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CONTENTS

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BLUE HERON COLONIES IN NORTHERN OHIO

BY E. L. MOSELEY

Most people have never seen a nest of a Great Blue Heron, although they may often have seen one of these majestie birds flying along a stream or standing on one leg in a marsh, patiently waiting a ehanee to spear a frog or fish. They have been told that these birds were eranes. I had been teaehing elasses in zoology and making observations on Ohio birds for nearly thirty years before I learned the loeation of any herony in the state. In later years, as the result of considerable inquiry, I have heard of thirty or forty nesting sites of Great Blue Herons (*Ardea herodias herodias*) and have visited many of them myself. The largest is in Sandusky County, nine miles northwest of Fremont, in woods belonging to Horatio and Harry Waggoner. Fortunately these men are interested in the preservation of the birds, whieh are favored also by having their home in a law-abiding eommunity, where no one attempts to shoot them.

On May 2, 1935, before the leaves had eome out on the trees, I went to the Waggoner woods with a large number of students from Bowling Green. With their aid and also help from Horatio Waggoner and his son John, the heronry was divided into eight strips, running east and west, eaeh several rods wide. The lines bounding these strips were followed by tall men who did no counting, but aided those who did the eounting to keep within the lines. If a tree containing nests was on the line, they saw that it was ineluded in only one list. Thus we avoided duplieations and omissions. One thousand one hundred eighteen nests were eounted. As some nests had only reeently been started, probably a few more were built after we made this eount. If any of the nests eounted were unused in 1935, the number was probably very small.

We saw egg shells on the ground that day and Mr. Waggoner heard one or two young birds. The first of the herons he had seen arrived from the south on Mareh 10. The previous year, 1934, and also in 1932, a few arrived March 1. In earlier years the first arri-

vals observed were usually about March 15. or 20. other individuals coming later. some not arriving until about the middle of April.

Nests used the previous year are repaired. if not too dilapidated. As the colony has been inereasing. many new nests are built each year. They consist of platforms of sticks. most of which are smaller in diameter than a finger. Sweet clover or other herbaeeous stems are used to line the nest. which is shallow and two and a half feet or more in diameter. After about four weeks eaeh nest becomes the home of two or three baby herons usually; but the number may be more than three. or only one.

To feed between two and three thousand nestling herons enough to enable them to attain in five weeks the size of their parents requires considerable aetivity on the part of the latter. After the young are half grown. a ton of fish a day would probably not satisfy them. Only a trifling amount eould be obtained within six miles of the heronry. Probably half of the whole supply is carried a distanee of fourteen miles or more. Many persons have wondered why these birds ehoose for a home a locality so remote from their food supply. The reason is that woods containing a large amount of tall trees suitable for their nests are not to be found nearer to the water in whieh they obtain most of their food. Like other gregarious creatures too big to hide. these birds and their young are safer when many are elose together. beeause enemies are less likely to attack them or to sueeeed if they do attack. Charles Holloway has told me of seeing a large dog repulsed by a Great Blue Heron whose wing had been injured so it could not fly. The dog rushed at the bird. which dealt it one savage blow on the nose. This took all the courage out of the dog.

A visitor to the heronry in summer is likely to hear the thud of a fish falling to the ground only a few yards from where he stands and he wonders why the birds lose so many after earrying them so far. If the falling of fish went on all through the day as fast as when visitors are present. the young birds would starve. for the fish that fall are not recovered. Evidently the presence of visitors eauses the loss. I used to think that fright confused the birds so that the fish was lost in transferring it from parent to offspring. but I have observed it when I believe only the young were at the nest and when they had passed the tender age when they receive partly digested food direetly from the throats of their parents. Many of the fish found on the ground under the nests are almost whole. Perhaps it is instinctive with young herons. when they seem to be in danger from some enemy.

FIG. 1. The Waggoner Heronry. Seventeen nests in this tree.
Photograph by Robert L. Baird.

FIG. 2. The Waggoner Heronry. Twenty-two nests in this tree.
Photograph by Robert L. Baird.

to regurgitate what they have swallowed; in this way the appetite of the hungry predator might be appeased.

The fish found included sheepshead, sunfish, sucker, carp, and goldfish, the last not at all uncommon. Recently we found a catfish about eight inches long whose stout pectoral spines stood out prominently on each side. My colleague, Dr. C. H. Otis, recently watched a mature heron while it cautiously swallowed, head first, a bullhead which he estimated weighed a pound and a half, but we think the bird which brought the catfish to the heronry was not very considerate of the welfare of its offspring.

Horatio Waggoner has found an explanation for herons standing on one leg when fishing. More than once he has seen them put the other foot down and hold a luckless fish that swam close to the foot which had been supporting the weight of the heron.

That such large heronries are no longer common may be due to the difficulty of supplying a sufficient quantity of food for the young. To secure a ton of fish each day for several weeks requires extensive fishing grounds. Now that frogs are in demand for human food the supply of these amphibians has become much depleted. Snakes and lizards are getting scarce and the draining of swamps has curtailed the supply of various kinds of aquatic food. In this part of Ohio the herons have become so numerous that they are pressing on man's food supply by taking fish from the ponds. Some of the wholesale fishermen have obtained permission to shoot herons found robbing their nets.

In 1912 or 1913, the first year that any herons nested there, Mr. Waggoner says most of the nests were built in two sycamore trees. In his woods large sycamores are not numerous, so that various other trees are now used, most of them larger than the largest trees of the same kinds in a majority of the woods remaining in Ohio. We have observed nests in four kinds of oak—red, black, white, and bur—also in silver maple, shell bark hickory, ash, and in many elm trees. One bur oak in 1931, had twenty-two nests. In 1932 one red oak contained eighteen nests and another twenty-three. This is the largest number we have ever counted in a single tree, but some years ago Mr. Waggoner counted thirty in one sycamore tree. The 1118 nests counted in 1935 were in 194 trees, but 490 of the nests were in thirty-seven trees, each of which had more than nine nests. Only eleven trees contained more than fourteen nests each.

A silver maple tree which had died was cut down in order to utilize the timber in it. In the top were several heron nests. With

steel tape we found that they had been 110 feet above the ground. The highest of the nineteen nests in a big sycamore tree was found by the method of similar triangles to be 120 feet from the ground. What appeared to be the lowest nest in that vicinity had an elevation of seventy-six feet. In the entire woods there are probably a few that are somewhat lower. The nests are apparently placed as far from the ground as adequate support can be found. Trees with open tops seem to be preferred, as their limbs do not interfere with flight.

In the Waggoner woods the mature herons are never seen on the ground. The bushes and other undergrowth would probably interfere with these large birds rising from the ground; presumably they must have a clear space from which to take off. If by mischance a nestling should get down on the ground in the woods it would starve. In fields south of the woods we have seen mature herons on the ground. They do not appear to find food there. Mr. Waggoner thinks that they resort to these fields to the leeward of the woods to avoid the chilling effects of a cold wind from the north.

In the museum of the University at Bowling Green is the unbroken shell of a heron egg which we found on wet ground in these Waggoner woods May 7, 1926, when it was still fresh. It had probably fallen more than seventy feet. By the first week of July many young herons may be seen standing on or near the nests, a few of them testing their wings as if about ready to fly. Fewer old birds are seen at the heronry during the day in July, but between 5:30 and 7:00 P. M. they sail in from the distant fishing grounds with a cargo of food for the lusty youngsters. Some fish are brought as late at 9:30.

In 1930 there were still very many herons at the heronry on August 3; but when the woods were visited by one of my students a week later, no herons were seen or heard. This heronry is always deserted in August, but many of the birds continue to frequent the streams or marshes of northern Ohio until October, and some still later; rarely has one been seen in December.

The colony in the Waggoner woods has grown so large that the herons have already appropriated most of the trees which are suitable for their nests. In 1933 they built six nests in a tract of woodland about a half mile to the south, and the next year built more nests in those woods. On May 5, 1935, I counted 151 nests in this new colony and found egg shells under some of the trees and the air bladder of a fish, showing that there were already young herons in some of the nests, although a few nests had not yet been completed. Forty-four

trees, most of them American elms, contained from one to ten nests each.

An older colony, started about 1924, in woods one mile south of the bridge which crosses Sandusky Bay is also probably an offshoot from the Waggoner colony, for Sandusky Bay has long been a fishing ground for Great Blue Herons and those frequenting the western part of the bay, if not the entire bay, probably had their home in the Waggoner woods until the bay bridge colony was founded.

Among the other heronries in Ohio which are occupied exclusively by Great Blue Herons I know of none which have had so many as a hundred nests at any time in the past ten years. Very few now contain as many as thirty nests, but quite a number have between fifteen and thirty. Just over the line in Michigan, about sixteen miles west and north of Toledo, is a heronry in which I counted 129 nests May 31, 1931, probably overlooking some because of the foliage. The following spring, before the leaves came out, Reverend Hammond, of Berkey, Ohio, which is near these woods, counted 214 nests. This colony, like the one in the Waggoner woods, has been growing, especially in the last few years.

Great Blue Herons were numerous until their breeding places were visited by hunters whose ambition was to kill something big. Their numbers then were greatly reduced, but in recent years, on account of protection by law and a growing interest in bird life, the herons have been multiplying. At the heronry at Indian Lake in Logan County some have been shot by lawless hunters in recent years. At the heronry in Trumbull County, near Orwell, where there were said to be about sixty nests in 1930, sixteen of the herons were shot by one man who afterwards was prosecuted and made to pay a fine of $25 for each heron. Few, if any, nests longer remain at that place, but in most places, thanks to laws backed by public sentiment, the birds are permitted to rear their young unmolested. Very few are likely to be killed by other birds or by mammals, for with their long, sharp, straight beaks these big birds are able to defend themselves and their young. They have been increasing in numbers, in Ohio, and other states, but the increase has been restricted by the limited supply of food and to some extent also by the remoteness from their fishing grounds of any woods that are suitable for a large heronry.

Great Blue Herons seem to show some preference for sycamore trees, but very tall deciduous trees of any kind are used, if there are enough of them in a single woodland near the source of food. The woods need not be low or wet, if they are near a food supply and far

from traffic. A majority of the nesting sites are in low wet woods, but this is because woods near a large supply of aquatic food are more frequently of this character. In Huron County, six and a half miles south of Monroeville, far from roads and houses was a heronry which a few years ago contained about forty nests in eight sugar maple and two beech trees on hilly ground where foxes had a den. Nearly all of the large trees in the woods were of these two kinds. This was too far from Lake Erie for the herons to go there regularly for fish and the low water in the Huron River in recent summers has probably been the primary reason for this heronry dying out.

East of Springboro, in Warren County, is the only nesting site for Great Blue Herons which I know of in southern Ohio. The birds began nesting there about 1927. On August 14, 1932, we found twenty-six nests, of which twenty-four were in second growth beech trees, tall but less than a foot in diameter. The woods are on ground which is 950 feet above sea level and slopes away in all directions, except toward the northeast. They probably afford more seclusion for the herons than they could find anywhere closer to their food supply, which comes from the Great Miami River, five miles away, and from the Little Miami, six miles away.

In Sandusky County about twelve miles farther from Lake Erie than the Waggoner heronry, I found March 22, 1931, twenty-two nests in the tops of eight elm trees, there being few other large trees in these woods. In the Goll woods near Bean Creek, in the southwestern part of Fulton County, where for years there have been between fifteen and thirty nests, all are in large bur oaks, although a tall cottonwood near one of the oaks formerly contained a nest. Long ago when there were cottonwood trees that towered above other trees, they were favorite nesting sites of Great Blue Herons. Now elm and bur oaks are the trees most used.

On visiting various heronries one is impressed with their isolation from the busy world around. It seems as if the birds had tried to get as far as they possibly could from public roads and human habitations, or else where a person would need rubber boots or a boat in trying to reach the place.

Black-crowned Night Herons have shared some of the nesting sites, for a time, with the Great Blue Herons. Their flimsy nests are usually in small trees and not so high as the nests of the larger birds. So far as I know they do not resort to the same nesting site very long. The trees they use are killed in a very few years by the excrement. More slowly this fate befalls the big trees that hold considerable num-

bers of Great Blue Heron nests, but in such big timber as they were accustomed to select the growth of medium sized trees kept up with the destruction of the large ones. Before the coming of white settlers, such a forest may have formed a harbor for these majestic birds every summer for more than a century.

We know that several of the present nesting sites were first used by the herons after the big trees in the woods which they had previously been using were felled by the axe or destroyed by fire. The same is probably true of many whose history we have not learned. In most cases we do not know when the birds began to use the earlier nesting sites. One of my students, whose father owns part of the big woods which the herons used before they began nesting in the Waggoner woods three miles farther south, told me that these birds were nesting there when her father's great grandfather was a young man. This was about 1840. For how many years previously they had been coming to those same woods we can not tell.

The big heronry northwest of Toledo has been maintained in the same place for half a century. Until 1871, the year of the great Chicago fire and of many very serious forest fires, herons nested in cottonwood trees in heavily timbered swampland about four miles northwest of the present heronry. Fire destroyed these trees and the birds then began nesting in cottonwoods in a tract of timber about one mile to the northwest of the present site. Some fifty years ago that tract was cut over and all the very tall trees removed, causing the birds to take up their abode where the heronry is now.

Until about 1890 there was a large heronry in Gorham Township in the northwestern part of Fulton County, in a woods consisting of five or six acres; in large cottonwood trees along Bean Creek there are said to have been some 250 nests. At present, and for many years past, the food supply here has been quite inadequate for such a large heronry. Indeed a person unfamiliar with the region would wonder how such a large number of these great birds could ever have maintained themselves there. But formerly thousands of acres of what is now fertile farmland were covered with water from early spring until July or later. Frogs and fish were abundant. Clark Powers who still lives there remembers that his father often caught a bushel of fish at a time with a gill net or sieve, and would put the small ones back in the water. Fish abounded not only in the natural streams but also in ditches and ponds and they spread into the water that covered the land, where many perished and stank. Until it was dredged, the Bean Creek contained more fish than it does now.

Changes in drainage would not have brought about the complete extirpation of this large heronry so soon but in addition to depletion of the food supply the birds suffered persecution from unscrupulous hunters. Men and boys used to go to the nesting site on Sundays and shoot herons for sport, never eating any of them, although from a few they cut the wings to be used in dusting shelves. Some of the hunters would shoot as many as twenty-five herons in one day. Even such persecution might not have wiped out the heronry entirely, for the inhabitants were not bent on getting rid of the birds, but the felling of the big cottonwoods in which they had made their nests year after year put an end to what had been, so far as we know, the largest heronry in the interior of the state.

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FOOD OF THE LIMPKIN

BY CLARENCE COTTAM

Because of its peculiar distribution and unique feeding habits, the Limpkin (*Aramus pictus pictus*) is one of the most interesting of North American birds. In habits it seems to partake somewhat of the characteristics of both the rail and the heron. Like the rail, it runs rapidly and stealthily on the damp ground and frequents the borders of wooded streams and swamps; like the heron, it perches in trees.

In distribution the bird is restricted to the Okefenokee Swamp in southern Georgia and to Florida. Over much of its range it is absent or rare and is common only locally where the food and environment are to its liking. Perhaps the principal factor responsible for its discontinuance and spotty distribution is its peculiar and restricted food. It feeds primarily on a large fresh-water snail of the genus *Ampullaria*, and is, therefore, largely restricted to places where this snail is sufficiently abundant to afford adequate sustenance.

It has generally been assumed that the bird feeds exclusively on this gastropod. Howell in his excellent book on "Florida Birds" (1933, page 200), states that the Limpkin subsists entirely on this one genus of mollusk. A recent but brief inspection at Wakulla Springs, Florida, gave convincing evidence that it also takes other foods. Along the Wakulla River the Limpkin is locally common. *Ampullaria depressa* likewise is common, as are the fresh-water mussels (Unionidae).

It seems to be a common habit of the bird to feed at given points or stations. At such places a large pile of empty shells could be seen,

perhaps sufficient to fill a half-bushel basket. Each of these feeding stations, while containing many *Ampullaria*, also contained a few empty and broken shells of the Unionid bivalve (*Lampsilis vibex nigrina*). Two guides along this river, who have opportunity daily to observe the birds ,informed the writer that while the species fed primarily on the large snail, it also occasionally fed on mussels and other material. From field observation it seemed apparent, therefore, that while the birds subsist largely on this one genus of fresh-water mollusk, they obtain a small part of their food from other sources.

Dr. Henry Bryant made careful observations of the bird in Florida and wrote in the Proceedings of the Boston Society of Natural History (Vol. VII, p. 13, 1859) that: "On the St. Johns (Fla.) it feeds principally on a species of *Natica*, which is extremely abundant, and also on the small Unios. The large green snail, so common in the Everglades, is not very often met with on the St. Johns. Its manner of feeding is to hold the shell in one of its feet, and then with a few blows of its powerful bill to detach the animal, which it immediately swallows. All the specimens I killed had the stomach filled with the more or less digested remains of various mollusks—principally Unios."

Thirty stomachs of the birds collected over many years from various localities have been examined in the Biological Survey laboratory. Of these, twenty-one were filled with the fleshy content of a gastropod that appeared to be *Ampullaria*. Some of them contained small bits of the mollusk opercula, only three of the stomachs containing even a trace of anything other than this gastropod. Five of the stomachs and gullets contained, twenty-five, twenty-four, fifteen, twelve, and ten snails, respectively. One stomach contained ten or more gastropods of the genus *Campeloma*. The other eight stomachs contained unidentifiable fleshy parts of mollusks, most of which appeared to be gastropods, probably *Ampullaria*. Of the thirty stomachs examined, the fleshy part of mollusks comprised 100 per cent by volume of the food content in all but one stomach, and in that exception it comprised 99 per cent of the total food. The other one per cent consisted of weed seeds and insects. Weed seed (*Polygonum*, *Ambrosia*, *Panicum*, *Myrica*, *Sisban*, and *Cephalanthus*) occurred in six of the stomachs, but amounted to only a trace of the total food content.

From stomach examination it will, therefore, be seen that 70 per cent of the total food was believed to be *Ampullaria*, while 3.33 per cent was identified as *Campeloma* and 26.66 per cent was unidentifiable

mollusk flesh, probably most of which was *Ampullaria*. Identification in this instance was made more difficult because only the fleshy part of the animal had been consumed. Plant fiber or seed fragments made up but 0.01 per cent of the volume of the total content.

U. S. Biological Survey, Washington, D. C.

EGG LAYING BY THE COWBIRD DURING MIGRATION

BY THOMAS D. BURLEIGH

Centuries ago Solomon wrote, "there is no new thing under the sun", and yet from time to time events transpire that seem to reveal a new thing. Interest in bird study during recent years has revealed much that has long been merely conjecture concerning the life histories of some of our familiar birds, and the acquired facts have usually corroborated earlier opinions of what actually happened. Yet exceptions do occur. And in the case of the Cowbird, a species already marked by its unique breeding habits, it would appear that there is some justification in considering recent knowledge of its actions during spring as something "new".

A study of the range of the Cowbird (*Molothrus ater ater*) in the southeastern States shows it to be a common migrant south of Virginia. According to the fourth edition of the A. O. U. Check-List it does not breed on the Atlantic slope south of central Virginia, and actual records of eggs or young in that State are scarce. Like the other blackbirds, it is a hardy species and in the fall normally lingers in the northern States well into October and frequently much later. Despite these facts, however, young birds have appeared in the southern States with unfailing regularity in July, and their occurrence during summer both in the Carolinas and in Georgia has presented rather a perplexing problem. Arthur T. Wayne in his "Birds of South Carolina" has commented on the occurrence of Cowbirds at Charleston as early as July 25, and Dr. Herbert Friedmann in his monograph on this species states, "It is very puzzling to find that in the Southern States the first migrant Cowbirds are seen as early as the end of July."

During nearly ten years spent at Athens, Georgia (from September 1920 to January 1930) I frequently found this species appearing in the open fields and pastures shortly after the middle of July, my earliest record being July 17, 1928. Specimens collected proved to be fully grown young birds of the year, but at the time the significance of this fact escaped me.

In the course of field work carried on in western North Carolina, from January, 1930, through August, 1934, I again found Cowbirds appearing with unfailing regularity early in July in pastures about Asheville. As this conformed with the habits of the species farther south, little thought was given at the time to these early summer records. In fact, any explanation of this early summer movement of the birds would probably have been given little consideration had it not been for the unexpected discovery of the actual breeding of this species near Asheville. On June 10, 1933, Ernest Lyda, a local bird enthusiast, brought me a week-old fledgling taken from a Red-eyed Vireo's nest that, because of its size and actions, he suspected of being a young Cowbird. His surmise proved to be correct; and as this record extended materially the breeding range of the species, an attempt was made to determine whether eggs were being laid by more than one pair. Oddly enough no adult birds could be found anywhere despite a careful search of all suitable spots, and it was then that the thought that these birds might lay eggs in migration first suggested itself.

Further verification was, of course, necessary, and in 1934 a detailed study was made of the occurrence of the Cowbird about Asheville during the spring and summer. As in previous years, flocks of varying sizes were numerous during March and the first half of April. There was then a steady decrease in the numbers observed, and on May 4 the last individual was recorded, a male, feeding in an open pasture. In the following two months a systematic survey was made of all areas where these birds might occur. Open fields and pastures, farm yards, and all spots where cattle or other livestock might be grazing were inspected, but with no success. No adult Cowbirds were seen, and farmers who were questioned invariably expressed an opinion that the birds were not present during summer. It was of decided interest then to find early in June two Red-eyed Vireos' nests that had been parasitized by Cowbirds and that held a fledgling and an addled egg, respectively. These were near Weaverville, the place where the first fledgling had been taken, so the surrounding open country was subjected to an especially careful search, but no evidence was noted of the presence at that time of any adult birds. Early in July, as in past years, Cowbirds made their appearance about grazing cattle in pastures about Asheville, and a close scrutiny of these birds showed that all of them were fully grown young of the year. On August 2, twelve that were without exception young birds were seen in a field in the open Mills River Valley, and up to the middle of September no adults had been noted.

According to this evidence it would seem probable that Cowbirds actually do lay eggs in migration. It is realized that this suggests a situation without a parallel in the bird world but it would be difficult otherwise to reconcile the fact that young birds and eggs have been found in the nests of such species as the Red-eyed Vireos with the additional fact that adult birds could not be found during late spring and early summer despite the most diligent search. Fortunately the Cowbird is a relatively conspicuous bird during the breeding season, and because of its preference for the more open country is not easily

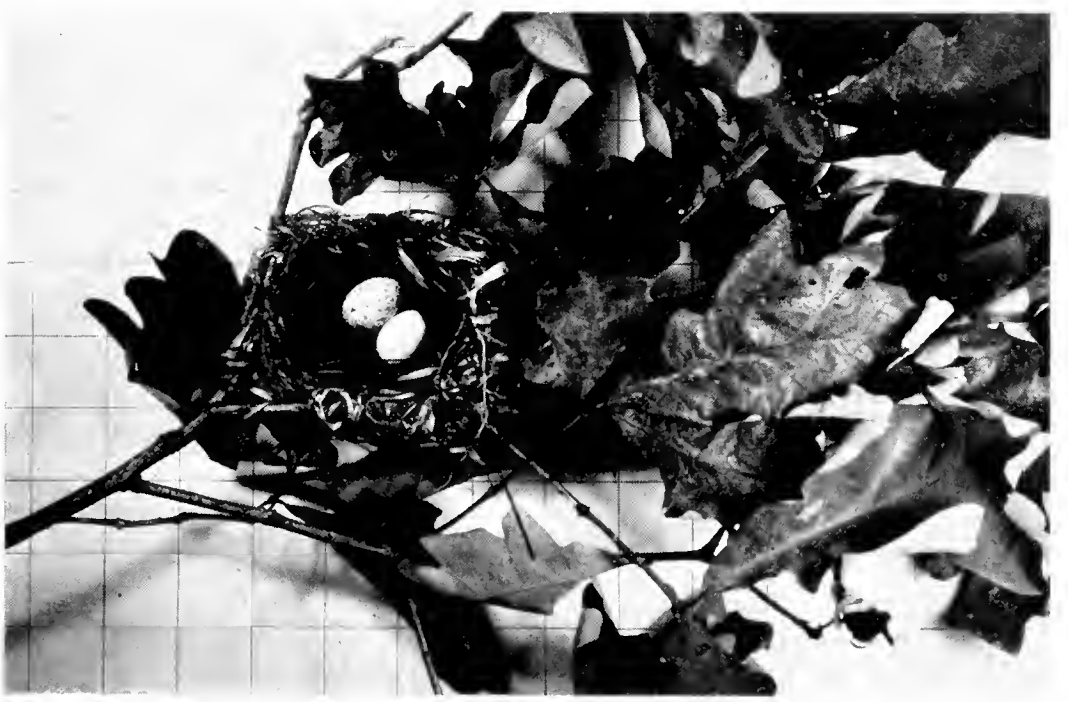

FIG. 3. Nest of the Red-eyed Vireo which contains an addled Cowbird's egg. Asheville, N. C., June, 1934.

overlooked. Of some species I would hesitate in being positive concerning their actual status, but I am confident that I did not overlook any Cowbirds.

My conclusion that the Cowbird lays eggs during its migration would explain the presence of the birds during summer far south of the range of the adult birds during the accepted breeding period, and would solve a problem that has long puzzled bird students in the southern States. It would also account for the supposed breeding records from Florida and Georgia that until now have been discredited, but that may thus prove to be authentic. An example is that of the Cowbird's egg included in a collection of eggs from Wayne and McIntosh Counties, Georgia, on the basis of which Ridgway gave Georgia as the southern breeding limit of the species. This was ques-

tioned by Wayne in his "Birds of South Carolina", and later was considered an error by Dr. Friedmann in his discussion of the present range of *Molothrus ater ater*. Personally I would be inclined to accept such a record as this, in view of the evidence I have just summarized, and include at least Georgia in the breeding range of this species. In this connection it is of interest to note that the host was a Red-eyed Vireo, agreeing in this respect with the preference shown in western North Carolina.

Further study is desirable and additional data should be secured to settle the question as to whether Cowbirds do lay eggs during migration. Bird students south of the now accepted breeding range of the Cowbird should note carefully the spots where the last migrants were observed in spring, and later, within a reasonable radius of such places, attempt to find as many nests as possible of such species as might possibly be parasitized. An occasional egg or nestling may reward such efforts, and ultimately reveal the proportion of Cowbirds laying in any one locality during migration. It is obvious that in the northern States it would be impracticable to try to determine where individual birds had laid.

In conclusion I might state that a seeming argument against this theory of laying during migration is the admitted appearance from time to time of adults, either male or female, in such states as South Carolina or Georgia early in summer. George E. Hudson has recorded an adult Cowbird observed at Clemson College, South Carolina, on June 17, and I personally have two such records for Athens, Georgia, for the middle of July. Such birds, however, are few and far between, and it is known that the post-breeding wanderings of many northern species frequently result in their occurrence in the southern States in June. The occurrence of a bird at a certain spot late in spring is always suggestive of a breeding bird, but unless the nest is actually found there is always the probability that it is a nonbreeding individual or one that has already finished nesting.

U. S. Biological Survey, Washington, D. C.

EPISODES IN THE LIFE OF AUDUBON IN INDIANA

BY S. E. PERKINS III

I.

We must ever speculate on the gist of the interesting exchange of experiences that took place at Clarksville, Indiana, opposite Louisville, Kentucky, and in sight of the famous Falls of the Ohio (the site of which town is now mostly washed into the river), when John James Audubon and his family visited Gen. George Rogers Clark in his home there. Neither made any notes upon these social calls that are extant. Each was a collector at first hand of the natural history facts to be observed in the fastnesses and swamps of lower Indiana. They both had much in common for they had each traversed the same regions of the state. It is too bad that no records were made by either about the calls of the traveler-naturalist Audubon upon the soldier Clark, which occurred on some of Audubon's many trips up and down the Ohio River between 1807 and 1818. Gen. Clark died in the last named year.

II.

After coming across an experience of Audubon in southern Indiana between 1811 and 1817, having to do with a law suit which he brought, I searched several biographies of Mr. Audubon but found no references to it.

It seems that sometime between the above dates John James Audubon desired one hundred raccoon skins, presumably for resale through his store in Henderson, Kentucky, so he crossed the town ferry and entered into a contract with a huntsman and trapper who lived on the Indiana side of the Ohio River across from Henderson, to furnish him these skins by a certain date. When the man failed to fulfill his agreement Audubon sought Jack Anthony, a Justice of the Peace in the Indiana township opposite where Audubon then lived, and brought suit for breach of contract. The defendant appeared on trial day and in his defense alleged that he had proceeded in good faith to carry out his part of the contract but unfortunately in felling a tree he had killed his hunting dog; that without the assistance of his hound he was unable to capture raccoons at the speed required to fulfill the contract. He further answered that he applied to the plaintiff, Audubon, for the use of his dog "Dash", but that Audubon had refused to loan the animal to him, and that therefore he was unable to comply with the terms of his contract.

When these facts came before the Justice, in the characteristic manner of the early courts he decreed, "This case is continued for

three months and the plaintiff herein is to furnish his coon dog to the defendant during that time." The record shows that at the expiration of the time of continuance that one hundred skins had been furnished. The case was then dismissed without costs and in order that good feeling might prevail, Watt Bryant, constable for the court, procured a quart of whiskey from one of the trading boats that was lying nearby in the river. From it a drink was had by the parties all around: whereupon both Audubon and the defendant to the law suit acknowledged their satisfaction.

III.

The first reference to the American Avocet in this naturalist's works came from an experience of Audubon two miles south of Vincennes, Indiana, at a small pond, in June, 1814. As he traveled on horseback from Henderson, Kentucky, to Vincennes, Indiana, he noticed a number of birds alighting in the pond. He immediately left his horse and crawled towards the water. He found the swamp but a few inches deep but with mud thereunder fully knee deep. As he approached through the tall grasses four birds assailed him, constantly giving harsh cries. They remained upon the wing but dived at him repeatedly. He soon recognized them as Avocets. It was new to him to find them breeding so far from the ocean, so he painstakingly sought out three nests which contained eggs. He then, from a hidden position in the shelter of the grasses, watched the behavior of the birds. He found that they were experts at catching insects; that they ran with partly extended wings; that they waded through the water hunting food often with the whole head and part of the long neck submerged, as he had seen the spoon-bill and the Red-breasted Snipe doing in other parts of the country.

Audubon returned early the next morning from Vincennes for further study and was able to advance on hands and knees to within three feet of a sitting Avocet. He exclaimed as he watched the bird from such a close range: "Lovely bird! How innocent, how unsuspecting, and yet how near their enemy, albeit he be an admirer of thy race." Within a moment after this thought came to his mind, he noted that the bird left the nest and used the well known broken-wing trick, appearing to have been wounded as it flopped along the ground in an effort to distract Audubon's attention from its nest and eggs.

During that morning, Audubon collected five of these birds, three females and two males, which served as specimens from which he

drew his painting of them in the elephant folio called "Birds of America".

IV.

Upon a three weeks' visit by Constantine Rafinesque with Audubon at Henderson, Kentucky, in the summer of 1818, together these scientists, who were only a year apart in age, crossed the Ohio River at Henderson into Indiana in order that Audubon might show Rafinesque, on a day's journey, the gigantic trees of our western forests and a cane-brake more than two miles wide, as well as the associated botanical forms. In Indiana they encountered a bear and became drenched in a heavy thunder shower. The area was not new to Audubon as he says he was "well acquainted with it".

Rafinesque made a collection of fungi, lichens, and mosses on this side of the Ohio River but not being familiar with the efforts of cane-brake travel found it strenuous and discarded the botanical specimens one by one in order to go forward lighter. When these men of science reached the Ohio again, late in the day, Audubon sounded his horn whereupon a boat came across from Kentucky for them, which allayed Rafinesque's expressed fear that they should never find their way out of the brake alive.

V.

It is recorded by the eminent authority on Indiana history, George B. Lockwood, that Audubon, while residing and maintaining a store at Henderson, Kentucky, was a visitor at New Harmony, Indiana, calling upon the scientific men there assembled. At that time the Robert Owen Communistic experiment was being tried at New Harmony with the aid of such well known scientists on the Staff of Educators as Thomas Say, now called the "Father of American Zoology", Gerard Troost, Charles A. Lesueur, William Maclure, popularly called today the "Father of American Geology", Lucy Sistaire Say, and Josiah Warren. New Harmony is about forty miles northwest from the town of Henderson.

Another statement concerning Audubon in New Harmony appears in *Harper's Magazine* and is by Mrs. Phillip Speed, late of Louisville, Kentucky, daughter of George Keats, brother of the English poet, John Keats. Mrs. Speed states that her father told her when she was a young girl that he and Audubon resided for a time at New Harmony while the Rappites lived there.

The Rapps occupied the town from 1815 to 1825. George Keats came from England in 1818. Audubon lived in Henderson from 1810 to 1818, during which time he visited at New Harmony. Next he resided in Louisville and then in Cincinnati till October 12, 1820. After that for a time he resided in New Orleans, Louisiana, and Natchez, Mississippi. Thereafter he is not known to have lived in Indiana or Kentucky. I find no corroborative evidence of Mrs. Speed's statement. I believe the statement of Mrs. Speed is an error, as the residence of Audubon is accounted for elsewhere.

VI.

On October 12, 1820, after Audubon had finished his work as taxidermist at the Cincinnati Museum, he left there with two flat boats carrying Capt. Samuel Cummings, Jacob Aumack, Joseph Mason, and others, executing a plan made to explore the Ohio, Mississippi, Red, and Arkansas Rivers and adjacent woodlands in order to study birds and plants and to make drawings of them for his great work.

I find an interesting entry in the journal of Audubon made on board his scow, October 17, 1820, as he scanned the northern or Indiana shore of the Ohio. The item is, "The Turkeys extremely plenty and Crossing the River hourly from the north side. Great number destroyed falling in the Stream for want of strength."

Audubon's fleet of boats made its first recorded stop on the Indiana shore a few hundred yards below Evansville on November 1. While Aumack, acting captain of one of the boats, sought to collect a debt due him there, and Cummings with young Mason went on ahead down the Ohio to Henderson in a skiff, Audubon made note of large flocks of Snow Geese, only one of which birds was, he says, in perfect plumage.

When afloat again and down three miles from Evansville, Audubon observed three birds he considered Brown Pelicans. He and the party landed below them while they were perched in a red maple tree. The artist let it be known that he desired to have one of them. Mr. Aumack stalked them and fired at two that were close together. Neither fell, which Audubon regretted exceedingly. The adventurers spent the night at that place.

The next night, reports Audubon, because of quite a gale they put ashore on the Indiana side opposite Henderson, his former home. While here the painter made what he is pleased to call "a rough drawing" of the place. At this camp Audubon says they saw sea gulls, *Larus argentatus*.

Continuing the journey down the Ohio, they came to Diamond Island, wild and beautiful, the next day, November 3. Audubon and his party landed upon it and found a fine Snow Goose, northern divers, and a few Sandhill Cranes. Our ornithologist spent the whole next day hunting on this immense island with the result that he saw a great many turkeys and "dears", blue cranes, "wood groos", a winter wren, and turkey buzzards. The latter were engaged in feeding on a dead hog.

When Slim Island, a mile below Mt. Vernon, was reached November 5, Capt. Cummings went ashore there but found nothing of interest to him. Of the stretch of the Ohio opposite this island, Audubon reports "this part of the river rather difficult". It has shifted its banks or bottom since that time for the main channel which is between the island and Indiana now presents a magnificent, sweeping bend beside and below the island where I have lately watched flotillas of a half dozen heavily laden barges lashed into a whole, while being pushed by a stern-wheel packet, negotiate the course with the utmost ease.

On down stream, after he left this island, Audubon had a red letter day for he saw geese, loons, red-breasted thrushes (robins), many sparrows, parokeets, a winter hawk, and a woodcock.

When these two barges, proceeding lashed together side by side most of the journey while in the Ohio, arrived at a place nine miles above the mouth of the Wabash River, though the temperature that November 6th was 28° and the weather very disagreeable, Audubon disembarked and with gun on shoulder tramped in Indiana to the confluence of these two streams. His trip was over the open weedy spaces, through forests of pecan, hickory, maple, and tupelo, and vast cane-brakes, all of which characterized the region. While he doubtless enjoyed this trek along shore he says he found nothing new of bird kind which he desired to collect for painting. His crafts, after he was aboard again, soon encountered a gale and were blown to the Illinois shore a mile down.

I have lately journeyed afoot over some of the territory embraced in the nine mile trek along Indiana's southern border, now in Posey County in the southwest corner of the state. There are no brakes of reed or fishing-pole cane today. All one sees is a patch here and there of slim six or eight foot tall stalks. A half dozen forest trees in clumps are to be encountered at intervals along shore, the only reminders of river-bordering woodlands that in days agone were so dense as to be almost impenetrable. They have largely gone to fur-

nish fuel to wood-burning packets, common soon after Audubon's time. Cypress trees then as now, likely grew only in the nearby bayous of both rivers as Audubon makes no mention of encountering any of them along the river border.

Audubon's nine miles afoot constitute the last trip on which he is known to have visited Indiana.

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Indianapolis, Ind.

PERCIVAL BROOKS COFFIN

BY R. M. STRONG AND W. C. ALLEE

Percival Brooks Coffin was born in the small city of Richmond, Indiana, in 1865, the youngest child of a Quaker family that had for two generations strongly influenced the religious, philanthropic, and financial development of its community; he died nearby Richmond in his modest summer home, "The Brooks", on October 7, 1935, after a brief illness. His parents did not send their youngest and somewhat delicate son to public school, but taught him or had him taught at home. One of his closest friends writes: "It always seemed a bit pathetic to think of this active mischief-loving little chap not allowed to play with boys away from home, not allowed to go to public school, always tutored, sitting on the floor forming armies with spools while his parents read aloud Parkman's histories." Although his father, Charles F. Coffin, among his many other notable activities, was one of the founders of Earlham College, the boy was not sent there.

As happens to good minds denied formal school and college training, he felt a vivid sense of his loss which he was constantly alert to repair by his own efforts. In this he was so successful that in full maturity he had become one of the best and most truly educated of men.

Percival Brooks Coffin. 1865-1935.

The three external determining factors in Percival Coffin's life were his association with his parents and their wide range of philanthropic interests, such as prison reform, the rights of Indians and the improvement of hospitals for mental diseases; the failure of his father's bank when Percival was still a young man; and his marriage to Lucy V. Baxter, daughter of an outstanding Quaker family of Richmond, and an enthusiastic naturalist. There followed highly formative years (1894-96) at Santa Fe, New Mexico, and the beginning of Mr. Coffin's development as a naturalist in his own right. The young couple went on frequent trips into the interesting surrounding country and made acquaintance with such birds as the Woodhouse's and Piñon Jays, the Townsend's Solitaire, and other Rocky Mountain species.

Characteristically strong and lasting friendships were founded in this period. After that he moved to Chicago which was his residence for the remainder of his life. Percival Coffin's ornithological activities, aside from excursions into the country as a lover of birds and of nature in general, were largely associated with the Chicago Ornithological Society, the Wilson Ornithological Club, and the Inland Bird-Banding Association, all of which involve Lucy V. B. Coffin, whose interest in ornithology preceded his. The senior author met Mrs. Coffin as an alert and enthusiastic student in a lecture course on birds open to persons not regularly registered as students in the University of Chicago, some time before 1912.

This led to a friendship with both members of the family and they were among the first persons considered as possible members of the Chicago Ornithological Society, which was founded in 1912. They accepted the invitation and became charter members. Until ill health during the past two years took them away from Chicago, they were leading supporters of the society. They attended meetings regularly and did much more than their share of the work involved in making it a success. Both served frequently on committees and as officers of the society and they often contributed to the program. Mr. Coffin was president in 1921 and 1922; he was on the Ridgway Memorial Fund Committee in 1928; in 1920 he conferred with the Governor and both Senators of Indiana about the possibility of establishing a state park in the Indiana Dunes—a splendid project which was later accomplished.

