed, and the weather, in a few months after the operators ceased working at a given point, would wear down the vertical faces of the banks to a slope unsuited to the nesting of the swallows. Consequently the Bank Swallow population of this section was directly dependent on the amount of commercial activity in the sand banks. Of course many nests were destroyed by the sand diggers, but the nesting sites made available by their activities seemed to more than compensate for this destruction.

From a blind placed only a few feet in front of the entrances I observed burrow excavating and nest building. Both birds of a pair took part in the work. A bird would begin by clinging to the vertical face of the bank with feet and tail and pecking at the dirt with a side-to-side motion of the head. When the opening was deep enough for it to get partly inside it would use its feet also, kicking the loosened sand backward in vigorous little spurts. As the tunnel became deeper the bird disappeared from sight, but still the sand came spurting out as evidence of the work of the little miner inside.

Bank Swallows seem to take the work of excavating their burrows very lightly, more like play than work. Indeed, an eager holiday spirit seems to pervade the flock. A swallow will work vigorously for a few minutes, the while many of its comrades are circling about over the bank talking to each other in their reedy, buzzing twitter. Soon it

can no longer resist the temptation and it flies out for a ride through the air with them. But usually not for long, and after a few minutes it returns to its job. These activities continue throughout the day, though at intervals the entire flock may leave the bank for a time. As evening comes on they fly away to some favorite roosting place in a nearby marsh.

In the early stages of burrow excavation some fighting occurs among the occupants of a nesting site, apparently in settling territorial claims to desirable burrow locations. The contestants peck each other vigorously and sometimes fall together to the earth in front of the bank in the intensity of their struggles. Soon one succeeds in demonstrating its mastery over the other and the defeated bird flies away, though no apparent damage has been done to either.

After a few days of these activities some of the birds begin to carry straws and grasses into their burrows. At this stage, when just completed, the burrow is about 2½ inches wide by 1½ inches high, somewhat flattish across the top and more rounded below. As the burrows become older, however, they lose this form, especially about the entrance, because of wearing due to use by the birds and by erosion, so that the opening tends to become larger and rather rounded, particularly in such loosely packed sand as that in the sand banks near Milton. The depth of the burrows here averaged about thirty inches, though some were much deeper and one reached forty-three inches. Usually the burrow slopes slightly upward or bends gently upward a few inches back from the entrance. This is a decided advantage in that it prevents rain water, during heavy storms, from running into the burrows and flooding the nests. However, I have found a number which had no perceptible upward slope or bend.

The straws and grasses are used for the body of the nest, which is placed in an enlargement at the inner end of the burrow. Later the birds carry in feathers to be used as a soft lining for the nest. The feathers are almost always white ones, though occasionally one finds dark ones such as those of Barred Plymouth Rock fowls, or blue pigeon feathers.

One wonders where the birds get all the feathers. They seem to have no trouble finding them, for in addition to all they use in the nests one finds many scattered around on the ground in the vicinity of the nesting site. They seem to enjoy playing with them. One day in early June I saw a white feather floating high in the air just above a bank where a large colony of Bank Swallows was located. Suddenly a swallow darted at tthe feather, caught it and carried it a short dis-

tance, and then released it. Another bird caught the feather and released it, and then another and another. At last, apparently tiring of the game, one caught the feather and carried it into its burrow. Many of their activities during the early part of the nesting season seem to be carried on for the pure fun of it. They seem to like to poise on beating wings before the face of the bank where their nests are located, holding their positions for a few seconds and then wheeling away out over the nearby fields, only to return soon again to repeat the performance. This they do in companies of eight to a dozen or more.

One of my purposes was to observe the nest life of the Bank Swallow at close range. Because their nests are placed so deeply in sand or gravel banks this was much more difficult to accomplish than it would have been with almost any other kind of bird. However, I believed it would be possible to dig a pit down from the top of the bank to some distance below the level of the nests, work carefully forward until one came to the nests from the rear, and then make a small opening into the nest cavity through which to make observations. Accordingly, after waiting several days to allow time for eggs to be laid and incubation to get under way, I began a pit some four feet back from the edge of the bank. The burrows were scattered irregularly over the face, some being not much more than a foot from the top while others were six or seven feet down. When I reached a depth of several feet I began to work carefully forward toward the nests, using a trowel. The sand was of uniform texture throughout, with no roots except those of grasses and dewberry plants near the surface, making the digging a rather easy job.

The first nest I came to had five pure white eggs, but the next one had recently hatched young. I plugged the openings into both nests with rags, hurriedly arranged a covering over the opening of the pit above so as to darken it, with myself inside, and sat down in the earthly darkness to await developments. The birds had been more or less disturbed by my digging operations, but now that all was quiet again they soon returned and I could hear their twittering outside. Before long I heard twittering in the nest that contained young, only a few inches away beyond the rag plug. Carefully pulling the rag so as to make a tiny opening I cautiously looked in, and there in the semi-darkness saw the parent bird brooding the young. What a thrill to be so near!

It was very difficult to avoid disturbing the parent bird and several times it left the nest hurriedly, though it always returned before long. Sometimes it brought food for the young, so that I was able to observe

FIG. 20. Adult Bank Swallows at the entrances of their burrows.

FIG. 21. Nest and eggs of the Bank Swallow, as opened, showing the entrance burrow leading off to the right.

both brooding and feeding this first day. Fearing that too prolonged observation at this stage might eause the old birds to desert I decided to go home and leave them until the next day to become accustomed to the new arrangements. I elosed the rear opening into the nest cavity with a square of old linoleum held in plaee with sharp sticks pushed into the sand. and after crawling out of the pit covered it with a big pieee of old linoleum. Before leaving the place I had to build a rude fenee around the pit to prevent certain cows. which were pasturing in the field and whieh had been showing altogether too warm an interest in my investigations. from falling into it.

I returned to the sand bank on the afternoon of the following day with great anticipations. but to my keen disappointment found the nests deserted. Apparently my extensive mining operations disturbed the birds too mueh. Perhaps tiny drafts of air blowing through their burrows and over the nests. whieh I was not able entirely to prevent after they were opened from behind. eaused the desertion. At any rate my hopes of studying the nest life of the Bank Swallow this season were not to be realized. and it was not until two years later that I sueceeded in observing it from hatching time until the young left the nest.

The summer of 1934 I spent at Sodus Bay on the southern shore of Lake Ontario. where Bank Swallows nested by the thousands in the high bluffs that faee the lake. The soil here is much harder for the birds to dig than the sand banks at Milton. being a tightly packed boulder elay of glacial origin with many pebbles and larger stones seattered through it. and as a result the nest burrows are not nearly so deep as those in the easily worked sand at Milton. I measured many burrows and found them to range from fourteen inehes to eighteen and one-half inches in depth. Some were plaeed only a few inches from the top of the bluff in the humus-bearing soil to be found there. while many others were to be found farther down the faee of the bluff. Not nearly all the burrows were occupied. sinee many of them had to be abandoned because the birds had met rocks or roots before the burrows were deep enough. making it neeessary for them to start over again in a new place. Occasionally. however. they would detour around the obstruetion by bending the burrow to one side.

After a little scarch I found a plaee favorable for my mining operations. A pit was dug a short distance baek from the edge of the bluff. deep enough that it would be possible to sit in it for several hours with a fair degree of comfort while making observations. This time I planned to fill the pit with soil up to a point above the level

of the nests after each observation, to prevent tthe possibility of drafts blowing through the burrows. As the nests here were only a few inches below the top of the bluff it was not necessary to make the pit very deep, so that the labor of shoveling the dirt out of the pit and in again each day was not prohibitive.

On the day, June 23, when the excavation was made into the two nests included in the pit, there were two-day old nestlings in the nest on the left and newly-hatched young in the nest on the right. The new openings into both nest cavities were plugged with rags to prevent drafts from blowing over the young birds and also to give the old birds time to become accustomed to the changes in the rear of the nest cavities. Then I covered the pit, myself inside, with two thicknesses of tent canvas and sat down to await the birds' pleasure. In less than half an hour I heard the low-pitched reedy twittering of an adult Bank Swallow in the nest on the right—the one with newly-hatched young. With extreme care I pulled the rags slightly to one side, making a little opening through which I could see one of the old birds brooding the young. Later I enlarged the opening until it was more than an inch across. This startled the bird and it flew out, but soon returned. Occasionally both parent birds were in the nest cavity together. They seemed greatly mystified and somewhat disturbed by the strange developments at the rear of their nest cavity and several times one of them came to the opening and put its head through, peering inquiringly into my partially darkened pit. These two nests were only a little more than a foot in from the face of the bank and this short distance allowed a good deal of light to penetrate into the pit through the burrow and nest cavity. Once or twice I had to put my hand to the opening to keep one of the birds from falling into the pit with me.

The newly-hatched birds in this nest were pink in color, with a scanty covering of gray down on the back of the head and neck, base of wings, and top of back. The eyes were very large and showed black through the closed lids. The inside of the mouth and the flanges on the bill were lemon-yellow, the bill yellowish-gray, the feet pinkish-gray. The tiny nestlings appeared quite weak and it seemed to be only with the greatest effort that they were able to raise their immense wobbly heads for the food their parents brought them.

The old birds did not return to the nest on the left, in which the young were two days old, until after an hour or more. Before leaving for the day I plugged both openings tightly with rags and shoveled the removed dirt back into the pit.

When I returned the next day I put a glass window in the opening to the nest on the right, holding it in place by means of sharpened hooked sticks which I pushed firmly into the soil. The opening into the nest cavity through the glass was now an irregular one about three inches deep by four inches wide which allowed a clear view of all that went on in the nest cavity from within the pit. When the old birds returned to the nest they seemed much puzzled by the shiny glass at the back of the nest cavity. They came back to it, one at a time, and pecked at it, no doubt disturbed by the reflections of themselves which they must have seen in the glass against the dark interior of the pit. But after a short time they accepted this new arrangement and went about their duties of feeding and caring for their young, though returning now and again to peer wonderingly into the glass and peck at it.

During the hour which I spent in the observation pit the young were fed several times on small flies, the parent placing the food far down into the mouths of the nestlings. One of the parent birds remained on the nest nearly all the time, brooding the young while the other was foraging for food. When the latter one returned to the burrow, giving its low cheerful twitter upon reaching the entrance, the bird that had been brooding flew out for a short time, usually returning before the one that had brought food was gone. Judging from their actions and from the fact that the bird that brought in the food was somewhat more active and more alert and masculine in appearance than the one that did most of the brooding I believe it safe to call it the male, and the one that brooded the young most the female. Later observations tended to uphold this view, though not to prove it conclusively. Male and female Bank Swallows look so much alike that it is impossible to tell them apart with certainty without killing and dissecting them.

It was necessary for me to be away from Sodus Bay for the next two days, but Mr. William Montagna, then a student at Bethany College and a keen bird man who was helping me during the summer's study, spent a part of each day in the observation pit. He found the nest on the left deserted, but everything was all right in the one on the right, where I had placed the glass window the day before. As happened then one bird, apparently the female, remained on the nest most of the time to brood the young while the other, apparently the male, foraged for food. When he returned she usually left the burrow for a moment, coming back about the time he had finished feeding the young. Sometimes she would remain outside longer and then the male

would brood the young until her return. When returning from these short trips outside the female sometimes brought food also.

Sometimes while the female was brooding the young the male would squeeze himself in beside her on the nest and then actually push her off. She would leave reluctantly and return in a few seconds. Sometimes while the male was foraging he would come back to the entrance of the burrow, twittering cheerfully, look in for a second or two as if to see that everything was all right, then fly away.

When entering the burrow with food the male calls in a series of peculiarly sweet, fine notes much higher in pitch than the usual Bank Swallow call. This seems to be the food call to the young, for upon hearing it they raise their heads with mouths wide open. That is, if they are hungry. At times they do not seem to be hungry and give no response to the call. Then the male does a most surprising thing—he lightly tramps over them, gently kicking them as though to awaken them out of their sleepiness, calling sweetly all the while. Soon one or another raises its wobbly head, opens its mouth, and the food is deposited within.

On the next day, the fourth for our observations, feeding went on just as it had the day before, the male foraging while the female remained in the nest to brood the three young. Feeding occurred on an average of twice every five minutes, the diet consisting mostly of small flies and caddice flies. The parent birds, on this as well as the previous days, swallowed the small packets of excrement voided by the nestlings. Sometimes the female, after inspecting and cleaning the nest, would walk forward from it some distance in the burrow and then back up over it, spreading her feathers over the young to brood them.

On the fifth day, which was really the day when the young were four days old, I heard for the first time the call notes of the nestlings, weak and rather frequent and resembling somewhat the food call of the old birds. As on previous days, the male did nearly all the feeding, the female bringing food only three or four times during a two-hour period. The food was of the same character as that of the day before, mostly of flies and caddice flies, which often protruded from the old bird's mouth when it entered the burrow. The parent gave all the food brought on a single trip to but one offspring, not dividing the load among two or more as do many small birds. Only for short periods were both parents absent from the nest, seldom for more than a minute at a time. As before, the male brooded the young for short periods while the female was out of the burrow, and he, while brood-

ing, nearly always sat facing out. The female while brooding often faced in.

As the days passed the character of the food brought to the young gradually changed, probably due mainly to changes in the relative abundance of various kinds of insects in the vicinity. On the sixth day a brood of may-flies emerged along the lake shore and these insects began to appear in the diet. The young birds, now five day old, required less brooding, for on several occasions both parents were absent from the nest. At this age the feather sheaths have appeared in the feather tracts but as yet none of them have burst. The nestlings are much more stronger and noticeably larger, and their eyes are open though they keep them closed most of the time. Sometimes both parent birds returned to the nest at the same time, each carrying food. On one trip one of them brought a white feather and spent some time working it into the texture of the nest.

Each day the young birds were becoming more active, and their appetites larger. Their parents no longer needed to resort to the old trick of tramping over them to arouse them to take food. On the day they were six days old their food consisted mostly of may-flies. Both old birds were out of the burrow during most of the observation period, brooding the young for only two or three very short periods during the hour and ten minutes which I spent in the pit. They fed the young frequently for a while and then not so often, sometimes not more than once in ten minutes. Again one of the parents brought a white feather which it added to those in the nest, working it carefully in and rearranging the others. They no longer swallowed all the excrement of the young, but carried much of it outside the burrow.

On June 30, when the nestlings were seven days old, I spent from 7:05 A. M. to 9:45 A. M. in the observation pit, a period of two hours and forty minutes. Neither of the old birds returned until 8:15 A. M., leaving the nestlings alone for an hour and ten minutes. I was beginning to fear they had deserted, but after they did return they came regularly, feeding the young ten times in an hour. At no time were both birds in the burrow at the same time. Brooding had become less needful each day as the young grew older, and on this day what little brooding was done was for very short periods only, usually for less than a minute. The female, relieved of the necessity of remaining so much in the burrow to brood, took a more active part in the feeding operations. The food seemed to be exclusively may-flies on this day. The parent birds no longer swallowed any of the excrement of the young, but carried it away from the burrow each time. At this age of

the young many feathers in the dorsal tract have burst their sheaths, and also a few of the wing and tail feathers.

The following day I spent an hour and a half in the observation pit. Feeding occurred twelve times during the first hour, but after that neither of the old birds returned. In fact the parents leave their young alone for more or less extended periods during this stage of their development, as we saw by their absence for an hour and ten minutes on the day before. The young birds have become increasingly active each day. On this day they moved quite freely about the nest cavity, especially to void excrement. In performing this act they nearly always moved forward toward the entrance of the burrow, though occasionally one of them would come to the back of the nest cavity and leave the capsule of waste matter against the glass of the window. As during the day before all excrement was carried out of the burrow by the old birds, none of it swallowed. The young birds usually answered the calls of their parents given as the latter came through the entrance. Their voices had now begun to resemble those of adult Bank Swallows. Sometimes when they did not respond to the food call of the parent the old bird gave a very soft, high-pitched call that was exceedingly musical and sweet.

During the observation period on the next day the old birds were away most of the time, feeding the young only once in the space of an hour. The nestlings were very hungry and at the appearance of one of the parents at the entrance with food rushed toward it down the burrow with mouths widely open. Now nine days old, they had become rather well feathered, most of the body feathers and many of the wing and tail feathers having burst their sheaths. However, their appearance was rough and unkempt, for the feathers were only partly grown and the scanty natal down still clung to the tips of many of the feathers.

On July 3 the young, then ten days old, were very active and hungry, stretching their necks, opening their mouths, and calling eagerly for food when an old bird appeared at the entrance. They were fed thirteen times in an hour, the food being practically all mayflies. They moved freely about in the nest cavity, one or two of them frequently getting outside the nest proper and pressing against the dirt wall of the cavity or the glass window at the back. At other times all three young birds lay quietly in the nest for a time, later to resume their restless movements. Fleas (*Ceratophyllus riparius* J. and R.), which breed abundantly in the nest material, seemed to cause them some annoyance, for the pests were often seen crawling about

over the birds. Mites also infested them, and their frequent scratching and picking at themselves were doubtless caused by the attacks of these parasites.

On the next day I observed activities in the nest from 9:40 A. M. to 11:50 A. M. The old birds did not return until 10:26, but after that they came very often, thirteen times in half an hour. The young were exceedingly active, especially when food was brought. The parents did not brood them at all any more. I exploded several photoflash bulbs in an attempt to secure flashlight pictures and neither the old birds nor the young seemed to be disturbed by the sudden brilliant flash of light. But when I removed two of the nestlings, leaving only one in the nest, the old bird was much puzzled and looked anxiously about the cavity for the missing young. I soon returned them to the nest and then the parents seemed satisfied again.

No visits were made to the nest on July 5, but the entire day of July 6, from 5:00 A. M. until 8:00 P. M., was spent in the observation pit. Thus far the daily observations had been for periods ranging from an hour to nearly three hours, sometimes in the forenoon and sometimes in the afternoon. It seemed that an entire day, from dawn to dark, spent in observation of the nest activities might give an insight into the daily life of the birds that we were missing in our shorter daily periods. We decided to work in two-hour shifts, I to take the first one from 5:00 A. M. to 7:00 A. M., Mr. Montagna the second, from 7:00 A. M. to 9:00 A. M., I the third, he the fourth, and so on. As it happened, we chose what turned out to be the hottest, most oppressive day of the entire summer for our day-long vigil, a day of great humidity and intermittent thunder showers, with periods of warm sunshine between the showers. The conditions on such a day within the narrow confines of the observation pit, covered over by two thicknesses of canvas, can hardly be imagined. I learned that day what it means to sweat from every pore.

It was raining slightly from a nearby thunderstorm when we arrived at the bluff where the observation pit was located at 4:25 A. M. No swallows were flying about as yet. But it was necessary for us to return to camp for some forgotten equipment and when we came back at 4:45 A. M. many of the birds were coursing about above the bluff and over the lake. We opened the pit and found only two young birds in the nest. Later search at the foot of the bank in front of the burrow disclosed the fate of the missing one—it had fallen out of the entrance of the burrow and been dashed to its death on the hard soil below. Young Bank Swallows of this age often rush toward the en-

trance to meet one of their parents returning with food, and it was probably in this way that the accident occurred.

The remaining nestlings were thirteen days old on this day. They were quite well feathered, with a considerable amount of natal down still clinging to them. They spent a good part of the time moving about, exercising by stretching wings and legs, and preening their feathers. At other times they rested sitting in the nest, or leaning against the dirt wall of the nest cavity or the glass of the window. Sometimes one of them would press itself hard into the corner formed where the glass of the window met the earth of the cavity wall. At other times they would lean against each other, eyes shut and heads drooping in the most comical fashion. The day was very warm, causing them to pant from the heat.

But when the call of one of the old birds was heard at the entrance both nestlings became eagerly alive, often rushing forward to meet the parent for the food. They were nearly always fed alternately. This was not due to any choice on the part of the parents, but to the habit of the young bird just fed retiring to the back of the burrow and the other moving forward to be in the most advantageous position when next a parent returned with food. Once in a while this method of alternating did not work, mainly, I think, because the young bird whose turn it was to be fed next was not hungry enough to move forward where it would be the first to meet the returning parent.

During the fifteen hours that the nest was under continual observation food was brought one hundred and fifteen times. Except for several fairly long absences from the nest of eleven to fifty-five minutes occasioned by outside disturbances such as our changing watch at the end of each two-hour interval, the arrival of campers at their tent nearby, and their engaging in target practice, the length of time between feedings ranged from one to fifteen minutes, averaging somewhat less than five minutes for the day. Several times both parents came at the same time with food. May-flies again seemed to be the main article of diet. Occasionally one would be dropped while being passed from parent to young and it would struggle, in a more or less mutilated condition, along the floor of the burrow toward the entrance. Neither the young nor old birds would pay any attention to it.

During the period from 5:00 P. M. to 7:00 P. M. feeding occurred more often, many times at only one-minute intervals. But after 7:00 P. M. no more visits were made by the parents that day.

Twice during the day a grass stem was brought and added to the nest, and once a feather. Excrement was removed whenever voided by the young, each time by carrying to the outside.

Outside the pit it was noticed that at about 7:30 P. M. a general movement of the swallows flying about began down along the shore of the lake toward the marshes on Sodus Bay. They did not all leave at once, but the number diminished gradually until by 7:50 P. M. they were all gone. I did not see any birds fly into the burrows after 7:30 P. M. though several flew out to join those leaving the bluff. Apparently after the young birds are fairly well grown and no longer require brooding the parents leave them for the night, joining other adult birds from their own and other colonies in the vicinity to roost together in the marshes.

At 8:00 P. M., all the adult swallows having gone to their roosting place and darkness about to fall, we closed the observation pit and ended our work for the day.

No observations were made at the nest on the next day, July 7, and when I went to the observation pit on July 8 there was only one young bird in the nest. It was fifteen days old, fully feathered, and practically all the natal down was gone. It walked easily about the nest cavity and burrow, and exercised its wings frequently. The fate of the other nestling I do not know. It may have fallen from the burrow entrance, although I did not find its body at the foot of the bank, or it may have been tempted to try its wings too early.

On July 10, when the young bird was seventeen days old, I spent from 8:35 A. M. to 10:05 A. M. in the pit. During this period it was fed seven times. Several times it ran out to the entrance to call to its parents but usually backed into the burrow when one of them brought food. I worked with the glass window out on this day and once it fell through the opening into the observation pit. It apparently was not excited by this but lay still where it fell until I picked it up, and then sat for several minutes on my hand at the edge of the nest cavity. The old birds were no longer removing excrement and the nest was becoming rather unclean.

When I went to the observation pit on the morning of July 11, eighteen days after the young had hatched, I found the last nestling gone and the nest deserted.

From the data secured in the daily observations at the nest can be made certain general statements concerning the nest life of the Bank Swallow. When the young are first hatched, and for four or five days thereafter, they are brooded almost continuously, apparently by the

female, while the other parent, apparently the male, forages for food. When the male comes with food the female often flies out for a brief time, usually returning by the time he is through feeding the young. If she has not come back by that time he remains to brood them until she arrives. Occasionally she brings food with her.

The food the first few days consists of small soft-bodied insects. In the nest under observation it was mostly of small Diptera. Feeding occurs quite often, averaging twice every five minutes in this nest of three young. Only one young is fed at a visit—that is, all the food brought by the parent on one trip is given to one young. When entering the burrow with food the parent calls in a series of sweet high-pitched notes to the young. If the young are not hungry the parent calls more insistently, at the same time trampling them gently to arouse them.

As the young get older they are brooded less and less, by the sixth day scarcely at all. When brooding is no longer necessary both birds seem to share about equally in the feeding. Many times they both return at the same time with food.

In the nest under observation the food during the middle and latter part of the time spent in the nest seemed to consist almost entirely of may-flies, which were very abundant along the shore of the lake at this time. From the studies of other investigators, notably those of Dayton Stoner on the Bank Swallows of the Oneida Lake region in New York, we know that the food of nestlings includes a variety of other kinds of insects, especially high in those of the orders Diptera, Coleoptera, and Homoptera.

During the first five or six days the small packets of excrement voided by the nestlings are swallowed by the old birds, but throughout the remainder of the time the packets, larger now, are carried outside. During the last two or three days they are not removed at all and the nests soon become quite filthy. This was true of the nest observed from the pit as well as of many others observed from the outside.

Early in life the young birds begin to call, in very weak notes at first. As they become older they call more loudly and gradually their notes come to resemble the characteristic reedy twitter of the adults of the species.

As the young get older they become increasingly active, moving about the nest and nest cavity and later out into the burrow, exercising legs and wings. During the latter part of the time spent in the nest they preen and pick at their feathers a good deal. Young birds are occasionally lost by their moving too far out of the burrow and

dropping to the foot of the bank below. One was thus lost from the nest under observation. Search at the foot of a bank occupied by these swallows during the latter part of the nesting season shows that a number are killed in this way.

Bank Swallows leave their young alone in the burrows at night after they are partly grown, the adults flying away to roost with others of their kind in a marsh.

The old birds keep bringing new feathers and straws or grass stems to add to the nest until a few days before the young leave.

Young Bank Swallows usually remain in the nest until the eighteenth day after hatching, sometimes two or three days longer. By the fourteenth day they are completely feathered with some of the natal down still clinging to them, but this is gone by the sixteenth day. They can fly by the sixteenth day, though not for more than a few minutes at a time. One that escaped from us at this age flew far out over a field but lacked endurance and gradually lost altitude until it came to earth. But by the eighteenth day they can fly quite strongly.

Many times we witnessed what apparently was the initial flight of a young bird. Swiftly it would dart from the burrow and course out over the lake. The old birds flying about seemed to know that this was the first flight of a fledgling for quickly one or two of them would fly close to the young one and follow it. These first flights were noticeably more erratic than those of the older birds. One young bird that took to the air a little too soon could not maintain itself in flight but gradually came down until it fell into the rough waters of the lake. I was unable to learn the fate of this one; it was probably drowned or beaten to death by the waves. But when a young Bank Swallow falls into still or fairly still water it swims easily to land.

Before they are fully fledged young Bank Swallows are entirely without fear, but about the fourteenth day the fear instinct begins to appear. Fledged birds will crouch as far back in the nest cavity as possible when one reaches into a burrow, or, seeing a shadow darken the entrance, they will sometimes fly out, sometimes on unsteady wings. After capture, however, they will submit to considerable handling if it is done carefully, even posing quietly on a stick for a photograph. When returned to the entrance of the burrow they run eagerly back into its dark interior.

According to many writers some of the birds in a colony of Bank Swallows rear a second brood. Dayton Stoner, who has done some very careful work with Bank Swallows in connection with bird banding

operations in Iowa,[1] and later in the Oncida Lake region of New York,[2] believes that the rearing of two broods in a season is a fairly common occurrence. He found newly hatched young in northwestern Iowa as late as August 5, and this certainly looks as though a second brood were being reared. In my own experience, however, I found no evidence of second broods though I looked persistently for them throughout July and August in the Sodus Bay region. Here many young birds were on the wing by late June and by that time flocking had begun, great numbers of both old and young birds being seen every day resting on telephone wires and power lines. Throughout early July the size of these flocks kept increasing while the number of birds flying about the nesting sites and in and out the burrows kept decreasing. We continued watching the birds at the banks and investigating burrows into which we had seen them fly, but in no case did we find eggs or even unfledged young. On July 26, when the banks were pretty well deserted, we investigated a burrow that was still being used, thinking that here perhaps a second brood was being reared, but it contained fully fledged young birds almost ready to fly.

It is true that Bank Swallows are rather irregular as to nesting dates, some beginning egg-laying even after others have well grown young in the nests. Among the swallows nesting in the bluffs on Lake Ontario near Sodus Bay we did not find any great irregularity, for here the birds were not disturbed, and nearly all the pairs of a colony had finished nesting by July 15. But where Bank Swallows are being more or less continually disturbed by the commercial working of the sand and gravel banks, or by the slumping of the banks due to erosion, it is easy to see that there would be more irregularity in nesting. Possibly some unfortunate pairs would have their nests destroyed repeatedly and not succeed in beginning incubation or producting newly-hatched young until late July or early August, and thus give the impression that a second brood was being reared. It is possible, of course, that an occasional second brood is reared in the same season, but I believe that such an occurrence is rather rare, at least among the Bank Swallows nesting in the vicinity of Sodus Bay.

Mansfield State Teachers College,
Mansfield, Pa.

[1]The Auk, Vol. 42, pp. 90-93; Vol. 43, pp. 199-209; Vol. 45, pp. 310-320.
[2]Roosevelt Wild Life Bull., Vol. 9, No. 2, pp. 122-233.

EDITORIAL

The Annual Meeting this year is to be held at the University of Michigan, Ann Arbor, on November 25-26, and will celebrate the Fiftieth Anniversary of the Wilson Ornithological Club. A number of special features in the program are being planned. It promises to be a big meeting. In 1939 the Club will no doubt meet in Columbus, Ohio, with the American Association. There has been some talk of a meeting of the American Association in Kansas City in 1940, in which case the W. O. C. will no doubt follow. If, however, the 1940 A. A. A. S. meeting is held in Philadelphia we will have to find some place in the Middle West—probably in the northern part of our territory. In this case the stage would be properly set for a W. O. C. meeting in the South in 1941—probably in Nashville, Louisville, Memphis, or elsewhere.

The Editor has received some criticism on the change in the cover of the last number of the Wilson Bulletin. The objection seems to be directed at the omission of the sketch of the Wilson Warbler. A return to the old cover has been requested. The Editor is reluctant to make a change in the midst of a volume, but at the beginning of another volume he would be glad to make any change which seems to meet with general approval. As well as the Editor can figure out, the Wilson Bulletin has appeared in nine different covers. Four have been figure designs, while the others have used type designs. The first figure design was a sort of salmagundi (1902-1907); the second one used the Wilson Warbler, peeking over the wall (1908-1915); the third used the Wilson Phalarope (1916-1925); the fourth again used the Wilson Warbler in a conventional pose (1926-1937). The Editor is under the impression that none of these designs was adopted by the Club as a fixture—or at all.

Some of the ornithological magazines have been fortunate in having a fairly constant format and cover design from their beginnings; that is, they were full-grown when they were born. Others have had to grow. Perhaps the Wilson Bulletin has not matured yet. But who knows what it should be at maturity? Any suggestions or comments from members to the Editor will be gratefully received—and will be stewed up together for the Editor's consumption.

Mr. Arthur Cleveland Bent has issued the announcement that he is now ready to receive notes and photographs relating to any of the North American flycatchers, larks, and swallows, for use in the fourteenth volume of the "Life Histories" series. He also reports that the "eleventh volume is now in press and about to appear, the twelfth has gone to the publishers, and the thirteenth is largely written". Thus this great work is progressing.

GENERAL NOTES

Conducted by O. A. Stevens

Fall Records of Golden Plover in Iowa.—On October 9, 1937, the first day of the open season on ducks, I was hunting on a pond five miles east of Salix in Woodbury County. Early in the morning several large flocks of plovers flew over my blind. One of the hunters on the pond shot into one of the flocks and brought down one bird. I took it to Dr. T. C. Stephens of Morningside College, who identified it as a Golden Plover (*Pluvialis dominica*). These birds were reported in flocks of from twenty to two hundred for several days in that vicinity. On October 17, while out with the Sioux City Bird Club, a flock of about forty Golden Plovers were identified by Dr. Stephens and myself. They were feeding on a fall-plowed field three miles east of Remsen in Plymouth County. —Wilfred D. Crabb, *Sioux City, Iowa.*

Duck Hawks Nesting in Western Tennessee.—While several pairs of Duck Hawks (*Falco peregrinus*) are known to breed annually among the rocky crags of eastern Tennessee, there is only one record, so far as known to the writer, of their nesting in the western part of the State. Consequently it was with great surprise that the writer, with Dr. S. C. Kendeigh, noted an adult of this species circling over the tree tops and screaming incessantly in the extensive swamp forests on the west side of Reelfoot Lake, March 27, 1937. Near at hand stood a tall, dead cypress with the crown broken off. The writer, upon pounding the base of this tree, frightened another Duck Hawk from the broken top of the trunk, some sixty feet in height. Both adults now flew about overhead, screaming continually, one daring to re-alight on the cypress. These actions left no doubt in the writer's mind that they were nesting in the top of the tree stub.—Frank Bellrose Jr., *Brussels, Ill.*

Canada Geese Nesting in Indiana.—My observation of wild geese has always been of the V-shaped flock making its semi-annual pilgrimage to the far north in the spring, or to the south in the fall. Occasionally I have seen them feeding along the Kankakee River or on the small lakes in northern Indiana. Imagine my surprise when I found Canada Geese nesting in Porter County, northwestern Indiana, about eight miles north of Hebron, and not twenty rods from State Highway No. 2 (a concrete road), and not more than 400 feet from a dwelling house. I investigated all places where domesticated geese were kept, and was informed by all owners that none of their birds were missing. Returning to the nesting place I found one gander and three females. The nest was made in the marsh grass at the edge of a pond (not a lake), and contained six eggs. When I approached they rose and flew in a circle, and returned to the nest when I departed.—Charles H. Reider, *Valparaiso, Ind.*

A New Device for Studying Chimney Swifts.—During the summer of 1937 Mr. John Kee, a farmer living in Roane County, West Virginia, showed me a device for studying and photographing Chimney Swifts (*Chaetura pelagica*) which was new to me, and which may be of some interest to ornithologists in general. Mr. Kee had become convinced that it was desirable to have these birds about his home, and, to encourage them, he had taken tin coffee cans, open at the top, had fastened wires on either side of the cans near the top rim, and had suspended

the cans from the chimney, fastening the wires to nails driven in the mortar. In this way the cans could be raised to the top of the chimney, and study and photography were easy. Eighteen had been placed at varying levels in this one chimney, and all were occupied. In view of the difficulties sometimes experienced in reaching and photographing occupied nests of Chimney Swifts, I believe that a wide use of this method might be made by interested persons.—Maurice Brooks, *West Virginia University, Morgantown, W. Va.*

A Fatal Combat Between Heron and Snake.—That war is a loss to all concerned is sometimes as true of Nature's less highly developed progeny as it is of mankind. On September 10, at the mouth of North Landing River, Currituck Sound, North Carolina, Dr. W. S. Bourn observed mute but clear evidence of a fight to the death between an unusually large Great Blue Heron (*Ardea herodias*) and a huge (forty-five inch) water snake (*Natrix* sp.). The bird and snake were found sometime after their death very much entangled with each other. The lower mandible of the heron was found to have first penetrated the skin of the snake on the ventral side approximately four inches from the mouth and then to have been forced forward and upward until the tip of the bill finally emerged through the top of the snake's head. Dr. Bourn reports that apparently while this was taking place, "the snake in its struggle to escape, made a complete half-hitch around the bird's neck and a coil entirely around the right wing. This action resulted in so kinking the bird's neck as to break it and at the same time forced the bird's bill through the head of the snake". The observer further reported that "from the evidence presented by the disturbance of the normally firmly packed sand along the beach the action was vigorous while it lasted".—Clarence Cottam, *U. S. Biological Survey, Washington, D. C.*

The Invasion of Northern Mississippi by the Starlings.—Almost fifty years have passed since the Starling (*Sturnus vulgaris*) was introduced into New York City from Europe. It is now fairly abundant in all the southern states, but it is only recently that large flocks have appeared in northern Mississippi. The first record of this bird in Louisiana was in December, 1921 (Walter C. Carey in *Bird-Lore*, XXIV, 95, 122). The first record in Alabama was of one which was blown against a barn during a rainstorm on January 14, 1918 (P. A. Brannon in the *Auk*, XXXV, 224, 1918).

The writer's first contact with the Starling came in December, 1930, when a small flock was observed feeding in a field in company with Cowbirds (*Molothrus ater*), near Tupelo, Mississippi. In January, 1934, a flock of nearly one hundred were seen and photographed near Brooksville, Mississippi. Several blackbirds were in this flock. It may be noted here that Starlings almost always appear to mix freely with members of the family Icteridae. The writer has never observed a flock composed only of Starlings.

The first great flocks appeared near State College, Mississippi, in November, 1934. One of these extended over a distance of a quarter of a mile and was estimated to contain more than 5,000 birds. On many successive evenings several of these flocks were observed moving in directions which converged in an area several miles southwest of State College. During the day the flocks foraged over the countryside, but always appeared to retire to this area in the evening. By the process of triangulation the writer was able to locate this area one evening. He arrived at dusk and found the birds arriving in thousands so that the branches

of the pines in which they were roosting were thickly crowded with them. The ground beneath the trees was white with droppings, indicating that this site had been in use for some time. Probably about ten per cent of these birds were Bronzed Grackles.

Nesting pairs were first noted in the vicinity of State College in the spring of 1935. In May, many of them nested in buildings on the campus, and one pair nested in a hole in a telephone pole previously used by woodpeckers. This nest contained four young on May 15. The birds have bred on the campus in increasing numbers since that time. For some reason many Starlings are found dead, and since the species is new to this locality, people bring many of them to the college for identification.—Ross E. Hutchins, *State College, Miss.*

Piping Plover Taken in Central Ohio.—On September 16, 1937, the writer collected an adult female Piping Plover (*Charadrius melodus*) on a mud flat at the east end of Cranberry Island, Buckeye Lake, Licking County, Ohio. It was first observed at the same place on September 15 by Gene Rea and Dale Jenkins, of Columbus. The specimen was donated to the Ohio State Museum (No. 7503).

The Piping Plover breeds locally on many sandy beaches of the Great Lakes, including those of six Ohio counties bordering Lake Erie (Hicks, *Breeding Birds of Ohio*, 1935). The Ohio breeding population from 1925 to 1935 ranged from eight to twenty-six pairs each year. A careful check of all former nesting areas indicated that only six pairs nested in 1937: three in Lucas County, two in Lake County, and one in Ashtabula County. The decrease is explained in part by man's increased recreational use of Lake Erie beaches in summer. Other dune areas have been destroyed by wave erosion or have been made unattractive by vegetation successions.

The rarity of this plover in inland Ohio indicates that few birds nesting on the Great Lakes cross the State, or, that most of those that cross do not stop. This may be due to the prevalence in the interior of the State of shore-bird feeding areas of the "mud-flat" rather than of the "sand-flat" type. A check indicates that the above record is the second collection for inland Ohio (the first since 1879) and that only about five sight records have been made. The gradual decrease in the number of plovers breeding on the shores of Lake Erie decreases the probability of inland occurrence.

No Ohio records (other than for the Lake Erie Counties) were cited in the State lists of Kirtland, Wheaton, Jones, and Dawson. Wheaton, however, listed the plover as a "not common migrant in the interior of the State", and Dawson considered it "rare or casual in the interior". The only other known inland specimen is a female taken by Charles Dury in Hamilton County, Ohio, on May 4, 1879 (Cincinnati Museum of Natural History Collection No. 114). I find the following five sight records: Englewood Dam, Montgomery County, Ohio, one on August 16, 1924, by Ben J. Blincoe (Wilson Bulletin, XLI, 31, 1929); Cranberry Island, Buckeye Lake, Licking County, Ohio, one on September 20, 1929, by Robert B. Geist and Charles F. Walker; O'Shaughnessy Reservoir, Delaware County, Ohio, one on August 17, 1930, by Lawrence E. Hicks, one on September 7, 1932, by Milton B. Trautman, and one on August 24, 1936, by Gene Rea.—Lawrence E. Hicks, *Ohio State University, Columbus, Ohio.*

Association of Marsh Hawk and Game-bird Nests.—During the past few years much has been written in support of our diurnal birds of prey, the hawks, but little has been done for them especially in the Northern Great Plains States where certain species of hawks are protected legally, but their status is ignored and enforcement is conspicuous by its absence.

In recent years certain state game departments and many so-called "sportsmen's" organizations have gone on record in their local weekly and daily newspapers recommending that hunters shoot hawks they chance to meet while afield. These recommendations have too often been blanket condemnations with no restrictions on any species. Maybe the recommendations were made with the knowledge that the average sportsman can't identify our common hawks in the hand let alone on the wing.

Not so long ago I heard a man, holding an administrative position in a state game department, make this statement to a group of representative sportsmen from every section of the state: "I have always been a firm believer in the beneficial food habits of the Marsh Hawk until this morning, when I found one feeding on a duck. From now on the Marsh Hawk is on my black list". That statement made by a man in an official position, coming as it did just prior to the hunting season, probably did more harm than the hawk supporters in his state can live down in the next five years. That official, like the layman who ventures in any scientific field, arrived at a snap conclusion about as logically as the man who condemned a rat for killing a horse upon which he found it feeding.

Last summer I made an interesting observation on the nesting of a Marsh Hawk (*Circus hudsonius*) and Greater Prairie Chicken (*Tympanuchus cupido americanus*). For some time I had been visiting weekly a sweet clover field in which four young Marsh Hawks were rapidly approaching the time when I could hand them and feel reasonably assured that they would take to wing before some prowling marauder destroyed them. Each time I visited the nest the car was driven through the waist-high sweet clover to a lath set about fifty feet away. One day early in July as I visited the nest to band the young Marsh Hawks, I diverted from my usual path about ten feet and to my surprise flushed a Prairie Chicken from a nest containing ten eggs, a few of which were pipped. This was only fifty feet from the nest of young hawks!

Unfortunately I left on my vacation the following day and was unable to continue observations. Upon returning two weeks later I visited the location again and found only eggs from which the young grouse had emerged normally and an abandoned hawk's nest. This was mute evidence to the fact that a grouse and hawk had successfully reared broods of young within, we might say, calling distance. To those who are hasty in passing judgment upon the Marsh Hawk, I hope the above observations will not be termed "coincidental".

One of my associates, Mr. Irvine Dietrich, has kindly permitted me to add a similar incident observed by him near Mandan, North Dakota, a few years ago. A Ring-necked Pheasant was flushed and ran into one of the small patches of Wolfberry bushes (*Symphoricarpos occidentalis*) which are so common on the prairie in this region. At once the pheasant came out again post haste with a female Marsh Hawk in hot pursuit. The hawk overtook the pheasant, struck it and knocked it rolling on the ground. The hawk then returned to the bushes where its nest was located and the pheasant went its way.—Adrian C. Fox, *Park River, North Dakota.*

Nesting of Red-winged Blackbirds.—Observations were made of the nesting of Red-winged Blackbirds (*Agelaius phoeniceus*) in a swamp near Harrisburg, Pennsylvania, during the spring of 1937. The swamp, in a public park, was subjected to damage by fishermen who may have destroyed some of the nests. The swamp, two acres in extent, was mostly of bur-reeds (*Sparganium androcladum*) with ten clumps of cattails (*Typha latifolia*). Although I had seen a female redwing in this swamp on January 1 and 7, 1936, the first migrant in 1937 was seen here March 12, with a flock of males March 25, the females not arriving until April 22. The first trip into the swamp, May 12, revealed three nests, one with eggs.

The nests, when discovered, were given numbered tags and marked with rayon streamers, rayon not getting as heavy as cotton when wet. Five of the nests could not be found the second time, and during the nine weeks and sixteen trips of the investigation the reeds grew from a height of two or three feet to five feet for the bur-reeds and to seven feet for the cattails. Within the swamp also nested Virginia Rail, a Bittern, and Song Sparrows. Owing to the constant movements of the redwings it was not possible to make an exact count of the adults, but there appeared to be over ten pairs and the charted records show sixteen occupied nests on June 1.

All nests were made of the same material, cattail leaves wound around stalks and leaves of reed and lined with grasses, except for a few which contained green algae from the pond and a little mud. No nests were built in any available bush or tree. All but one were built over water and from one to three feet above the surface. One nest which was dissected had been built into eighteen bur-reed stalks, was composed of 142 strips of cattail leaves up to thirty-four inches long, and 705 pieces of grass. The cattail leaves made 273 laps around the reeds, with only one making a complete circuit. The tensile strength of this matting was shown by the fact that the nest could withstand a weight of four pounds before beginning to slide down the stalks. The size of the nests was very uniform: the dissected nest had an inside depth of two inches, inside diameter of three and one-half inches, outside depth and diameter of about four and one-half inches.

Forty-two completed nests were found, but eleven of them were never used although seen repeatedly. No nest was used for a second brood, and no nest would survive the season. The abandonment of the nests resulted from different causes. Some were not used after the birds were frightened away, others were. Redwings will not abandon eggs because of being discovered, as will Robins. The only natural enemies discovered in the swamp were three large water snakes (*Natrix sipedon*). One nest which had contained eggs was later found to be pulled over, as by a snake. No nest contained any Cowbird's eggs; no Cowbirds were seen in the neighborhood.

Twenty-nine nests contained ninety-four eggs among which were two infertile eggs. There were two completed clutches of two eggs, eleven of three, and fourteen of four eggs. One nest with a single egg was abandoned early. Most eggs were of the usual pale blue or bluish-green with erratic brown or black lines, but one set had a pure white background and one clutch of four bluish eggs had no

dots or lines whatever, but over the larger end had sepia washings of varying shades and tones as though painted on with a brush. Freshly laid eggs were found from May 12 to July 12, suggesting two broods for this locality. Sixteen of the thirty-seven nests which were followed through had successful broods, a nest efficiency of forty-two per cent. Including all nests which were built, only one-third produced full grown young which left the nests. Twenty-three nests contained seventy-three eggs of which fifty-three (seventy-two per cent) hatched; the balance had been infertile, deserted, or destroyed. Only thirty-five full grown young birds left the nests, a productivity of forty-eight per cent.

In an adjoining swamp Merrill Wood made a previous study of redwings, reporting in *Bird-Lore* (July-Aug. 1928, p. 262). Twelve nests contained thirty-nine eggs, with two infertile, producing thirty-three nestlings and twenty-one fledglings, a productivity of fifty-two per cent. The incubation period was definitely determined, eleven days in three cases and twelve days in one instance; the young birds left the nest in from eight to eleven days. These young were banded but never heard from again.

The incubation period was not determined by me. Incubation by the Red-winged Blackbird evidently begins before the entire clutch is laid, as all birds are not hatched on or near the same day. Laying with the redwing is probably not a momentary operation, as with some birds such as swallows, but requires several hours upon the nest during which time the eggs laid previously are subjected to incubation. Eleven days seemed the approximate time spent by my young birds in the nest. Twenty-three were banded. The young redwings have a few small sparse tracts of black natal down, located as parietal, occipital, ulnar, scapular, lumbar, sacral, and femoral, with an oblique abdominal.

The ability of a nestling redwing to take care of himself was tested. A nestling less than two or three days old would be apt to drawn if it should tumble out of the nest. As they grow older they become more able to save themselves. Placed in water, the half-grown nestling will float and can swim, but in a very excited manner. They will swim to the reeds and hold on, calling for their parents. When well covered with feathers, but yet a few days before being ready to vacate the nest, they readily swim, but excitedly, and can climb up the cattails to the nest. They are not combative and can not protect themselves against enemies. None of these young had any ectoparasites. An attempt was made to determine their stomach contents by aspiration with an eye dropper, but only liquids and digested material were obtained. By dissection, one stomach was found to contain flies and other insects, no seeds. All of the birds left the swamp on their southern migration early in August.—Harold B. Wood, M. D., *Harrisburg, Pa.*

Blue Goose in Western New York.—On November 11, 1937, I discovered a lone Blue Goose (*Chen caerulescens*) in immature plumage on a small pond which is cut off from Lake Keuka by a willow-grown sandbar. I notified Mr. Verdi Burtch, who made the bird's presence known to a number of Yates County bird lovers and it was visited by several observers in the next couple of days. It remained on this pond for five days and was last seen on November 15. Eaton ("Birds of New York", 1910) mentions the Blue Goose as "one of the rarest waterfowl which visit the waters of New York State". He gives data on but six collected specimens known to that date.—Chas. J. Spiker, *Branchport, N. Y.*

An Albinistic Townsend's Solitaire.—On November 2, 1937, an albinistic Townsend's Solitaire was taken in a banding trap at the Indian Wells Ranger Station, Lava Beds National Monument, Siskiyou County, California. The bird could not be skinned at the time, and was, therefore, banded (36-69698) and released. No color standards were available, so the following description is entirely subjective.

In general, the bird was a dirty white, darkest on the tail, the pigments appearing to be greatly but varyingly diluted, rather than anywhere absent. Beak pinkish gray; legs pinkish light brown, soles of feet yellowish; iris light chocolate, (normal, or only very slightly lighter); head brownish cream, ear coverts

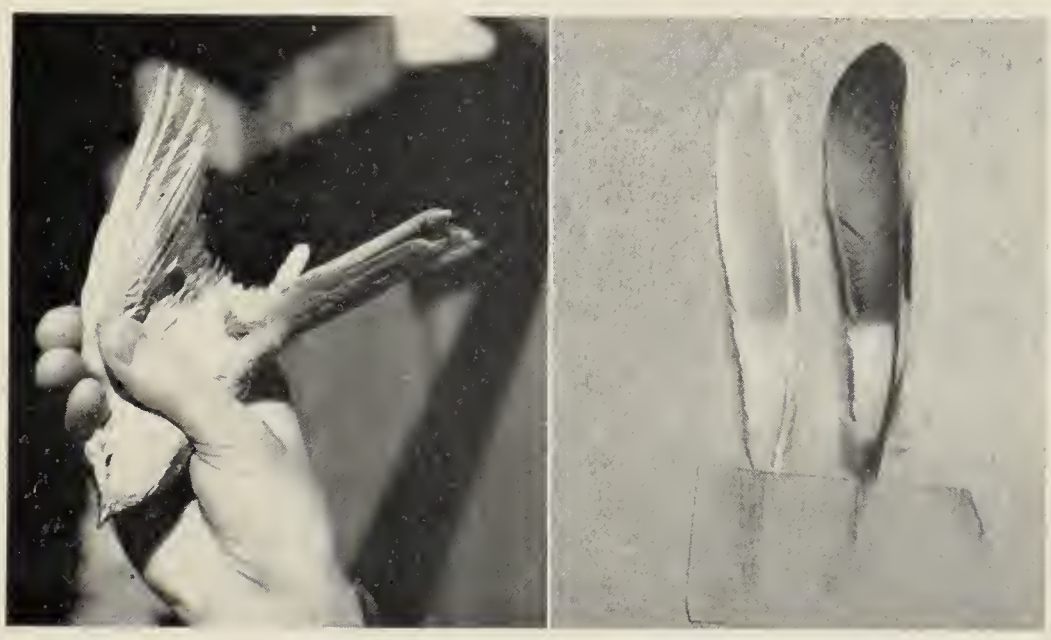

Fig. 22. Albinistic Townsend's Solitaire. The two feathers are the eighth primary of the albinistic bird (left), and the corresponding primary of a normal Solitaire (right).

and feathers below them slightly darker; underparts, back, scapulars, wing and tail coverts dirty white (extremely dilute brown); secondaries and five or six inner primaries dusky white, distal half darker than proximal; buffy wing bars about normal in color; outer primaries as light throughout as proximal part of inner primaries; tail (darkest part of bird) light dirty brown, except for normal distribution of white, and except for the left central rectrix, which was as light as the body and of less than normal length; downy parts of body feathers medium gray with slight buffy cast; quills of all large feathers practically pure white throughout.

This bird (except for the one tail feather) seems to fall within the first type of albinism defined by H. and J. R. Michener (*Condor*, 38(3): 102-109, bottom of p. 108).—Richard M. Bond, *U. S. National Park Service, Portland, Ore.*

The 1937 Fall Migration at the Washington Monument.—The following notes may be added to the records of bird migration at the Washington Monument in Washington, D. C. (Wilson Bulletin, Vol. XLVIII, 1936, p. 222; Vol. XLIX, 1937, p. 118). The bird mortality at the monument was much greater in 1937 than in any other recent year, 945 individuals of 43 species having been recorded this fall.

In 1937, again, there were two "big nights", though they were not consecutive as in 1936. On September 12, in the hour and a half preceding midnight, 576 birds fell to the base of the Monument. Two weeks later, on September 26, 251 birds were picked up. The remaining 118 birds struck the Monument in numbers from 1 to 23 on 27 other nights from August 27 to October 30.

The list of birds which struck the monument in the Fall of 1937 follows: Northern Flicker, 1; Brown Creeper, 1; Eastern House Wren, 1; Long-billed Marsh Wren, 4; Short-billed Marsh Wren, 2; Catbird, 1; Olive-backed Thrush, 1; Eastern Golden-crowned Kinglet, 14; Eastern Ruby-crowned Kinglet, 17; Cedar Waxwing, 2; White-eyed Vireo, 31; Yellow-throated Vireo, 1; Blue-headed Vireo, 6; Red-eyed Vireo, 242; Philadelphia Vireo, 2; Black and White Warbler, 13; Blue-winged Warbler, 1; Tennessee Warbler, 7; Nashville Warbler, 1; Parula Warbler (subsp.?), 41; Magnolia Warbler, 121; Cape May Warbler, 3; Black-throated Blue Warbler, 11; Myrtle Warbler, 3; Black-throated Green Warbler, 66; Blackburnian Warbler, 6; Chestnut-sided Warbler, 15; Bay-breasted Warbler, 7; Black-poll Warbler, 7; Northern Pine Warbler, 2; Palm Warbler (subsp.?), 5; Oven-bird, 16; Connecticut Warbler, 7; Yellow-throat (subsp.?), 238; Yellow-breasted Chat, 4; American Redstart, 29; Scarlet Tanager, 1; Indigo Bunting, 4; Eastern Grasshopper Sparrow, 1; Eastern Henslow's Sparrow, 1; Slate-colored Junco, 1; Eastern Field Sparrow, 6; Swamp Sparrow, 2.

As in the preceding two years, the same three species suffered most heavily. There were picked up 242 Red-eyed Vireos, 238 Yellow-throats, and 121 Magnolia Warblers. Nearly two-thirds of the total number were of these three species. There were 66 Black-throated Green Warblers in 1937 as compared with 13 in 1936 and 15 in 1935.

The total number of birds which have struck the Monument in the past three fall migrations is now 1,468, and, with the addition of eight previously unrecorded species, the 1937 list brings the total number of species to forty-seven. The last date Whip-poor-wills were seen flying about the Monument was October 27.

Again Miss Phoebe Knappen and Allen McIntosh of the Department of Agriculture, and William Wimsatt and James Fox greatly aided me in securing the data submitted herewith.—Robert Overing, *Landover, Maryland.*

ORNITHOLOGICAL LITERATURE

Bird Studies at Old Cape May. An Ornithology of Coastal New Jersey. By Witmer Stone. Two volumes, Royal Octavo. Pp. i-xiv + 1-941. Pls. 1-120, and 270 text figures. Pub. by the Delaware Valley Ornithological Club, Philadelphia (19th St. and the Parkway). 1937. Price, $6.50 postpaid.

A very adequate review of this work comes in a letter from the author himself, who refers to these handsome volumes as a "'field study' covering my experiences in 'days off' since 1890 and those of my fellow members. The 'studies' of behavior and life history are mainly from observations at Cape May but the records cover the whole New Jersey coast. I have tried to picture the environment of the various species and to get the atmosphere and the spirit of the Cape as I know it. (But have not been led into *verse*!!)"

Here we give the reader the story and the background, even including a facetious reference to current Bulletin editorial. Dr. Stone tells us that "It has been a great pleasure to personally plan and manage the production of such a work and to see it take form just as I had planned."

Probably during the greater part of the half century (forty-eight years) of his studies in this region he was playing with visions of such a work. Can one visualize all this in terms of human life! It becomes the more interesting when we recall the short period of time which Alexander Wilson had for the execution of his ornithological work. What can be more inspiring to the scientific tyro than such a life-long devotion to a purpose, and what can be more satisfying than its final materialization! Dr. Thos. S. Roberts with his "Birds of Minnesota" gives us a very similar picture in the field of contemporaneous ornithology. Both men are Nestors in present-day North American ornithology.

The first seventy pages are devoted to an "introduction", which describes the geography and ecology of the region, the changes in bird life which the author has noted, the migration phenomena, and the monthly calendar. The remaining pages of the two volumes are devoted to the author's annotations of the species treated. The two volumes are bountifully illustrated, there being three colored plates, more than a hundred plates of halftone photographs, and innumerable line sketches. And all of these illustrations have been contributed by Dr. Stone's colleagues in the Delaware Valley Ornithological Club. Thus we record another stately addition to the literature of American ornithology.—T. C. S.

The Birds of America. By John James Audubon. With an Introduction and Descriptive Text by William Vogt. The Macmillan Co., New York. 1937. 500 col. pls. Price, $12.50.

Some years ago one of the large Chicago newspapers reproduced in color for its Sunday edition a great many of the Audubon plates. Many people attempted to preserve a complete set of these newspaper reproductions—a futile effort, probably, for most of those who attempted it. Now the complete set of bird portraits has been issued in book form by one of the large publishing houses of the country. There can be no doubt of the beauty of these plates, nor of the privilege of possessing them in one cover. Yet, beautiful as they are, they only enhance the esteem for the work of our modern bird artists. It ought to be possible to award a full measure of praise and credit to this great pioneer artist without indulging in futile hero worship.

As one turns the pages of plates it is comparatively easy to note glaring faults in the coloring. It is not possible, however, to assign the fault. Was it in the original painting, or was it in the hand coloring of the original reproductions? Or is it in the present printed reproduction? We have never had the opportunity of placing two of the elephant folio plates side by side for comparison. But it seems reasonable to suppose that they must have varied to some extent in the color shades. Recently in Indianapolis we did have the opportunity of comparing the first fifteen printed plates (1937) with the elephant folio in the possession of the William Henry Smith Library in the State Historical Library Building. Plate No. 1 of the Wild Turkey (1937) is too yellow on the upper back, too bright on the tip of the tail, the primaries are too light, the leg feathers are too yellow; the iris lacks in color, and the blue bars on the lower back are not as bright as in the original; the details of feathering on the wattle are obscured. Of the fifteen plates compared four were considered to be copied closely enough, while the others deviated in greater or less degree. There is the possibility of variation in the plates of the original elephant folio edition, that is, difference between the plates of the set now in Indianapolis and those used for copying. There is also the possibility that the Indianapolis plates may have become faded or soiled. Or the printer may have erred in selecting his shades of ink.

The names of the birds which appear on the 1937 plates are those authorized by the A. O. U. Check-List, while the full legends of the elephant folios are collected in a "Transcript" at the end of the volume. There is also an index of common names. It is also noted that Mr. Vogt, in the Preface, makes a fair enough mention of Alexander Wilson. And, we may be grateful that there is no derogatory reference to Wilson. An article in a May, 1938, magazine refers to Wilson as "the dour Scotch weaver . . . who . . . in his blundering way came to know birds that Audubon never saw until much later", and also refers to his "bitter Scotch soul" and his "ill-directed life"—all of which we have failed to gather from his biographies.

It may be truly said that among all the bird books now available there is no other like this one.—T. C. S.

A Monographic Study of the Red Crossbill. By Ludlow Griscom. Proc. Boston Soc. Nat. Hist., Vol. 41, No. 5, pp. 77-210. Boston, 1937.

The goal of taxonomy is perfect classification, but fortunately for the taxonomist there are still categories that defy him. Therein lies the joy of the work, for it tests one's mettle to bring comparative order out of a chaotic family or genus or species. It is easy to share vicariously the satisfaction of a task well done that must have come to Mr. Griscom with the completion of his study of the Red Crossbill.

In all taxonomic studies opinion must still be the ultimate basis of a scientist's conclusions. The individual is fortunate who can eliminate this factor as far as possible from his analysis. Abundant material is a great aid to this end, but far more important is the innate scientific attitude that enables the individual to recognize the significance and limitations of his materials, and to refrain from unsupported assumptions. This monograph is a fine example of all these attainments. In his introductory pages the author makes clear the strangely contradictory and baffling nature of the data accumulated through field observation and presents logical conclusions regarding the erratic migrations of the crossbill subspecies and the overlapping of their ranges. In the following systematic dis-

cussion he lists a truly imposing total of 2447 specimens examined in private and museum collections throughout the United States. The evaluation of this material as to the condition of the birds when taken also seems judicious, an important point when the bearing of the breeding period on the distribution is taken into consideration.

As is always the case, the taxonomist who makes such a study is so much better informed than any of his readers on the technicalities involved that it would be ridiculous to criticize his arrangement without equally detailed research. The integrity of the author's effort must be the hallmark of his results, and here one can not but feel that nothing is lacking. Whatever changes this fine revision may suffer in the future can only be the results of the gradual progress to which all scientific work is subject.

A final sense of approval arises from the author's opening comments on the Old World races of crossbills. What taxonomist worthy of the name has examined material in any group of animals or plants from the vast expanses of Eurasia without a feeling of diffidence! Yet the Old World forms often aid materially in the analysis of allied Nearctic species, hence such conclusions as are presented are reassuring evidence that the author has left no stone unturned in his attempt at thorough and comprehensive study of these interesting birds.

In conclusion, this paper seems an admirable example of the detailed study of abundant material, and the keen comprehension and admirable restraint through which, alone, the difficult problems of taxonomy seem likely to be solved. Perhaps in the distant future we can find absolute criteria for classification. Until that Utopian day may we have many more monographs like the study of the Red Crossbill.—A. W. Lindsey.

Les Oiseaux de France. Volume III. By A. Menegaux. Published by Paul Lechevalier, 12 Rue de Tournon, Paris, VI. About 317 text pp. plus 64 colored plates and some black ones. Price, 60 francs.

The third volume in this series on the birds of France is now available. It treats of the rollers, kingfishers, bee-eaters, hoopoes, goatsuckers, swifts ,swallows, flycatchers, wrens, waxwings, shrikes, thrushes, warblers, and all other passerine birds. About one hundred pages of keys and taxonomic material form Part I, while Part II is the Atlas including the colored plates with descriptive texts. In format this volume conforms to its two predecessors, being 4½x6¼ inches in dimensions, and cloth-bound. Announcements of the earlier volumes of this series appeared in the Wilson Bulletin for June, 1933, and December, 1934. These pocket-size books are admirably adapted for the use of travellers in Europe.—T. C. S.

The Blue-winged Teal, Its Ecology and Management. By Logan J. Bennett. Collegiate Press, Ames, Iowa. 1938. Pp. i-xiv + 1-144. Price, $1.50.

The frontispiece of this book is a very beautiful colored plate of a pair of blue-wings, the male standing erect with outspread wings. Sidney H. Horn is the artist. The text by Dr. Bennett presents an account of the complete life history of this species. The summer studies were made chiefly in north central Iowa, while the winter studies were made in Mexico. The book contains nineteen chapters, with a bibliography and an index. The usual topics concerned in a life history study are treated in these chapters. Considerable attention is given to the ecology of these birds in an agricultural community, such as Iowa.—T. C. S.

Bird Notes from the Journal of a Nature Lover. By William Graham Ross. Edited by Ella Lamson Clark. Privately published. Burlington, Iowa, 1938. Pp. i-xiv + 1-169. Price, $1.00 (Shriner and Johnson, Fairfield, Iowa).

We might say that this book is written by a gentleman of the "old school". And by that we would mean that in the generation preceding ours there were men here and there who were gifted with a deep appreciation of nature, yet whose enjoyment had to be taken alone. There were no bird clubs to bring like-minded folks together. In spite of their isolation they made observations and recorded them. They had few opportunities for publication—perhaps never thought of publication. The present title seems to be the diary of such a man. The preface states that the notes "cover some thirty years, but largely come from the memoranda made between the years 1898 and 1910". It may be doubtful whether this book adds any facts to the science of ornithology, for precise dates are not given. But it is pleasant reading, and is evidently a partial record of an interesting life. Mr. Ross was a lawyer. It is our impression that fewer lawyers than doctors find relaxation in nature. At the end of the book there is an unannotated list of birds for the vicinity of Fairfield, Iowa, a town which, by the way, is one of the active bird study centers of the state.—T. C. S.

A Descriptive Bibliography of West Virginia Ornithology. By Earle Amos Brooks. Privately lithoprinted by the Author (166 Plymouth Road, Newton Highlands, Mass.). 28 pp. Price, $1.00.

A vast amount of valuable bibliographic information is contained in the few pages of this work. It is offered only as a "fairly complete list of all ornithological publications referring to the Birds of West Virginia". The list begins with Alexander Wilson's work in 1831, and runs through to the date of publication, in 1938. This particular effort is well done and is a service to the ornithologists of West Virginia. We are most impressed, however, by the idea that something of a similar nature might, and ought, be done for nearly every state. Such a bibliography as this one might well serve as a model, both in format and mode of reproduction.—T. C. S.

Environmental Responses of Vertebrates in the Great Basin. By Jean M. Linsdale. Rep. from Amer. Mid. Nat., XIX, No. 1, Jan., 1938, pp. 1-206.

This study was carried out in the Toyabe Mountains in the south central part of Nevada. The paper gives a list of 3 amphibians, 13 reptiles, 152 birds, and 47 mammals, with ecological notes on each. The author found, among other things, that flight songs were frequent, and considered this due to the scarcity of high perches.—T. C. S.

Native Bird Song. By A. R. Brand. Price, 75 cents, any Victor dealer.

This is a Victor phonograph record. Our readers are already familiar with the four discs of bird songs previously issued under Mr. Brand's direction. They were issued under the title, "Songs of Wild Birds" and "More Songs of Wild Birds". (See Wilson Bulletin for June, 1934, and for December, 1936). The present Victor disc records on one side the songs of the Hermit Thrush, Wood Thrush, Brown Thrasher, and Whip-poor-will; on the other side are the songs of the Field Sparrow, Phoebe, Black-capped Chickadee, and Loon.—T. C. S.

Logbook of Minnesota Bird Life, 1917-1937. By Thomas S. Roberts, M. D. Univ. Minn. Press, Minneapolis, 1938. Pp. i-xii + 1-355. 23 figs. Price, $3.50.

Dr. Roberts has here gathered together his communications to *Bird-Lore* under the heading, "The Season". The book contains twenty chapters—one chapter for the letters of each year from 1917 to 1937. Since these letters are based quite largely upon reports from Dr. Roberts' correspondents in most parts of the state, it amounts to a history of the important ornithological events in Minnesota during the twenty-year period. In the Preface Dr. Roberts states that he has compiled and published this Logbook "primarily as a mark of appreciation to all those who have by their contributions made possible the compilation of these articles"—an unusual but most thoughtful mode of expression.—T. C. S.

The Home-life and Economic Status of the Double-crested Cormorant. By Howard L. Mendall. Univ. Maine Studies, 2d series, No. 38. Univ. Maine Press, Orono, 1936. Pp. i-iv + 1-159.

This paper gives a very full account of the reproductory habits of the Double-crested Cormorant, but distribution and migration are discussed by a chapter on each. Considerable attention is given to the matter of food and feeding habits, and the conclusion is reached that, "except in scattered, local instances, it is largely neutral if not actually beneficial in its relationship to man".—T. C. S.

The Birds of Brewster County, Texas. By Josselyn Van Tyne and George Miksch Sutton. Misc. Publ. Mus. Zool., Univ. Mich., No. 37. Ann Arbor, Mich. 1937. Pp. 1-119. Pls. I-V. Col. frontispiece. Price, $1.25.

The field work on which this paper is based began in 1928 and was continued in 1932, 1933, and 1935. The authors credit 239 living forms of birds to Brewster County. Of these, four subspecies are new, five forms are new to the United States, and eleven are new to Texas. Extensive annotations are accorded most of the forms included in the list. The colored plate, drawn by Sutton, portrays the new subspecies known as Fuertes' Red-tailed Hawk.—T. C. S.

The Audubon Year Book, 1937. Pub. by the Indiana Audubon Society. Vol. XV. Pp. 1-98. Price, $1.00.

Nearly a hundred pages of readable material are presented in this edition of the Indiana Year Book. Dr. L. A. Test offers a discussion of "Color in Feathers". A list of 173 species of birds of Jay County, Indiana, is presented from the notes of the late Hal B. Coffel. Interesting reminiscences of sixty years ago are offered by Elmer R. Waters, under the title, "The Farmers' Attitude Towards Bird Protection". Teachers will find much information in Esther Boal's paper on "Bird Study for Indiana". Dr. Earl Brooks is the Editor.—T. C. S.

Proceedings of the Linnaean Society of New York. No. 48 for 1936. Published by the Society at the American Museum of Natural History, New York. Issued in October, 1937. Pp. 1-112. Price, 75 cents.

The first article is on "The Great Wisconsin Passenger Pigeon Nesting of 1871", by A. W. Schorger. This is a vivid account of the vast numbers of wild pigeons which formerly bred in Wisconsin. The author describes the nesting area as being approximately seventy miles long by ten to fifteen miles wide, amounting to 850 square miles. He estimates that no less than 136,000,000 birds nested in that area that year. The birds were enabled to thrive in such numbers

because of the vast abundance of the oak tree with its fruit. Dr. Schorger was able to bring to light a great amount of factual material by a thorough search of the local newspapers of that period. A. L. Rand presents a paper on the life of two young Blue Jays in captivity, including many interesting notes on behavior. Allan D. Cruickshank gives a report on "The Ornithological Year 1935 in the New York City Region".—T. C. S.

Check-List of the Birds of the National Parks. Compiled by various observers and issued in mimeographed form by the National Park Service, Washington, D. C. December, 1937.

It is expressly stated that the list is tentative. Perhaps many of the Parks have not been studied thoroughly enough to obtain a complete list of the birds present. The lists of the older and larger Parks may doubtless be considered reasonably complete. Separate lists are given for twenty-three national parks. Each species is very briefly annotated. Considerable variation seems to prevail in the extensiveness of the bibliography for different parks, the one for the Yellowstone Park being especially meager, with too little credit being given to the earlier work of M. P. Skinner, and perhaps others. The authorities of the National Park Service propose to issue this work in printed form when it has reached a satisfactory state of completion.—T. C. S.

We are listing below a considerable number of papers and reports concerning which we assume our readers will wish to know, all of which would have been more fully reviewed except for the limitations of space and time.—Ed.

The Great Wisconsin Passenger Pigeon Nesting of 1871. By A. W. Schorger. Repr. Proc. Linn. Soc. N. Y., No. 48, 1936, published October, 1937.

Birds of the Yosemite. By M. E. Beatty and C. A. Harwell. Yosemite Nature Notes, XVII, No. 1, Jan. 1938. Pp. 1-34. Price, 25 cents. Number of species listed is 202.

A Study of the Distribution and Migration of the Great Horned Owls in the Missouri Valley Region. By Myron H. Swenk. Repr. with revision of page 100 from Nebr. Bird Rev., V, October, 1937.

Nesting Birds of Iowa. By Thos. G. Scott and George O. Hendrickson. Extension Circ. 247, Iowa State College, Ames. March, 1938. Pp. 1-64. Figures of common birds are to be colored by the pupil .

The Pterylosis of the Falconiformes with Special Attention to the Taxonomic Position of the Osprey. By Lawrence V. Compton. Repr. Univ. Calif. Publ. in Zool., Vol. 42, No. 3, pp. 173-212. Berkeley, Calif., 1938. On the basis of the pterylosis the Osprey is found to be more closely related to the American Vultures (Cathartae) than to the Falcones.

Territory, Annual Cycle, and Numbers in a Population of Wren-Tits (Chamaea fasciata). By Mary M. Erickson. Repr. Univ. Calif. Publ. in Zool., Vol. 42, No. 5, pp. 247-334. Berkeley, Calif. 1938. A full life history study of this western species.

A Pictorial Guide to the Families of Birds, Including a List of the Birds of Southeastern Michigan with Their Migration Dates. By Edward Boardman and Elizabeth Barto. Bull. No. 9, Cranbrook Inst. Sci., Bloomfield Hills, Mich. Pp. 1-48. 1937. Price, 50 cents. An illustrated key to the families of birds.

Some Early Bird Records of Wisconsin and Neighboring Territory to the West and North (1896-1900 and of Indiana (1876-1877). By M. E. Pinney and J. F. MacNaughton. Repr. Trans. Wis. Acad. Sci. Arts & Letters, Vol. 30. 1937.

The Birds of Boulder County, Colorado. By Gordon Alexander. Repr. Univ. Colo. Studies, Vol. 24, No. 2, March, 1937. A list of 250 species given with brief annotations.

Faunas of Canada. By R. M. Anderson. Repr. from Can. Year Book, 1937. Mainly an elaboration of Merriam's system of life zones.

Mammals and Birds of the Western Arctic District, Northwest Territories, Canada. By R. M. Anderson. Repr. from Canada's Western Northland. 1937. An account of relatively unexplored country, with chief attention to mammals.

Beautiful Birds of the Southern Audubon Sanctuaries. By Alexander Sprunt, Jr. Bull. No. 8, Nat. Ass'n Aud. Soc. New York, 1938. 7½x11¾ in. Pp. 1-39. Price, $1.00. Eleven beautiful colored plates adorn this pamphlet: about seventeen subtropical American birds are popularly described. All of these birds are large and spectacular in appearance. They are the birds which the Audubon Society has concentrated upon especially in protective efforts.

The Migration of North American Birds. By Frederick C. Lincoln. Circ. 363, U. S. Dept. Agric., Washington, D. C. 1935. Price, 10 cents.

The American Egret in the Albany Region. By Dayton Stoner. Bird Day number, Bull. to Schools, Univ. State N. Y. March 15, 1938. Price, 5 cents. Other articles on birds are included.

The Postjuvenal Molt of the Grasshopper Sparrow. By George Miksch Sutton. Oc. Papers Mus. Zool., Univ. Mich., No. 336. Ann Arbor. 1936. 1 col. pl.

The Juvenal Plumage and Postjuvenal Molt of the Chipping Sparrow. By George Miksch Sutton. Oc. Papers Mus. Zool., Univ. Mich., No. 355. Ann Arbor, Mich. 1937.

Are They Vermin? Cornell Rural School Leaflet, Vol. 31, No. 2, Nov., 1937. Pp. 1-32. A useful compilation of facts concerning hawks, owls, and mammals commonly classed as "vermin".

Factors Affecting Yearly Abundance of Passerine Birds. By S. Charles Kendeigh and S. Prentiss Baldwin. Repr. Ecol. Monog., Vol. 7, pp. 91-124. 1937.

The Birds and Mammals of the Western Slope of the Azuero Peninsula, Republic of Panama. By John Warren Aldrich and Benjamin Patterson Bole, Jr. Sci. Publ. Cleveland Mus. Nat. Hist., Vol. VII, pp. 1-196. 1937.

Crow-Waterfowl Relationships. By E. R. Kalmbach. Circ. 433, U. S. Dept. Agric. Washington, D. C., 1937. Price, 10 cents.

The Distribution of Breeding Birds in Ontario. By James L. Baillie, Jr. and Paul Harrington. Repr. Trans. Roy. Can. Ist., Vol. XXI, 1936-1937.

A Ten Year Study of a Bird Population in Central Ohio. By Lawrence E. Hicks. Repr. Amer. Midl. Nat., Vol. 16, No. 2, pp. 177-186. Notre Dame, Ind. 1935.

The Birds of the Lake St. Martin Region, Manitoba. By T. M. Shortt and Sam Waller. Contr. Royal Ont. Mus. Zool., No. 10. Pp. 1-51. Pub. under the Reuben Wells Leonard Bequest. 1937.

Baird's Sparrow. By B. W. Courtwright, T. M. Shortt, and R. D. Harris. Contr. Royal Ont. Mus. Zool., No. 11. Pp. 153-199. Repr. Trans. Roy. Can. Ist.. XXI, Pt. 2, 1937. This paper gives the latest summary of the known distribution of this species.

Ontario and Its Avifauna. By L. L. Snyder. *And* The Museum's Bird Collection. By J. L. Baillie. Pub. under the Reuben Wells Leonard Bequest. 1938.

The Resident Birds of Southern Michigan. By William Henry Burt. Bull. No. 7, Cranbrook Inst. Sci. Bloomfield Hills, Mich. 1936. Price, 50 cents. Twenty-eight resident species of birds are popularly described by the author and illustrated in black and white by George Miksch Sutton.

Wildlife Management in the National Parks. By George M. Wright and Ben H. Thompson. Fauna series No. 2. Pp. i-viii + 1-142. Washington, D. C. 1935. Price, 20 cents. A little confusing on the title page, but an excellent report, well illustrated.

Thirst on the Land. By William Vogt. Circ. No. 32, Nat. Ass'n Aud. Soc. New York. No date. A pretty full elucidation of the drainage problem.

Small Refuges for Waterfowl. Pub. anonymously by the More Game Birds in America Foundation, 500 Fifth Ave., New York. 1933. Those who would like to have wild ducks even within the city limits should read this pamphlet.

Wildlife Cycles in Relation to the Sun. By Leonard William Wing. Repr. Trans. 21st Amer. Game Conf. 1935.

Behold—The Innocent Blatter! Reprint of editorial by Harry McGuire in Outdoor Life for Feb. 19, 1934. A stirring appeal for the removal of sheep from the National Forest areas. If every conservationist in the country could read this valiant appeal surely something would be done.

Birds of the Eastern Arctic. By P. A. Taverner. Repr. from Canada's Eastern Arctic. 1934.

A Bibliography of Tennessee Ornithology. By Jesse M. Shaver. Repr. Journ. Tenn. Acad. Sci., VI, No. 4, October, 1931. A collection of 237 bibliographic citations on Tennesse ornithology, arranged alphabetically.

A Historical Review of the Habits and Anatomy of the Woodcock. Compiled from the earliest drawings and accounts to those of the present day. By Henry Mousley. Repr. Canadian Field-Nat., XLIX, January, 1938. A valuable source of early information.

Nesting Colonies of the Double-crested Cormorant in British Columbia. By J. A. Munro. Repr. Prov. Mus. B. C. Pp. 26-30. 1936.

The American Merganser in British Columbia and Its Relation to the Fish Population. By J. A. Munro and W. A. Clemens. Bull. No. 55, Biol. Board of Canada. Pp. 1-50. Ottawa, 1937. Price, 35 cents.

Man's Friend: The Crow. Publ. No. 65, Emergency Conservation Com. New York, 1937.

Owls. Teaching Unit No. 5. By Ellsworth D. Lumley. With Introduction by Paul L. Errington. Pub. No. 67, Emergency Conservation Com. New York. 1937.

Review of Local or State Periodicals Printed

The *Nebraska Bird Review* for October (V, No. 4, 1937) presents an exceedingly illuminating article on the distribution and migration of the Great Horned Owls in the Missouri Valley Region, including a discussion of the taxonomy and nomenclature. No one interested in this species in the interior can afford to overlook this paper. The same serial for January-June (VI, No. 1, 1938) appears in a brand new dress, featuring a new figure of the Burrowing Owl by Dr. Sutton. At the same time the magazine becomes a semi-annual instead of a quarterly publication. The new cover makes a decided improvement. This issue contains a short paper on the birds of the Crescent Lake Migratory Bird Refuge (in the sandhills), and more than eighteen pages of "general notes"—quite a remarkable collection of material.

The *Kentucky Warbler* (XIV, No. 1, 1938) now appears in a new cover, with a design by Mr. Ganier. Dr. J. J. Murray, of Virginia, contributes the leading article on some breeding birds of Letcher County, Kentucky, fifty-six species being listed. Short notes and minutes fill the remainder of the 12-page number.

The *Flicker* for December (IX, No. 3-4, 1937) contains a list of 1937 nesting birds in Minnesota, and an account of an ornithologist's trip afoot in Northern Minnesota, both by G. N. Rysgaard. Another article by Dr. C. Evans gives a description of the mating of the American Bittern.

The September number of the *Migrant* (VIII, No. 3, 1937) publishes an article reporting a flight of Mississippi Kites. As many as thirty-four were counted at one time, all feeding on the periodical cicadas in a woodland area. In the number for December (VIII, No. 4) Mr. Arthur Stupka reports Pine Siskins in the Great Smoky Mountains from March to December, 1937. Mr. Ben B. Coffey writes on his work in banding Chimney Swifts, 2,375 being banded in 1937. In the March number (IX, No. 1, 1938) Mr. Frank Belrose contributes a list of birds seen in the Great Smoky Mountain National Park during about a week in early September, 1937. Mr. E. D. Schreiber reports on the results of fifty-three nest boxes erected

during the seasons of 1936 and 1937. Several observations on the destruction of young birds by snakes are included in this paper. Considerable space is given to Christmas census reports.

In *Iowa Bird Life* for December (VII, No. 4, 1937) Dr. L. J. Bennett and Miss Kate E. LaMar present a report of a ground-nesting colony of Black-crowned Night Herons in north central Iowa. Other papers included are, "Conclusions as to the food habits of the Barred Owl", by P. L. Errington and Malcolm McDonald, and "Birds of the Sioux City Area in 1936", by Bruce F. Stiles. The March number (VIII, No. 1, 1938) contains an account of the 1934 spring migration through Clay and Palo Alto Counties, Iowa, by Dr. Logan J. Bennett. The article on the birds of the Sioux City area in 1936, by Bruce F. Stiles, is concluded. A page and a half of general notes, with three pages devoted to the Christmas census completes the number.

Review of Local or State Periodicals Mimeographed

The *Wildlife Review*, No. 11, Feb., 1938, abstracts 104 pieces of current literature on wildlife conservation. A second number (No. 12) was issued in February for the purpose of abstracting the papers presented in the Transactions of the Second North American Wildlife Conference held in November, 1937. No. 13 was issued in March, and No. 14 was issued in May.

In the *Snowy Egret* for Spring, 1938 (XIII, No. 1) Mr. H. A. Olsen gives a history of his publishing efforts. Mr. O. M. Bryens gives an interesting account of his observations on the habits of the Ruffed Grouse. Mr. Byrens also contributes five other papers to this issue. One of the latter includes some notes on the winter movements of the Lapland Longspur, showing that the birds were present throughout the winter of 1936-1937.

The *Prothonotary* for December (1937) and January and February (1938) follow pretty closely the usual plan of reviewing the preceding month's weather conditions and giving noteworthy bird records and miscellaneous notes. The March number (IV, No. 3a, 1938) features a very readable article on conservation, reviewing the situation in a way suitable to the observance of National Wildlife Restoration Week—an occasion which will doubtless recur annually hereafter.

The Editor of the *Redstart* in the December number (V, No. 3, 1937) reports his ornithological observations along the South Carolina coast. Among other things of interest he saw an Arkansas Kingbird. A note in the March number (V, No. 6, 1938) shows the regularity in the fall migration of the Nighthawk—only one day variation in five years. Members of the Brooks Bird Club do not hesitate to travel a hundred miles on a bird study trip, as was shown by their pilgrimage to the Pymatuning Lake area in Pennsylvania, and reported in the May number.

The *Bluebird* for January (V, No. 1, 1938) gives a sight record for two individuals of the Eastern Ground Dove near Columbia, Mo., on September 31 (1937?), and in support mentions that this species has been "taken both in

Arkansas and Iowa (Des Moines)". If this refers to the case reported in the *Auk* (XXXIX, 1922, p. 566) it must be emphasized that no specimen was taken, and DuMont (1934) placed it in the hypothetical list. Accompanying this issue there is "An Introduction to Bird Study in Missouri" by Prof. Rudolf Bennitt, which gives many hints for the pursuit of hird study, especially for the beginner. The April number (V, No. 4) gives a column approval for grasshopper poisoning work. Bird students in gencral will do well to suspend judgment on this matter for another year or two.

The *St. Louis Bird Club Bulletin* for January (VII, No. 1, 1938) consists of four pages of matter of local and general interest. Among other things the question is raised whether applicants for a hunting license should be required to pass an examination concerning the game laws and show ability to identify game which can be legally killed. It also gives, on authority of the U. S. Biological Survey, estimatcs of our wild duck populations, as follows: 1,000,000,000 in 1870; 100,000,000 in 1930; 27,000,000 in 1935.

The *Chickadee* for December (VII, No. 1, 1937) features a list of 179 species of birds locally observed.

The September-Octoher number of the *Raven* (VIII, No. 9-10, 1937) contains: "Birds of Chatham, Virginia", by Eleanor E. Herrick, it being a list of 106 species; and "Herons and Egrets on the Potomac River near Alexandria, Va.", hy William B. McIlwainc, Jr., besides many hrief items. In the November-December numher (VIII, No. 11-12) Dr. J. J. Murray discusses "The Extension of the Range of the Black Vulture". He finds that there has becn an actual northward extension, and accounts for it by a diminution of the regular food supply in the South. This, in turn, is thought to he due to progress in sanitary practice, such as hurial of dead animals and discontinuance of the practice of the markets of throwing the waste meat into the streets. Dr. Murray also gives some very interesting facts relative to changes in the distribution of other species. Dr. Murray's writings are suhstantial.

The September-Octoher number of the *Chat* (I, No. 7-8, 1937) consists of an extensive article on the birds of Lake Mattamuskeet, N .C., by Earle R. Green. It is accompanied by a map, a plate of two photographs, and a bibliography. The numher for November-December (I, No. 9-10, 1937) gives an account of several rather northerly located rookeries of the Little Blue Heron. This seems to be another case of cxtension of range. There is also a report of a sight record of two American Flamingoes on Pea Island in June, 1937. "Learn a bird a week" is a novel feature in which four common birds are roughly illustrated and accompanied by a list of field marks. The January number (II, No. 1, 1938) summarizes the Club's accomplishments for the preceding year, thus: Six issues of the *Chat*, including 72 pages, 1200 copies mailed to 19 states and Cuba, with other figures on various matters. In the February number (II, No. 2) Dr. T. G. Pearson reports some ohservations which he thinks may confirm Mr. McAtee's account of certain birds placing live ants (or other insects) in their plumage (see the *Auk* for January, 1938). A very thoughtful discussion of bird conservation philosophy by the State Ornithologist of Massachusetts, Joseph H. Hagar, is also found in this number. The March-April number (II, No. 3-4) records the Proceedings of the Second Annual Meeting of the North Carolina Bird Club,

and reports 32 new members, making a total membership of 133. Mr. C. S. Brimley, well-known zoologist throughout the country, contributes a short biographical sketch. A paper by Mr. T. M. Carter reports three large Robin roosts in North Carolina, with an estimated total population of about six millions of the birds. The account is brief, but indicates an opportunity for an intensive study.

The *Bird Calendar* of the Cleveland Bird Club for June-July-August, 1937, continues on the same plan as before, but gives special attention in this number to census work.

The *Inland Bird Banding News* for December (IX, No. 4, 1937) contains the minutes of the Annual Meeting and reports of the officers. There is also a note on the "Feeding habits of the Black Tern", by Paul W. Hoffman. This paper makes some observations on the food of this species, and on the manner of securing it. It is stated that the Black Terns "rarely plunge into the water for food as do other members of the tern family". It is also found that Forster's Terns occasionally "adopt" the young of the Black Tern. The March number (X, No. 1, 1938) reports some good work in endeavoring to secure support in South American countries in bird banding and protection. Mr. M. J. Magee reports results of his banding work on Purple Finches.

In *News from the Bird Banders* for January (XIII, No. 1, 1938) we find an article entitled "The Herring Gull: An Experiment in Co-operation". This undertaking was carried out in gull colonies along the Atlantic coast, and a total of 6,140 birds were banded in nine colonies from the Gulf of St. Lawrence to New York. All birds received an aluminum band and one or more colored celluloid bands, the combination being the same for each colony but different from the other colonies. Thus, birds may be identified with one of the nine colonies without capture.

North Dakota Bird Notes for 1937 (March to June). Under this heading we have thirteen dated sheets of bird notes on the migration season in that state. These notes were compiled by Prof. O. A. Stevens, at Fargo, and have appeared annually for a long period.

The *Fifth Annual Bulletin* (1937) of the Toledo Naturalists' Club consists of thirty-seven mimeographed pages enclosed in an artistic cover produced by the silk screen process. Among the articles we find instructive accounts of the habits of several species, e. g., the Chimney Swift, by Miss A. A. Vandenburg; the Great Blue Heron, by John J. Stophlet; and on the Bank Swallow, by F. J. Flickinger. Mr. L. W. Campbell reports the unusual bird records for the year 1937. Such a volume affords an excellent method of preserving the Club's activities.

COMMUNICATIONS

Editor, Wilson Bulletin: The Wilson Bulletin for March, 1938, has just come to hand, and I have been reading it, as usual, from cover to cover.

On page 61, under the heading, "Whooping Cranes in Southwestern Missouri, 1937", there is described what is purported to be the nesting of a Whooping Crane in that section. Perhaps the editor of the Wilson Bulletin did not read this article before it was printed; for I can not imagine why it was given space. If the description is accurate, the bird could not possibly be a Whooping Crane.

First, the bird "flew into the very top of a dead tree where I could see her perfectly, silhouetted against a green hill beyond". *Second*, further along in the article, speaking of the young birds, they were "about the size of a good big hen and able to fly". *Third*, the last paragraph of the article ends as follows: "and one can only be thankful that these birds escaped the perennial warfare of state fish hatchery employees against fish-eating birds".

Having had vast experience with the Whooping Crane when they were exceedingly plentiful; having had them in captivity, watched them at their nesting places; and having seen them disappear almost completely from our fauna, I have *never* seen a Whooping Crane light in a tree. The young of the Whooping Crane, when able to fly, are four times as large as any hen, and stand fully five feet in height; and, while Whooping Cranes will occasionally take fish, they are not and never will be fish-eaters.—E. A. McIlhenny, *Avery Island, La.*

Editor, Wilson Bulletin: Thank you very much for sending me Mr. McIlhenny's letter. Criticism by a man of his standing and long experience certainly deserves serious consideration and reply.

There are six large, white birds that would be at all likely to occur in Missouri at any time: White Pelican, Snow Goose, American Egret, Whistling Swan, Wood Ibis, and Whooping Crane. Mrs. Cahill's bird had black wing-tips, which eliminates the swan and the egret. It had long legs, which eliminates the swan, the pelican, and the goose. It had a white head, which eliminates the Wood Ibis. Mrs. Cahill sent me a profile sketch of the head, which showed a typical crane bill, not that of an ibis, a pelican, or a heron.

The Whooping Crane is the only one left. Evidence *pro:* Size, color, bill, legs, flight with neck extended, voice. Evidence *con:* Mr. McIlhenny's statement that (1) he has never seen a Whooping Crane alight in a tree, (2) the young when able to fly are five feet high and four times as large as any hen, and (3) these birds are not fish-eaters. Discussing his points in reverse order:

(3) The fact that the birds visited the hatchery is no proof that they were eating fish. However, the "perennial warfare" does exist, and it is waged against all the large waders which are *thought* to eat fish by the hatchery men. This point seems to me irrelevant.

(2) The size of the young birds was reported one morning at dawn by Mrs. Cahill's husband. Light conditions were poor, and if his comparison re-

ferred to the size of the body, rather than the height above ground, the error seems understandable but not destructive to the other evidence.

(1) Does a Whooping Crane ever alight in a tree? I have never found evidence that it does; therefore I wrote Dr. H. C. Oberholser, who has known about this record since last fall. The following paragraph is taken from his letter of May 7:

"Your point regarding the alighting of the bird in a tree is not so clean-cut and distinctive as might seem at first hand, since all birds do strange things under peculiar circumstances, and I should not consider that this point weighed materially against the bird being a Whooping Crane. In the first place, the Whooping Crane is in general a bird of the open country where there are no trees—marshes, plains, prairies, meadows, and similar areas—and I suppose a large part of the actual field observations of cranes of this species have been made in such areas. Therefore it is entirely likely that a person even very familiar with the bird in life may never have seen one alight in a tree: but this, of course, does not prove that the bird never does such a thing. In parts of its winter range, particularly in Texas, this bird lives about ponds in the midst of woodlands or tall chaparral, where there is plenty of cover and protection, as well as on the more open areas, and I have myself seen the bird about ponds in forests of low trees. Under the circumstances it is entirely likely that the bird would occasionally alight in a tree, for it is just as able to do so as is a Great Blue Heron, which is about the same size."

It seems to me that Mr. McIlhenny's undeniably valid criticism is not strong enough to overcome the weight of evidence on the other side, provided the evidence was reported to me truthfully. Knowing Mrs. Cahill and many of her associates at the School of the Ozarks and elsewhere, I know there is no question of this.—Rudolf Bennitt, *University of Missouri, Columbia, Mo.*

This case is now open for discussion.—Ed.

TO OUR CONTRIBUTORS

Our members are urged to submit articles for publication in the BULLETIN. Short items are desired for the department of General Notes, as well as longer articles pertaining to life-history, migration, ecology, behavior, song, economic ornithology, field equipment, methods, etc. Local faunal lists are desired, but limited space makes slower publication inevitable. In preparing such lists for publication in the BULLETIN follow our existing style, and use the nomenclature of the fourth edition of the A. O. U. Check-List.

THE MANUSCRIPT. The manuscript, or copy, should be prepared with due regard for literary style, correct spelling and punctuation. We recommend the *Manual of Style*, of the University of Chicago Press, as a guide in the preparation of manuscripts. Use paper of good quality and of letter size (8½x11). Avoid the use of thin paper. Write on one side only, and leave wide margins, using *double spacing* and a reasonably fresh, black ribbon. The title should be carefully constructed so as to indicate most clearly the nature of the subject matter, keeping in mind the requirements of the index. Where the paper deals with a single species of bird it is advisable to include the scientific name of the species in the introductory paragraph. If the author will mark at the top of the first page the number of words in the paper, a little of the Editor's time will be saved.

ILLUSTRATIONS. To reproduce well as half-tones photographic prints should have good contrast with detail. It is best to send prints unmounted and untrimmed. The author should always attach to each print an adequate description or legend.

BIBLIOGRAPHY. The scientific value of some contributions is enhanced by an accompanying list of works cited. Such citations should be complete, giving author's name, full title of the paper, both the year and volume of the periodical, and pages, first and last. In quoting other works care should be taken to carry over every detail, *verbatim et literatim.*

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The Wilson Bulletin

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PREDATION OF GULLS IN MURRE COLONIES

BY R. A. JOHNSON

The destruetion of large numbers of eggs of the Atlantie Murre (*Uria aalge*) by gulls has been reported by many observers and usually eredited to the extreme stupidity of the murre. In eastern North America the Great Black-backed Gull (*Larus marinus*) is the speeies responsible for the damage and in western waters the Western Gull (*Larus occidentalis*) appears to be the eulprit. Methods to eheek the gull as a predator have been proposed and in some eases introduced without knowledge of the inherent behavior patterns involved in the murre-gull relationship. This proeedure may very possibly result in the aeeeleration of the damage whieh it is intended to eheek.

To better understand the relationship of these birds on the nesting ground let us eonsider some of their adaptations to food getting and to natural enemies and thus learn in what way their interests elash as neighbors in restrieted areas during the nesting season. The gull is normally a seavenger in its feeding habits. It can not dive for food as can the murre, and is therefore subject to periods of starvation in a way that the murre is not. But the gull is at home in the air, eseapes the approaehing enemy easily and depends upon its own faeulties to reeognize safety. The gull is very useful to the murre to warn it of approaehing enemies. The warning ery of the gull elieits an immediate response from the murre. As long as man stays out of sight of the nesting murres and the population of the gulls is within reasonable limits, the gull gets for the most part only a seavenger's share of the murre eggs—mostly the abandoned ones. But, if the murre's vigil beeomes weakened by any influence, sueh as disturbanee, the former scavenger has little trouble in seeuring many eggs. Quiekly the gull beeomes an aggressive predator and takes the first unguarded egg. The adjoining murre missing her accustomed neighbor beeomes uneasy and falters at the wrong moment so the gull gets her egg too, and then another and another. Meanwhile the non-incubating group of murres is inereasing—a condition whieh adds to the general restlessness in a way to accelerate the loss of eggs. If the disturbing factor

soon desists these unoccupied murres will likely soon produce another egg and incubation pertinacity may be re-established. On the other hand, I found while studying the Atlantic Murre in relationship to the Great Black-backed Gull, that if the colony is accessible to gulls and it is disturbed more than about three times by man during the early incubation period it is likely to be mostly or entirely lost. In cases where the murre colony is relatively small and exposed to gull attack (gulls will not go down into caves or deep crevices), and gull food is otherwise scarce, progressive loss of the murre colony may occur without being in the first place initiated by the disturbance of man. Some of the birds may join another breeding colony elsewhere and lay again.

The Fear Response in the Murre

The development of a fear complex in the murre of which I have spoken and which appears to become quickly contagious is at first elicited through three or more serial responses, which may be observed when the breeding colony is first visited by man. The three responses to which I would call attention are as follows: (a) Response to gull warning cries by slight initiating movements—lifting of the head by those birds in exposed positions or by those to the least degree preoccupied by the incubation urge. (b) More intense raising and lowering of the head combined with vocal utterances from the incubating birds upon sight of the approaching enemy. (At this point all unoccupied birds move away from the locality of the breeding colony). (c) A flapping withdrawal of certain birds upon close approach of the enemy or after actual predation, and immediate stampeding of that part of the incubating colony composed of birds in position to see the flapping exit of their companions. Birds so located that they can not view the flapping exit of their companions will often remain and continue to incubate while the main body of the colony is being captured for banding purposes. Herein is evidence that the wing flapping of birds in a stampede is the actual stimulus which elicits the same response from their companions.[1]

This entire series of responses may be observed in a breeding colony of Atlantic Murres which has not previously been disturbed but as already stated, the birds so soon become conditioned that they readily all leave their eggs when they hear the gull warning. Furthermore they seem to lose any power to differentiate in their response to different meanings in gull vernacular. After this sequence of stimuli

[1] I believe that the white tipped secondaries in the murre have a function as releasers to the flight response. I have already shown that this character does not occur in plumage of young birds. (Auk, July, 1938).

FIG. 23. Colony of the Atlantic Murre near Fog Island, Quebec.

FIG. 24. Collected shells of Murre eggs showing the destruction by the Great Black-backed Gull.

and responses has been experienced two or three times the colony becomes so conditioned that it will respond to a nearby gull cry by stampeding in the middle of the night. Such a conditioned colony is subject to progressive loss of all eggs accessible to the gulls and if the entire colony is accessible the murres are likely to all abandon after a thirty to fifty per cent loss. The final loss may take place several days after the initiating disturbance which caused the fear conditioning has disappeared.