Percival Coffin was treasurer of the Wilson Ornithological Club during the years 1914-16, inclusive. Up to that time the organization had been small and its future uncertain. The WILSON BULLETIN had been kept alive largely through the devotion and perseverance of

Professor Lynds Jones of Oberlin College. Mr. Coffin applied his unusual business ability and experience to the financial problems of the club and he had much to do with its expansion and reorganization. His sane and comprehending advice was greatly appreciated by the other officers.

He was one of the organizers of the Inland Bird-Banding Association, calling the first meeting to order and serving on the first nominating committee.

About 1918 they purchased a farm near Richmond, Indiana, which they named "the Brooks". This became a bird and plant sanctuary where they made systematic studies of the habits of birds and experiments in allowing a portion of the land to return to its natural state so far as possible. Here they spent their vacations, sometimes half of the year.

On coming to Chicago, Mr. Coffin first entered and later continued his father's office as investment banker, and relieved himself from business cares by work on civic committees of the City Club; by continuing his music; and by active interest in the Society of Friends, in which the now well-known work of the American Friends Service Committee early caught his attention and devotion. During the long, slow progress of the depression the attention of the Coffins turned more and more toward their naturalistic interests, even after the severe illness of Mrs. Coffin stopped active field observation.

An interesting result may be quoted in full from the November, 1935, issue of Biological Abstracts (9/9):

"Coffin, Percival Brooks. The eyes of birds. *Indiana Audubon Soc. Year Book.* 1933: 62-65. A general critical account, with conclusions, relating to the morphology and visual properties of birds' eyes."

Among ornithologists, bankers, college professors, farmers, and particularly among the many young people the Coffins befriended, of whom some of us, including the junior author are no longer young, Percival Brooks Coffin is remembered primarily for his friendliness, his whimsicality, his originality, and his clear-eyed, wholesome philosophy of life.

OBSERVATIONS ON THE FLORIDA BLUE JAY

BY DONALD J. NICHOLSON

My experiences with habits of Florida Blue Jays (*Cyanocitta cristata florincola*) has extended over a period of more than thirty years and I felt that the subject might be interesting to some.

Range in Florida

This subspecies is found throughout the entire State, but the center of their abundance is central Florida, in Orange, Lake, and Volusia Counties. They are especially numerous in this section on account of the large acorn-bearing oaks. The center of their abundance appears to be in Orlando and Winter Park. These cities are literally alive with them.

Jays are most commonly found where large water oaks and live oaks prevail, and elsewhere are far less numerous. They are to be found on all high ground, but not in marshes except in rare cases. Cypress swamps, pine timber, little hammocks in prairie country, sandy wastes with scrubby oaks, are all frequented. Birds found in cities and villages greatly outnumber those which inhabit sparsely populated areas, and are even more noticeably rare in wild parts of Florida. They seem to have a preference for human society, and are not wild in the cities. The birds of the unpopulated sections are entirely different, becoming most secretive and shy, avoiding man.

Should Mr. W. E. Clyde Todd's new subspecies of the Blue Jay be accepted by the A. O. U. Committee, it will leave in doubt the exact range of the Florida Blue Jay in southern Florida.* Mr. Todd's specimens were collected near Cocoanut Grove, Dade County, Florida.

As some few individuals in this section (Orlando) are noticeably darker than others during the breeding season, Todd's specimens may prove to be only a case of individual variation, occasionally found.

General Habits

The bird is very bold and dashing, being able to cope with most any bird of its own size, and frequent encounters take place among such birds as mockingbirds, woodpeckers of several species, Florida grackles, cardinals, brown thrashers, and others. These conflicts are usually about food supply, or following territory intrusions.

Their bitterest enemies seem to be any species of owl, and when once discovered, these noisy fellows make life miserable for a luckless Screech Owl found dozing on some limb. I can invariably tell when

*Editor's Note. This paper was submitted before the Fourth Edition of the A. O. U. Check-List appeared in 1931.

a Screech Owl is in the neighborhood by the deafening din caused by all the jays in the vicinity assembling and voicing their protest. Excitedly jumping from limb to limb or flying here and there, they dive and peck at the unfortunate owl until he is so dazed and harrassed that he hurriedly seeks refuge and after him goes the entire flock screaming as they follow. This is often repeated until the object of their wrath moves out of their range and finds a safe hiding place. Crows are probably as badly hated, and are promptly put to flight. Small hawks or even larger ones are likewise bombarded. Snakes, squirrels, cats, and dogs come in for their full share of attention and for long periods the jays will clamor loudly, pecking and darting at such enemies. Oölogists are classed as first-rate nuisances and are treated as pests in case one molests their nests; and woe to the man or boy who ascends bare-headed, be his intentions mere curiosity or "egging", for most surely he will receive a smart jab on the top of the head, with a couple more thrown in for good measure. However, this depends on individual pairs of birds; some will quietly fly away, perhaps giving a few outcries; but in the majority of cases both parents, augmented by many others, will come shrieking and attempt to intimidate the intruder.

It is a decidedly embarrassing moment to a sensitive oölogist, to be found robbing a jay's nest, on some main street in town, by a benevolent old man, attracted to the scene by these vociferous defenders, and he will have to do some tall explaining at times, especially if he is caught on the old man's property. I well remember an amusing incident that occurred years ago. I had spotted a nest in an oak, under which there was a public bench, in a fashionable section of town, and to obtain this set of eggs I was compelled to climb after nightfall. I had ascended and was in a precarious position out on a slender limb, when along came a spooning couple and parked on the bench below. Fearing detection, and probable accusation of eavesdropping, I ceased all movements, hardly daring to breathe. The outcome was that this pair remained until I was all but exhausted, and a very sleepy young man, and vowing to never again resort to such means of collecting. The eggs are in my collection to remind me of this now amusing predicament.

Just a little after day-break the jays begin their day, and practically every morning they give a really beautiful musical concert, which is impossible to describe on paper. The manner in which it is given is as follows: One bird will utter a mellow two-syllabled note which to me sounds like, "*toooo-el, toooo-el*": the o's (uttered like u)

are repeated many times and by many birds, creating a pleasing effect. This is kept up for fifteen or twenty minutes and then is heard no more. I have noticed this peculiar program for a year and it occurs throughout the entire year. Whether this is merely a local habit, or not, I cannot say.

They have a very large vocabulary, and quite varied tones. Nearly every one is familiar with their loud *day, day, day* notes, but the bird also has a low, sweet, musical, mimicking twitter, which is delivered while perching, and is not accompanied by the bobbing motion of the body, as when uttering their calls. The most uncommon and peculiar vocal sound is a rattling of the throat producing a sound like marbles being shuffled in a bag, and is always done with an energetic bobbing of the head and body. This is usually a sign of great agitation, and is often followed by vicious pecking and pounding on the perch. The bird is angry and wrecking its vengence on something to display its feelings.

A series of low, soft notes uttered in rapid succession, sounding like, *tit-tit-tit-tit-tit-tit-tit*, are invariably given while the birds are both at the nest during building, or when the male returns to feed the female on the nest, which he does frequently. Countless other indescribable notes are given in pitches of different degrees. These jays are quite expert at imitating the call notes of the Florida Red-shouldered Hawks, and they are thus commonly heard in any part of their range. The deception is difficult to detect. It is the only mimicry practiced by this bird.

Jays are restless, energetic birds, moving from place to place among the trees, and just as much at home on the ground, where they hop about in search of food or nesting material. They are more or less sociable, and go about in troups, but are often found singly.

The flight of these birds is strong and is generally in a straight, direct course, with medium wing-beats. But another form of flight is a slow-moving undulating sweep, given with an occasional flap, and only used in going short distances. This slow flight is more often seen when the birds give their musical "*Tooo-del*" notes.

They are much attached to certain given ranges and remain for years near the same spot.

Nesting Habits

The Florida Blue Jay is a most abundant breeder at Orlando, and I doubt if there are any other cities in the State where it can be found in such large numbers, due to ideal food conditions and nesting places. In any part of its range it is found to breed much more commonly in

densely populated towns and cities in preference to uninhabited areas. Whether this is due to a plentiful food supply or for protection against natural enemies not found in inhabited areas, or a combination of both I do not know, but I am inclined to lean towards this theory. It would not be an exaggeration to give an estimate of 15,000 jays within a radius of six square miles in this district (Orlando and Winter Park).

The favorite nesting-tree is the oak, and on many streets along the sidewalk I could count from three to six nests within one city block, which will give some idea of their numbers. At this present writing (April 27) I counted three nests within a circle of 150 feet, and as close as forty feet one way and seventy-five feet the other way from the center nest, and all occupied. A huge oak over 100 feet high with a spread of 200 feet is as readily used as a small tree. Such trees as pine, oak, orange, grapefruit, china-berry, bamboo, hickory, and a few others are also used.

The most cunningly concealed nests are placed in moss-draped trees, and the hardest of all to detect are those in tall pines. As a general rule no special pains are exerted to conceal their nests, at least not in cities; but a country nest is indeed difficult to see and the birds are very wild. Nests are placed anywhere from seven feet above the ground to seventy feet, but on the average a nest is from eighteen to twenty-five feet high. In large trees the nests are placed on small out-cropping branches of some immense limb, or occasionally saddled in a fork of a horizontal branch among a few sprouts. Upright or horizontal branches are equally used, and sometimes the extremity of a long slender branch is used. Most generally the interior of trees is chosen, thus saving the nest from destructive swaying branches.

A foundation of course twigs is always used, and frequently mud is employed to cement the lining to remain intact. Sticks, Spanish moss, paper, twine, rags, pieces of crockery, wire metal, are all more or less used, and the lining is composed of either black or yellowish-brown oak rootlets, or fine orange roots. Grass or weeds are seldom used, strange to say. A nice, neat hollow is made. Some nests are very slim, while others are quite bulky. The time required to build a nest varies from six days to a month, but this is in unusual cases. Horse-hair formerly was used frequently along with the rootlets in lining, but this is a scarce article now.

During the later part of February jays begin building their nests and by the middle of March many have completed their sets of from

two to five eggs. The most common number is four, but three eggs are quite common and full sets of two eggs are not at all unusual. A set of five eggs is very rare. Williams, at Tallahassee years ago, recorded one set of six eggs but out of hundreds of nests examined I have seen but five eggs as the extreme.

I have found nests containing eggs as early as late February in very warm early springs, but eggs are rarely deposited until March 10: and from then on until August. Two nests found by my brother, Wray H. Nicholson, and myself, contained eggs during the first week in September. This gives this bird a breeding period of eight months, but, strictly speaking, it nests regularly for six months.

Again during May a second set is laid, which is comprised of about the same number of eggs as the first set, and again in July or August a third set is deposited. This prolific nature accounts for the large number of these birds, and as they have few enemies (such as gray squirrels, an occasional prowling crow, and even their own species) their chances are excellent for rearing many young. I once caught a squirrel robbing a jay's nest. The jays themselves have a habit of robbing a neighboring jay's nest, and oftentimes I have found holes pecked in eggs.

As a usual thing a jay will not abandon the nest if inspected, whether the set is complete or not, but on numerous examinations I have returned only to find the eggs pecked and destroyed or entirely missing. This I am not sure was caused by the birds themselves (parents), but am inclined to believe they had at times something to do with this destruction.

These birds will resort to a certain tree or group of trees each year to nest and you can be sure of finding a nest at the proper time. If a nest is taken she will within a few days build another a short distance away, or in the next tree a few yards from the first site, or even in the original tree in another limb. I have known them to rebuild and lay another complete set of four eggs in twelve days. I once took a set of eggs, and passing several weeks later found that they had rebuilt in the identical crotch where the first nest had been. In another case I took a set and the bird again built her nest on the same limb within four feet of the first nest, which was still intact. On March 17, 1929, I collected all of four eggs. On April 29 a third nest was found fifty feet away, with three eggs, one a runt about the size of an English Sparrow egg. These eggs were all identical in shape, ground-color, type of markings, in all three sets, except the runt which was very dark: it was without a yolk.

A most unusual occurrence is the laying of a second set in the same nest when robbed. My brother Wray once collected a set of three fresh eggs from a nest and some weeks later happened to find a bird sitting on the same nest. Upon investigation he found her on five pipped eggs. I found a jay's nest in a grapefruit tree in April, 1929, and in less than two weeks she was sitting upon another set in the same nest.

The birds sit quite closely upon their nests and seldom flush until you ascend within several feet of them. Then they either hop off into a limb within several feet and scold, or fly quite a distance screaming as they go: or more rarely, leave silently and remain away while you are at the nest. The parents usually keep up a fierce clamoring, and are often joined by other jays adding to the turmoil.

Some sitting birds are quite tame and can be handled and placed back upon the nest, remaining as if nothing happened. Such behavior has been observed by my brother, Wray, the late William Leon Dawson, and myself. This is of course, unusual. Last year I found a jay sitting on her nest and, reaching over carefully, lightly touched her bill. She never moved, but blinked her eyes. Very slowly I moved my hand and stroked her head, and along the back: she, then, became alarmed and flew away. The next day I repeated the operations, lifted her off the eggs, and placed her gently back on the nest: she remained perfectly quiet, seeming not to mind in the least. No scolding or pecking was done, nor did her mate utter any outcry. Several "close-ups" were snapped within two feet of her, taken by William Leon Dawson, just seven weeks prior to his dath. This was some of the last photographing he did in Florida.

The eggs of the Florida Blue Jay, vary more, I presume, in pattern of markings, shade of ground-colors, and the inconstancy in sizes, than any other of the North American Corvidae. Few other species on the A. O. U. list can compare with it for variation in the eggs. The ground-color can be dark green, light green, pale blue, putty-color, salmon-color, gray, all shades of brown, and even dirty white. The markings are either brown, gray, lilac, or purple, with occasional black shell markings. Some eggs are finely speckled, others sprinkled with large dots, some with heavy capped ends, and a few with lines finely drawn connecting the markings. The usual type of marking is a speckling over the entire surface, with less at small end and confluent at large end. However, many eggs are almost devoid of markings on the lower half of egg. Others are so finely sprinkled over the entire egg that it obscures the ground-color. The shape of mark-

ings may be round, irregular, streaked, or pin-point dots, but I have never seen large blotches or splashes. Some eggs are identical with the Crow, and look like miniature eggs of that species.

The most common shape of the egg is quite pointed, few are quite blunt and some are very nearly equal-ended. There is a great discrepancy in size and many eggs are three times as large as others, while others quite small although fertile. But as a general thing the eggs in one set average alike in size, also in type of color and markings. I have never seen an unmarked egg. The shell is smooth and hard, with or without gloss, and much tougher than that of a Crow in comparison. Often little pimples are found on their eggs. To display a few sets in one drawer to an oölogist, and then have another drawer of different patterns shown later would completely throw him off his guard, as to the identity.

Food and the Young

Jays generally speaking will eat almost anything. They are fond of kitchen scraps, meats and bread, fruits of many kinds, bugs, insects, beetles, eggs, worms, corn, and all sorts of grain, green food, and have been accused of devouring young birds, which I have never seen them do. The cannibalistic habits must be infrequent or else I would have noted it, and neighboring small birds would be more antagonistic towards this saucy bird. I have never seen the nests of other birds with punctured eggs, or few deserted nests, where jays were numerous, which to my mind is evidence of innocence. I forgot to mention acorns which is their favorite food, and any time of the year they drop to the ground, pick up a fallen nut and perching with it firmly held by their strong toes, hammer with heavy blows until opened. They fly onto an ear of corn and pick away until the objective is secured. They hang upside down chickadee-fashion in trees, on moss clumps, or on ends of branches, searching for insects. I have seen them dart out from a tree and pursue, flycatcher-like, an insect, chasing it for long distances. Farmers do not class this bird as destructive, but as a beneficial species.

As mentioned before the female is fed upon the nest, but often also while off the nest. She entreats in the teasing manner of the young, and with quivering out-spread wings, using the *exact* notes of the hungry young, until the male gives her food. This voice positively can not be told from that of the young. I once saw a female feed a young one of the first brood, and a minute later settle down upon her second set of eggs, on the same limb upon which she fed

the young bird, which was apparently full grown. The young follow the parents for weeks begging for food, and are fed.

When first hatched the nestlings are perfectly naked, hideous-looking objects, with their eyes closed. They leave the nest in from fifteen to eighteen days, at which time the tails are quite short, and the feathers not fully developed on any part of the body or wings. Their power of flight is not by any means strong when they first leave the nest, and only short spaces can be covered. Many a young bird at this time of the year falls an easy prey to cats and various snakes. Many meet tragic deaths. A stray cat or dog is a sure target for jays in the neighborhood of a nest, and spirited dives and dashes are made, even sharp thrusts are given the animals, the birds all the while yelling and screaming their loudest.

In three weeks to a month, it is difficult to distinguish the young from the adults, but the face and throat is a smoky, dark color, instead of the rich black of the adult, and the bill is horn-colored, instead of black as in the parents; otherwise the plumage is apparently the same to all outward appearances. By the following spring no difference is seen. Even by fall I can not discern a particle of difference. A fledgling when caught, if caught by anything, emits terrified screeches as if in mortal agony, bringing the parents to its defense at once.

In preparing this article, I forgot to mention, under the caption of "Nesting", a few other facts worthy of note. The approach to the nest may be direct, but more often the bird flies to another part of the tree and gradually works its way to the nest. Both birds assist in nest-building, incubating, and rearing the young. There is practically very little mortality, as the young are quite hardy. Infertility in eggs is infrequent and a high percentage are hatched. I am ashamed to admit that I do not know the exact time required for incubation, but think seventeen days is about right.

ORLANDO, FLA.

NESTING OF THE PRAIRIE FALCON IN MONTANA

BY V. L. MARSH

Early Sunday morning, May 13, 1934, Ellsworth D. Lumley, Wm. Reavley, Jr., and I left Great Falls to visit the nest of a pair of Prairie Falcons (*Falco mexicanus*) that had been reported nesting a short distance from the Sun River Park road about one mile from the park and about a quarter of a mile south of the road.

FIG. 5. General environs of the pair of Prairie Falcons. Photographed by V. L. Marsh, July 4, 1934.

FIG. 6. The Prairie Falcon's nesting habitat. Nests of Brewer's Blackbird, Yellow Warbler, and the Western Lark Sparrow were found in the same area. Catbirds and Arctic Towhees could always be flushed from the bushes in the center of the scene.

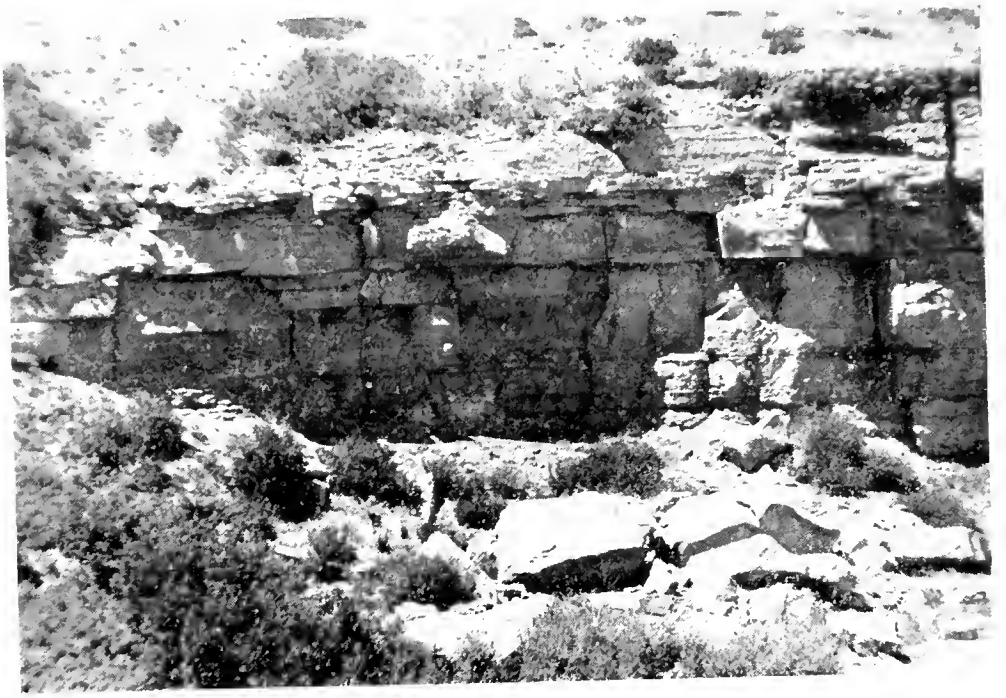


FIG. 7. Closer view of the rock cliffs on which the Prairie Falcons built their nest. Rock Wrens also nested within this area.

FIG. 8. The Prairie Falcon's nest is in the vertical crevice shown in the lower right hand corner of the picture. Cliff Swallow nests may be seen above.

Arriving at the desired destination, we stepped from the car and scanned the sides of the cliffs and hill to the south with binoculars, but no evidence of a Prairie Falcon could be found. Having brought along some rope, a couple of flashlight bulbs, camera, etc., we assembled our equipment and proceeded up the steep hill to the south. A walk of a quarter of a mile brought us into a deep narrow gorge walled in on three sides by more or less irregular cliffs about fifty feet high. As we entered the mouth of the gulch a shrill scream pierced the air and at the same time a grey streak shot out over the gorge toward us. Presently the second falcon appeared on the scene and from their actions it was plain to be seen that we were treading on forbidden territory. After a few minutes the bluster of protest died down and one of the parent birds sailed up and out over the valley to the north until we lost sight of it in the distance. The other bird perched on the southeast side of the gorge about one hundred yards away and directly opposite the crevice in the west wall of the cliff where the nest was located.

Being the camera man it was up to me to scale the cliff and see what could be done about photographing the nest of young. Lumley and I climbed to a ledge about twelve or fifteen feet below the crevice containing the nest. I scrambled on up and managed to get to the mouth of the crevice. Lumley passed the camera, film holders, and flashlight equipment up from below and in a few minutes all was ready for the picture. Two flashlight pictures were taken. One of them is Fig. 1. When I first looked into the crevice I could see nothing, but in a minute or so my eyes had become accustomed to the darkness and the nest could be easily seen about five feet back from the opening. The nest contained five young Prairie Falcons that I judged to be about two weeks old. At the opening the crevice was about two feet high and sixteen inches wide. It ran back for fifteen or twenty feet and turned out of sight to the left. At the point where it turned out of sight the crevice had narrowed down to six inches wide and twelve inches high. The floor of the crevice was comparatively level though there was a hollow comprising the nest bowl in which the young falcons were closely huddled.

The floor of the crevice was strewn with bones. This same nesting sight has probably been used by Prairie Falcons for many years as was evidenced by the decayed bones and excrement mixture composing most of the covering of the floor of the crevice. Some grass and a few sticks had been brought in for nesting material but there was not much evidence of a well shaped nest. Probably a few twigs

and some grass stems are used to reline the nest hollow each year. but when the young are running about they strew it from one end of the crevice to the other.

An external parasite was working on the little fellows and they were kept busy most of the time scratching and picking themselves much like a dog that is badly infested with fleas.

This was too good an opportunity to pass up so I placed a No. 6 band on each of the five young falcons.* None of them objected to being banded, but I would not advise anyone to try banding birds of this species when they are much older than these were unless an assistant is at hand.

The parent bird that had been perched across the canyon kept its perch until about the time I reached the mouth of the crevice and at that time it flew very close (probably not more than twenty feet) screaming at the top of its voice. After a few of these dashes it disappeared and we did not see it again until about the time we were ready to leave which was probably about fifteen minutes later.

The nest was visited the second and last time on May 27. The young were walking about in the crevice and were constantly screaming much like their parents as I looked into the mouth of the crevice. Two of the young came running to meet me flapping their wings and uttering a peculiar, harsh caw much like that of a farm-yard hen when she sings to herself. Although the young were still covered with white down the black primary feathers had begun to show on their wings and they would probably leave the nest in about two or three weeks.

During the last visit to the nest the two adult birds kept up a constant screaming and darting here and there about the edge of the cliff. Although they made no attempt to strike at me I did not stay long for. after an experience I once had with a pair of Great Horned Owls nesting on a cliff much like this one, I was in no mood to have a pair of talons sunk into my back when twenty feet up on the side of a rock cliff.

The Prairie Falcon is not a common resident of this district though I see a few birds each year at scattered points over the State.

GREAT FALLS, MONT.

*Prairie Falcon B665825 was killed twenty miles west of Polsen, Mont., on October 5, 1934.

THE CONCENTRATION OF CATBIRDS AT THE CLOSE OF THE NESTING SEASON

BY GEOFFREY GILL

Mention is made by the writer in the October, 1930, issue of *Bird-Banding*, of the probability suggested by John T. Nichols that Catbirds (*Dumetella carolinensis*), tend to concentrate in certain favorable tracts at the close of the nesting season. Such tracts being understood to contain a density of cover, water, and food, such as insects and wild berries of many kinds.

During the past five years, in Huntington, Long Island, New York, this concentration of individuals from outside my banding station area has apparently centered in an extensive planting of Scotch pine, now about fifteen years old, situated on the northern boundary of my station. Wild blackberry canes and other small berry-bearing growth have overgrown this planting to such an extent as to make it almost inaccessible in places, while a constant supply of water is assured by my traps and several bird-baths of my neighbors.

This concentration near my station usually takes place in August but occasionally continues into September when weather conditions are arid. The following table of Catbird captures at the station supports this view:

Year		May	June	July	Aug.	Sept.	Oct.	Total
1931	Adult	19	4	4	6	2	0	35
	Immature	0	0	3	26	8	0	37
1932	Adult	31	8	1	5	12	7	64
	Immature	0	0	14	33	13	1	61
1933	Adult	11	1	7	13	5	2	39
	Immature	0	8	7	16	1	1	33
1934	Adult	26	14	1	11	6	2	60
	Immature	0	1	6	43	1	0	51
1935	Adult	26	6	10	8	28	1	79
	Immature	0	23	23	49	9	0	104
Total	Individuals	113	65	76	210	85	13	563

It will be seen that a large percentage of each year's catch is made in August and that many new adults are taken at this time. In the seasons of 1932 and 1935, I believe the concentration periods extended into September. It will be noticed in the above table that more adults and immatures were taken in September of these years than is usual. The extension of this period in 1932, I believe, is due to weather conditions. James H. Scarr, United States Meteorologist, in his weather records for New York and vicinity, gives the average precipitation for August and September as 7.72 inches, while in the season of 1932, the rainfall during these two months amounted to only

4.28 inches. During the first fifteen days of September the maximum temperatures were considerable above normal; the second day of the month registered the highest temperature of the year.

Weather conditions in 1935 were similar. August, 1935, had less rainfall than the dry August of 1932. September, 1935, had more rainfall than is normal, but this was nearly all confined to four days early in the month, September 3 to 6, while temperatures for the two months were very close to normal.

A tabulation of the trap repeats of this usually trap-shy species for the five years further supports the concentration theory. Sixty-six per cent of the repeats were made in August and September and are as follows:

	May	June	July	Aug.	Sept.	Oct.	Grand Total
Repeats	20	22	26	77	55	7	201

Forty-five of the above September repeats were made in 1932 and 1935 which is more than five and one-half times greater than the total repeats made in this month for the other three years. The same number of water-baited traps have been in operation throughout the entire five years and in the same locations. As the majority of these traps are of the automatic type, the element of chance in the trapping of these birds is equal throughout the seasons. Unless there was a concentration, as suggested, it would seem that the records would be different.

While it is admitted that birds of the year greatly swell the totals of the new birds trapped in July and August, and also swell the number of repeats, immature birds being easier trapped than adults, young birds do not account for all of this concentration. Many new adults are trapped in August and seldom caught at other times.

With the thought in mind, that many of the immature birds appearing in my traps during the concentration period might be young from nearby nests, twenty-seven fledglings were banded in 1935, within 500 feet of my station to test out this theory. Only two of these fledglings repeated in my traps. Both repeated once in the first week of August. It is the belief of the writer, that the female and her brood wander away as a family group after leaving the nest. They appear to wander far enough to be outside of the area from which the concentration near my station is drawn and probably join some other concentration elsewhere. The male stays around his territory and if it is early in the season, he may be joined by another mate. However, old male birds, in which sex is known by colored banding, are a part of the influx of adults at the local concentration.

Possibly the theory of a concentration is best shown by the records of certain individuals at this station, many of them at least two or three years old, which are seldom taken during the nesting season, but appear in our traps in August. They are as follows:

Band No.	Date of Banding	Year	August	Repeats and Returns Other Months
B-165493	May 17, 1932	1932	9	May 18, June 15
		1933	....	July 28
		1934	3, 10, 11	.....
		1935		*July 20
B-165496	May 18, 1932	1932	....	.....
		1933	2	.....
		1934	1, 16	May 20, July 5
C-132219	June 16, 1932	1932	20	June 17, 18, July 13
		1933	6	May 13
		1934	17	May 17
C-132239	July 29, 1932	1932	29	.....
C-132262	Aug. 11, 1932	1932	....	.....
		1933	....	July 15
		1934	10	May 12
C-132270	Aug. 14, 1932	1932	....	.....
		1933	....	Sept. 18
		1934	7	.....
		1935	....	Sept. 22, Oct. 5
C-144214	Sept. 21, 1932	1932	....	.....
		1933	30	.....
C-144282	May 18, 1933	1933	10	.....
F-102408	July 27, 1933	1933	5	.....
		1934	22	.....
F-102482	May 12, 1934	1934	1, 18	.....
		1935	....	July 4

*Caught by neighbor's cat—released.

These ten Catbirds repeated the same year as banded, five times before August and seven times during August. During the following years they were in the traps four times during May, five times in July, twelve times in August, twice in September, and once in October.

It is believed that the above adults nested at some distance from the banding station and at the close of the nesting season they were attracted to the vicinity of the station by the favorable factors already mentioned.

In the case of C-132219, the nesting history of this bird is known for three years. In 1932, C-132219, a male, nested with his mate within ten feet of an automatic trap, hence the large number of repeats in that year. During 1933 and 1934, he nested 300 feet east of our traps and while he recorded his presence at the beginning of the nesting season, he did not repeat again until August during the last two years. It is thought that the case of C-132219 is typical of the majority of such adult males which are trapped each year in August.

Huntington, L. I., N. Y.

THE BIRD COLLECTION OF THE CARNEGIE MUSEUM*

BY RUTH TRIMBLE

Although the bird collection of the Carnegie Museum is not among the oldest of American collections, it has the distinction of being among the largest. Listing American collections according to their size we find Carnegie in fourth place, with approximately one hundred and ten thousand specimens, representing about one-fourth of the known species of birds in the world. No munificent gifts of large private collections have increased our store, and no spectacular million-dollar expeditions, such as have contributed to the history of our sister institutions, have come our way. It would seem that the bird department of Carnegie Museum, much after the fashion of its founder, whose name it bears, has lifted itself by its own boot-straps.

In November, 1895, Andrew Carnegie's gift to the City of Pittsburgh became a reality. On June 1, 1896, the first birds were received. They consisted of 185 mounted specimens, a gift to the Museum from the Academy of Science and Art of Pittsburgh. Naturally the first concern of the new museum was exhibition and the early collections acquired were mainly of local birds. A consistent attempt in the early years of the museum succeeded in assembling an appreciable array of birds from western Pennsylvania. No inconsiderable part of this was the collection of Mr. W. E. Clyde Todd, who was destined to become the curator of the Section of Ornithology. Also included was a part of the George B. Sennett Collection, and the birds collected by Mr. Samuel N. Rhoads for the Museum. These collections all contain many interesting birds which now form a large part of our exhibition series of the birds of western Pennsylvania. As the years passed, the series of Pennsylvania birds continued to develop, until now we have a very complete representation of the birds of our region. Areas which received particular attention were the region of Lake Erie, the only section of western Pennsylvania where water birds abound; Pymatuning Swamp, which ecologically offered a fertile field for investigation; and the mountains of the middle portion of the State. In 1904 Mr. Todd published in the *Annals of Carnegie Museum* a comprehensive survey of the birds of Erie and Presque Isle, and in 1928 in the same publication Dr. George M. Sutton brought out an interesting paper on the bird-life of Pymatuning Swamp. This paper was quite timely, due to the fact that much of

*Read at the Twentieth Meeting of the Wilson Ornithological Club in 1934, at Pittsburgh, Pa.

the swamp-land was to vanish before a State project calling for the flooding of the area in the construction of a storage dam. In the past few years Pymatuning Dam has gradually become a reality, which has spelled doom for many marsh-dwelling birds, but which at the same time has opened up new territory for water birds. Observations on these changes and much valuable information as to the occurrence and distribution of the three hundred-odd species of birds known to occur in our region will be recorded in a long contemplated work by Mr. Todd on "The Birds of Western Pennsylvania", soon to be published. The basis of this report is a collection of approximately 6,000 birds, taken within a period of fifty years, and supplemented by detailed notes by the author, as well as those of many other observers who have unselfishly placed their notes at his disposal.

Coincident with the effort to build up a series of local birds the Section of Ornithology began to enlarge its scope and cast about for ornithological "plums", so to speak. From the Baron van Schauburg in Holland were purchased 800 beautifully mounted European birds. These constitute at present a large portion of the Synoptic Series of Genera of Birds of the World in our Galleries. Two unique and historic collections acquired in the early days of the Museum were that of A. W. Anthony, consisting of 10,000 North American birds, and that of Sir Walter Buller, 200 specimens of the birds of New Zealand. The Anthony birds were taken in the western States, in Lower California, along the Pacific Coast, and on the Island of Guadalupe. From the latter island are good series of the Guadalupe Junco (*Junco insularis*) and the Guadalupe House Finch (*Carpodacus amplus*), both described by Anthony, and also representatives of the now extinct Townsend's Shearwater (*Puffinus auricularis*), the Guadalupe Caracara (*Polyborus lutosus*), and the Guadalupe Flicker (*Colaptes cafer rufipileus*). The Anthony collection includes nineteen types, and is particularly rich in seabirds.

The Buller collection which came to the Carnegie Museum is that upon which Sir Walter Buller based his *Supplement to the Birds of New Zealand*, published in 1905. History was to record the almost complete destruction of a unique avifauna by the ingress of civilization on these islands, and today many of the native birds exist only in museums, and even there are rare. A number of these extinct forms are included in the Buller collection, among them one of the famous Stephen's Island Wren (*Traversia lyalli*), of which only about a dozen specimens are known to exist, the extermination of this species having been perpetrated by the light-house keeper's cat within a few months of its discovery by the self-same cat.

Although these particular units are important historically, they are but isolated bits of the main general collection, which from its inception was particularly designed to build up a representation of the avifauna of the New World. Two regions were designated for exhaustive investigation. The first comprised the arctic and subarctic regions of North America with particular emphasis upon the Peninsula of Labrador; the second, the countries of northern South America and the adjoining states of Middle America.

Operations in the North Country were first begun in 1901, when Mr. Todd led an expedition to Newfoundland Labrador. No less than twelve expeditions to Labrador and the region of the James and Hudson Bays have been conducted under Museum auspices since that initial venture. At the time this project was inaugurated Labrador was from a naturalist's standpoint an unworked field, and the collection of birds that has subsequently been assembled by the Carnegie Museum is surpassed by no other. The various expeditions have encircled the Peninsula, working the coast, the coastal islands and rivers of Ungava, Ontario, and Quebec, north of the southern limit of James Bay. In spite of the inaccessibility of the region investigations were made during all seasons of the year. On one occasion Mr. O. J. Murie elected to spend the winter in the Great Whale River region of western Quebec with the result that a magnificent series of such little-known arctic and subarctic species as Holboell's Redpoll, Rock Ptarmigan, Snow Bunting, and Lapland Longspur were secured for Carnegie Museum. On another occasion the Museum accomplished a difficult traverse of the interior of the Labrador Peninsula from the Gulf of St. Lawrence to Ungava Bay, a region never previously visited by naturalists. And again Mr. Todd invaded the winter fastness of the Hudson Bay area by dog-team with the specific purpose of observing nesting birds and collecting the little-known eggs and young of arctic forms. Thus the Carnegie collection is unique in that it was made not only in a region the natural history of which remains unrecorded, but also because it covers an entire season, winter as well as summer. The series of ptarmigan showing the various stages of spring and fall molt are not to be duplicated elsewhere; there are exceptional series (adult and juvenile plumage) of the various species of Limicolae, which have become rare of late years; and the many specimens of geese and ducks from this area prove invaluable in settling problems of subspecies and their distribution. The results of this research are being prepared by Mr. Todd for publication.

In line with the studies in Labrador was an intensive survey of the bird-life of Southampton Island, in Hudson Bay, made by Dr. George M. Sutton, whose conclusions were recently published in the *Carnegie Museum Memoirs*, and whose excellently prepared specimens are now all a part of our collection. Later studies have also been made in Manitoba, Saskatchewan, and British Columbia. Much of this work in the North Country has been made possible through the generosity of Mr. John B. Semple, of Sewickley, a trustee of the Carnegie Museum. Although the Museum has never actually worked in Alaska, we have secured several small but important collections from this territory, as well as from Wrangel Island and eastern Siberia.

In addition to our series of birds from Pennsylvania and the nearby States of Maryland, Virginia, and the District of Columbia, we have acquired a worth-while collection from Florida, secured by Mr. Willis W. Worthington in the early 1900's, and latterly through the efforts of Mr. John B. Semple and Dr. Sutton. These two gentlemen have within recent years collected for the Museum in the Rio Grande Valley of Texas and in Oklahoma. Except for these few instances our work in the United States has been somewhat erratic, and the greater part of our birds from the western states are those acquired in the Anthony Collection.

More than half of our entire collection has come from South and Middle America. From the Bahama Islands of the West Indies we have a small but fairly representative series of land birds, which formed the basis of a paper on the ornithology of those islands, published by Mr. Todd in 1911. In 1912 and 1913 Mr. G. A. Link, Sr., then of the Museum staff, secured during a year's residence on the Isle of Pines a splendid collection of birds, concerning which Mr. Todd published in the *Annals of Carnegie Museum*, in 1916, an admirable monograph, which stands as the authority on the birds of that neotropical island.

British Honduras was early marked for attention, and our first material was received from Mr. Morton E. Peck in 1905. For several years Mr. Peck collected in this interesting locality, but we were unable financially to acquire all of his collections. Through the courtesy of other institutions which received a share of this material the opportunity of studying and listing the specimens was granted to Mr. Todd, who was contemplating the preparation of a paper on the birds of British Honduras. It was apparent that more field work was necessary, even after Mr. Ernest G. Holt in 1926 had added another fine series of birds to our store. Meanwhile the Museum of Zoology of

the University of Michigan has acquired some note-worthy birds from this region and Dr. Josselyn Van Tyne has agreed to collaborate with Mr. Todd in the preparation of the report. It is hoped that our plans for sending another expedition to British Honduras to finish up the work there will be a reality of the near future.

We have a reasonably complete representation of the birds of Costa Rica, a territory not so large as the peninsula of Florida, but supporting a wonderfully rich and varied avifauna. This collection was made by Mr. M. A. Carriker and was reported upon by him in our *Annals* in 1908.

Santa Marta, Colombia, came in for a share of attention in the very early days of our history. The initial collection from Santa Marta numbered about one thousand skins purchased from H. H. Smith in 1898. In 1911 Mr. Carriker began operations in the region. From that time until 1920 work was continued there practically without interruption, resulting in the assembling of 5,000 specimens of birds, more than 4,000 of which came ultimately to the Carnegie Museum. "The geographical position of Santa Marta, lying as it does right at the gateway, so to speak, from the plains of Venezuela into northern Colombia; its semi-insular character; the isolation of its mountains, and their different trend and greater height as compared with the neighboring Andean system, all combined to make the study of its bird-life a problem of exceptional interest." Mr. Carriker's collections were made at various elevations from sea-level savannas to snow-capped mountains and in all the various kinds of habitat represented. In collaboration with Mr. Todd a faunal report on the birds of Santa Marta was prepared and published in the *Annals* in 1922.