To understand the behavior of the murre in this fear response one should be aware of certain other characteristics of the bird. Some of these I shall list: (1) The murre normally guards its egg continuously during incubation; (2) murres which incubate in close proximity in colonies respond to the loss of a neighbor by showing great uneasiness, especially if the loss leaves their territory altered markedly; (3) among the birds which I have observed the murres never seemed to recognize the Great Black-backed Gull as an enemy, and they never indicated any objection to the presence of the gull working around the colony to collect any egg which was not being hovered; (4) I never saw a murre show the slightest interest in any egg except its own;[2] (5) once an entire colony has left the eggs each individual fears to be the first to return, so the eggs may be left unprotected for hours—returning Auks and Puffins which nest among the murres frequently are of great influence in leading the murres back to their eggs; (6) an egg left unattended is likely be pushed into some inextractible position in mud or filth by the movements of the crowded birds; (7) while a murre can move her egg readily and she usually does insist on holding to the original location as a place to incubate.

Field Observations

Large colonies nesting on the surface of islands where there is little or no natural cover find the needed sense of security in their very numbers. A disturbing force which endangers this security may be easily introduced yet halted only after the entire unprotected portion of the colony has been lost. Something like this appears to have continued on the Farallone Islands since the birds have been protected from the human element. If we consider the report, for example, of Taylor (1887), with that of Chaney (1924), relative to the effect of the Western Gulls on the murres of the Farallones, we find that the murre population has continued to decrease. Taylor says, "The California Guillemot (*Lomvia troile californica*) lays its large pear-shaped

[2]In the summer of 1938 I saw one adult adopt an abandoned egg after the original one was lost to a gull.

egg on the bare roeks in any position and colonies of them are to be seen sitting together eovering their eggs. . . . Their great enemy is the Western Gull (*Larus occidentalis*) for the latter is a ruthless pirate and steals and eats the eggs of other birds, espeeially the Guillemots at every opportunity. A murre is sometimes attacked by the gulls one on eaeh side, and so harrassed, until one of the gulls gets the egg which he divides with his fellow pirate."

Chaney (1924) after visiting the Farallones in 1923 reports conditions after the birds had been protected from human robbers for many years showing that the murres have eontinued to deerease. He states, "Only three small groups were aetually seen to be breeding. In eaeh case they laid their eggs in crevices large enough to aecommodate from seven to fifteen birds. . . . Aecording to the lighthouse keeper the small number of nesting murres become discouraged, after one or two attempts at nesting, beeause of the attaeks of the gulls. The selection by the murres of creviees in the roeks as breeding places suggests that they have felt the need for protection. . . . It seems probable, therefore, that the small number of breeding murres is indeed to be largely charged to interference by the gulls whose numbers are said to be greatly on the increase."

In this report Chaney gives us a sad picture of what has happened to a group of breeding birds whieh as late as 1885 (Wheelock, 1912) produced three hundred thousand eggs for the market.

Keading (1903) gives his observations of the gull damage at the Farallones as follows: "It is no uneommon sight to see a flock of gulls hovering over a nesting colony of murres in an effort to drive them from their eggs, and seizing every egg that is exposed. Should another eause drive the murres from their eggs, the gulls reap a harvest. This is perhaps as potent a factor as any in the destruction of the murres. For, while the human eggers took only the fresh eggs, they disturbed the whole colony of murres and the gulls took every thing in sight."

In this paper I wish to point out that by the very nature of the murre's responses to fear, the gradual disappearance of that great Farallone breeding population nesting in a loeation exposed to gull damage was an inevitable eonsequenee of the disturbance by human eggers. They struek the vital blow at this great eolony.

On the north shore of the Gulf of St. Lawrence where I made a study of the Atlantie Murre nesting on the islands where there were Great Black-backed Gulls nesting I eould eall attention to the following points in their relations: (1) On islands where both species are

nesting out in the open, the gulls take a certain percentage of the eggs regardless of disturbance. (2) If the murres are disturbed the damage may be anything up to complete loss of the murre colony. (3) On islands where the two birds are both found nesting, and the murres are protected by being down in crevices, caves, or faults in the rocks, the gulls are not likely to get many of the murre eggs; however, if the murres are disturbed a few times by man they may abandon, even at later dates because of gull cries to which they have become conditioned. ((4) Gulls which have lost their eggs by accident or because man has destroyed them as an attempt to control the gull population do not appear to leave their nesting territory any earlier than those gulls which rear young. As a result of general commotion which they set up because of the loss of the first set of eggs, the fuss they make in rebuilding the nest, and the general lack of demands on their time which the feeding of young birds would preclude, they are, at times, more serious enemies to other nesting birds than individual pairs of gulls which are allowed to breed normally. A pair of these gulls with young to feed appear to spend most of their time searching for food along the tide flats, whereas one without young spends most of its time watching from some crag or high rock in the nesting colony ready to take any unguarded egg or young bird of another species which may appear. It is this unoccupied group of gulls that I found were taking the greater portion of the unguarded murre eggs and newly hatched Eider ducklings. (5) On large islands where the gulls are nesting somewhat away from the murres any amount of disturbance among the gulls does not appear to affect the murres so long as they are never visited by man. They only become sensitive to the gull restlessness after they have been frightened two or three times.

Records of Experiments

At Wolf Bay in 1931, while studying the birds on Murre Island I discovered that there were about thirty pairs of Great Black-backed Gulls with their territories scattered about among six small nesting groups of murres. All the murre groups were more or less accessible to full attack. One colony was studied almost continuously over a period of several days from a blind placed in a fault in the rock nearby. This blind was completely concealed from murres and from gulls. It was entirely below the level of the surrounding surface of the island and was thatched over the top with weeds and fir boughs so that the birds walked across the cover without recognizing any change in the surroundings. In this blind I had a bed and food so that I could remain there for two-day periods. After a few hours in

the blind the birds were unconscious of my presence. The long stays were sufficient to allow them to settle down and to be studied under nearly normal conditions. The murre colony near this blind had 123 eggs originally. A few yards to one side of the murre colony was the nest site of a pair of blackbacks. The gulls had lost their eggs and, although it was past egg-laying season for them, the male repeatedly, each day, would get on the old nest and call the female. Usually she would stand nearby while he worked at the nest materials for some time. Then he might stand on the rocks by the female for several minutes. After this he would walk the twenty yards or so to the murre colony which he would approach along the highest ridge of the island. From the edge of the shallow, wide crevice in which the murres were located he would look all around to see if any egg was exposed. If he saw an egg exposed he would walk around to approach it without flying directly down among the incubating murres. I never saw the gull attempt to take an egg while a murre was incubating it, or approach a murre closely enough to receive a thrust from the sharp beak. When the gull was near one could sometimes hear a low gutteral sound from a murre which sounded like "auw", but no murre (not even the unoccupied ones) ever showed any inclination to drive the gull away from the colony. This colony was conditioned to fright because of my appearance when getting into the blind. As the more timid birds delayed the return to their eggs the gull feasted upon these. Thus progressive loss of the colony continued until there were eighty-two eggs remaining. At this time I left the island. When I returned a week later nothing remained but the empty shells of the murre eggs. Apparently the abandonment had been precipitous after a certain point.

The following notes taken from the blind described above will give a picture of the activities of these birds:

"July 14. I am in the blind at 'I' colony to observe the murres, 108 remain. Six egg shells were picked up this morning from the rocks here. One entire section of the colony containing fifteen eggs in an exposed position has disappeared.

"4:15 P. M. A Great Black-backed Gull came and took a murre egg. It ate the contents and left the shell on the rocks. 5:30 P. M. The murres are back on their eggs; this pair of gulls which have an empty nest nearby have finished the fourth murre egg in an hour. All the shells are on the rocks in front of the blind. 6:45 P. M. The gull chattered once and several murres left their nests, but a few stayed. The old gull calls his mate to their nest site in the same manner as

when he has food for her. Then he gets on the empty nest and turns about cooing in a way that reminds me of a pigeon. The female gives little attention, but he remains on the nest for some time. 7:15 P. M. The gull has been on his empty nest for half an hour while his mate stood alongside. 7:30 P. M. The gull got off his nest, called to his mate and walked along to the murre colony, picked at three shells which he had left earlier on the rocks and then went down after another egg which, finally, he could not reach. Then he cleaned up around the fourth shell left earlier in the evening. 4:30 A. M. July 15. All is quiet about the murres. The gulls have just taken another egg and left the shell on the rocks. 8:35 A. M. The gulls on the island gave a series of calls which caused most of the murres to leave their eggs. Some have not flown but are standing on the rocks looking about. It is always the male gull of the same pair which comes to this colony. 11:10 A. M. The gull got excited about something which frightened the murres. Most of them flew away from the colony. Some are coming back. 11:20 A. M. The gull is back. He went part way down in this wide crevice and came out with the shell which he left there this morning when I could not see what he was doing."

It should be noted that in connection with the above study that a pair of Great Black-backed Gulls which had three large young at a distance of not more that forty yards never approached or appeared interested in the murre colony. Other murre colonies on the same island were destroyed, however, in the progressive manner as indicated by the notes above. Of the several pairs of gulls living there most of them had been robbed of their chance to rear young. Human robbers had taken the gull eggs.

In 1934, while studying the birds on the east island of the St. Mary's group I found the murres were nearly all located in deep crevices where the gulls could not get the eggs. Here, too, most of the gulls had lost their nests. One pair of these gulls I knew particularly because it occupied a territory within sight of my tent. Most any time of the day one or both of the birds could be seen standing on a high rock overlooking the surf. Here was their territory and their perch. For the most part, they seem to wait there until food was in prospect and then go after it. When a brood of young eider ducks appeared these gulls were after them. They seemed always ready for such an occasion, but otherwise to have little to do with their time. Here, on the St. Mary Islands in 1934 I found the murres very readily became conditioned to gull warning as they did at Wolf Bay in 1931, although the gulls could not get to the murre eggs in most cases. Six

small colonies were studied by me during the two years, with as much caution as possible to prevent frightening but with a total record of ten to twelve visits for each colony, no handling of the adults being attempted. In these colonies there were originally 250 eggs. From these thirteen young were hatched of which five survived to go to the water (see Table 1). Murre colonies should be studied or observed for the most part by means of a concealed approach, especially if gulls are present to announce one's arrival.

TABLE 1. Showing the Effect of Disturbance on Colonies Which Were Visited Several Times During the Incubation Period, Although Precautions Were Taken to Prevent Frightening the Birds.

	Original No. of Eggs	No. Eggs Abandoned and Lost	No. Eggs Hatched	No. Young to go to Water	No. Colonies
Gull Island, 1931	43	39	4	1	3
Murre Island, 1931[1]	191	189	2	1	6
East Island, 1934[2]	16	3	7	3	1
Total	250	231	13	5	10

CONCLUSIONS

1. The murre normally nesting in colonies on remote islands or inaccessible cliffs, has not evolved a series of responses which permit it to adapt to repeated disturbances in a way to promote the preservation of eggs. The greater degree of adaptation appears to be in its ability to re-form a breeding colony and produce a new crop of eggs.

2. Breeding colonies of murres which are located in the range with Western Gulls or with Great Black-backed Gulls may be seriously affected either by a pressure from excessive numbers of gulls or from a fear conditioning resulting in gull predation of the eggs or the abandoning of them in locations not accessible to gulls.

3. This fear reaction is a colony response although it may start in one individual. At first the flight from the breeding site will not occur until the colony has experienced a series of stimuli ending in contact with a predator. After the conditioning the complete series of responses is set off by the warning stimulus.

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[1]The colonies on Murre Island were located so that the gulls could take and they did take most of the eggs.

[2]The small colony on East Island in the St. Mary Islands which was studied during 1934 hatched a larger number of young than other colonies used in the study. There were no gulls nesting near this colony, a condition which made it possible to approach with less disturbance.

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GOOD LANTERN SLIDES OF BIRDS

BY GEORGE MIKSCH SUTTON AND OLIN SEWALL PETTINGILL, JR.

The making and painting of lantern slides is a somewhat neglected corner on the field of Bird-Art. Photography has advanced. Technique has developed. Never do we attend an ornithologists' convention these days without being thrilled by new camera bird-portraits brought from far and near. Yet we continue to see lantern slides of these very photographs that are less interesting than they should be, poorly composed, and badly painted.

We purpose to present here some suggestions regarding the making and painting of lantern slides of birds. Assuming that photographic methods are understood, we suggest first that slides be printed by projection rather than by contact. This permits the enlarging of the small bird-image on the negative to any desired size. It permits the elimination of details in foreground or background that are unnecessary or out of focus, or that tend to destroy the center of interest. And it permits a proper framing of the slide.

Enlarging is important not alone because we usually wish to see the bird first of all, but because the larger image of the bird itself gives us an opportunity to paint in details of feather-pattern that would otherwise be missed. The elimination or subordination of inconsequential parts of a picture is important unless we are interested primarily in showing the bird *in its habitat.*

The framing of our subject is important. Thus, if our bird is flying, we must remember to allow more space in front of it than behind. If a flying bird is exactly centered, the slide is likely to appear crowded unless the bird-image is kept small. If we are framing a flock of flying birds it is well to avoid cutting any bird in two; and it is extremely bad to leave on the slide the rear half of a bird. A bird that is standing still may be centered. An owl that faces us may be centered. But a bird that is walking must have plenty of space in front of it—at least as much space in front as behind. And if the whole bird is shown, the head or eye, and not as a rule the body, de-

termines the center of interest, so that the body often should occupy a lower corner or lie within the lower two-thirds of the finished slide.

In printing much care must be given the matter of exposure. The success of a colored slide greatly depends upon this one step in the process. If a slide is underexposed the colors are likely to be blotchy and overbright, no matter how carefully they are put on, and they tend to bury details that should show. If, on the other hand, the print is overexposed the effect will be muddy. Nor can this muddiness be corrected with any amount of laying on of color. If overexposure is bad the whole picture is dark and colors that are added make it darker, not brighter. The only slide that can be colored satisfactorily and at the same time with ease is one which has been properly exposed; one which shows good detail and a degree of contrast. Getting this proper exposure often means several trials, alternating with each trial the length of exposure and the strength of developing fluid. A slide may, of course, show too much contrast, the blacks too black and the light areas too white. Such a print lacks detail and is to be discarded unless a purely artistic effect is desired.

It is always a good plan to project a slide with the lantern before undertaking to color it. This permits us to make a new and better print, if necessary, and to proceed intelligently with the painting.

In making a slide that is *not* to be colored, the usual acid fixing bath is desirable. This acid fixing bath should not be used, however, with slides that are to be colored, for it has a tendency to harden the gelatin so much that the water (and therefore water-color) is repelled. A slide that is to be colored should be fixed in a bath containing hypo and a 2.5 per cent solution of sodium bisulphite. This bath will not harden the gelatin; consequently, if the slide is held over a warm light while it is being painted, or if the temperature of the room becomes too high, the gelatin may become so soft that the brush will dig into it. Should this occur, the slide should be dipped two or three times in a 2 per cent solution of formalin, then thoroughly rinsed and dried before the painting process is resumed.

Now for the coloration. In most slides a large part of the background is light in value—this lighter part frequently being the sky. When first we began painting slides we gave all this lighter part—indeed sometimes the whole slide—a light blue tinting, using a big soft brush and plenty of water. Such a general tinting of any slide is a mistake, first, because it tends to make the whole picture dull; second, because it gives color to certain parts of the foreground which should remain *entirely uncolored* or which should receive colors of a

different sort than blue. In twigs that cross the sky, for example, there are nearly always highlights that are dominantly yellow or red and not blue. It is a bad mistake to deaden such reddish or yellowish tones with an indiscriminate blue wash before painting them.

What we have just said about the undesirability of toning down any large part of a slide with blue is even more true of green. How many slides have we seen in which some unfortunate, sickly shade of green is smeared all over that part of the photograph showing grass or shrubbery! Of all the colors that we find in nature perhaps none is so infinitely variable as green. In a single leaf there are a considerable number of shades, some of them the result of chlorophyll itself, others the result of colors reflected from the sky, from clouds in the sky, or from any number of surrounding objects.

In painting backgrounds where the blue or gray of a sky predominates, put this blue in in sections if branches cross, leaving the greater part of the branches wholly without blue. If cloud effects are desired, leave parts of the sky untouched with blue, using plenty of water so as to avoid hard edges anywhere. And leave untouched all parts of the foreground that in the finished slide should be strongly white, or yellow, or red. Parts of the foreground that are finally to be green may be washed with blue, for making these parts green means the superimposing of yellow—a simple process. But for reds and yellows a blue wash is fatal.

In painting backgrounds where greens predominate, introduce these greens in small sections, following a single grass-blade or a single leaf with one stroke of the brush, then changing the shade by adding a little brown or a little yellow or a little red for the leaves and grasses close by. In other words, break the green areas up into patches of brown, yellow, blue, red, and purple. Do not be afraid of overdoing the variety of shades. If you find your results a trifle too patchy, run them together by stroking the whole area with a water-filled brush, or by giving the overly spotted areas a faint bluish or yellowish wash.

The painting of gravel such as often surrounds a Killdeer's nest is not easy. A single tone of brown or gray will not do. Touch each prominent pebble with bright color—pinkish, yellowish, purple, or orange. The pebbles that do not show prominently do not matter much, but colors on those that receive the strongest light will give the slide sparkle.

The leaves of coniferous trees are not easy. Great care must be exercised in painting pine needles that show against the sky. The green must not be smeared across the distant blue; better far to leave

the needles unpainted altogether than to smear them in. And remember, too, that the colors of spruce boughs are often as gray or glaucous blue as they are green. Painting any piney woods means a constant fight against solid washes of green.

Bark, like gravel, requires spots of brilliant color here and there to keep it from being monotonous. Of course, there are limits: it would be a sad mistake to give aspen or sycamore or white birch bark an overdose of red; but bark should be treated as the green of a shrub is treated, with due regard for the variations of shade that occur everywhere as a result of reflection of color from surrounding objects.

Now for the birds. It is a good idea to have a specimen at hand so that shades may be carefully matched. Proceed with great care with any sort of general wash. Remember that any part of the bird that is white must *stay white* and not be touched with any wash unless it happens to fall in a shadow. If a white part of a bird falls in shadow that shadow is likely to be blue, not purple; and sometimes in the shadow there will be a hint of yellow or orange or brown or green reflected from surrounding objects. White birds, such as gulls, against a blue sky are among the most difficult of subjects. Here no blue of sky must cross the white plumage that is struck by the sun. This means painting the blue of the sky directly and very carefully up to the bird's body and no farther. Keeping the blue even and at the same time not smearing it over the bird is sometimes exceedingly hard. A mistake may necessitate washing the slide completely and beginning all over. We may someday discover some substance (such as rubber cement) that can be put on the figure of the bird that will permit us to proceed with a broad painting of the sky, remove our temporary coating, and finish the bird; but by that time we may all of us be able to photograph directly in color, and the painting of slides will be outmoded.

Wherever there is a center of interest in our slide there should be a strong light, hence sharply defined highlights, deep shadows and pure colors. This usually means the use of some heavy color such as purple or thick black, placed with great care in the deep shadows beneath eggs or in the darkest part of the pupil of the eye. Be the print before us ever so sharp and clear, and its darkest parts ever so dark, the adding of this heavy black, in opaque color, will add depth to the slide and produce a three-dimensional quality that is sometimes very striking.

The use of opaque color involves a special technique. Mixing a heavy black with a transparent blue, it is possible, if we work quickly, to give such a color area as the black crown of a tern a wonderfully

rich, glossy appearance. We ought to have some sort of transparent paint with which to step a neutral tone gradually down with application after application, but we have thus far not found such a paint. The "stone gray" that is usually included in books of lantern slide colors is hopelessly granulated. We rarely find it possible to use this color at all. So, as a rule, we resort to thick black, that may be mixed with blue or green where glossy plumage is involved; or, in achieving a gradually darker shade, to color after color superimposed in such a way as to neutralize each other.

This toning down of some objectionably light part of the slide is an interesting process. Suppose one corner of our print is for some reason far too light; or that a waving grass blade or leaf crosses in such a way as to produce a disagreeable effect. It is rarely possible to correct such a flaw with heavy opaque; usually we want to tone it down or to efface it by merging it with the background. To do this, put on first a bold, bright layer of pale pink. Put over this a layer of thin green. The resultant queer brown must be overlaid with purple or yellow or any other shade that is needed for neutralizing. Spotty effects are likely to result, of course. These spots must be handled individually. Each application should aid in the neutralizing process and gradually darken the tone. Bear in mind the complementary colors. In toning down what appears to be too strong a green use red; in neutralizing purple use yellow; and so on. The effects of such a treatment are often highly satisfactory. Even so difficult a spot of white as that which results from a finger nail scratch on the negative may be completely obliterated with a treatment of this sort. Be careful, however, in doing this, for an area so treated is likely to become dark with surprising rapidity.

The use of opaque colors, either heavy black or pure purple, is helpful in strengthening shadows. This is particularly true with such subjects as nests or birds on the ground where certain grasses and leaves are out of focus. Prints that are at first sight a hopeless blur may be given definition or brought into focus through the wise use of opaque color.

The use of opaque color in retouching a negative is a field of its own upon which further experiments may well be made. In building up our series of slides we occasionally come upon a photograph of some bird whose coloration is bright, but in which these bright areas appear very dark, even blackish, in the print at hand. Such is likely to be the case with a tern whose beak is bright red or orange; a ptarmigan whose comb is bright red; a Ruby-crowned Kinglet or a Red-

poll. These bright colors frequently "go dark" in the process of being photographed, so dark as to be quite beyond us in our painting unless we radically change the negative and print.

We have had good success in thus doctoring an occasional negative. In a Redpoll portrait, for example, we opaqued the red cap so completely in the negative that in the print it appeared a glaring, impossible, altogether flat white. But by applying proper tints we gradually brought this cap down to the proper shade of red, with the result that we now have a slide that is interesting and that shows a real Redpoll, not a Redpoll with a sooty crown.

Some persons will brand this doctoring of negatives as "Nature Faking". And, to be sure, that is just what it is. The whole business of photography is a nature-faking business. What we get in our final, unretouched print often is a far cry from what we actually saw at the time our photograph was taken. What we want in our final slide is the best likeness we can achieve of our subject. The light has played tricks on us. The camera has failed miserably in catching shadow-color. Parts of our subject are out of focus. Our task is to build up, as best we can, images of the subjects that will do them justice.

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CENTRAL WISCONSIN CRANE STUDY

BY F. N. HAMERSTROM, JR.

Sandhill Cranes (*Grus canadensis tabida*) are among Wisconsin's rarest breeding birds (Henika, Scott). The fact that a few cranes persist is due more to the tolerance of a few landowners than to any direct action toward maintaining or improving crane habitat. Although they are legally protected, protection alone has not been enough to swing the balance in their favor.

The chief reason for this casual treatment of so rare a bird seems to be lack of definite information upon which to base a program of active conservation. To make a start toward the needed factual base, in 1936 and 1937 a brief crane study was made as a part of the research program of the Central Wisconsin Game Project. Necedah.* The purpose of the study was to map the position of the crane ranges on and close to the Project and to learn something of the character of

*Farm Security Administration, Project LD-WI-5.

Acknowledgments: Field assistance—James Blake, Burns Carter, J. R. Goodlad, Oswald Mattson, and Millard Truax, members of the Project game staff; and Frances Hamerstrom. Review of this paper—Mr. W. T. Cox, Regional Forester-Biologist, Region II, F. S. A., and Professor Also Leopold, University of Wisconsin.

these places as a first step toward developing methods for increasing the population; in other words, crane management. The term "range" is used for areas in which fairly definite numbers of cranes are found fairly regularly during the breeding season. This paper is based upon a study of seven ranges which have been used for at least the last five years, and in most cases considerably longer. Their locations and the number of cranes in each are given in Fig. 25, which also includes four other places frequented by cranes. One of these, the Potter unit, is probably a definite range; a second, the Hog Island unit, may be a range newly established in 1937. The Daly and Norway Ridge units are probably feeding grounds for known ranges nearby.

Description of the Country

The area covered lies in the southwest part of Wisconsin's central plain. Soils are of two major types, sand and peat, both acid and lacking in essential plant foods, with a high incidence of frost in the peat areas. True prairie, at least in post-glacial times, has never been present in the area in significant quantity (Thomson), but once came within a few miles of its western side (Schorger).

Land industries are general farming, low-grade dairy farming, cranberry growing, and seasonal harvesting of sphagnum moss, marsh hay, and blueberries. About 100,000 acres near Necedah are being developed for wildlife by the F. S. A., following the removal and resettling of the resident farmers.

Except for a few bluffs and sand ridges, the country appears to be flat. The plain is actually a mixture of low marsh basins and slightly higher sand islands, undulations in the former bed of glacial Lake Wisconsin. The whole pattern is cut through by many drainage ditches. The basins, single or in southeast running chains, once held timbered swamps, bogs, and open marshes of from twenty to several thousands of acres. White and red pine grew on the sand islands and ridges, but were stripped clean during the lumbering days.

Repeated fires followed artificial drainage and destroyed most of the peat, as well as the forest duff on the sandy uplands. Aspen and willow have taken much of the burned peat, and poorly formed jack pines and scrub oaks have replaced the white and red pine.

The larger peat areas were more resistant to drainage, and to this fact, apparently, most of the remaining crane habitat can be traced. There a few tamarack-spruce swamps and leatherleaf-labrador tea bogs, small samples of original conditions, have persisted; but even in these places the ditchers were partly successful, and the swamps and

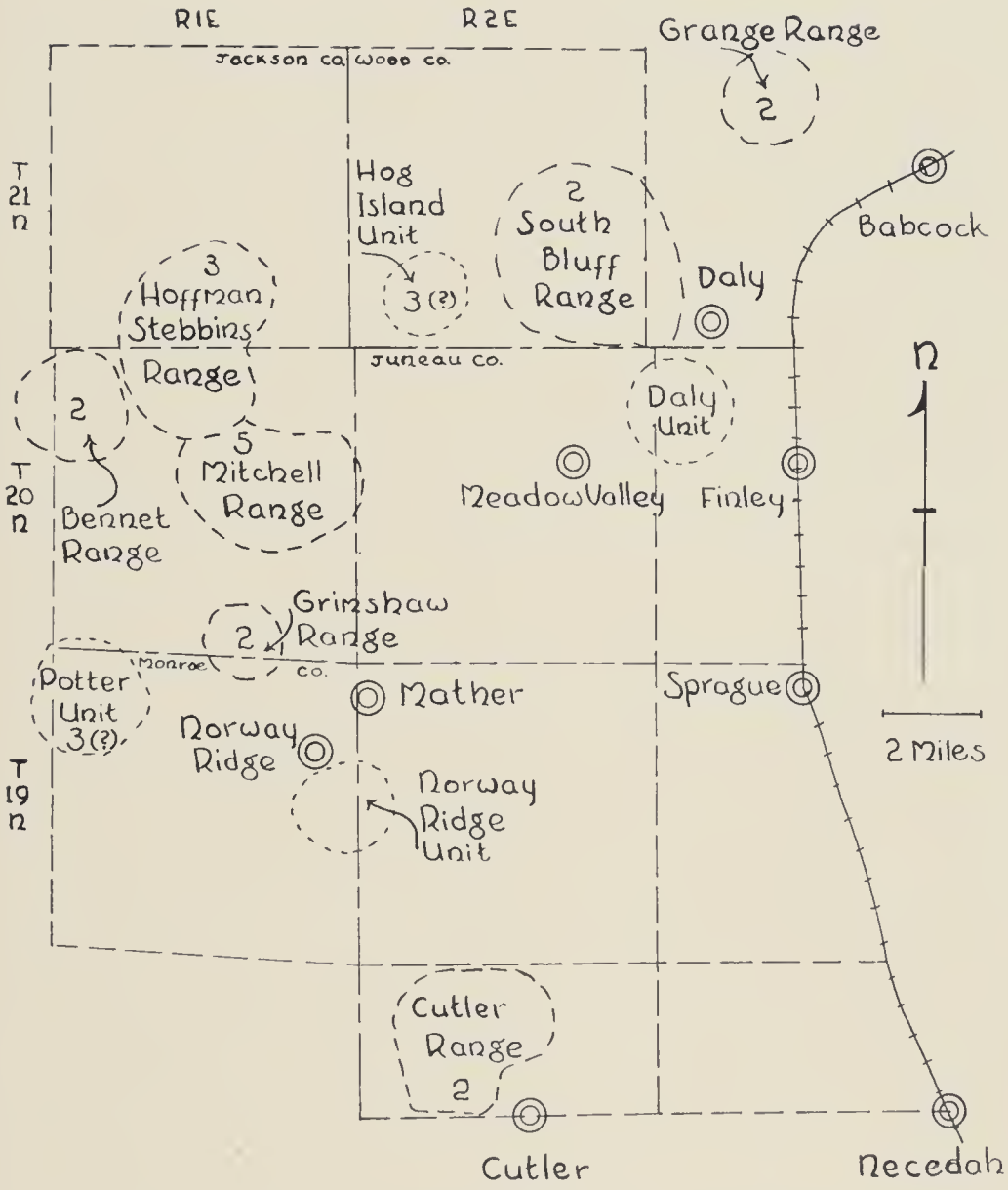

Fig. 25. Crane ranges, and the number of birds in each, in the study area.

bogs are associated with grass marshes and vast tracts of even-aged aspen, indicators of lowered water levels. Cover types, on the whole, occur in large blocks. Open water is confined to drainage ditches, a few breaks in the floating bog, and the impounded waters of the cranberrymen's reservoirs, around which over half of the ranges studied were centered. Fig. 26 shows the land forms of one such large peat area, containing three ranges.

One exception to this general condition was found: the Cutler range. It is an area of small marshes and sand islands and is more typical of the region as a whole than are the relatively few large peat areas.

What Is Crane Habitat?

We do not know exactly what the basic condition necessary for cranes may be, but it seems logical to assume that elements common to a number of ranges may include it or may produce it through their joint action. One element common to all of the seven ranges studied is the presence of areas of shallow water, over forty acres in size. These may be impounded waters—cranberry reservoirs, the ponds on the Cutler fur farm—or areas in which artificial drainage has been a partial failure. Cover types were floating sedge bogs, shallow grass, sedge and cat-tail marshes, and flooded aspen flats. Deep open water seems to be definitely less attractive.

A second common element is isolation. Although the cranes often feed in cultivated fields, and have some contact with the activity around cranberry marshes, there is usually a nearby area of a section or more in which the presence of humans is uncommon, except for such seasonal work as haying or mossing.

The invasion of marshes by aspen and willow, as already pointed out by Leopold, has a bearing upon both of these elements. Such invasion increases isolation, since hay and moss are no longer produced, but does away with the *openness* of the country, so uniformly associated with cranes in the literature. If an aspen flat is an acceptable substitute for open marsh, well and good. On the other hand, the presence of water may figure so prominently in the crane ranges because it keeps down brush invasion.

The large size of the ranges is one of their most striking characteristics. The smallest was somewhat over a thousand acres, the largest almost five thousand. In no case, however, was it all wild land. Cultivated fields, cranberry developments, and in one case a fur farm, occupied part of the range, although in each instance taking up less than ten per cent of the total. It would seem that the ranges are

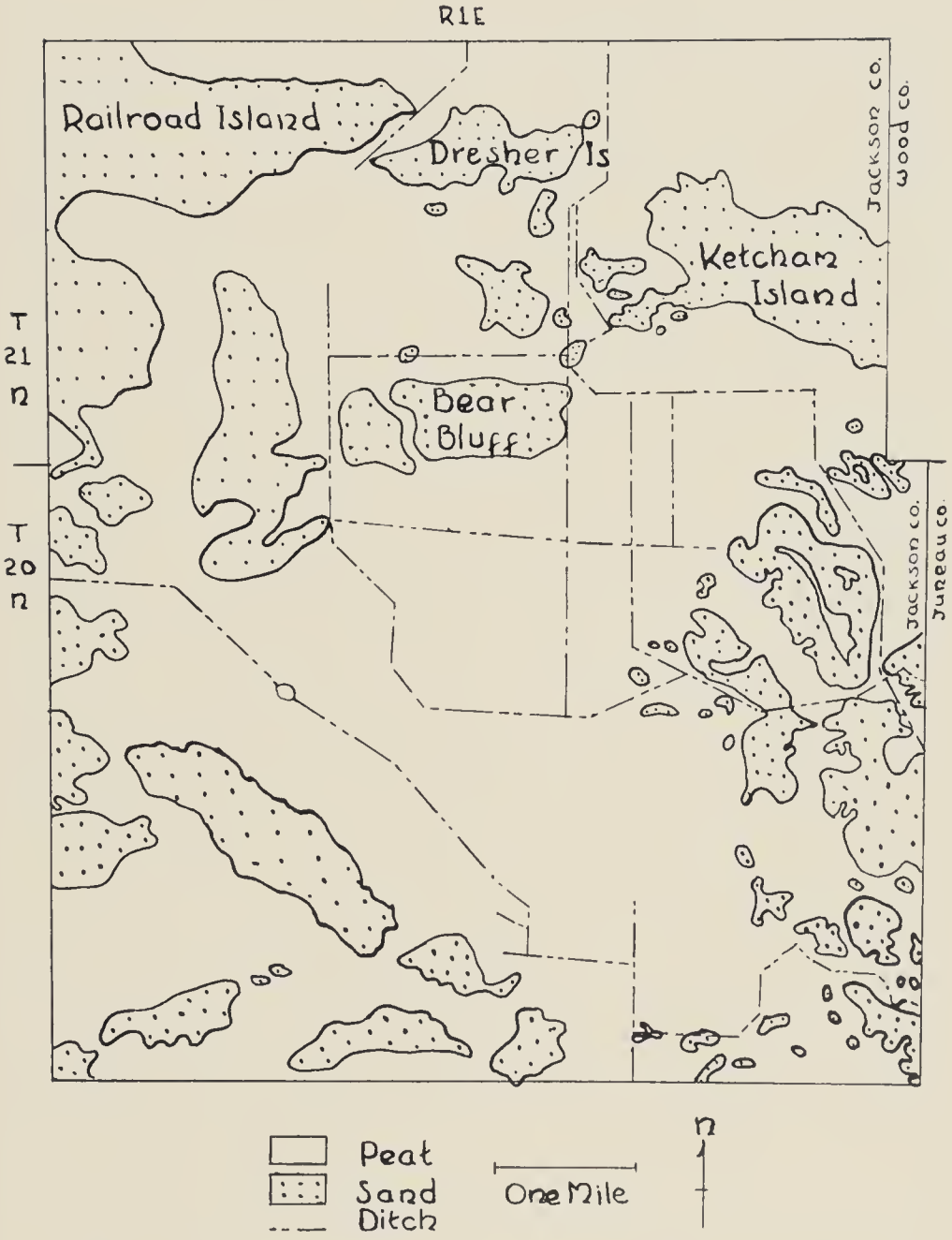

Fig. 26. Land forms in the northwest part of the study area.

made up of two parts: a relatively small nucleus in which particularly rigid standards must be met, and a much larger bordering zone which may be enroached upon to a far greater extent by unfavorable circumstances. Water areas, single if large or multiple if small, constitute the nucleus, while the bordering zone is the associated aspen flat–grass marsh cover.

The inclusion of a variety of cover types within a range, so characteristic of this nucleus and bordering zone arrangement, may or may not be an advantage. Long flights are made over aspen flats to objectives a mile or more away, suggesting that the great size of the ranges may be accounted for by the assumption that they include a scattering of favored spots within a vast matrix of unsuitable cover. Only twice were we able to find crane sign along the line of flight, in both cases in sedge openings similar to the nuclear portion of the range. Whether or not varied cover is an advantage, it is to be seen in the background of photographs of crane nests in Minnesota (Roberts) and in Europe (Berg). Berg, indeed, is of the opinion that edges of brush or dead timber are preferred nesting sites. An understanding of the exact relationship between these two parts of the range is probably the fundamental problem in crane management.

In all but one of the ranges studied—in fact, over the state as a whole (Scott)—all of these elements of crane range may be reduced to one common denominator: peat. Shallow water areas in large isolated tracts of open marsh and bog, swamp and aspen flat, occur in this region only in peat basins. It is not clear whether peat basins are preferred or are used because only they provide the size and isolation necessary for crane habitat. By their large size and limited economic productivity, areas of this sort are more suited to state control than are richer agricultural lands.

A final element common to all of the ranges is the presence of uplands, the possible importance of which as rearing grounds is mentioned in a later paragraph.

General Life History

There are about eighteen cranes in the ranges shown on Fig. 25, and about three more in the suspected Potter unit. Probably not more than one pair of breeders is present in each range, although the odd numbers in several ranges indicate additional non-breeders.

Dates of first arrival in the Hoffman-Stebbins range were: 1936, during an early warm spell in late March; 1937, April 9. The latter date is probably the more typical.

From the time of their first appearance until early summer, cranes in the Hoffman-Stebbins range were often seen in cultivated fields between early morning and ten o'clock, and again from about three until dusk. They were apt to be on the floating sedge meadow in the cranberry reservoir between eleven and three, although they often flew to the aspen flat, tamarack swamp, and floating bog country southwest of Bear Bluff instead. In early spring, one finds pairs or larger groups; as the season advances one is more apt to see single birds. In the other ranges, which were less intensively studied, the same general relationships seemed to hold.

Several of the cranberrymen have seen cranes dance on the marshes, and Mr. Griffen saw (May 12, 1937) what was undoubtedly the dance on a food patch on a high sand ridge near his house.

A nest containing two eggs was found by Goodlad and Carter on May 18, 1936, in the Hoffman-Stebbins range. By June 3 one egg had hatched, apparently the day before, and by the 5th both had hatched. One of the juvenals was in hiding about twelve feet away, the other ran about through the sedges, keeping within about twenty yards of the nest. The nest, a flat platform of sedges about twenty-four inches across and one and one-half inches high, had been built on a floating sedge meadow. Two clumps of four-foot willows gave slight concealment on two sides, while the other two sides permitted unobstructed vision across the three or four hundred acre sedge meadow. The floating sedge mat was thoroughly soaked, although the nearest open water was a ditch 100 feet away. Aspen and willow flats and sand ridges covered with pines and oaks surround the reservoir.

In the same year, a nest was found by Mr. Cleveland Grant in the South Bluff range. One of the adults had been killed on the nest, Mr. Grant thought by a coyote. This nest was also on a floating bog, in a rather open marsh. These two Wisconsin nesting places are essentially similar to three described by Walkinshaw in Michigan, and nine of the ten reported by Holt from the Kissimmee Prairie in Florida .

A nest was found some years ago in the Cutler range and I am told that cranes nest regularly on the Bennett marsh. Mr. Grimshaw noticed that the two cranes on his marsh behaved as though crippled when disturbed during the 1937 breeding season, and he regarded as juvenals two which remained for a time after the others had gone in 1936. It would seem, then, that nearly all of the ranges examined were actually breeding areas.

During the rearing period, cranes were very inconspicuous. It is probably during this time that the factor of solitude becomes particu-

larly important, for the birds practically drop out of sight. Except for young at the nest, reports of juvenals were seldom heard. Knute Olson, of Mather, told me that when he was surveying about twenty years ago he came upon two juvenals still unable to fly, although fairly large in size, in the marsh toward the southeast end of Hog Island. At that time the place was even less accessible than now, for there was much more water. If this basin, which is about four thousand acres in size, was a typical rearing ground it is not surprising that cranes are rarely seen during the rearing period. Whether they move deeper into the marshes with their colts or take them into the wooded uplands, as do their European relatives (Sieber), I can not say. If, indeed, the crane has taken to the marshes and swamps not from choice but from necessity, a dry ground stage in the development of the young is to be expected.

From late August until the southward migration the fall-gathered cranes, in a fresh grey plumage, again spend much of their time in the grainfields. Up to sixteen birds were seen in the Hoffman-Stebbins range in 1936, and Mr. Stebbins has seen as many as twenty in past years. Several of the marshes in Adams County, about thirty miles to the east, are concentration points for flocks of eighty to one hundred cranes, known to be migrants. From this disparity of numbers, it seems plain that the study area is not on the main migration route through Wisconsin, and that the birds which gather in the Hoffman-Stebbins range are of local origin. The same situation seems to hold in the spring, for while large temporary concentrations are seen in Adams County, there are no such spring stopping places in the area covered by this study.

The autumn flock was much more loosely organized than the small bands seen in spring, and often split into several parts. These may have been definite entities, such as family groups. Daily movements were more wide-spread, perhaps to prepare the juvenals for the long flight to come. The area south and west of Bear Bluff was much more frequently visited, and a greater part of it was included within the flight lines.

One of the first freezes in 1936, which came during the week of October 20, marked the end of their stay for most of the cranes. Two remained in the Grimshaw range until November 8, when they too left.

Marshes, except perhaps during the rearing period, seem to be the usual night roosting places. On one occasion, three cranes were seen at dusk on a sedge meadow at the edge of open water, and were watched until darkness had fallen. Conversely, observations begun before day-

light twice indicated that daily activity began in the marshes. We have many reports of cranes flying to the marshes at dusk and out of the marshes in the early morning.

The presence of cranes in cultivated grainfields has already been touched upon, but not sufficiently emphasized. Observations on feeding birds indicate that grains—particularly buckwheat, although corn and oats were also taken—are a large part of the diet in spring, early summer, and autumn.

Many of the autumn droppings were stained bright purple. From crane sign found along an elderberry thicket, Goodlad and Carter were of the opinion that these berries produced the color. According to their observations, grasshoppers and crickets were eaten at the same season. To test the value of food remains in the droppings as an index to food habits, thirty fresh fecal passages, distinctly purple in color, were collected from a buckwheat field on September 26, 1936. Lack of equipment made a thorough analysis impossible. With a hand lens the hard seeds of huckleberry (*Gaylussacia baccata*) and blueberry (*Vaccinium* sp.), fragments of the legs and wings of grasshoppers (*Melanoplus femur-rubrum*) and of the legs and elytra of a few unidentified beetles (*Coleoptera*), with a few bits of unidentified twigs, were separated from the buckwheat hulls and seed coats which made up 81.9 grams of the 82.8 grams of air-dried material.

Soft plant and animal matter would probably be unrecognizable, but dropping anaylses might well be used to good advantage to supplement direct observation of feeding birds.

Conclusions

Our findings may be related to the purposes of the Project in four ways:

(1) The minimum unit of land for crane management is about 1500 acres in a single block.

(2) Large areas of deep peat are most suited to crane management and should be reserved for that purpose. There is one such area within the Project, which was used by cranes before it was drained. It is being partially reflooded. Certain of the smaller reflooded marshes, particularly where linked together in a series, may also offer possibilities.

(3) On the blocks reserved for crane management the present gridiron pattern of roads, heritage of a C. C. C. invasion, must be broken up. Gates placed on bridges crossing the drainage ditches and destruction of side trails by flooding would prevent general automobile travel without seriously interfering with fire patrol. If this be not

done, the Project will defeat one of its own original purposes; namely, crane conservation.

(4) Food patches of corn or buckwheat should be maintained in occupied or prospective ranges to replace the grain fields lost through the removal of farmers.

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A LIFE HISTORY STUDY OF THE YELLOW-BREASTED CHAT

BY GEORGE A. PETRIDES

In an effort to increase the photographic record, as well as to add to our knowledge of the life-history of the Yellow-breasted Chat (*Icteria v. virens*), two nests of this species were studied during the nesting season of 1937. This enterprise was carried out under the direction of Dr. Paul Bartsch of The George Washington University, whose gracious loan of photographic equipment made possible the pictures here reproduced.

Photographs of the chat are extremely rare. To the best of my knowledge, the two pictures taken by Dr. A. A. Allen are the only ones, until this date, that have appeared in the literature.[1] This species is the shyest of the warblers and although often heard it is but seldom seen. Once the bird realizes that it is observed it becomes silent and moves about only furtively. The parents are silent about the nest and the discovery of the nesting site is accomplished only by systematic search. Many investigators emphasize the extremely timid nature of the chat and some have stated that the parents will leave their eggs

FIG. 27. Nest and eggs of the Yellow-breasted Chat.

FIG. 28. The female Chat resting at the nest.

or young on very little provoeation and that even slight disturbanees of the nest or the leaves around it may eause the birds to desert.[1]

In the present study, although the birds of the first nest were "eonditioned" somewhat by a gradual eneroaehment upon their nesting territory, the seeond nest was approaehed noisily through the underbrush on six different oeeasions and the eontents lifted out and handled. Despite this, there seemed to be no evidenee of a tendeney to desert and on all oeeasions the adults were seen or heard about the nest and the young hateheđ and flew normally.

Some eaution was exereised in preparing the birds of the first nest for study in the ease that these individuals were as timorous as reputed. The blind, a green umbrella tent six and one-half feet high, was first ereeted some eighteen feet from the nest and moved forward about four feet every other day until, when the eggs were hateheđ, the tent was only two and one-half feet from the nest. On eaeh visit several leaves were plueked from before the nest until it was well exposed.

It was not possible to identify the sexes in the field but it was eoneluded that the brooding bird was the female. (It appeared somewhat bedraggled and slightly less intense in eolor). She was no more suspieious than a bird of any other speeies and indeed she beeame quite tame for, despite the proximity of the blind, only very sudden sounds and movements disturbed her. It was possible to stand outside the blind, beside the nest, without flushing the bird. Throughout this study the behavior of the birds of the two nests was in marked eontrast to that deseribed in the literature.

The nests were the usual bulky struetures eomposed of grasses and plaeed in typieal positions three feet from the ground in grape and blaekberry vine tangles. The first nest was diseovered on June 13, 1937. and at that time eontained one egg. On the 15th there were three eggs (Fig. 27). The seeond nest was found on the 19th and also eontained three eggs. A visit on the 25th showed three eggs still in eaeh nest, but on the morning of the 27th there were, in eaeh nest, three small young whieh had undoubtedly hateheđ late the day before. Thus the ineubation period was eleven days from the appearanee of the full eluteh. F. Burns,[2] however, reeords an ineubation period of fifteen days for a pair of Vermont birds.

The young were born naked—the feather traets showing dark blue on the wings and less darkly on the baek.[3] The primary quills did

[1]Bird Lore, Vol. 21, No. 2, 1919.

[2]Wilson Bull., Vol. 27, 1915, p. 286.

[3]A. A. Saunders in Forbush's "Birds of Massachusetts" (III, 1929, p. 298) says that the chat is the only warbler that he knows that does not possess natal down.

FIG. 29. The female Chat cleaning the nest.

FIG. 30. The female Chat shielding the young from the sun, often called brooding.

not project on the day after hatching (27th) although on the 28th they were about $\frac{1}{16}$ inch long and on the 30th about $\frac{3}{8}$ inch. By the 2nd they had developed sufficiently to enable the young to fly.

On July 1 three young were present in both nests but on the 3rd, when the nests were again visited, they were empty and no chats were seen, although several notes were heard near the second nest. Thus the young developed to the flying stage in the period from June 26 to July 2—a period of eight days.

Brooding of both eggs and young was accomplished by the female alone during the time of observation, and although several attempts were made by the male to feed the young, his shyness caused their failure. It did not appear, however, that the male ever brooded the eggs or young.

The food of the young consisted almost entirely of soft-bodied orthoptera and larval lepidoptera. The only insect definitely identified was the large green mantis (*Paratenodera sinensis*), two half-grown specimens of which were fed the four-day old young. An unknown species of brown, almost hairless caterpillar was the greatest capture in numbers. A small green long-horned locust and a small brownish grasshopper also were fed the youngsters.

The four-day old young were fed only six times in five hours by the female, although the male attempted unsuccessfully to feed them several times. Copeland,[4] however, records a feeding time average of once every thirty-four minutes for the four-day old young over a thirteen-hour period.

The nest was kept very clean and the female, after feeding the young, would look carefully about the nest and if any excretory capsules were present she would pick them up in her bill and eat them. On one occasion after swallowing the excretory sacs of two of the young she pulled a third capsule from the anus of the third and flew off with it.

On or about the nest the female—and the male on occasion—uttered notes that may be classified in ascending order of alarm as follows:

1. A mild chatter in the throat, a gargling growl.
2. Clapping of the mandibles, rarely given.
3. A chuck-ing note given singly or as *cuk-cuk* or *cuk-cuk-cuk* in a rapid and sharp manner. quite common.

[4]Wilson Bull., Vol. 21, 1909, p. 42.

4. The more common, scolding chat note given in a nasal tone and most conveniently written "*cheow*", given sharply and usually singly.

These notes, some of which were always given when another bird species approached the nest bush and sometimes when other noises occurred. The first type was given when the bird was on the nest and apprehensive of intruders while the third type seemed to be given to attract the attention of the male while he was singing. The fourth is the most common alarm note and often preceded a flight from the nest. The nest was often quitted silently, however.

The male of this pair sang in spurts from first one direction and then another while the blind was occupied. His calls were only occasionally answered by his mate and although Townsend[5] records the chat imitating other species, this pair did not show that tendency despite the fact that a nearby Mockingbird whistled crudely like a chat.

The male of this pair also occasionally performed its clownish "courtship" flight-song given with "dangling legs, pumping tail, and slowly flapping wings". There did not seem to be any excuse for this performance at any time, however.

Summary

The reputed timidity of this species advised a gradual approach of the blind to within three feet of the nest and the gradual removal of leaves surrounding the nest. The female bird became quite tame and no difficulty was experienced in photographing it. A second nest was visited often and the contents handled but, contrary to reputation, the young were hatched and flew normally. The suspicious nature of this species is believed over-emphasized in the literature.

From data on both nests the incubation period was found to be eleven days, and the young spent eight days in the nest before leaving. The young were born naked. Brooding of both eggs and young was accomplished by the female alone during the period of observation, although both sexes evidently feed the young.

Their food consisted of soft-bodied orthoptera and larval lepidoptera. *Paratenodera sinensis* (mantis) was identified but the species of locusts and caterpillars were undetermined. The four-day-old young were fed only six times in five hours. The cleanly habits of the bird were noticed.

Four different types of notes uttered by the female at the nest are given in ascending order of alarm.

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[5]Auk, XLI, 1924, p. 548.

RELATION OF TEMPERATURE TO EARLY MIGRANTS

BY JOHN S. MAIN

In an article by Bissonnette entitled "Photoperiodicity in Birds", in the Wilson Bulletin of last December, there is an interesting discussion of the spring migration, and of the factors that operate to make the birds start. We are referring now not to the physiological changes leading up to the migration movement, nor the cause of these changes. As to that there is a wide difference of opinion among the physiologists themselves. Rowan, it appears, now favors the effect of increased exercise upon the gonads, having abandoned his original theory as to the direct effect of light. Bissonnette suggests an inherent rhythm of the anterior pituitary controlling the sex cycle, with light as an auxiliary. Kendeigh believes that environmental conditions are the efficient agent, acting both directly and through the medium of the endocrine system. Some stress food, some the thyroids, others the declination angle of the sun.

What we are here concerned with, however, is not the so-called conditioning process, but something quite different. It is the actual moment of departure, and the forces that finally arouse in the bird an uncontrolable impulse to begin its northward flight, for there is reason to believe that another factor becomes dominant at this time and furnishes the stimulus for action.

The agent above referred to, at least in respect to our early migrants, is none other than temperature. And yet, strangely enough, none of the persons mentioned by Mr. Bissonnette, with the single exception of Kendeigh, seem willing to admit that this is the case; and when evidence is adduced showing that when temperature is higher than usual, migration is earlier, it is dismissed with the statement that the warmer days may be due to less over-cast skies. That this explanation is not a sound one I believe the following remarks will show.

I must here take the liberty of referring to an article that appeared in the Wilson Bulletin (XLIV, 1932, 10-12) a few years ago, in which I reviewed an abnormally warm week in February of 1930. In that week, starting with the 17th, all previous heat records were broken, not only for the Madison region but for hundreds of miles to the south, the average temperatures being from 23 to 28 degrees above normal. This warm wave was accompanied by an abnormally early migration. Of seven species of small birds that are commonly the first to arrive, all appeared from two to three weeks

before their usual time. In fact, their return, in nearly every case, antedated by a week or more any previous record.

What was the meaning of this coincidence of warm weather and early migration? Since it is well known that the temperature at the place of departure is more important than that at the place of arrival, an examination was made of the records from various stations of the U. S. Weather Bureau as to the temperatures that prevailed to the south of us during the period in question, and it was found that the reports from all were substantially the same. For example, a station 150 miles to the south gave the following summary: "Warmest February but one in 75 years. The week ending February 25 was the warmest winter week in 50 years or more, and as warm as the normal last week in April." The answer to our question is obvious.

I was interested to see that Roberts, in his recently published "Logbook of Minnesota Bird Life", makes the same observations, both as to that year and the year following, to which reference will presently be made. His data as to temperature and arrival dates corroborate those above given, as well as the conclusions arrived at.

But what about the sunlight? Could not that have been a contributing factor? As to this, the answer is simple. Both in January and February of that year the hours of sunshine throughout the region were less than normal, while for the days during which the migrants must have been starting the hours of sunshine averaged very much less than normal.

Another circumstance may well be mentioned. It so happened that February of the following year was also exceptional, being even warmer than that of 1930. In this case, however, the heat in the winter home of the migrants was more evenly distributed, the week starting the 17th having a mean temperature of only 10 degrees above normal. The result was that, even though the hours of sunshine were greater than for the same week of the previous year, the migrants referred to did not appear until much later—in fact, not appreciably before their usual time.

Cole, in his experiments with Mourning Doves, showed the effect of sustained light in hastening reproductive activity, but he also called attention to the fact that on a chart graphing the spring migration of doves over a period of years, there was no correlation between their northward advance and the increasing length of day. Supplementing this, examinations made of early migrating blackbirds this spring, at the University of Wisconsin, showed no enlargement of the gonads or other indications of sexual activity.

It is obvious that physiological changes induced by light do not take place overnight, but are a gradual process. In experiments made by Cole and Rowan two months or more were required to activate the gonads, even under forced lighting conditions that simulated continuous daily sunshine. Migrating birds, moreover, show no preference for clear days over cloudy ones. Indeed, the great majority of our small birds travel chiefly by night.

Returning to the subject of temperature, Roberts, in referring to the birds first seen in the spring, says: "These are the birds that migrate on a temperature schedule and are early or late as the spring is early or late."

Kendeigh, following a similar statement, gives an excellent description of bird waves. He says: "The theory as to how bird waves are formed is that species keep moving northward until they come to a low temperature barrier, where they stop. Several species and many individuals thus become concentrated just below the barrier. Then, when the barrier is lifted by a rise in temperature, they all move forward at the same time."

Cooke, in a well known passage, refers to the isotherm of 35 degrees as "the line of spring", and in speaking of the early Robins describes the sudden rise in temperature under the influence of the chinook winds, the rapid advance of this isothermal line resulting therefrom, and how the birds accelerate their speed to keep up with it. In this connection it is noteworthy that the temperature in that week of February, 1930, was 15 degrees above Cooke's line of spring.

That temperature may have a decisive effect upon birds during their migration is beyond dispute, and if such is the case it is difficult to see why it may not have an equal effect on them at the commencement of their northward flight. If not, just when would it start to function? Is there any reason to suppose that birds are more sensitive to heat or cold at the end of the first day's journey than at the start?

What we have been discussing is unseasonably warm weather in relation to the early migrants, since here the effect of temperature stands out in clearest relief. Later on, as warm days become the rule rather than the exception, and as physiological changes complete their cycle, the part that temperature plays in initiating migration will probably be less important, and will certainly be less easy to define. It is, however, one of the ever-present environmental factors that are an integral part of a bird's life. It must be borne in mind that wild birds in their winter home are normal, active individuals, continually

exposed to all their surroundings and responsive to them to a degrec beyond our comprehension, in eonfirmation of which we need only point to the innumerable theories advaneed by physieists in an effort to explain the ability of birds to find their way, theories that run all the way from terrestrial magnetism to speeially sensitive membranes of the ear.

In the words of Lansborough Thompson, "One does not neeessarily attach importanee to the behavior of birds not wholly subjeet to natural eonditions."

Madison. Wisc.

HIGHWAY CASUALTIES IN CENTRAL ILLINOIS DURING 1937

BY WILLIAM CHARLES STARRETT

Students of nature have long been aware of the disastrous rôle the automobile plays in destroying our wildlife; however, it has never been pointed out to what degree this destruetion is carried throughout an entire year in a given area. Most of the literature on this subjeet is a summary of a trip across a number of states during one season. It is the purpose of the writer to show the amount of easualties through one year, 1937, in Central Illinois. No doubt the death rate due to automobiles fluetuates from one year to another, varying with the temperature, humidity, and precipitation (Dreyer, 1935). Also the rate will ehange due to animal eyeles of abundanee. Aeeording to Stoner (1936) the mortality varies among speeies in different loealities. The writer was greatly impressed by this faet while making a tour through New York State and New England in 1933, by the great amount of skunks seen dead on the highways in eomparison to Illinois. The following results may then be applied to Central Illinois, and used only as a eomparison to other seetions and regions of North America.

The foeal point of this study was Peoria, Illinois, from whieh place 219 trips were taken for a total of 7,529 miles, averaging 34.56 miles per trip. The greatest distance from Peoria was eighty miles. Mileage and observations were kept only on well traveled highways in the eountry. Domestieated animals, such as poultry, dogs, and cats were omitted, eonfining the survey to wildlife only.

Central Illinois is loeated in the heart of the agrieultural belt of the Middle West; consequently, most of the land is tilled, the chief erops being eorn, wheat, and oats. This view is oeeasionally broken by an oak-hickory grove.

The mortality seems to be divided into five sections or seasons due to temperature, activity, and the appearance of certain species. The survey began the first of January, which was during the winter season. This season lasted through March 21, and began again November 15, lasting for the remainder of the year. The casualties of the two winter seasons were almost equal; .038 vertebrates for the first, and .040 for the second. The pre-spring season was inaugurated by the appearance of the woodchuck, which ended with the appearance of snakes, April 13. The spring season ended June 20, based on the great increase of animal activity along the highways. The summer season terminated August 31, with the increase of snake mortality. The pre-fall season lasted until October 12, with the decline of great animal activity. The fall season came to a close November 15, with the beginning of cold weather and snow.

For a complete summary of casualties see Tables I and II.

Mammals represented 24 per cent of the vertebrates killed, of which the cottontail rabbit composed 17 per cent and 70 per cent of the mammals. The rabbit, of all the vertebrates, is the only one whose mortality varies little through the seasons. If the results were plotted on a graph, the rabbit would appear in almost a straight line; whereas the other vertebrates would rise and fall in relation to seasons.

TABLE I. Vertebrate Casualties in Central Illinois, 1937.

NAME OF VERTEBRATE MAMMALS	WINTER (2067 miles)	PRE-SPRING (581 miles)	SPRING (1652 miles)	SUMMER (1296 miles)	PRE-FALL (868 miles)	FALL (418 miles)	WINTER (647 miles)	TOTAL FOR ENTIRE YEAR
Opossum	0	0	2	0	0	2	0	4
Common Mole	0	0	0	0	0	1	0	1
Common Skunk	0	0	0	1	1	1	0	3
Woodchuck	0	1	3	2	0	0	0	6
Striped Gopher	0	0	5	13	3	1	0	22
Gray Gopher	0	0	2	0	1	0	0	3
Fox Squirrel	0	0	3	2	5	0	0	10
Eastern Meadow Mouse	0	0	0	4	2	2	0	8
Norway Rat	0	0	0	2	2	1	1	6
Cottontail Rabbit	43	15	31	20	18	11	17	155
Unidentified	0	0	0	1	0	0	0	1
No. Mammals								219

BIRDS								
Hooded Merganser	0	1	0	0	0	0	0	1
American Rough-legged Hawk	1	0	0	0	0	0	0	1
Eastern Sparrow Hawk	1	0	0	0	1	0	1	3
Eastern Bob-white	1	0	0	1	0	0	0	2
Ring-necked Pheasant	0	0	1	0	0	0	0	1
Spotted Sandpiper	0	0	0	1	0	0	0	1
Eastern Mourning Dove	0	0	0	1	0	0	0	1
Northern Barred Owl	0	0	0	1	0	0	0	1
Northern Flicker	0	0	1	2	0	0	0	3
Red-headed Woodpecker	2	0	3	15	4	1	0	25
Yellow-bellied Sapsucker	0	0	0	0	1	0	0	1
Northern Downy Woodpecker	0	0	1	0	0	0	0	1
Eastern Kingbird	0	0	1	0	0	0	0	1
Northern Crested Flycatcher	0	0	0	1	0	0	0	1
Eastern Phoebe	0	0	0	1	0	0	0	1
Prairie Horned Lark	1	0	0	1	0	0	0	2
Barn Swallow	0	0	0	4	2	0	0	6
Rough-winged Swallow	0	0	0	1	4	0	0	5
Eastern Crow	1	0	0	0	0	1	1	3
Catbird	0	0	0	1	0	0	0	1
Brown Thrasher	0	0	2	3	0	0	0	5
Eastern Robin	0	1	11	8	3	0	0	23
Migrant Shrike	0	0	1	0	0	0	0	1
Starling	0	1	2	5	5	2	0	15
English Sparrow	28	2	53	244	113	30	5	475
Eastern Meadowlark	0	0	3	5	0	1	0	9
Eastern Red-winged Blackbird	0	0	0	2	0	0	0	2
Rusty Blackbird	0	0	0	0	1	0	0	1
Bronzed Grackle	0	0	0	2	1	0	0	3
Dickcissel	0	0	1	3	0	0	0	4
Towhee	0	0	0	1	0	0	0	1
Eastern Field Sparrow	0	0	0	1	0	0	0	1
Unidentified	0	0	0	5	0	0	1	6
No. Birds								607
REPTILES								
Bull Snake	0	0	17	4	13	1	0	35
Garter Snake	0	0	1	3	8	1	0	13
Coluber sp.	0	0	1	2	9	0	0	12
Chrysemys sp.	0	0	0	2	1	0	0	3
Chelydra sp.	0	0	1	0	0	0	0	1
No. Reptiles								64
AMPHIBIANS								
Rana sp.	0	0	0	1	0	0	0	1
Bufo sp.	0	0	0	1	0	0	0	1
No. Amphibians								2
Total Numbers	78	21	146	367	198	56	26	892

Birds were the most frequent dead vertebrates, composing 68 per cent of the fatalities. The English Sparrow represented 53 per cent of all the vertebrates, and 78 per cent of the birds. Eighty-eight per cent of the bird mortality occurred during the warmer seasons (April 13 through October 12). The Red-headed Woodpecker made up 2.8 per cent of all mortality and 4 per cent of the birds. In central Illinois the Red-headed Woodpecker is a permanent resident; however

only two were found killed by cars during the winter months. This is due to their habit of being a roadside bird only through the warmer months, and spending the remainder of the year in the white oak-hickory woods.

Reptile mortality was highest during the spring and pre-fall seasons. The logical explanation for this seems to be that the highways were the warmest places the snakes could find. The reptiles represented 7 per cent of all vertebrate fatalities, out of which the bull snake made up 3.9 per cent and 58 per cent of the snakes. Turtle casualties would have been found higher had more trips been taken in the region of lakes, rivers, and sand dunes.

A total of 174 game animals were noted, this group made up 19 per cent of the mortality. The rabbit represented 89 per cent of the game animals. Beneficial and game animals combined were 43 per cent of all mortality. The remaining 57 per cent were non-beneficial animals, chiefly English Sparrows.

TABLE II. Amount of Mortality per Mile.

	Winter	Pre-Spring	Spring	Summer	Pre-Fall	Fall	Winter	Average for Year
All vertebrates	.038	.036	.088	.283	.228	.134	.040	.118
Mammals	.021	.028	.028	.035	.037	.045	.028	.029
Cottontail	.021	.026	.019	.015	.021	.026	.026	.021
Birds	.016	.009	.048	.238	.156	.084	.011	.080
Reptiles	.000	.000	.012	.008	.036	.005	.000	.009
Amphibia	.000	.000	.000	.002	.000	.000	.000	.0002

Stoner (1936) tabulated results from several surveys on highway casualties over the eastern part of North America during the warmer months, and found an average of .153 dead vertebrates per mile, including domesticated animals. An average of .186 was found by the writer in central Illinois over the same period and included only wildlife. Excluding domesticated animals from Stoner's (1936) trip across Illinois, .207 vertebrates per mile were noted; .228 per mile was found by the present writer in 1937 during the same season.

The average over the entire year was .118 dead vertebrates per mile or a casualty every 8.47 miles.

From the writer's experience the killing of birds by an automobile seems to be unavoidable in most instances; however, the mortality in mammals and reptiles could be lowered if drivers were educated to avoid them.

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PEORIA, ILLINOIS.

A UNIQUE POPULATION OF WATER BIRDS IN NORTHERN OHIO—1937

BY LAWRENCE E. HICKS

Southwest of Sandusky, Ohio, and a dozen miles due south from Sandusky Bay, Lake Erie, is loeated the little eity of Bellevue. The inhabitants boast of Bellevue as "the eity without any sewers". The explanation of this anomaly is coneerned with the development of a most remarkable population of water birds in the Bellevue area during the summer of 1937.

The baekground is one of geology. Bellevue rests on a formation of Devonian limestone. A belt averaging twelve miles in width outerops from the Lake Erie shore southwards for nearly fifty miles. This eorniferous limestone is extremely soluble, so that surfaee waters enlarge every eraek they penetrate and sink in, forming elaborate eonnected systems of underground ehannels. Sinkhole topography is general, with little or no development of surface drainage systems.

Surface waters from as far south as the divide between the Ohio-Lake Erie drainage systems pass northward through these underground ehannels past Bellevue to Sandusky Bay, emerging as mammoth artesian springs at Miller's Pond, Green Spring, and Castalia. The largest of the several Blue Holes at Castalia delivers 5,000 gallons of water a minute. Holes punehed in this rock formation enable rural landowners to solve all farm drainage problems and eity dwellers to dispose of sewage wastes.

On about six oeeasions sinee 1800 this eonvenient arrangement has "baekfired". The last eruption, late in June, 1937, was by far the most serious and extensive. Cloudbursts on June 21 were followed by heavy rain which began on June 24 and resulted in 7.84 inehes of preeipitation in the Bellevue area and nearly as mueh in most of north eentral and northwestern Ohio. At Bueyrus the total preeipitation for June (mostly in the last week) was 14.81 inehes. Soon a waterhead of more than eighteen feet developed. Loeal flood waters were augmented by the thousands of aetive artesian springs that developed over night. In single fields were several hundred little fountains from as many springs. In one area of less than an aere the writer eounted 134 springs, including a number of large size. With no surfaee drainage, every sinkhole basin became a large lake. This grew until it spilled over the divide and created a dashing torrent whieh spiraled around the countryside spreading destruction on every hand. The law of gravity seemed to have been "repealed", with flood waters

bursting from hill tops and crossing ridges that would be immune except in a topsy-turvy flood.

In Bellevue geysers spouted from dooryards or lifted masses of pavement from the streets. Some 160 houses were inundated. All highways in the region were impassable for many days. Several that crossed sinkhole basins were blocked by water for more than two months. Some farmers were forced to use boats for weeks to reach their homes. Many trees died because the water suffocated the roots. Basements refilled with subterranean water as rapidly as it was pumped out. The original flood conditions redeveloped twice during the first two weeks because of subsequent cloudbursts.

For three weeks after the floods began, transportation difficulties made it nearly impossible to check on most of the water areas to determine the number of water birds attracted. By July 15, the twenty-five square miles estimated to have been covered by flood waters in the Bellevue area at one time had dwindled to about 1,500 acres of land-locked ponds which slowly decreased in size.

My record of the rise and fall of the water bird population of this area is supplemented by the observations of Louis W. Campbell, of Toledo; Dr. John W. Aldrich and F. W. Braund, of the Cleveland Museum of Natural History; Gene Rea, of Columbus; and Edward S. Thomas, of the Ohio State Museum.

These thirty-five ponds were located as follows: Twenty-one were north of Bellevue (see Bellevue Quadrangle of the U. S. Geological Survey), ten being in Sandusky County (all in York Township), and eleven in Erie County (all in Groton Township). Fourteen were southwest of Bellevue (see Siam Quadrangle), in Seneca County (Thompson Township, 12; Adams Township, 1; and Scipio Township, 1).

These ponds were not large in total acreage, but were ideal in distribution and nature to support large summer populations of water birds. Their shore line length was great. Many low islands were included. The waters were shallow and teeming with stranded fish. Conditions were such that immense numbers of aquatic insects and other small water animals developed. Flooded wheat fields were most attractive to ducks and grebes. The grain was ripe but uncut, remaining erect throughout the summer, providing ideal food and cover. Fields originally in corn and potatoes became ideal mud flats as the waters slowly retreated, exposing new areas for shore birds each week. Some species of shore birds were most attracted to the hillsides high above the ponds where the spring waters spread out in broad, alluvial fans.

The thirty-five ponds totaled 1,210 acres on July 15, 693 acres on August 1, 432 acres on August 15, 208 acres on September 1, and 128 acres on September 23. Fall rains stopped the shrinkage of many ponds so that a number of small pools totaling 100 acres remained as late as November 1.

The drop in water level was nearly synchronized in the different ponds, but the larger, deeper ones lasted longer. As the harvest of fish and other water animals at one pond was completed with its disappearance, the water birds present moved on to adjacent ponds. It is thought, however, that the maximum populations recorded for each pond, when totaled, will about equal but not much exceed the total population present. The largest count for each of the thirty-five ponds, when totaled, gives the maximum summer population for the area as 5,170 ducks, 4,900 shore birds, and 1,134 herons. The height in numbers varied for each species but came earliest for shore birds (August 5 to 20), next for herons (August 25 to September 10), and latest for ducks (September 5 to September 25).

Reasonably accurate counts were made at the majority of the important ponds on each of fifteen dates: two counts in July, five in August, five in September, and three in October. Permanent records of several of the rarer species were made by collection. In all, eight species of herons and bitterns, thirteen species of ducks, twenty-seven species of shore birds, and eighteen species of other water birds, or a total of sixty-six aquatic species, were recorded.

The heron population was augmented from large colonies of the Great Blue Herons and Black-crowned Night Herons in the general region, and a heavy influx of "white herons" from the south. The duck population, before early September, probably was drawn from Ohio breeding ducks of the nearby Lake Erie marshes of Lucas, Ottawa, Sandusky, and Erie Counties. Elsewhere in Ohio in 1937, the unusually high level of Lake Erie, reservoirs, and streams made few sites attractive to shore birds. My own observations, supplemented by those of various ornithologists of the State, make it possible to list for comparison the approximate 1937 maximum shore bird populations (July to September) at each of the principal shore bird areas of the State:

Sandusky area	800	Youngstown region	800
Lower Maumee River	700	Buckeye Lake	75
Lucas—Ottawa marshes	500	Indian Lake	50
Painesville—Ashtabula area	300	Grand Reservoir	125
Pymatuning Lake	250	Portsmouth area	120

Thus it seems highly probable that the unusual events in the Bellevue area in the summer of 1937 attracted a shore bird population

approximately equal to that of the remainder of Ohio. In the following lists the name of each species is preceded by two numbers; the first represents the number of trips (out of the fifteen recorded) on which that species was noted, and the second represents the total number of individuals counted (or in some cases estimated) on all trips combined. Many individuals, of course, were recounted on several of the weekly counts, but the total number enumerated, together with the number of trips on which recorded, gives a good index to the relative numbers present. The species in each group are listed in the order of abundance. Those of rare occurrence in northern Ohio are starred. The vernacular names used follow the 1931 A. O. U. Check-List.

A. Shore Birds—Twenty-seven species.

14—1,398	Pectoral Sandpiper	6—23	Black-bellied Plover
13—1,238	Semi-palmated Sandpiper	5—20	Western Sandpiper
12—1,177	Least Sandpiper	3—20	Sanderling
14—1,100	Lesser Yellow-legs	1— 6	*Long-billed Dowitcher
13— 922	Killdeer	2— 4	White-rumped Sandpiper
13— 530	Semi-palmated Plover	2— 2	Ruddy Turnstone
15— 248	Wilson Snipe	2— 3	American Woodcock
11— 222	Greater Yellow-legs	2— 3	*American Knot
13— 125	Spotted Sandpiper	1— 2	*Buff-breasted Sandpiper
7— 103	Eastern Dowitcher	1— 1	Piping Plover
8— 98	Stilt Sandpiper	1— 1	Golden Plover
11— 82	Solitary Sandpiper	1— 1	*Hudsonian Godwit
3— 54	Red-backed Sandpiper	1— 1	*Northern Phalarope
6— 32	Baird's Sandpiper		

B. Ducks—Thirteen species.

15—5,846	Common Black Duck	2—26	Redhead
15—3,844	Common Mallard	2—18	Lesser Scaup Duck
7— 872	Blue-winged Teal	6—16	Shoveller
4— 137	Baldpate	3—16	Gadwall
5— 78	American Pintail	1— 6	Ruddy Duck
5— 36	Green-winged Teal	3— 3	Canvas-back
7— 27	Wood Duck		

C. Herons and Bitterns—Eight species.

11—549	Black-crowned Night Heron	9—61	Little Blue Heron
15—446	Great Blue Heron	10—29	American Bittern
13—308	American Egret	2— 3	Eastern Least Bittern
12—286	Eastern Green Heron	1— 1	*Snowy Egret

D. Other Aquatic Birds—Eighteen species.

6—26,700	Bank Swallow	3—3	Herring Gull
14— 148	Pied-billed Grebe	3—3	Duck Hawk
9— 92	American Coot	2—3	King Rail
13— 61	Eastern Belted Kingfisher	2—3	Sora
15— 46	Marsh Hawk	2—2	Osprey
6— 13	Florida Gallinule	2—2	Caspian Tern
5— 21	Ring-billed Gull	1—2	Common Tern
4— 6	Virginia Rail	1—2	Bonaparte's Gull
3— 5	Black Tern	1—1	*Forster's Tern

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EDITORIAL

At the Meeting in Ann Arbor in 1928 the question of a W. O. C. library was presented. At the Des Moines Meeting in 1929 the report of the Committee shows that two institutions had indicated a willingness to accept the library on terms agreeable to the Club. These institutions were the University of Michigan and the Iowa State College. The report of the Library Committee and the text of the Agreement with the University of Michigan were printed in the Wilson Bulletin for March, 1931. This report includes the following paragraph: "The original plan includes the establishment of one or two additional libraries of a similar, though possibly less technical, nature: one to be located somewhere in the south, and another, perhaps, west of the Mississippi River. Preliminary steps have been taken looking toward these additional libraries, but it was the Commitee's policy to secure the culmination of the first one before taking active steps toward others."

As a member of the first Library Committee the present writer may state that it was the Committee's intention to proceed with the establishment of the other libraries as soon as suitable locations could be found. At the time the original committee was functioning the Iowa State College had agreed to accept the establishment of a library on the same terms agreed to by the University of Michigan. The Iowa State College has a beautiful new stone library building which is fireproof and provided with ample space. Ornithological research is being carried on as actively here, perhaps, as anywhere in the middle west. There are arguments in favor of concentrating our support on the existing library at Ann Arbor. But a good case may also be made for getting under way whatever additional libraries may be considered feasible. The conclusion is that it may be wise for the Club to again take up the consideration of a library west of the Mississippi River. The writer has been informed that the proposal from the Iowa State College is still open.

GENERAL NOTES

Conducted by O. A. Stevens

The Golden Eagle Again Noted in Ohio.—Mr. Roy Hamilton, of near Kenton, Ohio, set a trap for a bird that had attacked one of his sheep. Although the bird had picked out both its eyes and had made a large hole in its side, the sheep still lived. On February 3, 1938, the bird was caught and found to be a Golden Eagle (*Aquila chrysaëtos canadensis*). When caught the eagle raised and flew fifty-two feet carrying a piece of wood weighing over twenty pounds. It had a wing spread of six feet. A pair had been seen for several days before the capture; but the mate disappeared. Mr. Hamilton says that twelve years ago a pair of these eagles were observed in the same neighborhood.—Katie M. Roads, *Hillsboro, Ohio.*

Red-throated Loon and Herring Gull in Western Pennsylvania.—At Linesville Lake, Pennsylvania (the sanctuary adjoining Pymatuning Lake on the Pennsylvania-Ohio line), the writer saw a Red-throated Loon (*Gavia stellata*) on April 20, 1938. The bird was in winter plumage but a trace of red was noticed at the sides of the throat. Observations were made with a 35x telescope at 150 yards or less and in good light. At one time a Common Loon passed less than six feet from the Red-throated Loon. Mr. A. B. Fuller, of the Cleveland Museum of Natural History, saw a Red-throated Loon at the same place on April 10. In ten years of observing water birds, the above is my first record for this species.

On January 3, 1938, I saw an adult Herring Gull feeding in an open field about two miles west of Youngsville, Pennsylvania. The region is quite hilly and several miles from any lake or stream. In this location the bird seemed strangely out of place.—M. B. Skaggs, *South Euclid, Ohio.*

Barrow's Golden-eye: A Correction.—In the June, 1923, number of the Wilson Bulletin. Vol. XXXV, p. 116, I reported the occurrence of Barrow's Golden-eye at Buckeye Lake, Ohio. For many years I have been satisfied that the identification was obviously erroneous, the individual in question having been an immature male American Golden-eye. In this conclusion Milton B. Trautman and F. Dale Pontius, who also observed the bird, are in entire agreement with me. I have seen a number of young male American Golden-eyes in a similar plumage, superficially resembling that of the adult male Barrow's. In such specimens the white of the scapulars is much reduced and the white spot before the eye partially concealed, so that it may be higher than wide. In addition, the mixture of purplish-brown and iridescent black feathers on the head gives a purplish cast in certain lights. This, however, does not approach the brilliant violet sheen of the head of the adult male Barrow's, nor does the white mark extend across the entire base of the bill as in the latter species.—Edward S. Thomas, *Ohio State Museum, Columbus, Ohio.*

Breeding of the Mockingbird in Northwestern Iowa.—In Philip A. DuMont's book, "A Revised List of the Birds of Iowa", the Eastern Mockingbird (*Mimus polyglottos polyglottos*) is listed among those species of birds considered as typical Carolinian indicators in the past, but which have recently advanced so far north that they may now hardly be considered as true guides to the northern limits of the zone. Anderson's "Birds of Iowa" (1907) reports a pair as nesting

in Sioux County, Iowa. During the summer of 1911 or 1912, a pair is reported by Bennett to have nested in Woodbury County, Iowa.

On July 21, 1938, Mrs. W. C. DeLong of Sergeant Bluff, Iowa, reported to me that a pair of mockingbirds were nesting on the farm of George Mathers in Liberty Township, Woodbury County, Iowa. I visited the place the next day and found the nest. The nest was built in a vine on the front porch, about six feet from the ground. There were four young in the nest, and I judged them to be less than a week old. Both adult birds were seen. Mr. Mathers' father told me that another pair of adult birds had been there that day and he had seen all four birds at one time. I saw only the one pair.—Bruce F. Stiles, *Sioux City, Iowa.*

How Do Crows Carry Eggs?—On May 2, 1938, while working on the E. H. Fabrice Wildlife Demonstration Area in southeastern Wisconsin, it was my good fortune to see a Crow carrying an egg which I judged to be that of a semi-wild Mallard. The Crow had first pierced the egg with both mandibles closed when it discovered my presence and jumped back from the egg. It immediately returned and placed the upper mandible into the opening made in the egg, and then by lowering its head, scooped up thte egg. It flew apparently supporting the egg on the lower mandible and keeping it there by means of pressure from the upper mandible. After flying a distance of 100 yards the Crow came down in an opening in the woods. I ran after it hoping to get the egg, but it took off again, repeating a second time the operation of placing the upper mandible into the opening in the egg and rolling the egg onto the lower mandible by a scooping movement of the head. This time the Crow flew far into the woods and I lost track of it. I should greatly appreciate correspondence from any one of the readers who have witnessed Crows carrying eggs or who know of any references on this subject in the literature.—Douglas E. Wade, *University of Wisconsin, Madison, Wis.*

An Unusual Nesting Site of the Rough-winged Swallow.—Ordinarily the Rough-winged Swallow (*Stelgidopteryx ruficollis serripennis*) selects stream banks, quarry faces or ereviees in rocky eliffs for nesting sites. I was much surprised to find, on May 6, 1938, two pairs nesting in the iron over-flow pipes of a swimming pool. This was located at Boy Scout Camp Oyo on the Roosevelt Game Preserve, Scioto County, Ohio. At the time of discovvery the pool contained no water. The over-flow pipes, two in number, were set about four inches apart and flush with the vertical faee of the concrete wall. The pipes were about three inches in diameter. The nests were placed eight inches within the pipes and could readily be seen from the openings. The swallows made repeated trips to and from the nests while under observation. This suggests a technique which wildlife managers might utilize. In localities where the natural nesting sites have been walled up with stone by stream "canalization" relief projects, valuable mosquito-consuming swallows might be encouraged by setting short lengths of iron pipe into the stone walls for use as nesting places.—Floyd B. Chapman, *Ohio State University, Columbus, Ohio.*

Audubon's Shearwater Nesting on Mona Island, Puerto Rico.—In March, 1937, Leslie Holdridge, of the United States Forestry Service in Puerto Rico, told me of a colony of birds in a cave on Mona Island in a part of the island which I had never visited. His description of the bird led me to believe that it was Audubon's Shearwater (*Puffinus lherminieri*), though that bird had

not to my knowledge been found breeding in the Greater Antilles, nor had it been observed to breed in caves. Mr. Holdridge described the cave as halfway down a cliff, accessible only by means of a rope. He reported no birds flying about outside, but the floor of the cave was lined with nests so close together that it was difficnlt to step between them, and that the birds were fluttering about by the hundreds inside the cave. My first opportunity to revisit Mona Island after this report was in October, 1937, when through the courtesy of Mr. E. W. Hadley, Forest Supervisor, I was included in a party inspecting some work of the Forestry Service on this island. I availed myself of this opportunity and took a guide to the cave. I did not expect to find the birds nesting at that season of the year, but hoped to find enough feathers, bones, and eggshells to prove the identity of the species. My guide, one of the few residents of the island, pointed out to me the slight concavities used as nesting burrows. They were indeed all over the floor of the cave, some in total darkness, some in the dim light from the mouth of the cave. I gathered some feathers and eggshells from the more protected nests under rocks and ledges, and finally found a dead bird with skull entire and many of the feathers in good condition. Then, as I passed farther into the cave, a bird scuttled off among the rocks. We captured this and another individual, the only two seen, and were able to establish the identity as Audubon's Shearwater. This is, to the best of my knowledge, the first breeding record of this bird in the Greater Antilles, and a rather unusual nesting habitat, for this shearwater usually makes its own burrows in the earth. No attempt was made to count the number of nests, though my guide, who has used this colony as a source of eggs for many years, said there were thousands. The egg season is reported as being in January and February.—J. Adger Smyth, *Puno, Peru.*

Shore Birds Attracted to Streams Polluted by Sewage.—Year after year my best locality for observing shorebirds was along a branch of the Portage River thirty or forty rods below where a ditch enters it. This open ditch, three miles long, carried the sewage from the city of Bowling Green. After years of discussion and investigation a sewage disposal plant was constructed. It began operating in 1935. Since that I have found very few shorebirds along this part of the stream, where formerly I often found between twenty and forty.

In order of abundance they were Lesser Yellow-legs, Killdeer, Pectoral, Semipalmated, Solitary, Least, and Spotted Sandpipers, Greater Yellow-legs, Baird's Sandpiper, Semipalmated Plover, Sanderling, and Stilt Sandpiper. After rearing their young in Canada or Michigan, may of these birds return to northern Ohio late in July or early in August.

The part of the stream where the greatest number were observed is close to an important highway, so that they were not attracted to it because of its affording seclusion. It has some sharp bends and shallow water with many partly emerged stones, and some mud flats and sandy beaches.

One of my former students who knows the birds told me that in Norwalk, Ohio, he used to see shorebirds along the creek below where sewage from a portion of the city entered, and nowhere else in Norwalk. Since the disposal plant has been in operation, about four years, he has not seen shorebirds there. Below a dam on the Sandusky River in Tiffin, Ohio, October 3, 1936, I saw more than fifty shorebirds, a majority of them yellow-legs and Pectoral Sandpipers. I think their food was derived from sewage. Below another dam some twenty miles

farther south in the same stream I spent considerable time the next day looking for shorebirds but saw none. This was not near any town. These birds have often been seen in large numbers along the Portage River where it runs through the village of Elmore and along the Maumee River in Antwerp, which is not far from the Ohio-Indiana line.

Microörganisms of several kinds thrive in sewage. They are fed upon by other tiny creatures, and these in turn by those still larger. After a number of such transformations the material probably becomes a part of the molluscs, crustacea, and aquatic insects that are attractive to birds.—E. L. Moseley, *Bowling Green, Ohio.*

A Note on Highway Mortality.—While driving from Princeton, New Jersey, to Flagstaff, Arizona, on June 8-14, 1938, the writers made a count of bird mortality on the highways. Our results may be thus summarized:

Native birds (50 species)	268	48.90%
English Sparrow (*Passer domesticus*)	235	42.88
Chicken (*Gallus gallus*) and Pigeon (*Columba livia*)	19	3.47
Starling (*Sturnus vulgaris*) and Pheasant (*Phasianus colchicus*)	3	.55
Unidentified birds	23	4.20
Total	548	100.00%

Our route was through southern Pennsylvania to Washington, Pa., then on U. S. Route 40 to St. Louis and U. S. Route 66 from there to Flagstaff. After subtracting night driving, a count of dead birds was made over 2,195 miles, of which 867 were east and 1,328 west of the Mississippi River. Over this distance we found an average of one bird every 2.68 miles east, and one every 5.93 miles west of the river, or an average of one bird per four miles for the trip. English Sparrows were divided 164 east to 71 west, and native birds 133 east to 135 west of the Mississippi.

The number of birds found over considerable distances west of the river was undoubtedly much reduced by heavy rains and wind. In Arizona, where favorable conditions for counting obtained, 29 native birds (7 species) were counted in 155 miles, contrasting with 28 native birds (9 species) from the 210 miles driven in Ohio. Such comparisons, of course, are significant, if at all, only for species frequently killed by automobiles.

The following native birds were detected in greatest numbers: Lark (*Otocoris alpestris*), 32 (23 in Texas); Grackle (*Quiscalus quiscula*) 32; Robin (*Turdus migratorius*), 28; Nighthawk (*Chordeiles minor*), 20 (14 in Arizona); Shrike (*Lanius ludovicianus*), 15 (12 in New Mexico and Arizona); Meadowlark, two species, probably, (*Sturnella*), 13; Brown Thrasher (*Toxostoma rufum*), 11; Screech Owl (*Otus asio*), 11; Mourning Dove (*Zenaidura carolinenses*), 10.

Although automobiles may occasionally strike almost any species of bird, we were surprised to find the following victims: Wood Duck (*Aix sponsa*), adult ♀ near Hazelgrove, Missouri; Chimney Swift (*Chaetura pelagica*), one at Edmond, Oklahoma; White-throated Swift (*Aeronautes s. saxatalis*), one west of Grant, New Mexico. An Eastern Kingbird (*Tyrannus tyrannus*) picked up June 14 twenty miles west of Holbrook, Navajo County, is apparently the first Arizona specimen of this bird (by four days!). The skin is in the collection of the Museum of Northern Arizona at Flagstaff.

Remarks. Most birds killed by automobiles are, as would be expected, of common, widely distributed species. In regions of heavy automobile density, however, it seems likely that appreciable decreases in the local population of a few vulnerable species, such as the Screech Owl, may result from highway mortality.

Dr. J. M. Linsdale (*Condor*, 1929, pp. 143-145) and others have emphasized the important and complex influence of roads upon birds. Although the benefits to bird-life are frequently more important than the toll taken by automobiles, every effort should be made to reduce this heavy and ever-increasing destruction. With the exception of a few areas having a heavy population of soil-loving species such as the Nighthawk and Horned Lark, the writers found it evident that along highways where roadside vegetation was scanty or had been removed, the number of dead birds was always low. For this reason we believe that on highways where traffic is continuous and rapid, such activities as tend to discourage immediate roadside concentrations of birds, and to make approaching vehicles more visible, should be encouraged by conservationists. The maintenance of a strip of gravel two or three yards wide on each side of the pavement is one such measure that seems to be particularly effective.—Henry N. Russell, Jr., *Princeton, New Jersey*, and Dean Amadon, *American Museum of Natural History, New York, N. Y.*

Carrier Pigeon with Blue-winged Teal.—For a number of years The Duck Island Club has maintained a very complete record of the kill of waterfowl on its preserve along the Illinois River between Pekin and Havana. There are a number of interesting marginal notes in its record books, of which the following seems to show another curious fate of Carrier Pigeons which do not return to their cotes.

> October 5th Wednesday 1921 at the hour of about 2:30 PM D. W. Voorhees Sr of Peoria Ills. was shooting ducks from a blind in the upriver end of Pond Lilly Lake when he Mr. Voorhees & his guide Clark Fuller of Banner, Ills. sighted what was as they suppose 4 blue winged teal approaching high up *from the north* over the big timber. As the 4 birds came nearer all flying in a line, we discovered the 3rd bird from the front was different from the other 3. Mr. Voorhees shot the front teal duck & dropped back & killed the 3rd bird. On Clark Fuller's picking up the 2 birds it was discovered that the 2nd bird killed was a large male *carrier pigeon.* On the pigeon's right leg standing behind it is an *aluminum* band bearing the stamp (viz.) AJ21E7523. On the left leg was a *brass band* on which (inside) is the number 4553. Its crop was very plentifully filled with "soy beans". The pigeon was heavy and apparently well nourished. Opinion only: the pigeon had been started on a home flight became lost & taken up companionship with the 3 blue winged teal. We examined the crop of the blue winged teal killed while in company with the carrier pigeon & found the teal's crop contained the same kind of "soy beans" as that contained in the pigeon's crop. We expect to advertise the above numbers in the sporting paper & try & locate the owner.
>
> Signed D. W. Voorhees
> Clark Fuller
> 10/5/21
>
> Mr. Voorhees has in his possession the legs & bands described & will gladly exhibit them to anyone interested: the feed being the same in the teal's and pigeon's crop shows conclusively they had been feeding together.

—Ralph E. Yeatter and David H. Thompson, *Illinois Natural History Survey, Urbana, Ill.*

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MEMBERSHIP ROLL OF THE WILSON ORNITHOLOGICAL CLUB†

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Strong, Dr. Reuben Myron, 5840 Stoney Island Av., Chicago, Illinois ..... Founder

Life Members

Bretsch, Clarence, 690 Broadway, Gary, Indiana 1925
Ellis, Ralph, Jr., Jericho, Long Island, New York 1926
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*Lyon, William Isaac 1921
McIlhenny, Edward Avery, Avery Island, Louisiana 1910
Rogers, Charles Henry, Princeton Museum of Zoology, Princeton, N. J. 1903
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Taylor, Dr. Arthur Chandler, Washburn, Wisconsin 1929
Taylor, Mrs. Rose Schuster, 900 Santa Barbara Rd., Berkeley, California 1916
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*Whitney, Thomas Hayes 1916

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†This membership roll is complete to June 1, 1938. The Secretary would appreciate immediate notification of any omission of names and change in address, or any errors in the spelling of names, the use of titles, and the exact years of election to membership. The Secretary would also appreciate having the *full* names of all members.

*Deceased.