The success of the work done in Colombia made the opportunity to acquire additional collections from Venezuela, put up in Mr. Carriker's inimitable style, seem highly desirable in furthering our work in neotropical regions. Venezuela was chosen as the next field of endeavor because it was the most logical field to enter after Colombia and presented a chance to work out distributional problems raised in connection with the investigations in Colombia. To Mr. Carriker's collections were added those from Mr. S. M. Klages, who had a wide experience in collecting in South America, and those of Mr. Ernest G. Holt and Mr. Harold Clement, who were sent out by the Museum on a regularly organized expedition, which, sad to relate, came to an untimely end. The Venezuelan material at present comprises more than 12,000 specimens and represents diverse areas, including as it does material from the north coast, from the Lower Orinoco and Lower

Caura Valleys, the foothills and western slopes of the Venezuelan Andes, and the coast region of the Gulf of Maracaibo to the paramos of the Andes of Merida.

Supplementary to the Venezuelan material are fairly good collections from Trinidad and Curacao, secured by Mr. Carriker, and also a valuable collection from French Guiana, received from Mr. Klages. French Guiana is of peculiar scientific interest because it is the accepted type-locality of many species of South American birds originally described in the writings of French and Dutch naturalists. In addition to his work in Venezuela and French Guiana, Mr. Klages also collected in Brazil for the Carnegie Museum. This material, amounting to almost 15,000 specimens from the valleys of the Lower, Middle, and Upper Amazon, is the largest and most excellently prepared collection of those birds in existence. It is very rich in such families as the Antbirds, Ovenbirds, Woodhewers, etc., and many species are in series large enough to permit disposal of duplicates by exchange when the collection has been finally worked up.

As early as 1909 we received our first consignment of birds from Bolivia, collected by Mr. José Steinbach. Until the time of his death a few years ago Mr. Steinbach sent us material regularly, mainly from his headquarters near Santa Cruz de la Sierra, but also from the Andes to the north and west. In many ways this material is the most interesting received from South America, because Bolivia is relatively unknown ornithologically. It has been a difficult collection to study because of the scarcity of material for comparison, but already a number of new forms have been described.

No attempt has been made to prepare faunal accounts of the countries of South America just reviewed. In most cases additional field-work will be necessary for comprehensive surveys. However, in the course of critical and systematic studies of our collection family by family—a task which is at present a little more than half complete—this large assemblage of birds has proved amazingly fruitful. In actual numbers it exceeds 60,000 specimens and comprises 2,500 species and subspecies, or fully one-half the number at present known from the South American continent. Already more than 280 new forms have been described, and with such excellent material available important contributions to geographical distribution and the revision of certain families and genera were made possible. These papers have been published, mainly by Mr. Todd, in the *Annals of Carnegie Museum*, in the *Proceedings of the Biological Society of Washington*, and in the *Proceedings of the U. S. National Museum*.

Carnegie Museum has, as already stated, given greatest consideration to the building up of adequate series of New World birds. Our collection of the birds of the Old World is consequently most inadequate. It is limited to the more common European forms and to small collections from China, Japan, the Philippine Islands, New Guinea, Australia, and New Zealand, already mentioned, and a small but interesting lot of the fast vanishing avifauna of the Hawaiian Islands. Most of this material has been acquired by purchase or exchange, except for one short trip to Austria and Yugoslavia, made by Mr. Ludwig von Fuehrer under Museum auspices.

The continent of Africa is represented by collections from Algeria, Cameroun, Kenya Colony, Nyasaland, Southern Rhodesia, and Angola. The Cameroun birds were collected over a period of years, mainly by Mr. Jacob Reis, and comprise almost 4,000 specimens. Two expeditions to Africa were made possible by the interest of generous friends. In 1929-30 Mr. Rudyerd Boulton, then a member of our staff, collected in Nyasaland and Southern Rhodesia; and in 1930-31 he again went to Africa—this time to Angola, in Portuguese West Africa, accompanying Mr. Ralph Pulitzer of New York, who generously financed the expedition. Our collection from Angola, although not extensive, supplements admirably the material in the American Museum of Natural History, and together with it will form the basis of a report on the birds of Angola, which Mr. Boulton is preparing. A number of obvious new forms have already been described by Mr. Boulton in advance of his general paper.

That, somewhat sketchily, is an account of the scope of Carnegie's collection of birds and the purpose it has served. We trust that in the future it will serve as capably to advance the science of ornithology. The success of the work is attributed in part at least to the general excellence of our material and its careful, systematic arrangement. The standard of quality upon which Mr. Todd has insisted has sometimes proved a trial to collectors, but at the same time a delight to those who have utilized our material. We take justifiable pride in the fact that our collection is regarded as unexcelled in quality and arrangement.

Carnegie Museum,
Pittsburgh, Pa.

GENERAL NOTES

Conducted by M. H. Swenk

Another Three-egg Set of the Mourning Dove.—Having read with interest the letter of Archibald Johnson of Stewart, Nevada, in the September issue of the WILSON BULLETIN, I wish to add another to the list of three-egg sets of the Mourning Dove (*Zanaidura macroura carolinensis*). This nest was found May 29, 1935, when it contained but two eggs, but the next day a third egg had been added. A dove's nest built directly on the ground was also observed about the same time, which is also unusual in my experience.—JOHN B. LEWIS, *Amelia, Va.*

The Great-tailed Grackle in Arizona.—On May 28, 1935, the writer had under observation for half an hour three individuals of the Great-tailed Grackle (*Cassidix mexicanus*). The birds were seen in a marshy, wooded area adjacent to the Gila River not far from the city limits of Safford, Arizona, and were possibly breeding. So far as known to the writer, there is no published previous record of the occurrence of this species in Arizona. According to Florence Merriam Bailey (1928) the farthest west breeding record of this species is for near Las Cruces, New Mexico, and the farthest west occurrence is at Mimbres, New Mexico. Both stations are considerably to the east of Safford, Arizona. It is regretted that no opportunity further to observe these birds presented itself, and it is hoped that a specimen can be collected during the coming breeding season.—GALE MONSON, *Soil Conservation Service, Safford, Ariz.*

American Egrets at Ray Lake, Des Moines County, Iowa.—Mr. Allen A. Green, overseer of the Allen Green Refuge, a State wildfowl sanctuary in northeastern Des Moines County, Iowa, reported the arrival there on August 21, 1935, of a flock of some thirty-five American Egrets (*Casmerodius albus egretta*). The writer visited the locality on September 15, when twenty-seven were counted. By September 27 the number had dropped to sixteen and a week later only one remained, this individual staying on until the middle of October. Ray Lake, for about half of its approximate mile length and less than a quarter mile width, nowhere more than a few feet in depth, is included in the Refuge. This part of the lake is bordered by trees and supports a considerable growth of reeds and other vegetation, and to it the egrets' activities were chiefly confined, usually standing or moving about slowly in the shallow water on the lookout for food. At all times they were very cautious and wary, taking wing whenever close approach was attempted.—HAROLD M. HOLLAND, *Galesburg, Ill.*

A Winter Record of Henslow's Sparrow in Indiana.—While taking a Christmas bird census on December 24, 1933, near Houston, in the western part of Jackson County, Indiana, I flushed a strange sparrow from the tall grass in a fallow field. Not having a gun to collect it, and fearing that the bird could not be found later, I decided to run it down, as it flew a short distance and dropped into the grass. After flushing it a number of times I succeeded in throwing my cap over it. The bird was placed in a cage, but it died during the night. I made a poor attempt to skin the specimen and the damaged skin was sent to Mr. Amos W. Butler of Indianapolis, who identified the specimen as the Western Henslow's Sparrow (*Passerherbulus henslowi henslowi*) and his identification was verified by the National Museum. The skin is in Mr. Butler's collection of bird skins. To the writer's knowledge, this is the first wintering record of this species in Indiana, and one of the few winter records of the species north of the Ohio River.—RAYMOND J. FLEETWOOD, *Knitz, Ind.*

A Red-tailed Hawk Caught by Hand.—On September 1, 1935, in Cheboygan County, Michigan, I caught an adult Red-tailed Hawk (*Buteo borealis borealis*) with my hands. I discovered the bird sitting on a stump in a large clearing. Keeping a stub of a tree between the hawk and myself, I began to stalk it. Having its back to me made the bird less difficult to stalk. When within a few feet of it, I noticed that the hawk was periodically dozing and preening its feathers. There was good reason for this, for on the stump lay a half-eaten Red Squirrel. When within almost touching distance of the hawk, it apparently heard me, for its body stiffened and it turned its head toward me. At that moment I stood stark still. When the bird turned its head away from me, I caught it. The hawk was very much surprised and frightened upon finding it was caught. While looking it over for any possible injuries, the hawk shook hands with me by driving its talons deep into my hand. I immediately put it down on the stump, where it flew to a tree a short distance away. The hawk appeared to be in good condition. The only other instance of a hawk being caught by hand that I have heard of is that of an Osprey (*Pandion haliaetus carolinensis*).—JOHN J. STOPHLET, *Toledo, Ohio.*

Additions to "Bird Life of a Transient Lake in Kentucky".—Since the publication of my article under the above title in the September, 1929, issue of the WILSON BULLETIN, there have been four seasons when this lake, caused by an overflow from an underground river system, has remained long enough to attract many species of water and wading birds. In 1932 the lake remained for a little less than a month during late March and early April. In 1933 it became quite large and remained until May 26, but in 1934 all the water had disappeared by May 5. For the third time in over a century, in 1935 the water remained all through the summer, that is until the early days of September.

In my original list there were thirty-two species of water and wading birds. This list has now grown to fifty-six species. The twenty-four species added since 1927, the year of my former study, are as follows:

1. American Egret. First seen in 1933; rather common in the late summer of 1935.
2. Black-crowned Night Heron. Rare in 1934 but common in 1935.
3. Blue Goose. Five stayed for a month on the lake in March-April, 1933.
4. Baldpate. Seen in small numbers in 1933, 1934, and 1935.
5. Shoveller. Common to abundant in 1932, 1933, 1934, and 1935.
6. Redhead. A few recorded in 1934.
7. Ring-necked Duck. Fairly common in 1934 and 1935.
8. Lesser Scaup. Common in 1932 and 1933; abundant in 1934 and 1935.
9. American Golden-eye. A few seen in 1932, 1934, and 1935.
10. Old-Squaw. Two recorded in 1935.
11. White-winged Scoter. Rarely seen in 1934 and 1935.
12. Surf Scoter. A few in 1934.
13. Florida Gallinule. One recorded rarely in 1934. In 1935 I found eight young and several adults.
14. Piping Plover. Plentiful near the end of the 1933 season.
15. Golden Plover. Two records in 1935.
16. Ruddy Turnstone. One record in 1935.
17. Black-bellied Plover. One record in 1933.

18. American Woodcock. A few seen in 1933.
19. Western Willet. Recorded in both spring and fall in 1935.
20. Baird's Sandpiper. Several records for the spring of 1935.
21. Red-backed Sandpiper. Two recorded in the spring of 1935.
22. Long-billed Dowitcher. Two seen in the fall migration of 1935.
23. Wilson's Phalarope. Two females recorded in 1933.
24. Common Tern. Several records for the summer of 1935.

During the season of 1935 I found nests or young birds of the following species: Eastern Green Heron, Black-crowned Night Heron, Blue-winged Teal, Florida Gallinule, and American Coot. Other species that were recorded steadily through the summer, though no nests or young were found, were the Pied-billed Grebe, Great Blue Heron, Shoveller, Lesser Scaup, King Rail and Black Tern. The area where all these species occurred, bear in mind, is normally a cornfield, which is covered with water only in wet springs and summers.—GORDON WILSON, *Bowling Green, Ky.*

The Scarcity of Hawks and Owls in Indiana.—We have very few hawks and owls in Indiana, in comparison with other birds. It is but rarely that I encounter one of these birds on my bird trips, and when I do it is a surprise, as sometimes for many weeks at a time there is not one to be found. To me this is a sad situation, for the balance of nature is something which is being forgotten, along with the forgotten man. When there is a scarcity of species of valuable birds, and many are disappearing because of the effects of civilization upon bird life, we soon may reap the result of our indifference and folly by not stepping in to save them, instead of allowing them to vanish, as they are doing. One thing that is very wrong is to allow certain species to be protected and let killers take any others, when they may not know one from the other, as is the case with most men and boys with guns. Then if they should find that they have killed the wrong bird, which may be valuable from an economic standpoint, they naturally will not tell on themselves as having broken the law, which also is a bad thing on character. This also sets a bad example for others.

I know of many cases in which the innocent bird must suffer for the sins of his tribe, when the man with the gun may not know or care about the harm he may do. Many birds which are valuable, such as the Red-shouldered Hawk, Red-tailed Hawk, Marsh Hawk, American Rough-legged Hawk, Barn Owl, Long-eared Owl, Short-eared Owl, Barred Owl, Snowy Owl, and the rare Hawk Owl (which I have seen but once), are allowed to be killed, while the Screech Owl and Sparrow Hawk only are supposed to be protected. Then under the guise of conservation, hunters go out for sport and as a rule kill at random any bird that is either a hawk or owl and pretend to think they are doing a good turn. Some of the above mentioned birds are indeed rare, yet hunters would kill the last one without a thought. No hunter should be allowed to go into the field unless he knows his birds accurately, for who is going to protect the good birds, or the ones supposed to be protected by law? There are too few who are posted on birds, yet whoever has the price of a hunting license is allowed to go forth at will, without a word of warning about the harm he may do. We have too few real bird friends who stand for their welfare and protection. I know a man, a former judge, who killed an Osprey, thinking he had killed a Bald Eagle. The man who mounted it for him brought it here for identification. It was re-

ported to the proper authorities and the judge was forced to pay a heavy fine for his "eateh", whieh he had bragged about too soon, having a write-up in the papers about it. I passed by a shaek in a neighboring state, where there was a Turkey Vulture nailed against the building, with the wings outspread to show passers-by what a large bird had been killed. I was not sure about the law in that state or some one might have had to pay for it. A Snowy Owl, the only one of the kind ever reported here, was shot as it sat in a tree where the snow had settled in spots, but the bird was not seriously injured. The man eaught the bird as it fell and brought it in for identifieation. He was so pleased to learn its name, that he borrowed a eage from me, and said he intended to plaee the owl in it and put it in the bank window for the people to see. However, I learned afterward that he sold it instead to a showman for $18.00, to exhibit in his show, and I never saw the man or bird eage again.—Mrs. Horace P. Cook. *Anderson. Ind.*

An Indiana Hawk Migration.—On Oetober 21, 1934, the writer made a leisurely east-west auto trip across the state of Indiana, whieh required all of the daylight hours. The travel route was a zig-zag one, to inelude wild life habitats of speeial interest, but was in general near a line drawn from Fort Wayne, Indiana, to Danville, Illinois. Of great interest was the observation of a rather unusual hawk migration. At least one hawk was observed during each fifteen minute period between dawn and darkness, exeept for two. However, no hawk eoneentrations were observed, the flight being evenly distributed both as to numbers and speeies. The greatest number of hawks under observation at one time was three.

Beeause of the distanee at whieh many individuals were observed and the time available for observation, some birds are listed below without complete identifieation. Those interested in the eonservation of the birds of prey will be gratified by the fact that it is still possible, under most unusual eireumstanees, to observe in one day such a large number of hawks. However, as with waterfowl, oeeasional eoneentrations may not neeessarily indieate aetual numbers throughout the range. It will be of interest to note that the most numerous species listed are those which for the most part are the most difficult to shoot. Obviously some species were more conspicuous at greater distances than others, or were more readily identified. This flight can be eonsidered remarkable because of the broad territory it covered and the many species involved. It is by far the largest hawk flight ever observed by the writer, except along mountain ridges or near large bodies of water.

Below is a list of the species recorded and the number of each. The eleven speeies total 174 individuals.

6—Turkey Vulture (*Cathartes aura septentrionalis*)
5—Sharp-shinned Hawk (*Accipiter v. velox*)
64—Cooper's Hawk (*Accipiter cooperi*)
12—Unidentified Hawks (*Accipiter* sp.)
1—Ameriean Rough-legged Hawk (*Buteo lagopus s. johannis*)
26—Eastern Red-tailed Hawk (*Buteo b. borealis*)
3—Northern Red-shouldered Hawk (*Buteo l. lineatus*)
4—Broad-winged Hawk (*Buteo p platypterus*)
11—Unidentified Hawks (*Buteo* sp.)

1—Northern Bald Eagle (*Haliaeetus l. leucocephalus*)
18—Marsh Hawk (*Circus hudsonius*)
2—Eastern Pigeon Hawk (*Falco c. columbarius*)
21—Eastern Sparrow Hawk (*Falco s. sparverius*)
—Lawrence E. Hicks, *Ohio State University, Columbus, Ohio.*

Observations of Bird Life in Green Bay.—Green Bay extends from Fort Madison, Iowa, northward ten miles to the small stream known to Iowans as Skunk River, and has an average width of five miles.

As I recall my adventures and strange experiences within the area, I recollect my observations of the American Bittern (*Botaurus lentiginosus*). I remember on one occasion one of these birds walked into my field of view, giving me the opportunity of seeing it produce the booming note which it creates in the spring. The bittern remained motionless for about fifteen minutes, uttering its hollow note "*plunk-er-lunk*". In producing the sound the bird gulped in air by a forward movement of the head and snapping of the bill, then expelled it rapidly. In the act the throat was distended.

In the spring of 1934 my boat transported me to unfrequented sections of the Bay to observe Great Blue Herons (*Ardea h. herodias*). It was my pleasure, on one occasion, to observe forty-four of these beautiful "feathered fishermen" feeding. Motionless they waited for their prey to come within reach, or went in search for it, then stabbed their six-inch bill through it. Once stabbed, the morsel of food, usually a small fish, but not always, was thrown into the air to be caught in a gaping mouth.

Here and there among the Great Blue Herons, eighty-four American Egrets (*Casmerodius alba egretta*) were feeding. These snowy white crane-like birds made their appearance in southern Iowa this year earlier than they usually do. The habits of these birds I found were similar to those of the Great Blue Heron. While afloat by night in the Bay I could hear the hoarse squawk of Black-crowned Night Herons (*Nycticorax nycticorax naevius*) as they left their roost, to wing their solitary way to a chosen feeding place.

From April until the middle of June Double-crested Cormorants nested in Green Bay. This is the first time these birds have nested within this area since 1897. About ninety nests were sighted.

At the close of this paper, may I suggest that my readers visit Green Bay, should the grand opportunity present itself? I understand that the area has been turned into an Iowa fish reserve. It is the author's wish that the necessary action be taken to protect all of the birds that nest therein. As an ardent bird lover, I think it is a grand event to visit Green Bay, and observe thousands of wild birds in their native haunts.—Lawrence E. Hunter, *Dallas City, Ill.*

Peculiar Actions of a Great Blue Heron.—On September 1, 1935, while out for a stroll, when I arrived at the edge of a patch of timber bordering on a small stream a Great Blue Heron took flight from one of the tree-tops farther on in the woods, circled over me several times while making the squawking noises common to that species, and then returned to the tree-top. I thought it had become alarmed at my approach. I entered the woods, when it again left its perch, circled over me squawking as before, but this time much louder. I watched it for a minute but it kept right on circling and squawking. I moved on, occasionally stopping and looking. Finally the heron alighted in a tree a few rods

ahead. I started toward it, and as I neared the tree a Barred Owl flew from an adjoining tree. The heron took after the owl, squawking, and followed it across a small opening in the woods. When the owl had disappeared the heron returned and alighted at the edge of the stream, quite contented. Was this heron actually trying to attract my attention to the hiding place of the owl? It seemed that way to me, for I had been in the vicinity of this woods for a long time before this happened and up to that time the heron had made no commotion or I should have noticed it.—F. W. Rapp, *Vicksburg, Mich.*

Some Bird Notes from Central Illinois.—Blue Goose (*Chen caerulescens*). Three Blue Geese were seen March 19, 1933, three miles southwest of Manito, at the edge of a small pond, by W. C. Van Deventer and the author.

Osprey (*Pandion haliaetus carolinensis*). On April 6, 1935, W. Kannapal and the author saw an Osprey near Spring Lake. The bird was noted several times. The last date of observation was May 12, 1935.

Florida Gallinule (*Gallinula chloropus cachinnans*). A crippled male bird was found in Peoria, July 22, 1934. The bird died within a few days, refusing to take food of any kind. The skull was saved.

Arctic Three-toed Woodpecker (*Picoides arcticus*). V. H. Chase saw two of these birds at close range January 11, 1925, in the city of Peoria. The observation followed a severe sleet storm.

Evening Grosbeak (*Hesperiphona vespertina vespertina*). Dr. W. Packard reports having seen six Evening Grosbeaks in early April of 1934, near Banner. The birds remained in the vicinity for about three weeks.—William C. Starrett, *Peoria, Ill.*

The Cruising Speed of the Golden Plover.—While on a business trip across the fertile Hornick Bottoms south of Sioux City, Iowa, on October 1, 1935, the writer had a splendid opportunity to determine the speed of the Golden Plover (*Charadrius dominicus dominicus*). A flock of about thirty of these birds was first noticed flying parallel to the highway and just inside of the fence line. The speed of the car at this time was an even sixty miles per hour. The birds were, however, pulling away from the car at this speed, but by increasing the speed of the car to seventy miles per hour I was able to keep even with the plovers. This pace was kept up for nearly a mile until the birds swerved out over a field and were soon out of sight. I think that this speed is not unusual for the Golden Plover and had danger threatened in the form of one of the large falcons, this speed probably could have been increased quite a bit more, for a short distance.—Wm. Youngworth, *Sioux City, Iowa.*

Bird Notes from Anderson, Indiana.—This spring (1933) we had the honor of a call from a Woodcock. It came to our back yard, but disappeared with a whir of wings as a member of the family almost stepped upon it. We live but four blocks from the center of the city, yet our yard is a small wilderness which many birds of unusual varieties visit, owing to its many attractions for birds of almost every kind. The back of the lot is entirely filled with dense shrubs, suitable for birds, with a hidden rockery and bird bath and leaves left as they fall, thus attracting many birds of the wilderness. We have room for only a flagstone walk through the place, and in the hot summer weather birds collect in this cool spot, where water and shelter attracts them and bird enemies are few.

Last spring (1932) the Whip-poor-will came to this place. It was the second bird of the kind that I have seen in this part of the state since 1900. The other was about five miles away in a wild woods. I had a close up of the bird for some time, as it stayed about the place most of the day on or near the ground. Another Whip-poor-will was seen later in the spring near this city in an open woods.

For two years the Prothonotary Warbler has visited this neighborhood, coming both times to the yard back of us—an old-fashioned place with dense shrubbery of all kinds. In 1932 this bird lingered about the place for several weeks, singing his loud, clear, ringing song time and again as I imitated him. He was seen repeatedly creeping in and out of a water spout that was broken loose at the eaves of the upper story of the house next door to this one. We might have believed that he nested there only we saw no female during this time. His song of "*sweet*" or "*tweet*", repeated several times, reminded me of those of the Connecticut Warbler and the Kentucky Warbler, which are similar, to me. Neither of the two last-named birds are common in this vicinity, but I have seen both occasionally, and heard the former sing once. The Kentucky Warbler is in Mounds State Park, and was noted twice this spring. I also saw it in the cemetery here. It generally is near the ground and about running water. At the Mounds once this spring, it was seen singing in a tree.

The Connecticut Warbler and the Blue Grosbeak, both most rare birds in this part of the country, appeared as if by magic within a few feet of me as I sat on a stump watching for thrills one spring morning in a wild cut-over woods east of the city. I have seen the Blue Grosbeak three times in all, twice in Indiana and once at Chicago. At this place I heard a strange song in one of the Chicago forest preserves, and watched for the bird only to see a young male in his mottled blue and brown immature plumage rise from the ground and perch in a small tree or shrub and warble his melody right in front of me. That is a bird experience I shall not soon forget.

One day this summer when I was away on a bird trip the Golden-winged Warbler came to my back yard and took a bath in the shallow pool. The boy next door, a young ornithologist, could hardly wait to report this find, as this bird is most rare in Indiana. It was identified by his brother, another bird student. Both boys are very careful to be correct in their identifications. The Pine Warbler also visited my lawn, and peered at me from a short distance away near the back porch shrubbery. All five of the thrushes came each spring—the Wood, the Wilson, the Gray-cheeked, the Olive-backed, and the Hermit (which comes first). The Cardinal, which has been here for three years, winter and summer, has nested here twice and is building the second nest now, on June 23. This time it is in the *Aralia spinosa*, where the thorns hold it securely in place. The tragedy of bird life is appalling, the whole brood many times being lost to the Blue Jays or cats which accidentally get by the "standing army" in the house. I seldom have to resort to violent means with birds, but one must choose between bird friends and enemies, and the Blue Jay is a greater criminal than most persons believe. Such persons want him saved because he is beautiful, and some folks try to tell us that "their cat" does not catch birds.

The Rose-breasted Grosbeak during the first year is quite unlike the adult male bird. The black areas are dull brown with a small amount of white dotted through the plumage. There is no decided rose color on the throat and breast,

but a faint pink, barely hinting at the beautiful rose color that comes later on. A bird of this kind sang in my yard this spring (1933), but his song was not as full and confident as that of the adult male. The latter seemed to sing sweetly, "*Pretty Carrie, pretty Carrie, pretty pretty Carrie*". Sometimes he varied it somewhat and added a few other complimentary adjectives, and repeated his notes, making quite a long warble, but mostly his song was as above, composed of twelve or fourteen notes as a rule. One male bird kept up a continuous warble for a minute or two before he stopped singing. There were six of these birds in an elm tree at the same time, and they lingered about the place off and on for about ten days or two weeks on their way north. The young male birds as a rule sing a more choppy song than that of the adult male bird. Perhaps it is because their voices are changing.

I once saw an immature male Redstart in mottled plumage. He was in a woods in the spring. His song was so amateurish that I did not recognize it until I saw him. His coat was blotched red, yellow, and black, making a most peculiar appearance, for he was changing from the gray and yellow of the first plumage, like the female, to the orange-red and black of the male at the spring of the next year. I also saw a young male Scarlet Tanager in adolescent plumage. He was beautiful in his splashed and blotched red and brassy-yellow coat, but his song was not up to his coloring. These changing males of various kinds are uncommon, and I know of few who have seen them. The dress of the young male Baltimore and Orchard Orioles as they chhange to the adult male attire are also most interesting. It is a most fascinating study to watch these odd birds.—Mrs. Horace P. Cook, *Anderson, Ind.*

PROCEEDINGS OF THE WILSON ORNITHOLOGICAL CLUB

By Lawrence E. Hicks, Secretary

The Twenty-first Annual Meeting of the Wilson Ornithological Club was held at St. Louis, Missouri, on December 29-30-31, 1935, in connection with many other organizations affiliated with the American Association for the Advancement of Science. The business and program sessions were held in the Alexander Room of the Melbourne Hotel. Short business sessions were held Monday and Tuesday mornings. The four program sessions Monday and Tuesday, morning and afternoon, and the banquet program session, included thirty-eight papers, slide talks, and movie presentations. The maximum attendance at each session was 66, 92, 72, 96, and 70.

Tuesday evening the Wilson Ornithological Club Annual Dinner was held at the Sayman Town Club, seventy being present. The chairman of the local committee, Mr. A. F. Satterthwait, served as toastmaster. Miss Lillie R. Ernst, Principal of Blewett High School, gave the address of welcome, to which President Josselyn Van Tyne responded for the Wilson Ornithological Club. A score of those present were introduced or called upon for brief remarks. Following this the group adjourned to the auditorium for the evening program session. Mr. H. M. Kennon, Ornithologist of the St. Louis Zoo, gave a lecture on "The Hummingbirds", with a fascinating account of experiences with a score of captive Ruby-throats kept at the Zoo. Professor A. E. Shirling of Teachers College, Kansas City, gave a beautifully illustrated lecture on "Some Habits and Habitats of Birds in the Rocky Mountain National Park". Mr. Albert F. Ganier of Nashville, closed with a splendid illustrated discourse on "Rare Nesting Birds of Tennessee".

Monday evening, and other free time during the three days of the meetings, was utilized by those present to hear the address of the retiring president of the A. A. A. S. or to visit the science exhibits, the Municipal Auditorium, the St. Louis Parks, Forest Park with the Zoo and its splendid collections of live birds, reptiles, and primates, the Jefferson Memorial with the Lindbergh trophies, the Art Museum, the Educational Museum, the arboretum of Tower Grove Park, the Missouri Botanical Garden (Shaw's Garden), other points of interest in St. Louis, or in attending sessions of some of the sections of the A. A. A. S. at Washington University.

Sunday, December 29, was spent in field work by thirty-two members. The party motored from the hotel to the west of St. Louis to Creve-Coeur Lake and the interesting adjacent lowlands, then to Horseshoe Lake on the Illinois side. After noon luncheon at Garavellis, the group split, some to view the Aviary at the Zoo, others to continue field work in areas north of the city. The heavy snow, temperature of about 20 degrees, and the light wind, kept the list seen down to 35 species and 931 individuals. The list included Rough-legged Hawk, Barred Owl, Pileated Woodpecker, Yellow-bellied Sapsucker, Brown Creeper, Mockingbird, Robin, Bluebird, Myrtle Warbler, European Tree Sparrow, Red-winged Blackbird, Towhee, Fox Sparrow, and White-throated Sparrow.

Attendance

The 1935 meeting was one of the most successful in the history of the organization despite the fact that the attendance was smaller than for any of our last six meetings, save one. The total registration (106) was low due to the small local attendance and the adverse weather conditions which prevented many out-of-town visitors from using auto transportation. However, eighty-three were present from outside of St. Louis and sixty-five from outside of Missouri. A large number, particularly local visitors, failed to register. Additional unregistered visitors attended the annual dinner or participated in the field trip.

Forty eight universities, colleges, museums, and other institutions were represented in the attendance at the St. Louis meeting. These included: Cornell University, Ohio State University, University of Illinois, University of Wisconsin, University of Missouri, George Peabody College, University of Iowa, Iowa State College, University of Nebraska, Morningside College, Otterbein College, University of Michigan, Western Reserve University, Emergency Conservation Committee, National Association of Audubon Societies, Hawk and Owl Society, Missouri Division of Conservation, Mississippi Department of Fish and Game, Michigan Museum of Zoology, Chicago Academy of Sciences, United States Biological Survey, National Park Service, United States Soil Conservation Service, University of Virginia, University of Tennessee, Lebanon Valley College, Bowling Green College, St. Louis Zoological Gardens, North Dakota State Teachers College, North Dakota Agricultural College, Ashville Teachers College, United States Bureau of Entomology, St. Louis University, St. Louis Educational Museum, Christian Brothers College, St. Louis Bird Club, Webster Groves Nature Club, Mayo Clinic, Michigan Western State College, Louisiana State University, Purdue University, Wheaton College, Illinois Natural History Survey, Missouri Biological Survey, Illinois State Normal College, Principia College, American Nature Study Society.

Business Sessions

Short business sessions were held Monday and Tuesday mornings, President Van Tyne presiding.

The minutes of the 1934 meeting were approved without being read, since they had previously been published in the Wilson Bulletin (Vol. XLVII, No. 1, pp. 81-95). The Secretary's and Treasurer's reports for the year 1935 were next read and approved. The Secretary's report indicated that during the past year forty-eight members had assisted in the membership campaign by making nominations resulting in the securing of one or more members each. A list was presented of the 141 new members secured during 1935, and previously confirmed by the electoral board. These were elected to membership. The report showed that there had been a net gain of 63 members in 1935, resulting in a total membership of 784, which exceeds by nine members the previous high in membership total established in 1930.

The Secretary also presented a bundle of 219 letters received from members in thirty-six states, each of which, though unable to attend the St. Louis meeting, had written a letter acknowledging the meeting notice, expressing regret at being unable to attend, and sending best wishes for the success of the meeting. Excerpts were read from a number of them. The receipt of so many unsolicited letters indicates that the great bulk of the Wilson Ornithological Club membership consists of persons actively interested in furthering the ornithological studies

and the educational and conservation work sponsored by the organization. The members assembled paid tribute to these absent members and the Secretary expressed his thanks for the many encouraging and stimulating news letters received from the members throughout the year, and voiced his regret at being unable to reply except by brief delayed notes or through the pages of the WILSON BULLETIN.

The Editor next presented a carefully prepared report of his activities to the group, giving some conception of the many duties and difficulties involved in the office, the present status of the WILSON BULLETIN, and recommendations for the coming year. In the absence of the Librarian, his report was read. In approving the Treasurer's report, the group unanimously passed a resolution commending retiring Treasurer Rosene for his splendid work during the trying economic conditions of his six-year term of office.

The following temporary committees were appointed by the President: Nominations, Mrs. H. J. Taylor, Jesse M. Shaver; Resolutions and Amendments, A. F. Ganier, Leonard B. Nice, Edith R. Force; Auditing, Myron H. Swenk and S. E. Perkins, III.

The committee on Resolutions offered the following resolutions, all of which were adopted by motion:

Resolved, that the Wilson Ornithological Club commends the United States Biological Survey for its policy of shortening the open season and restricting the kill of waterfowl during the 1935 season.

Resolved, that the Wilson Ornithological Club go on record as emphasizing the principle that the wild life resources of the United States, including game species, belong to the whole people and not alone to hunters or any other special group, and that game management practices and hunting regulations should be fostered which will not endanger the breeding stock of any species, and which where desirable will tend to increase it.

Resolved, that the members of the local committee, A. F. Satterthwait, Lillie R. Ernst, Elizabeth Golterman, Clara Heising, D. M. Hetler, also the officers of the A. A. A. S., the management of the Melbourne Hotel, Ann Loftus and Mrs. A. F. Satterthwait, and the St. Louis Chamber of Commerce, be commended for their part in the arrangements for a splendid annual meeting at St. Louis.

Resolved, that the officers of the Wilson Ornithological Club, particularly those three upon which such a heavy burden falls, the Editor, Secretary, and Treasurer, be thanked for their efforts of the past year in carrying on so splendidly the work of the organization.

The Committee on Nominations offered the following report:

President—Josselyn Van Tyne, Museum of Zoology, Ann Arbor, Michigan.
First Vice-President—Alfred M. Bailey, Chicago Academy of Sciences, Chicago, Illinois.
Second Vice-President—Margaret M. Nice, Columbus, Ohio.
Secretary—Lawrence E. Hicks, Ohio State University, Columbus, Ohio.
Treasurer—S. E. Perkins, III, 709 Inland Building, Indianapolis, Indiana.
Councillors—Lynds Jones, Oberlin, Ohio.
A. F. Ganier, Nashville, Tennessee.
W. M. Rosene, Ogden, Iowa.

The report was adopted by motion, and the Secretary was instructed to cast a unanimous ballot for the nominees. This being done all were declared elected for the coming year.

The concensus of opinion as expressed by the officers, councillors, and members present, and the replies from the questionaire in the annual letter, was that the 1936 Annual Meeting of the Wilson Ornithological Club should be held at Chicago, Illinois, sometime during the month of October or November. More detailed announcements will be made later. Following the completion of the general program the session adjourned *sine die*.

Program of Papers

The papers, with brief abstracts, are listed below in the order presented, which differs somewhat from the previously announced program. All meetings were held in the Alexander Room of the Melbourne Hotel, except for the Banquet Session, which was held at the Sayman Town Club.

Monday Morning Session

1. A Study of the Nesting of the Common Coot (*Fulica americana*). (10 minutes). George O. Hendrickson, Iowa State College, Ames, Iowa.

   An analysis of ecological conditions, life history studies, and mortality factors found during the observation of twenty Coot's nests in two marshes of northern Iowa in June and July of 1935.

2. The Future of Waterfowl Protection. (10 minutes). Irving Brant, St. Louis Star, St. Louis, Mo.

   A critical analysis of the North American waterfowl resources of today with definite recommendations as to policies, protection, and management procedures which should best serve to perpetuate these species.

3. Food Habits of Buteo Hawks in North Central United States. (15 minutes). Paul L. Errington, Iowa State College, Ames, Iowa, and Walter J. Breckenridge, University of Minnesota, Minneapolis, Minn. (Read by Robert B. Gordon).

4. Resident Game Birds of Missouri. (30 minutes). (Lantern). Rudolf Bennitt, University of Missouri, Columbia, Mo.

   A summary of a comprehensive game and fur survey of the State made by W. O. Nagel and the speaker in 1934-1935 under the auspices of the National Park Service E. C. W. Only breeding species were considered, the most important of these being the Bob-white, Ruffed Grouse, Prairie Chicken, Ring-necked Pheasant, Wild Turkey, and Mourning Dove. Subjects discussed included the present status of each, historical influences, releases of stock, general methods, objectives, estimated population of each species today, annual kill, and drouth effects.

5. Education of Children and Adults in Bird Study. (10 minutes). Edith R. Force, Tulsa High School, Tulsa, Oklahoma.

   A synopsis of proven methods of education in bird study and an inspirational appeal for recognition of the value of, and necessity for, more extensive activities in this direction.

6. Home Life of Some Far Northern Birds—the Churchill Region. (30 minutes). (Lantern). A. Marguerite Heydeweiller, Cornell University, Ithaca, N. Y.

   A pictorial account of nesting and life history studies of Tree Sparrows, Redpolls, Longspurs, Shorebirds, Gulls, Jaegers, Ptarmigans, Warblers, and Terns during two summers in the Hudson Bay region.

Monday Afternoon Session

7. Ornithology in Scientific Literature. (15 minutes). O. A. Stevens and H. Gordon Heggeness, North Dakota State College, Fargo, N. D.

   The amount of published material is too large and too often improperly organized. Ornithology is peculiar in the mass of detail and in the large

quantity of borderline scientific-popular material in its literature. Specific recommendations are: cöoperation between workers, more editorial supervision, segregation of scientific and popular material, and suppression of, or collection of, short items.

8. Building Conservation for the Future. (15 minutes). Roger T. Peterson, National Association of Audubon Societies, New York, N. Y.

   Specific recommendations for conservation of valuable wild life resources, with suggestions as to how various conservation organizations and individuals can make definite contributions to the task at hand.

9. The Cowbird as a Subject of Study. (20 miautes). Margaret M. Nice, Columbus, Ohio.

   The Cowbird is not specialized for parasitism as is the European Cuckoo, for its eggs are relatively small, its incubation period is no shorter than that of its relatives, and young Cowbirds do not evict their nest mates. On Interpont (in Columbus, Ohio) Cowbirds are gregarious during the nesting season and have laid in 26 per cent to 77.7 per cent of the early Song Sparrow nests studied during a five year period. Adult Cowbirds removed 5.7 per cent of the Song Sparrow eggs, and young Cowbirds crushed or starved 3.5 per cent of the Song Sparrow young. However, Cowbird eggs have not succeeded as well as those of their hosts, for only 30.7 per cent of the former while 35.8 per cent of the latter were fledged. In 1930-1931 there was one female Cowbird to about 11.5 pairs of suitable hosts, but in 1934 and 1935 there was one female to 8.6 pairs of suitable hosts.

10. Presentation of and Remarks by Ira N. Gabrielson, Chief, United States Biological Survey, Washington, D. C.

    A review of the Survey's program for the coming year with a narration of the many facts and events of ornitholigical interest.

11. Sex Ratio and Mortality Studies of English Sparrow Nestlings. (15 minutes). (Lantern). Leon J. Cole and G. W. Woolley, University of Wisconsin, Madison, Wisc.

    Sex was determined on 746 sparrow nestlings and 69 embryos. Of the total, 48.8±.017 per cent were males, which is not a significant deviation from equality. However, there appears to be a definite tendency for a higher percentage of males in late June and early July than earlier or later in the season. The average number of nestlings in 279 nests was 2.7. There is a high mortality of nestlings as age increases, but no evidence that this mortality is differential with respect to sex.