Sustaining Members

Bailey, Harold H., 820 Alhambra Circle, Coral Gables, Florida 1908
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Barnes, Hon. Richard Magoon, Laeon, Illinois 1909
Bishop, Dr. Louis Bennett, 450 Brandford St., Pasadena, California 1903
Brand, Albert Rich, 9 E. Av., Ithaea, New York 1931
Bruen, Frank, 22 High St., Apt. A-4, Bristol, Conneeticut 1902
Cahn, Dr. Alvin Robert, Forestry Bldg., Norris, Tennessee 1914
Chambers, Willie Lee, 2068 Escarpa Dr., Eagle Roek, Los Angeles ,Californ nia..1934
Christopher, Mrs. Joseph, Fairhope, Alabama (May 30-Oet. 30) Hingham, Massaehusetts 1937
Coursen, Charles Blair, 761 E. 69th Pl., Chieago, Illinois 1927
Fargo, William Gilbert, 506 Union St., Jaekson, Michigan 1923
Frost, Mrs. Charles Sumner, 880 Elm Tree Rd., Lake Forest, Illinois 1937
Ganier, Albert Franklin, 2507 Ashwood Av., Nashville, Tennessee 1915
Goetz, Christian John, 3503 Middleton Av., Cicninnati, Ohio 1930
Harper, H. F., Motor Wheel Corporation, Lansing, Michigan 1938
Harriot, Samuel Carman, 200 W. 58th St., New York, New York 1934
Harris, Dr. Arthur Travenning, 700 Van Buren St., Gary, Indiana 1930
Havemeyer, Henry Osborne, Mahwah, New Jersey 1930
Helmuth, Dr. William Todd, 667 Madison Av., New York, New York 1934
Howell, Arthur Holmes, 2919 S. Dakota Av., Washignton, D. C. 1921
Magee, Michael Jarden, 603 South St., Sault Ste. Marie, Miehigan 1919
Mitehell, Dr. Walton Iungerieh, 1644 Visalia Av., Berkeley, California 1893
Myrland, Arthur Lucius, Magdalena, New Mexico 1938
Nelson, Miss Theodora, 2695 Heath Av., New York, New York 1928
Philipp, Philip Barnard, 172 East 64th St., New York, New York 1914
Proeter, William, 430 Park Av., New York, New York 1937
Roads, Miss Katie Myra, 463 Vine St., Hillsboro, Ohio 1914
Roberts, Dr. Thomas Sadler, Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1914
Shearer, Dr. Amon Robert, Mount Belvieu, Chambers Co., Texas 1893
Stephens, Dr. Thomas Calderwood, Morningside College, Sioux City, Iowa 1911
Stoddard, Dr. Herbert Lee, Route 5, Sherwood Plantation, Thomasville, Ga. 1916
Striekland, J[ud] Warren, Jr., 703 5th Av., Mt. Vernon, Iowa 1938
Sutton, Dr. George Miksch, Bethany, West Virginia 1920
Swenk, Myron Harmon, 1410 N. 37th St., Lincoln, Nebraska 1914
Todd, Walter Edmond Clyde, Carnegie Museum, Pittsburgh, Pennsylvania 1911
Toppin, Mrs. Isabel Whitehouse, 1420 Harvard Blvd., Toledo, Ohio 1938
Toppin, James, 1420 Harvard Blvd., Toledo, Ohio 1938
Uhrig, Mrs. A. B., 425 E. Water St., Oeonomowoc, Wiseonsin 1926
Vandervort, Charles Champion, Laeeyville, Pennsylvania 1937
Young, Col. John Paul, 205 Devon Rd., Ithaea, New York 1913

Active Members

Abbott, Dr. Cyril Edward, Oakland City College, Oakland City, Indiana 1937
Adams, Benjamin, 25 Garden St., Wethersfield, Connectieut 1936
Aldrieh, Dr. John Warren, Cleveland Museum of Natural History, Cleveland, Ohio 1930
Allen, Dr. Arthur Augustus, Fernow Hall, Cornell University, Ithaca, N. Y. 1914
Allen, Durward Leon, Swan Creek Wildlife Experiment Station, Allegan, Michigan 1933
Bailey, Alfred Marshall, Colorado Museum of Natural History, Denver, Colo. 1928
Bartel, Karl [Emil] Edgar, 2528 W. Collins So., Blue Island, Illinois 1934
Bartlett, Wesley Hamilton, Parsons College, Fairfield, Iowa 1936
Bartseh, Dr. Paul, U. S. National Museum, Washington, D. C. 1894
Bennett, Carey Hall, 1565 Loeust St., Denver, Colorado 1937
Bennett, Miss Mary Allison, 623 E. Carroll St, Macomb, Illinois, or 5559 Unio Av., Chicago, Illinois 1933
Bennett, Walter Waldo, Arnolds Park, Iowa 1925

Bennitt, Dr. Rudolf, Department of Zoology, University of Missouri, Columbia, Missouri 1932
Bent, Arthur Cleveland, 140 High St., Taunton, Massachusetts 1893
Blain, Dr. Alexander Willis, 2201 Jefferson Ave., E., Detroit, Michigan 1902
Blake, Mrs. Charles Henry, Massachusetts Institute of Technology, Cambridge, Massachusetts 1935
Blincoe, Benedict Joseph, Route 1, Dayton, Ohio 1920
Bole, Benjamin Patterson, Jr., 2717 Euclid Av., Cleveland, Ohio 1938
Brant, Irving, 630 F. St., N. E., Washington, D. C. 1932
Breckenridge, Walter John, Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1929
Brockner, Winston William, 175 Dutton Av., Buffalo, New York 1933
Brodkorb, Dr. William Pierce, Museum of Zoology, Ann Arbor, Michigan 1936
Brooks, Major Allan Cyril, Okanagan Landing, British Columbia, Canada 1930
Brooks, Earle Amos, 166 Plymouth Rd., Newton Highlands, Massachusetts 1933
Brooks, Maurice [Graham], Department of Zoology, University of West Virginia, Morgantown, West Virginia 1934
Bryens, Oscar McKinley, McMillan, Luce Co., Michigan 1924
Buckelew, Herbert, 611 E. 2nd St., Milford, Delaware 1936
Burdick, Dr. Harold C., Box 164, Milton, Wisconsin 1929
Burleigh, Thomas Dearborn, Oakhurst Route, Gulfport, Mississippi 1922
Burtch, Verdi, Branchport, New York 1924
Cahalane, Victor Harrison, Wild Life Division, National Park Service, Washington, D. C. 1933
Carpenter, F. S., 2402 Longest Av., Louisville, Kentucky 1934
Chapman, Dr. Frank Miehler, American Museum of Natural History, 77th St. and C. P. W., New York, New York 1910
Chase, Henry B., Jr., Southern Biological Supply Co., New Orleans, La. 1932
Christy, Bayard Henderson, 403 Frederick Av., Sewickley, Pennsylvania 1922
Clay, Miss Marcia Barnes, Bristolville, Ohio 1924
Coffey, Ben Barry, Jr., Inspection Bureau, 1434 Bank of Commerce Bldg., Memphis, Tennessee 1927
Cole, Dr. Leon Jacob, Genetics Bldg., University of Wisconsin, Madison, Wisconsin 1921
Cook, Miss Fannye Addine, State Game and Fish Commission, Jackson, Miss. 1925
Cottam, Dr. Clarence, U. S. Department of Agriculture, Biological Survey, Washington, D. C. 1929
Cox, William Thomas, Regional Forester, U. S. Resettlement Administration, 6th Floor Court House, Milwaukee, Wisconsin 1936
Danforth, Dr. Stuart Taylor, Box 541, Mayaguez, Porto Rico 1924
Deaderick, Dr. William Heiskell, 36 Circle Dr., Hot Springs, Arkansas 1936
DeLury, Dr. Ralph Emerson, Dominion Observatory, Ottawa, Ontario, Canada 1920
Dickinson, Francis Reynolds, 1518 Astor St., Chicago, Illinois 1931
Dodge, Thomas Henry, Box 69, Gallup, New Mexico 1933
Dodge, Victor Kenney, 137 Bell Court, W., Lexington, Kentucky 1935
Douglass, Donald Wickmore, Department of Biology, Texas Technological College, Lubbock, Texas 1929
DuMont, Philip Atkinson, Sand Lake Waterfowl Refuge, Columbia, So. Dak. 1928
Duncan, Donald Pendleton, 5841 Nickeroon Av., Norwood Park, Chicago, Ill. 1936
Eifrig, Prof. Charles William Gustave, 1029 Monroe Av., River Forest, Ill. 1907
Ekblaw, Dr. George Elbert, 506 W. Main St., Urbana, Illinois 1914
Ekblaw, Dr. Walter Elmer, Clark University, Worcester, Massachusetts 1910
Emilio, Shepard Gilbert, 7 Winter St., Salem, Massachusetts 1929
English, Dr. Pennoyer Francis, Dept. Zoology, Pennsylvania State College, State College, Pennsylvania 1934
Ernst, Miss Lillie Rose, 6058 Kingsbury Av., St. Louis, Missouri 1935
Errington, Dr. Paul L[ester], Iowa State College, Ames, Iowa 1932
Feeney, W. S., 410 Walton Pl., Madison, Wisconsin 1937
Fleming, James Henry, 267 Rusholme Rd., Toronto 4, Ontario, Canada 1906
Floyd, Judge Joseph Larke, 1009-11 George D. Harter Bank Bldg., Canton, Ohio 1903

Fredine, C. Gordon, 1807 Wesley Av., St. Paul, Minnesota....1938
Friedmann, Herbert, U. S. National Museum, Washington, D. C....1932
Friley, Charles Edwin, Jr., The Knoll, Ames, Iowa....1937
Gabrielson, Dr. Ira Noel, Biological Survey, Washington, D. C....1913
Gault, Benjamin True, Wheaton Health Resort, Wheaton, Illinois....1895
Gregory, Stephen Strong, Jr., Box N, Winnetka, Illinois....1922
Grinnell, Dr. Joseph, Museum of Vertebrate Zoology, University of California, Berkeley, California....1914
Griscom, Ludlow, Museum of Comparative Zoology, Cambridge, Mass....1937
Guest, Mrs. Marjorie Lee, Athens State Hospital, Athens, Ohio....1924
Hand, Ralph Levi, 543 South 5th Street West, Missoula, Montana....1933
Handlan, John Welty, Ogelbay Park, Wheeling, West Virignia....1932
Hann, Dr. Harry Wilbur, Department of Zoology, University of Michigan, Ann Arbor, Michigan....1930
Hendrickson, Dr. George Oscar, Department of Zoology, Iowa State College, Ames, Iowa....1933
Herrick, Dr. Francis Hobart, 2863 Noble Rd., Cleveland Heights, Ohio....1917
Heston, Dr. Walter Enoch, Jackson Memorial Laboratory, Bar Harbor, Maine....1936
Hetler, Dr. Donald M., 322 Beckwith Av., Missoula, Montana....1935
Himmel, Dr. Walter J., Department of Botany, University of Nebraska, Lincoln, Nebraska....1915
Hinshaw, Thomas Doane, 1908 Scottwood Av., Ann Arbor, Michigan....1926
Hunt, Ormond Edson, 14-133 General Motors Bldg., Detroit, Michigan....1937
Jackson, Cicero Floyd, University of New Hampshire, Durham, N. H....1936
Jenner, William Alexander, 806 W. Davis St., Fayette, Missouri....1933
Johnson, Robert Anthony, State Normal School, Oneonta, New York....1930
Jones, Harold Charles, Thomas Berry College, Mount Berry, Georgia....1929
Jones, Harold Robert, 317 New York St., Scranton, Pennsylvania....1938
Jones, Sterling Price, 690 Bonita Ave., Webster Groves, Missouri....1935
Jung, Clarence Schram, 4612 N. Oakland Ave., Milwaukee, Wisconsin....1921
Kalmbach, Edwin Richard, 527 Custom House, Denver, Colorado....1926
Kase, John Charles, 221 De Hart, West Lafayette, Indiana....1937
Kehrer, Victor John, 910 Walnut St., Martins Ferry, Ohio....1937
Kelso, Leon, 241 Linden Av., Ithaca, New York....1930
Kendeigh, Dr. Samuel Charles, Experimental Zoological Laboratory, Wright and Healey Sts., University of Illinois, Champaign, Illinois....1923
Knappen, Miss Phoebe Malura, 2925 Tilden St. N. W., Washington, D. C....1926
Komarek, Roy Vance, Raleigh, North Carolina....1935
Laird, Miss Lonnie, 3664 Washington St., St. Louis, Missouri....1935
Lambert, Bert, Allenville, Michigan....1936
Larrabee, Prof. Austin Park, Yankton College, Yankton, South Dakota....1921
Laskey, Mrs. Amelia Rudolph, Graybar Lane, Nashville, Tennessee....1928
Leopold, Prof. Aldo, 1532 University Av., University of Wisconsin, Madison, Wisconsin....1928
Lewy, Dr. Alfred, 2051 E. 72nd Pl., Windsor Park, Chicago, Illinois....1915
Lopp, O. Vernon, 1502 Raymond Av., St. Paul, Minnesota....1936
MacCracken, Dr. Walter Harrington, Detroit College of Medicine and Surgery, 1516 St. Antoine St., Detroit, Michigan....1933
Mailliard, Joseph, 1815 Vallijo St., San Francisco, California....1930
Marshall, Miss Irma, Rugby, North Dakota....1938
Mayfield, Prof. George Radford, Vanderbilt University, Nashville, Tennessee....1917
McAtee, Waldo Lee, U. S. Biological Survey, Washington, D. C....1911
McCabe, Thomas Tonkin, Museum of Vertebrate Zoology, Berkeley, Calif....1928
McConnell, Harry Burns, Cadiz, Ohio....1935
McCreary, Otto, Agricultural Hall, University of Wyoming, Laramie, Wyo....1930
McCullagh, Dr. E[rnest] Perry, 2020 E. 93rd St., Cleveland, Ohio....1937
McKnight, Edwin Thor, 201 I St., N. W., Miami, Oklahoma....1936
McMath, Robert P., Route 4, Pontiac, Michigan....1934
Mershon, William Butts, Saginaw, Michigan....1910
Metcalf, Dr. Zeno Payne, State College, West Raleigh, North Carolina....1900
Minich, Edward C., 1047 Fairview Av., Youngstown, Ohio....1925

Mitchell, Mrs. Margaret Knox Howell, 69 Oriole Rd., Toronto, Canada....1933
Morse, Dr. Harry Gilman, Huron, Ohio....1914
Morse, Miss Margarette Elthea, 11432 Mayfield Rd., Cleveland, Ohio....1921
Moseley, Edwin Lincoln, State College, Bowling Green, Ohio....1925
Musgrave, Dr. John Knox, 350 Parkway Dr., Pittsburgh 16, Pennsylvania....1937
Mushbach, George E., Box 603, Brigham, Utah....1936
Neff, Johnson Andrew, Bureau of Biological Survey, 270 Federal Bldg., Sacramento, California....1920
Nice, Dr. Leonard B., Chicago Medical School, 710 S. Lincoln St., Chicago, Illinois....1932
Nice, Mrs. Margaret Morse, 5708 Kenwood Av., Chicago, Illinois....1921
Nichols, Charles Ketcham, 212 Hamilton Rd., Ridgewood, New Jersey....1933
Oberholser, Dr. Harry Church, 2805 18th St., N. W., Washington, D. C....1894
Oehlenschlaeger, Miss Elizabeth Auguste, 926 E. Kilbourn Av., Milwaukee, Wisconsin....1936
Olsen, Dr. Richard Ellsworth, St. Joseph's Hospital, Pontiac, Michigan....1937
Osgood, Dr. Wilfred Hudson, Field Museum of Natural History, Chicago, Ill....1910
Otis, Dr. Charles Herbert, Department of Biology, Bowling Green State University, Bowling Green, Ohio....1937
Over, Prof. William Henry, University Museum, Vermillion, South Dakota....1930
Palmer, Dr. Theodore Sherman, 1939 Biltmore St., N. W., Washington, D. C....1914
Palmgren, Dr. Pontus, Museum Zoologicum Universitatis, Helsenki, Suomi, Helsingfors, Finland....1935
Parker, Herbert, South Lancaster, Massachusetts....1928
Pemberton, John Roy, 3031 N. Lake Av., Altadena, California....1922
Perkins, Samuel Elliott, III, 709 Inland Bldg., Indianapolis, Indiana....1923
Pettingill, Dr. Olin Sewall, Jr., Department of Zoology, Carleton College, Northfield, Minnesota....1930
Phelps, Frank Mills, 312 5th St., Elyria, Ohio....1912
Phillips, Allan Robert, 113 Olive Rd., Tucson, Arizona....1934
Pirnie, Dr. Miles David, W. K. Kellogg Bird Sanctuary, Michigan State College, Battle Creek, Michigan....1928
Platford, Sidney D., 4166 Fifth Av., Los Angeles, California....1936
Poole, Miss Betty, 42 W. 30th St., Indianapolis, Indiana....1937
Pough, Richard Hooper, 144 East 45th St., New York, New York....1938
Preble, Edward Alexander, 3027 Newark St., Washington, D. C....1929
Presnall, Clifford Charles, 6335 Ridge Dr., Station A., Washington, D. C....1930
Prill, Dr. Albert G., Main St., Scio, Oregon....1933
Quillian, Marvin C., Wesleyan College, Macon, Georgia....1927
Randall, Mrs. W. S., 4424 Belclaire Av., Dallas, Texas....1925
Reeder, Miss Clara Maude, 318 College Av., Houghton, Michigan....1938
Renneckar, Miss Gertrude Idella, Smithville, Ohio....1938
Riley, Joseph Harvey, U. S. National Museum, Washington, D. C....1914
Rogers, Mrs. Walter E., 911 E. North St., Appleton, Wisconsin....1931
Rorimer, Mrs. Irene Turk, 22275 Parnell Rd., Shaker Heights, Ohio....1938
Rosene, Walter Melvin, Ogden, Iowa....1923
Rust, Henry Judson, Box 683, Coeur d'Alene, Idaho....1921
Satterthwait, Mrs. Elizabeth Allen, 806 W. Ohio St., Urbana, Illinois....1925
Saunders, Dr. George Bradford, 562 Custom House, Denver, Colorado....1926
Saunders, William Edwin, 352 Clarence St., London, Ontario, Canada....1902
Schorger, Dr. Arlie William, 168 N. Prospect Av., Madison, Wisconsin....1927
Schwerin, Mrs. Lotta Bean, Hotel Solano, Vallejo, California....1936
Scott, Dr. John W[illiam], 400 W. 27th St., Cheyenne, Wyoming....1937
Shaffer, Chester Monroe, Dorcas, West Virginia....1934
Sheffler, William James, 4731 Angeles Vista Blvd., Los Angeles, California....1937
Shelford, Dr. Victor Ernest, Vivarium Bldg., Wright and Healey Sts., Champaign, Illinois....1931
Shepherst, Max [John], 536 Walden Av., Toledo, Ohio....1937
Skinner, Milton Philo, 1316 Harding St., Long Beach, California....1926
Smith, Frank, 79 Fayette St., Hillsdale, Michigan....1910
Smith, Frank Rush, Route 2, Box 100, Laurel, Maryland....1930

Smith, Harry Madison, 2007 Calumet Av., Whiting, Indiana....1936
Smith, Roy Harmon, 183 N. Prospect St., Kent, Ohio....1936
Sperry, Charles Carlisle, U. S. Biological Survey, Denver, Colorado....1931
Spiker, Charles Jolley, Branchport, New York....1916
Stebbins, Miss Fannie Adell, 31 Ely Av., West Springfield, Massachusetts....1935
Stillwell, Jerry E., 7460 San Benito Ray, Route 4, Dallas, Texas....1935
Stoner, Dr. Dayton, New York State Museum, Albany, New York....1912
Stuart, Miss Anne, 1905 D St., Lincoln, Nebraska....1924
Suthard, James Gregory, 832 Ohio St., Long Beach, California....1936
Swanson, Dr. Gustav Adolph, Division of Economic Zoology, University of Minnesota, University Farm, St. Paul, Minnesota....1927
Taylor, Dr. Aravilla Meek, Lake Erie College, Painesville, Ohio....1936
Taylor, Walter Penn, 254 Faculty Exchange, College Station, Texas....1937
Thacker, Miss [Lillian] Maxine, Route 3, Buckhannon, West Virginia....1938
Thomas, Edward Sinclair, 1116 Madison Av., Columbus, Ohio....1921
Tift, Richard, Madison Terrace Apts., Albany, Georgia....1937
Tinker, Almerin David, 519 Oswego St., Ann Arbor, Michigan....1909
Townsend, Miss Elsie White, Wayne University, Detroit, Michigan....1938
Tyler, Dr. Winsor Marrett, 112 Pickney St., Boston, Massachusetts....1914
Valentine, Miss Marguerite Elsie, 66 Robinson Av., Glen Cove, Long Island, New York....1937
Van Tyne, Dr. Josselyn, Museum of Zoology, Ann Arbor, Michigan....1922
Vaughan, William Coleman, 591 Ashland Av., Buffalo, New York....1938
Visscher, Dr. Paul, Biology Laboratory, Western Reserve University, Cleveland, Ohio....1924
Walkinshaw, Dr. Lawrence Harvey, 1421 W. Michigan Av., Battle Creek, Michigan....1928
Warren, Edward Royal, 1511 Wood Av., Colorado Springs, Colorado....1911
Weber, Orlando Franklin, Jr., Mt. Kisco, New York....1936
Webster, Walter A., Sycamore Lawn Farm, Route 1, Quaker City, Ohio....1935
Wetmore, Dr. Alexander, U. S. National Museum, Washington, D. C....1903
Weydemeyer, Winton, Fortine, Montana....1930
White, Francis Beach, St. Paul's School, Concord, New Hampshire....1926
Wilson, Archie Francis, 1921 Lake Av., Whiting, Indiana....1937
Wilson, Gordon, 1434 Chestnut St., Bowling Green, Kentucky....1925
Wineman, Andrew, 150 Michigan Av., Detroit, Michigan....1934
Wing, Leonard William, Box 364, Norris, Tennessee....1924
Wood, Dr. Casey Albert, Wood Library of Ornithology, McGill University, Montreal, Canada....1924
Yeatter, Dr. Ralph Emerson, Illinois Natural History Bldg., Urbana, Illinois....1932
York, Mrs. Olive Rogers, 862 Hoffman St., Elmira, New York....1938
Zimmerman, Harold Alexander, 915 W. Gilbert St., Muncie, Indiana....1932

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Adams, I. C., Jr., 1600 Hinkson St., Columbia, Missouri....1933
Adelson, Richard Henry, 3348 167th St., Flushing, New York....1938
Aitkin, Andrew Drummond, Jr., Box 411, Greggton, Texas....1936
Alexander, Gordon, Department of Biology, University of Colorado, Boulder, Colorado....1936
Alexander, Donald Child, 18 Hurd St., Lowell, Massachusetts....1937
Allen, Arthur Francis, 108 Terrace Apts., Sioux City, Iowa....1925
Allen, Robert Ward, Ossian, Iowa....1936
Allender, Miss Christia [Hysel], Central High School, Tulsa, Oklahoma....1937
Allert, Oscar Paul, Route 1, McGregor, Iowa....1923
Amadon, Dean, 356 W. 34th St., New York, New York....1935
Ambrosen, Donald Roy, 315 E. King St., Winona, Minnesota....1937
Ammann, George Andrew, 272 Rockaway Av., Boonton, New Jersey....1935
Amundson, Gene, Valentine, Nebraska....1936
Anderson, Anders Harold, Box 111, Tucson, Arizona....1937

Anderson, Dr. Rudolph Martin, Division of Biology, Department of Mines and Resources, National Museum of Canada, Ottawa, Ontario, Canada....1937
Appleton, John Sparhawk, 1332 N. Citrus Av., Hollywood, California....1936
Arnold, Miss Cordelia H., 17 N. Hanover Av., Atlantic City, New Jersey....1937
Arthur, Stanley Clisby, 1309 State St., New Orleans, Louisiana....1937
Austin, Dr. Oliver Luther, Tuckahoe, Westchester Co., New York....1930
Axley, Mrs. Jessie Loew, Washburn, Wisconsin....1938
Ayer, Mrs. Nathan Edward, 1300 Hillcrest Dr., Pomona, California....1936
Babcock, Mrs. Lester, 402 Madison Av., Milton, Wisconsin....1936
Bailey, Mrs. Florence Merriam, 1834 Kalorama Rd., Washington, D. C....1911
Bailey, Mrs. Mary L., 610 20th St., Sioux City, Iowa....1918
Baird, Mrs. Charles, 1631 Laurel Av., Knoxville, Tennessee....1938
Baker, John Hopkinson, 1165 5th Av., New York, New York....1930
Baker, Rollin Harold, Department of Geology, College Station, Texas....1938
Baker, William Calvin, 223 W. Pershing St., Salem, Ohio....1931
Baldwin, John H., Box 36A, Ludlow, Kentucky....1938
Ballard, J. O., 5388 Waterman Av., St. Louis, Missouri....1935
Bamberg, John, Tennessee Valley Authority, Joe Wheeler Dam, Alabama....1936
Barber, Dr. Bertram Alpha, 350 West St., Hillsdale, Michigan....1923
Barkalow, Frederick Schenck, Jr., Box 671, Alabama Polytechnic Institute, Auburn, Alabama....1938
Barnett, Miss Dorothy I., 3820 N. Newhall St., Milwaukee, Wisconsin....1933
Bartow, Mrs. Leslie W., 211 E. Hudson St., Columbus, Ohio....1938
Bassett, Mrs. Victor Hugo, 1010 E. Park Av., Savannah, Georgia....1931
Batchelder, Charles Foster, 7 Kirkland St., Cambridge, Massachusetts....1927
Bates, Charles Evarts, Box 34, East Wareham, Massachusetts....1937
Baumgartner, Dr. Frederick Milton, 629 E. Grand River, East Lansing, Michigan....1935
Baumgartner, Luther LeRoy, Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio....1936
Beard, Daniel B., 910 Columbus Blvd., Coral Gables, Florida....1938
Beatty, Harry Andrew, Christiansted, St. Croix, Virgin Islands, U. S. A....1936
Beebe, Ralph, 353 Salliotte St., Ecorse, Michigan....1924
Beeghly, James Leon, 46 Woodview Av., Youngstown, Ohio....1933
Behle, William Harroun, Department of Biology, University of Utah, Salt Lake City, Utah....1935
Bellrose, Frank, Jr., 1220 W. Madison St., Ottawa, Illinois....1935
Benchley, Edwin Allen, Jr., 79 Buckminster Rd., Brookline, Massachusetts....1937
Benedict, Mrs. Howard Smith, 18320 Kinsman Rd., Shaker Heights, Cleveland, Ohio....1926
Bennett, Logan Johnson, IA Horticulture Bldg., Pennsylvania State College, State College, Pennsylvania....1934
Benson, Frank Weston, 14 Chestnut St., Salem, Massachusetts....1937
Benson, Mrs. Mary Heydwiller, 310 Elmwood Av., Ithaca, New York....1937
Benson, Dr. Seth Bertram, Museum of Vertebrate Zoology, Berkeley, Calif....1930
Bicrens, Rev. G. C., Fairmount, North Dakota....1936
Birkeland, Henry, Roland, Iowa....1934
Black, Charles Theodore, 3836 Lowell Av., Chicago, Illinois....1935
Blair, W. Frank, Museum of Zoology, University of Michigan, Ann Arbor, Michigan....1936
Blincoe, Mrs. Benjamin J., Route 1, Dayton, Ohio....1926
Bodine, Miss Margaret Lamb, Rittershouse Plaza, 19th and Walnut St., Philadelphia, Pennsylvania....1930
Bohning, Leonard L., Box 350, Knox, Indiana....1935
Bolt, Benjamin Franklin, 5300 Brookside Blvd., Kansas City, Missouri....1930
Bond, Richard Marshall, 328 East Islay St., Santa Barbara, California....1936
Boone, Miss Delia Robinson, 1044 2nd St., N. W., Grand Rapids, Michigan....1938
Bordner, Mrs. Frances Comfort, Hudson, Iowa....1930
Borell, A. E., Soil Conservation Service, Albuquerque, New Mexico....1936
Borror, Dr. Donald Joyce, Department of Zoology and Entomology, Columbus, Ohio....1927

Boulton, Rudyerd, Field Museum, Chicago, Illinois....1922
Bowdish, Beecher Scoville, Demarest ,New Jersey....1924
Bowman, Lawrence Lincoln, Orchard Hills, Route 7, North Canton, Ohio....1935
Brady, Dr. John A., St. Augustine College, Lakewood, Ohio....1925
Braun, Howard Wylie, 1413 Louisiana Av., N. W., Canton, Ohio....1937
Braund, Frank William, 1022 Central Av., Cleveland, Ohio....1935
Brooks, Alonzo Beecher, Oglebay Park, Wheeling, West Virginia....1931
Broun, Maurice, Rt. 1, Orwigsburg, Pennsylvania....1935
Brown, John Wilcox, Dartmouth Outing Club, Hanover, New Hampshire....1932
Brown, Robert Bowen, Jr., 806 Rosewood Av., Winnetka, Illinois....1935
Brown, Mrs. William, Edgewater Park, Celina, Ohio....1936
Buchanan, Borden Campbell, 100 S. Cecelia St., Sioux City, Iowa....1937
Bujak, Boleslaus Joseph, Museum of Zoology, Ann Arbor, Michigan....1936
Burk, Walter Leon, 701 E. 3rd St., Vinton, Iowa....1937
Burt, Dr. William Henry, Museum of Zoology, Ann Arbor, Michigan....1928
Burroughs, Raymond Darwin, Game Division, Department of Conservation, Lansing, Michigan....1937
Buss, Irven O., Faville Grove Wildlife Area, Lake Mills, Wisconsin....1936
Cain, Brighton C[lark], Box 796, Oakland, California....1934
Calhoun, John Bumpass, % U. S. Hayes, Cabell Av., University, Virginia....1935
Calvert, Earl Wellington, Haliburton P. O., Ontario, Canada....1937
Campbell, Louis Walter, 304 Fearing Blvd., Toledo, Ohio....1926
Campbell, Miss Mildred Florence, 29 N. Hawthorne Lane, Indianapolis, Ind....1938
Campbell, S. H., Oak Grove, Louisiana....1934
Carlson, Prof. Carl Olof, Department of Biology, Doane College, Crete, Nebr....1923
Carpenter, John Richard, 2670 N. Alpine Rd., Grand Rapids, Michigan....1934
Carter, John Darlington, Lansdowne, Pennsylvania....1930
Cartwright, Bertram William, 238 Guilford St., Deer Lodge, Winnipeg, Can....1930
Chamberlain, Glen David, 22 Academy St., Presque Isle, Maine....1930
Chapman, Floyd Barton, 1944 Denune Av., Columbus, Ohio....1932
Cheathum, Mrs. Edith, Biology Department, Southern Methodist University, Dallas, Texas....1936
Chutter, Miss Mildred C., Box 229, Athens, Ohio....1936
Clapp, Alston, Sr., 1115 Cotton Exchange Bldg., Houston, Texas....1934
Clark, Mrs. Ella Lamson [Mrs. C. C.], 922 N. Third St., Burlington, Iowa....1925
Clarke, Dr. Charles Henry Douglas, Department of Mines and Resources, Mines and Geology Branch, National Museum of Canada, Ottawa, Ontario, Canada....1932
Clebsch, Alfred, Route 1, Clarksville, Tennessee....1935
Clout, George John, 89 North St., St. Catherines, Ontario....1935
Clow, Miss Marion, Box 163, Lake Forest, Illinois....1929
Cole, Harry Maurice, 3016 Capitol Av., Cheyenne, Wyoming....1935
Cole, Dr. W. Storrs, Geology Dept., Ohio State University, Columbus, Ohio....1937
Coles, Victor, 2910 Grasselli Av., Cincinnati, Ohio....1929
Compton, Lawrence Verlyn, Soil Conservation Service, Box 1314, Aubuquerque, New Mexico....1923
Compton, Miss Leila Anna, 846 E. Bowman St., Wooster, Ohio....1930
Conrad, Charles Louis, 423 Warwood Av., Wheeling, West Virginia....1937
Cook, Grant MacDonald, 2301 Elm St., Youngstown, Ohio....1923
Cooley, Miss Eleanor Graham, R. F. D., Berwyn, Maryland....1936
Counce, Dr. Cynthia Cunningham, Lynnhurst Sanitarium, Oakville, Tennessee....1937
Courtright, Mrs. Mary L., 3 Elm Av., Larkspur, California....1937
Cox, Rodman D., 785 South Av., Rochester, New York....1933
Crabb, Wilfred Dayton, 3814 Ridge Av., Sioux City, Iowa....1937
Crawford, Eugene E., 445 North 8th St., Corvallis, Oregon....1936
Crook, Compton N., Jr., Matthew Whaley School, Williamsburg, Virginia....1929
Crow, Louis W., Niles Center, Illinois....1936
Cunningham, James W., 4425 Main St., Kansas City, Missouri....1935
Currier, Edmonde Samuel, 8541 N. Chicago Av., Portland, Oregon....1930
Curtis, Miss Elizabeth Long, 5648 Beach Dr., Seattle, Washington....1935

Cuthbert, Nicholas LeHuray, Genetics Bldg., University of Wisconsin, Madison, Wisconsin 1937
Dalke, Dr. Paul David, Division of Wildlife Research, Missouri Wildlife Research Unit, Columbia, Missouri 1936
Damon, David, SP-20, Kaiser, Missouri 1933
Danforth, Charles Garrison, 1680 College Av., Palo Alto, California 1938
Danner, Mrs. May S., 1646 Cleveland Av., N. W., Canton, Ohio 1921
Davidson, Mrs. Gaylord, 4735 S. Dupont Av., Minneapolis, Minnesota 1938
Davidson, William Mark, Route 1, Silver Spring, Maryland 1933
Davis, Edward M., Winter Park, Florida (Nov. 1-May 1), and Shirley, Massachusetts (May 1-Nov. 1) 1936
Davis, George, State Teachers College, Murfreesboro, Tennessee 1936
Davis, Mrs. Louie Irby, Box 988, Harlingen, Texas 1933
Davis, Dr. William B., Department of Wild Game, College Station, Texas 1938
Dawley, Jean Wilson, 13962 Clifton Blvd., Lakewood, Ohio 1931
Debes, Victor Albert, 1211 Folsom Av., Prospect Park, Pennsylvania 1937
Denton J[ames] Fred, Jr., Department of Zoology, University of Georgia, Athens, Georgia 1935
Deusing, Murl, 142 N. 75th St., Milwaukee, Wisconsin 1937
Devitt, Otto Edmund, 31 Willowbrook Blvd., Toronto, Ontario, Canada 1935
Dille, Frederick Monroe, 822 Grand Av., Nogales, Arizona 1912
Dingle, Edward von Seibold, Huger, South Carolina 1921
Dixon, James Benjamin, Box 688, Escondido, California 1936
Dodge, Ernest Stanley, Peabody Museum, Salem, Massachusetts 1936
Dodson, Joseph Howard, 701 S. Harrison Av., Kankakee, Illinois 1936
Dole, J. Wilbur, 51 E. Stone St., Fairfield, Iowa 1930
Dolley, John Seiver, Box 75, University, Mississippi 1937
Domm, Dr. Lincoln Valentine, Whitman Laboratory for Experimental Zoology, University of Chicago, Chicago, Illinois 1936
Drum, Miss Margaret, Owatonna, Minnesota 1937
Dunaway, Mrs. Nell Lively, 910 S. 8th St., Lawton, Oklahoma 1937
Dyer, Mrs. Minnie M., Byington, Tennessee 1930
Easton, Robert S., 904 Moss Av., Peoria, Illinois 1936
Eastwood, Sidney Kingman, 301 S. Winebiddle Av., Pittsburgh, Pennsylvania 1928
Ebersole, Frank Boyd, 1656 Richardson St., Fort Wayne, Indiana 1937
Eekelberry, Donald [Richard], 133 West Indiana Av., Sebring, Ohio 1938
Edge, Mrs. Charles Noel, 1200 Fifth Av., New York, New York 1931
Eheim, Joseph Mathious, Hutchinson, Minnesota 1926
Eike, James, Box 4, Woodbridge, Virginia 1933
Elder, William Hanna, Biology Building, University of Wisconsin, Madison, Wisconsin 1918
Eliot, Samuel Atkins, Jr., 32 Paradise Rd., Northampton, Massachusetts 1932
Elrod, Mrs. Walter DeWitt, Box 103, Okmulgee, Oklahoma 1923
Emery, Frank Hardie, 620 Euclid Av., Toronto, Ontario, Canada 1933
Emlen, Dr. John Thompson, Jr., University of California, Davis, California 1936
Engleby, Thomas Lester, 1002 Patterson Av., Roanoke, Virginia 1934
Erickson, Arnold Burton, Department of Zoology, University of Minnesota, Minneapolis, Minnesota 1938
Eriekson, Miss Mary Marilla, Willamette University, Salem, Oregon 1930
Erwin, W. G., Henderson State Teehers College, Arkadelphia, Arkansas 1936
Evans, Dr. Evan Morton, 550 Park Av., New York, New York 1929
Evans, Thomas R., Kasson, Minnesota 1937
Evins, Samuel N., 38 E. 14th St., Atlanta, Georgia 1921
Eynon, Alfred Ernest, 1718 Andress Terrace, Union, New Jersey 1938
Fautin, Reed Winget, Box 307, R. F. D. 2, Provo, Utah 1937
Feighner, Miss Lena Veta, 298-I S. Tremont St., Kansas City, Kansas 1935
Felton, W. R., 1709 Summit St., Sioux City, Iowa 1934
Finster, Miss Ethel Beulah, Asheville Teachers College, Ashville, North Carolina 1930
Fisher, Miss Edna M., 2410 Fulton St., Berkeley, California 1938

Fitzpatrick, Dr. Frederick Linder, Teachers College, Columbia University, New York, New York....1924
Fleetwood, Raymond Judy, S. & B. Court Hall St., Madisonville, Kentucky....1934
Flentge, Louis George, Box 68, Wheeling, Illinois....1936
Fletcher, William Barger, Box 188, Savannah, Missouri....1937
Foote, Maurice Edwin, 66 Joslyn Pl., Rochester, New York....1932
Forbes, John Ripley, 9 East Av., Ithaca, New York....1937
Force, Miss Edith Rhoda, 3021 E. 8th St., Tulsa, Oklahoma....1931
Fossler, Miss Mary Louise, 550 N. Los Robles Av., Pasadena, California....1936
Foster, George, 15 W. Circle Dr., Norris, Tennessee....1935
Fowle, John Trenchard, Route 2, Vernon ,British Columbia, Canada....1936
Fox, Adrian Casper, Box 367, Soil Conservation Service, Fargo, North Dakota....1937
Frazer, Dr. T. Atchinson, Marion, Kentucky....1934
Friauf, James J., 930 Dewey Av., Ann Arbor, Michigan....1936
Frishman, Kenneth, 1114 9th Av. S., Fargo, North Dakota....1936
Frost, Marvin. Asheville School, Asheville, North Carolina....1937
Frothingham, Mrs. Randolph, 56 Sargent Crossway, Brookline, Massachusetts....1932
Fryklund, P. O., Roseau, Roseau Co., Minnesota....1926
Furniss, Owen Cecil, 2203 1st Ave., West Prince Albert, Sask., Canada....1934
Gail, John F., 1450 Warren Av., Chicago, Illinois....1936
Ghigi, Alessandro, R. Universita, Bologna, Italy....1931
Gier, Dr. Herschel Thomas, Ohio University, Athens, Ohio....1937
Gifford, Dr. Harold, 323 S. 51st St., Omaha, Nebraska....1936
Gilbert, Dr. Winifred, 524 W. 24th St., Cedar Falls, Iowa....1936
Gill, Geoffrey [Trafford Holmes],24 Overlook Dr., Huntington, Long Island, New York....1934
Gillett, Francis C., Box 1269, Omaha, Nebraska....1935
Glenn, Robert W., 509 Orchard Av., Avalon, Pittsburgh, Pennsylvania....1934
Goerlitz, George, 520 E. Main St., Boonville, Indiana....1934
Goldsmith, Glenn Warren, Box 1611, University Station, Austin, Texas....1931
Good, E. E., 1310 High St., Hamilton, Ohio....1936
Gordon, C. E., Fennimore, Wisconsin....1936
Goslin, Robert Martin, 312 Wilson Av., Columbus, Ohio....1936
Grant, Cleveland Putnam, 620 Greenup St., Covington, Kentucky....1928
Grater, Russell K., Box 395, Boulder City, Nevada....1936
Greene, Earle Rosenbury, Okefenokee Wildlife Refuge, Fargo, Georgia....1930
Gresham, Albert Burton, Winnipeg Free Press, Winnipeg, Manitoba....1934
Grimes, Samuel Andrew, Rt. 5, Box 284F, Jacksonville, Florida....1924
Groskin, Horace, 220 St. Georges Rd., Ardmore, Pennsylvania....1937
Gross, Dr. Alfred Otto, Bowdoin College, Brunswick, Maine....1927
Gross, Miss Margaret Edith, Route 5, Grand Rapids, Michigan....1937
Guion, George Seth, 1701 American Bank Bldg., New Orleans, Louisiana....1935
Guthrie, Frank Keller, Keuka Park, New York....1938
Hadley, Miss Theodosia Hamilton, Western State Teachers College, Kalamazoo, Michigan....1938
Haecker, Frederick Woods, 506 S. 52nd St., Omaha, Nebraska....1938
Hagar, Mrs. Jack, Rockport, Texas....1930
Hague, Dr. Florence S., Sweet Briar College, Sweet Briar, Virginia....1931
Hainsworth, William Pickard, 214 Railroad Av., North Andover, Mass....1930
Hale, Arthur Thomas, Jr., Box 753, Mission, Texas....1935
Hall, Fred Thomas, 1215 Danville Av., Crawfordsville, Indiana....1936
Haller, Karl William, Route 1, Short Creek, West Virginia....1934
Hallman, Roy Cline, Box 826, Panama City, Florida....1928
Hamerstrom, Frederick N., Jr., % Aldo Leopold, University of Wisconsin, Madison, Wisconsin....1934
Hamilton, B. G., Box 22, Highland Park, Illinois....1936
Hamilton, Dr. William John, Jr., Department of Zoology, Cornell University, Ithaca, New York....1933
Handley, Charles Overton, Virginia Polytechnic Institute, Blacksburg, Va....1925
Hanna, Wilson Creal, 141 E. F St., Colton, California....1936
Happ, Prof. George Bippus, The Principia College, Elsah, Illinois....1935

Harford, Dr. Henry Minor, 1034 Argyle Bldg., Kansas City, Missouri....1938
Harkin, Hon. James Bernard, Department of Interior, Ottawa, Ontario, Can....1924
Harllee, Capt. Harry Lee, 900 S. Irby St., Florence, South Carolina....1936
Harmanson, J. S. W., 333 Royal St., New Orleans, Louisiana....1937
Harper, Dr. Francis, 224 S. Chester Rd., Swarthmore, Pennsylvania....1930
Harris, Curtis Lea, 921 W. Central St., Eldorado, Kansas....1928
Harris, Mrs. William Gray, Pine Ledges, Old Boylston ,Massachusetts....1932
Hartman, Fred Oscar, 523 Hackett Rd., Toledo, Ohio....1938
Hatch, Dr. Alden Bruce, School of Forestry, University of Idaho, Moscow, Idaho....1937
Hausler, Mrs. M., 7348 Paxton Av., Chicago, Illinois....1936
Hawkins, Arthur S., Illinois Natural History Survey, Urbana, Illinois....1936
Hawkins, B. L., Hamline University, St. Paul, Minnesota....1936
Hayward, C. Lynn, Dept. Entomology and Zoology, Brigham Young University, Provo, Utah....1933
Hayward, W. J., Box 1282, Sioux City, Iowa....1913
Heaton, Leonard, Moccasin, Arizona....1937
Hedge, Homer William, 607 New York Av., Holton, Kansas....1936
Helfer, Miss Louise, 111 Ninth St., Watkins Glenn, New York....1937
Hellwig, Miss Isabelle, 1299 Green Rd., South Euclid, Ohio....1936
Henderson, Walter Cleaveland, 8 Magnolia Parkway, Chevy Chase, Maryland....1928
Henderson, [William] Grant, Route 6, Greensburg, Indiana....1930
Henika, Franklin S., 207 Whitman Av., Pullman, Washington....1936
Henry, Cordia John, Box 37, Upham, North Dakota....1933
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Herman, Carlton Martin, 615 N. Wolfe St., Baltimore, Maryland....1937
Hicks, Mrs. E. H., Fredericktown, Ohio....1932
Hiett, Lawrence Davison, 2134 Parkwood Av., Toledo, Ohio....1929
Hill, Herbert Oliver, 132 West Lincoln Av., Mt. Vernon, New York....1938
Hill, Julian Werner, 707 Coverdale Rd., Wilmington, Delaware....1935
Hillmer, Davis B., 454 Colburn Pl., Detroit, Michigan....1926
Hilton, Dr. David Clark, 305 Richards Bldg., Lincoln, Nebraska....1918
Hinchman, Richard May, 75 Fairbanks Rd., Milton, Massachusetts....1931
Hinds, Frank J., Dept. Biology, Western State Teachers College, Kalamazoo, Michigan....1935
Hoag, Ena, Box 407, Pacific Grove, California....1934
Hobson, Mrs. L. G., 1155 Dove Rd., Louisville, Kentucky....1935
Hoffman, Edward Carlton, 1041 Forest Cliff Drive, Lakewood, Ohio....1937
Holland, Harold May, Box 615, Galesburg, Illinois....1915
Holt, Ernest Golsan, 2121 New York Av., Washington, D. C....1926
Hostetter, D. Ralph, Eastern Mennonite School, Harrisonburg, Virginia....1937
Howard, William J., % National Park Service, Richmond, Virginia....1935
Howell, Joseph Corwin, Laboratory of Ornithology, Cornell University, Ithaca, New York....1938
Hoyt, John Southgate Yeston, 5 Lewis St., Lexington, Virginia....1936
Hudson, Dr. George Elford, Department of Zoology and Anatomy, University of Nebraska, Lincoln, Nebraska....1933
Hucy, Laurence Markham, Natural History Museum, Balboa Park, San Diego, California....1932
Huggins, Russell Arno, Biology Department, Western Reserve University, Cleveland, Ohio....1937
Hughes, George Thomas, Box 153, Plainfield, New Jersey....1929
Hulbert, Lloyd Clair, 529 W. Grand River Av., East Lansing, Michigan....1938
Hunter, Lawrence E., Hanna City, Illinois....1934
Hurley, John Beatty, 401 S. 17th Av., Yakima, Washington....1937
Ijams, Henry Pearle, % News-Sentinel, Knoxville, Tennessee....1924
Imler, Ralph Hysel, Food Habits Research Laboratory, 562 Custom House, Denver, Colorado....1937
Ingersoll, Albert Mills, 908 F St., San Diego, California....1921
Jackson, Norma R., Box 215, Campe Verde, Arizona....1935

Jacobson, Karl A., Division of Wildlife Research, Department of Forestry, University of Maine, Orono, Maine....1936
Jelier, Franciscus Peter, Groote Visschcrystraat 19a, Rotterdam, Holland....1931
Jenks, Randolph, Rancho Esperero, University Station, Tucson, Arizona....1934
Jenkins, Miss Betty, Oak Hill, Ohio....1936
Jenkins, Dale W., 38 N. Chase Av., Columbus, Ohio....1937
Jensen, Jesse Peter, Box 364, Dassel, Minnesota....1926
Jessman, Miss Lena M., 11 Linden Ave., River Rouge Bch., Detroit, Michigan....1935
Jewett, Homer, 2680 West Paris Blvd., Shaker Heights, Ohio....1937
Johnson, Archibald, Route 2, Jamestown, North Dakota....1934
Johnson, D. Elmer, 266 Lava St., Hot Springs, Idaho....1934
Johnson, Delos Edward, 42 Public Square, Shelbyville, Indiana....1934
Johnson, Frank, 1202 Kenwood Av., Fort Wayne, Indiana....1935
Johnson, Mrs. [Oscar] Irene W., 38 Portland Pl., St. Louis, Missouri....1931
Johnson, Paul H., Soil Conservation Service, Bethany, Missouri....1936
Jones, E. W., 3335 Monte Vista, Albuquerque, New Mexico....1936
Jones, John Courts, 3224 19th St. N. W., Washington, D. C....1931
Jones, Paul F., 1724 Michigan St., Toledo, Ohio....1937
Jones, Solomon Paul, 509 West Av., N., Waukesha, Wisconsin....1921
Jones, Victor Emmons, University of Idaho, Southern Branch, Pocatello, Idaho....1938
Kamm, Mrs. Oliver, 365 Lake Shore Dr., Grosse Point Farms, Michigan....1934
Kelker, George Hills, School of Forestry, U. S. A. C., Logan, Utah....1938
Kellogg, Dale Cosnett, Box 343, Norwalk, Ohio....1932
Kelly, Mrs. George A., 2300 La Salle Gardens, N., Detroit, Michigan....1935
Kennedy, Homer Ney, Box 294, Rosslyn, Virginia....1935
Kindler, Mrs. Grace Emma, Sheridan Dr., Lancaster, Ohio....1937
Klein, Jacob, Box 424, Shawano, Wisconsin....1936
Klepfer, Ward, 169 Morris Av., Buffalo, New York....1934
Knapp, Elmer Leslie, Route 2, Troy, Pennsylvania....1930
Knight, Dr. Harry Hazelton, Department of Zoology and Entomology, Iowa State College, Ames, Iowa....1926
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LYNDS JONES

BY MRS. H. J. TAYLOR

In the diary of Publius Virgilius Jones for the year 1865 under the date of January 5, is this entry: "Baby Boy born 2 A. M." Two days later the entry reads: "Baby cried all night". The first entry may be taken at face value. The second should not be taken too seriously. In the homes of early settlers there was no separate room for a baby and fathers were sometimes disturbed. The expression "cried all night" meant the baby woke up once or twice during the night. Noticing a prominent facial feature on their new born son the parents exclaimed: "He has his grandfather's chin! He shall have his grandfather's name!" The infant was Lynds Jones.

When Lynds Jones was born his parents, Publius Virgilius Jones and Lavinia Burton Jones, were living in the little town of Jefferson, Ashtabula County, Ohio. The territory from the Western Reserve to the Mississippi River was largely settled by people from the New England States and in turn from this territory Iowa, Nebraska, and Kansas received settlers. The Civil War was over. Young men wanted to make their own footing, attain personal independence, and be their own masters. They had ideals for their families. Their children should have books, music, college education, and if possible, travel. It was for this hope of opportunity that Publius Jones, a mill wright in the little town of Jefferson, gave up home, friends, comforts, and culture and took his wife and seven small children across the Mississippi to locate on a prairie farm three and one-half miles northeast of Grinnell, Iowa. The mournful howl of the Prairie wolf through the night; the terrifying, blinding blizzard; the raging fury of the prairie fire; these were well known to every pioneer of the middle west.

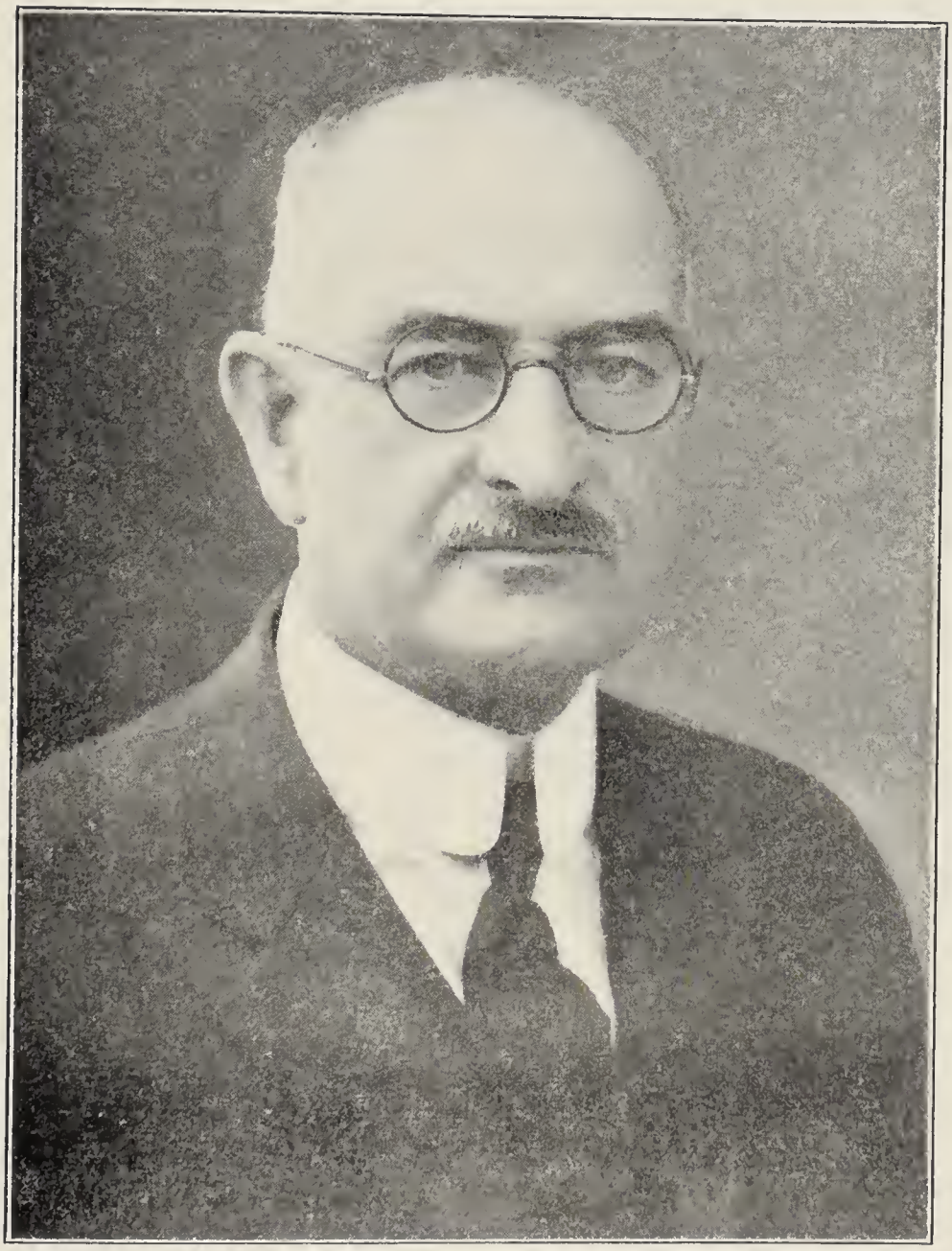
It was a hard year for Lavinia Jones in this new country. In addition to her own family consisting of one daughter and six sons she had under her roof and care three of her brothers. Her babe of only a few months was withering in the sultry, breathless heat of the middle west. Cholera infantum, feared and dreaded by mothers, held

the life of Lynds Jones in the balance for many days. To feed, clothe, and make a home for a family of twelve and tenderly care for a sick infant was indeed a heavy program for Lavinia Jones. How can a woman endure so much? Love and interest give strength and endurance without limit. In the narrow life of the pioneer love and family were lasting interests. A few years of hardship and struggle would bring opportunity to the children and that meant joy to the parents. A forward look can pull a heavy load. Lynds Jones says: "My mother had no artificial charms. She needed none."

Many Iowa settlers were good tree planters and parts of the state had become wooded sections. These were a partial protection against the raging fury of the prairie fire and also against the ruthless fury of the blizzard. After a year on the prairie the Jones family moved to a farm three and one-half miles northwest of Grinnell into a natural grove of oak and hickory trees. What if the cabin was but a single room!—there were trees around it. Near by there were woods—one hundred acres of trees! There was a bubbling spring not far away; and a place to swim: winter would make it into a skating pond. Here was a place that offered free and joyous education to all who had capacity to receive. There were hazel nut bushes gracefully bending their nut-laden branches. Hickory trees with nuts as well as lithe branches for making Indian bows. There were choke cherry trees beautiful with great racemes of white flowers and with oncoming fruit too strongly flavored with tannic acid to be enjoyed—except by small boys. Gooseberries, red raspberries, luscious blackberries, and the sweetest of strawberries were feasts for the children who usually filled up to capacity before they took a supply to the house. The Jones farm was a paradise for children and birds. As soon as it could be done, a five-room story-and-a-half frame building was annexed to the log cabin which henceforth became the kitchen.

Two events of early childhood impressed themselves indelibly on the mind of young Lynds. The first was the total eclipse of the sun on August 7, 1869. The mother had told her children of its coming and they were eagerly awaiting the event. Not knowing the meaning of the sudden darkness roosters crowed vociferously, chickens hastened to their roost, a nearby herd of frightened cattle ran wildly hither and thither. A young herdsman was terrified and almost crazy, while the Jones boys enjoyed the unusual demonstration of the movements of heavenly bodies.

The second, not less memorable event, happened a few weeks later. Lynds was left in charge of his little creeping brother. Sud-



Lynds Jones

denly the little fellow, gabbling loudly, was hastening on all fours toward the interesting object he had spied lying under the stove in the log cabin kitchen. Lynds saw the coiled snake as it lay warming itself and flicking its tongue. Snatching the baby he let out such a terrific yell that it brought his mother instantly to the scene. Screaming, she grabbed both children and slammed the kitchen door with great violence. Hearing the commotion, the father hastened to the house. The rattler was gone. His only possible escape was to get under the loose boards of the kitchen floor. He must be found. The father began to mow the weeds patch near the kitchen. Soon the snake with twelve rattles and a button was held aloft on his scythe.

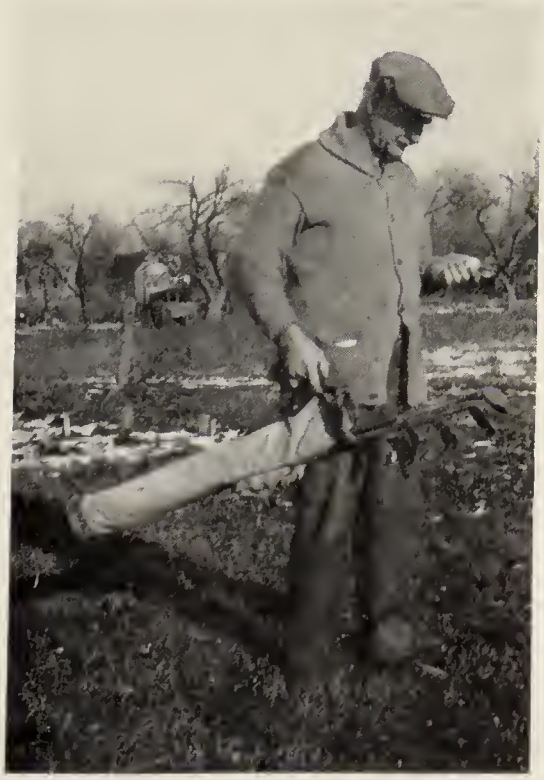
At the age of five and a half years Lynds began his book education in the district school about a mile away. With its program of classes from A B C to Geography, Physiology, and Algebra the district school had a rare and subtle value that was eliminated by the graded system. Younger pupils absorbed much from the recitations of the older ones and had a keen incentive for advancement into the next class. Nor was promotion held up till the close of the term; it was made when the pupil was ready. Lynds Jones was often "ready".

At the age of seven years Lynds, under the direction of a neighbor boy, named Ivan Wheeler who was not only a good collector but also a good taxidermist, began to make a collection of eggs. That the first, a rare collection of singles, was destroyed by mice and the second was accidentally tipped over ruining every egg, was disappointing but not discouraging to Lynds Jones. Mice had to be reckoned with in those days and pioneer homes were pretty well filled with children, leaving little room for boxes of eggs and specimens of birds. Ivan taught Lynds to collect eggs in full sets and to blow them properly through one hole in the side and also to mark them. From Ivan he also obtained his first book, "Samuel's Nests and Eggs of New England Birds". This book is still in the Jones library. Summing up his results Dr. Jones says: "When I left Iowa to go to Oberlin in 1890 my collection numbered approximately 250 species of birds' eggs, most of them collected by myself, some from exchanging duplicates for species which did not nest in Iowa. This collection I have just [1937] donated to Berry College, Georgia." The founder of this college, the accomplished Martha Berry who gave all her years and all her fortune that mountain children might have educational advantages, rejoiced that Berry College received recognition from a northern educator.

At eleven years of age Lynds Jones worked all summer weeding onions for a neighbor at forty cents a day. His earnings bought a suit

1874—Aged 9

1892—Aged 27
A Graduate of Oberlin



1915—Aged 50
A Golf Enthusiast

1923—Aged 58
And Grandchild

LYNDS JONES

of clothes—with the necessary suspenders thrown in. From that time on he earned all his own clothes by working summers. At the age of seventeen — wages had been raised to seventy-five cents a day — he earned not only enough to buy his clothes but also enough to buy Coues' "Key to North American Birds". This marked the beginning of scientific study for Mr. Jones. Throughout the winter all his spare moments were spent studying the "Key", and how to use it with facility when the spring birds began to arrive. With the "Key" and Samuel's "Nests and Eggs of New England Birds" Lynds Jones had a select library for his work. With the return of the birds the farm work began in earnest. Neither it nor the birds could be neglected. Mornings, from twilight to chore time, were spent in the woods in search of new species; if found he collected a specimen. During the noon hour he identified the specimen and in the evening he wrote up the notes. Now and then a half holiday gave time for trips afield. Even Sunday had its invariable program of church and Sunday school.

When Lynds Jones was about thirteen years old he met "The Pathfinder" and his greed for reading became insatiable. Cooper's Tales, one and all, were devoured and he became Leatherstocking rather than Lynds. With his six-foot gun, made from a pine board, he, with his brothers and the neighbor boys, dramatized the Leatherstocking Tales in the nearby woods. Their war whoops were heard afar. Lynds invariably took the leading part. He didn't act, he was Leatherstocking; imagination had become a reality. He is but one of thousands of boys who are gratefully indebted to Cooper for thrilling adventure in the boundless realm of imagination. In spite of hard work, scarcity of money, and want of comforts, a farm gives children great and rare opportunities of learning what can not be put into books.

Successful farming demands a steady program of work. Publius Virgilius Jones was a hard worker and, in the estimation of his sons, was scarcely second to Samson in strength. He was, however, not a hard task master: ideals for his family were never lost sight of. The Jones farm was successful though it may not have produced its capacity in grain, corn, and hogs. This loss was offset by healthy, happy, mentally alert children who had time for play, for roaming the woods, for knowing birds and trees and flowers. The Jones boys responded to the lure of spring, awaited the return of birds and made whistles when sap was running freely in the willows. They knew the hazy, indescribable atmosphere of Indian summer that meant birds

1926—Aged 61
Still birding

1933—Aged 68
Trimming trees

1936—Aged 71
His 54th Ford car

Date unknown

LYNDS JONES

were preparing to go to warmer climates. droning bees were saying farewell before going into some hollow tree well stored with delicious honey. Winter with its snow and ice and twenty degrees below zero weather is a glorious challenge to exuberant youth. Nature's school is never closed and grades depend solely on capacity to see. to hear. and to think.

Publius Jones must have had Grinnell. the oldest college in the State of Iowa. in mind when he located a few miles from the town which was then the end of the Chicago. Rock Island and Pacific Railroad. Grinnell was a colony town composed from the Eastern States entirely. It had an intellectual atmosphere. Grinnell College merits its reputation for scholarship and thoroughness. It is Congregational but not sectarian. Mr. Jones had three winter terms in the Academy followed by two full years at Grinnell College.

Pioneer families had good food and plenty of it—corn bread was a little too plentiful—but there was scarcely any ready money. A little cash was an absolute necessity when going to college. In western colleges and universities it was customary for young men to board themselves. They walked home Friday nights if it wasn't more than ten or fifteen miles and returned on Monday morning carrying a sack with bread. butter. and vegetables for the ensuing week. Cash for room rent had to be provided somehow. Lynds Jones reduced his cash needs to the minimum. When attending Grinnell College. three and a half miles away. he not only eliminated room rent by walking forth and back. but was also able to assist with the farm work. His daily walk brought him face to face with two board and thirteen wire fences put up to keep the cattle in or out of something. He looked at the fifteen fences. They could not be moved. He accepted the challenge. The board fences he vaulted: two low wire fences he jumped; the remaining eleven barbed wire fences presented a difficult problem. He must crawl under them. The weeds and dirt could be brushed off; to tear his clothes would be a calamity. both financial and otherwise. He removed the barbs from the lower wires. crawled under and went on his way rejoicing. His athletic ability was not lost when he went to Oberlin. where he played tackle and halfback on the Varsity Football Team. He allowed forty-five minutes to walk from the farm to Grinnell and the same to return. but usually he studied his Greek lesson going and his Latin lesson returning and the time was increased somewhat. On reaching home he cultivated corn with his Algebra

fastened to the eultivator. Mr. Jones says: "It was good mental discipline to work out my Algebra lesson that way." When resting the team he stopped at the edge of the woods and checked up on the nesting birds.

Having finished his freshman and sophomore years at Grinnell he went for his junior and senior years to Oberlin College where he graduated in 1892 with the A. B. degree. The eollege at onee gave him the position of Laboratory Assistant. In September, before Oberlin College opened, he married Clara Mabelle Tallman of Grinnell. They went at onee to Oberlin and have lived there ever sinee. Their home has been one of peaee and eontentment free from all distraeting worry, an atmosphere to thrive in and one eondueive to fruitful years of whieh Mr. Jones has had many. In 1895 he reeeived a Master's degree from Oberlin. In 1899 he was promoted to Instruetor. In 1905 he was made Assoeiate Professor and in 1922, full Professor. From the University of Chieago, in 1905, he reeeived the degree of Doetor of Philosophy. He was retired in 1930, having served his eollege eontinuously for thirty-eight years. He did more than serve his eollege, for through the lives of many young men and women who went forth from his class room the world has been enriched.

Letters before me are full of gratitude to a teaeher who gave lasting values. One of his early students writes: "The eourse in ornithology with Dr. Jones in the spring of 1897, started a life-long interest which is of the greatest value to me. My father, Professor A. A. Wright of Oberlin College, was for many years head of the Zoology Department and Mr. Jones was his assistant and deeply valued friend and helper. Oberlin was one of the first to inelude sueh a eourse, and Mr. Jones, single handed, eertainly made the town and eollege of Oberlin 'bird eonseious'. I reeall our sunrise trips. People looked out of their windows and half-opened doors wondering what the queer group was seeing in the tree tops and the sky. Sueh a group was soon known as Mr. Jones' Ornithologieal Class. It was a wreneh to get up for those early trips but no one who went once would ever miss another. Perhaps the best thing a teaeher ean do is to arouse the desire to know more and this he eertainly did for me and many others."

A student writes thus: "Dr. Jones is a very quiet, modest, retiring, but effective man: a teacher who plaees the world of nature before you, and with a few guiding remarks expects you to make the diseoveries for yourself. When in 1914, for the first time, a major in

ecology at Oberlin was offered I signed up. It was then that I fully realized what an excellent scholar along these lines Dr. Jones was. Today I can say that his teaching has lasting and ever increasing value. It has contributed to the joy of living more than that of any other professor." Another of his students writes: "The name of Lynds Jones brings before me a quiet, dignified student of nature; a strong physique; a rugged character; a rare teacher. This personality I describe by the one word 'homespun'."

In the spring of 1890 half-fare railroad rates enabled Mr. Jones to visit Dr. R. M. Strong at his Wauwatosa, Wisconsin, home. It was a memorable visit. With him he took interesting and helpful trips, especially so was the tramp to the heronry. With Dr. Strong he also went to Pewaukee where he met Captain B. F. Goss, a pioneer ornithologist of Wisconsin. A few weeks later, at the Indianapolis meeting of A. A. A. S. Mr. Jones met Otto Widmann, Amos Butler, Barton W. Evermann and others—men he had known and valued for their writings now became a reality and he a co-worker with them. While in the University of Chicago in 1905 he met Dr. T. C. Stephens and as with Dr. Strong and others there grew a lasting friendship out of the contact. In the summer of 1898, in Washington, D. C., he met Robert Ridgway, T. S. Palmer, and H. C. Oberholser. In New York he met J. A. Allen and Frank M. Chapman. He also met his first Starlings in 1898: a small flock seemed established on one of the little islands in Long Island Sound.

Time evaluates our years. Alert students, enlarged by the inspiration of the class room, express their lives through the avenues opened by a true teacher. Colleges and universities justify their existence in the measure in which they send out men and women able to minister to the needs and welfare of mankind.

Dr. Jones' interests lay preëminently in the field of science. At various times he taught zoology, geology, entomology, dendrology, ornithology, and other allied subjects. He was also curator of the Zoology Museum and in 1922 he became Professor of Animal Ecology. He was at home in all these fields but nearest and dearest to his heart was the field of ornithology. This field he had roamed and enjoyed from earliest childhood. He knew the birds that came and went and those that remained all the year on the Iowa farm. He knew the songs of the birds and the music of the trees. One of his valued friends writes: "Professor Jones has a poetical interest in nature as well as

a scientific view point. He was always painstaking as a field observer with a keen ear and memory for bird songs and notes." One of his students says: "A Conservatory professor told me that Dr. Jones' ear was so perfectly trained that he heard tones which the ordinary human never heard. I also recall Dr. Jones saying that many bird songs were so high that they were not heard by any human ear. To him the sounds of nature were enthralling."

Dr. Jones says: "I organized a class in ornithology in the spring term of 1895. It was the first formal course in that subject ever offered in an American college. The subject has been continuously offered in Oberlin since that time. The first class numbered 27 students, the second 35, and from that on up to a maximum of 137." A former student, now established in natural science work, writes: "Dr. Jones stimulates his students to interest in birds outside of the class room. Several times I went on over night trips with him to Bay Point to observe the warbler migration. Once our combined list of warblers and other birds reached 144 species. The study of bird skins, the use of the balopticon in the class room, and the field trips enabled people to learn the common species. [In 1913] Dr. Jones organized a department of ecology separate from zoology and botany. Only Chicago had preceded him in organizing such a department."

Long before he put it into practice Dr. Jones had the vision for extensive out-of-door study for students. In 1915 the dream became a reality. He took a group of fourteen students in ecology across the country for study in the native haunts of birds. He went by train to Seattle, thence by boat and launch to Neah Bay and Moclips. Of this, the first of thirteen trips across the country with college students, a member of the group says: "I rejoice that I was one of the fourteen students who took the first trip with Dr. Jones to the western coast. He had so often talked of going. With three Indian guides we explored the coast of Washington for 250 miles. We were the first women to visit these little islands. Because they are Bird Reservations we had procured permission from Washington, D. C., to visit them. No other trip that I may ever take will be as marvelous as was this one; it is all so vivid; the delightful incidents would fill a book; the six weeks were all too short.

"This was the first time the college had granted ecology credits for such an outing. I am sure Dr. Jones had no easy task in convincing the college that the study would be worth while and that we weren't

a bunch of jolly girls and boys out for fun. We had to adhere strictly to the rules of the college, such as "No dancing" and "No smoking".

"Again in 1919 I enrolled with a class of twenty for a six weeks' study across the country and on the west coast. This trip was made with five Ford motor cars and one truck. It was before the days of auto camps and we slept under the stars, rain or no rain. In 1920 I again joined the class. These trips gave us something not found in books. We also came to know intimately one of the finest of men as well as a great teacher. Work under Dr. Jones, more than any other professor, gave me that something which has remained an ever present source of joy. These trips were not made without annoyances, but Dr. Jones rarely made the slightest reference to any unpleasant incident."

In the thirteen trips across the country with students Dr. Jones made it a point to visit national parks and other places of interest en route. Twice he took his party to National, Iowa, to see the interesting work done by Miss Althea R. Sherman. Of especial interest was the tower she had built for the Chimney Swifts that were roosting and nesting in it. On several trips he visited the interesting laboratory at Lake Okoboji, Iowa. Those who were able to avail themselves of these out-of-door studies attest to their value. The idea of Nature Schools is deeply rooted and is steadily on the increase.

For his personal study of bird life Dr. Jones took a trip to the west coast in 1900. He was accompanied by one of his students, W. L. Dawson. A Summer Reconnaissance in the West (Wilson Bulletin, 1900, XII, No. 4) is the account of this trip. Also for his own study he made two trips to Alaska and the Yukon, and one to Porto Rico. Exclusive of the birds he listed in Porto Rico Dr. Jones has a Life List of 672 birds. His interest in the subject of birds is boundless. He realizes the study should reach beyond the scientific; it should be popularized to call people to lake and wood, marsh and meadow, to train eyes and ears and to this end he gave much time and effort.

In Fall River, Massachusetts, December, 1888, the Wilson Ornithological Club was founded. Its object was the study of birds in their haunts and habits. Of the twelve founders but three are living, Franklin Lorenzo Burns, Reuben Myron Strong, and Lynds Jones. All three have played a large part in the nurture and welfare of this organization. They have been constant and vital factors through many trying and seemingly hopeless years. Much tenacity of purpose is re-

quired to produce the growth of an idea. In this respect the founders of W. O. C. were not wanting. Unto tenacity they added perseverance and faith. The history of the Wilson Ornithological Club is one of years of struggle crowned with success.

Every office, except that of Vice President—for which I am sure he could qualify—has been held by Lynds Jones. The presidency he held eleven years, from 1890-1893 and from 1902-1908, and again from 1927-1929. He was secretary from 1888-1889, and treasurer from 1894-1901. He was editor from 1888-1924. For thirty-nine years he held office. Any one with such a record must have been satisfactory to all political parties. For thirty-six years Lynds Jones was editor of this would-be club. The signs of life were often dim but nurture never ceased. The editor's job was not all absorbing which was of no great moment as editors draw no pay. They draw the printer's bill which, large or small, some one must pay. On such occasions the editor seized the opportunity of taking the lonely bill out of his pocket and giving it to the printer. Dr. Strong says: "The first number of the Wilson Quarterly was published in 1892 and was edited by Lynds Jones with myself as publisher. It had 40 pages. This was the first number edited by him. It appears as Volume 4, No. 1, but it was the first issue under this name. It was preceded by other publications issued as the organ of the club but different in name and form."

We are grateful to the founders but we are not sorry for them Life must reach beyond the task by which it earns a living. It must feel the pulse throb of humanity and respond to its needs and interests. The vision of the founders was not in vain, the aim of the organization "to study birds in their haunts and habits" has been fulfilled. From its original membership of twelve the Wilson Ornithological Club now has 838 members and money enough to pay the printer.

Oberlin, in 1930, placed the name of Dr. Lynds Jones on the retired list but Lynds Jones has not retired. His interest in nesting activities of birds and their migration is as keen as ever. In 1937 he taught in Berry College, Georgia. He continues to take field trips. His interests increase with the years. He takes no small part in the civic and educational affairs of Oberlin. He plays golf and tennis if the day is long enough. His garden, out of which he digs weeds and health, is one of choice and beautiful flowers. And Lynds Jones is a welcome guest in the homes of all who know him.

The years of his life have been useful and fruitful. He has the love and high regard of unnumbered students; he is rich in life-long

friendships; this club honors and values him for his constant and unlimited service. Lynds Jones became a Life Member of this club. The Wilson Ornithological Club made Professor Jones an Honorary Member. The years have made Dr. Jones a Beloved Member.

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Berkeley, Calif.

SOME SAW-WHET OWLS IN CENTRAL IOWA[1]

BY THOS. G. SCOTT[2]

In Iowa the Saw-whet Owl (*Cryptoglaux acadica acadica*) is considered "An uncommon and irregular winter visitor. Unrecorded by a number of observers." (DuMont, 1934). This status encourages the submission of data concerning the habits of some Saw-whet Owls in central Iowa during the winter of 1936-37.

Two of these owls were observed in a hawthorn (*Crataegus* sp.) thicket along Beaver Creek near Camp Dodge, Polk County, Iowa, on December 28, 1936. The thicket was about two acres in area, having a density of from eight to twenty trees per square rod. The thorny, interlocked branches provided an extensive barrier of mechanical protection. In relation to the surrounding country, the thicket was bordered on the north and east by wooded pasture and on the south and west by reasonably open fields. On January 4, 1937, another of this species appeared and the population grew to three. At least one owl remained in the thicket until the last observation on February 28. Another report of the Saw-whet Owl in Iowa (made at Des Moines on December 31, 1930) likewise made reference to the use of the hawthorn tree as a daytime refuge (Palas, 1931).

Incidental to these observations, it may be fitting to report a Saw-whet Owl picked up in Ames on February 17, 1937. The owl, having been injured in some manner, died the following day. The specimen is preserved in the Iowa State College Collection.

The owls that remained in the thicket near Camp Dodge were subjected to brief observation at intervals of several days. Although this procedure did not permit the collection of detailed information relative to daily movements of the birds, it was considered advisable as a measure against attracting undue attention to them.

The owls appeared content to remain deep within the thicket during the daylight hours, exhibiting a tendency to use a chosen perch with much regularity. White excrement distributed over the branches after the habit of raptors, served to indicate the location of each perch. Five perches appeared to be in frequent use, but no more than three owls were observed in the thicket at any one time. The accompanying photograph (Fig. 34) illustrates a preferred perching place and the

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[1]Journal paper No. J-581 of the Iowa Agricultural Experiment Station. Project No. 598. In coöperation with the American Wildlife Institute, U. S. Biological Survey, and the Iowa State Conservation Commission.

[2]Credit is due Mrs. Harold Peasley and Mrs. Ross Thornburg for contributing correlative information.

position of the owl. Most of the perches were from six to seven feet above the ground and on a limb to the southeast side of the tree trunk. The writer knew of only one perch which was not well within the thicket. This was located at the thicket margin in a hawthorn tree grown over with a thick tangle of grape (*Vitis* sp.) vines. Random dropping of pellets and excrement throughout the thicket indicated a slight inconsistency in the owls' use of preferred perches.

While on the perch the owls proved to be excellent subjects for close scrutiny, and it was not difficult to approach within arm's length of them. They sat quietly, unafraid and not too concerned about the presence of other animals in the vicinity. Flocks of Black-capped Chickadees (*Penthestes atricapillus*) working over the outer branches and twigs of an owl's perching tree merely caused it to turn its head and watch them as they passed. There was little activity at the perch other than the usual head turning and movements in regurgitation.

The food habits determination for these owls was made by pellet analyses. The fur, feather, and osteological remains found in the pellets proved easily subject to recognition. Skulls were available for identification of all the mice and shrews except for a part of the white-footed mouse (*Peromyscus* sp.) and meadow mouse (*Microtus* sp.) representation. In consideration of the material at hand, it was thought reasonably accurate to make reference to the genus of mammalian prey not represented by skulls. However, such recognition is treated as questionable. Table I presents an enumeration of the total number of representatives for each prey species. The part of these totals which may be recognized as questionable is entered below the affected total and is indicated by a negative sign. Identification beyond the family group was not attempted for the bird remains.

A list of the potential prey species found within one quarter-mile radius of the thicket center proved helpful in making an evaluation of these food habits. Such forms as white-footed mice, meadow mice, small short-tailed shrews (*Cryptotis parva*), large short-tailed shrews (*Blarina brevicauda*), house mice (*Mus musculus*), Black-capped Chickadees, Tree Sparrows (*Spizella arborea*), Slate-colored Juncos (*Junco h. hyemalis*), Goldfinches (*Spinus t. tristis*), White-breasted Nuthatches (*Sitta c. carolinensis*), Downy Woodpeckers (*Dryobates pubescens medianus*), and Hairy Woodpeckers (*Dryobates v. villosus*) were present in varying numbers dependent upon the plant communities.

FIG. 34. Saw-whet Owl in typical crataegus perching site. January 10, 1937. Johnson Station, Polk County, Iowa. Photograph by Dr. H. R. Peasley.

TABLE 1. Prey Representation.

PREY	Dec. 23	Jan. 4	Jan. 10	Jan. 23	Jan. 24	Feb. 14	Total per Prey Appearance	Percent per Total Prey Appearance	
								Uncorrected	Corrected
Fringillidae		1			1		2	3.0	3.0
Cyrptotis parva		4					4	6.1	6.1
Blaina brevicauda		1					1	1.5	1.5
Peromyscus sp.	2	13	1	2	8	13	39	60.0	44.6
		−2			−3	−5	−10		? 15.3
Microtus sp.		1		4	9	4	18	27.6	15.3
		−1		−4		−3	−8		? 12.3
Mus musculus		1					1	1.5	1.5
Number of Pellets	1	17	1	5	16	16			

About 97 per cent of the food was procured from among mouse and shrew populations; the remaining three per cent was of birds (probably Slate-colored Juncos). The brunt of the predation was borne by white-footed mice and meadow mice. Sixty per cent of the total prey appearance was by white-footed mice. About one-fourth of this showing, however, must be treated as being reasonably accurate but subject to question. Similarly, about one-half of the 27.6 per cent of meadow mice must be considered questionable. These findings leave no doubt as to the value of the food habits of the owls investigated. They also conform with the results of Errington (1932) in southern Wisconsin.

The prey species represented would indicate that most of the hunting was done in the adjacent open fields spotted with a low shrubby growth. This is certainly true for the mammalian prey, and quite possibly the birds represented were captured at roost in the lesser ragweed (*Ambrosia artemisiifolia*) patches found in these same fields. This is also reflective of an availability of prey peculiar to predation of all types.

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THE CHESTNUT-COLLARED LONGSPUR IN COLORADO

BY ALRED M. BAILEY AND ROBERT J. NIEDRACH

The rolling prairies extending to the eastward of the continental divide are the wintering grounds of flocks of small passerine birds; Desert Horned Larks (*Otocoris a. leucolaema*) occur in great flocks in the northeastern portion of the state, and occasionally smaller groups of McCown's Longspurs (*Rhynchophanes mccowni*) are found nearby, or mixed with the more abundant horned larks. The Chestnut-collared Longspur (*Calcarius ornatus*) is not common in winter, if we may judge from our limited observations and from the number of specimens in our collection. Sclater (1912) lists various winter records, but we have only three specimens, all taken at Barr, Adams County, Colorado, in December, 1909. Although the Chestnut-collared Longspur has been found nesting in states adjacent to Colorado, it has not been recorded breeding here, so far as we have been able to find.

In the spring of 1932, Captain L. R. Wolfe stopped at The Colorado Museum of Natural History, and mentioned that he had seen Chestnut-collared Longspurs in a broad valley south of Cheyenne, Wyoming, just over the Colorado line. He believed them to be nesting and Mr. F. W. Miller visited the location and succeeded in finding nests and collecting several sets of eggs, which we have in the Museum collection.

During the past two seasons (1936 and 1937) we have visited the locality on several occasions and have found that the birds are numerous in this broad valley, where they were nesting with McCown's Longspurs, Lark Buntings, Desert Horned Larks, and Mountain Plovers as near neighbors. We made our first trip on August 8 and found the various prairie species assembled in flocks; they were exceedingly scarce except in the vicinity of a small waterhole and about a field of irrigated alfalfa, where hundreds of longspurs and horned larks were feeding upon insects. It was difficult to distinguish between the McCown and Chestnut-collared in flight and we found them extremely wild; we ran several miles each way from our little valley without finding Chestnut-collared Longspurs elsewhere, although McCown's Longspurs were common upon the level prairie adjacent. On September 5 we again visited the area and found birds still numerous about the waterhole where we had no difficulty in securing a few specimens in their fall plumage.

The summer of 1937 was well advanced before we had an opportunity to visit the breeding grounds on June 19. The prairie was covered with wild flowers—the prairie primrose, penstemon, and wall-

flowers making a natural garden; and black-breasted male Chestnut-collared Longspurs were dotted about the valley. They rested upon song perches or hovered in the air upon outstretched wings as they poured forth their satisfaction with the world in general, and then, at the conclusion of their songs, drifted downward to their weedstalks. It is strange how similar are the songs and antics of the males of various species of prairie birds during the spring. Even the nuptial flight of such unrelated birds as the Mountain Plover and longspurs are similar, although, of course, the songs themselves have nothing in common.

The song of the Chestnut-collared reminds us of that of the Western Meadowlark, and time and again we were deceived as we heard their clear calls. The nuptial flight of the males of the two longspurs differs somewhat: the McCown mounts high in the air, singing all the while, and then floats downward with outspread wings making a definite "V". The Chestnut-collared tends to circle more, dropping less abruptly, and they seem to quiver their wings as they descend to earth, their dark underparts black against the light blue of the sky.

It is an easy matter to locate nests of both species of longspurs after the song perches have been discovered, for the females are almost sure to be tucked away in the near vicinity, and it is only a matter of walking about until they flush from under foot. We found many nests of both species with contents ranging from fresh eggs to half-grown young, and imagined we could distinguish a choice of nesting sites in that the majority of those of the Chestnut-collared were in rolling country, on the slopes and along the valley floor, while the McCowns were more abundant on the level prairie. The McCowns were found adjacent to the Chestnut-collared, but the latter were not observed nesting on the flat areas. In other words, the flat expanses were typical nesting areas of the McCown's Longspurs and the valleys of the Chestnut-collared, but the former extended their nesting range into that of the latter. There was no place, however, where we could draw a line between nesting areas.

The nests of both species were cup-like affairs tucked in depressions excavated by the female, lined with grasses, hair, and feathers; they were usually concealed between some bit of prairie vegetation, and oftentimes were beautifully placed near prairie asters, phlox, or flowering cactus. Even when in the open, however, cut by only a few blades of wiry grass, they were difficult to see. They had from three to five eggs of various markings, no two sets that we found being alike.

Whenever we found a nest of Chestnut-collared young, the male was extremely solicitous. Frequently he would alight within a few

FIG. 35. Chestnut-collared Longspur.
By the Authors.

feet of us, voicing protest, without losing the small insects which crammed his beak. We erected our photographic blinds to observe the birds better, and to secure our film record for our picture library. Hardly had we concealed ourselves until the male was back, chucking insects down coöperative young, but the female would not come to the nest, although she sat some distance away with food-filled beak. When only eggs were in the nest, however, conditions were reversed, for then it was the female that returned to the nest and the male remained in the distance. We worked with too few birds to generalize, however: it may have been that other individuals would have reacted differently. We found twelve nests of the Chestnut-collared Longspurs in the course of our ramblings over this isolated bit of Colorado prairie, and were glad of a chance to add a pictorial record of this species to our files of the nesting birds of our state.

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NEST BUILDING BEHAVIOR IN THE LOGGERHEAD SHRIKE GROUP

BY ARCHIBALD JOHNSON

Statements concerning male Loggerhead Shrikes[1] (*Lanius ludovicianus*) aiding in nest building are placed by Miller[2] in the group of writings on life history which "yet are not founded on well proved facts". Without regard to whether or not such behavior is normal, this paper will attempt to show that one male Loggerhead assisted in nest building.

The incomplete nest of this bird and his mate was discovered in Woodbury Township, Stutsman County, North Dakota, on May 6, 1937, in a dead poplar tree hardly forty-five yards from a farmhouse. It rested about sixteen feet from the ground in an angle formed by the

[1]This is a case to show the inadequacy of the vernacular names in the current A. O. U. Check-List. The author does not wish to distinguish between *Lanius ludovicianus migrans* and *L. l. excubitorides*. But there is no common term to include the two subspecies. Hence the term "Loggerhead" is here allowed to stand for the specific group.—Ed.

[2]Systematic revision and natural history of the American shrikes (Lanius). By Alden H. Miller. Univ. Calif. Publ. Zool., Vol. 38, No. 2, 1931, pp. 11-248, page 168.

bole and a cluster of twigs and slender branches springing from the east quadrant of the trunk.

These birds were not shy. In fact, late in April they had examined the Virginia creeper about the porch on the farmhouse while in search of a nest site. From May 6 to May 27 (when the eggs were destroyed by some marauder) the activities at the nest were observed from a distance of twenty-eight yards without the birds being disturbed. As was to be expected, they hotly resented all trespassing in the immediate vicinity of the nest.

When first located, the nest was so incomplete that a working bird could be seen plainly through the walls. Materials used in the construction of it were fragments of Russian thistles and soft plant substances. From May 6 through May 14, 604 minutes were spent in watching the building activities at the nest. During this time the birds brought material to the nest thirty-five times with time intervals between trips averaging 8.5 minutes. The calculation of time intervals was based only upon time lapses between trips. A more detailed summary of these data is given in Table I.

TABLE I. Summary of the nest-building activities of a pair of Shrikes (*Lanius ludovicianus* subsp.) as further described in the accompanying paper.

Date	Hours of Observation	No. Min. Spent in Observation	No. Trips to Nest with Material	Average No. Minutes Between Trips	
May 6	7:37-8:18 A.M.		12	3.16	
	11:14-11:45 A.M.	91	7	4.42	
	11:45 A.M.-12:04 P.M.		0	0	
May 7	12:50-1:04 P.M.	14	0	0	
May 8	2:56-3:11 P.M.	15	0	0	
May 9	8:20-9:35 A.M.	75	7	9.07	
May 10	2:27-4:30 P.M.	123	0	0	♀ first fed by ♂
May 11	3:15-3:27 P.M.	12	0	0	
May 12	7:12 P.M.	1	0	0	A bird busy in nest
	9:35-10:27 A.M.		3	14.25	
May 13	10:55 A.M.-12:16 P.M.	168	6	13.20	
	12:44-1:19 P.M.		0	0	
May 14	2:03-3:48 P.M.	105	0	0	
May 15					First egg laid

In the enumeration of details relative to the building activity of the male, "arrange" implies all activity of a bird in a nest under construction while making newly gathered material a part of that nest.

On May 6 at 7:59 A.M., a bird entered the nest with material and arranged. One minute later (8:00) the other bird of the pair brought material and gave it to the first bird which continued arranging until

8:01. Immediately the second bird, without material, entered the nest and arranged for a few seconds only. By 8:05 A. M. a bird again entered the nest with material and arranged. It left at 8:06 when the other bird entered and arranged material it had brought until 8:07.

At 8:20 A. M., May 9, a bird entered the nest without material and stayed only a few seconds. At 8:21 the other bird entered with material and arranged while the bird that had first been in the nest rested on a near twig.

Then at 11:31 A. M., May 13, a bird entered the nest from the south without material and arranged. By 11:33 the second bird brought material to the nest tree, but did not go to the nest before going to the fifth poplar south. Here, after dropping some material, the bird went to the nest and deposited the remainder. It was arranged by the bird that had been busy in the nest since 11:31 and that left at 11:34½.

These are the only instances observed in which the two birds brought material to, or worked about, the nest at the same time. Instances in which one bird gave material to another were studied closely. In no case was the material mistakable for food. Also at none of these times was begging heard.

One of these birds must have been the male of the pair since at no time were more than two birds seen in the territory. Although in certain species individuals in addition to the mated pairs concerned are known to assist in caring for broods of young (Skutch, A. F., "Helpers at the Nest", *Auk*, LII, p. 257), such behavior would seem to be intolerable to shrikes, not to mention assistance in nest building.

Whether or not the male shared equally with the female in nest building could not be determined objectively. However, since at only six times were visits to the nest concurrent for the two birds, and furthermore, since males usually attend the females rather closely during nest building (Miller, *op. cit.*, p. 166) making possible participatory visits seldom other than coincidental with those of the females, it would seem reasonable to conclude that this male did not assume any great portion of the burden of nest building.

Jamestown, N. D.

THE SKULLS OF DUCKS

BY CYRIL E. ABBOTT

Several years ago a young man whose father belonged to a hunting club presented me with the heads of several different species of wild ducks. It seemed such a pity to discard these without putting them to some use, that I finally decided to preserve the skulls. A casual examination of these indicated that, on the basis of the forms of the lacrymals alone, the marsh ducks (Mallards) may be distinguished from the open water species (Scaups). This led to an examination of the remaining movable bones of the skull, in the expectation that they would yield further evidence of grouping. The results, though different from those expected, are so interesting that they are described in detail.

The two longest axes of each bone were measured, and recorded in millimetric fractions. (See Table I). The selection of axes, though more or less arbitrary, was made consistently; corresponding points were selected for measurement in all specimens. The measurements are represented in the figures, especially Figure 37, by the dotted lines. Each set of crossed lines represents the measurements of one bone; excepting the jugal and quadratojugal, which, for obvious reasons, were measured as one bone.

It was impractical to attempt the measurement of the cranial bones, in part because their curvature made determination of axes difficult, and also because the sutures between the cranial bones of birds are very indistinct.

Despite fundamental differences in form between the lacrymals of Mallards and Scaups, there is actually a graded series existing: from the terete lacrymal process of the Redhead to the expanded and very thin lacrymal process of the Green-winged Teal.

With the exception of the lacrymals, there is very little difference in the proportions of corresponding bones in the skulls of various species of ducks. In some cases the dimensions are also identical. The vomer is of equal size in several species; so also is the maxilla and the squamosal. The set of bones exhibiting the greatest variation in this respect are the jugal-quadratojugals.

To continue briefly a comparison of certain bones: the fractional index for the articular of the Mallard is 10/10: for the Black Duck it is 11/12; for the Green-winged Teal it is 6/6; for the Blue Goose it is 12/14. It is of interest that the index of this bone is identical (10/10) for the Lesser Scaup, Ringneck, Redhead, and Mallard.

TABLE 1. Measurements of the Skull Bones of Ducks. Denominators indicate the longest axes; numerators the second longest axes. Numbers represent millimeters.

	Premaxillary	Maxillary	Nasal	Lacrymal	Vomer	Palatine	Prevomer	Squamosal	Quadrate	Pterygoid	Jugal-Quad-Jugal	Dentary	Splenial	Angular	Articular	Ocular Orbit
Lesser Scaup	13/30	6/30	6/9	10/15	4/18	6/22	7/10	20/20	9/11	4/11	2/30	4/40	4/22	6/33	10/10	15/20
Ringneck	13/30	6/30	6/8	10/15	4/15	5/17	4/12	18/18	9/12	3/10	2/34	4/40	4/15	5/32	10/10	15/18
Redhead	10/30	7/30	6/9	11/16	4/15	3/10	5/15	20/20	5/6	4/15	2/40	4/22	2/13	2/9	10/10	15/20
Mallard	5/9	8/40	9/14	15/25	4/20	6/27	5/20	23/25	10/15	4/15	1/20	4/60	2/25	3/20	10/10	18/22
Black Duck	16/45	9/44	10/14	16/25	4/20	7/25	5/20	25/25	10/15	4/12	2/45	5/60	6/20	4/21	11/12	17/20
Green-winged Teal	8/17	6/30	6/10	10/15	2/15	3/20	3/10	15/20	8/10	3/8	1/30	3/40	2/15	5/30	6/6	14/18
Blue Goose	8/30	6/30	9/10	15/15	5/15	10/30	5/15	25/30	10/15	5/15	2/40	4/60	5/20	7/40	12/14	17/20
Red-breasted Merganser	4/30	2/15	6/6	10/10	3/15	4/20	3/10	18/20			2/30	3/45	4/15	6/36		15/18
Pintail	12/35	7/40	9/12	15/20	4/20	4/25	5/20	20/23	10/12	3/12	2/42	4/55	5/20	7/45	10/10	

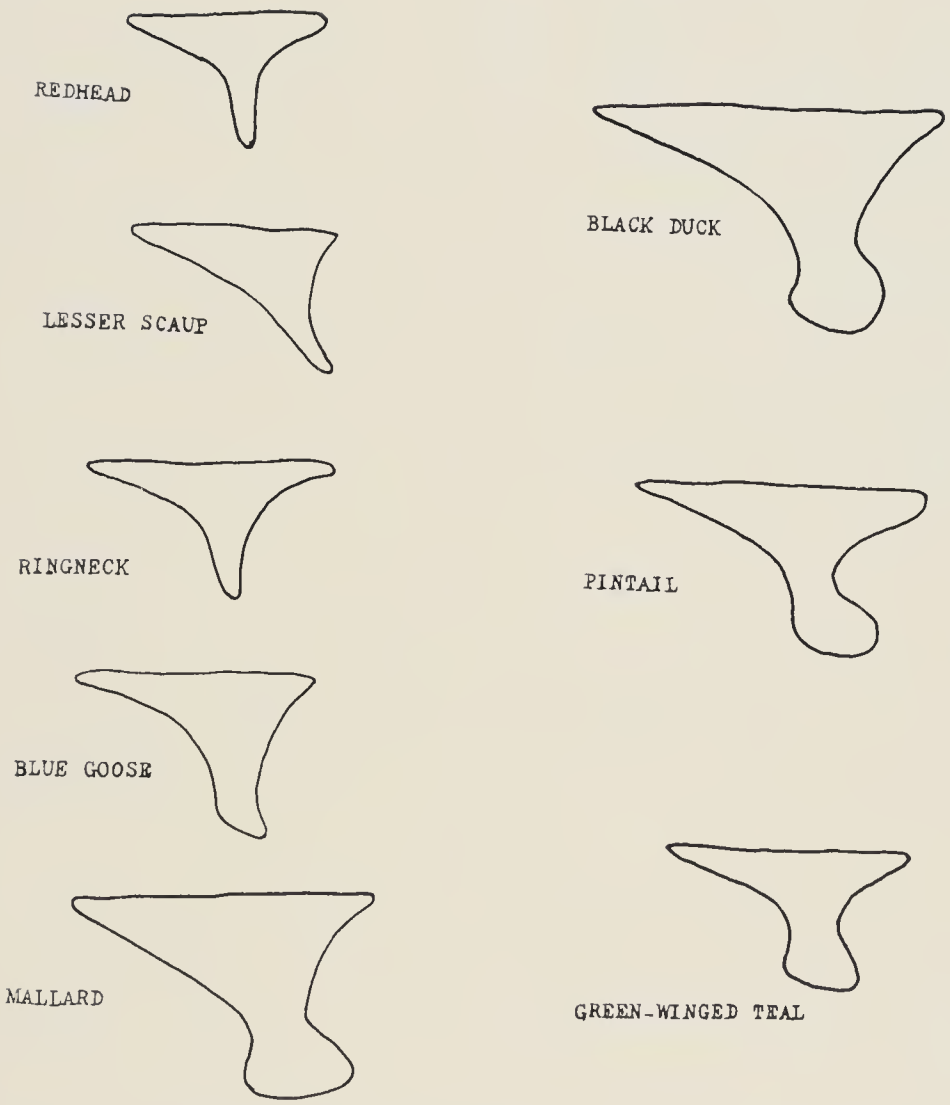

Fig. 36. Outlines of the lacrymal bones in various species of ducks.

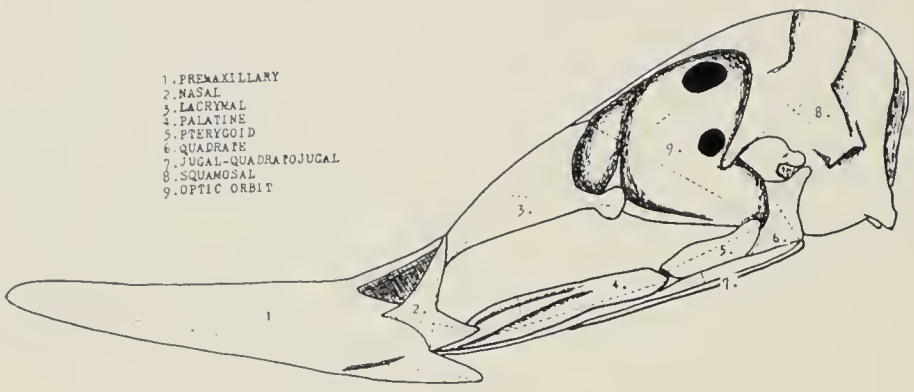

FIG. 37. Left lateral aspect of the Pintail skull.

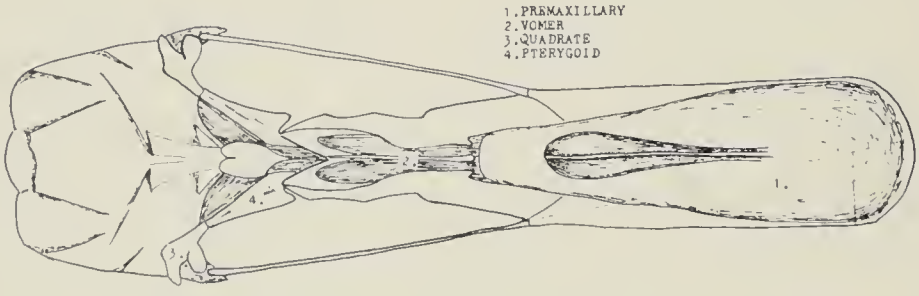

FIG. 38. Ventral aspect of the Pintail skull.

FIG. 39. External lateral aspect of the lower mandible of the Pintail skull.

Correspondence in the dimensions of the bones in various species follows no definite classification. It certainly does not correspond with taxonomic relationships: not even with similarities in other bones. Thus the prevomer of the Mallard and the Black Duck both have the index 5/20, but so does the Pintail; while that of the Teal is 3/20!

The similarity in form and dimension in the movable bones of the skulls of various species of ducks is probably due to the interrelationships of these parts. The living bird is able to flex the upper mandible, thus increasing the size of the mouth opening. This ability also enables the duck to work limnaceous material through the mouth. The action may be duplicated in a wet skull by holding the cranium firmly in one hand and flexing the premaxillary with the other. It may then be observed that during this action the quadrates rotate forward and upward; the jugal-quadratojugals, together with the palatines, are pushed forward; the palatines are moved forward by the pterygoids; these last two pairs of bones sliding their ental processes along the vomer and the bases of the interorbital processes. This action, by forcing forward the prevomer and maxillaries, raises the mandible.

It is obvious that this mechanism must be delicately adjusted, and hence, probably, the correspondence of its parts in different species of ducks.

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HOW VALUABLE ARE WOODLAND CLEARINGS TO BIRDLIFE?

BY DANIEL W. LAY

Ecological field work conducted between June 1 and September 30, 1936, in Walker County, Texas, permitted a limited census of bird populations in several types of interior woodland and corresponding margins of clearings. Most of the counts were made in or near second-growth pine-oak-hickory woodland. This association includes shortleaf and loblolly pine, red oak, post oak, water oak, sweetgum, winged elm, and black hickory. The younger types of cut-over are quite open and contain many of the developmental species which occur in recently abandoned fields.

Kashkarov (Acta Universitatis Asiae Mediae, Series VIII-a, Zoologia, Fasc. 1, 1927), whose method follows closely that used by Grinnell and Storer (Animal Life in the Yosemite, 1924, pp. 22-35), has discussed rather thoroughly quantitative methods of analyzing bird associations. Space units are difficult to define when one is working with birds, so time-unit methods which involve listing and counting all birds seen on a two- or three-hour excursion in one type are recommended. Census trips are made afoot. The above workers take census records only for the nesting season in determining resident associations; but counts of bird populations at all seasons of the year have been found useful to show important seasonal changes.

An expression of relative abundance was the object of the present census which is based upon thirty-minute time-unit counts of individuals as well as of species observed. In making the counts the observer walked slowly and recorded all birds seen during each thirty-minute period. With field glasses in hand, stops were made whenever birds were heard or glimpsed. Usually only the birds actually seen were recorded; but occasionally, when the unmistakable song of a familiar bird was heard in nearby cover, time was not consumed in stalking for sight of the individual. Individuals not readily recognized were listed as unidentified. The path of the observer followed no definite line. Interior counts were made more than one hundred yards from margin; usually they were much deeper within the woodland. Marginal counts were made along the edges of clearings. No bird more than twenty-five yards from the edge was included in these marginal counts. Nearly all the counts were made before 10 A. M. This served to make the counts more comparable; however, weather may have as much effect on the counts as the time of day. Generally, two or four counts were made during a morning, alternating between a

margin and its corresponding interior. This further reduced variation in census conditions.

A summary of thirty such counts follows:

TABLE 1. Relative abundance of Birds in Margins and Interiors. (From counts made in Walker County, Texas, between July 1 and September 30, 1936).

TYPE OF INTERIOR	MARGIN			INTERIOR		
	No. of Counts	Ave. No. Species	Ave. No. Birds	No. of Counts	Ave. No. Species	Ave. No. Birds
Oak-palmetto river bottom	3	6	17	2	3.5	4.5
Oak-elm river bottom	3	6.7	19	4	4.25	6.25
1-4 year cutover pine	2	6.5	15.5	3	5.3	13.3
10-14 year cutover pine	3	3.3	10.3	5	4.4	8.2
15 and older cutover pine	3	9.7	20.7	2	6	11
Summary of all counts	14	6.5	16.6	16	4.6	8.5

The summary of thirty counts, showing that margins of clearings averaged 16.6 birds of 6.5 species and that interiors average 8.5 birds and 4.6 species per thirty-minute period, apparently gives a true picture of the relative value of margins and interiors for birdlife.

All of the very common species appeared in both margins and interiors. Some of them, however, were more than twice as numerous in margins as in interiors. Among these were the Cardinal, Mourning Dove, Blue Jay, Red-headed Woodpecker, and Sparrow Hawk.