12. A Behavior Study of an Eastern Meadowlark. (12 minutes). (16 mm. motion pictures). Thomas B. Magath, Mayo Clinic, Rochester, Minn.

    A pictorial record of a wild female Meadowlark which came with young and procured food at the station, or even from the hand, for two seasons.

13. Episodes in the Life of Audubon in Indiana. (20 minutes). Samuel E. Perkins, III, Indianapolis, Ind.

    A review of various trips taken by the naturalist within the State of Indiana, covering the Ohio River country and southern Indiana north to Vincennes. He visited with General George Rogers Clark, with Rafinesque, and with the scientific group at New Harmony, on one or several occasions.

14. Wisconsin Pioneers in Ornithology: Thure Kumlien and Ludwig Kumlien. (30 minutes). (Lantern). Mrs. H. J. Taylor, Berkeley, Calif.

    A biographical account of Thure Kumlien with special consideration of the ornithological work by himself and his son, Ludwig Kumlien.

Tuesday Morning Session

15. Checking Field Observations by Studies of Confined Birds. (10 minutes). George B. Happ, Principia College, Elsah, Illinois.

16. Hybridism in the Genus Hedymeles (Grosbeaks). (15 minutes). Myron H. Swenk, University of Nebraska, Lincoln, Nebr.

    A discussion, illustrated by distribution maps and paintings, of hybridism between the Rose-breasted Grosbeak and the Black-headed Grosbeak in the Mississippi-Missouri basin.

17. A Melanistic Phase in the Wilson's Snipe. (10 minutes). Josselyn Van Tyne, University of Michigan, Ann Arbor, Mich.

    Exhibit of a melanistic specimen of the Wilson's Snipe taken in Michigan, with comments on the parallel case of the "*sabini*" phase of the Common Snipe (*Capella gallinago gallinago*) of the British Isles.

18. Seasonal Sex Characters in African Weaver Finches. (20 minutes). (Lantern). Emil Witschi, University of Iowa, Iowa City, Iowa.

    An experimental analysis of the factors (genetical and hormonal) which control the assumption of breeding and of eclipse plumages in finches, especially indigo buntings, and African weaver finches. Discussion of the bearing of these results on the problem of the evolution of hen and cock plumage in birds.

19. Nesting Habits of the Tree Sparrow. (20 minutes). (Lantern). A. Marguerite Heydeweiller, Cornell University, Ithaca, N. Y.

    A summary of the life history of this species as learned from observations on individuals marked with feather plumes in the Churchill region of Canada.

20. Some Aspects of Bird Population Problems. (20 minutes). Margaret M. Nice, Columbus, Ohio.

    Three scientists are working out theories of animal populations by means of mathematical calculations, namely, V. Volterra, S. A. Severtzoff, and A. J. Nicholson. Severtzoff contends that populations tend to increase as fast as they can and then are decimated by a plague, either a biotic or epidemic disease. Nicholson emphasizes the "balance of populations", and believes that competition is the controlling factor. The theories of these two men were discussed and compared with the author's findings in a seven year study of a population of Song Sparrows.

21. A Preliminary Report on a Comparative Study of the Leg Muscles of Birds. (20 minutes). (Lantern). George E. Hudson, University of Nebraska, Lincoln, Nebr.

    Avian myology is a much neglected field. The only leg muscles that have been seriously investigated from a comparative standpoint are the thigh muscles and certain flexor tendons of the foot. A study of several species of Buteonid hawks and falcons indicates that these two groups differ radically in their musculature. The flycatchers and swallows agree in one respect that sets them off from the other Passeriformes examined. These points must be investigated in many more forms before definite conclusions can be reached.

22. Reproductive Activities in the Domestic Pigeon. (20 minutes). (35 mm. motion pictures). Leon J. Cole, University of Wisconsin, Madison, Wis.

    This film illustrated the nesting of the domestic pigeon, including egg laying, incubation and rearing of the young, and showing particularly the method of regurgitation by which the young are fed.

Tuesday Afternoon Session

23. Observations on the European Starling. (5 minutes). Mrs. Howard S. Benedict, Shaker Heights, Ohio.

    Close observation of a male Starling at Mrs. Benedict's home in Shaker Heights, Ohio, in June, 1935, proved him to be quite a mimicker of several of our common birds, including the Blue Jay, Bob-white, Brown Thrasher, Cardinal, Catbird, House Wren, Meadowlark, Phoebe, Robin, and Song Sparrow. These songs were easily recognized. Other songs uttered were doubtless in imitation of still other species.

24. Behavior Studies of the Tufted Titmouse at Feeding Stations. (15 minutes). R. D. Book, Corning, Ohio.

    The author maintained a feeding station in a natural park for twenty-five years. Tufted Titmice came to know him and fed from his hand. These birds collect in clans in the winter. One year a one-legged Titmouse appeared in one of the clans. When spring came this bird was unable to secure a mate. After a week or two of unsuccessful search it was accepted into the company of the mated pair which claimed the territory. It stayed with them summer and winter, attending them closely day and night. After this experience the unattached bird found a mate in February of the next year. A little later they departed together, and were not seen again. Titmice stay in one territory for about three years. With the influx of new birds they leave or are driven away.

25. The Significance of the Ornithological Research Collection. (20 minutes). Josselyn Van Tyne, University of Michigan, Ann Arbor, Mich.

    An analysis of the ends which are served by ornithological research collections with remarks on certain current misconceptions concerning them.

26. Observations on the Life History and Food Habits of the Great Horned Owl. (20 minutes). (Lantern). Frederick M. Baumgartner, Cornell University, Ithaca, N. Y.

    Numerous nest studies on this species near Ithaca were summarized in charts and tables.

27. Notes on the Owls of Iowa. (20 minutes). (Lantern). W. M. Rosene, Ogden, Iowa.

    A report by means of lantern slides of numerous nest studies of owls. Considerable ingenuity was shown in securing photographs of nests in tall trees.

29. Birds of Protected Areas—Bear River Marshes, Rainy Sanctuary, and the Yellowstone. (45 minutes). (16 mm. motion pictures). Alfred M. Bailey, Chicago Academy of Sciences, Chicago, Ill.

Tuesday Evening Session

30. The Hummingbirds. (25 minutes). H. M. Kennon, St. Louis Zoo, St. Louis, Mo.

31. Some Habits and Habitats of Birds in the Rocky Mountain National Park. (30 minutes). (Lantern). A. E. Shirling, Kansas City Teachers College, Kansas City, Mo.

32. Rare Nesting Birds of Tennessee. (20 minutes). (Lantern). Albert F. Ganier, Nashville, Tenn.

The following papers were read by title:

33. Homing Instincts of Wild Birds. William I. Lyon, Waukegan, Ill.

34. Further Notes on the Protocalliphora, Parasites of Nestling Birds. Edward S. Thomas, Ohio State Museum, Columbus, Ohio.

35. Thirty-five years of Bird Migration in Northern Ohio. Lynds Jones, Oberlin, Ohio.

36. Relation of Peck Dominance to Maize Running Ability and Reproduction in the Canary (*Serinus canarius*). Hurst Shoemaker, University of Chicago, Chicago, Ill.

37. Measurements of Animal Populations. Lawrence E. Hicks, Ohio State University, Columbus, Ohio.

38. Coloration of Lantern Slides. Slide Examples Including Pictures of the Ivory-billed Woodpecker in Louisiana. George M. Sutton, Cornell University, Ithaca, N. Y.

REGISTER OF ATTENDANCE AT THE ST. LOUIS MEETING

From California: Mrs. H. J. Taylor, Berkeley. From Colorado: Ralph B. Swain, Fort Collins. From Illinois: A. M. Bailey, Roy V. Kommarek, Earl G. Wright, Chicago; George B. Happ, Elsah; Mabel Spenser, Granite City; H. J. Long, George E. Moreland, Greenville; Fremont Arbeiter, Jacob; John E. Fraley, Normal; George E. Ekblaw, Ralph E. Yeatter, Urbana; J. Clifford Stickney, Wheaton. From Indiana: S. E. Perkins, III, Indianapolis; M. L. Fisher, Charles R. Jordan, R. E. Jordan, L. A. Test, West Lafayette. From Iowa: Logan J. Bennett, George O. Hendrickson, Hugo E. Press, Ames; Lillian Serbousek, Myra G. Willis, Cedar Rapids; Emil Witschi, Iowa City; W. M. Rosene, W. M. Rosene, Jr., Ogden; Mary L. Bailey, Ruth B. McDonald, T. C. Stephens, Sioux City. From Kansas: Gladys Beck, Kansas City. From Kentucky: Mabel Slack, Louisville. From Louisiana: O. W. Rosewall, Baton Rouge. From Michigan: F. J. Hinds, Kalamazoo; Josselyn Van Tyne, Ann Arbor. From Minnesota: T. B. Magath, Rochester. From Mississippi: Fannye A. Cook, Jackson. From Missouri: L. E. Dennig, Jack Stupp, Clayton; Rudolf Bennitt, John A. Cameron, Columbia; A. E. Shirling, Kansas City; Clara J. Beerman, Gertrude E. Maull, Kirkwood; Angelica Frisch, Jeannette Schrage, Oran; E. R. Thro, St. Charles; J. O. Ballard, Mary B. Birkichs, Irving Brant, Adele Christ, Arthur Christ, Louis Dougan, L. R. Ernst, Alma Fletcher, Elizabeth Golterman, Lucile Hanna, Gretcher M. Happ, Clara Heising, Albert A. Henize, H. M. Hinnon, Lonnie Laird, Hubert Lewis, Anne Loftus, Amelia Meissner, A. M. Obrecht, Mildred Widmann Phillips, Ray S. Snider, Glenna Spencer, Louis M. Weber, Laura E. Whelfrley, St. Louis; Cora Shoop, Steelville; Mrs. Maud C. Mattinger, Warrensburg; Sterling P. Jones, Charlotte Manger, James Manger, Mrs. J. H. Manger, Mr. and Mrs. A. F. Satterthwait, Webster Groves. From New York: Robert F. Hart, Buffalo; F. M. Baumgartner, Ithaca; R. T. Peterson, New York City; A. Marguerite Heydweiller, Rochester. From North Carolina: Ethel B. Finster, Ashlville. From North Dakota: H. Gordan Heggeness, Fargo; Perna M. Stine, Minot. From Nebraska: Mr. and Mrs. L. M. Gates, George E. Hudson, Mr. and Mrs. Myron H. Swenk, Lincoln. From Ohio: E. L. Moseley, Bowling Green; Mrs. H. S. Benedict, Compton Crook, Cleveland; Robert B. Gordon, Lawrence E. Hicks, Leonard B. Nice, Margaret M. Nice, Raymond Osborne, John H. Schaffner, Columbus; R. D. Book, Corning. From Oklahoma: Edith R. Force. From Pennsylvania: V. Earl Light, Annville. From Tennessee: W. K. Butts, Chattanooga; Albert F. Ganier, Jesse M. Shaver, Nashville. From Virginia: John B. Calhoun, University. From Washington, D. C.: Paul Bartsch, H. C. Bryant, Ira N. Gabrielson. From Wisconsin: L. J. Cole, G. W. Woolley, Madison.

Summary of Attendance: California, 1; Colorado, 1; Illinois, 12; Indiana, 5; Iowa, 11; Kansas, 1; Kentucky, 1; Louisiana, 1; Michigan, 2; Minnesota, 1; Mississippi, 1; Missouri outside of St. Louis, 18; St. Louis, 24; New York, 4; North Carolina, 1; North Dakota, 2; Nebraska, 5; Ohio, 10; Oklahoma, 1; Pennsylvania, 1; Tennessee, 3; Virginia, 1; Washington, D. C., 3; Wisconsin, 2. Total attendance, 112. Total outside of St. Louis, 88. Total outside of Missouri, 70. Maximum number at each program session: Monday morning, 66; Monday afternoon, 92; Tuesday morning, 72; Tuesday afternoon, 96. Number on field trip, 32. Number at Annual Dinner, 70. Number of papers listed on the program, 38.

REPORT OF THE SECRETARY FOR 1935*

To the Officers and Members of the Wilson Ornithological Club:

During the past year, an intensive campaign for new members was continued by the Secretary, in an attempt to bring a halt to the steady decrease in number of members, which has been the general rule in our own organization as well as in most others, during these last five years of turbulent economic conditions. This objective has now been accomplished. It is a great pleasure to report that our organization is now considerably larger than a year ago.

The Secretary solicited more than 1450 membership prospects during the past year, in addition to sending out more than 1240 other letters in the course of his regular duties. Members of the Club gave splendid assistance by sending in numerous names of prospective members for solicitation. Our membership is especially urged during the coming year to attempt to acquaint friends with the benefits of the organization and forward to the officers the names of all membership prospects. We will do the rest.

The membership campaign has been quite successful. In 1932, 113 new members were secured, in 1933, 114, and in 1934, 112. In 1935, 141 new members were added to the rolls. These 141 new members were: Sustaining, 1; Active, 22; and Associate, 118. The new members were distributed through thirty-seven states and provinces: Missouri, 16; Kentucky and Illinois, 10 each; Ohio, Michigan, and New York, 9 each; Virginia, 8; Iowa, Massachusetts, and Minnesota, 5 each; Wisconsin, Pennsylvania, Ontario, Texas, and Tennessee, 4 each; Indiana, Arizona, and Georgia, 3 each; New Jersey, California, Oklahoma, North Carolina, Kansas, Washington, and Wyoming, 2 each; and Louisiana, Arkansas, British Columbia, Montana, Maryland, Nebraska, North Dakota, Oregon, South Dakota, Florida, Delaware, and Finland, 1 each.

Disregarding some duplications in nominations, the various members responsible for the applications of new members, were as follows: Lawrence E. Hicks, 126; T. C. Stephens, 11; Mabel Slack, 8; W. M. Rosene, 6; A. F. Satterthwait and Frank Blanchard, 4 each; Charles J. Spiker and Lyndon L. Hargrave, 3 each; the following nine persons 2 each: M. G. Lewis, J. M. Shaver, Lucy P. Kearns, L. Irby Davis, M. M. Nice, Gordon Wilson, Gordon W. Jones, Mrs. W. Bird Rice, and A. M. Bailey; and the following thirty-one persons 1 each: Frederick H. Test, J. W. Aldrich, A. F. Ganier, J. E. Patterson, Edith R. Force, O. A. Stevens, E. L. Knapp, Sidney K. Eastwood, R. W. Sheppard, Dora Moore, G. M. Cook, Donald W. Douglass, Winton Weydemeyer, Clara M. Heising, S. A. Eliot, Jr., Lawrence H. Walkinshaw, John J. Stophlet, Lawrence Bowman, Delos H. Johnson, Francis M. Uhler, Fred R. Zimmerman, J. Van Tyne, L. W. Wing, S. E. Perkins, III, B. C. Cain, W. C. Starrett, W. B. Taber, Jr., Carl W. Rahe, David Damon, Mrs. W. M. Dawley, and Otto M. Creary.

*Revised to the end of December, 1935.

FIG. 9. ALFRED M. BAILEY
First Vice-President

FIG. 10. MRS. MARGARET M. NICE
Second Vice-President
Photograph by Bachrach.

FIG. 11. SAMUEL E. PERKINS III
Treasurer

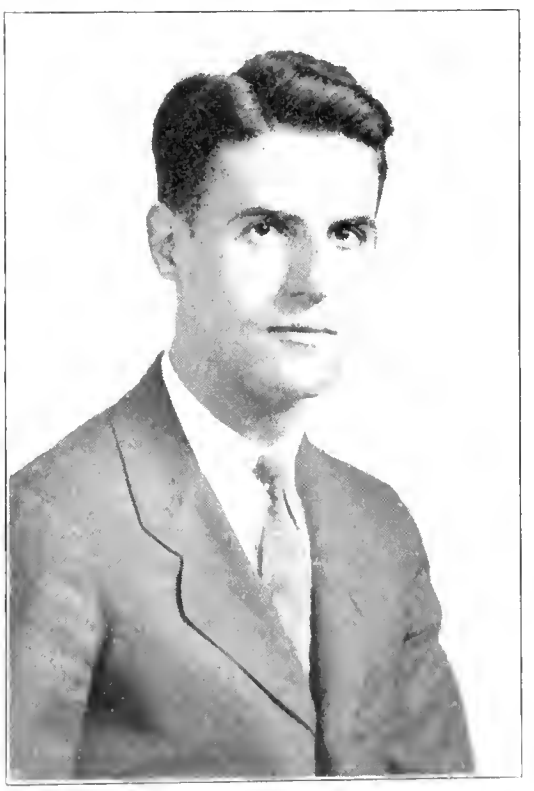


FIG. 12. F. P. ALLEN
Librarian

Fig. 13. Group at the Annual W. O. C. Meeting, St. Louis, 1935.

With these increases the Club has had a decided net increase in membership. The total number of members lost during the year 1935 from all causes was 122, 1 being Life, 3 Sustaining, 12 Active, and 96 Associate. A considerable number of former members have reinstated during the year. Thus there has been a net gain of 63 members during 1935.

This leaves the present membership of the Club at 784, distributed as follows: Honorary, 6; Life, 11 (2 also are Honorary); Sustaining, 42; Aetive, 189; Assoeiate, 538. This is the largest total membership in the history of our organization, exeeeding by nine members the former high point reaehed in 1930 at the time of the Cleveland meeting.

The Secretary wishes to take this opportunity to thank the many members who have assisted in the membership eampaign, helped with the staging of the annual meeting, or otherwise advaneed the work of the Wilson Ornithologieal Club during the past year. It has been particularly gratifying to have reeeived in all more than 410 letters from the members giving news of their own work, ideas and suggestions on ornithologieal and eonservational topies, or words of eneouragement and construetive eritieisms of the work being done. It is greatly regretted that the pressure of other duties has made it impossible to answer many of these direetly or to reply save by abbreviated note.

Respectfully submitted,

LAWRENCE E. HICKS, *Secretary*.

KEY TO GROUP PHOTOGRAPH OF THE W. O. C. MEETING AT ST. LOUIS, 1935

1, Albert F. Ganier. 2. E. L. Moseley. 3. A. M. Obrecht. 4. Sterling P. Jones. 5. Ann Loftus. 6. Lillian Serbousek. 7. Mabel Stack. 8. A. Marguerite Heydeweiller. 9. Irving Brant. 10. Mrs. Howard S. Benedict. 11. S. E. Perkins, III. 12. Lawrence E. Hicks. 13. Fannye A. Cook. 14. Leonard B. Nice. 15. T. C. Stephens. 16. Mrs. H. J. Taylor. 17. Margaret M. Nice. 18. Edith R. Force. 19. Myra G. Willis. 20. W. K. Butts. 21. Perna M. Stine. 22. Robert B. Gordon. 23. R. D. Book. 24. Roger T. Peterson. 25. W. M. Rosene. 26. Earl G. Wright. 27. Roy V. Kommarek. 28. Jack Stupp. 29. Mrs. A. F. Satterthwait. 30. Miss Phinney. 31. John B. Calhoun. 32. Frederick M. Baumgartner. 33. Walter M. Rosene, Jr. 34. Fremont Arbeiter. 35. Mrs. Myron H. Swenk. 36. L. M. Gates. 37. Mrs. L. M. Gates. 38. Josselyn Van Tyne. 39. M. L. Fisher. 40. R. E. Jordan. 41. Louis M. Weber. 42. Rudolf M. Bennitt. 43. A. E. Shirling. 44. Logan J. Bennett. 45. Ira N. Gabrielson. 46. Paul Bartsch. 47. George O. Hendrickson. 48. Jesse M. Shaver. 49. Myron H. Swenk. Copies of this 1935 photograph may be obtained for forty cents by addressing Mr. A. J. Nolte, 3431 Osage Street, St. Louis, Mo.

REPORT OF THE TREASURER FOR THE YEAR 1935

Receipts for 1935

December 15, 1934, Balance on hand as per last report			$ 842.32
The following was collected as dues from members:			
3	Associate members for 1933	$ 4.50	
13	Associate members for 1934	19.50	
5	Active members for 1934	12.50	
334	Associate members for 1935	501.00	
146	Active members for 1935	365.00	
21	Sustaining members for 1935	105.00	
104	Associate members for 1936	156.00	
43	Active members for 1936	107.50	
12	Sustaining members for 1936	60.00	
2	Associate members for 1937	3.00	
	Total collected from membership dues		1,334.00
The following was collected from subscribers:			
1	Subscriber for 1934	1.50	
75	Subscribers for 1935	112.50	
15	Subscribers for 1936	22.50	
40	Part subscriptions and part memberships, etc	49.67	
	Total received from subscriptions		186.17
The following were miscellaneous receipts.			
	Back numbers of Bulletins sold	24.75	
	Contributed toward publication fund	106.50	
	Total miscellaneous receipts		131.25
	Total receipts including old balance		$2,493.74

Endowment Fund

December 15, 1934, Balance on hand from last report		$1,442.02
June 1, 1935, interest		18.02
December 1, 1935, interest		.05
		$1,460.09
During the year the Endowment Fund was invested in the following securities:		
June 1, 1935, U. S. Savings Bonds	$ 675.00	
June 1, 1935, U. S. Postal Savings 2½% Coupon Bonds	780.00	
Balance in savings account, Citizen's National Bank, Boone, Iowa	5.09	
		$1,460.09

Disbursements for 1935

Printing four issues of the Bulletin	$1,090.75	
Cost of halftones, cuts, etc.	151.82	
Cost of reprints	3.17	
Other expenses in Editor's office	151.45	
Total publication costs		$1,397.19
Expenses in Secretary's office	133.01	
Printing programs, convention expense, etc.	119.21	
Expenses in Treasurer's office	49.25	
President's postage expense	4.84	
18 subscriptions refunded on account of error	20.95	
Check returned and not made good	1.50	
Ecological Society of America	1.00	
U. S. check tax on two checks at 2c	.04	
Total general costs		329.80
Total disbursements for year 1935 (see itemized sheet)		$1,726.99
Balance on hand December 20, 1935		766.75
Total		$2,493.74

Respectfully submitted,

W. M. Rosene, *Treasurer.*

Ogden, Iowa, December 21, 1935.

Report of the Auditing Committee

The undersigned have examined the report of the Treasurer of the Wilson Ornithological Club for the fiscal year ending December 21, 1935, and vouchers accompanying the same, and have found them correct.

Respectfully submitted,

Myron H. Swenk.
Samuel E. Perkins, III.

REPORT OF THE LIBRARIAN FOR 1935

December 23, 1935.

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

EXCHANGES. During the past year the library has received regularly on exchange *Iowa Bird Life* and the University of Iowa *Studies in Natural History*. The value of this material can not be overemphasized. The exchange of the BULLETIN for not only domestic but also foreign journals is of inestimable scientific value to the Club and its library in the field of research. The exchanges may quite naturally become the very backbone of the research library.

REPRINTING. On the matter of reprinting out-of-print numbers of the BULLETIN some progress has been made. With funds available from the sale of back numbers, one hundred copies of BULLETIN No. 18 (January, 1898) were made by the lithoprint process. This BULLETIN is available for $1.00 with a 20 per cent discount to members.

STOCK. During 1935 no stock of BULLETINS was received.

BOOK PLATE. As yet no book plate has been adopted by the Club although several have been submitted.

DONORS. The Librarian takes pleasure in acknowledging gifts to the Club Library from the following persons during 1935: Mr. Ralph Beebe, Ecorse, Michigan; Mr. S. T. Danforth, Puerto Rico; Mr. Samuel C. Harriot, New York, N. Y.; Mr. Lawrence Hicks, Columbus, Ohio; Mr. Leon Kelso, Washington, D. C.; Mr. O. A. Stevens, Fargo, N. D.; Mr. Warren J. Willis, New York, N. Y.

STATISTICS. A FIVE-YEAR SUMMARY. The gifts to the library for 1935 total twelve bound volumes and ninety separates, reprints, and unbound numbers of periodicals. This makes a total for the five-year period of the existence of the library of 190 bound volumes and 1477 separates.

	Donors	Bound Volumes	Pamphlets
1931	13	54	750
1932	7	66	97
1933	5	36	298
1934	3	22	242
1935	7	12	90

As an officer of the Wilson Ornithological Club I view with alarm this decided falling off of our accessions. It may be readily observed that we have never had as poor a year as 1935. Another unfortunate aspect of the situation lies in the fact that there were no new donors during the past year. Delighted as we are with yearly contributions from old friends of the library, it is nevertheless gratifying to have new names to add to our list of donors. Out of our entire membership it is amazing that only fifteen people have been sufficiently interested to contribute to the library over the entire five-year period. Fortunately eight of these have contributed more than once. Mr. Willis has contributed for four years, Mr. O. A. Stevens and Mr. Kelso have contributed for three years, while Mr. Beebe, Mr. Danforth, Mr. Summer, Mr. Harriot, and Mr. Hicks have contributed for two years.

All members of the Wilson Ornithological Club should become much more library minded and the time to start is now with a contribution.

Respectfully submitted,

F. P. ALLEN, *Librarian.*

EDITORIAL

The Twenty-first Meeting of the Wilson Ornithological Club was held at St. Louis, Missouri, on December 30 and 31, 1935. This was the second meeting in St. Louis. The first meeting, in 1919, was marked by the presence of Mr. Otto Widmann. While our second St. Louis meeting has been exceeded in the matter of attendance, yet the program continued to maintain a high level of scientific interest. Both of our St. Louis meetings have been with the American Association for the Advancement of Science. In 1919 all sessions of the Association were held under one roof, the Soldan High School. This was found to be a most convenient and satisfactory arrangement, although the meeting room to which we were assigned at that time would hardly have accommodated the audiences we had in 1935. At this last meeting of the A. A. A. S. the various sessions of the forty-seven participating societies were scattered from Dan to Beersheba, and consequently most of us remained in one place. The W. O. C. was comfortably housed and conveniently located. We were much indebted to our Local Committee for the comfort and precision with which our meeting was conducted.

The 1936 meeting of the W. O. C. will be held in Chicago, at the Chicago Academy of Sciences, on November 27-28. In 1937 the meeting will be held at Indianapolis, with the American Association, during the last week in December.

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

	Cleveland 1930	New Orleans 1931	Columbus 1932	Pittsburgh 1934	St. Louis 1935
Local Attendance	41	11	92	49	24
Out-of-town Attendance	122	81	65	129	88
Total Attendance	163	92	157	178	112
Dinner Attendance	98	35	69	72	70
Titles on the Program	33	27	35	39	38
Honorary Members	7	7	7	6	6
Life Members	7	7	10	12	11
Sustaining Members	58	57	75	44	42
Active Members	227	214	175	154	189
Associate Members	479	461	469	507	538
Total Membership	775	744	734	721*	784
New Members Added	241	162	113	112	141
Pages in Bulletin	312	334	256	288	318
Total Income	$2451	$2686	$2191	$2230	$2494
Fiscal Balance	$675	$731	$517	$842	$767

It was with much regret that the Club accepted the resignation of Mr. W. M. Rosene as Treasurer. Mr. Rosene's services in caring for our funds, without loss, through the perilous depression days can not be too highly appreciated. And we may say that Mr. Rosene has won a high place in the esteem of all members of the organization. Mr. Samuel E. Perkins III, of Indianapolis, was elected to the office of Treasurer, succeeding Mr. Rosene. We are confident of Mr. Perkins' ability and desire to maintain the high efficiency in this office.

It was a general agreement among officers and members at this meeting that an effort would be made in 1936 to eclipse all previous records in the development

*This number in last year's summary was in error by 100.

of the Wilson Ornithological Club. All members are therefore urged to be ready to give assistance when called upon, and to volunteer whatever aid may be within their power to give toward this end. The objective is to reach or exceed two hundred new members. The Secretary can tell us that this goal can not be reached without some hard work. Let us help him, therefore, in every possible way to report success at the next annual meeting. The Editor promises to increase the size of the WILSON BULLETIN as rapidly as our finances will permit.

We shall be glad to have our readers send us any notes on the effects of the past cold winter season on the bird life.

Dr. Tracey I. Storer, of the University of California, has recently completed his file of the WILSON BULLETIN. Prof. George M. Sutton, of Cornell University, is anxious to secure any or all of the following numbers to complete his file of the WILSON BULLETIN: Serial number 11, 1896; 12, 1897; 15, 1897; 19, 1898; 20, 1898; 22, 1898; 23, 1898; 25, 1899; 26, 1899; 27, 1899; 29, 1899; 30, 1900; 34, 1901; 35, 1901; 36, 1901; 37, 1901; 46, 1904; 60, 1907; 65, 1908; 94, 1916; 97, 1916.

We have reached the conclusion that it is bad practice to change the original paging in the reprinting of articles. Retention of the original pagination enables one to make a citation from a reprint. If the author wishes to omit the running magazine heads with original folio numbers perhaps it would be better to omit page numbers entirely. The alternative is to authorize the printer to reset the folio line with the original folio numbers only.

THERE WAS HELD at Washington on February 3-7, of this year, the organization meeting of the North American Wild Life Conference. From the "invitation" and prospectus it is not very clearly determined who were expected to attend. Our "invitation" was received less than a week before the opening date of the conference. So we presume that such general invitations were more or less perfunctory, and that the conference was a more or less set-up affair. A national wild life conference of this kind is much needed, and it should be democratic rather than bureaucratic. We doubt if a hot-house convention of this sort will win general support. It is not representative. We believe it would be more effective to organize a half dozen or more regional conferences, the latter to elect delegates to a national conference. Then the national conference would have the force of representation. Wisdom or power superimposed from above is bound to be less effective than the same developed and organized from below.

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	$1.25	$2.00	$3.50	$4.75	$6.00	$7.25	$8.50	$9.75	$11.00	$12.25	$13.50	$2.50
100	1.50	2.25	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	2.75
200	2.00	2.75	4.25	5.50	6.75	8.00	9.25	10.50	11.75	13.00	14.25	3.00
300	2.75	3.50	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	15.00	4.00
400	3.25	4.00	5.50	6.75	8.00	9.25	10.50	11.75	13.00	14.25	15.50	5.00
500	3.75	4.50	6.00	7.25	8.50	9.75	11.00	12.25	13.50	14.75	16.00	6.00

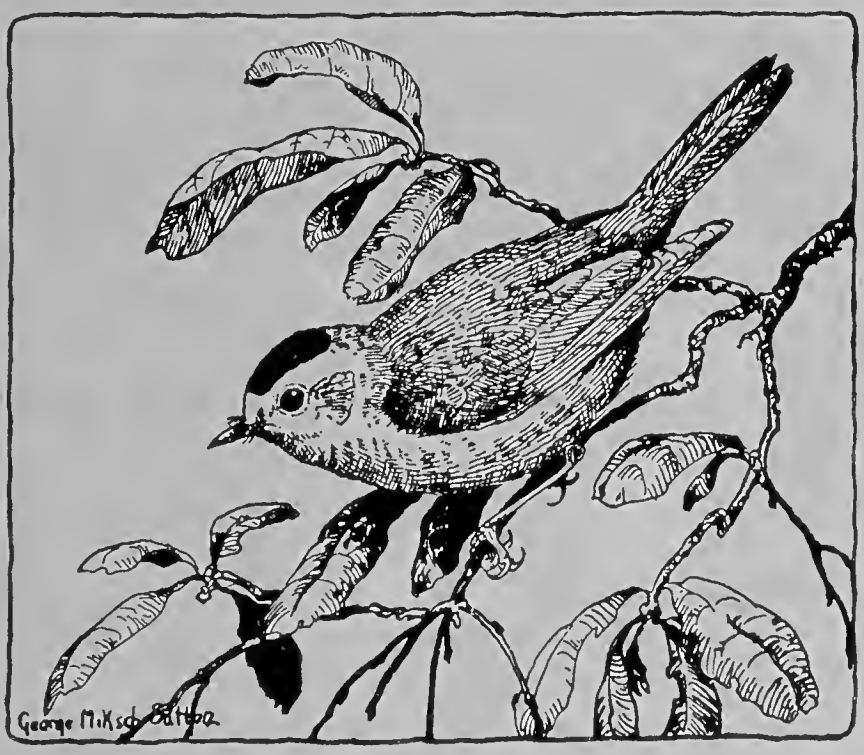
Repaging—25c per page extra. Title Page—$1.25.

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. New Morrison Hotel	T. C. Stephens
1917—Pittsburgh. January 1-2, 1918. With the A. A. A. S.	W. F. Henninger
1919—St. Louis. December 29-30. With the A. A. A. S.	M. H. Swenk
1920—Chicago. December 27-28. With the A. A. A. S.	R. M. Strong
1921—Chicago. December 26-27. The Field Museum	R. M. Strong
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

Vol. XLVIII JUNE, 1936 No. 2

THE WILSON BULLETIN



A Magazine of Field Ornithology

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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.

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—Dr. Josselyn Van Tyne, University of Michigan, Ann Arbor, Mich.
First Vice-President—Mr. Alfred M. Bailey, Chicago Academy of Sciences, Chicago, Ill.
Second Vice-President—Mrs. Margaret M. Nice, Columbus, Ohio.
Treasurer—S. E. Perkins III, 109 Inland Bldg., Indianapolis, Ind.
Secretary—Dr. Lawrence E. Hicks, Botany Dept., O. S. U., Columbus, Ohio.
Editor—T. C. Stephens, Morningside College, 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. XLVIII JUNE, 1936 No. 2

Vol. XLIII (New Series) Whole Number 176

TRENDS IN MODERN ORNITHOLOGY*

BY JOSEPH GRINNELL

When I reeeived word from Secretary L. L. Snyder that his Program Committee wanted a few serious eommcnts from me at this dinner—"serious" ones, mark you, and thcrefore to be *written*, on the subject, "Trends in Modern Ornithology", I agreed, with little hesitation. I did so with meager notion of the amount of thinking I was in for. When I did get down to the job of thinking, as we eame east through British Columbia, I was at onee given pausc by ecrtain difficulties of definition, two in number: What *are trends?* And what *is modern ornithology* as distinct from aneient, or from sub-modern, ornithology?

Dealing with the last difficulty first, I ventured the definition that ornithology is thc mass of knowlcdge possessed by all students of birds at any onc time. What is not known at such time, is not yet a part of ornithology. Thus, we can quite as properly speak of what was known of birds in the days of Wilson as *ornithology*, as we can of what is known today. It is the *volume* of what is known in that field of knowledge that differs from time to time.

Looking backward, from the prescnt time-level, wc can thus speak of the ornithology of thc different epochs; but the total mass, and the faetual and philosophical constitution of it has changed: modern ornithology shows cnormous mass, relative to that of preeeding epochs, and it is subdivided into a multitude of minor fields, ineoneeivable in number and kind only a few decades ago. Incidentally, it is simply impossible for one person nowadays to be an all-round ornithologist, as was Wilson in his day, or Coues in his. Eaeh of us today is an avian systematist, or an avian morphologist, or an avian behaviorist, or a paleornithologist, or an avian territorialist, or—somcthing else.

*Read at the Annual Dinner, Fifty-third Stated Meeting of the A. O. U., Toronto, October 23, 1935.

Now, that word "trend" bothered me even more. How can a person recognize the true trend of development as obtaining at any one time-level, until subsequent lapse of time has furnished sufficient perspective to enable him to do so? I could now, with enough study, state what were the trends in ornithological development in the year 1900, as judged from the literature of that in comparison with later years. But to say what the true trends are in the present year, 1935, becomes, as I now see it, a guess, or a prophesy, or merely a declaration of what one would like to see happen on the basis of his own personal interests or bent. And no two of us would be in any near agreement.

Therefore, the best I find myself able to do is to offer a brief catalogue of some of the sub-fields of ornithology that have emerged, or come to the fore, within the immediately passed few years. I will not give the names of persons who are now, or have been, identified with these fields, as I was not asked to deal with personalia. You will think of some of them as I recite the subjects of their respective research pursuits.

Perhaps standing first as to amount of recent attention accorded it, has been analytical bird-behavior, this as evinced in territoriality, in cyclical patterns in which reproduction is the central element, and in seasonal shiftings of populations both local and general. More and more intensive studies have been made along these lines, upon single species.

A tendency manifest (and a bit unfortunate) is to base very general "laws" upon one or a few such studies. A recent warning has properly been sounded against such premature generalization. Behavior patterns sharply different in certain respects from one another, or, on the other hand, strikingly alike, may have evolved in different orders of birds, even families and genera—quite as in the case of adaptive structural features.

Included in this subject of behavior is sociology in birds—inter-individual relations and reactions. I think of the phenomenon of "peck-order" recently described: that is, scale of dominance among the individuals in a group or flock. The superiority versus inferiority "complex" seems in certain birds startlingly like similar manifestations in the human animal: and it extends to the behavior of groups of individuals toward other groups. We see dictators and we see self-asserted, "superior" races—in birds!

Bird-voices and their meanings are being studied as never before, and investigated with the aid of modern recording devices. And inter-

pretations are being made in the light of findings in other animals, including man. Thus anthropomorphism, not long ago frowned upon, is coming into its own, in a certain conservative sense—in reverse!

The physiological basis of individual behavior in terms of internal secretions, or of vitamin activation, has been receiving much attention—and much recognition as if of supreme scientific importance. While a degree of importance must freely be acknowledged, we should not forget that chemico-physical mechanisms have likely been evolved on a selective basis. They have approached perfection only on the basis of selection toward ecological adaptation, that is, as imposed by special environmental pressures upon the internal structural core carried along conservatively by the machinery of inheritance.

Plumage change as being under control of varying hormone production is being recognized through studies in micro-anatomy and micro-physiology. Tie-ups with varying courses of general development become apparent.

Gross morphology is no longer content with the cataloging of structures in the dead specimen. Only as correlated with functions, does anatomy appeal to workers nowadays. And clearly this correlation carries over into behavior in all its manifestations. It is the *living mechanism* that holds the attention of the enthusiastic anatomist today. And thereby the building of new phylogenies, improvement of earlier "trees", goes on—with the increasing promise of that ideal, near-perfect system of classification which we all envision for the future. In that millennium only one A. O. U. Check-List will be needed every fifty years—instead of four in the same period!

As to systematics, the day of the brief description of new forms, and of that type of group revision which is concerned only with dead anatomical features, has nearly or quite passed. Indeed, I may say safely that there is no such thing any more as "pure systematics". Rather, does the modern student of speciation concern himself with his birds as living organisms that react in manifold ways, each species, each subspecies and each minor population group within a more or less different environmental set-up. The systematist of today is open-minded toward the findings of biologists in the field of genetics, in that of animal behavior, in that of ecology in the broadest sense: for his major problem is not only to find out how phylogeny as we see it has been attained, but how and why it is proceeding as it does in the present.

Nomenclature continues necessary, of course: but it is subservient to the aim of more and more accurate expression of truly genetic

relationships. The recent tendency appears to have been more toward synthesis than analysis; the race-group has of late come into the taxonomic scheme.

Exploration, ascertainment of geographical distribution, according to the earlier methods of amassing huge series of specimens, seeking among them new kinds and listing all the species, with meager distributional notes, has lessened in importance. Field-work on a large scale is now organized toward general ecological analysis, with searching attention to the other animals associated with the birds, and to the plant-life which is basic to the fortunes of all of the animals. Enormous possibilities remain in the direction of faunal analyses, faunal derivations, interactions of faunas, the behavior of bird populations in-the-large, both spatially and through time. This means field projects of continuing duration, projects that can be correlated for many parts of the world, projects that take into account many sorts of physical phenomena.

The main methods used in ornithology already for many years remain those: (1) of studying dead material in the museum and laboratory; (2) of experimenting upon live birds in captivity or as banded, hence more or less under control; and (3) of observing birds altogether unfettered or undisturbed in any way, under the conditions under which they carry on their natural existence. Although these three methods may best be used simultaneously, it looks to me as though the last-named method has, just now, come into greater prominence. This is the method of intensive, disciplined bird-watching out-of-doors. It is the method by which deeper and deeper insight is being gained into *birdness*—I mean as to what constitutes the animal we call a bird—*what* it does in an infinite number of respects under different circumstances, and *why* it does each of these things.