Species that were found only in margins include Blue Grosbeak, Orchard Oriole, Mockingbird, Blue-gray Gnateatcher, Red-cockaded Woodpecker, Turkey Vulture, Red-winged Blackbird, Scissor-tailed Flycatcher, Migrant Shrike, Ruby-throated Hummingbird, and Sycamore Warbler. The last two species were found once in fourteen counts so their appearance only in the margin may not show true relative abundance. Several others in this list frequently may be found in interiors but they are, nevertheless, characteristic of the margins.

Characteristic birds of the interiors were the Tufted Titmouse, Pine Warbler, White-breasted Nuthatch, Brown-headed Nuthatch, Red-eyed Vireo, and the Barred Owl. With the exception of the Tufted Titmouse, which was more than twice as numerous in interiors as in margins, these species were not observed in margins.

Common species which were not distinctly more numerous in either margins or interiors were the Chickadee, Carolina Wren, Red-bellied Woodpecker, and Yellow-billed Cuckoo.

The relations of birds to marginal vegetation have long been recognized by ornithologists. The present study serves merely to empha-

size with numerical examples the value of clearings to birdlife. The margins of clearings were found to contain 41 per cent more species and 95 per cent more individual birds than the corresponding woodland interiors. There is abundant evidence, also, that mammals are attracted to the margins of clearings.

Obviously a primary essential to the management of woodland areas for wildlife, especially for birdlife, is the provision of clearings with extensive margins. The influence of a clearing usually extends less than a hundred yards into the interior of the woodland, consequently maximum development of an area for wildlife requires numerous, well located clearings. The interior of a large clearing is as depleted of wildlife as is the interior of the woodland, hence the need for small but numerous clearings.

Summary

(1) Thirty-minute time-unit bird counts are useful for expressing the relative abundance of birds in two or more types.

(2) An average thirty-minute walk in the margin of a Walker County, Texas, pine woodland clearing may be expected to disclose 16 or 17 birds of 6 or 7 species. A similar walk in the interior of woodland more than 100 yards from the edge of a clearing discloses 8 or 9 birds of 4 or 5 species.

(3) The margins of clearings have 95 per cent more birds representing 41 per cent more species than the interiors of corresponding woodland.

(4) In the management of pine woodland the provision of well scattered, small (less-than-thirty-acre) clearings is distinctly favorable to birdlife.

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A PRELIMINARY LIST OF THE BIRDS OF HOT SPRINGS NATIONAL PARK AND VICINITY

BY WILLIAM H. DEADERICK

Hot Springs National Park is located southeast of the center of Garland County, this county lying just southwest of the center of Arkansas. The generally rough topography of the county is drained by the Ouachita River and its tributaries and by the tributaries of the Saline River. The steep ridges, which are mostly of zigzag or parallel patterns, range up to 1400 feet above sea level. They make up parts of six distinct mountain ranges separated more or less from each other by a system of three relatively wide basins.

The exposed rocks of this county represent a rather continuous deposition of sands, mud, and chert in the Ouachita Embayment which persisted in the present Ouachita Mountain area throughout most of the Paleozoic era. The sedimentary rocks of this region are essentially all silicious and include the following formations, listed in order from oldest to youngest: Mazarn shale, Blakely sandstone, Womble shale, Bigfork chert, Polk Creek shale, Blaylock sandstone, Missouri Mountain shale, Arkansas novaculite, Hot Springs sandstone, Stanley shale, Jackfork sandstone, and Atoka sandstone. Most of the ridges are topped with Arkansas novaculite and there are small areas of igneous rocks exposed in a few places. I am indebted to Mr. H. W. Lix of the National Park Service, for these geologic data.

The soil is thin, rocky, dry, acid, and relatively sterile over almost the entire county. From the standpoint of agricultural productiveness Garland stands near the bottom of the list of Arkansas counties.

There is a small area of Upper Austral Zone in the extreme northern portion of the county west of Jesseville, an area more or less sausage-shaped, running approximately east and west and not more than four by eleven miles in extent. None of my bird studies were made in this section but were confined to the Lower Austral Zone.

The Ouachita River enters the county at the center of its western boundary, winds irregularly southeast and makes its exit near the southeast corner. In 1924 the Arkansas Light and Power Company completed a dam across the Ouachita River, forming Lake Catherine, some six miles of which is in the southwest corner of this county. Another dam was built across this river four miles south of the City of Hot Springs forming Lake Hamilton. The gates to the dam were closed December 17, 1930, and the initial operation of the hydroelectric plant was January 1, 1932. This lake is at an elevation of 400 feet above sea level, has a river length of twenty-four miles, a shore

line of 170 miles, and covers an area of 7,150 acres. The depth varies from wide shallows over the inundated flats to more than 100 feet in the river channel. Depending on the rainfall and the amount of water required for the generative units the water level varies. A maximum vertical fall of twenty-five feet has been reached once. These variations produce marked changes in the shore line, resulting in wide beaches at low levels.

The average temperature in this section during January is about 42° F., that for July about 80° F. The rainfall during 1934 was 53.67 inches, in 1935, 59.66 inches, in 1936, 38.04 inches.

Seventy-eight per cent of Garland County is in forest, at least seventy-five per cent of which is in second growth pine, principally short leaf pine (*Pinus echinata*) and loblolly pine (*Pinus taeda*). Forest fires occur often enough to sweep the ground cover of the pine woods clean.

There are no extensive areas of deciduous trees in the county, such as there are lying mostly along the streams. A not inconsiderable portion of this hardwood was destroyed in clearing the beds of Lakes Catherine and Hamilton. The commonest deciduous trees are the various species of oaks, sweet gum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), and American elm (*Ulmus americana*). In the more open flats are found *Crataegus* ssp. and persimmon (*Diospyros virginiana*) as well as blackberry and reproduction growth of winged elm (*Ulmus alata*). There is the usual ground shelter of grass and weeds but cattle are permitted to roam at large and forage grasses are kept closely cropped.

The principal food plants are wild cherry (*Prunus serotina*), blackberry and dewberry (*Rubus* ssp.), hackberry (*Celtis* ssp.), pokeberry (*Phytolacca decandra*), service-berry (*Amelanchier canadensis*), Indian cherry (*Rhamnus caroliniana*), red mulberry (*Morus rubra*), French mulberry (*Calicarpa americana*), mistletoe (*Phoradendron flavescens*), wild grape (*Vitis* ssp.), poison ivy (*Rhus toxicodendron*), sumac (*Rhus copallina* and *R. glabra*), black haw (*Viburnum* ssp.), dogwood (*Cornus florida*), and various elms (*Ulmus* ssp.). The seed producing weeds and other plants are estimated at about 350 varieties. Mr. H. R. Gregg of the National Park Service, kindly furnished these botanical data.

In Lake Hamilton the decided fluctuations of the water level are not conducive to a wide variety of food plants for water fowl. "Musk grass", however, is abundant and is a favorite food with many water birds. A specimen of this was sent to Dr. Marshall A. Howe, of the

New York Botanical Garden, who kindly identified it as *Chara robbinsii.*

It is only about forty miles north of Hot Springs to the Arkansas Valley. From there north the proportion of deciduous trees is at least a reversal of that in this section, in fact there are extensive areas of forest in which little pine is found. About twenty-five miles south of us begins the Gulf Coastal Plain. In that part of the state there are large tracts of deciduous forest and in the bottomland and along the main rivers and smaller streams there are bands of practically one hundred per cent of hardwood types including cypress. The fact that the Hot Springs area is wooded largely with second growth pine and lies between two sections rich in deciduous woods, may account for the scarcity or absence of some species of birds, and the paucity of individuals which are more or less common in some other parts of the state. Two or three hours easy flight would enable most birds to pass us by. Particularly noticeable is the small number of warblers found in this vicinity. The only migratory movement I have ever seen in this section which could be called a "wave" is that of the Myrtle Warbler which is also a winter resident. The transients pass here the latter part of March and early April and again in early November in great numbers.

On the other hand there is a variety, and in the case of some species, a considerable number of individuals, of water birds.

A line drawn due north through Lake Hamilton transects Lake Taneycomo and Lake of the Ozarks, both of which are artificial lakes in Missouri. Lake Taneycomo, 155 miles north of Hot Springs and in the southern part of Missouri, is twenty-five miles long and covers 5,000 acres. Lake of the Ozarks, about 265 miles north of here, is the largest body of impounded water in the world, over 129 miles long and covering more than ninety-five square miles. This line crosses also the Arkansas River some fifty miles north of Hot Springs and, continued south about 180 miles, the Red River in Louisiana. It could hardly be maintained that this line has been adopted as a new migratory lane for it lies in about the center of the widest and most used of the known migratory avenues but it does afford suitable feeding stations at convenient intervals. About 140 miles to the east is the much traveled Mississippi River route but I know of nothing comparable to the west of us. It is not improbable that during seasons of drouth water birds will concentrate along lanes affording a certain water supply. The effect of recently impounded water on the water bird life of this section is shown by the addition of thirteen water birds

to the state list, by the observation of four water birds of which there is only one previous record in the state, four of which there are only two previous records, and two recorded by only four observers.

Within the limits of the National Park the greatest enemy of bird life is probably the cat. It is estimated that twenty are killed annually by the park rangers and that there are yet probably fifty at large. Public Enemy No. 1 to breeding birds in this vicinity is undoubtedly the Blue Jay, our most abundant bird with the exception of the English Sparrow. Crows also are numerous and are notorious nest robbers. Hawks and owls are relatively rare. Aside from the cat the only mammals which may be predators of any importance are the opossum and the squirrel. Our predacious snakes, which are in moderate numbers only, are the black snake (*Coluber constrictor* ssp.), the pilot black snake (*Elaphe obsoleta obsoleta*), and the coach-whip (*Masticophis flagellum flagellum*). The man-element in bird destruction is almost negligible. I know of no collectors of either birds or eggs in this region. There is probably the usual number of air guns and small bore rifles in the hands of the boys but poor marksmanship prevents many kills.

The List

Common Loon. *Gavia immer immer*. Fairly common fall transient, rare winter resident. Arrivals, October 5-24. My 1935 observations were recorded in the *Auk*, July, 1936, p. 349.

Horned Grebe. *Colymbus auratus*. Fairly common fall transient, rare winter resident. Arrivals, October 1-15. My first observation was reported in the *Auk*, July, 1936, p. 349.

Pied-billed Grebe. *Podilymbus podiceps podiceps*. Common winter resident. Arrivals, August 2-September 6; latest records, April 16-22; one record for July 3, 1935. Usually seen as singles or small groups, largest of 13.

Double-crested Cormorant. *Phalacrocorax auritus auritus*. Common transient. Spring arrivals, March 26-April 18; latest spring records, May 8-13. Fall arrivals, September 16-25; latest fall records, November 17-December 17.

Water-turkey. *Anhinga anhinga*. Very rare transient. I have only one record, October 30, 1931.

Great Blue Heron. *Ardea herodias herodias*. Permanent resident, fairly common in spring, common in summer and fall, uncommon in winter.

Ward's Heron. *Ardea herodias wardi.* Observations made July 29, August 4, 5, and 11, 1936. On August 5 there was a pair, on the other dates, singles.

American Egret. *Casmerodius albus egretta.* Common summer visitant. Arrivals, July 22-23; latest records, September 16-October 26.

Louisiana Heron. *Hydranassa tricolor ruficollis.* Rare summer visitant. One was seen August 1, 1937, two singles August 8, 1937. and one August 19, 1937.

Little Blue Heron. *Florida caerulea caerulea.* Common summer visitant. Arrivals, July 4-27; latest records, September 28-October 10. An off-season record for May 14, 1935, another for May 18, 1936. Of 632 individuals enumerated during the summers of 1935 and 1936 six have been in the blue phase.

Eastern Green Heron. *Butorides virescens virescens.* Common summer resident. Arrivals, April 14-18; latest records, September 9-23. All the nests I have found have been in water oak trees (*Quercus nigra*).

American Bittern. *Botaurus lentiginosus.* I have only one record, November 17, 1936. A specimen was taken by some local hunters and presented to me.

Common Canada Goose. *Branta canadensis canadensis.* Uncommon fall transient. Arrivals, October 19-24.

Lesser Snow Goose. *Chen hyperborea hyperborea.* Uncommon transient. One spring record, March 25, 1936; fall arrivals, October 24-November 8.

Blue Goose. *Chen caerulescens.* Rare transient. Singles were seen October 25 and 30, 1937.

Common Mallard. *Anas platyrhynchos platyrhynchos.* Common transient, uncommon winter resident. Arrivals, October 21-26; latest record, March 26.

Common Black Duck. *Anas rubripes tristis.* Uncommon transient, rare winter resident. Spring arrivals, about the middle of April; fall arrivals, during the last of October.

Gadwall. *Chaulelasmus streperus.* Common transient. Fall records, October 17-December 28.

Baldpate. *Mareca americana.* Fairly common transient. Spring records, April 5-6; fall records, October 12-November 12.

American Pintail. *Dafila acuta tzitzihoa.* Common transient, uncommon winter resident. Fall arrivals, September 20-28.

Green-winged Teal. *Nettion carolinense.* Fairly common transient, uncommon winter resident. First fall record, November 13.

Blue-winged Teal. *Querquedula discors.* Abundant transient. Spring records, April 2-May 10; fall, August 25-November 2.

Shoveller. *Spatula clypeata.* I have only one record, October 5, 1936.

Wood Duck. *Aix sponsa.* My single record is for January 10, 1935.

Redhead. *Nyroca americana.* Uncommon transient. Earliest record, October 28; latest, November 14.

Ring-necked Duck. *Nyroca collaris.* Common winter resident. Arrivals, September 16-October 29; latest records, April 4-May 13.

Canvas-back. *Nyroca valisneria.* Fairly common transient. Earliest fall record, October 24.

Greater Scaup Duck. *Nyroca marila.* Rare transient and winter resident. Earliest fall record, October 7.

Lesser Scaup Duck. *Nyroca affinis.* Common winter resident. Arrivals, September 27-October 5; latest records, April 2-May 23.

Buffle-head. *Charitonetta albeola.* Fairly common transient, rare winter resident. Earliest fall record, November 17.

Ruddy Duck. *Erismatura jamaicensis rubida.* Common transient, uncommon winter resident. Arrivals, October 10-November 4.

Hooded Merganser. *Lophodytes cucullatus.* My only record is for October 26, 1936.

American Merganser. *Mergus merganser americanus.* I have only one record, January 28, 1937, when a single and a group of six were seen on Lake Hamilton.

Red-breasted Merganser. *Mergus serrator.* Uncommon fall transient. Arrivals, October 24-November 14. My earliest observations were reported in the *Auk*, July, 1936, p. 349.

Turkey Vulture. *Cathartes aura septentrionalis.* Common permanent resident. The ratio of my records for this species to those of the Black Vulture is as six to one.

Black Vulture. *Coragyps atratus atratus.* Fairly common permanent resident.

Sharp-shinned Hawk. *Accipiter velox velox.* Uncommon transient.

Cooper's Hawk. *Accipiter cooperi.* Uncommon, probably a permanent resident. One was recorded May 2, 1937.

Eastern Red-tailed Hawk. *Buteo borealis borealis.* Rare transient. Two spring records, March 13 and 18; one fall record, November 4.

Northern Red-shouldered Hawk. *Buteo lineatus lineatus.* Uncommon permanent resident.

Southern Bald Eagle. *Haliaeetus leucocephalus leucocephalus.* Uncommon permanent resident. Reported in the *Auk*, July, 1936, p. 349.

Marsh Hawk. *Circus hudsonius.* I have made only three observations, September 11 and October 3 and 20, 1936.

Osprey. *Pandion haliaëtus carolinensis.* Fairly common summer resident. Arrivals, April 7-May 6; latest records, October 26-November 4. I have seen as many as four at one time on a small portion of Lake Hamilton.

Eastern Sparrow Hawk. *Falco sparverius sparverius.* Uncommon permanent resident.

Eastern Bob-white. *Colinus virginianus virginianus.* Common permanent resident.

Ring-necked Pheasant. *Phasianus colchicus torquatus.* Only one has been observed, May 3, 1936.

Eastern Turkey. *Meleagris gallopavo silvestris.* Rare permanent resident. One was killed about twelve miles from Hot Springs by a local hunter, April 16, 1937.

King Rail. *Rallus elegans elegans.* One was killed by a local hunter, December 22, 1935. Reported in the *Auk*, October, 1936, p. 455.

American Coot. *Fulica americana americana.* Abundant transient, common winter resident. Arrivals, August 27-September 28; latest records, May 12-June 12. Seen in rafts of a thousand or more during the fall migration.

Piping Plover. *Charadrius melodus.* A single specimen was collected August 10, 1936.

Semipalmated Plover. *Charadrius semipalmatus.* Fairly common fall transient. Earliest record, August 30; latest, October 12; largest group seen, three.

Killdeer. *Oxyechus vociferus vociferus.* Common permanent resident.

American Golden Plover. *Pluvialis dominica dominica.* Uncommon transient. Observed from March 28-April 14, 1936, and September 9, 1936. The largest group numbered five. Reported in the *Auk*, October, 1936, p. 455.

Black-bellied Plover. *Squatarola squatarola.* Uncommon fall transient. Seen in summer plumage, September 14, 16, and 17, 1936; in winter plumage, October 28, 29, and November 1, 1936. The largest group was one of six.

American Woodcock. *Philohela minor.* I have no personal records of this species but reports of reliable sportsmen convince me that it is found here in increasingly small numbers.

Wilson's Snipe. *Capella delicata.* Uncommon transient. Spring arrivals appear during the latter half of April; fall, August 16-October 14.

Upland Plover. *Bartramia longicauda.* Uncommon fall transient. Earliest record, August 10; latest, September 5. Largest group observed, one of twenty-two.

Spotted Sandpiper. *Actitis macularia.* Common transient. Spring arrivals, May 7-20; fall, July 21-August 10. Have never seen more than two together.

Eastern Solitary Sandpiper. *Tringa solitaria solitaria.* Rare transient. Spring arrivals, May 1-18; only one fall record, September 13.

Western Willet. *Catoptrophorus semipalmatus inornatus.* Uncommon transient. Spring arrivals, May 3-20; fall arrivals, August 16-September 15.

Greater Yellow-legs. *Totanus melanoleucus.* Fairly common transient. Fall arrivals, August 23-September 5; latest record, November 6. I have no spring records.

Lesser Yellow-legs. *Totanus flavipes.* Common transient. Spring arrivals, May 1-4; fall arrivals, August 3-September 23; latest fall record, October 29.

Pectoral Sandpiper. *Pisobia melanotos.* Common transient. Spring arrivals, May 7-12; fall arrivals, first week in August. Seen from August 5-October 3. Largest flock observed, thirteen; most commonly as singles, pairs, or small groups. My first observation reported in the *Auk*, July, 1935, p. 324.

White-rumped Sandpiper. *Pisobia fuscicollis.* Rare transient. Two observations only, May 12, 1935, and April 24, 1936. See the *Auk*, July, 1935, p. 324.

Baird's Sandpiper. *Pisobia bairdi.* Rare transient. Only one record, September 16, 1936.

Least Sandpiper. *Pisobia minutilla.* Fairly common transient. Spring arrivals, May 13-14; numerous fall observations between August 17 and November 2. Largest flight seen, fifteen.

Red-backed Sandpiper. *Pelidna alpina sakhalina.* November 2, 1936, two of these were seen feeding with seven Least Sandpipers and November 12, 1936, another pair was observed.

Stilt Sandpiper. *Micropalama himantopus*. Rare transient. Two observations only, August 26 and September 2, 1936, each of a single bird.

Semipalmated Sandpiper. *Ereunetes pusillus*. Fairly common transient. Spring arrivals, May 12-16; fall, on or about August 10. Has been seen in flights up to twenty-five in number. My first observations here and in eastern Arkansas were recorded in the *Auk*, July, 1935, p. 324.

Buff-breasted Sandpiper. *Tryngites subruficollis*. Fairly common fall transient. Numerous records between August 8 and September 13. Largest group seen, thirteen. All I have seen were feeding in the grass above the shore line.

Sanderling. *Crocethia alba*. Rare transient. Only two records. September 16 and October 29, 1936.

Wilson's Phalarope. *Steganopus tricolor*. Rare fall transient. Singles were seen August 27 and September 10 and 11, 1936.

Herring Gull. *Larus argentatus smithsonianus*. Uncommon winter resident. Arrivals, September 24-October 24; latest records, May 3-20. Largest group observed, one of eight.

Ring-billed Gull. *Larus delawarensis*. Fairly common but irregular winter resident. Arrivals, August 21-November 2; latest records, February 7-May 3. Largest group recorded, twenty-nine.

Franklin's Gull. *Larus pipixcan*. Rare transient. My only record, a flight of nine observed September 29, 1936.

Bonaparte's Gull. *Larus philadelphia*. Uncommon transient. Observed in 1936, October 1, a single; October 17, three; October 25, a pair; October 31, a flight of sixty; and November 7, a single.

Forster's Tern. *Sterna forsteri*. Fairly common. I have seen them during May (after the 13th), June, July, August, September, and October (to the 10th). Largest flight, twelve.

Common Tern. *Sterna hirundo hirundo*. Uncommon transient. Earliest record, May 20; latest, September 10. Largest group seen, six. See the *Auk*, July, 1936, p. 350.

Least Tern. *Sterna antillarum antillarum*. Fairly common. Seen irregularly through most of June, July, August, and early September. Largest group observed, twenty.

Caspian Tern. *Hydroprogne caspia imperator*. Fairly common fall transient, from August 31-September 29. Largest flight seen, eleven. First observations reported in the *Auk*, July, 1936, p. 350.

Black Tern. *Chlidonias nigra surinamensis.* Abundant transient. Spring arrivals, May 12-24; fall, July 24-August 6. I have seen flights up to one hundred or more.

Eastern Mourning Dove. *Zenaidura macroura carolinensis.* Common permanent resident.

Yellow-billed Cuckoo. *Coccyzus americanus americanus.* Common summer resident. Arrivals, May 4-7; latest records, August 7-September 11.

Black-billed Cuckoo. *Coccyzus erythrophthalmus.* I have only one record, May 5, 1936.

Barn Owl. *Tyto alba pratincola.* One was killed in 1935 and the mounted specimen is now on display at the shop of a local taxidermist.

Southern Screech Owl. *Otus asio asio.* Uncommon permanent resident.

Great Horned Owl. *Bubo virginianus virginianus.* One was captured alive in the National Park, September 2, 1936, by Mr. H. W. Lix, National Park Naturalist. It was measured, photographed, and released the next day.

Northern Barred Owl. *Strix varia varia.* Uncommon permanent resident.

Short-eared Owl. *Asio flammeus flammeus.* My single record for this species is for February 3, 1937.

Chuck-will's-widow. *Antrostomus carolinensis.* Uncommon summer resident.

Eastern Whip-poor-will. *Antrostomus vociferus vociferus.* Fairly common summer resident. Arrivals, April 18-May 13; latest records, June 26-July 11.

Eastern Nighthawk. *Chordeiles minor minor.* Uncommon summer resident. Arrivals, May 17-31; latest record, September 10.

Chimney Swift. *Chaetura pelagica.* Abundant summer resident. Arrivals, March 28-30; latest records, October 7-18.

White-throated Swift. *Aeronautes saxatalis saxatalis.* A specimen was taken alive on the eleventh floor of a local office building and given to Mr. H. R. Gregg, National Park Naturalist, who reported it in the *Auk*, October, 1935, p. 452.

Ruby-throated Hummingbird. *Archilochus colubris.* Common summer resident. Arrivals, April 9-15; latest records, September 3-21.

Eastern Belted Kingfisher. *Megaceryle alcyon alcyon.* Common permanent resident.

Southern Flicker. *Colaptes auratus auratus.* Common permanent resident.

Southern Pileated Woodpecker. *Ceophloeus pileatus pileatus.* Fairly eommon permanent resident.

Red-bellied Woodpecker. *Centurus carolinus.* Abundant permanent resident.

Red-headed Woodpecker. *Melanerpes erythrocephalus.* Abundant summer resident, rare winter resident.

Yellow-bellied Sapsucker. *Sphyrapicus varius varius.* Uncommon winter resident. Arrivals, Oetober 2-4; latest reeords, April 7-19.

Eastern Hairy Woodpecker. *Dryobates villosus villosus.* Fairly eommon permanent resident.

Southern Downy Woodpecker. *Dryobates pubescens pubescens.* Common permanent resident.

Eastern Kingbird. *Tyrannus tyrannus.* Fairly eommon summer resident. Arrivals, April 15-18; latest records, August 23- September 10.

Northern Crested Flycatcher. *Myiarchus crinitus boreus.* Common summer resident. Arrivals, April 19-22; latest reeords, August 6-September 15.

Eastern Phoebe. *Sayornis phoebe.* Fairly eommon permanent resident. A nest which I found was used for two broods in 1935 and again in 1936.

Least Flycatcher. *Empidonax minimus.* Fairly eommon spring and fall transient. Earliest spring reeord, April 29; earliest fall record, September 12.

Eastern Wood Pewee. *Myiochanes virens.* Common summer resident. Arrivals, April 20-May 1; latest reeords, September 15-Oetober 1.

Prairie Horned Lark. *Otocoris alpestris praticola.* My sole record is for April 3, 1936.

Tree Swallow. *Iridoprocne bicolor.* My only observation of this speeies was made April 23, 1936.

Bank Swallow. *Riparia riparia riparia.* Uneommon transient. Several were observed May 4, 1937, flying with Rough-winged, Tree, and Barn Swallows.

Rough-winged Swallow. *Stelgidopteryx ruficollis serripennis.* Common summer resident. Arrivals, April 2-7; latest reeords, Oetober 14-29.

Barn Swallow. *Hirundo erythrogaster.* Uneommon transient. Spring arrivals, May 6-10; fall, on or about October 9.

Northern Cliff Swallow. *Petrochelidon albifrons albifrons.* Uncommon transient. Seen April 27, 1937, flying with Tree and Barn Swallows.

Purple Martin. *Progne subis subis.* Common summer resident. Arrivals. March 13-20; latest records, August 13-16.

Northern Blue Jay. *Cyanocitta cristata cristata.* Permanent resident. Our most abundant bird with the possible exception of the English Sparrow. Have seen them carrying nesting material as early as March 8. Flocks observed October 4-8 may indicate migration.

Eastern Crow. *Corvus brachyrhynchos brachyrhynchos.* Abundant permanent resident.

Carolina Chickadee. *Penthestes carolinensis carolinensis.* Common permanent resident.

Tufted Titmouse. *Baelophus bicolor.* Abundant permanent resident.

White-breasted Nuthatch. *Sitta carolinensis carolinensis.* Abundant permanent resident, distributed nearly evenly throughout the year.

Red-breasted Nuthatch. *Sitta canadensis.* Rare transient. My records are for spring only. March 17-31. Reported in the *Auk*, July, 1935, p. 324.

Brown Creeper. *Certhia familiaris familiaris.* Uncommon winter resident. Earliest record, November 1; latest, March 27.

Western House Wren. *Troglodytes aedon parkmani.* My two records are for April 14 and September 24, 1936. The skin of one of the specimens was identified for me by Dr. Herbert Friedmann.

Eastern Winter Wren. *Nannus hyemalis hyemalis.* Uncommon winter resident. Records too few to determine arrival and departure dates.

Bewick's Wren. *Thryomanes bewicki bewicki.* Uncommon winter resident, remaining from about October 6 to about April 15.

Carolina Wren. *Thryothorus ludovicianus ludovicianus.* Abundant permanent resident.

Eastern Mockingbird. *Mimus polyglottos polyglottos.* Abundant permanent resident with no apparent seasonal variation in prevalence. Its militant territorialism is not confined to the breeding season.

Catbird. *Dumetella carolinensis.* Common summer resident. Arrival on or about April 20; latest records, October 2-22.

Brown Thrasher. *Toxostoma rufum.* Fairly common permanent resident. Have seen them carrying nesting material as early as March 14.

Eastern Robin. *Turdus migratorius migratorius.* Abundant permanent resident except during the last three months of the year when observations are relatively fewer. Spring migratory influx denoted by floeks in March. Raise two broods.

Wood Thrush. *Hylocichla mustelina.* Abundant summer resident. Arrivals. April 13-17; latest reeords, September 21-24.

Eastern Hermit Thrush. *Hylocichla guttata faxoni.* Fairly eommon winter resident. Arrivals, on or about October 20; latest records. April 18-19.

Olive-backed Thrush. *Hylocichla ustulata swainsoni.* Uncommon transient. Singles were seen May 5, 8, 9, 10, and 12, 1937.

Gray-cheeked Thrush. *Hylocichla minima aliciae.* Uneommon transient. Spring reeords, April 27-May 8; one fall reeord, November 19.

Bluebird. *Sialia sialis sialis.* An abundant permanent resident. Have seen them eopulating as early as February 19.

Blue-gray Gnatcatcher. *Polioptila caerulea caerulea.* Common summer resident. Arrivals. Mareh 30-April 4; latest reeords, September 2-28.

Eastern Golden-crowned Kinglet. *Regulus satrapa satrapa.* Uneommon winter resident. Arrivals. Oetober 25-28; latest reeords. February 23-Mareh 20.

Eastern Ruby-crowned Kinglet. *Corthylio calendula calendula.* Fairly eommon winter resident. Arrivals, Oetober 5-8; latest reeords. April 29-May 5.

American Pipit. *Anthus spinoletta rubescens.* Fairly eommon transient. Spring arrivals during the first week in April; fall, about the middle of Oetober.

Cedar Waxwing. *Bombycilla cedrorum.* Erratie winter resident.

Migrant Shrike. *Lanius ludovicianus migrans.* Common permanent resident. Little if any variation in seasonal prevalence.

Starling. *Sturnus vulgaris vulgaris.* On Oetober 27, 1936, I watehed a flight of sixty or more feeding near Lake Hamilton. Speeimens were colleeted.

White-eyed Vireo. *Vireo griseus griseus.* Common summer resident. Arrivals. Mareh 28-April 1; latest reeords. September 21-25.

Yellow-throated Vireo. *Vireo flavifrons.* Uneommon spring transient, very rare summer resident. Arrivals. March 27-30.

Blue-headed Vireo. *Vireo solitarius solitarius.* Rare transient. One spring record, April 29; two fall reeords, eaeh November 1.

Red-eyed Vireo. *Vireo olivaceus.* Common summer resident. Arrivals, April 13-20; latest records, August 24-September 18.

Philadelphia Vireo. *Vireo philadelphicus.* Rare transient. A male was collected May 8, 1937.

Eastern Warbling Vireo. *Vireo gilvus gilvus.* Rare transient. One record. April 29.

Black and White Warbler. *Mniotilta varia.* Common summer resident. Arrivals, on or about March 28; latest records, September 19-October 14.

Tennessee Warbler. *Vermivora peregrina.* Rare transient. I have only two records, May 9, 1935, and September 19, 1936.

Orange-crowned Warbler. *Vermivora celata celata.* Rare transient. My observations were reported in the *Auk*, July, 1936, p. 350.

Northern Parula Warbler. *Comsothlypis americana pusilla.* Uncommon transient. Spring arrivals, March 27-April 30; fall arrivals, September 10-19. I have one summer record, July 11, 1935.

Eastern Yellow Warbler. *Dendroica aestiva aestiva.* Rare transient. I have only two records, May 8 and 9, 1935.

Magnolia Warbler. *Dendroica magnolia.* Rare transient. Arrivals, May 6-12: one fall record, September 19.

Myrtle Warbler. *Dendroica coronata.* Abundant transient, fairly common winter resident. Arrivals, October 4-November 1; latest records, April 22-May 4.

Black-throated Green Warbler. *Dendroica virens virens.* Uncommon transient. Spring arrivals, April 22-29; fall arrivals, October 5-24.

Blackburnian Warbler. *Dendroica fusca.* Rare transient. I have only two records, May 7, 1935 and April 29, 1936.

Chestnut-sided Warbler. *Dendroica pensylvanica.* Rare transient. A single specimen was seen May 5, 1937.

Bay-breasted Warbler. *Dendroica castanea.* Very rare transient. One was collected May 9, 1937.

Black-poll Warbler. *Dendroica striata.* Rare transient. My single record. May 11, 1935.

Northern Pine Warbler. *Dendroica pinus pinus.* Fairly common permanent resident. Flock movement noted especially during September and October.

Northern Prairie Warbler. *Dendroica discolor discolor.* Fairly common summer resident. Arrivals, April 28-May 12; latest records, August 24-29.

Louisiana Water Thrush. *Seiurus motacilla.* Fairly common summer resident. Arrivals, March 27-April 11; latest records, July 21-August 23.

Kentucky Warbler. *Oporornis formosus.* Uncommon summer resident. Arrivals, April 22-May 11; latest record, August 24.

Connecticut Warbler. *Oporornis agilis.* Rare transient. I have only one record, April 28, 1936.

Mourning Warbler. *Oporornis philadelphia.* My only record is for May 29, 1935.

Northern Yellow-throat. *Geothlypis trichas brachydactyla.* I have only one record. A specimen collected October 4, 1936, was identified for me by Dr. Herbert Friedmann.

Maryland Yellow-throat. *Geothlypis trichas trichas.* Common summer resident. Arrivals, April 9-18; latest records, July 15-August 6.

Yellow-breasted Chat. *Ieteria virens virens.* Fairly common summer resident. Arrivals, April 22-27; latest records August 1-September 5.

Hooded Warbler. *Wilsonia citrina.* Uncommon summer resident. Arrivals during the first half of April; latest record, September 10.

Wilson's Warbler. *Wilsonia pusilla pusilla.* Uncommon transient. Spring arrivals, May 13-18; fall arrivals, September 10-21.

American Redstart. *Setophaga ruticilla.* Uncommon spring transient, rare fall transient. Spring arrivals, May 7-15; one fall record of arrival, September 10.

English Sparrow. *Passer domesticus domesticus.* Abundant permanent resident. I have seen them carrying nesting material every month in the year and copulating as early as January 28.

Bobolink. *Dolichonyx oryzivorus.* Rare transient. Two were recorded May 8 and one May 9, 1937, all males.

Southern Meadowlark. *Sturnella magna argutula.* Common permanent resident; less prevalent during the winter.

Western Meadowlark. *Sturnella neglecta.* Rare transient. A flock of about thirty, in full song, was recorded November 13, 1937.

Orchard Oriole. *Icterus spurius.* Abundant summer resident. Arrivals, April 15-17; latest records, August 18-23.

Baltimore Oriole. *Icterus galbula.* Uncommon spring transient, rare fall transient. Spring arrivals, April 29-May 3; one fall record, September 16.

Eastern Redwing. *Agelaius phoeniceus phoeniceus.* Common summer resident, uncommon winter resident. Arrivals of summer residents, March 9-23; latest records of summer residents, July 4-August 10.

Rusty Blackbird. *Euphagus carolinus.* I have only three records, April 3 and November 15 and 21, 1936.

Bronzed Grackle. *Quiscalis quiscala aeneus.* Uncommon permanent resident, rare during the last half of the year.

Eastern Cowbird. *Molothrus ater ater.* Fairly common summer resident, uncommon winter resident.

Scarlet Tanager. *Piranga erythromelas.* Uncommon summer resident. Arrivals, April 27-28; late records too meager to determine departures.

Summer Tanager. *Piranga rubra rubra.* Fairly common summer resident. Arrivals, April 20-22; latest records, September 14-23.

Eastern Cardinal. *Richmondena cardinalis cardinalis.* Abundant permanent resident.

Rose-breasted Grosbeak. *Hedymeles ludovicianus.* Uncommon transient. Single females were observed May 5 and 8 and a male May 12, 1937.

Indigo Bunting. *Passerina cyanea.* Fairly common summer resident. Arrivals, April 23-26; latest records, September 8-October 7.

Dickcissel. *Spiza americana.* My only record is for April 29, 1936.

Eastern Purple Finch. *Carpodacus purpureus purpureus.* Uncommon winter resident. Usually in the company of Goldfinches. Earliest record, November 10; latest, April 9.

Northern Pine Siskin. *Spinus pinus pinus.* One observation only, March 30, 1936. See the *Auk*, October, 1936, p. 456.

Eastern Goldfinch. *Spinus tristis tristis.* Abundant transient, fairly common winter resident, uncommon summer resident. Spring flights occur from the latter part of March to the middle of April.

Red-eyed Towhee. *Pipilo erythrophthalmus erythrophthalmus.* Uncommon winter resident. Arrivals, October 11-31; latest records, April 15-18.

Eastern Savannah Sparrow. *Passerculus sandwichensis savanna.* Uncommon transient. Spring arrivals, April 2-May 12; fall, October 15-20.

Eastern Grasshopper Sparrow. *Ammodramus savannarum australis.* Only one observation, May 1, 1936.

Vesper Sparrow. *Pooecetes gramineus gramineus.* Uncommon transient. Observed March 23, 24, April 8 and 9, 1937.

Eastern Lark Sparrow. *Chondestes grammacus grammacus.* Common summer resident. Arrivals, April 6-27; latest records, August 6-September 29.

Bachman's Sparrow. *Aimophila aestivalis bachmani.* A specimen was collected in the National Park by National Park Naturalist H. W. Lix. The skin is in my collection.

Slate-colored Junco. *Junco hyemalis hyemalis.* Abundant winter resident. Arrivals, October 24-25; latest records, April 9-11.

Eastern Tree Sparrow. *Spizella arborea arborea.* I have only one record, January 27, 1937, when a flight of about forty was seen.

Eastern Chipping Sparrow. *Spizella passerina passerina.* Common permanent resident.

Eastern Field Sparrow. *Spizella pusilla pusilla.* Common winter resident, very rare summer resident. Winter residents arrive October 18-25; latest records, April 21-22. I observed a single individual September 12, 1936. H. R. Gregg, National Park Naturalist, found a nest containing four eggs upon which the parent was sitting May 13, 1936.

White-crowned Sparrow. *Zonotrichia leucophrys leucophrys.* Fairly common winter resident. Arrivals, October 28-November 2; latest records, April 11-May 3.

White-throated Sparrow. *Zonotrichia albicollis.* Abundant winter resident. Arrivals, October 11-20; latest records, May 4-9.

Eastern Fox Sparrow. *Passerella iliaca iliaca.* Rare winter resident. My records are too scattering to give arrival and departure dates.

Lincoln's Sparrow. *Melospiza lincolni.* Fairly common spring transient, uncommon fall transient. Spring arrivals, April 15-26; fall, during the first half of October. Ate regularly at my feeding station, thirty feet back of the house, during the spring of 1936.

Swamp Sparrow. *Melospiza georgiana.* Rare winter resident. I have too few records to determine length of stay.

Mississippi Song Sparrow. *Melospiza melodia beata.* Song Sparrows are fairly common winter residents. They arrive October 28-31 and remain until March 23-April 8. Of six skins (all in my collection) sent to Washington for identification, four were *juddi* and two *beata.* This small number of identifications can not determine the relative frequency of these varieties. Much further study is necessary to ascertain the presence or absence of other subspecies, particularly *M. m. melodia,* and their relative frequency.

Dakota Song Sparrow. *Melospiza melodia juddi.* See comments on preceding variety.

Hot Springs, Ark.

COURTSHIP AND NESTING OF THE GREAT HORNED OWLS

BY FREDERICK M. BAUMGARTNER

During the years 1933-1936 the author was engaged in a study of the Great Horned Owls (*Bubo virginianus*) for his doctor's thesis at Cornell University. Besides extensive field work at Lawrence, Kansas, and especially at Ithaca, New York, the study involved a thorough perusal of ornithological literature of the subject. The following section of the thesis presents an account of the courtship and nesting activities through incubation, emphasizing those angles of the subject in which original research has added to the fund of knowledge previously published.

Courtship

On bright moonlight nights the hooting of the horned owls begins to become noticeable about a month before the actual mating begins. By the time of actual selection of mates one can go into horned owl country and be certain of hearing their notes. Then on a clear night several birds can be distinguished, calling back and forth steadily for a few hours after dusk and again toward morning. At times the hooting lasts practically all night.

The length of the courtship period has been very difficult to determine, because of the fact that the males call occasionally at most seasons of the year. However, the period when the males are hooting vigorously lasts for a month or six weeks. On the other hand the answering calls of the females are heard for only a week or two, toward the end of the six-week period. This period began in late November and lasted until about the first of January at Lawrence, Kansas. At Ithaca, New York, as would be expected in a more northern latitude, the dates were about a month later.

The actual courtship display has been witnessed and described in careful detail by Chief Red Eagle (1929). Audubon (1856) and Maynard (1881) mention varied actions and notes.

Judging from its effect upon other owls of the species and the circumstances under which it is given, hooting of the male has a threefold function. As with the songs of birds in general, hooting seems to be an expression of physical vigor and vitality. At times the male appears to hoot for the mere pleasure of hearing his own voice, and the notes produced are an indescribable assemblage of hoots, chuckles, screeches, and squawks given so rapidly and disconnectedly that the effect is both startling and amusing. Such "language" is often heard when several birds gather together during the mating season and in-

dulge in vocal battles. On rare occasions similar outbursts are heard at other seasons of the year (Forbush, 1929).

A second function of hooting is its challenge to others of his sex. In regions where horned owls are common the males do a great deal of competitive hooting from favorite perches in their territories. Thus in the creek bottoms south of Lawrence, Kansas, where one horned owl territory was often hemmed in on two sides by the ranges of other individuals, one bird would hoot and in regular sequence as many as four or five others would answer. It was seldom that two birds were heard calling simultaneously.

The third and most important function of hooting is to attract a mate. During the mating season the challenging, deep, rich tones of the males are occasionally interspersed with the higher and huskier notes of the females. I have never definitely identified the hoot of a female horned owl at any time except the mating and nesting period and doubt if they do much calling at other seasons. Even at that season they do not seem as vociferous as the males. The latter may call back and forth at regular intervals for hours at a time, while the female owl's calling periods, at short and indefinite time intervals, seldom exceed more than fifteen to twenty minutes.

Mating

Mr. Fred Hastie, of Lawrence, Kansas, has witnessed the final stages of the courtship that culminated in the act of copulation. The nodding and bowing of the birds became quite violent for a period and then they quieted down and went through many repetitions of the billing and cooing performance. Finally the female crouched down on the limb and the male mounted her back in the fashion of a barnyard fowl. A detailed account of this performance has apparently not been recorded in the literature.

Nesting Sites

There is some evidence to suggest that Great Horned Owls may select nesting sites several months before the eggs are laid. At Lawrence, Kansas, horned owls were frequently observed during the fall and winter in territories where young birds were subsequently seen. Errington (1932) likewise noted that during the fall and winter birds roosted close to stick nests which were later occupied. However, the birds did not actually move into the nest until a short time before the eggs were laid.

From the records of Bendire (1892), Bent (1938), and numerous others, it is apparent that the choice of nesting sites of the Great Horned Owls throughout their wide range includes almost every type

of situation in which birds nest, a range of variation unequalled by any other North American bird. From extreme heights of almost a hundred feet to badger and coyote dens in the ground, the situations include old nests of other birds, hollow trees and stumps, holes and ledges on cliffs, and even the open ground.

Throughout the timbered regions of eastern North America the birds have been most frequently recorded to occupy old nests of crows, hawks, ospreys, bald eagles, herons, and squirrels. Most of these situations are from twenty to seventy feet from the ground and located near the edge of fairly dense timber. Hollows in trees or limbs are often reported, especially in the southern states, and in more hilly country ledges on cliffs are not uncommonly described. Bendire (1892) quotes Captain B. F. Goss to the effect that hollows in trees and limbs were the preferred sites in Wisconsin before the cutting of the larger timber. Recent records indicate that the large percentage of birds are now using old stick nests in this region (Errington, 1932).

In western North America where small caves or niches in cliffs and mountain slopes are available, tree sites are often passed up for these more inaccessible situations. Old magpie nests are particularly favored in the Northwest.

In treeless regions such as the Prairie Provinces of Canada and the Great Plains of western United States low cliffs, buttes, railroad cuts, and even low bushes appear just as satisfactory as more elevated sites. Ground nests are occasionally reported here and appear to be more common than in other parts of this bird's range.

Bendire (1892) records that one observer noted these large birds sitting in the mouths of badger and coyote dens near the Umatilla Reservation in northeastern Oregon. This observer believed that the owls were nesting in these burrows. Other unusual sites include hay barns (Kirkwood, 1925), prehistoric ruins (Sugden, 1928) and the tower of a cathedral (Bendire, 1892).

In the deserts of the Southwest cactus plants take the place of trees and horned owls often occupy old nests among the thorny branches.

The Nest

Observations in the Ithaca region suggest that when there are several satisfactory nests in a territory the birds will choose a larger nest preferably in a fairly open situation. It is obvious that a nest completely enclosed by interlacing branches would not allow such bulky birds to approach or depart quickly in time of emergency and all nests which I have examined have been at least moderately exposed.

There is a wide range in the size and structure of horned owl nests, as may be readily surmised when one considers the diverse situations in which they dwell and the variety of original owners. Ground nests, nests in caves, on rock ledges, and in hollow trees often do not meet the ordinary concept of that term. In such situations the eggs are laid on the bare ground, wood, or stone.

In general stick nests seem to be preferred to leaf nests. This is probably due to the fact that they are larger and offer firmer foundations. However at times horned owls display little care in their selection of tree nests, adopting structures so dilapidated and flimsy that they fall apart and dump the young out onto the ground (Errington, 1932). The nest may be so small that the bird is quite conspicuous or even ridiculous when covering eggs or young. Again it may be a huge affair and the owl completely hidden from view from below.

Few data are available on preference regarding other types of nests but it appears that the same requirements hold—a spot fairly open yet concealed, which is large enough for the needs of the young until they are able to move about freely. Nests located on ledges or in niches or caves are generally sheltered from the wind, rain, and sun, although the situation permits the young to bask in the sunshine at the entrance.

A table of ten nests located in the Ithaca area probably gives a representative sampling of the types of tree nests in the northeastern part of the United States. (See Table 1).

From an examination of their nests it is evident that horned owls clear out a certain amount of debris before the eggs are laid, and also line it with a more or less complete layer of breast feathers. Beyond

Table 1. Nests of Great Horned Owls in the Ithaca, N. Y. Region, 1934-1936.

No.	Locality	Situation		Type of Nest
1	Ellis Hollow	Sugar maple	27 ft.	Stick—Old hawk nest (?)
2	McAllister farm	White pine	22 ft.	Stick—Old hawk nest (?)
3	Danby Pond	White pine	34 ft.	Stick—Old hawk nest (?)
4	Danby Pond	Chestnut oak	47 ft.	Stick—Crow (?) nest
5	Conn. Hill	Chestnut	29 ft.	Stick—Red-tailed Hawk nest*
6	W. Dryden	White pine	18 ft.	Stick—Crow nest
7	Lake Ridge	White oak	40 ft.	Stick—Hawk nest
8	Sapsucker woods	Beech	24 ft.	Stick—Hawk nest
9	Sapsucker woods	Beech	40 ft.	Leaf—Grey squirrel nest
10	Trumbull's corners	Beech	21 ft.	Stick—Hawk nest

*This nest was a huge affair, apparently having been used by Red-tailed Hawks for several seasons so that the accumulated mass of material produced a structure at least five feet in diameter. The owl could not be seen at all from the ground.

that there is apparently no activity in most cases. However there are a few records of horned owls repairing or practically rebuilding an old nest. Cameron (1907) discusses a pair of Montana Horned Owls that repaired an old nest in his yard in Custer County, Montana, every year and states that by spring it was "often a storm-swept fragment". Mr. G. Lang of Indian Head, Saskatchewan, (*corres.*) has found several nests that the horned owls constructed entirely. One pair built a nest in a spruce tree on his grounds, in a location closer to his home than crows will choose and Mr. Lang is positive that there was no foundation present when the owls chose the site.

The nest lining usually consists of shreds of bark, leaves, or down plucked from the breast of the incubating bird. Rockwell (1909) suggests that feathers from their prey may be added at times. G. Lang (*corres.*) states that near Indian Head, Saskatchewan, the birds occasionally build rabbit fur into their nests before the eggs are laid. The extent of the lining of downy feathers varies considerably with individual birds from a few feathers to a fluffy mass which practically encloses the large eggs. Of the Ithaca nests, the contents of No. 1 were not examined, but the other nine contained at least a few breast feathers. At Nest No. 8 the lining practically hid the eggs; at all others the eggs were quite conspicuous from above.

On the bare floor of a hollow tree or cavity in a cliff the eggs are often enclosed merely by a rim of sticks, stones, or bits of rubbish. Huey (1935) describes a nest of *Bubo v. pallescens* in Mexico "composed entirely of regurgitated pellets". The location was between two lava blocks on a rocky hillside.

Renesting After Disturbance

The selection and occupation of a second nest is a fairly common occurrence, frequently recorded by egg collectors. After their first set is taken the birds will often choose a nearby nest and lay another set of eggs. Frequently, however, the birds will continue to occupy the original nest in spite of disturbance, and Bendire (1892) mentions that Dr. Ralph found a third set of eggs in the same nest in Florida after the first two had been taken.

In some instances the second nesting is not carried to completion. The writer found a pair of birds near Ithaca, New York, in 1935 that probably had such a history. The female was discovered sitting on an empty nest on February 25. Examination of the site every few days found the bird on the nest at irregular intervals as late as March 12. On that night there was a heavy snow and the nest was practically filled by the next afternoon. The birds remained in the region for

at least two weeks thereafter but eventually they moved and were not seen there during the remainder of the season.

T. E. Randall, of Boyle, Alberta (*corres.*) describes a similar observation on the Arctic Horned Owl in Alberta. Ten days after he had collected a set of two eggs he found the bird occupying the nest again. When he climbed the tree to investigate the bird attacked him. The nest was empty, however, and no eggs were laid in it that year, nor were any young raised in the vicinity. A pair of birds observed over a three-year period by A. L. Rand (*corres.*) near White Rock, Nova Scotia, twice failed in a second attempt at nesting.

Eggs

Of the North American species horned owls are one of the first to nest in the spring. Their eggs have in fact been taken as early as late November and early December in Florida (Forbush, 1929).* In Texas they lay in January and early February. As one moves northward a direct correlation between latitude and date of laying can be observed, until the extreme is reached in Labrador where sets are often not completed until after the first of April.

In the western part of the country the correlation with latitude is often obscured by the effect of altitude upon climatic conditions.

Table 2, compiled from a mass of records of oologists and other observers, is an attempt to demonstrate this correlation between geography and the dates at which horned owls have completed their first sets of eggs.

The usual number of eggs for the horned owl is two. Along the Atlantic seaboard this number is most frequently recorded, with three eggs uncommonly found and sets of four very rare. In Florida one egg often constitutes a full set. Bendire (1892) quotes Dr. Ralph to the effect that sixty per cent of the sets in the Ralph collection contained only one egg. In central and western North America the sets appear to be definitely larger, with three and four eggs not uncommon, and five and six occasionally reported. Bent (1938) suggests that this may be due to the more abundant food supply.

Dixon (1914) notes that Pacific Horned Owls tend to lay larger sets of eggs during wet than dry seasons and suggests that it may be because the birds find food more plentiful at such times. Randall (*corres.*) found that two and three eggs to a clutch was the usual number but that in 1932 all the nests that he examined contained four

*O. E. Baynard (*corres.*) reports a complete set of eggs from middle-western Florida taken on October 27.

TABLE 2. Average Dates of Completed First Sets of Eggs of the Horned Owl throughout the United States and Canada.

Date	Geographical Areas
Late November to early January	Southern Florida.
Late December to early February	Northern Florida, southern Texas.
Early January to late February	South Carolina, Georgia, Alabama, Mississippi, Louisiana, central Texas, southern California.
Late January to early March	North Carolina, Virginia, Maryland, Delaware, New Jersey, Long Island, Connecticut, Rhode Island, Massachusetts, Pennsylvania, West Virginia, Ohio, Kentucky, Tennessee, Indiana, Illinois, Missouri, Arkansas, Oklahoma, northern Texas, Kansas, central California.
Early February to late March	Maine, New Hampshire, Vermont, New York, southern Ontario, Michigan, Wisconsin, southern Minnesota, Iowa, Nebraska, South Dakota, northern California, Oregon, western Washington.
Late February to early April	Newfoundland, Nova Scotia, New Brunswick, southern Quebec, central Ontario, northern Minnesota, North Dakota, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Idaho, western Washington.
Early March to late April	Central Quebec, northern Ontario, southern Manitoba, southern Saskatchewan, southern Alberta, southern British Columbia.
Late March to early May	Labrador, northern Quebec, northern Manitoba, northern Saskatchewan, northern Alberta, northern British Columbia, Alaska, Yukon, District of Mackenzie, District of Kewatin.

eggs or young. He also suggests the possibility of direct correlation between the number of eggs and the abundance of food.

The interval between laying of the eggs varies from one to seven days, according to reports of egg collectors and observations of differences in the stages of development of the nestlings. Randall (*corres.*), who has collected extensively in Alberta, has found an interval of two days to be the usual period. My own observations at Ithaca indicated a similar interval. Occasionally there is a conspicuous difference in the ages of young owls in a nest. Whether such records indicate longer periods between laying of the eggs or a physiological disturbance I am unable to say.

There is apparently a low percentage of infertility in Great Horned Owl eggs. There are records of sets that were partially or completely infertile but in most cases all of the eggs hatch.

Incubation

Incubation normally begins with the laying of the first egg. As a consequence there is usually a pronounced difference in development of the young for the first week or ten days.

The length of the incubation period for the Great Horned Owl, to the best of my knowledge, has not been accurately determined. Writers have suggested various periods ranging from twenty-one to thirty-five days. The most satisfactory evidence available indicates that it is at least twenty-six and probably nearer thirty days (Bent, 1938). Dr. A. O. Gross (*corres.*) reports eggs hatching twenty-six days after being found. Dr. W. J. Breckenridge (*corres.*) made some observations near Fridley, Minnesota, which indicate a period of at least twenty-nine days.

Normally the horned owl incubates very closely, rarely leaving the nest uncovered for periods of more than a few minutes. Due to the extremely low temperatures during which this species nests in the northern parts of its range it is imperative that the eggs be protected almost constantly to prevent their chilling.

When undisturbed horned owls are inclined to be quiet and almost motionless on the nest. I have watched individuals for hours at a time which have rarely shifted the position of the body. They do take a very active interest in their surroundings, however, and even the slightest sounds attract their attention at once. The ability of owls to revolve their heads through 180° is frequently used to advantage. The most characteristic position seems to be the one in which the head is held high, eyes forward, the wings held close to the body and the tail laid out straight behind. In this position the "horns" are quite conspicuous and often give the bird's presence away immediately.

One of the most interesting and difficult problems in the study of the Great Horned Owl is the question of duties of the sexes during incubation. Bent (1938) says that both birds incubate the eggs, and suspects that the female does the larger share. Most authors suggest that the female does all the incubating while the male stands guard and brings food for his mate on the nest. In support of this hypothesis I have found numerous records of female horned owls shot on the nest but not a single instance of a male taken thus.

On the other hand pellets are seldom found beneath the nest trees, indicating that the females must leave the nests occasionally and in severe weather the other bird may take her place. Dixon (1914) observed that on certain days a Pacific Horned Owl flushed off the nest much wilder than on others. He attributed this difference in behavior

to the two birds that were taking turns in the incubation. S. F. Rathbun (*corres.*) states that male birds collected during the nesting season almost invariably have a part of their abdomens denuded of feathers, a characteristic of incubating birds. Randall (*corres.*) observed a nest occupied on one day by a "very white bird", on the next by a "medium grey bird". When the "white bird" was shot from the nest it proved to be the female.

With this question in mind I spent several consecutive nights in a blind beneath Nest 4 near Ithaca, New York. It was a period of full moon and with 10x field glasses I could see the bird on the nest clearly. On March 5, 1935, I entered the blind about 7:30 P. M., and shortly afterward heard the male bird hoot about a hundred yards from the nest. He soon flew over and alighted beside the nest. Then the regular hooting was interspersed with soft clucking notes: "*Quawk, quawk. waugh! hoo-hoo! quawk, quawk, quawk, quawk.*" These notes were accompanied by vigorous nodding by both birds and the bird on the limb bowed a few times. They also seemed to rub their beaks together. After several repetitions the bird on the nest stood up, bowed, then stepped out of the nest and he as carefully walked into it. The female flew off into the woods: the bird on the nest arranged the eggs beneath him with his bill and then settled down and all was quiet.

The female came in at 11:45 P. M., when I heard hoots and twittering notes like those a young owl makes when being fed. The female had come to the nest carrying part of some mammal, and apparently her mate was begging for food. She shared the kill with him and flew away again.

At 5:15 A. M. the bird came in and relieved her mate. There was no display of affection other than the low notes at this shifting of duties. The male flew off to an open perch a few hundred yards away and hooted a few times. His louder and clearer notes were unmistakable.

At a later stage in the incubation period the schedule of the two birds seems to have been different. Then the female was on the nest all night with the exception of a short period toward morning. In all probability there is individual variation among different pairs in their duties as well as changes in schedule at different stages of incubation.

Response to Interference

When first disturbed by man the birds usually seem quite reluctant to leave their nests and at times have to be practically lifted off them. In rare cases, judging from the observations of others as well as my

own, the birds flush from the nest as soon as they catch sight of an approaching man. More commonly they wait until the person is very close to or beneath the nest tree. Some require the additional stimulus of pounding on the tree to flush them off.

Such faithful birds usually return very soon after the climber has descended, though some individuals do not return for half an hour or more. I have had experience with three nests that were entirely deserted due to my interference. In two cases I do not believe that the birds resumed incubation after they were first disturbed. This intolerance of observation may have been due to greater shyness of these individuals or to the fact that incubation had just begun and the instinct was not well developed. The latter hypothesis is not supported by the history at Nest 4. In this case the bird came back to eggs that subsequently proved to have been fresh. It appears then that the response of the incubating owl to the approach of man varies markedly with the individual and to a lesser extent with the stage of incubation.

After the first visit the responses are usually quite different. On the second visit the owl often flies off when one is several hundred yards away and rarely allows as close an approach as on the first day. In the case of nests which have been visited daily, the birds eventually become accustomed to this interference to a greater or lesser degree and in time will tolerate a much closer approach before flying. However I have never found a bird that, after the first visit, would permit one to climb to the nest level before it left.

This increasing tolerance may be more clearly demonstrated by comparing the intervals of time between departure and return to the nest. Birds which stay away half an hour or more at the first visit may after several visits be back on the eggs in less than five minutes. The question arises, however, as to whether or not this tolerance is due to the development of the incubation instinct rather than to the acceptance of man's proximity. With the hatching of the first egg the response of flight at man's approach seems to be practically subdued by the instincts to protect the young.

Frequently, due to interference by man, crows, or other disturbing elements the eggs chill and the embryos are killed. Nest No. 4 suffered such a fate. On February 20 when I first ascended the tree the old bird was kept off for a period of half an hour, and the eggs apparently chilled. The owl sat faithfully on them for a period of at least forty-five days. The eggs upon examination proved to have been spoiled at a very early stage of incubation. On the other hand I kept birds off another nest for periods of about on hour on several days

without interfering with the hatching of the eggs. In these instances the temperature was well above freezing, though the stage of incubation may have been a factor in the ability of the eggs to withstand exposure.

Another source of interference is the harassing of crows. In this connection an interesting observation was made at Nest No. 4, located in a region where crows were numerous. The owls were seldom flushed without five to twenty of these black imps appearing to mob them as they flew off into the timber.

On several mornings I noted that the male bird usually flew in close and hooted a few times shortly after sunrise. This invariably aroused the crows and when they besieged him he flew off to a hemlock tree a few hundred feet deeper in the woods. This performance had no significance for me until one morning, after the owl had flown over into the conifers to roost, the crows began to harass his mate on the nest. Finally she uttered a few low hoots and immediately her mate appeared, alighting on a branch close to the nest. The crows at once shifted their attention to this more conspicuous enemy. After a short period of ducking and dodging this owl flew into the top of an adjacent tree in an even more conspicuous spot. Gradually he led them off through the woods by short flights and the incubating bird settled down on the nest again free of her tormentors.

This same performance was witnessed on three successive days and on several later occasions. In all probability the male's response was merely an expression of anxiety. In any event it was an effective manuever. I have never observed a similar action on the part of any other pair, nor have I found records in the literature of such a response.

Summary

1. Hooting of the males becomes conspicuous about a month before mating begins. Active courtship and mating apparently last less than two weeks.

2. Hooting of the males has a three-fold function—to express physical vigor and vitality: to warn other males of their territorial rights: and to attract a mate.

3. The hooting of the female is chiefly limited to the mating and nesting season.

4. A description of copulation in this species is recorded apparently for the first time.

5. A synopsis of the variation in general and immediate nesting sites is given. This species shows a wider range than any other North American bird.

6. The birds show considerable individual variation in the type of nest and amount of building and repair.

7. Renesting is often attempted, sometimes without a change in the nest site.

8. A table gives the average date of laying throughout Canada and the United States, showing a direct correlation between latitude and date of laying.

9. The average number of eggs varies throughout North America —one to two being the usual clutch in Florida; two throughout eastern North America; and three or four in the central and western parts of the continent. Limited evidence suggests that the number varies from year to year as well as by localities according to the abundance of food.

10. No indisputable data on the exact length of the incubation period has been found. The most satisfactory evidence indicates that it is at least twenty-six and probably nearer thirty days.

11. Great Horned Owls are close incubators unless disturbed by man. With frequent visits the birds usually develop an increasing toleration of man.

12. Both birds share in the duties of incubation. In all probability there is individual variation among pairs as well as changes in schedule at different stages of incubation.

13. At one nest the owls appeared to have found a successful method of distracting the attention of crows.

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East Lansing, Mich.

GENERAL NOTES

Conducted by O. A. Stevens

Change of Route in the Fall Migration of Nighthawks.—In the forty years of observation of the Eastern Nighthawk (*Chordeiles m. minor*) a fall migration route has been directly over Hillsboro, at least for thirty years. Every year the period of migration lasted for three days, at which time the air was filled with vast numbers. After these days only stragglers were seen. The heavy movement began on August 21, and extended to the 29th. In 1931 these birds changed their route to a line seven miles eastward, and only a few stragglers are seen over the old route.—Katie M. Roads, *Hillsboro, Ohio.*

The Sexes in Migration.—Detailed work took me afield on every suitable day during the migration season. I have noticed that the males of the Brown Thrasher and Red-eyed Towhee await the arrival of the females before moving on. The first arrival of the Brown Thrasher (*Toxostoma rufum*) was a male, and it arrived on March 19; the second one came on March 25. The males continued to arrive until the 29th, when a few females appeared. On April 3 more females were on hand. On April 4 the migration had moved on, leaving only the usual number of summer residents. Five males of the Red-eyed Towhee (*Pipilo erythrophthalmus*) arrived on February 24, and they became common on March 11. On March 23 the females arrived. On the 24th all had moved on except the few that remained as summer residents.—Katie M. Roads, *Hillsboro, Ohio.*

The Black and White Warbler in Europe.—The *Weekly Scotsman* of Edinburgh, for November 28, 1936, records the fact that at Tingwall in the Shetland Islands, about eighty miles east of the mainland of Scotland, there was picked up by the roadside, shortly before that date, a small bird identified at the British Museum as an American Black and White Warbler. The distance from the eastern normal range in North America of the species to where the bird was found is about the same as its southern migration distance, but the eastern journey across the Atlantic was almost entirely over water and that to its wintering ground largely over land. This bird was doubtless swept out of its range by storm winds. This is believed to be the first record of the finding of this species in Europe.—Samuel E. Perkins III, *Indianapolis, Ind.*

Female Grouse at Drumming Log.—About 4 P. M. on May 14, 1937, I heard a grouse drumming on the top of Ferry Bluff, an erosion remnant of about 150 acres rising 300 feet above the Wisconsin River below the towns of Prairie du Sac and Sauk City, Wisconsin. The sides and top of the Bluff are covered with oak with several small "goat" prairies in a few spots.

I worked towards the drummer by moving during the drummings, which came at intervals of about three minutes. The drumming seemed to cease for I waited several minutes longer than the usual interval when I heard a rustling on the leafy floor to my right. I watched carefully and soon saw a ruffed grouse, presumably a female, moving along the brow of the bluff (which was wooded) closely pursued by a male in full display. She seemed to move at irregular trots with pauses until the male approached to within a few inches. Her body was turned left thirty degrees to the line of progress. The male's tail was erected perpendicularly to the body and the feathers were fully fanned out. The ruffs of the neck

were fully erected and the head and neck stretched far forward and almost touched the ground. He moved after her in a zig-zag line, continually moving the body to and fro. The female apparently detected me although I stood still in my tracks. She flew when fifteen feet away and returned in the direction of the drumming log, disappearing in the trees. The male looked about a bit, then lowered his display and went toward the drumming log on foot.

He drummed again in a few minutes and I was able to find him on the log. I paced the distance from the log to the spot where the female left and found it to be fifty-three single paces. My paces average about a yard. The route taken from the log to the spot where the female left was much longer as it was apparently circuitous.

This observation would indicate that the female does come to the drumming log at times, and that the male may pursue her from here. It is possible that in this case the drumming served as a location notice from the male rather than as a territorial proclamation.—Leonard Wing, *Madison, Wis.*

A Local Nesting Habit of the Towhee.—The Red-eyed Towhee (*Pipilo erythrophthalmus erythropthalmus*) is a rather abundant summer bird along woodland borders in southern Michigan, where it nests usually on the ground with the nest rim about even with the ground level. Of twelve nests I have found only two were in shrubbery, one a foot, the other about two feet, from the ground.

While spending some time at Lovells in Crawford County in the northern part of the Lower Peninsula of Michigan, I found during July, 1937, four nests of the Towhee on an area which had been burned over two or three years before. This area was now covered with shrubbery and low trees, most of which were under seven or eight feet in height and with numerous low branches or basal sprouts. All four nests were located in this dense undergrowth, well off the ground; one was up 21 inches, another 24 inches, while two were 36 inches above the ground. These nests were found in July and are summarized as follows: Nest No. 1, July 5, two eggs and one of the Cowbird; Nest No. 2, July 8, two eggs, and on July 9, three eggs: Nest No. 3, July 9, one egg, and on July 10, two eggs and one of the Cowbird, and on July 11, three eggs and one of the Cowbird: Nest No. 4, July 11, two eggs and one of the Cowbird. In Nest No. 3 the young Cowbird and two of the Towhees left the nest on August 1, with date of hatching undetermined.—Lawrence H. Walkinshaw, *Battle Creek, Mich.*

Red Phalarope in Northeastern Illinois.—A specimen of the Red Phalarope (*Phalaropus fulicarius*) was secured by the writer on September 10, 1938, on the Lake Michigan beach north of Waukegan, Lake County, Illinois. It proved to be a male in full fall plumage except for a few small patches of the breeding plumage on the back. The skin (No. 110141) is now in the study collection of the Field Museum of Natural History, Chicago.

The only other extant Illinois specimen of the Red Phalarope which the writer was able to locate, is in the collection of the American Museum of Natural History, New York. This, a female (No. 357777, Dwight Collection No. 21134), was collected by Charles K. Worthen along the Mississippi River near Warsaw, Hancock County, Illinois, on September 27, 1883. It is very likely one of those "taken two or three times" in that region by the same collector (p. 62, Widmann, A Preliminary Catalog of the Birds of Missouri: *Trans. Acad. Sci. St. Louis*, Vol. XXVIII, No. 1, Nov. 16, 1907). The species is listed for the state by a number

of early ornithologists (Kennicott, Nelson, Ridgway), and specimens have been taken in neighboring states (southern Wisconsin and Indiana).—Frank A. Pitelka. *University of Illinois, Urbana, Ill.*

Lesser Scaup Duck Defending Nest.—That the Lesser Scaup Duck (*Marila affinis*) is fearless in defense of its young has often been observed, but the incident related below, of an individual defending her nest, is unique in my experience.

On a small, wooded island in Ministik Lake, Alberta, on July 20, 1931, a Lesser Scaup was disturbed from her nest in a patch of sedges near the water's edge. The nest contained eight eggs. The bird did not fly but walked in a crouching attitude toward the water. After proceeding about ten feet, she turned about, walked back in the same manner and settled upon the eggs. Meanwhile, with a companion, I was standing within three feet or so of the nest. My companion then put out his hand which prompted the duck to again leave the nest, and, moving forward with wings outspread, grasp a finger with her bill.

We returned to the nest again an hour later and the same performance was repeated with variations a number of times. A sudden movement would impel her to leave the nest only to return immediately. Not once did she fly. Sometimes she picked at the sedges around the nest, or, standing upright, re-arranged the down. Usually upon settling, she turned her tail toward us and once after doing this, turned completely about and faced us. Finally at a time when the bird was relaxed on the eggs we drew together the sedges above the nest and left her in peace.—J. A. Munro. *Okanagan Landing, B. C.*

Nesting Behavior of Kingbirds.—The writer's porch faces westward upon a row of elms, where on the evening of June 16, 1938, a pair of Arkansas Kingbirds (*Tyrannus verticalis*) were busy building a nest in a fork some twenty-five feet from the ground. It seemed but half completed and both birds were industriously bringing materials to be woven into it by the female. Several pieces of string were added, one of them so long that it became entangled in the surrounding twigs.

During an interval when both owners were away, an Eastern Kingbird (*Tyrannus tyrannus*) alighted at the nest and began tearing it to pieces with claws and bill. Hastily collecting the looser bits, she flew directly to a group of trees back of the house. Returning shortly, the female owner was greatly excited. She flitted off and on the nest, re-built and re-shaped it and then spent a time perched above it complaining shrilly. No sooner had she departed upon another collecting trip, however, than her white-breasted cousin returned, tore hurriedly at the nest, struggled with the entangling string and left with a bill full of materials by the same air-way as before. These raids were repeated until dusk, the owners sometimes surprising the thief and driving her off with furious attacks and great noise.

During the following day all was quiet, the Arkansas Kingbirds occupying the tree alone. Evening, however, saw the return of the trespasser and several severe battles ensued. Other species, especially Robins, mingled in the fray, apparently assisting the owners. A female Baltimore Oriole suddenly appeared to assist in repelling the invader, but when all had again quieted, she was seen tugging away at the long string, pulling and fluttering to carry it aloft, and in the absence of

FIG. 40. Photograph of a Lesser Scaup Duck defending its nest.
By J. A. Munro.

FIG. 41. Photograph of a Lesser Scaup Duck defending its nest.
By J. A. Munro.

the owner, taking her turn at stealing the materials of the nest. Thus the foundations of a hanging nest were soon visivle about ten feet higher up in the tree, the length of white string connecting the two nests. Strangely enough her depredations seemed to pass unnoticed, and after two or three days both nests were completed and the home life of the kingbirds and the orioles proceeded peacefully.—A. D. Whedon, *Fargo, N. D.*

A Hand-reared Arkansas Kingbird.—Returning from work one evening about the middle of July, I found twelve-year-old Charles busily engaged in catching grasshoppers and feeding them to a pair of baby Arkansas Kingbirds. He and his pal had found the birds that afternoon, apparently dislodged from their nest by the high wind of the night before. I feared that the birds would die, but could suggest no better plan. One of them did indeed die within a day or two, but through no fault of the boys. A striped ground squirrel seized and killed it while the boys were hunting grasshoppers only a few yards away. A few days later Charles avenged the bird by killing the squirrel.

The remaining bird thrived on its diet of grasshoppers until about a week later when we took it with us on a trip to the lake. The weather was rainy and insects were hard to find. We supplemented what few we could catch with bits of bread and meat. Some of the meat was highly seasoned and apparently was not suitable because the next day, "Pete", as the boy had called the bird, was quite droopy. The sun came out in the afternoon when we were able to find plenty of grasshoppers and Pete quickly "perked up".

At about this time he began to learn that he had wings and soon could make short flights from one's hand to a convenient garage roof or to the ground. Charles commented that Pete was more fun than a model airplane: "you did not have to wind him up". The next step was for the bird to fly from his perch to one's hat, shoulder or outstretched finger when a tempting grasshopper was offered.

We soon learned Pete's language. A certain lusty sound accompanied by a suggestively open mouth meant that he was hungry. Another short and fainter sound, "*pip-pip-pip*", when offered the fourth or fifth grasshopper in rapid succession, meant that he was not interested in food for the time being. Still another chirp indicated indifference or mild curiosity.

The accompanying picture was taken about the first of August. At this time Pete still depended entirely on our ministrations for his food. In another two weeks he had become self-supporting, but still welcomed an occasional grasshopper from our hands. On August 2 he was officially decorated with a Biological Survey leg-band, No. 38-127463.

Each night Pete was taken to the basement where he perched on one of the electric light wires running through the floor joists. Here he would remain contentedly until about six o'clock in the morning when he would begin to call for breakfast. He would accept food from others but was more familiar with members of our family. Without detailed records of the food, especially of weights of the grasshoppers, it would be hard to estimate the amount eaten per day, though the number probably ran as high as seventy-five.

On the evening of August 12 we were not at home until after Pete's bedtime and he was not to be found. Neighbors reported that he had appeared at the usual time and made considerable disturbance, clamoring to be put to bed. The next morning as I started for the office, I heard a familiar chirp and from a tall

tree across the street Pete came in a bee-line for my hat. There could be no doubt that he was glad to see me.

From that time on, he became more independent. He would disappear immediately in the morning. Sometimes we saw him during the day, sometimes not. Some days he returned to be put to bed; other days he remained out. After the morning of August 22 we saw him no more. The other Arkansas Kingbirds disappeared at about the same date, so Pete probably went south with them. We hope that he may return next spring with a mate and nest in our vicinity.—A. J. Pinckney, *Fargo, N. D.*

Western Henslow's Sparrow Taken in Virginia.—While engaged in field work in the West Virginia mountains in June, 1935, Maurice Brooks informed the writer that there was at that time no authentic record of Henslow's Sparrows for the State, either as a migrant or as a breeding bird. This species had been recorded as a breeding bird in forty-six of the eighty-eight counties of Ohio (Hicks, "Breeding Birds of Ohio", 1935). It is known to breed sparingly in ten of the twenty-two unglaciated counties of southeastern Ohio in territory similar to large areas of West Virginia. Several sizeable breeding colonies were then known for Ohio that were within twenty miles of West Virginia. Hence it seemed certain that the species crossed into and probably nested in, West Virginia.

Accordingly, several week-end trips were made through the Ohio River counties of western West Virginia between Huntington and Parkersburg. Few habitats of types attractive to Henslow's Sparrow were found, and these few were unoccupied, except one. On July 7, 1935, the writer discovered a small breeding colony in a narrow weedy strip of bottomland near the Kanawha River, and about six miles above Point Pleasant, Mason County, West Virginia.

Two males were singing on either side of a highway. No nests could be found but several females and a juvenal were flushed. The latter was barely capable of sustained flight but eluded capture. An adult male, however, was found dead along the roadside, possibly having been struck by an automobile. This bird weighed 13.2 grams and was in breeding condition (testes 5.5 mm. x 9 0 mm.). The skin was somewhat decomposed but was prepared, and has been donated to the collection of the West Virginia University at Morgantown. It represents, so far as known, the first record and the first breeding record of Henslow's Sparrow in West Virginia. Dr. H. C. Oberholser, of the Biological Survey, determined the specimen as typical of the western race (*Passerherbulus h. henslowi*). All Ohio specimens examined to date have also been assigned to this form.

The eastern race (*Passerherbulus h. susurrans*) has since been recorded in eastern West Virginia as follows: A migrant taken October 9, 1935, near Masontown, Preston County, by Haller, Handlan, Margolin, and Brooks (*Auk*, LIII, 1936, p. 91); breeding adults with young seen near Burlington, Mineral County, July 19, 1936, by Brooks and Haller (*Auk*, LIII, 1936, p. 453); adults seen by Maurice Brooks on July 7, 1937, near Stony River Dam, Grant County (*Redstart*, IV, 1937, pp. 68-69).—Lawrence E. Hicks, *Ohio State University, Columbus, Ohio.*

EDITORIAL

The American Ornithologists' Union held its Fifty-sixth Annual Meeting in Washington, D. C., on October 17-21, 1938, with a registered attendance of 233 people. The program carried fifty-nine titles, and three days were allotted for their delivery. The Brewster Medal Award was granted to Dr. Thomas S. Roberts in recognition of his work on "The Birds of Minnesota". Dr. Ira N. Gabrielson, Chief of the U. S. Biological Survey, was elected a Fellow. Two Honorary Fellows and six Corresponding Fellows were also elected. Eight members were elected, including, Thomas T. McCabe, Harold Michener, Gayle B. Pickwell, E. Lowell Sumner, Jr., all of California, Austin L. Rand, New York, Alexander F. Skutch, Maryland, Herbert G. Deignan, Washington, D. C., and S. Gilbert Emilio, Massachusetts. The number of Associate Members elected was 337. The next A. O. U. meeting will be held in the San Francisco Bay Region of California on June 19-23, 1939. The official announcement has also been made that the A. O. U. will hold a meeting in May, 1942, at Philadelphia, in order to serve as host to the Eleventh International Ornithological Congress.

The Twenty-fourth Annual Meeting of the Wilson Ornithological Club was held at the University of Michigan, Ann Arbor, on November 25-26, 1938. The total registered attendance was 265 (113 members and 152 visitors), and the number of papers listed on the program was forty-four. A full report of the meeting will be given as usual in the March number. Louisville, Kentucky, was selected as the meeting place for 1939.

In Behalf of the Wilson Ornithological Club the Wilson Bulletin wishes to acknowledge the generous compliment from the National Association of Audubon Societies, which we have just read on the editorial page of the November-December issue of *Bird-Lore*. Such cheering words from an institution so long and well established, and through the medium of one of our most esteemed contemporary magazines—so long associated with the name of one of America's most renowned ornithological leaders, Dr. Frank M. Chapman—will warm the hearts of all of us. If all the fine things which have been said are true, it is because of steadfastness of purpose and untiring effort. We thank *Bird-Lore* for its kindly overtures, and wish for it a long-continuation of the era of growth and prosperity which it is now enjoying.

Our Readers may be interested in the fact that an Audubon Museum is being erected by the Federal Works Progress Administration in the Audubon Memorial Park, which is located along the Ohio River about one mile north of Henderson, Ky. The Park consists of 400 acres of high, rolling, and thickly wooded land, overlooking a "majestic stretch of the Ohio River". The two-story Museum building is built of gray stone, in the Norman style of architecture. It seems to be the plan to gather for permanent exhibition in this building a complete collection of Audubon prints, books, portraits, mounted birds, and other Audubboniana. It may be possible that such a location is a good one for an Audubon exhibit, but if so,

it would seem to us that there would be many reasons why the entire setting should be primitive and natural. The WPA report states that "A formal garden will be laid out in front of the building". Of course, the landscape architects who are in charge of such an enterprise can not forego the opportunity to insert a little of their own brain genius. There is such a wide difference in the ideals of architects and engineers on the one hand, and nature lovers on the other hand, that coöperation is usually not feasible.

Mrs. H. M. Bailey, 610 Twentieth Strect, Sioux City, Iowa, has a run of the Wilson Bulletin, 1918 to 1936 inclusive, which she would like to dispose of.

We Have Seen a new type of binder for the Wilson Bulletin. which is retailed by the National Association of Audubon Societies (1775 Broadway, New York, N. Y.). The actual binding is done by the owner, at home, but the cover comes already lettered and ready to be affixed. You will need to caution the makers that you wish to have the title exactly centered on the back of the book, for they are a little careless about that. The price of the binder for one volume of the Bulletin is $1.25—not much cheaper than permanent binding, but sturdy and worth the price. With so ready a means of binding many more of us will want to preserve the volumes of the Bulletin.

In Running Through a file of papers on conservation we ran across a printed leaflet giving the "Extension of remarks of Hon. Fiorello H. LaGuardia, of New York, in the House of Representatives" on April 29, 1926. At this time he was discussing H. R. 7479, known as the migratory bird bill. This bill contained the provision for public shooting grounds, and Mr. LaGuardia was opposing it for that reason. On this subject Mr. LaGuardia said: "When the bill was before the House in the Sixty-eighth Congress I voted against it. I did so for the reason that I am strongly and unequivocally in favor of a real bill for the protection of the bird life of this country and that I am unalterably opposed to an unsportsman-like bill, which, under the guise of a conservation of bird life bill, creates so-called sanctuaries that may be turned into shooting grounds for unsportsmen hunters to slaughter birds." Mr. LaGuardia further exposed the lobby that was behind the bill. He gave his full support to the Merritt Bill (H. R. 10433) which provided for reduced bag limits on game birds. His record in Congress shows him to be a true conservationist, and a fearless one.

With the completion of this issue of the Wilson Bulletin the Editor retires. His successor has not yet been named.

ORNITHOLOGICAL LITERATURE

Life in an Air Castle. By Frank M. Chapman. D. Appleton-Century Co. New York, 1938. Pp. 1-250. Pls. I-XXXI. Price, $3.00.

Dr. Chapman here continues the record of his observations and experiences on Barro Colorado, the first instalment being given in his "My Tropical Air Castle". The present book deals with birds in part, but also relates experiences with a few mammals, and one chapter deals with a tree. Perhaps the most interesting chapter in the book is the one on the Turkey Vulture, or Buzzard. Here Dr. Chapman reverts to the old controversy on whether the vulture locates its food through the sense of sight or the sense of smell, and takes the latter view. He set up several experiments to test the birds in this behavior, and called them, for example, the Empty-house Test and Box-on-the-hill Test. From the results he reached the conclusion that the birds depended on the sense of smell in locating food, thus taking a view contrary to what we would consider the current opinion. Apparently, this controversy, which began with Audubon, has not been closed.

The book closes with a chapter on "The Past and Present" of the Barro Colorado Island and Laboratory, with many interesting bits of history and reflections. We notice that the last line on page 202 is, apparently, misplaced—an error in proof reading which is seldom found in an Appleton book. And on page 85 occurs the line: "The movements of their head seem independent of those of their body". But only a hyper-critic will notice such things. The undoubted verdict will be that the book is good reading for those who are in the least interested in outdoor life.—T. C. S.

The Log of Tanager Hill. By Marie Andrews Commons. Baltimore, 1938. Price, $2.50.

This volume will stand as a memorial to Frank Watkin Commons and his work in banding birds in Minnesota. Mrs. Commons, the author, was equally interested in the progress of the work upon which the book is based. In looking over the book several things are impressed upon the mind: a) the care and accuracy with which observations were made and recorded, especially considering the fact that the workers would be classified as amateurs: b) the wonderful opportunity in bird banding work for yielding relaxation and great pleasure to the man of the business world.

The bird banding work at the Tanager Hill Station was carried on for eight years (1923-1930, inclusive). The experiences of these bird banders from day to day are recorded in narrative form, and will be readable to bird banders as well as to many who may not be banders. At the close of the narrative the banding results in twenty-six species are summarized. And twenty-eight tables give the dates of banding and returns for as many species. The book contains a goodly number of original illustrations from photographs. A pocket map enables the reader to visualize the text descriptions. So we have here a noteworthy addition to the growing literature of bird banding lore.—T. C. S.

The Natural History of Magpies. By Jean Linsdale. Pac. Coast Avifauna No. 25, pp. 1-234. Cooper Ornith. Club, Berkeley, Calif., 1937.

This publication adds another to the growing list of monographic studies, since it treats both the taxonomy and the natural history, and gives a review of

the literature. Though it is doubtless unnecessary we may mention that it gives a reasonably full discussion of the subspecies, distribution, food, migration, courtship, nest, eggs, young, plumages, molt, populations, and ecological relations. From his examination of the literature the author concludes that the use of mud in the magpie nest is the normal thing. From an editorial point of view we are interested in the author's incidental comments on local faunal lists. He thinks such lists have been useful in the past, and that in the future every encouragement should be given to the publication of such lists by those "whose preference or opportunity dictates" this line of effort. We are inclined to think that such lists will always be useful for comparison, if for no other reason, but where they should be published is another question.—T. C. S.

Avian Hosts of the Genus Isospora (Coccidiida). By Donald C. Boughton, Ruth B. Boughton, and Joseph Volk. Ohio Journ. Sci., XXXVIII, No. 3, May, 1938, pp. 149-163.

In recent years considerable study has been given to the internal parasites of birds, among other animals. The paper here mentioned gives a list of 177 bird forms which are known to be hospitable to the seven known species of avian Isospora. One interesting observation is to the effect that parasites belonging to the genus Isospora seem, in general, to be associated with the "higher" orders of birds; while similar coccidians belonging to the genus Eimeria were found associated, in general, with the "lower" bird orders.—T. C. S.

Birds and Mammals of Mount McKinley National Park, Alaska. By Joseph S. Dixon. Fauna series No. 3, Nat. Park Service. Washington, D. C. 1938. Pp. i-xiv+1-236. Price, 35 cents.

The bird list includes 107 species (plus five in a hypothetical list), fully annotated as to "general appearance", "identification", "distribution", and "habits". The entire paper is illustrated with eighty-five halftone reproductions of original photographs, and one map. There is a good summary of the facts known concerning the nesting of the Surfbird. The introduction gives the information that the records are based mainly on two expeditions—one in 1926 by Messrs. Dixon and Wright, and one in 1932 by Mr. Dixon. Mr. Dixon states that he has hiked about 750 miles in Mount McKinley National Park in his field studies there. The material is well organized but is entertaining nevertheless.—T. C. S.

Letters by Rafinesque to Dr. Short in the Filson Club Archives. By S. E. Perkins III. Filson Club History Quart., Vol. 12, No. 4, Oct., 1938. Pp. 200-239.

This bit of biographical material presented by our fellow member may be of interest to many of our readers. While Rafinesque was primarily a botanist, yet he is now credited as being the first to describe and name the Cliff Swallow. The Filson Club is a historical society with headquarters at Louisville, Ky.—T. C. S.

Proceedings of the Linnaean Society of New York, for 1937. No. 49. Pp. 1-104. Price, 75 cents.

Contents: A biographical sketch of Charles Anderson Urner, by J. L. Edwards; Preliminary notes on the Behavior and Ecology of the Eastern Willet, by William Vogt; Black-crowned Night Heron colonies on Long Island, by Robert Allen; general notes, and reports of officers.—T. C. S.

Birds of Algonquin Provincial Park, Ontario. By D. A. MacLulich. Cont. No. 13 Roy. Ont. Mus. Zool. 1938. Pp. 1-47. Price, 25 cents.

A list of 169 species of birds with annotations. It is too much to expect that all readers will know the geographical location of the area treated, hence it should be given in the text. The annotations are full and instructive.—T. C. S.

A Faunal Investigation of Western Rainy River District, Ontario. By L. L. Snyder. Cont. 14, Roy. Ont. Mus. Zool. 1938. Pp. 157-213. Price, 25 cents.

A series of papers on the animals of this region, including a list of 138 species recognized as "summer birds". The list uses binomial nomenclature exclusively, although in many cases the subspecific possibilities are discussed in the annotations—a procedure which we heartily approve.—T. C. S.

Indiana Audubon Society Yearbook, 1938. Vol. XVI. Pp. 1-105. Price $1.00 (Harold Zimmerman, 915 W. Gilbert St., Muncie, Ind.).

As usual this annual contains a wide assortment of material. Mr. Donald H. Boyd discusses the bird life of the Indiana Dunes region. Mr. Frank Johnson discusses the Bewick's Wren in Indiana. Many additional short items are included—all of local interest.—T. C. S.

The following short papers are listed by title:

Preliminary Notes on the Behavior and the Ecology of the Eastern Willet. By William Vogt. Proc. Linn. Soc. N. Y., No. 49, 1938.

Record of Bird Temperatures. By Dayton Stoner, Ph. D. Circ. 19, N. Y. State Mus., Albany, N. Y., 1937.

Check List of the Birds of Michigan. By Josselyn Van Tyne. Occasional Paper No. 379, Mus. Zool., Univ. Mich. 1938.

The Breeding Birds of Tarrant County, Texas. By George Miksch Sutton. Ann. Carnegie Mus., XXVII, 1938.

Physiology of Development of the Feather. II. General Principles of Development with Special Reference to the After-Feather. By Frank R. Lillie and Mary Juhn. Physiol. Zool., XI, No. 4, October, 1938.

Review of Local or State Periodicals Printed

The *Nebraska Bird Review* for July-December (VI, No. 2) is the second number as a semi-annual publication. The leading article is on the Prairie Chicken, and is by Glenn Viehmeyer. The author gives a thoughtful review of the various exterminative factors applying to this species in the Nebraska Sandhills. The picture as painted is not bright for the future of this bird. Seven pages of general notes, a table of migration dates, and minutes of the annual meeting last spring, make up the number.

The *Iowa Bird Life for June* (VIII, No. 2) contains a very instructive article on the European Partridge in Iowa, which, however, overlooks an earlier paper on the same subject by Chas. J. Spiker, which appeared in the Wilson Bulletin of March, 1929. The remaining pages include the minutes of the Sixteenth Annual Meeting of the Iowa Ornithologists' Union last May, general notes, bibliography of Iowa literature, and reviews.

The *Migrant* for June, 1938 (IX, No. 2) reports the nesting of a pair of Prothonotary Warblers in the cavity of an empty water pitcher. These birds have taken a liberal share of ornithological attention during the past year. Messrs. Ganier and Clebsch report in the September number (IX, No. 3) the results of a week's field work in June on the top of the Great Smoky Mountains. They found eighty-seven species, which was eighty-seven more than we saw in driving over these mountains in August. But probably one must make several trips into that wonderland before one can expect to see anything but the mountains and the vast, timbered gorges.

The *Kentucky Warbler* for the summer of 1938 (XIV, No. 3) in a new cover has for its leading article a list of the waterfowl of Kentucky, by Robert M. Mengel. Following we find a detailed account of the Audubon Museum in the new Audubon State Park near Henderson, Ky. Not many months ago we read the announcement of such a proposed institution, and we are now surprised to learn that it has been built, and that it was to have been opened to the public "some time in July" last. It is stated that many relics of Audubon have already been sent to this museum for preservation, and among other things a set of Wilson's Ornithology "with Audubon's notations throughout". A note by Mr. Maslowski reports that the Least Terns were found nesting in Fulton County, Ky., as early as June 13.

In the *Florida Naturalist* for July, 1938 (XI, No. 4) Mr. Donald Nicholson offers a critique of a previously published Florida list. A short note by Mr. O. E. Baynard reports an Arkansas Kingbird in Florida. This species has been making a remarkable expansion in its range in recent years. An interesting note is to the effect that the chief of police in one Florida town has ordered the destruction of shrikes on the ground that these birds annoy the cats and dogs. This sounds a little like a joke but it may not be. Can a police officer abrogate a state law in Florida?

Review of Local or State Periodicals Mimeographed

The *Raven* is the virile and healthy offspring of the Virginia Society of Ornithology. The April-May number (IX, Nos. 4-5, 1938) gives a list of 120 birds of Chesterfield County, Va. A membership of fifty-eight is listed in the June number. Dr. Murray's "Recent records and new problems in Virginia ornithology" is the type of literature which aids greatly in promoting the scientific study of birds locally. (Lest we never have a better opportunity, we wish to say here that we telephoned Dr. Murray as we passed through his town last August, and regretted his absence). The August number (IX, No. 8) is a list of sixty-four species of summer birds of Middle Mountain, Highland County, Va., by Dr. Murray. The September number (No. 9) is devoted wholly to an annotated list of birds of Amelia and Brunswick Counties, Va., by John B. Lewis.

The *Redstart* is issued monthly by the Brooks Bird Club, of Wheeling, W. Va. The July-August number (V, Nos. 10-11) gives a list of 198 species of birds known to occur in the eastern Panhandle of West Virginia. In the September number (V, No. 12) Messrs. Frank Conner and John Pattison record the finding of a Raven's nest with five eggs in Monongalia County, W. Va. William A. Lunk

reports in the November number (VI, No. 2) on the finding of Brewster's Warbler near Fairmont, W. Va.

The *Prothonotary* is the Bulletin of the Buffalo Ornithological Society. It has always made a specialty of local records—unusual migration records and nesting records. Its purpose has been to gather as complete information as possible concerning the local birdlife. This society is to be credited with successfully conducting long field trips. They have, for instance, taken one or more field trips to the Pymatuning Swamp region of western Pennsylvania. On such occasions their party was joined by interested persons from neighboring states. The number for June (IV, No. 6, 1938) reports a successful jaunt to this region covering the dates of May 28, 29, 30; and another trip was projected for October 8-9. In the September issue (IV, No. 9) Mr. Harold D. Mitchell, in reviewing the work of the Society, suggests that a bird club is likely to succeed best by encouraging its members to specialize and to adopt ornithological projects. This suggestion is worthy of consideration by many local societies.

In the *Bluebird* for September (V, No. 9, 1938) Brother Hubert Lewis presents an original and very strong indictment of the Blue Jay. He cites three observations of the Blue Jay's predation on nestling song birds, namely on the Rose-breasted Grosbeak, on the Yellow-billed Cuckoo, and on the Wood Pewee. Another note gives a little information about the distribution of the European Tree Sparrow in the St. Louis region. In practically each issue of the *Bluebird* one finds a delightful original poem relating to nature—usually by Editor G. E. Moore, but occasionally by another of Missouri's poets.

The *Chat* for May-June (II, Nos. 5-6, 1938) first gives a fitting tribute to Mr. C. S. Brimley, followed by articles on herons and terns. In the July-August number Dr. Brimley has a brief, but most interesting, discussion of Brewster's and Lawrence's Warblers in terms of Mendelian inheritance. Another contributor tells of seeing Red-headed Woodpeckers devour an unidentified nestling. In the September-October issue (II, Nos. 9-10) Dr. J. J. Murray reports finding two young of the Least Tern at Oregon Inlet (Va. or N. C.?) on August 18, 1938. From it we also learn that the Georgia Ornithological Society has been in existence for some time, and that Mr. Earle R. Greene is the present President.

Bird Calendar of the Cleveland Bird Club for October, 1938, (No. 3) contains a report of census work in the Cleveland area. The bird students of this region are doing some very creditable field work and keeping records of it.

The *Snowy Egret* (Vol. 13, No. 2) for the Autumn of 1938 is now issued from 172 Manchester St., Battle Creek, Mich. These pages contain local bird lists mainly, but Mr. O. M. Bryens presents a diary of observations on the Warbling Vireo.

Game Research News Letter for May and November, 1938, give reports on wildlife management researches being carried on at the University of Wisconsin.

North Dakota Bird Notes (March to June, 1938) is a stapled series of weekly reports on local ornithological events in that state during the migration season. These sheets are distributed regularly to the newspapers of North Dakota for such

use as they may care to make. The project is carried out by Prof. O. A. Stevens, of Fargo.

News from the Bird Banders for May (XIII, No. 2, 1938) presents a detailed report of the banding activities of the W. B. B. A. for the year, 1937. It shows that a total of 46,828 birds were banded by the Society during that year. The number for September (XIII, No. 3) carries an important paper entitled "The unseen Roads of Bird Migration", by Kenneth C. Alexander. The gist of this paper is to emphasize the ordinary physical factors of the birds environment to explain the cause of migration routes, as well as of local routes; or that local fly-routes are caused by ordinary physical factors, such as heat radiation, winds, etc., while a migration route is simply the summation of the local routes. Mr. Alexander is preparing an elaboration of his ideas in book form.

The *Inland Bird Banding News* for June (X, No. 2, 1938) carries an announcement of the death of Mr. W. I. Lyon, the well-known leader of the Inland Bird Banding Association. Mr. Lyon was well known for his banding work with gulls and terns, but his later work with Cowbirds seems to us to have been more productive of interesting results. We believe that no paper has been published embodying all of the data and conclusions in Mr. Lyon's work, and would urge that some one undertake to collect and present the material.

The *Wildlife Review* (No. 15, July, 1938) is issued by the U. S. Biological Survey under the direction of Mr. W. L. McAtee. The issue for November (No. 16) has also appeared. This serial gives abstracts of articles in the field of conservation and wildlife management, the originals of which are widely scattered.

INDEX FOR VOLUME L, 1938

Compiled by Chas. J. Spiker

Numbers in *italics* indicate pages on which the species is the subject of a major article or field note.

TO OUR CONTRIBUTORS

Our members are urged to submit articles for publication in the BULLETIN. Short items are desired for the department of General Notes, as well as longer articles pertaining to life-history, migration, ecology, behavior, song, economic ornithology, field equipment, methods, etc. Local faunal lists are desired, but limited space makes slower publication inevitable. In preparing such lists for publication in the BULLETIN follow our existing style, and use the nomenclature of the fourth edition of the A. O. U. Check-List.

THE MANUSCRIPT. The manuscript, or copy, should be prepared with due regard for literary style, correct spelling and punctuation. We recommend the *Manual of Style*, of the University of Chicago Press, as a guide in the preparation of manuscripts. Use paper of good quality and of letter size (8½x11). Avoid the use of thin paper. Write on one side only, and leave wide margins, using *double spacing* and a reasonably fresh, black ribbon. The title should be carefully constructed so as to indicate most clearly the nature of the subject matter, keeping in mind the requirements of the index. Where the paper deals with a single species of bird it is advisable to include the scientific name of the species in the introductory paragraph. If the author will mark at the top of the first page the number of words in the paper, a little of the Editor's time will be saved.

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Dues for 1939

ANNUAL DUES FOR 1939 ARE NOW PAYABLE

This is the Treasurer's first notice to all members that dues for 1939 are now due and payable to the Treasurer,

Dr. Gustav Swanson,
University Farm,
University of Minnesota,
St. Paul, Minn.

You are earnestly requested to remit at your earliest convenience, thus saving postage to the Club and much time to the Treasurer. A receipt will be returned only if requested.

Life Members	**$100.00**
Sustaining Members	**$5.00 Annually**
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The Club suffers a considerable loss each year by members dropping out without notifying the officers. In order to avoid this loss it seems necessary to restrict the mailing list of the BULLETIN to paid up members. However, members who find it inconvenient to remit before March may receive the March number by sending a card to the Editor indicating intention to continue membership. The Club values the support of every member, and every resignation is received with regret.

Members who may wish to assist the Club may bring the WILSON BULLETIN to the attention of the local Library or High School. All additions to our subscription list will aid in making a larger magazine.

In behalf of the officers of the Club the WILSON BULLETIN extends the greetings of the Season to all of its readers.