I venture to say that the outlook at this moment is exceedingly favorable for worthy contribution to science from the student of birds alive and out-of-doors, without, or with, the aid of binoculars and camera. The present trend may prove to be along that route. Thank you for listening to these "serious" remarks!

Museum of Vertebrate Zoology, University of California,
Berkeley, Calif.

NOTES ON THE WINTER FOOD OF THE SHORT-EARED OWL

BY IVAN R. TOMKINS

During the fall of 1930 there was an unusual influx of Short-eared Owls (*Asio f. flammeus*), to the dunes and marshes about the Savannah River entrance, making it possible to study the food habits in the light of several years general acquaintance with the territory and its winter residents, both mammalian and avian.

Sixty-eight pellets were collected at various times during the following winter, and forwarded to the Biological Survey for identification. These pellets contained the remains of ninety-six house mice (*Mus musculus*), and four rats of the genus *Rattus*, which were most likely the roof rat (*Rattus alexandrinus*), though the Norway rat (*R. norvegicus*), and the black rat (*R. rattus*), are also to be found in this territory. Thirty-eight birds had been eaten, of which fifteen species were identifiable, though seven birds could not be separated as to species.

The entire list of birds is sufficiently interesting to be included:

2 *Porzana carolina*	Sora
1 *Squatarola squatarola*	Black-bellied Plover
1 *Arenaria interpres*	Turnstone
2 *Actitis macularia*	Spotted Sandpiper
1 *Tringa solitaria*	Solitary Sandpiper
1 unidentified shorebird	
1 *Colaptes auratus*	Flicker
1 *Sphyrapicus varius*	Yellow-bellied Sapsucker
1 *Telmatodytes palustris*	Long-billed Marsh Wren
9 *Turdus migratorius*	Robin
1 *Regulus satrapa*	Golden-crowned Kinglet
5 unidentified warblers	
1 *Molothrus ater*	Cowbird
1 *Pooecetes gramineus*	Vesper Sparrow
1 *Junco hyemalis*	Junco
4 *Zonotrichia albicollis*	White-throated Sparrow
2 *Passerella iliaca*	Fox Sparrow
3 unidentified Fringillidae	

As these pellets were collected over the major part of the winter, and in various places, individual peculiarities in feeding were subdued and a truer average was obtained. It is very likely that the winter food presents a better index to the natural feeding habits of the species than might be obtained in the breeding season, particularly if

there should then be either a plenitude or scarcity of certain forms of life. Here there was a considerable choice of food to be had, and the extreme pressure of obtaining food for a nestful of growing young did not tend to introduce aberrant habits.

Daytime feeding was not the rule here. There was no evidence that flying owls in the daytime were otherwise occupied than in trying to find a peaceful spot to rest. When flushed the owls would fly around in their peculiarly erratic way, now high, then low over the sandhills, and occasionally one would light on the nearby mudflat, to the consternation of the small shorebirds feeding there. The sandpipers would fly much as before the Marsh Hawk (*Circus hudsonius*), but the alarm was not so infectious as that caused by the sight of a Pigeon Hawk (*Falco columbarius*), sweeping low over the grass tops.

All along the dunes the roof rats and the house mice had their dens, and were abroad at all times of the day and night. This was in the same places used as day resting stations by the owls. It would be expected that an owl would emerge from its day dreams occasionally to pick up a mouse that came too close, as other observers have usually regarded this owl as somewhat of a daytime hunter. But in the same places there were thousands of Savannah Sparrows (*Passerculus sandwichensis*), creeping under the bent grasses in search of seeds. That none of this species were found in the owl pellets—unless among the three unidentified Fringillidae—is good evidence that the owls did not feed on the ground in the daytime. And when returning from the marshes at evening, we did not see the owls taking up their hunt until nearly dark.

To better determine the feeding method, the possible hunting grounds for miles around could easily be divided into three habitats, viz., (a) the marsh, (b) the shore, and (c) the shrubbery. Only the last named needs any description, and it consisted of such shrubs as myrtle, groundsel tree, cassena, and prickly ash. These shrubs were from ten to twenty feet high, and harbored in the daytime many species of passerine birds.

Disregarding the unidentified birds, the other remains could be divided loosely according to the habitat, and it was found that:

(a) from the marsh were eaten four birds of three species, and no mammals,

(b) from the shore were eaten five birds of four species, and 100 mammals,

(c) from the shrubbery were taken nineteen birds of seven species, and no mammals.

In the thick grasses of the marsh lived the rice rats (*Oryzomys p. palustris*), and the owls had eaten none of these. And in the short thick grass between the shrubbery lived, in considerable numbers, the cotton rat (*Sigmodon h. hispidus*), and this species too, was absent from the pellets. While *Sigmodon* is pretty much of a diurnal species it still is a favorite food of the Barn Owl (*Tyto alba pratincola*), which hunts only at night, so it must be abroad then as well as in the day.

In the shrubbery were many species of birds not eaten by the owls at all, according to the evidence. It was the unusual proportion of Robins that held the clue to the species taken from this habitat. It is well known that the Robins roost in the bare branches at night, and the owls must have done quite a bit of hunting over these places. To find the warblers, the woodpeckers, and the kinglets there does not seem unusual, but one might be a little surprised at the Fox Sparrows and White-throated Sparrows going to bed in the upper branches, after spending the day on the ground underneath. The thrashers, catbirds, and cardinals, all very common among the shrubs, seemed to have safer roosting habits, at least in this case.

So we have the picture of the owls hunting over the shore and mudflats, the open places in the marshes, and in the top of the bare branches. All of the shore and marsh birds might easily be found out in the open, or resting on the beach.

In the general economy of nature this is a satisfactory and successful species. Its wide range of food allows it automatically to accept the commoner or more easily captured kinds, and prevents it doing too much harm to a depleted species, except perhaps in the case of a seasonal concentration. And with its wide breeding range, it has great stability.

But when one comes to the economy that deals with credits and debits of value to humanity alone, an entirely different set of factors is introduced. And by the evidence of this study, we find the Short-eared Owl killing far too many beneficial and harmless birds to be given an entirely clear bill of health.

Further, we should not expect to find the species of much value in reducing a plague of small rodents, living in thick cover—*Microtus*, for instance—if the feeding habits are as this study shows. Fortunately other observers have found much different habits.

U. S. Dredge "Morgan",
Savannah, Ga.

NOTES ON NESTING RUBY-THROATED HUMMINGBIRDS

BY A. L. PICKENS

That one does not deliberately go into the woods to find hummingbird nests, for hummingbird nests are gifts of the gods, is the poetical idea of a certain nature writer. Nevertheless, in the southeastern states, I found a certain amount of eliminative reasoning and planning of decided value in locating the lichen-covered nest of the ruby-throat. First, the direction from the feeding grounds is apparently indicated by the flight of the bird after its feeding visit is over. Second, where it grows abundantly, the post oak (*Quercus minor*) is the favorite nesting tree of these birds—its lichen-covered branches forming a suitable setting for the similarly covered receptacle for the eggs. Third, the droning sound made by the wings of the mother as she hovers about the nest is a good guide for the ear, though at times the same sound may merely lead one to a sap-flow from the wounded bark of some forest tree.

Of nine nests observed in the vicinity of the old Richmond Church site, near Equality, S. C., six were in post oaks; two, evidently by the same individual in succeeding nesting seasons, were in one pine tree at a high elevation, and one in a small plum tree in a locality that, to the imaginative, truly seemed to stamp it as a divine gift. I had returned to the old farm on which I was reared, and was to spend a long summer vacation. It was one of those old southern farms whose original owner had helped expel the Cherokees in colonial days, leaving the soil and cherished traditions to be passed on in unbroken line to the modern owners. I had not had time to get fully settled, when from the familiar old dining table I glanced through the window, and found a female hummingbird at work constructing a nest on a limb of a small sugar plum that grew up before the window of the room above, which I was to occupy. I must confess it was a temptation to rhapsody and poetry rather than cold scientific observation. It was rather easy to personify the Old Mother, who came so near dropping a gift like that in one's lap. However, I determined to make use of this opportunity to observe at close range the nesting life of the ruby-throat in a scientific way. Spider-webs, bits of lichen, pappus, and tomentum from the lower side of white oak leaves appear to most of us rather untidy materials when seen in the crude state, but it was of such material that the midget below my window wove her nest. Sometimes she brought a lichen bit for the outside. If she fitted such to the base of the nest, she leaned far over, while seated in the cup, and placed it in position with the tip of her

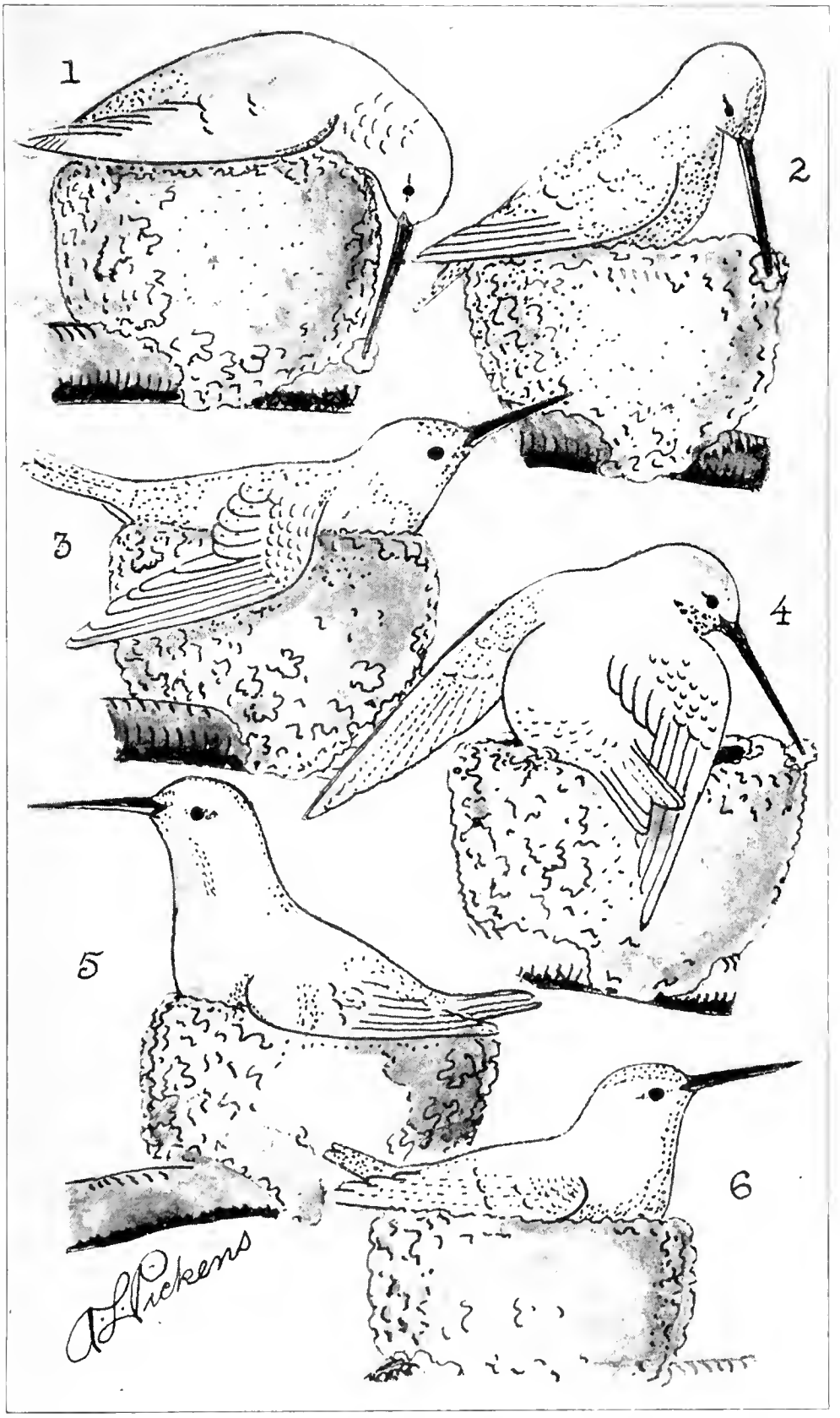

Fig. 14. Sketches of a female Ruby-throated Hummingbird in various stages of nest building and incubation.

long beak; if on the edge above she drew up her bill along the throat and attached it in the same manner. Again she brought downy lining for the inside and twisting round and about packed and felted it into place by lying partially on one side and working it into place with the feet, while one wing drooped over the edge of the nest. Then with the body twisted into an odd little knot, and the wings drooping over the edge as when working on the interior lining, she busied herself with the outside, also placing yet another bit of lichen in position. Before the final touches the first egg was deposited, incubation beginning at once. Keenly alert to surroundings, at times the mother was seen with the head held high as in the two lower figures of Figure 14. Assured of the safety of her immediate neighborhood, she would drop comfortably down into the nest as seen in Figure 15. This long vigil of incubation she varied with additional touches of lichens on the outside of the nest, the contents of the interior precluding any further work on the lining. I was surprised at the length of time required for hatching, for my information from various authors led me to expect these small eggs to be fully incubated in something like ten days. In this case I had a long wait of two weeks. The first arrival was very unlike a hummingbird, being very black, wrinkled, and naked, with a bill about one-eighth of an inch in length and almost as wide at the base. The mother leaving the nest with one egg unhatched immediately began the feeding. She went and came often, returning at times between feeding trips, not to feed the young, but merely to hover on the nest, the outside of which a few days before had received so much of her care, even to apparent plumbings of the side with her beak, which in reality may have been the plucking off of loose spider-web ends. Even the eggs, as we noted, could not stop the careful addition of a few extra lichens to the outside, but with no male assistance to feed the young, we may well imagine the female with sufficient responsibility to provide food for herself and offspring. A hummer's feet, as is the case with the pewee, are small, and little used except for perching, and the mother did not step from the edge into the bowl of the nest as larger birds might do, but lifted herself and flew this short distance! That is she would rise lightly on her wings and drop gently in to hover her charge. When she came with food she roused her baby from its slumber with a weak, gentle, little call of "*chiff-chiff, chiff-chiff, chiffit*"!

The next morning the other egg was still unhatched, and I rashly presumed it had decayed, and set about securing it for a collection I had made entirely from decayed and deserted eggs. I improvised a

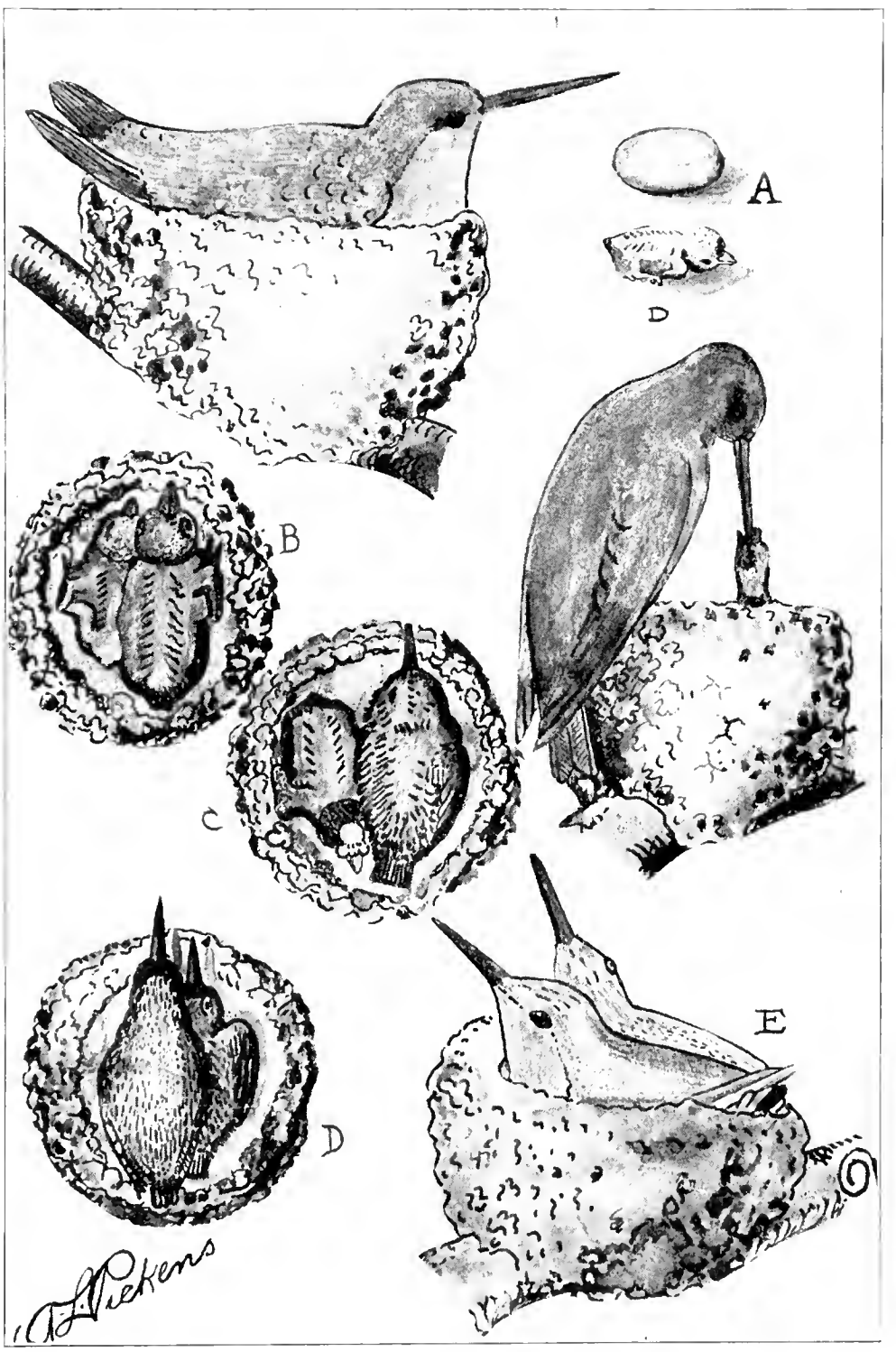

FIG. 15. Sketches showing adult female Ruby-throat sitting on the nest and in the act of feeding the young. Other figures show the young in various stages from hatching to the time of leaving the nest.

ladder and climbed up to the limb that held the nest, and reached in to get the egg. To appreciate the delicacy of this task one must recall how fragile an egg like that of a titmouse or a small sparrow is, and remember that a hummingbird's egg is smaller still. Forceps might crush it, and to take it between thumb and fore-finger was to introduce both in a space barely large enough for the thumb. The result was that I dropped the egg, and it bounced earthward by stages, striking my improvised ladder once or twice on the way down. When I picked it up it was fractured, as I recall now, quite all around the smaller diameter, and blood was oozing through the suture. Rarely have I experienced keener chagrin. That egg was no longer a mere laboratory or field specimen. Despite my memories of the kind little city boy who, visiting grandmother's, helped a chick out of the egg with disastrous results, I resolved to save the young bird in that egg. From the pantry I secured a hen egg, broke it and took some of the membrane that lines the inside of the shell, and this I wrapped around the broken exterior of the smaller egg. From time to time I moistened the membrane to keep it from growing dry and hard, keeping it warm by blowing on it with my breath, or else by holding it cupped in my palms or against my body. I was at last rewarded by vigorous movement on the part of the bird. It gave several kicks with the legs, pushed the surrounding membrane with the feet, and opened the beak as if for air. Very carefully I punctured a hole in the improvised covering quite near the bill. The movements became more insistent and I began to unwrap the outer membrane. When I had partly finished, the bird raised its head and exposed the throat to view. Through the delicate skin I caught sight of a distinct and emphatic up and down motion which was evidently the tongue and larynx adapting themselves to their new position. A few grains of sand, glued with albumen, stuck to the skin of the nestling as a result of its dangerous drop to the earth. These I carefully removed, and wetting the point of a needle I freed the midget wing that had become stuck to the side of the body by the same medium. At last it wriggled out of the remains of the shell, and lay stretched on my palm, its body about as big as a pea, its head about half that large, its feet impressing the observer by their exceeding smallness and the delicacy of the plainly visible claws. I carried it again to the nest, where the mother came and hovered it, and I soon had the satisfaction of seeing it raise its head and open its mouth to receive the long beak with which the mother regurgitated food from her crop to its own. I sketched the mother feeding

one of the pair, and the young I sketched at intervals of about three days until the green feathers began to show just a little in the wings. After about one week, one of the pair found a voice and uttered from time to time a soft little cheeping, "*Tweet*". Then they came to answer their mother with a "*tsip, tsip*", changed later to a "*psweep, psweep, psweep*", something like the cry with which a young squab greets its parents. When young of this species leave the nest this gives place to a shrill, distinct, "*tsweep*", repeated slowly and deliberately and audible for some distance, especially to the highly attentive mother, who for some time continues her feeding operations.

The skill of the young when they take to wing is one of the marvels of ornithology. How they learn so quickly to judge the nearness of a perch, and to sustain themselves without the usual drops to the ground that we find in larger species is marvelous, but once they are on the wing, he is foolish who gives them chase. I shall not soon forget dragging a heavy ladder into the wood, propping it against the limbless trunk of a tulip poplar and climbing far up into the crown following a young hummer's notes and half hoping to find a nest. It buzzed away as easily as a bumble-bee, and alighted in a nearby tree with the poise of an experienced flyer, although it was out of the nest perhaps a matter of only a few hours.

One of the nests mentioned above was quite finished by the fourteenth day of May. Nearly two months later another nest nearby held a pair about ready to fly, while the one beneath my window was almost completed by June 10. Thus, nesting activities at this place would appear to be chiefly between the first of May and the middle of July with additional time for attending the young on the wing. Curiously enough I can record but one nest of this species built in a conspicuously flowering tree. A large Albizzia, or Silky Tree, often planted in the South for shade and ornament, grew in the yard of a boyhood friend who lived about twelve miles away from my father's home in upper South Carolina. One summer this tree was selected as a nesting site by a female ruby-throat. I have found them nesting on limbs very near an immense bower of honey-suckles, but never within a blooming limb or spray of foliage of any kind, and when they do it appears to be a departure from the general habit that seeks for concealment for the nest.

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THURE LUDWIG THEODOR KUMLIEN*

BY MRS. H. J. TAYLOR

Concern is expressed that the race will suffer in physical development with the passing of the pioneer. Many lives were sacrificed in homesteading, nor were all who survived physical giants, though courage, perseverance, and endurance were well-developed qualities in them. Pioneering for homes and lands is now past, but intellectual pioneering, the opening of new avenues of human understanding for the comfort and betterment of mankind, will ever be in order. New and unexplored fields of intellectual advancement are ever present, awaiting the enterprise of the pioneer in thought. The field of ornithology has had many eminent pioneers, whose studies of bird life have made valuable contributions to agriculture, or to pure science. One such pioneer in ornithology was Thure Kumlien, of Wisconsin.

Thure Ludwig Theodor Kumlien—he signed his name, Thure Kumlien—emigrated to America after graduating from the University of Upsala, Sweden, in 1843. He was a scholarly young man of unusual ability in literature and the languages of Europe. He possessed also a talent in the direction of science, and even in his college days had received recognition as a botanist and ornithologist. He settled in Wisconsin and found opportunity to follow his interest in these fields.

W. M. Wheeler gives us the following additional facts: "Thure Kumlien was born in Herrlunda Parish, Wester-gothland, Sweden, on the 9th of November, 1819. His father was an army quartermaster and owned and operated several large estates. Thure, the oldest of fourteen children, was early entrusted to a private tutor, soon entered the gymnasium at Skara, and subsequently graduated from the University of Upsala in 1843." (Supplement to the Report of the Trustees of the Milwaukee Public Museum, 1888).

Accompanied by his betrothed, Margaretta Christina Wallberg, and her sister, Thure Kumlien emigrated to America in 1843, and, after ten weeks in a sailing vessel, reached America. They went directly to Milwaukee, Wisconsin, where Thure Kumlien and Christina Wallberg were married on September 5, 1843. They then located about seventy miles from Milwaukee near Lake Koshkonong, where Kumlien bought forty acres of virgin forest from the Government, adding another forty a little later.

His first home, a log house, was near the little town of Busseyville, now called Sumner. The big living room was decorated with

*Read at the Twenty-first Meeting of the Wilson Ornithological Club, at St. Louis, December 29, 1935.

beautiful water-color pictures of birds and flowers painted by Kumlien while at the University of Upsala. In 1874 a two-story frame house was built on the home site. The log house, standing in the rear of the new home, was removed in 1908.

Kumlien's son, T. V. Kumlien, says: "The region abounded in game of all kinds common to this section. Even buffalo horns were found by the early settlers. The lake was a favorite resort for water

Thure Ludwig Theodor Kumlien, 1819-1888.

fowl, and these, with the fish and the animals, were new to him [Thure Kumlien]. The grand old forests, as yet untouched by the settlers, were swarming with birds. A great treat was in store for him in the study of the wild flowers which at that time had only been disturbed by the grazing of wild deer. The entomology of this country was an endless source of pleasure to him."

A Swedish Episcopal clergyman, the Rev. Gustav Unonius, who visited the Kumliens in 1845, but two years after the young scientist had undertaken to subdue his piece of wilderness, wrote of him: "It

was quite remarkable to see how he [Thure Kumlein] divided his time between farming and scientific researches. Necessity found [his] hand to the plough and to the hoe, while interest and desire held [his] thoughts on flowers, birds, and insects. A rich herbarium and an ornithological cabinet of no mean importance, but on account of its small capacity, not arranged in order, possibly also bears evidence to a greater field of work as a naturalist than as an agriculturist. It could very well happen that the oxen would be permitted to stand in the furrow a little longer than was necessary for their rest, in case the ploughman's eye accidentally caught a glimpse of some rare insect or of some flower of the field that had not as yet been analyzed. He united with real scientific education also an excellent ability for mounting birds and other animals, and worked in this manner in order to bring himself a small income." (Reminiscences of Gustof Unonius, 1861, in P. V. Lawson's "Life of Thure Kumlein").

Thure Kumlien was no farmer and his family of growing children would not have fared so well had it been dependent solely on the income from the farm. Angie Kumlien Main says that he earned his living by taxidermy and collecting specimens, both of which he did extensively. Many of these specimens are in the State Normal Schools of Wisconsin. His paintings of birds and flowers, most of which were made while he was in the University of Upsala, are in the possession of the family.

In a letter to President Twombly, of the University of Wisconsin, 1870-1874, Thure Kumlien says: "Having gone through the regular course of studies at the schools and gymnasium, I studied four years at Upsala University. In 1842 I made a collecting tour of some of the Islands of the Baltic [Sea] and found many specimens both of plants and birds. Among the latter was a gull that had not been found in Sweden since Linnaeus found it. . . . During the time I have lived in this country (since 1843) I have sent many large collections of birds, insects, etc., to the museums of Leyden, Holland, Prof. H. Schlegal: Berlin, Prof. Peters: Stockholm, Prof. Sundevall: Upsala, Pr. Lilljeborg: and many smaller collections to England and east in the United States: and to the Smithsonian, Philadelphia (Cassin) and to Boston Society of Natural History, of which I have been a member since 1854.

"Of plants I have sent a large collection to Prof. E. Fries, Upsala, among which plants several are by him considered different from those described in our American works. I have consequently had a great

deal of experience in collecting in almost every branch of natural history."

Among the specimens sent by Thure Kumlien to Professor Elias Fries was a purple aster that grew at Busseyville. It proved to be a new species and was named by Fries "*Aster Kumlienii*", in 1860.

Ornithologists in the east were well aware of Kumlien's wide and accurate knowledge of birds, and they sought his aid for the great work, "History of North American Birds", to which he was a generous and valuable contributor. Mrs. Angie Kumlien Main in a letter to the writer, (1932), says: "I have eighty-five letters written by Dr. Brewer to my grandfather, Thure Kumlien, all asking for information for his great work. He collected for weeks at a time for Dr. Brewer. I have hundreds of my grandfather's first copy of letters to such men as Brewer, Baird, Samuels, etc., all just teeming with his knowledge. For weeks he waded in the marshes and rushes of Lake Koshkonong to study the nesting habits of yellow-headed blackbirds. Nothing was too arduous for him when he was imparting knowledge of his beloved birds."

In a letter to Dr. Brewer, Kumlien writes: "I am poor, sir, I have to work hard to support my family and I see money but seldom. I was not brought up to work with make [which makes it] come harder for me; still I can live well here being content with little. I have bought another 40 acres of land and when I get that paid for (nearly 200$) and some more improved I calculate to let out some on shares and hope I would be able to live, with the addition of some work, on half what the field will yield and then I will have time for birds & flowers of which two things I have been passionately fond ever since a child."

In another letter to Dr. Brewer he writes: "I am glad to get fifty cents a piece for yellow-headed blackbird skins, and wish I could sell many at that price. It is easier for me kill and skin a bird than it is to go out and work hard for fifty cents a day for a farmer."

From 1867 to 1870 Kumlien held a professorship in Albion College, located a mile or two from his home, at Albion, Dane County, Wisconsin, where he taught botany and zoology, as well as some of the languages. One of his students shot a strange bird on the campus. On seeing it Kumlien exclaimed: "I have not seen that bird since I was a boy in my native land. It is *Passer domesticus*, or English Sparrow." It was the first appearance of the bird in this part of the state.

In 1870 Kumlien left Albion College, which was in financial distress, to accept an appointment from the State of Wisconsin to collect and arrange plant and animal specimens for the University at Madison and for the Normal Schools. The University collection was destroyed in 1884, when the Science Hall burned. I well remember that fire, and the repeated expression, "If only Irving's geology specimens and the Kumlien collection could be saved!" Nothing was saved. But the collections he placed in the Normal Schools are probably still in existence.

From 1881 to 1883 Thure Kumlien was employed by the Wisconsin Natural History Society. In 1883 he became Taxidermist and Conservator to the Public Museum in Milwaukee, where he remained until his death in 1888. A recent letter from the Milwaukee Public Museum says that the Museum contains about 400 bird skins, about 700 plants and flowers, and more than 200 fossils, donated by Thure Kumlien. Besides these he donated a large number of insects and shells, also the picture of a turtle painted by him.

A modest reserve made it hard for Kumlien to appear in public. His granddaughter says there is but a single article written by him, "The Disappearance of Wisconsin Wild Flowers", which he read before the Wisconsin Academy of Science. The following paragraph is from this paper. "For the last thirty-two years I have resided in the vicinity of Lake Koshkonong, in Jefferson County, Wisconsin, and have during that time paid some attention to the Fauna and Flora of that locality, and have collected somewhat extensively in nearly all the branches of Natural History, particularly Ornithology and Botany. When first I came here in 1843, a young and enthusiastic naturalist, fresh from the university at Upsala, Sweden, the great abundance of wild plants, most of them new to me, made a deep impression on my mind, but during these thirty-two years a large number of our plants have gradually become rare and even some eradicated." (Trans. Wis. Acad. Sci., Vol. 3, 1875, pp. 56-67.)

It is to be regretted that Thure Kumlien's reluctance to write and appear before the public deprived the world of first hand records from his extensive and accurate studies. Perhaps his scholarly attainments made him feel that it would be humilitating to mispronounce or blunder in verbal construction. His notes on eggs, nests, and birds, were largely answers to requests for information by eastern ornithologists, and were used directly by them. His skill in taxidermy was widely recognized. S. F. Baird, on August 30, 1880, wrote to Thure Kumlien as follows: "Would you consider twenty dollars suffi-

cient compensation for your swan? I shall be very glad to have it as an important addition to the Museum of the Smithsonian Institute." The offer was accepted.

Kumlien made a deep impress on his students, among whom his son, Ludwig, and Edward Lee Greene rank among the foremost. Ludwig followed in the footsteps of his father. Edward Lee Greene became professor of botany in the University of California. From 1895 to 1904 he was professor of botany in the Catholic University of America, Washington, D. C., and later became associate in botany at the Smithsonian Institution. A warm and life-long friendship developed between Thure Kumlien and Edward Lee Greene from the time they first met. A correspondence, which continued for twenty-six years, began when Greene went to the Civil War in 1862. A part of one letter from Greene to Kumlien, dated in 1862, at Ft. Henry, Tennessee, says: "I hope I will be in Albion next spring in time to gather *Arethusa* and *Pogonia* with you from that blessed little tamarack marsh." (Trans. Wis. Acad. Sci., Vol. 24. p. 151.) It was in this marsh that Thure Kumlien discovered a bed of *Linnaea borealis*, so named by Gronovius when Linnaeus found this small, trailing evergreen herb in Lapland in 1732. It is the only species in this genus.

Mrs. Angelia Kumlien Main records the following incident. "In a letter from Berkeley, California, dated January 9, 1885, Mr. Greene, who was then Professor of Botany at the University of California, wrote his old friend Mr. Kumlien that he had just named in his honor *Kumlienia hystricula*. In . . . describing this flower . . . Professor Greene says: 'I gladly dedicate this very characteristic plant of our Sierras to Prof. Thure Ludwig Kumlien, A. M., formerly Professor of Natural History at Albion, Wisconsin, a learned and zealous naturalist, and my first instructor in the science of botany. . . .'" (Life and Letters of Edward Lee Greene. Trans. Wis. Acad. Sci., Vol. 24, pp. 147-185.)

Professor Greene presents an interesting characterization of Kumlien in the following words: "Mr. Kumlien had been, while at Upsala, a very special favorite among the botanical pupils of Professor Elias Fries. How thoroughly worthy the youth must have been of the particular attention of the great Swedish botanist of the nineteenth century was still manifest in Mr. Kumlien when I first made his acquaintance, some sixteen or eighteen years after his arrival in this country. He was then a sort of a second and American edition of Fries. . . . He had, in 1860. . . . so well mastered the extensive and varied flora of southern Wisconsin, that there was no indigenous tree

or shrub, flower, grass, or sedge, or moss or hepatic, lichen or mushroom, the scientific name of which was not at his tongue's end. . . . I am confident that no state in our Union has ever had so complete a master of its whole flora, as Wisconsin had in this extraordinary man . . . whom, with his low stature, muscular frame, rather stooping shoulders, light hair and keen blue eyes, a stranger might have mistaken as he passed along the country roads, for an ordinary farmer from the Scandinavian settlement, who in the most polished society would have been recognized as an intelligent, refined, and almost courtly gentleman . . . whose tongue could address a foreigner in . . . any one of the languages of Europe spoken between Spain and Sweden.

". . . from boyhood his specialty appears to have been ornithology. It was to the birds . . . that he gave most of his time. Even the fame, which he would not seek, but which was thrust on him at last, was that of an ornithologist. Lake [Koshkonong] is eight or nine miles long and three in breadth. . . . The still and shallow waters, bordered with green fields of reed and wild rice, were twice in each year the resort of great flocks of wild geese, pelicans and swans . . . and the wooded hills and open meadows were . . . the home of . . . spring and summer song-birds, of grouse and pheasant. The building site which Mr. Kumlien chose . . . and where he dwelt to the end of his life . . .[lay] back from Lake Koshkonong, on a pleasant elevation. Oak woods enclosed the place northward and westward: to the eastward lay a stretch of open undulating arable land, suitable for farming purposes. The pristine quiet and seclusion of the place was always retained. . . . One reached the place by either of two by-roads, closed by gates. . . . A little tract of tamarack marsh . . . occupied a deep abrupt depression among the heavier forest some two miles distant northward from the dwelling. . . . Here bloomed many rare flowers, [among them] *Arethusa bulbosa*. This was always in Mr. Kumlien's opinion the very loveliest of all North American wild flowers." (Pittonia, Vol. I, 1887-1888, pp. 250-260.)

Aside from his contact with scientists Thure Kumlien was not a well known man in Wisconsin. He had been in America more than twenty-five years when W. D. Hoard, later governor of Wisconsin, read in the Chicago *Tribune* that Louis Agassiz of Boston, considered Thure Kumlien of Busseyville, Wisconsin, the greatest authority in the world on bird nests. Hoard, who lived in the same county, had never heard of him, but set out at once to see so unusual a man, and found him plowing his field with a yoke of oxen. Through personal contact the quality and scholarly attainments of Thure Kumlien were

readily recognized. But his modesty held him in reserve, he had to be sought out. Kumlien's house and surroundings, while an ideal laboratory for a naturalist, did at the same time isolate him. He was not on the highway, nor could the house be seen from the road. Large museums, where his life would have had an immediate and natural outlet, were far removed from the middle west. He became an associate member of the American Ornithologists' Union in 1883, the year of its founding. He could not attend the meetings, and his diffidence prevented him from writing for publication. Wisconsin was a pioneer state with the usual hardships. His home was one of joy and peace. He was deeply concerned for the welfare of his family, but was never distressed. The great naturalist, trying to make a living by farming, of which he knew little or nothing, for his family of five growing children, was not annoyed by fretful complaints or distracting worries. Pioneer hardships were met and mastered in that wholesome family. The death of his rare and understanding wife in 1874 left him deeply saddened but wholly composed. Christina Kumlien and her sister Sophia Wallberg, who lived to the age of ninety years, were beloved by all who knew them. As a teacher in Albion College and in all personal contacts Kumlien's knowledge of birds and flowers, insects and mammals, was generously and effectively imparted. He gave directly, always his best, to all who came to learn from him. The name and memory of Thure Kumlien may fade when those whose lives he quickened and encouraged have gone. Thure Kumlien, the eminent scholar, thorough scientist, and rare character, was a great man, and his spirit has enriched the world.

While preparing and mounting bird skins in the Milwaukee Public Museum Thure Kumlien became suddenly ill, due to breathing the poison used in curing the skins. He was immediately taken to the Milwaukee Hospital, where he was attended by the great Doctor Nicholas Senn. He died that day, August 5, 1888, and was buried on August 7 in the home cemetery near Lake Koshkonong.

His life may be summed up in the following quotations from his biographers: "He was a man of most refined tastes, without any of the extravagant desires which such tastes often engender. He was satisfied to live most simply a life which philosophers might envy." (W. M. Wheeler, in the "Necrology", Supplement to the Report of the Trustees of the Milwaukee Public Museum, 1888.) "A purer, nobler type of the naturalist of the reserved and non-advertising class, there was not in his day, in America, than Thure Ludwig Theodor Kumlien." (Pittonia, Vol. I, pp. 250-260.)

Berkeley, Calif.

NOTES ON THE FIELD SPARROW IN MICHIGAN

BY LAWRENCE H. WALKINSHAW

Side-hills, covered with black-berry bushes, young trees or shrubs, grass grown meadows, pastures and weed-grown fence-rows are the habitat of the Field Sparrow (*Spizella pusilla pusilla*) in Michigan. It has been reported from as far north as Mackinac Island, breeding (4). Barrows mentions no other reliable record north of the Lower Peninsula in Michigan (1). I have never observed the species in the Upper Peninsula but have found it, yet in fewer numbers than both *Spizella pallida* and *Spizella passerina passerina*, in the region of Crawford and Oscoda Counties in the northern part of the Lower Peninsula. In the southern part of the state it is a common bird during the summer months and its plaintive song can be heard from its time of arrival in late March or early April, during daylight hours, until the latter part of August when nesting activities cease.

At Battle Creek migrations have been checked for several years. The species becomes fairly common during the first half of April when the males can be heard singing from their favorite perches. During October, the Field Sparrow is found in small flocks rather than singly, as in the spring, and these feed in certain favorite areas until they depart. Following is a list of migrations:

Year	First spring arrival	Common	Last of fall
1919	March 22	.....	.....
1920	March 27	.....	.....
1921	March 26	.....	.....
1922	March 27	.....	.....
1924	April 15	.....	.....
1926	April 7	.....	.....
1927	April 9	.....	.....
1929	March 30	April 6	October 13
1930	April 6	April 6	October 12
1931	April 7	April 11	October 25
1932	March 30	April 3	October 16
1933	April 6	April 15	October 22
1934	April 6	April 8	October 27
1935	March 23	April 9	.....

The earliest date of nesting which I have for the Field Sparrow is for a nest found on May 2, 1931, which contained three eggs. The latest nest is one found August 10, 1923, with four eggs from which the young left August 29. In a group of seventy nests observed, nine were found between May 1 and 15: seven during the last half of May: fifteen for the first half of June; nine for the last half: sixteen for the first half of July: five for the last half: and nine for the first half of August.

The nests of the Field Sparrow observed ranged from 5 to 120 cm. above the ground. None of the nests observed, even those placed in grass, clover, or sorrel, were resting on the ground. The majority of the nests were from 15 to 30 cm. up and were usually placed in a small bush or shrub. Sometimes a nest was found along some fence-row or road-side in a small tree some distance from the ground. A favorite spot for nesting is on the dry side-hills covered sparingly with blackberry bushes. In a compact group of these bushes, one can easily locate a flimsy nest of the species, often after the nesting season

Fig. 17. Portrait of a Field Sparrow. July 18, 1935.

has passed. Young oak trees, hazel-nut bushes, cinque foil (*Potentilla*), in fact any type of dense, short vegetation in any open field or on a dry side-hill might be a nesting site of the Field Sparrow.

These nests are made usually of very dry grass stems, roots, and weed stalks, the materials becoming finer as the inside is neared. The lining often contains horsehair, or some other hair, intermixed with very fine grasses. The whole mass varies in width on the exterior from 80 to 100 mm. The inside dimensions vary in the neighborhood of 60x60 mm. in width. Five nests measured 60x62mm., 60x55 mm., 50x50 mm., 62x48 mm., and 60x60 mm. These same nests had a depth of 40, 42, 44, 40, and 38 mm. respectively. The nest is very seldom anchored securely, with the result that many are tipped over during

heavy storms, especially, after the young are a few days old. Usually the nesting materials are merely placed in a natural crotch of one or several branches or stalks. The Field Sparrow does not weave, in or on these in any way, the materials which they bring to the nest.

The eggs have been described (3) as "pale greenish-blue, bluish-white or white, speckled, spotted and penciled with shades of brown, chiefly at the larger end; may be occasionally thickly marked all over, obscuring the ground color." There is a similarity in the color of markings of eggs of the same set but often there is a remarkable difference in color in different sets. The number of eggs varies from two to five. I have three records of complete sets of two eggs (Nos. 6, 9, and 16); eighteen records of sets of three; twenty-one sets of four; and three sets of five.

The measurements of fourteen eggs were 20x13.5, 18.5x13.5, 18.5x13, 18.5x13, 17.5x13, 18.8x14, 17.5x14, 18x13, 18x13, 17x13, 18x13, 17.5x14, 18x13, and 17.5x14 mm., averaging 17.95x13.35 mm. The average weight of eighteen eggs was 1.6 grams. There were, one set of three, averaging 1.76 grams; one set of three averaging 1.33 grams; one set of four, averaging 1.55 grams; one set of four, averaging 1.57 grams; and another set of four, averaging 1.75 grams.

Following is a list of seventy nests which I have observed in Michigan:

No.	Date found	Contents	Location	Outcome	Complete set of eggs
1.	June 14, 1919	5 young	Calhoun Co.	Left nest June 18	5
2.	June 21, 1919	4 eggs	Calhoun Co.	Left nest about July 10	4
3.	May 11, 1920	4 eggs	Calhoun Co.	2 young left May 28	4
4.	May 23, 1920	1 egg	Calhoun Co.	Destroyed	x
5.	June 5, 1920	1 egg	Calhoun Co.	Destroyed	x
6.	June 6, 1920	2 eggs	Calhoun Co.	Destroyed	2
7.	June 6, 1920	4 young	Calhoun Co.	4 young left June 10	4
8.	July 25, 1920	3 eggs	Calhoun Co.	Destroyed	3
9.	Aug. 8, 1920	2 eggs	Calhoun Co.	2 young left Aug. 21	2
10.	Aug. 8, 1920	3 young	Calhoun Co.	3 young left Aug. 14	3
11.	June 1, 1921	4 young	Calhoun Co.	4 young left June 1	4
12.	June 4, 1921	1 young	Calhoun Co.	1 young left June 4	x
13.	July 5, 1921	1 young	Calhoun Co.	1 young left July 5	x
14.	Aug. 12, 1921	2 young	Calhoun Co.	2 young left Aug. 12	x
15.	May 4, 1922	0 eggs	Calhoun Co.	Destroyed	0
16.	May 12, 1922	2 eggs	Calhoun Co.	Destroyed	2
17.	May 17, 1922	1 egg	Calhoun Co.	Destroyed	x
18.	May 18, 1922	2 eggs	Calhoun Co.	Destroyed	x
19.	May 21, 1922	4 eggs	Calhoun Co.	4 young left June 5	4
20.	May 21, 1922	3 eggs	Calhoun Co.	Destroyed	3
21.	Aug. 6, 1922	2 eggs	Calhoun Co.	3 young left Aug. 24	3
22.	June 3, 1923	2 eggs	Calhoun Co.	Unknown	x
23.	June 17, 1923	4 eggs	Calhoun Co.	4 young left June 29	4
24.	July 3, 1923	1 egg	Calhoun Co.	Destroyed	x
25.	July 9, 1923	4 eggs	Calhoun Co.	Destroyed	4

No.	Date found	Contents	Location	Outcome	Complete set of eggs
26.	Aug. 10, 1923	4 eggs	Calhoun Co.	4 young left Aug. 29	4
27.	July 19, 1924	0 eggs	Calhoun Co.	Destroyed	x
28.	July 24, 1924	3 young	Calhoun Co.	3 young left July 31	3
29.	Aug. 10, 1924	3 eggs	Calhoun Co.	Destroyed	3
30.	May 10, 1925	3 eggs	Calhoun Co.	Destroyed	3
31.	June 8, 1927	4 eggs	Calhoun Co.	Destroyed	4
32.	May 13, 1928	4 eggs	Ann Arbor, Washtenaw Co.	Destroyed	4
33.	Aug. 5, 1928	4 eggs	Calhoun Co.	Destroyed	4
34.	Aug. 12, 1928	1 egg	Calhoun Co.	Destroyed	x
35.	June 2, 1929	4 eggs	Washtenaw Co.	Unknown	4
36.	July 13, 1929	3 eggs	Calhoun Co.	Destroyed	3
37.	June 9, 1930	Empty	Calhoun Co.	Destroyed	x
38.	June 14, 1930	3 eggs 1 Cowbirds	Calhoun Co.	Unknown	x
39.	June 21, 1930	3 eggs	Calhoun Co.	Unknown	3
40.	June 22, 1930	4 young	Calhoun Co.	4 young left June 28	4
41.	June 22, 1930	4 young	Calhoun Co.	4 young left June 29	4
42.	June 29, 1930	x young	Calhoun Co.	Unknown	x
43.	July 4, 1930	3 eggs	Ann Arbor, Washtenaw Co.	Unknown	3
44.	July 4, 1930	3 eggs	Wayne Co.	Unknown	3
45.	July 6, 1930	x eggs	Milford, Livingston Co.	Unknown	x
46.	July 10, 1930	2 eggs	Calhoun Co.	Unknown	x
47.	May 2, 1931	3 eggs	Calhoun Co.	Unknown	3
48.	May 13, 1931	4 eggs	Calhoun Co.	Unknown	4
49.	May 15, 1931	5 eggs	Barry Co.	Unknown	5
50.	June 7, 1931	1 young	Barry Co.	1 young left June 8	x
51.	May 22, 1932	4 eggs	Barry Co.	Unknown	4
52.	June 8, 1932	3 eggs	Calhoun Co.	Unknown	3
53.	June 10, 1932	3 young	Calhoun Co.	Unknown	3
54.	July 14, 1932	4 young	Calhoun Co.	Unknown	4
55.	May 14, 1933	5 eggs	Barry Co.	Unknown	5
56.	June 4, 1933	4 young	Calhoun Co.	Unknown	4
57.	June 21, 1933	1 egg	Calhoun Co.	Unknown	x
58.	Aug. 6, 1933	3 young	Barry Co.	Unknown	3
59.	June 25, 1934	1 young 2 eggs	Calhoun Co.	Unknown	3
60.	May 18, 1935	1 egg 3 Cowbirds	Kalamazoo Co.	Unknown	x
61.	June 25, 1935	1 egg 2 Cowbirds	Calhoun Co.	Deserted	x
62.	July 2, 1935	3 eggs	Calhoun Co.	3 young left July 19	3
63.	July 7, 1935	Construct'n	Calhoun Co.	Storm tipped nestover	4
64.	July 11, 1935	1 Cowbird egg	Calhoun Co.	Deserted	x
65.	Juy 11, 1935	Empty	Calhoun Co.	Unknown	x
66.	July 11, 1935	Empty	Calhoun Co.	Unknown	x
67.	July 11, 1935	2 eggs	Calhoun Co.	2 young left July 29	3
68.	July 12, 1935	1 egg 2 Cowbirds	Calhoun Co.	Destroyed	x
69.	July 22, 1935	4 eggs	Calhoun Co.	Destroyed	4
70.	July 24, 1935	4 eggs	Calhoun Co.	Destroyed	4

Of the seventy nests, forty-six were followed until destroyed, deserted, or until after the young had left the nest. The forty-six nests contained 119 eggs or young for an average of 2.5 per nest. Twenty of these brought off sixty young from sixty-three or more eggs. There were three nests of one young; four of two: four of three; eight of four; and one of five. The Field Sparrow has much better luck than its close relative, the Chipping Sparrow, in this part of Michigan.

Nest No. 6. This nest was only 5 cm. from the ground. It was built in tall grasses in heavy shade of three large black-walnut trees almost in the farm-yard.

Nests Nos. 37, 40, 41, 44, and 59 were in black raspberry bushes.

Nests Nos. 49, 61, 63, 64, 65, 66, and 67 were in black-berry bushes.

Nest No. 62. July 2, 1935, at 7 A. M., three eggs, averaging 1.76 grams per egg in weight. Nest in mass of bushy cinque foil (*Potentilla fruticosa* L.) Nest 15.5 cm. from ground. July 11, 7 A. M. and 6:30 P. M., three eggs; July 12, 6:30 A. M., one egg and two newly hatched young.

Weights of Young (Grams)

	July 12 6:30 A.M.	July 14 8:00 A.M.	July 15 8:30 A.M.	July 17 7:30 A.M.	July 18 7:30 A.M.
No. 1	1.85	4.5	8.3	9.8	10.3
No. 2	1.85	4.5	7.9	9.0	9.8
No. 3	XXX	3.1	6.4	7.2	9.3

July 18 young showed fear when handled. Feathers showed several mm. beyond quills, in oldest two. July 19, 6:30 A. M., entered blind which had been erected at nest. Adults fed young several times while I photographed them. Left blind at 8 A. M. Young, two largest, two wing bars, breast was creamy color; maxilla, bluish; mandible, lighter; tomia, yellow near base, grayed at tip.

The incubation period at this nest was at least eleven days; two young remained in the nest seven days and the younger six. The young hatched over a period of twenty-four hours indicating that incubation commenced one day before the last egg was laid.

Nest No. 63. July 7, 1935, nest about two-thirds completed. July 8, one egg; July 11, noon, four eggs; July 21, three young just hatched, other egg found outside of nest.

Weights of Young (Grams)

	July 21 11 A.M.	July 22 6:30 A.M.	July 23 6:30 A.M.	July 24 6:30 A.M.	July 25 A.M.
No. 1	1.55	2.6	4.3	5.55	7.4
No. 2	1.6	2.6	3.8	5.0	6+
No. 3	2.0	Gone	XXX	XXX	XXX

When the nest was visited on July 25 it had been tipped over by a severe rain of the night before and both young were on the ground dead. One had been eaten somewhat by ants.

The nest was built in a large black-berry patch. It was 31 cm. from the ground to the rim. The eggs averaged 1.33 grams each on July 11.

The incubation period was ten days. The young were nearly four days old when killed. Only one parent was observed to feed the young.

Nest No. 67. Found July 11, 1935, two eggs. July 13, 6:30 A. M., four eggs; July 21, 6:30 A. M., four eggs; July 22, 6:30 A. M., one young, three eggs; July 23, 6:30 A. M., three young and one infertile egg.

WEIGHTS OF YOUNG (Grams)

	July 22 6:30 A.M.	July 23 6:30 A.M.	July 24 6:30 A.M.	July 25 2:00 P.M.	July 26 8:00 P.M.	July 28 10:00 A.M.
No. 1	1.9	2.55	3.3	5.8	9.4	10.9
No. 2	xx	2.55	2.9	5.4	Gone	xxx
No. 3	xx	1.1	2.6	4.6	7.3	9.4

The young left the nest July 29 in A. M., when six and seven days old: the incubation period was ten days. The nest was in black-berry bushes on a steep side-hill. It contained much horsehair in the lining, and was 290 mm. from the ground to the rim.

Nest No. 68. This was the only nest of the Field Sparrow found, containing Cowbird eggs, which was not deserted, but on July 15 at 7 A. M. when it was visited it had been torn from its bush and was scattered about the vicinity.

Nest No. 69. July 22, 1935, 6:30 A. M. and 8 P. M., four eggs; July 23, 7 A. M., two young and two eggs; July 24, 7 A. M., four young; July 31, about 4:30 A. M., cat tipped nest over. How many young were caught is not known.

WEIGHTS OF YOUNG (Grams)

	July 23 7:00 A.M.	July 24 7:00 A.M.	July 25 2:00 P.M.	July 26 8:00 P.M.	July 28 10:00 A.M.	July 30 6:30 A.M.
No. 1	1.9	3.5	5.0	8.6	9.7	10.7
No. 2	2.0	3.5	4.5	7.8	9.4	10.4
No. 3	xx	2.8	4.3	7.8	8.9	9.6
No. 4	xx	1.85	3.3	5.7	8.1	9.4

The average weights of the eggs on July 22 was 1.76 grams. Incubation period not known: nestling period seven and eight days. This nest was located in a red raspberry patch in the garden on my father's farm. It was 71 cm. from the ground to the rim of the nest.

Nest No. 70. This nest was located along the roadside in a small oak and was 120 cm. from the ground. Egg weights, averaged 1.75

grams. The nest contained a great deal of horsehair for lining. The outside dimensions were 95x95 mm.: the inside 60x60 mm.

Often the birds are parasitized by the Cowbird (*Molothrus ater ater*). Some of these nests were not recorded but during 1935 in twelve nests, four contained six Cowbird eggs and only three Field Sparrow eggs. These nests were all deserted, except one.

Blinds were erected at nests 62, 63, and 69. In no case could I be sure that the male helped in feeding the young, the female apparently doing all or nearly all of the home duties while the male sang from some nearby perch. When an intruder approached the nest he, however, came immediately to the nest and scolded as much as she. The young were fed eleven times in nest 63, during a period of two hours, from 9-11 A. M. The food at all three nests was mostly insects. The excreta were swallowed by the female after feeding. Only one of these was eaten at a time. Egg-shells and dead young were removed from the nest and it was usually very tidy even when the young were ready to leave.

The lightest fledgling was a bird of 1.1 grams. Most of them hatched during the night and the following morning weights ranged between 1.55 and 2.0 grams. The young, when they were ready to leave the nest, weighed about 10.5 and 11 grams. Adults weigh only one or two grams more than this (2).

The male Field Sparrow is a very persistent singer. His song has been heard during all of the daylight hours from late March until the first of September and even during autumn migrations in the latter part of October I have heard the song uttered in a half-hearted manner from some member of a feeding flock. During the hot days of late July and August, when nearly all bird voices become quieted during the middle of the day one can feel sure that if he drives to a brush covered field he will hear the song of the Field Sparrow.

Two common songs were observed, "*see-a—see-a—see-a—see-see-see*" and "*see-e—see-e—see-e-see-see-see*". These songs vary, but the songs of one male always seem to be the same monotonous yet attractive notes, over and over all day long. The time of the song is about two seconds by the stop-watch. The usual rate of singing was about four or five times per minute, even during the middle of the day.

The regular alarm note is a rapid chipping, uttered by both parents, while another call, a note of contentment, is a low "*See-see-see-see*". Another call, when the young were in danger, uttered by the parent was "*Che-che-che*", the young freezing immediately. The young called a low "*chip*" when calling for food, after leaving the nest.

SUMMARY

The Field Sparrow arrives from March 22 to April 15 in the region of Battle Creek and leaves for the south between October 12 and 27. The nesting season extends from May 1 until the last week in August, probably two or more broods being reared in a year. Three and four are the average number of eggs. These average about 1.6 grams in weight. The young weigh about 1.1 grams or a little more when hatching and when ready to leave the nest weight about 10.5 grams. The female does the feeding according to my observations. The young remain in the nest six to eight days.

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BATTLE CREEK, MICH.

RESTORATION OF ROADSIDE COVER BY THE C.C.C.

BY WILLIAM JOHNSTON HOWARD

Much of the roadside beauty of the Illinois prairies has yielded to agriculture and commerce. The bushy hedge row with its diversity of plants and seasonal color changes has been replaced by the prosaic wire fence: highway cuts have hastened erosion and many of the trees have made way for the hot dog stand and the oil station. These newer uses of the roadside have been accompanied by less obvious changes. Grasses which become highly inflammable in dry seasons have supplanted the hedge row. The only recreation the road now affords is down the concrete slab, and wildlife, once a natural part of the fence row, has disappeared. The roadside has become, in many instances, drab and dreary. For the most part it is uninteresting.

East of St. Charles, Illinois, the State Highway Department has acquired rights of way two hundred feet deep and fourteen miles long, upon which was built U. S. Highway 64. A World War veterans company of the Civilian Conservation Corps, under the direction of the U. S. National Park Service, is engaged upon a program of highway beautification and roadside utilization on this strip. Power line poles, bill boards, fences, and structures are being removed. Grading, erosion control, elimination of blind intersections, construction of wayside trails and small bridges, and an extensive planting program are being undertaken by the C.C.C. in an effort to restore the former

FIG. 18. Showing artificial changes in road margins. Top, example of original roadside condition; middle, showing the C.C.C. crew sloping the bank preparatory to planting; lower, a finished piece of roadside, after it has been graded and planted.

beauty, give the roadside some recreational values such as hiking and horseback riding, and eliminate the sordid appearance which so often characterizes highways near cities.

While this project was essentially designed to improve the scenery along the thoroughfare, the planting program gives it significance as a cover restoration measure. Upon two fourteen-mile strips of prairie, which have been denuded of song bird and small mammal cover, native vines, shrubs, and trees are being replaced. Many species of native plants having known value as food and cover are being used in an informal planting scheme. In time, the result will be a double row of thicket and woodland, with occasional short breaks for vistas and road intersections.

Due regard is being given to ecological associations and as much diversity as is consistent with natural groupings is being observed in the plantings. Willows, red osier dogwoods, and other moisture loving plants will again grow on the banks of the few streams crossing the highway. On the drier upland soils the plant material will be as carefully selected. Groves of shade trees will be flanked by shrubby growth when such conditions would be found naturally. Occasionally there will be dense tangles of vines. The finished job will have little formality about it, except at road intersections where low growing shrubs will be used, as trees would tend to create conditions dangerous to the automobile driver. It will not be possible to make more than a skeletal planting, but as time goes on natural reproduction will fill the voids and other plants desirable to some of the small forms of wildlife, will undoubtedly find their way into the scheme.

It is known that an acre of fence row supports a heavier population of certain birds and small mammals than do many acres of solid cover. What the effect of this project will be on song birds we can only conjecture, but it seems plausible to assume that this, as well as a number of similar projects directed by the National Park Service, will do much towards increasing bird life in the immediate vicinity. It is hoped that the project, in addition to its objective of pioneer highway beautification, will serve as a demonstration and as an example for restoring roadside cover.

U. S. National Park Service.
Indianapolis, Indiana.

SOME OBSERVATIONS ON THE RUFFED GROUSE IN WISCONSIN

BY WALLACE GRANGE

While I was living on the family homestead in the cut-over, forested region twelve miles northwest of Ladysmith, in Rusk County, Wisconsin, I had an unusual opportunity to observe the Ruffed Grouse (*Bonasa umbellus togata*, Linnaeus). The species was almost a door-yard bird with us. Grouse could frequently be seen budding in the trees about the buildings.

THE GROUSE POPULATION. For my own satisfaction rather than from any effort to accomplish a piece of research, I kept a written record of all species seen each day, with either an actual count or an estimate of the number of individuals of each. A compilation of these records for the Ruffed Grouse is of interest, in connection with the numerical fluctuation of the grouse population now known as the cycle.

The table summarizes the compiled records. The chart shows the last four (lettered) columns of the table in graphic form. Curves A, B, and C all indicate a population peak about 1922 and a low about 1927, which corroborates the generalized Wisconsin Ruffed Grouse curve compiled by Leopold from reports of game observers (see Game Survey of the North Central States, p. 144). The parallelism with Leopold's curve is even closer when allowance is made for the interpretive comments to be made later.

TABLE 1. Indicators of Ruffed Grouse Abundance near Ladysmith, Wisconsin, Northern Thornapple and Southern Hubbard Townships, 1919-1930.

Year	No. days on which grouse were seen	A Number grouse seen	B Av. No. grouse seen per day	C Most grouse seen in one month	D Highest daily average in one month
1920	150	687	4.5	106 (Nov.) (13 days)	9.3 (Dec.) (11 days)
1921	141	812	5.7	120 (Apr.) (20 days)	27.5 (Nov.) (2 days)
1922	120	1050	8.7	240 (Apr.) (17 days)	14.1 (Apr.) (17 days)
1923	51	384	7.5	70 (Apr.) (10 days)	25.0 (July) (1 day)
1924	21	120	5.7	47 (Apr.) (3 days)	15.6 (Apr.) (3 days)
1925	6	28	4.7	28 (Dec.) (6 days)	4.8 (Dec.) (6 days)
1926	17	54	3.2	24 (Feb.) (5 days)	4.9 (Feb.) (5 days)
1928	1	3	3.0	3 (Oct.) (1 day)	3.0 (Oct.) (1 day)

The figures in the table should be considered as qualified by the following notes:

1920-24. The daily averages (B) do not reflect the actual abundance, since grouse were often seen in and from the yard, and such figures are averaged along with others on which ten or more miles were covered on foot through good country. If the averages pertained only to days of active field work, I believe the daily average would be above ten.

1925-26. The daily averages do not accurately reflect the *scarcity of grouse at* that time. I traveled 600 miles by team and by foot (all within the limited area under discussion), yet I recorded grouse only 82 times. The days on which no grouse were seen are *not* averaged with the others. Had this been possible, I believe the daily average would be less than one grouse.

1919. No written records. Drummers numerous, as many as six heard from one point by my father, in May. Several large broods seen in summer.

1920. Written records for entire year.

1921. Written records for every month except August.

1922. Written records for entire year. This season represents my most consistent field work for the period.

1923. Written records for every month except December. Field work much reduced.

1924. Written records to July 1. No field work last half of year, and field work first half reduced. Grouse were reported abundant that fall. Bags of five taken in a few hours in the open season.

1925. No field work except for December.

1926. Written records up to March 15. No field work during remainder of year.

1927. No written records. Field work confined to a few days in December. My father, and all other residents with whom I talked, reported grouse extremely scarce, or virtually extinct.

1928. Field work confined to one day in October. I covered twenty-four miles of good clover-sodded forest roads and saw three birds, two of which were drumming. Inquiry indicated that there were a few more grouse this year than last, but still scarce. (It is also of interest that in covering several thousand miles of Wisconsin roads off this area, by auto, during the summer and fall, I noted less than a dozen grouse. In 1922, I should have seen as many in two miles of good road).

1929. Field work confined to two mornings a few miles east of the original territory. At that time (September), I had little difficulty in collecting four grouse. Residents reported grouse very definitely increasing.

1930. No field work in the vicinity. It was common knowledge among residents that grouse were again fairly numerous, and apparently increasing rapidly.

I should summarize the above chart by saying that Ruffed Grouse were numerous and probably increasing in 1919; that they were abundant in 1920, 1921, 1922, and 1923; that they were possibly less numerous in 1924, and very positively were scarce in late 1925 and early 1926; that they were extremely scarce, almost to local extinction, in 1927; that they were increasing in 1928, 1929, and 1930 and by the fall of the last year had made substantial recovery.

As to the numerical abundance of grouse, I am able to make a fairly satisfactory estimate for our particular quarter section (160 acres). This tract was almost ideal grouse range. It contained a considerable acreage of 20-30-year-old aspen, birch, and balsam: an-

other higher woods of sugar maple, birch, ironwood, basswood, and balsam, with large elms along a wet weather "run"; a fine little black spruce swamp much used by grouse in winter; a typical hardwood "burn", grown up to raspberry and hazel, with the old birch, maple, and balsam stubs still standing; a long, irregular marsh with many arms extending into the woods and fringed by black alder thickets. The balance of the tract was cut-over pasture, cultivated crops, and open grass marsh.

There were approximately 100 acres of occupied grouse range in 1922, the year in which I did the most intensive field work. This is not necessarily the year of maximum abundance of grouse. In fact, I cannot say which of the four years, 1920 to 1923 inclusive, or possibly 1924, was the point of maximum abundance, but only that there were many grouse in each one of these years. I can mentally account for forty-five "grouse spots" where I could be fairly certain of finding birds in the spring and summer season, and I believe that in 1922 there were forty-five grouse in the 100 acres just prior to nesting. This is a density of 2.2 acres per grouse.

In winter I think there were, at times, in excess of fifty birds in the 100 acres. I think there was an influx of outside birds coming in to the hardwood for budding and to the spruce swamp for roosting.

I have made no attempt to estimate the fall grouse population, because at this season grouse roam, combine in groups, and shift position locally. In the spring the grouse are sedentary, drummers and hens alike being almost anchored to their breeding territories. But the fall population did not ever reach the total that one might have expected on the basis of the spring population.

It is my opinion that in the spring of 1927 there were not more than five grouse on the quarter-section, although this estimate is arrived at with less assurance than the figure of forty-five for the spring of 1922. To what extent, if any, local fires in the preceding years may account for this drop, I am uncertain. At the time I thought fires had some part in the reduction, but I now believe that they were a minor factor.

Number of Predators and Rodents. It is sometimes stated that predators, deprived of their normal rodent food supply, turn to game. Grouse scarcity in the past has even been mentioned as *an effect* of rodent scarcity. Also, in the discussions of population cycles, it is often considered that rabbits die first, that is, before Ruffed Grouse.

However, at Ladysmith, I noticed a very marked and very general scarcity of Ruffed Grouse in the winter of 1925-1926, but during

the same period I had no difficulty in trapping Snowshoe Hares (*Lepus americanus phaeonotus*) for study purposes, and I was amazed at the prodigious numbers of Red-backed Voles (*Evotomys gapperi* subsp.) in the spruce swamp, trapping dozens of them, several in a night. Deer mice (*Peromyscus* sp.) were also common in the woods, and Cottontail Rabbits (*Sylvilagus floridanus mearnsi*) and Meadow Mice (*Microtus p. pennsylvanicus*) were present in numbers. In short, grouse but not rodents had become scarce during the winter of 1925-

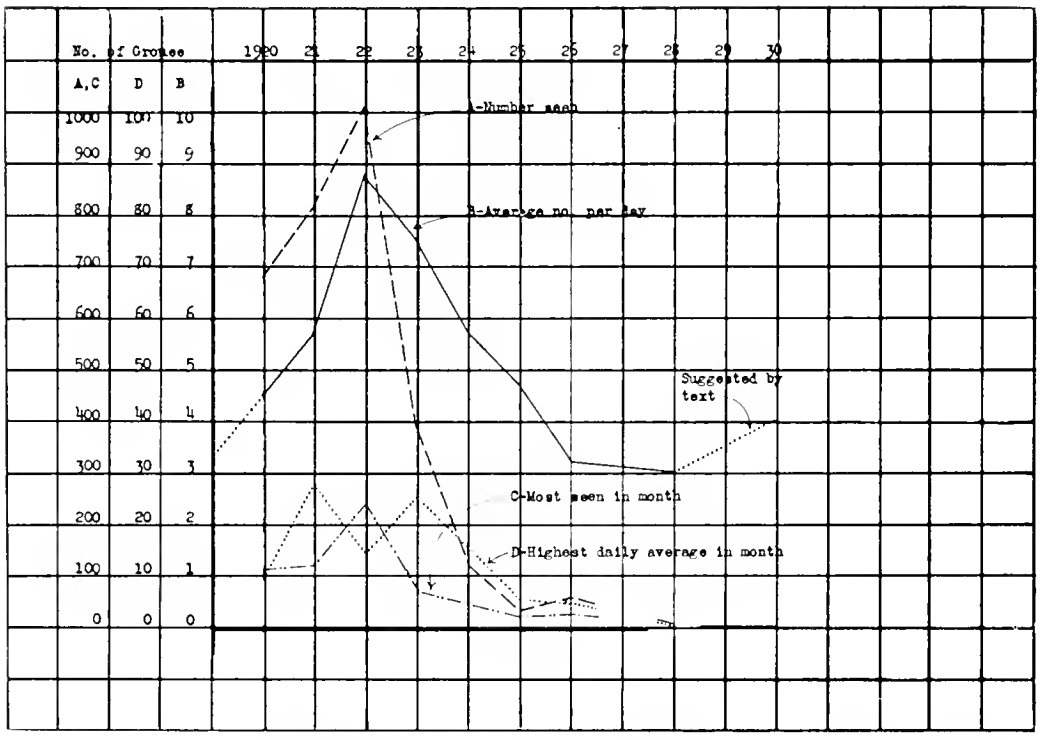

FIG. 19. Graph of Ruffed Grouse population levels near Ladysmith, Wisconsin, 1919-1930. See columns A, B, C, D of Table 1.

1926. In fact, under date of December 20, 1925, I recorded that Snowshoe Hares were "just as numerous . . . as I ever knew anywhere".

I believe that Snowshoe Hares were the most abundant on our land in 1919 and 1920, at which time we often hunted them successfully during the lunch hour. They were abundant, however, during the entire period recorded in the table. When I returned for a short visit in December, 1927, there were many runways in the spruce swamp, and I saw several of the animals. Even though a general scarcity of Snowshoe Hares was thought to exist at that time, high school boys at Ladysmith trapped several hares for me in 1927 and 1928, which is further evidence that hares were still present in some numbers. But, relatively reduced or not, they were much more abundant than the Ruffed Grouse, so the theory that predators turn to grouse through

necessity would certainly not apply to the Ladysmith region during the period here under discussion.

I did not see any evidence of abnormal predation on grouse. The predators in the locality included coyotes, skunks, and house cats (fairly numerous); timber wolves, bobcats (rare); weasels and mink (in varying numbers); Cooper's Hawks (common); Red-tailed and Red-Shouldered Hawks (fairly numerous); Goshawks and Snowy Owls very rare). One Goshawk was seen on January 12, and one each on February 13 and 14, 1926. Cooper's Hawk kills of young grouse were quite commonly noted in July, August, and September, and were, apparently, of perfectly normal occurrence.

I am certain that hunting did not cause the scarcity of grouse because in Rusk County there are many sections so remote from roads, and so rarely visited by hunters, that the effect of such hunting as does occur is negligible. Yet grouse became scarce in the unhunted as well as in the hunted areas.

General Observations

Drumming Records. Dates when drumming was first noted are: For 1920, March 26; for 1921, March 28; for 1922, April 9; for 1923, April 19; for 1924, April 13. The later dates for 1922-1924 do not indicate actual lateness, but rather lateness of the field work, or unfavorable weather conditions on the days when I was in the field.

I have Rusk County drumming records for each of nine months of the year, the exceptions being January, February, and July. Drumming reaches its peak during the last few days of April and the first ten of May. I have numerous records of grouse drumming in the moonlight, a common thing in spring and summer, I think particularly in late August.

Interesting drumming records include: August 24, 1921; August 25, 1920; September 5, 1923; September 18, 1921; October 14, 1923; November 13 and 25, 1922; December 1, 1921 (ten to twelve inches of snow on the ground); December 1, 1922; June 27, 1922; June 28, 1921. The period from June 28 to August 24 is certainly partly occupied by the molt so that no drumming would be expected, but the winter period, December to March, may eventually produce drumming records.

Nest Records. Nesting dates include: May 7, 1922, two nests, one with thirteen and one with eleven eggs; May 10, 1922, twelve eggs; May 18, 1920; and May 19, 1920. I have two hatching dates, namely June 1 and 4, 1922. In one case eleven of thirteen eggs hatched and

in the other, eight of eleven. On this date one dead young was found at the nest, and a second bird had died without emerging from the shell, although it had sueeessfully pipped it.

Budding. It is well known that the Ruffed Grouse is a great eater of buds. It does not seem to be so well known that buds are eonsumed at seasons when the birds are not driven to it by neeessity. The budding of aspen, for example, is eommon in September when there is still mueh other, and seemingly more desirable, food. I have three notes of Ruffed Grouse budding ironwood (*Ostrya virginiana*) in Oetober, 1921 (on the 9th, 10th, and 29th), and a note on August 19, 1921, indieating that a grouse had eaten aspen leaves.

Ruffed Grouse breakfast almost before dawn on the very eold, sharp mornings of mid-winter, and perhaps at other times. On January 23, 1922, I observed five Ruffed Grouse busily at work budding in the tree tops where they eould be seen silhouetted against the horizon while a few stars and the new moon were still bright. The mercury stood at 31° below zero. On January 1, 1924, another grouse was budding in an aspen tree at dawn; the temperature was 30° below zero. During the same eold snap, on January 7, the same habit was observed, and it has been frequently noted at other times. It would almost seem that the colder the morning, the earlier the breakfast of the Ruffed Grouse.

Roosting. The winter roosting habits vary greatly with the weather. When the snow is ten or more inches deep and is loose and fluffy, the grouse, as is well known, plunge into and under it. There, at the end of a short burrow (from ten inches to five feet long) they sit quietly for long periods. They may remain beneath the snow for as many as eighteen hours, as ean be determined when one finds grouse still in burrows late in the morning although a fresh snow fell the evening previous.

The burrow is sometimes straight and sometimes eurved or fish-hooked. If disturbed, the grouse leaves the burrow with a whir of wings and a burst of snow, but if unmolested, I believe they ordinarily emerge on foot. Sometimes a grouse pokes its head up above the level without emerging, and oeeasionally openings thus made along one of their long burrows show that the bird several times took a look around.

In plunging to roost under the snow, grouse often barely miss striking rocks, limbs, and logs which are covered up. I have often

wondered why they do not more frequently strike sueh objects, with fatal results.

On sunny winter days the grouse sit in little groups and preen in the shelter of fallen tree tops, especially if these still retain their leaves. They often sit up in the balsam trees where, no doubt, the dark background tends to inerease warmth.

When the snow is moist, thawing, or erusted, the grouse at Ladysmith were invariably to be found roosting either in the spruce swamp (in which I think some birds roosted habitually irrespeetive of weather conditions), or in a dense grove of balsams in the hardwood tract. On January 21, 1921, following several warm days with freezing nights whieh erusted the snow, I watehed a group of Ruffed Grouse go to roost in these balsam trees.

Just before sundown I approaehed the grove and plaeed myself, baek against a tree, under the thickest part of the grove. The trees were from fifteen to fifty feet in height. Under them the droppings had aeeumulated as if the spot were a ehieken eoop.

Very shortly I heard the wings of a grouse as it flew in, and soon saw the bird budding in a large-toother aspen. It was some time before others appeared, but they finally eame, one by one, flying short distanees from tree to tree, budding on eaeh for a few moments.

One grouse flew to the ground, others following almost immediately. The sun was now down and the twilight advaneing. Two of the birds walked toward me, their heads bobbing like pigeons. They seemed to inspeet me and each, after taking several mouthfuls of snow, flew on noisy wings into the balsams, settling down not more than ten feet from me. I heard many soft and beautiful eooing notes for the first time, having never before appreciated the conversational vocabulary of these birds. The grouse squatted down on braneheS about eight feet above the ground and about two feet out from the trunks of the trees. I watched several of them go to roost in this manner and noted that eaeh one ate snow before flying into the trees.

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IMPRESSIONS OF GRAND MANAN BIRD LIFE

BY OLIN SEWALL PETTINGILL, JR.

Grand Manan is one of those water-hugged bits of coastal terrain that has become, because of its bird life, a name permanently enshrined in the annals of ornithology. Like Cobb Island, Bird Rock, and Bonaventure, it has long been a "place to be seen" to many a bird enthusiast. John James Audubon visited Grand Manan and some of its outlying islands in 1833 and later wrote [1] of the great numbers of certain avian inhabitants. T. M. Brewer[2], Henry Bryant[3], Harold Herrick[4], and R. F. Pearsall[5] journeyed there and composed the first lists and ornithological accounts of the region. In recent years many ornithologists have included Grand Manan in their itineraries and, while not publishing extensive treatises on studies made there, have remarked in various natural history journals of the abundance of certain species and the unexpected appearances of birds beyond their normal range.

Grand Manan is an island which unhesitatingly appears out of the strong tides at the mouth of the Bay of Fundy. It lies directly off the coast of New Brunswick at its junction with Maine. Politically it is a part of Charlotte County, New Brunswick, and is approximately fifteen miles long and six miles in greatest width. Its particular scenic features are the bold northern and southern headlands, each adorned with shining white lighthouses; fjordlike Dark Harbour that breaks up the near-regularity of its western shore of otherwise red-colored, sheer two-hundred-foot cliffs; the low eastern coast notched by numerous snug harbors that are, in turn, surrounded by homelike villages of 2500 fisherfolk; outlying rock-ribbed, spruce-tufted islands; treacherous, tide-covered ledges; and cold thundering surf.

For so small an area—small, at least, beside the great continent that can be viewed from its western shore—Grand Manan has a remarkably long list of birds to its credit. This has been due not so much to the ornithologists who have visited it during the past fifty years as to the inspired work of two residents of the island, Mr. Allan L. Moses and his father, Mr. John R. Moses. Both keen observers and discriminating collectors, as well as skilled taxidermists, these two gentlemen have in their possession a collection of beautifully mounted birds. At the present time the younger Mr. Moses has these specimens

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[1] 1835. Ornithological Bibliography. Vol. III.
[2] 1852. Boston Journ. Nat. Hist. Vol. VI. pp. 297-308.
[3] 1857. Proc. Boston Soc. Nat. Hist. Vol. VI, pp. 114-123.
[4] 1873. Bull. Essex Inst. Vol. V, pp. 28-41.
[5] 1879. Forest and Stream. Vol. XIII, pp. 524-525.

on display in a small house set aside as a museum at the village of North Head. Already several well-known ornithologists have worked over this collection. Not only is the collection representative of the island but it also contains specimens that confirm numerous records for the area. Among the rarer birds to be seen are a Yellow-crowned Night Heron, Black Skimmer, Scissor-tailed Flycatcher, Black Tern, Marsh Wren (subsp.?), Chestnut-collared Longspur, Lark Bunting, two Lark Sparrows, Red-eyed Towhee, and Lapwing.

It is said that Grand Manan and fog are synonymous. It was only fitting, then, that my first near-view of Grand Manan should be through a vista of fog. This view I obtained on the morning of May 31, 1935, from the motorship "Grand Manan II" on which I was arriving with duffel and car. Faintly at first and then distinctly I saw the imposing cliffs of Seven Days' Work. In a few moments they were absorbed by the fog and Grand Manan was not seen again until the vibrating hull of the ship rounded Swallow Tail Light and nosed into North Head. My visit to Grand Manan continued until July 22, during which time I attempted to cover as much of the island as possible and to visit diversified habitats. I have Mr. Allan Moses to thank for placing me in touch with places frequented by species that I might have overlooked otherwise.

Faunistically Grand Manan is Canadian Zone of the C. Harte Merriam pattern. The central and western portions of the island are for the most part richly timbered with spruce, save on the outskirts where the trees become stunted. Numerous springs in the higher western region give rise to large alder-bordered streams which rush seaward along pebbled courses and sometimes filter through bogs of plushy moss and flowering shrubs. There is an ill-smelling salt marsh at Castalia that is gouged in typical fashion by tidal channels and stagnant sloughs. A few portions of the island's interior, where hardwoods occasionally predominate, are indicative of the Transition Zone, as are the vicinities of the villages where grass-covered fields, rocky pastures, and open marshlands occur.

From the very outset of my visit I could not fail to be impressed with the great abundance of certain species of land birds. The Robins and Crows were common in expected numbers as were the Cedar Waxwings, Savannah and White-throated Sparrows, and Slate-colored Juncos. But in no other region have I seen the Black-throated Green Warblers so common. During the first week of my visit I accounted for their conspicuous numbers by the fact that the migration wave was not yet over. Parula and Blackpoll Warblers were still common

FIG. 20. Yellow-bellied Flycatcher on its nest. Dark Harbour. July 5, 1935.

FIG. 21. Acadian Chickadee at the entrance to the nesting hole. Deep Cove, Grand Manan, July 18, 1935.

in areas where it seemed apparent they would not remain. But, by the end of June, the Black-throated Green Warblers were still ubiquitous in every type of wooded area whereas the Parulas were now scatteringly few and the Blackpolls had resorted to the exposed and stunted spruces at the northern and southern headlands. I found one nest of the Black-throated Green Warbler far up in a spruce in comparatively open country, another in a low hardwood shrub in deep woods, and observed young on two occasions in an extensive alder swale. Almost as impressive in numbers were the Redstarts, Nashville Warblers, Northern Yellowthroats, and Olive-backed Thrushes. Though requiring a more specialized type of tree association, their numbers were noticeable in areas where they existed.

About the villages the swallows unquestionably predominated in numbers. While these birds are known to frequent coastal regions in considerable numbers anyway, here man has both intentionally and unintentionally provided excellent nesting sites to further encourage this habit. The residents in the villages have taken an exceptional interest in providing small bird houses suitable for the Tree Swallows. At Seal Cove each door yard averaged five of these bird houses. Only a few were without them, while many possessed over a dozen. In one door yard I counted sixteen houses, nine of which were occupied. At a glance I believed some of the houses were not spaced far enough apart to allow each pair of birds ample territory and were not, in certain instances, placed high enough off the ground. The locations apparently made little difference. Two pairs occupied boxes scarcely six feet apart: one pair lived in a box five feet from the ground. The Barn Swallows have taken advantage of the peculiar structure of the fish smokehouses. In these buildings the apices of the roofs are open and covered with superimposed roofs. Through these openings the swallows gain admittance into the otherwise closed buildings and place their nests on the roof supports and fish racks. Unfortunately the smokehouses are so constructed as to allow scarcely any eaves. Thus the Cliff Swallows are deprived of the use of these buildings. Nevertheless, the species is present in numbers that would be expected in coastal communities, using the suitable eaves of barns and dwelling houses that are available. Where the sea has recently encroached upon the low-lying eastern shore of Grand Manan, the soil has been cut away leaving large gravel banks which seem especially suited to the nesting needs of the Bank Swallow. However, I found no more than a dozen pairs in all the available places. According to the residents of the island who live near these banks, the species has decreased

markedly during the last five years, once being a very common bird.

In spite of the abundance of some species, there were a few Canadian Zone birds whose presence I failed to note. I saw no Canada Jays and missed the Spruce Partridge and Tennessee Warbler. These species Mr. Allan Moses has never seen though he has been on the watch for them for many years. I noted but one Blue Jay. Other species that I expected to find common, such as the Brown Creepers, Pine Siskins, and Canada Warblers, were not observed.

No large family of birds was better represented on Grand Manan than were the flycatchers. Pairs of Kingbirds were frequently observed along the roadsides of the eastern side of the island. At Seal Cove I saw one Phoebe at intervals during the breeding season. On June 6 I heard two Wood Pewees on the road to Dark Harbour and from June 5 to June 17 I found the Olive-sided Flycatcher in different sections of the island. Since both the Wood Pewees and Olive-sided Flycatchers were not noted again as the season advanced, they were apparently on migration. On June 13 Mr. Allan Moses collected the first Least Flycatcher he had ever seen on Grand Manan. I saw another on July 2. Nearly every cluster of alders of any size was found inhabited by at least one pair of Alder Flycatchers. In the deep woods of the central and western portion of Grand Manan I sometimes noted the Yellow-bellied Flycatcher. I found a nest of the species in the process of construction on June 8 and followed it through the season until the young left the nest on July 13.

This habitat of the Yellow-bellied Flycatcher was typical of the richly wooded area of Grand Manan. Huge yellow birches and thickly growing spruces darkened the forest floor of cool moss. Lichens bearded the decaying stumps and rotting underbrush. Almost beside the Yellow-bellied Flycatcher nest that was hidden beneath a maple root, a spring-fed rivulet trickled over a leaf-soaked bed. From the nest side I recorded at one time or another, the following species: Black-throated Blue Warbler, Black and White Warbler, Winter Wren, Redstart, Parula Warbler, Oven-bird, Red-eyed Vireo, Golden-crowned Kinglet, Black-throated Green Warbler, and Bay-breasted Warbler.

Both the Black-capped Chickadee and Acadian Chickadee were on Grand Manan in almost equal numbers. Most of my attention was directed to the more northern form since it was a species entirely new to me. A study of it soon proved to my own mind that it was not unlike its darker relative in habits. The first nest that I found contained six well-grown young. In an attempt to find out if this species was capable of feeding its young as many times as the Black-capped

Chickadee has been found to do. a continuous all day observation was made at the nest side. The pair fed their young 365 times during the day. Between 6 o'clock and 7 o'clock in the morning they fed their young thirty-nine times. No observation blinds were neeessary as they permitted the onlooker to stand directly beside their nest while they carried on their feeding.

On Grand Manan's extensive salt marsh at Castalia I found nesting approximately a dozen pairs of Aeadian Sparrows. I noted as many as four males singing in the air at one time. Eaeh began his flight performanee by rushing several feet skyward, and then sailed abruptly earthward, giving. during the deseent, a suggestion of a song. though it resembled more the sizzling sound made when a eap is slowly removed from a bottle of ginger ale. A severe rain accompanied by strong northeast winds caused the marsh to be flooded during the middle of June by exeessive high tides. A visit here two days after the disaster revealed that three nests of this speeies and several of the Savannah Sparrow had been eompletely washed out, the eggs appearing in the grass. some of them broken. others intaet. Probably all of the nests in the marsh were wiped out at this time.

The predatory birds seemed to be comparatively few at Grand Manan. Of the hawks, only the Marsh Hawk was frequently seen. These birds apparently nest in some of the isolated bogs of the island's interior. Two nests of the year were reported to me and I found a last year's nest near Little Pond. I observed the Sharp-shinned Hawk twice. and the Osprey ten times. finding a nest of the latter at Miller's Pond. I discovered the nesting loeality of a pair of Sparrow Hawks and found a nest of the Broad-winged Hawk.

Occasionally a few Ravens were seen moving along the shores. At Deep Cove a nest of a white domestic duek was robbed twice by Ravens during the course of the season. One pair of Ravens nested earlier in the season on Outer Wood Island and another pair at Southern Head. Both nests were destroyed by human hands before the eggs hatehed.

It was partieularly gratifying to find Grand Manan a region where I could safely call the Woodeock common. On the first evening of my visit I walked along the road at Deep Cove whieh runs along beside the ocean and eounted ten birds going through their flight songs. These sounds already familiar to me, when mingled with the rush of the surf. presented a strange new combination of beauty. Subsequent trips through the numerous marshy alder-eovered swales and even in the thick forests were usually featured by flushing at least one. some-

FIG. 22. Atlantic Puffins on their nesting grounds at Machias Seal Island, July, 1932.

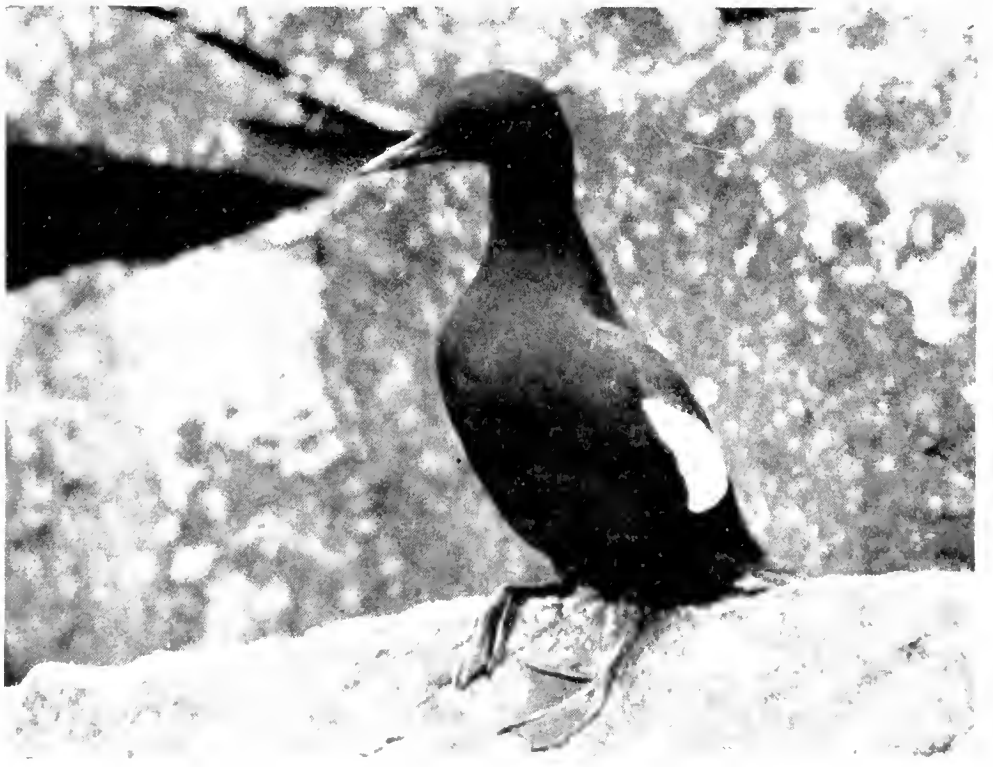

FIG. 23. Black Guillemot hesitating a few seconds after emerging from its nest located in the crevices in the rocks, Kent's Island, July 11, 1935.

times as many as five birds. Five broods were reported to me during the season.

It is probably the diversity of sea birds on the outlying islands that brings Grand Manan its particular distinction ornithologically. American Eiders nest on Three Islands and Little Wood Island. It has been estimated by the Bowdoin Biological Station located on Kent's Island (one of the Three Islands) that approximately 250 pairs nest here. On several islands are colonies of the Black Guillemot totaling about 430 pairs. Of the burrows of the Leach's Petrel, approximately 27,500 have been counted. A few Great Black-backed Gulls nest on Three Islands and Little Wood Island, undoubtedly no more than twenty-five pairs. The Herring Gull population of all of these islands is estimated at 22,500 pairs. On the Yellow Murre Ledge nest 100 pairs of the Razor-billed Auk.

Fifteen miles to the south of Grand Manan lies Machias Seal Island—the southernmost breeding ground of the Atlantic Puffin. In a visit made here in 1932, I estimated 400 pairs of birds. In 1935 I believed the numbers to be the same. From reports made in ornithological journals, it would appear that the numbers have remained almost constant for at least twenty years. In addition to the puffins, there are over 2,000 pairs of Aretic Terns, 50 pairs of Common Terns, and 2,000 burrows of Leach's Petrel.

That many of these islands are overpopulated with Herring Gulls, there can be no question. In fact, I saw several instances where I believed individuals were forced to seek nesting sites not used in previous years. On the ledge directly off the shore of Machias Seal Island, where formerly only terns were known to nest, six Herring Gull nests were built. On the Castalia marshes I observed two Herring Gulls that protested my presence vociferously whenever I approached within a certain area. From their behavior I believed this area to be selected nesting territory, though no nests nor eggs could be found. Mr. Allan Moses has never known the Herring Gulls to nest here. On Nantucket Island Mr. Moses and I estimated approximately 250 pairs of birds. During the previous breeding season Mr. Moses estimated the pairs nesting there to be under a hundred. Only the Machias Seal Island could I foresee any serious effect of the Herring Gulls on the other bird life. Here, unless the species is checked, the terns will be driven away. This seems deplorable as the island constitutes the only nesting colony of the Arctic and Common Tern in the vicinity of Grand Manan.

For a greater diversity of bird life, one could not ask for a better place than Grand Manan and the islands in its immediate vicinity. Probably there are no new forms to be discovered here. Nearly all the birds occurring in Northeastern North America have at some time or another been recorded. Nevertheless, Grand Manan has still many opportunities to offer ornithologists desiring to make field studies of particular species. There are birds in abundance and there are the facilities of the Bowdoin Biological Station on Kent's Island—a place we strongly hope will soon become a Barro Colorado or Tortugas of the Northeastern Atlantic coast.

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NOTES ON THE SUMMER AND FALL BIRDS OF THE WHITE MOUNTAINS, ARIZONA

BY LAURENCE M. HUEY

Between June 23 and July 24, 1933, a party representing the San Diego Society of Natural History collected birds and mammals in the White Mountains, Apache County, Arizona. The personnel comprised Karl Kenyon, Turlington Harvey III, Samuel G. Harter, and the writer. The writer later returned during his vacation and spent from September 28 to October 5, 1933, in the same locality. Following is a list, with notations, of the birds collected or observed, with a brief description of this interesting region.

The White Mountains are situated near the center of the eastern boundary of Arizona and form the highest part of the eastern end of the great Mogollon Plateau. Our summer camp was situated on the north fork of the White River, at an altitude of 8200 feet, and from this point we radiated on foot in all directions for a distance of three or four miles. On three occasions, by machine and on horse-back, greater distances and higher elevations were reached.

The rushing mountain stream that passed our camp-site—often referred to as "the creek"—ran in an east to west direction and was bordered with birches, alders, and low willows. To the south, Mount Ord and Mount Baldy rose to elevations of over 10,000 feet. During our summer visit, each retained a low bank of winter's snow on the north slope of their crests. A dense forest of spruce clothed these northerly slopes, and where fires had burned through this forest, pure stands of aspen had filled in. To the north of the river, the country was a gentle sloping plateau, chiefly forested with yellow pines. Grassy

prairies, void of trees, occupied parts of this plateau, and occasionally moist glades formed small meadows in the forests. The whole region visible from our camp had never been logged and was indeed a forest primeval, beautiful to see.

The Transition Zone, marked by the yellow pine forests, and the Hudsonian Zone, indicated by the spruces, were sharply defined. In our location, the river formed the boundary of each, and but few were the spots where the pines invaded the spruce territory south of the stream or vice versa.

The whole collecting area was within the Fort Apache Indian Reservation and the wild life had not been destroyed. Hunting for sport by any person except the resident Indians was prohibited. Bears, both black and grizzly, and a few wolves still roamed unmolested; turkeys and grouse were fairly abundant.

In former years sheep had been allowed on the higher elevations, but following the cessation of such grazing the response by nature seemed almost beyond belief. Grass was almost knee high over the more open parts of the Hudsonian Zone, while the forest meadows were waist deep in grass and flowers. A few cattle roamed over the prairies and through the yellow pine forests, but were so limited in numbers that the meadows and grassy parts of this zone were but little affected. The nearest settlement and postoffice was the small lumber-mill town of McNary, about eleven miles away, at an elevation of 7200 feet.

The writer wishes to express his thanks to the Arizona Fish and Game Commission for many courtesies extended; to Mr. William Donner, Superintendent of the Fort Apache Indian Reservation for his kindness in granting our party collecting privileges within the Reservation; to Mr. Hughey, the local game protector, whose knowledge of the region and its wild life proved to be very helpful many times; and to Mr. A. J. van Rossem and Mr. A. C. Bent, who aided in the identification of some of the specimens taken.

Pied-billed Grebe. *Podilymbus podiceps podiceps.* A pair of Pied-billed Grebes was seen swimming on the mill-pond at McNary on June 23, and on July 23 probably the same pair was seen with six small young.

Treganza's Heron. *Ardea herodias treganzai.* A single Great Blue Heron was seen several times as it fished along the stream during my stay between September 28 and October 5.

Common Mallard. *Anas platyrhynchos platyrhynchos.* A newly hatched duckling of uncertain identity was brought in by Kenyon on

FIG. 24. A spruce forest, with Mt. Ord in the distance.

FIG. 25. A mountain meadow filled with blooming iris. Yellow pines are in the foreground and background.

June 26. It was found with its mother a mile or more up White River from our camp, at an altitude of about 8300 feet. He tried to raise it but it died on June 28. Subsequently it was forwarded to Mr. A. C. Bent who identified it as a Mallard.

A few days later the local game warden, Mr. Hughey, took us to a place where he had flushed a Mallard from its nest which contained eight eggs. Unfortunately, the nest had been destroyed by some enemy, as only a few scattered egg-shells remained. The nest was under the grass at the roots of a scrub willow near the rushing creek.

Sharp-shinned Hawk. *Accipiter velox velox.* A molting female was taken on July 11 which upon dissection offered no indication of having nested. The bird was just emerging from immature into adult plumage. Barred breast feathers were replacing streaked, and on the back the new feathers were bluish instead of brownish. From this evidence it might seem that this bird was summering in its birthplace or possibly its future nesting region.

Western Red-tailed Hawk. *Buteo borealis calurus.* A single immature hawk of this species was living along the creek and seen almost daily during my fall visit.

Ferruginous Rough-leg. *Buteo regalis.* A pair of these hawks was seen several times in July during our summer visit, and on October 4 the writer saw one perched on a fence-post at very close range.

Golden Eagle. *Aquila chrysaëtos canadensis.* A pair of Golden Eagles was seen several times flying over the spruce forest at Bear Flat near Mount Ord. Once, while the writer was on horse-back, one of the pair flew very closely over head.

Eastern Sparrow Hawk. *Falco sparverius sparverius.* At least two pairs of Sparrow Hawks had chosen the forests bordering the large open prairies for their summer homes. They were exceptionally wild and only one specimen was obtained.

Dusky Grouse. *Dendragapus obscurus obscurus.* Dusky Grouse were not uncommon in the summer on the higher wooded ridges, where they were nesting. Three families of half-grown young were found during July by members of our party. They were accompanied by the female parents only: the males were not seen.

Merriam's Turkey. *Meleagris gallopavo merriami.* Turkeys were fairly common and were seen during both the summer and fall visits.

Virginia Rail. *Rallus limicola limicola.* The voices of Virginia Rails, emanating from a large marsh, were heard many times during the latter part of June and early July. However, in many attempts we

failed to secure a specimen, though the presence of the birds was beyond question.

American Coot. *Fulica americana americana.* Several pairs of Coots were nesting in the tules that bordered the mill-pond at McNary and were seen each time we passed the place during our summer's stay.

Spotted Sandpiper. *Actitis macularia.* A single individual was seen several times when it was flushed from the creek bank during my fall visit.

Western Mourning Dove. *Zenaidura macroura marginella.* A pair of Mourning Doves was seen and heard near our camp on July 5 and 6, and were the only birds of this species recorded during either visit.

Western Horned Owl. *Bubo virginianus pallescens.* The hooting of Horned Owls was heard almost every night during our stay in June and July, and also during the fall visits. One specimen, an adult male, was secured on June 29.

Western Nighthawk. *Chordeiles minor henryi.* Several times during our stay Nighthawks assembled about sundown in loose flocks to feed high over the yellow pine forest. The only opportunity to obtain a specimen came on July 9 when a female and two downy young were taken on an open grassy prairie.

Broad-tailed Hummingbird. *Selasphorus platycercus platycercus.* This bird was not common and was the only species of hummingbird found by our party in the White Mountains. A nest with one fresh egg was taken on July 19. It was situated on a dead twig of a fir tree, twenty feet above the ground in an open forest.

Western Belted Kingfisher. *Megaceryle alcyon caurina.* Two Kingfishers were living along the stream while I was there during the fall.

Red-shafted Flicker. *Colaptes cafer collaris.* Flickers were found in about equal numbers amidst the pines and spruces and were not uncommon. A young bird that had recently left the nest was taken on July 14.

Mearns's Woodpecker. *Balanosphyra formicivora aculeata.* These birds were seen commonly about McNary, where they were resident in the oak belt.

Red-naped Sapsucker. *Sphyrapicus varius nuchalis.* Three adult specimens in breeding condition were taken during our summer stay. This species was rather common as a migrant during the fall visit.

Natalie's Sapsucker. *Sphyrapicus thyroideus nataliae.* This was the commonest member of the woodpecker family and was found most abundantly through the yellow pine forest. Young birds just out of the nest were taken July 4.

White-breasted Woodpecker. *Dryobates villosus leucothorectis.* This form of Hairy Woodpecker was found sparingly through the yellow pine forest. A young male specimen, that had recently left its nest, was collected July 13.

Alpine Three-toed Woodpecker. *Picoides tridactylus dorsalis.* Of four specimens collected, three were secured in the yellow pines bordering the spruce forest, where no doubt they were foraging. The fourth, taken on July 9, was shot in the dense spruce forest on Snake Creek, a tributary of the White River, at 8500 feet altitude. This bird, a female, was in incubating condition.

Wright's Flycatcher. *Empidonax wrighti.* On July 22, Harter collected a female of this species and four partly-feathered young. The latter he took from their nest, which was situated five feet above the ground in a slender willow tree near a stream. On July 20, he had collected the male from the near vicinity. This was the only time this bird was found by our party.

Western Flycatcher. *Empidonax difficilis difficilis.* This species was fairly common during our summer stay. Several nests were collected and several found with young. In every case they were situated in a niche of a vertical rock wall or creek bank and on the shady, northerly side.

Western Wood Pewee. *Myiochanes richardsoni richardsoni.* This was the most common flycatcher found in the region. Their greatest abundance was in the yellow pines near the water courses and open glades.

Olive-sided Flycatcher. *Nuttallornis mesoleucus.* These large flycatchers were nesting commonly in the yellow pines, their lusty calls of "*It's me' here*" being heard almost every quiet morning during the first part of our stay. The habit of these birds of building their nests high up in the trees and perching on the very tip tops of the tallest pines was responsible for their being more often heard than seen.

Montezuma Horned Lark. *Otocoris alpestris occidentalis.* Horned Larks were abundant on the large open grassy prairies. Young on the wing and a set of three fresh eggs were taken on July 9.

Violet-green Swallow. *Tachycineta thalassina lepida.* This swallow was fairly common in the yellow pine forests and small colo-

nies were to be found nesting in dead stubs, where they were conveniently situated near marshes or meadows that offered good feeding grounds.

Purple Martin. *Progne subis subis.* A colony of five or six pairs was nesting in two dead pine trees at an elevation of about 8600 feet in the Hudsonian Zone and another small colony was found on the outskirts of the town of McNary.

Rocky Mountain Jay. *Perisoreus canadensis capitalis.* These shy birds were not common. Of five specimens taken four were found in the yellow pines, almost at the point of contact with the spruce forest. The fifth, a male, was taken on July 17 at Bear Flat (altitude 9000 feet) in a dense spruce forest. This bird was carrying a beakfull of insects when shot.

Long-crested Jay. *Cyanocitta stelleri diademata.* This noisy jay was common. A short-tailed youngster, just out of the nest, was taken on July 8.

Western Crow. *Corvus brachyrhynchos hesperis.* A flock of several hundred crows had assembled for the summer on a large high prairie, two miles east of our camp, at about 8500 feet elevation. One specimen was secured on July 9.

Clark's Nutcracker. *Nucifraga columbiana.* On July 21, Harter shot a pair of these birds in the pines near camp. They were the only nutcrackers seen by our party, but the species was said to be irregularly common by the resident game warden.

Mountain Chickadee. *Penthestes gambeli gambeli.* Chickadees were most often found along the water courses, where they were feeding in the birches. An incubating female was collected on July 3 and a young bird in full feather on July 19.

Rocky Mountain Nuthatch. *Sitta carolinensis nelsoni.* This larger nuthatch was found twice, a single specimen being collected on July 22, and another one seen the day following. The bird collected was in very worn plumage and had no doubt ascended from the oak belt found at lower altitudes on the White Mountains.

Black-eared Nuthatch. *Sitta pygmaea melanotis.* These diminutive nuthatches were common in the yellow pines and family bands were found many times feeding high in the tall trees. A young bird that had but recently left the nest was taken on July 14.

Red-breasted Nuthatch. *Sitta canadensis.* This species was not found during the summer visit, though more work in the spruce for-

ests would probably have determined its presence. However, two specimens were taken in the fall, one on September 29 and the other on October 1.

Rocky Mountain Creeper. *Certhia familiaris montana.* Creepers were not uncommon through the yellow pine forests and were probably more abundant than the four specimens taken would indicate.

Dipper. *Cinclus mexicanus unicolor.* Water Ouzels were found along the larger streams. The only specimen obtained was a young bird taken on July 4. On July 9, the writer found a nest containing four small young. When the nest was approached, a parent bird was flushed and, uttering its alarm note, was soon joined by the mate. Both birds were unusually tame and scolded constantly while I was near the nest.

Western House Wren. *Troglodytes aedon parkmani.* House Wrens were fairly common along the contact between the yellow pine association and the spruce. A young bird that had recently left its nest was collected on July 22. House Wrens were still to be found among the birches near the creeks during the last days of September and the first of October.

Common Rock Wren. *Salpinctes obsoletus obsoletus.* Rock Wrens were not common as the region was not suited to their needs. An occasional bird was seen near Snake Creek, where there were several rock-bound canyons.

Western Robin. *Turdus migratorius propinquus.* Robins were breeding commonly along the water courses. Young out of the nests were seen and one collected on July 1. A set of four heavily incubated eggs was collected on July 22. During my fall visit but a single specimen was seen and collected on September 28. At this time the entire Robin population had left for other localities nor were they seen at McNary, at an altitude of 7200 feet, during two visits to the town.

Audubon's Hermit Thrush. *Hylocichla guttata auduboni.* Hermit Thrushes were found sparingly along the water courses. A nest containing four eggs was found on June 24. It was situated six feet above the ground in a small spruce tree near the creek. The incubating bird was shot and upon dissection proved to be the male of the pair. Another set of four very heavily incubated eggs was taken on July 24.

Mountain Bluebird. *Sialia currucoides.* Mountain Bluebirds were found about the pine-bordered prairies. They were not abundant

FIG. 26. Nest and eggs of the Red-backed Junco.

FIG. 27. Nest and eggs of the Lincoln's Sparrow.

and, as elsewhere over their range, lived in open, dry, high transition localities.

Townsend's Solitaire. *Myadestes townsendi.* Solitaires were fairly common. Three pairs were found July 1 with young on the wing. Their old nests were located nearby, situated in niches of low perpendicular cliffs that bordered a small stream. Both wood rats (*Neotoma*) and chipmunks (*Eutamias*) were common about these rocky cliffs, and apparently the smooth surfaces of these sheer walls prevented the mammals from molesting the nests.

Western Golden-crowned Kinglet. *Regulus satrapa olivaceus.* Three specimens, two adult and one young, were taken on July 17, at an altitude of 9000 feet, in the spruce forest bordering the beautiful mountain park called Bear Flat, thus adding another record of this bird as a breeding species in Arizona.

Eastern Ruby-crowned Kinglet. *Corthylio calendula calendula.* These diminutive birds were found where the forests mixed and at a lower elevation. They were not rare and several families of young out of the nest were seen during July. At this time the almost incessant nuptial songs of the males had ceased and their presence was not as obvious as it would have been earlier in the season.

Plumbeous Vireo. *Vireo solitarius plumbeus.* An immature female of this race was taken at McNary on October 3.

Cassin's Vireo. *Vireo solitarius cassini.* A male specimen of this race was taken at the north fork of White River, 8400 feet altitude, during migration on September 29.

Western Warbling Vireo. *Vireo gilvus swainsoni.* It was with some surprise that the scarcity of this usually common bird was noted. In the writer's experience, aspen groves in the proximity of meadows and streams always harbor a goodly population of this species, but two adults and one young secured during July were the only specimens heard or taken. The adults were in breeding condition and the young one was not long out of the nest.

Virginia's Warbler. *Vermivora virginiae.* This rather quiet, diminutive bird may have been more common than the specimens collected would indicate. Two immature birds, one taken on July 2 and the other on July 17, proved the species to be nesting in this locality. Their choice of tall yellow pines as a feeding ground was no doubt the reason for their apparent scarcity.

Black-fronted Warbler. *Dendroica auduboni nigrifrons.* Comparison of the good series of breeding birds which we secured in the

White Mountains with Pacific Coast birds, and also with birds taken in the mountains of southern Arizona reveals the fact that the name *nigrifrons* should be applied to all breeding *D. auduboni* of Arizona.

MacGillivray's Warbler. *Oporornis tolmiei.* A few pairs of this species were found during our summer stay in a small area of dense scrub willows and birches growing near the creek. The three adult birds collected were all in breeding condition.

Lilian's Meadowlark. *Sturnella magna lilianae.** A few pairs of Meadowlarks were nesting on the large prairies. A single male specimen in breeding condition was collected July 9.

Nevada Red-winged Blackbird. *Agelaius phoeniceus nevadensis.* Two small colonies of red-wings were found. One colony was nesting in the tules growing in a mill-pond at McNary, and a smaller colony was nesting in the tall grass of a boggy meadow near our camp. By the latter part of July the young had taken wing and the whole population had left the region.

Brewer's Blackbird. *Euphagus cyanocephalus.* A small group of blackbirds lived about the village of McNary and another was seen and two immature specimens collected July 9 on the prairie near Snake Creek.

Western Tanager. *Piranga ludoviciana.* The three-note call of the Western Tanager was not uncommon and the species was well distributed over the whole area explored.

Western Evening Grosbeak. *Hesperiphona vespertina brooksi.* Two Evening Grosbeaks collected by Harter on the same day, July 21, proved to represent two races. When dissected neither bird was found to be in breeding condition. As both were in the midst of molting, it would indicate that their nesting period had passed and that they were migrating in search of a better food supply.

Mexican Evening Grosbeak. *Hesperiphona vespertina montana.* As recorded under the preceding form, a single specimen of this subspecies was taken on July 21.

Northern Pine Siskin. *Spinus pinus pinus.* During the summer, siskins were found where the pines bordered dry grassy flats. At the time of the fall visit, they had assembled in large flocks and were found feeding in weed patches by the roadside.

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*Proposed by H. C. Oberholser (Sci. Pub. Cleveland Mus. Nat. Hist., I, No. 4, p. 103, December, 1930) with a range of: Central western Texas and southwestern New Mexico, west to central and southern Arizona, south into Sonora and Chihuahua.

Mexican Crossbill. *Loxia curvirostra stricklandi.* These birds were heard more often than seen, as their peculiar, sharp, chattering notes attracted our attention during the latter part of our summer stay. No evidence of breeding was shown in the three specimens collected.

Green-tailed Towhee. *Oberholseria chlorura.* Green-tailed Towhees were not common and the first one of four specimens taken was caught in a mouse trap set amidst the rather dense shrubbery bordering White River. This bird, a female, showed unmistakable signs of incubating, though a search failed to reveal the nest. Later, on July 19, a member of our party found a nest containing two eggs. This nest was left undisturbed for the bird to complete the set, but was destroyed by a severe hail storm the next day. I believe that hitherto there has been no actual record of a nest of this species in Arizona, though it has been recognized as a summer resident.

Western Vesper Sparrow. *Pooecetes gramineus confinis.* Vesper Sparrows were abundant on all the larger grass-covered prairies. Young birds just out of the nest were seen on July 16.

Red-backed Junco. *Junco phaeonotus dorsalis.* This bird was fairly common, mainly along the stream courses. The greatest abundance was in the yellow pine area, though they were to be found scattered along the streams some distance into the fir-spruce forests. Nesting dates were irregular, as young on the wing were taken July 8 and a set of four eggs was taken July 19. This nest was found in the course of construction on July 7 and was situated on the ground under a tussock of grass near a small stream.

Western Chipping Sparrow. *Spizella passerina arizonae.* Chipping Sparrows were more abundant at lower elevations, where open pine forests and grassy glades occurred. Only one bird was taken at our White River camp, a male, in breeding condition, on June 23.

Gambel's Sparrow. *Zonotrichia leucophrys gambeli.* A specimen was taken from a small migrating flock on October 1.

Lincoln's Sparrow. *Melospiza lincolni lincolni.* These birds were fairly common and were found on nearly every wet meadow in the Hudsonian Zone that we explored. Young birds just out of the nest were taken on July 6 and a set of four fresh eggs was found on July 23.

San Diego Society of Natural History,
San Diego, California.

GENERAL NOTES

Conducted by M. H. Swenk

Woodcock and Whistling Swan in Iowa.—On March 26, 1936, I flushed an American Woodcock (*Philohela minor*) in the Backbone Park, Delaware County, Iowa. On the following day I noted seven Whistling Swans (*Cygnus columbianus*) on Swan Lake, in Johnson County, Iowa. Mr. E. B. Speaker, Field Supervisor of Fisheries, was with me on both occasions and also noted these birds. We took pictures of these birds observed in Johnson county.—W. W. Aitken, *Iowa Conservation Commission, Des Moines, Iowa.*

The Mute Swan and European Widgeon in Ohio.—A Mute Swan (*Sthenelides olor*) was observed by Mrs. Skaggs and the writer at Gordon Park in a small area of open water in Lake Erie on January 26, 1936. The bird was with a number of Lesser Scaups and was about 150 feet from the observers. Since this species has established itself in the East in a wild state, the bird may have been one of that type. No escapes have been reported from this region. Dr. S. C. Kendeigh also saw the swan, but it was in flight and he did not get to see the bill, so took it for a Whistling Swan.

On March 28, 1936, several members of the Cleveland Bird Club, including the writer, saw an European Widgeon (*Mareca penelope*) on the lake of the Sherwin estate, near Willoughby, Ohio. The bird was observed under perfect conditions and was a male in good plumage. Mrs. Sherwin saw the bird first on March 26. On March 29 it was not to be found. There are very few records for this bird in Ohio.—Merit B. Skaggs, *Cleveland, Ohio.*

Do Herons Use Their Beaks as Spears?—In the March, 1936, number of the Wilson Bulletin is an article on "Bird Life in Green Bay", by L. E. Hunter of Dallas City, Illinois, in which he says the Great Blue Heron (*Ardea herodias*) stabs fish with its bill. I wonder if this can be proved. I once found a Black-crowned Night Heron (*Nycticorax nycticorax hoactli*) with a broken wing. It shrieked fiercely and struck at my dog with open beak, and all the feathers raised on its neck. I called the dog off and it remained perfectly quiet while I picked it up and carried it some distance, but on seeing the dog, it again showed fight and struck at my throat. Luckily for me it did not strike spear fashion, but with open beak, making two scratches about an inch long, one on each side of my throat. It was a young bird in the immature plumage. But in the days of falconry, herons were supposed to be more or less dangerous to the attacking hawks and naturally one would suppose this meant using the bill as a spear.—William P. Hainsworth, *North Andover, Mass.*

The Harris's Sparrow in East-Central Illinois.—In the paper on the Harris's Sparrow (*Zonotrichia querula*) by Myron H. Swenk and O. A. Stevens, published in the September, 1929, number of the Wilson Bulletin, it is indicated that in Illinois, except in the southeastern portion, this sparrow occurs fairly regularly, especially in the vicinity of Lake Michigan. However, in the east-central portion of the state, in the vicinity of Champaign and Urbana, it has been noted but eight times in the last quarter century. Of these records, the greater number fall in April and May, and in October, as would be expected. It was my pleasure to record this bird for the first time at Mahomet, Champaign County, Illinois, on March 3, 1936. There are other March records for Illinois, although they are few in number, as mentioned in the above paper. The bird

was not collected, but the observation was made under such conditions of light and distance that no error is possible. Of added interest is the fact that the bird evidently was one hatched last summer, for it still retained the plumage characteristic of such birds when seen passing through during the fall migration. The chin and throat were white, and the breast was marked with a horizontal band of black streaks and blotches. The "pink" or reddish bill was quite distinctive.—C. T. Black, *University of Illinois, Urbana, Ill.*

The Snow Bunting in South Dakota.—The occurrence and distribution of the Snow Bunting (*Plectrophenax n. nivalis*) in South Dakota is not thoroughly established. At present it is classified as a winter visitor. It is not readily studied, as it occurs irregularly in flocks, usually during or following a severe snow storm accompanied by low temperatures. Then, too, it is often confused by the casual observer with Hoyt's Horned Lark, also a winter visitor. However, the Snow Bunting is more plump and at a distance displays more white on the belly.

Records of its occurrence are more common for the east half of the state than for the west. S. S. Visher (Wilson Bulletin, June, 1915) says for South Dakota, "common some winters; others rare." Norman Wood (*A Preliminary Survey of Bird Life of North Dakota*, 1923) says, "winter resident some years." Adrian Larson (Wilson Bulletin, March, 1925) says for South Dakota, "irregular winter visitor." These records apply to the eastern half of their respective states.

During the past winter (1935-36) it was recorded from the western part of the state. The writer has observed it many times in flocks of various numbers during cold days, either flying or feeding in weed patches or in plowed fields where snow had blown off. About 1915 a flock was seen feeding around elevators at Vermillion. In the Museum bird skin collection there are four from Hutchinson County, taken during the winter of 1901; one from Miner County, 1899, and three from Sanborn County, 1915.—W. H. Over, *University Museum, Vermillion, S. Dak.*

Bird Notes from Oklahoma.—The following sight records were made in Oklahoma during 1935. Reference to the *Birds of Oklahoma* by M. M. Nice (1931, revised edition) leads me to the belief that species herein mentioned are rare or uncommon in Oklahoma. For that reason, these notes are of some interest.

Lesser Snow Goose (*Chen h. hyperboreus*) and Blue Goose (*Chen caerulescens*). A flock of thirty Lesser Snow Geese and two Blue Geese was seen at Ponca Lake, Ponca City, April 15. The birds were fed grain by city park patrolmen and remained in the vicinity until April 24.

Osprey (*Pandion haliaetus carolinensis*). One bird observed flying over Lake Spavinaw, Mayes County, September 20.

Florida Gallinule (*Gallinula chloropus cachinanns*). One bird seen April 29 at Crystal Lake within the city of Woodward, Woodward County.

Dowitcher (*Limnodromus griseus* subsp.). A Dowitcher was observed in a rain-filled ditch ten miles north of Perry, Noble County, on April 15. Three others were seen October 6 on the west shore of Lake Overholser, Canadian County.

Sanderling (*Crocethia alba*). I noticed a flock of fourteen birds on a mud flat in the North Canadian River at Woodward, April 29.

Avocet (*Recurvirostra americana*). Two were seen April 15 beside a rain pool on U. S. Highway 77, eight miles north of Perry.

Caspian Tern (*Hydroprogne caspia imperator*). A large tern, most likely this species, was watched as it dived for fish while flying over Lake Spavinaw, September 20.

Common Tern (*Sterna h. hirundo*). Six were seen on April 29 at Crystal Lake, Woodward.

Canyon Wren (*Catherpes mexicanus conspersus*). Recorded by Mrs. Nice as "summer resident in the Wichita Mountains (Comanche County) and Cimarron County." Several were seen and heard on June 18 and August 28 in the Quartz Mountains, Greer and Kiowa Counties and no doubt the species nests in that locality.—James Stevenson, *Oklahoma City, Okla.*

Sex Ratio of English Sparrows.—After hearing Dr. L. J. Cole at the meeting of the Wilson Ornithological Club at St. Louis speak on the sex ratio of English Sparrow nestlings, my own records from 1932 to 1935 were reviewed, with the following results:

Month	Male	Female	Undetermined
January	13	0	0
February	6	6	0
March	7	19	0
April	7	25	0
May	3	35	22
June	1	1	33
September	14	24	0
October	26	37	0
November	12	14	0
December	37	20	0
Total	126	181	55

These figures include both young and old birds caught in traps used for banding purposes. Eighty-five of the birds were dissected for sex determination and other studies. The ratio of birds caught in different seasons shows a tendency similar to that of the Cardinal. More males enter traps during winter months and more females during nesting seasons.—Cora Shoop, *Steelville, Mo.*

The Field Characters of the Black-bellied and Golden Plovers.—Mr. Bayard H. Christy, an able and informative writer, made an inexplicable slip in his "Beach Combers" in the December, 1935, issue of the Wilson Bulletin that will surely cause confusion in the minds of some of his readers. On page 268 he stated, while discussing field marks of the Black-bellied and the Golden Plovers, that the "only sure field mark is the hind toe—its presence or its absence"—and this after having noted the "broadly white and outspread wings and tail" of the Black-bellied Plover then under observation. According to the best descriptions available, the light stripe in the open wing and the white or whitish tail are amply sufficient to distinguish the Black-bellied from the Golden Plover in straightaway flight. In a side view in flight of a bird in immature or winter plumage, the black axillars (showing a black spot under the wing close up against the body) form a conspicuous field mark of the Black-bellied that is absent in the Golden. So much for actual markings. But anyone really familiar with the Black-bellied Plover in any plumage need never fear that he will overlook a Golden Plover. The Golden is a totally different bird—slimmer, more shapely, with a smaller head, and decidedly brownish in its "gray" plumage.

I had seen thousands of Black-bellied Plovers before I ever saw a Golden Plover, and I always had the beginner's fear that Golden Plovers might be passing me unnoticed. But my first Golden Plover stood out as something distinctly different, and I knew from the first glimpse that I was looking at no Black-bellied Plover. Of course, I checked my identification by flushing the bird and noting the dark tail and wings and the lack of black axillars, but that was merely a precautionary measure. Later experience with the Golden Plover has strengthened my first impression, that it resembles the Black-bellied Plover only in size and in family characteristics and that it is as distinctly different from it in the field as the Least Sandpiper is from the Semipalmated Sandpiper.—Francis M. Weston, *U. S. Naval Station, Pensacola, Fla.*

Field Marks of the Blue-winged Teal.—Nearly all artists who paint wildlife depict the Blue-winged Teal (*Querquedula discors*) differently than I have observed it. Because the difference is so marked, I should like to present the bird as I have seen it. This study was made on twenty-three lakes and sloughs in southern Minnesota, beginning June 24, and ending October 30, 1935. Blue-winged Teals stayed unusually late in southern Minnesota in 1935. Five of these sloughs were visited every week and the balance every second week throughout this period. All observations were made with a pair of 6x25 Victory Stereo Bausch & Lomb binoculars. A total of ten specimens was collected, and hundreds of birds studied carefully at close range.

When the Blue-winged Teal swims, rests on land, or walks, no trace is visible of the blue which covers the middle and lesser wing coverts. This blue is conspicuous in flight at all seasons but is never shown when the bird is at rest. This coloration is completely concealed by the long scapulars under which the bend of the wing is carefully tucked. Neither is the speculum visible. Occasionally, as a bird folds its wings after alighting or preening, a stray blue feather will show for a moment, but invariably the bird will readjust its wings and the blue is at once completely concealed. Near St. James on the morning of October 22, 1935, I watched ten Blue-winged Teals from a distance of thirty feet. The afternoon of the same day at Lake Crystal I watched fourteen Blue-winged Teals from about forty feet for half an hour. One of these came up on the bank within fifteen feet of me, where it sunned and preened itself for ten minutes. I checked this point very carefully.

At this time of year both the male and female appear as small, slightly mottled, brownish colored birds, the back, ends of the primaries, and upper tail coverts being a little darker. The back of the head, neck, and shoulders are also somewhat darker, shading off to a grayish color forward. The neck and head are more slender than that of the Green-winged Teal and the bill larger. On the water the Blue-winged Teal seems to sit flatter and hold its head farther forward than the Green-winged Teal.

In the spring the female has a faint white patch at the base of the bill and a white spot on the side of the tail at its base. The breast and belly shade off to a lightish gray. The male in the spring has a conspicuous white crescent in front of the eye with the points extending to the back. The head at this time is a slate color and the white spot at the base of the tail is quite conspicuous. The back of the male is somewhat darker than that of the female, and the breast shades off to a reddish brown.

In examining the specimens taken, the bend of the wing did not seem to fold readily or naturally under the scapulars, which no doubt accounts for the custom among taxidermists to mount the bird with the bend of the wing outside, where the blue is plainly visible.—Bruce F. Stiles, *Sioux City, Iowa.*

Recent Records of the Orange-crowned Warbler Near Toledo, Ohio.—Because of a scarcity of records of the Orange-crowned Warbler (*Vermivora celata celata*) both in Ohio and in Michigan, the following sight records and specimens collected in the vicinity of Toledo, Ohio, which is close to the Ohio-Michigan boundary, are given. On October 4, 1931, in Washington Township, Lucas County, Ohio, one was found in giant ragweed by L. W. Campbell (sight record). On May 8, 1932, in Spencer Township, Lucas County, Ohio, one was seen in a white oak woods by L. W. Campbell (sight record). On May 14, 1932, in Lakeside, Ottawa County, Ohio, one was seen in second growth woods by L. W. Campbell (sight record). On May 6, 1933, in Woodlawn Cemetery, Toledo, Ohio, one was seen in a tamarack tree by L. W. Campbell (sight record). On September 28, 1933, an immature male was taken by Bernard R. Campbell in Jerusalem Township, Lucas County, Ohio, in second growth along the Lake Erie Beach. The skin is in the Ohio State Museum. On October 12, 1933, an adult female with crossed mandibles was taken by B. R. Campbell in giant ragweed three and one-half miles southwest of Toledo, Ohio. This specimen is in the University of Michigan collection. On September 23, 1934, an immature female was taken by L. W. Campbell in low growth along the Lake Erie Beach in Jerusalem Township, Lucas County, Ohio. This specimen is in the Ohio State Museum. On September 30, 1934, an adult male was shot by L. W. Campbell, which was too badly mutilated to be preserved. Another was seen the same day by L. W. and B. R. Campbell. Both of these birds were found in second growth in Jerusalem Township, Lucas County, Ohio. On October 6, 1934, six birds were found in giant ragweed in Adams and Springfield Townships, Lucas County, Ohio, by L. W. and B. R. Campbell. Of these, three were collected, as follows: Adams Township, Lucas County, Ohio, male—L. W. Campbell, University of Michigan Museum; Springfield Township, Lucas County, Ohio, male—B. R. Campbell, Ohio State Museum; Springfield Township, Lucas County, Ohio, male—collected by L. W. Campbell, prepared by B. R. Campbell, Ohio State Museum. On October 27, 1934, one was seen in a brushy place in Springfield Township, Lucas County, Ohio, by L. W. Campbell and James Nessle (sight record). On September 21, 1935, an immature female was collected in giant ragweed in Erie Township, Monroe County, Michigan, by L. W. Campbell. The skin, made up by B. R. Campbell, is in the University of Michigan Museum. On September 26, 1935, in low growth along the Lake Erie Beach, Jerusalem Township, Lucas County, Ohio, an adult female was taken by L. W. Campbell. The skin is in the Ohio State Museum. On October 6, 1935, three were seen along the shore of Maumee Bay in Jerusalem Township, Lucas County, Ohio, in second growth woods by L. W. Campbell (sight record).

From the above instances, we conclude that in the Toledo area the Orange-crowned Warbler is an uncommon migrant in the spring, but a regular migrant in small numbers during the fall migration, arriving later than the majority of other warblers. A partiality to giant ragweed in the fall is also indicated.—Louis W. and Bernard R. Campbell, *Toledo, Ohio.*

Further Additions to the List of the Birds of Yellowstone National Park.—Reference is made to two papers by Emerson Kemsies (Wilson Bulletin, September, 1930, pp. 198-210; and March, 1935, pp. 68-70) listing the birds known to occur in Yellowstone National Park. Checking the lists carefully, the writer finds two additional species that properly belong. These are given below, with records and references.

Farallone Cormorant (*Phalacrocorax auritus albociliatus*). Dr. Harry M. Kelly, ranger naturalist for a number of summers at Yellowstone Lake, informed the writer that a pair of these birds nested on the Molly Islands in 1928, and that he observed the nest with two half-grown young in that year. On June 26, 1930, Ludwig von Feuhrer, a Park Service taxidermist, found two nests of this cormorant, and observed two pairs of birds on the Molly Islands. One nest contained four eggs, the other was empty. The writer visited the islands on July 1, 1930. The two nests, both empty, were seen, but only two birds, very shy, were noted. The specific status of these cormorants had never been established, as they were very hard to observe. The writer, who had at that time seen very few cormorants, mistakenly considered them to be Baird's Cormorant, from their apparently small size, and so recorded them in the *Yellowstone Nature Notes* for August, 1930.

On June 29, 1931, Ranger Naturalist J. T. Stewart visited the islands and found two nests, each containing four eggs. All four adults were seen. His observations were recorded in *Yellowstone Nature Notes*, July, 1931. On July 18, 1931, the writer spent a short time on the nesting ground with a party led by George M. Wright, Chief of the Bureau of Wildlife Survey, National Park Service. Four cormorants were seen, but both nests were empty. On this visit the whitish crests and large size of the birds were plainly seen, proving them to be some form of Double-crested Cormorant and not Baird's Cormorant, as the writer had thought. Further, Baird's Cormorant, a Pacific Coast species entirely, would be far out of its known range here. So when one of these birds is examined at close range, it probably will be found to be the Farallone Cormorant.

George M. Wright (*Condor*, July-August, 1934) notes the finding of a nest containing three eggs, and of seeing two birds on June 4, 1932. In this paper he uses both the terms "Farallone" and "Double-crested" in designating the birds, and it is assumed that these names are used synonymously.* On July 12, 1932, the writer, with Ben Thompson of the Bureau of Wildlife Survey and Park Rangers Al Elliott and Frank Anderson, visited the Molly Islands for the purpose of banding young gulls and pelicans. Four adult cormorants were seen, but there was no sign of the nest reported earlier by Wright.

From these notes it would seem that one or two pairs of Farallone Cormorants nest each season on the Molly Islands, but that they rarely rear young, perhaps because of the abundance of California Gulls on the tiny, crowded islands.

Black Duck (*Anas rubripes tristis*). It is the writer's belief that there are no published records of this bird for Yellowstone Park. Three definite sight records are presented here. On August 23, 1932, two birds were seen on Junction Lake, a small glacial "pothole" in the Lamar Valley. Half an hour later three

*The Farallone Cormorant is a subspecies of the Double-crested Cormorant. It would seem desirable to have these records of the Farallone Cormorant for Yellowstone Park verified by further observations or specimens.—Ed.

birds were noted on Trumpeter Lake, a larger pothole lying immediately south of the first-named pond. It is possible that two of these were the two previously flushed from Junction Lake.

Black Ducks were not seen again until August 28, when three birds were recorded with a flock of Mallards on a little pond about two miles north of the above locations. Both Park Ranger Ben Arnold and Mrs. Marguerite Arnold, who have lived in this district for a number of years, told the writer that they believed they had seen Black Ducks on these lakes in former years, but were unable to give any definite dates.—COMPTON CROOK, *Western Reserve University, Cleveland, Ohio.*

Behavior of the White-fronted Goose at Tl-Ell, Queen Charlotte Islands, B. C.—On the evening of May 15, 1935, as I lay concealed beside the tidal flats on the Tl-ell River, a line of thirty geese flying abreast and twenty-five yards or so above the ground came straight toward me. A few birds were talking. Twenty-eight were White-fronted Geese (*Anser albifrons albifrons*) and two were Cackling Geese (*Branta canadensis minima*). When the flock was about fifty yards from me the birds swung into the southwest wind and, with wings bent down from the carpal angle, yellow feet thrust forward and webs extended, slanted down to a sand flat in the river. They alighted as they had arrived, in a long line, and for about ten minutes kept this alignment. As they stood thus, on the sandy stretch of river bottom where shallow pools of water glistened, some birds drank, thrusting the neck forward then throwing back the head to swallow the water, without moving from their position in the line. Others thrust heads into the shallow water and remained so for a minute or longer, perhaps taking sand. One bird stretched out a wing and balanced on one foot while combing the wing with the other. Accompanying these movements was a low, murmuring chatter of voices.

The birds were less than 100 yards distant, the light was perfect and binoculars revealed each feature in detail, the brilliant yellow feet, the pinkish bills, the white foreheads and the massed black on the bellies of the older geese. The two Cackling Geese in relation to the others appeared less than two-thirds the size.

Presently the birds became restless and individuals moved a short distance to one side or the other but kept the general alignment. Finally those at the end of the flock nearest to the salt grass meadow began walking toward it and soon the whole company was in motion and still in single file they paced, with rather long steps, toward the grass fifty yards away. Over a deep channel they swam and, still in single file, climbed a two-foot bank and on to the meadow grass. One bird, probably a male, seized with its bill a smaller bird by the tail coverts and held on with outstretched neck while the one thus held walked straight ahead, paying no attention to its follower. Six birds rose and after making a wide circle over the meadow and calling loudly dropped again to the main flock.

After all had reached the meadow they kept walking ahead in a fairly straight course but no longer in single file, seizing a piece of grass here and there without pausing. Fifteen minutes after reaching the meadow the birds had traveled about half a mile, passing through a wire fence on the way, and no longer were distinctly visible. On May 17 seven visited the meadows. These were the last seen.—J. A. MUNRO, *Okanagan Landing, B. C.*

ORNITHOLOGICAL LITERATURE

295 American Birds. Published and distributed by the University of Minnesota Press, Minneapolis, Minn. Price, $2.00.

The beautiful colored plates which illustrate "The Birds of Minnesota", by Dr. Thos. S. Roberts, have been previously mentioned in these pages. These plates were, for awhile, made available as separate and loose sheets. They have now been put together between stiff covers and held by a coiled spring binder. There are ninety-two plates, showing 295 species of birds which are found in the Mississippi Valley. These plates are the work of several artists, Major Allan Brooks, George Miksch Sutton, Walter Alois Weber, Walter John Breckenridge, Francis Lee Jaques, and the late Louis Agassiz Fuertes. It is an unusual collection of colored bird plates by noted American artists. —T. C. S.

The Birds of Nevada. By Jean M. Linsdale. Pac. Coast Avifauna, No. 23. Cooper Ornith. Club, Berkeley, Calif. 1936. Pp. 1-145, one map. Price, $4.00.

Most of the work on the ornithology of Nevada has hitherto been scattered. The work here listed is a summary of all that is known at the present time of the distribution of species within this state. It is a much needed publication.—T.C.S.

Birds of the Charleston Mountains, Nevada. By A. J. Van Rossem. Pac. Coast Avifauna, No. 24. Cooper Ornith. Club, Berkeley, Calif. 1936. Pp. 1-65, figs. 13.

The Charleston Mountains are located in the extreme southern tip of Nevada, not far to the eastward of Death Valley. These mountains are described as "boreal islands", surrounded by Sonoran deserts. The present work is an annotated list of 160 species. The list contains several forms which are not recognized by the A. O. U. Check-List. In a few cases the vernacular name has been made to vary from the Check-List. A foot-note explanation of such variations from established usage might be appreciated by many readers.—T. C. S.

Procedure in Taxonomy. By Edward T. Schenk and John H. McMasters. Stanford Univ. Press, Stanford University, Calif. 1936. Pp. 1-72. Price, $2.00.

We know of no other single volume which covers quite the same ground. The book is small, because it is concisely written. One chapter is on types, and defines the various types from holotype to topotype and plastotype. The storage of type material is also discussed. The procedures for describing new species and for compiling synonymies are presented. The appendix, which occupies a little more than half of the book, reprints the International Rules of Zoological Nomenclature, together with summaries of official interpretations rendered. Little is said of the status of, and rules governing, subspecies. While the book is written primarily for palaeontologists the same rules apply throughout the zoological field.—T. C. S.

Distribution of Breeding Birds of Ohio. By Lawrence E. Hicks. Bull. No. 32, Vol. VI, Ohio Biol. Survey. 1935. Pp. 123-190. Price, 75 cents.

The author reports on the breeding of 181 species of birds within the state of Ohio, basing the report on the literature and recent unpublished studies. The breeding status of each species is adequately discussed for the different parts of the state. A table shows the breeding status of the Ohio list in the seven adjacent states. A three-page bibliography is appended. No index.—T. C. S.

INDIANA AUDUBON SOCIETY 1935 YEAR BOOK. Published by the Indiana Audubon Society. Pp. 1-98. Numerous Illustrations. Price, $1.00 (Harold A. Zimmerman, Sec.-Treas., 915 West Gilbert St., Muncie, Ind.).

The front article is an encomium of T. Gilbert Pearson, well known for his work in the Audubon Association. Dr. Earl Brooks continues his anecdotes about the Robin. A paper by L. A. Test shows that more than 200 Blue Jays have been banded at West Lafayette; and the question whether the Blue Jay migrates from that locality seems to be in doubt. The Indiana Audubon Society holds an annual meeting, which was held at Indianapolis in 1935. The membership appears to be over 200.—T. C. S.

PRELIMINARY CHECK LIST OF THE BIRDS OF DALLAS COUNTY, TEXAS. Revised August 15, 1935. By Jerry E. Stillwell. Privately published by the Author, Dallas, Texas. Mimeographed pp. 1-53.

This check list has been made up to serve local needs, and therefore includes a number of expected species in addition to those actually found. A previous list was published in 1934, the present one being a revised edition. The present (1935) list "contains 412 birds, of which 273 have been recorded, leaving 140 on the 'possible' list." A remarkable amount of information concerning most of the species treated is given in a minimum of space; and the inexpensive mode of publication places it within easy reach of those interested.—T. C. S.

THE BIRDS OF NORTHERN PETEN, GUATAMALA. By Josselyn Van Tyne. Misc. Pub. No. 27, Mus. Zool., University of Michigan. 1935. Pp. 1-46.

Two hundred and twenty-two species and one new subspecies are listed in this report.—T. C. S.

THE BIRDS OF KODIAK ISLAND, ALASKA. By Herbert Friedmann. Bull. Chicago Acad. Sci., V, No. 3, September, 1935. Pp. 1-54.

After reviewing the work which has been done in this region the author gives an annotated list of 142 birds.—T. C. S.

PROCEEDINGS OF THE LINNAEAN SOCIETY OF NEW YORK. No. 47 for 1935. Published by the Society at the American Museum of Natural History, New York. Issued in March, 1936. Pp. 1-142. Price, 75 cents.

The first paper is an obituary of Mr. Warren Francis Eaton, with portrait. There follows a posthumous paper by Mr. Eaton on the birds of Essex and Hudson Counties, New Jersey. This is an extensive paper which gives the status of 297 forms in one or both of the counties treated. This list is preceded by a careful historical and ecological analysis of the avifauna. Mr. C. A. Urner contributes a paper on the status of various species of shore birds on the north and central New Jersey coast. Mr. Joseph J. Hickey presents an extensive review of the ornithology of the New York region during 1934. A number of other papers on birds make this issue again wholly ornithological.—T. C. S.

WINTER BIRDS AROUND MY HOME. By Thomas G. Scott and George O. Hendrickson. Ames, Iowa.

This is a pamphlet for the use of schools, clubs, or individuals, giving short sketches and outline drawings of twenty-four Iowa winter birds. The drawings are the work of Sid Horn, and are to be colored with crayons or paint by the

pupil. The work of the authors and artist is good, but the work of the editor is slip-shod. Whether the pamphlet is part of any series is not shown, and it is not dated. Names of the authors are given in an obscure corner. Usually when the name of the author is misplaced it is in order to give prominence to some "director", but no such submergence is evident here.—T. C. S.

The Birds of Zion National Park. By C. C. Presnall. Reprinted, Proc. Utah Acad. Sci. Arts and Lett., XII, 1935, pp. 196-210.

Mr. Presnall reports 140 kinds of birds known to occur in the Zion National Park. He points out that the regular tourist season is not the best time for bird observation in this area. The author follows the rule of using trinomials only where specimens have been taken, but introduces names not yet granted by the A. O. U. Check-List.—T. C. S.

The *Journal of Minnesota Ornithology* makes its appearance with Volume I, No. 1, for April, 1936. It is announced as an "Annual devoted to Minnesota Bird Life", and is published by the T. S. Roberts Ornithology Club, at fifty cents (address, Prof. George W. Friedrich, State Teachers College, St. Cloud, Minn.). A portrait and short sketch of Dr. Roberts are given in the first pages. Dr. H. C. Oberholser contributes a short list of birds from the Lake Traverse and Heron Lake regions, based on observations made in 1919. Dr. T. S. Roberts reports an October storm with high duck mortality in northern Minnesota in 1935. Several bird lists are published: one list from central Minnesota includes 239 species; another names 125 breeding species in the St. Cloud region; another is a short list for Heron Lake. Dr. Roberts reports the nesting of the Great Gray Owl in Minnesota.

The main article in the current number of the *Snowy Egret* (Spring, 1936, XI, No. 1) is an annotated list of birds observed in the Upper Peninsula of Michigan. The list includes 141 species. Another writer describes the flight song of the Phoebe. Prentice Preace gives a concise and clear description of the behavior of the Road-runner, especially when in conflict with a rattlesnake.

Mr. Harry B. Hall, of the Kansas State Teachers College at Pittsburg, Kansas, has published a list of "The Birds of Southeastern Kansas with Migration Dates" in the *Transactions of the Kansas Academy of Science*, Vol. 38, 1935, pp. 311-315. This list contains 208 species. In the same volume Mr. M. W. Mayberry presents a paper on the "Origin and Development of the Crop of the Chick", pp. 325-327, with four plates.

Iowa Bird Life for June, 1935, has an article by Dr. P. L. Errington on the Bob-white in Iowa. Mr. William Youngworth writes on the Blue Goose in Iowa. In the issue for September, 1935, (V, No. 3) Mr. Philip A. DuMont lists the private collections of birds in Iowa, and gives a brief description of each. The same author brings the Starling records up to date, and records the Magpie invasion of Iowa in 1934-1935. The December number is devoted wholly to a five-year index of the periodical. The leading article in the March, 1936, issue (VI, No. 1) is on the present status of the Prairie Chicken in Iowa, by William Youngworth, and indicates that this species is still resident in many parts of the state, though in small numbers. Each issue contains many short articles on the ornithology of Iowa.

The *Cardinal* for January, 1936, (IV, No. 3) presents an article by Maurice Brooks on the birds of the spruce belt of West Virginia, which lies chiefly above the 3000-foot level. It is interesting to note in this list many birds which in the interior are found only in much higher latitudes where temperature and vegetation are more or less comparable. Mr. Bayard H. Christy gives an interesting account on the feral life of Rock Doves in the city of Pittsburgh. Reference is also made to other reports of similar reversions to nature by this species.

In the *Florida Naturalist* for June, 1935, Mr. Robert C. McClanahan begins a fifty year comparison of the bird life at Gainesville, which is completed in the October number. Messrs. C. R. Mason and R. J. Longstreet contribute, in the January, 1936, number (IX, No. 2) a most entertaining account of the Tortugas Islands. The history includes the establishment of Fort Jefferson in 1846, its abandonment in 1873, revival in 1898, its abandonment again in 1901, and its conversion into a National Monument in 1934, under the control of the National Park Service. In 1907 the Carnegie Institution of Washington established a Marine Biological Laboratory on these islands, and here it was that Dr. J. B. Watson carried on his well known studies on the behavior of the Noddy Tern and Sooty Tern. Announcement is made in this number of the annual meeting of the Florida Audubon Society to be held at Winter Park in March.

Wildlife Review is a new and mimeographed publication issued by the U. S. Biological Survey for a new and distinct purpose. We have seen No. 1, for September, 1935, and No. 2, for January, 1936. It is at present conducted by W. L. McAtee. Its purpose is to present short abstracts of the literature on wildlife conservation and wildlife management. In the first number we find abstracts of papers on the following subjects: conservation (3 titles); cycles (2); disease (12); ecology (10); education (1); food habits (5); life histories (4); management (34); propagation (22); restocking (7). Number 2 was issued in January, 1936, and contains a similar lot of abstracts.

No. 3, for April, has also been distributed, and is similar in plan to the other numbers, except that a useful list of American sportsmen's magazines is included.

We wish only to say that the purpose and plan of the *Wildlife Review* are splendid. So much literature is being published on the subjects of conservation and management of wildlife, and in so many different places, that very few workers will have access to all of it. The enormous amount of literature in all biological fields has made the matter of abstracting very important. We hope there may be no question about the continuance of this abstracting service by the Survey. But the value of it would justify a printed bulletin rather than one by the mimeograph process.

In *News from the Bird Banders* for July, 1935 (X, No. 2), Dr. J. J. Parsons relates some experiments with hummingbirds. One orphan Costa Hummingbird, weighing only seven and a half grains, was placed in the nest of a Black-chinned Hummingbird, and was accepted and fed by the mother bird, in spite of a marked difference in ages of her own and the adopted one. Later the same adult was found to be caring for two nests at the same time—one

containing young, the other eggs. The August number contains a very complete history of the decline of the Ivory-billed Woodpecker. The February, 1936, number (XI, No. 1) announces that Mr. T. T. McCabe relinquishes editorship of the *News*, and will be succeeded by Mrs. M. C. Sargent, of Pasadena. Mr. and Mrs. H. Michener also present a comparative study of the singing of male mockingbirds.

The *Inland Bird Banding News* for September (VII, No. 3) and the December number for 1935 (VII, No. 4) bring reports on the activities of the Inland Association. The latter number has the minutes of the 1935 annual meeting, a sketch of the late Percival Brooks Coffin, and an index for the first five volumes, 1929-1933, of the periodical. The March number for 1936 (VIII, No. 1) has a note by Dr. J. F. Brenckle on the effect of dust storms on Burrowing Owls, and also notes by O. M. Bryens on age records of various birds.

The *Redstart* is issued by the Brooks Bird Club, of Wheeling, W. Va. The December number for 1935 (III, No. 3) consists mainly of a very readable article on the songs of warblers. In the March, 1936, number (III, No. 6), the matter of field identification of subspecies is given some editorial attention, indicating rather widespread interest in it. The April number (III, No. 7) gives a report of the Erie meeting of ornithologists and conservationists. This was a regional meeting attended by representatives from Ohio, Pennsylvania, New York, Ontario, and West Virginia. The plan agreed upon was to form a very loose organization, without dues, and without attempting the merging of any existing organizations. Mr. Bayard H. Christy, of Pittsburgh, was made Executive Chairman, and a vice chairman was named from each district.

The *Raven* is issued monthly in the interest of Virginia ornithology by the Virginia Ornithological Society. Many notes of local and general interest are put on record. For instance, the September-October number (1935, VI, No. 9-10) reports the Arkansas Kingbird for November 16, 1931. And in a historical paper (February-March, 1936, VII, No. 2-3) Mr. John B. Lewis tells of taking a specimen of the Green-tailed Towhee in the winter of 1907-1908. It is doubtless on the basis of this specimen that the A. O. U. Check-List lists this western species as accidental in Virginia. This number also contains the minutes of the Sixth Annual Meeting of the V. S. O. The report shows the Society to be in a flourishing condition, and we hope the *Raven* continues to make its regular trips, as usual. No. 1 for January we did not see.

We note the issuance of several mimeographed periodicals from Missouri. The *Saint Louis Bird Club Bulletin* is the official organ of the St. Louis Bird Club. It has now reached Volume 4, No. 8, for November, 1935. The *News Letter* of the Audubon Society of Missouri has issued January, February, and April copies and Bulletin No. 1, for 1936. *Nature Notes* is the Journal of the Webster Groves Nature Study Society, of which we have seen only No. 9 of Volume VIII, for January, 1936. The *Night Heron* is published privately by Messrs. John O. Felker and John P. Stupp, at Clayton, Mo., and has passed through Volume 3, No. 9, for September, 1935.

A new mimeographed publication to reach us is *Bird Notes*, issued by the Superior (Wis.) Audubon Society (Mrs. E. L. Bolender, 92 Maple Ave., Superior, Wis.—Dues, $1.00 per year). The initial number (Vol. I, No. 1, 1936) contains papers on the activities of the Society, on winter birds of the region, on certain Purple Finches, the winter feeding of game birds, planting to attract birds, protection of hawks and owls, and short notes.

The *Chickadee* for June, 1935 (Vol. V, No. 1) publishes a 1935 spring migration list, minutes of the Forbush Bird Club's meetings and field trips, and various news notes.

Some of our readers may be interested in a new monthly magazine called *Nature Notes*, which first appeared with the January number for this year. The numbers thus far issued averaged about twenty-four pages of interesting and timely articles on all phases of nature lore. The numerous illustrations are from excellent photographs. The March number reports a field observation of two Arkansas Kingbirds in the western part of Michigan on May 31, 1935, the evidence for which seems to be satisfactory. The subscription price is $1.00 per year, and the address is 4800 Prospect Road, Peoria, Ill.

The *Bird Calendar of the Cleveland Bird Club* is a mimeographed bulletin which seems to be older than most similar publications now current, the January, 1936, number being marked "31st Year, Bulletin No. 4". The eleven pages of this number are filled with local notes and statistics, and fall migration records.

The *Game Research News Letter* (mimeographed) is issued by the Department of Game Management at the University of Wisconsin, and gives information of the current activities in training game management workers at this University.

The *Migrant* for last December contains an account of ornithological work done at Peabody College by Dr. Shaver's students, nineteen theses being listed. The issue for March (VII, No. 1) mentions twenty species of birds to be added to Ganier's "Distributional List of the Birds of Tennessee". Both numbers carry the halftone plates which Mr. Ganier inaugurated.

The *Prothonotary* is published by the Buffalo (N. Y.) Ornithological Society. The subscription is 50 cents a year, and may be sent to Mrs. Geo. C. Kratzer, 140 Wardman Road, Kenmore, N. Y. It gives records of field trips and news of local events. The March number announces a regional meeting of bird students to be held at Erie, Pa., on March 14 and 15. The April number indicates that this meeting was held. We would have been glad to learn more about it.

The *Flicker* continues to appear at its regular intervals of February, May, October, and December. It is issued by the Minnesota Bird Club. The officers are: Charles Evans, President; Robert Turner, Vice-President; Robert Upson, Secretary-Treasurer, 4405 Lyndale Ave., S., Minneapolis; George Rysgaard, Editor.

EDITORIAL

For About Two Years Mrs. Margaret M. Nice has been preparing for *Bird-Banding* a topical review of current ornithological literature, on a plan somewhat similar to that employed in *Biological Abstracts*. For example, the last number of the magazine (April) classifies the abstracts under the following topical headings: Bird-Banding, Migration, Homing, Longevity, Life History, Song, Ecology, Bird Behavior, Books. Here a worker may readily turn to the particular group of literature which most concerns him. With a file of the magazine at his service the ornithologist is even better equipped than with *Biological Abstracts*, in which emphasis is placed on taxonomy. And it is of the greatest value that this abstracting service covers also the European ornithological magazines, to which complete citations are made. We regard this work as one of the most valuable contributions to ornithology now being regularly published. If now, somewhere, there could be made available a pretty complete list of all ornithological periodicals, with addresses from which copies might be obtained, it would seem that the ornithological worker would be well equipped. Any expansion of this work which might be found possible should receive the appreciative support of all concerned.

Mr. A. M. Bailey has been appointed Director of the Colorado Museum of Natural History, at Denver, where he was at one time Curator of Birds and Mammals. Mr. Bailey will be missed in the Mississippi Valley, and will carry with him the best wishes of many friends.

One of our most pleasant contacts at the 1934 Pittsburgh meeting was with Mr. Warren F. Eaton, who represented the National Association of Audubon Societies. His affable and enthusiastic personality engendered feelings of highest regard. And we felt certain that he was a young man with promise of a brilliant future. It was with sadness, therefore, that we read of his death on February 16, at the age of thirty-five years.

The Eleventh Annual Meeting of the Cooper Ornithological Club was held in Los Angeles in April. Dr. Guy C. Rich kindly sent us a copy of the program listing thirty-one papers. Mr. Harry Harris favored us with an artistic announcement of the Art Exhibit held in connection with this meeting. This exhibit consisted of forty-four original paintings of birds and mammals by Major Allan Brooks, some of which were on sale.

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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CONTENTS

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THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY

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ANALYTICAL STUDIES OF GROUP BEHAVIOR IN BIRDS[1]

BY W. C. ALLEE

The bird flock as a social organization is again receiving a part of the attention it deserves. With increase in facility in marking individuals, there has come new and valuable information regarding some aspects of the intimate social structure of bird groups. Some of the earlier work was reviewed by Allee (1931, 1934); the most spectacular of the modern trends was initiated by Schjelderup-Ebbe who has recently summarized his own studies (1935). In this latest summary, Schjelderup-Ebbe says (p. 949), "One of the points which the recognition of each individual bird in the flock of the same species makes it possible to observe is that *there exists among birds a definite order of precedence or social distinctions.*[2] The precedence in rank proved to be founded upon certain *conditions of despotism.* Between any two birds of each species, in a large number of species examined, one individual *invariably* had precedence over the other . . ." Schjelderup-Ebbe records that he has observed such despotism in over fifty species of birds including the common chicken, a common sparrow, various ducks, geese, pheasants, cockatoos, parrots, various tits, and the common caged canary.

Stimulated by Schjelderup-Ebbe's early observations, for several years at Chicago, we have been accumulating data concerning the social hierarchy in some few species of birds. Our experience with the common chicken (Masure and Allee, 1934a) is similar to that of Schjelderup-Ebbe, Murchison, and other observers. With the other birds, our observations differ significantly.

Masure and I found first with pigeons that the position in the social order is not so firmly fixed that one bird of a given contact pair always is dominant and the other always gives way. Rather we found that individual relationships in the flocks of pigeons which we

[1]This report is a review of studies published or to be published in detail elsewhere.

[2]All italics as in the original.

studied were give and take affairs. To be sure one bird of any two usually dominated more than it retreated. In a flock of seven male pigeons, in only two of the twenty-one possible pairs did the same bird win all the observed contact reactions. In the other nineteen pairs, the loser, on the average, won twenty-three and lost forty of the observed pair contacts.

In the similar group of sex segregated female pigeons, no single bird dominated any other individual in all their observed pair contacts; rather the loser won an average of twenty-five and lost an average of forty-five such encounters. One bird, *RY*, stood at the bottom of the social order at first and came to dominate the whole female flock in the end. Even in the twenty-eight days during which we studied her while she occupied the dominant position, she lost fifty-eight contact reactions while winning 329. All the other members of the flock, except one, won over her during her period of dominance; one of them as many as twenty-two times that we witnessed.

There is also a place factor in the dominant-subordinate relationship. Among these female pigeons, at one time, *BB* dominated at the entrance to the roost, while *BY* won the majority of all her contacts on the ground.

With shell parrakeets, Masure and I (1934b) found a similar sort of flock organization except that among the female flock of seven, during our somewhat brief period of observations, there were six of the twenty-one contact pairs in which one female had been regularly submissive or had engaged in "no decision" contacts; among the males there were four such cases again out of twenty-one possible pairs. Of the others, the loser among the females on the average, won five and lost twenty-nine of the observed decisive contacts. The corresponding figures among the sex segregated flock of males are six and twenty-seven, respectively.

Since these data were published, Miss Mary Bennett has observed the same win-and-lose sort of organization among ring doves, and Mr. Hurst Shoemaker has made extensive observations with canaries and more incidental ones with a flock composed of five White-throated and one White-crowned Sparrow. Among the canaries, he finds the give-and-take relationship: with the sparrows, there is apparently a greater fixity, but even with them a reversal has been observed in the same hour's observation and without an unusually violent struggle.

In all these birds in which this now-one-wins-now-the-other reaction takes place, there is no evidence that the reversals are unusual reactions as they undoubtedly are among chickens. In the same hour,

one canary or pigeon or ring dove may dominate in a given contact and the other of that particular contact pair may dominate at their very next meeting.

The picture that emerges is one of a flock organized into a social hierarchy which, however, is not necessarily so hard and fast as that of chickens. In the long run in such groups, one becomes fairly sure which of two given individuals will dominate in the larger number of their contacts, but the result of any one meeting is not predictable with certainty.

Putting the matter somewhat facetiously, all of Schjelderup-Ebbe's birds and American chickens as well appear to have the sort of "line organization", which is characteristic of a military system or of a Fascist or Nazi state while the birds we have studied, chickens excepted, have a more democratic organization. The sort of hierarchy found among chickens may be characterized as being based on an almost absolute peck-right while that we have seen in pigeons, ring doves, canaries, and perhaps in sparrows, is based on what may be called a peck-dominance.

With many birds there is a definite social prestige related to sex. The usual report is that the more showy or larger sex is dominant. With the shell parrakeets which we have tested, the females are distinctly dominant except during the breeding season when the dominance shifts to the other sex. In shell parrakeets the two sexes are closely similar in coloration and size. The males tend to be less shy in the presence of an observer but in a mixed flock they are clearly dominated much of the year by the females. Even the low ranking birds in a homosexual flock dominated the high ranking males when placed with them.

It has been reported by others (Katz and Toll, 1923) that in chickens there is a positive correlation between ability to learn and social position; with the parrakeets, Masure and I found no such correlation. This is one of the points that Mr. Shoemaker is now testing with canaries.

Masure and Allee (1934b) suggested that high rank in the social order could easily have survival value during times of food shortage, a suggestion which needs to be tested by exact observation. Murchison (1935d) subjected a flock of chickens to mild starvation and found that the dominant roosters lost more weight than those lower in the social scale and that, in fact, loss of weight was directly proportional to social position. This is explicable in terms of the behavior differences he found to be associated with social position, a matter which will be examined shortly.

It would be extremely interesting and important to make further analyses of the underlying physiology of the social hierarchy. Such experiments might well proceed along two different lines. In the first place, using a white breed, such as the white leghorn chicken, one could alter coloration of birds with known social status and ascertain whether color is an important recognition mark in these social hierarchies. Such experiments would have immediate significance in relation to the whole question of recognition color markings. Along the same line of experimentation, contour lines could also be modified by plucking or cutting feathers, e. g., or by some other method, and test thereby the importance of this factor in social recognition.

More significant investigation would endeavor to alter experimentally the physiological state of selected birds of known status in the social group. The injection of sex hormones, e. g., and many of the other devices of the students of sex physiology, would give an excellent chance for testing the social effects of these active physiological agents. The possibilities of experimental work along this line are almost as varied as the probable results are important and fascinating. Preliminary experiments indicate that positive results may be expected.

Another aspect of this problem has been somewhat investigated already. This is concerned with the effect, direct social order contacts aside, of the presence of other individuals on the behavior of any given member of the flock. With chickens, Murchison has recently reported a series of studies covering certain phases of these reactions. When released from behind glass doors into a narrow runway, cocks will run toward each other: the one higher in the social order will run the greater distance (1935a). When two cocks from the same flock are confined in wire cages some six feet apart, and a third member of the flock is released into the enclosure containing the cages under the conditions of the experiment, the free bird, if a male, goes toward the caged cock that is lower in the social hierarchy: if a female, it goes toward the cock that is higher in the hierarchy (1935b).

Three of the six cocks in the one flock Murchison studied did not exhibit primary sexual behavior; of the other three, the number of treadings, other conditions being similar, were in order of the relative dominance of the cock, with the most dominant bird treading pullets most frequently. Also the dominant female was most trod of the pullets and the number of treadings of the other females was in direct relation to their position in the social scale; the pullet lowest in the social hierarchy received the least sexual attention (1935c). These last observations are in accordance with the findings of Masure and

Allee that birds high in the social scale have more contact reactions per unit of time than do those low in the social order in the same flock.

Another type of interaction between individual birds has been tested by Allee and Masure (1936). The fact that shell parrakeets are closely flocking species led us to an extended study of the rate of learning of these birds in a simple two-alley "problem" box when isolated and when paired. From observations on other animals it seemed likely that the parrakeets might learn more rapidly if paired, but this expectation was not realized.

Both isolated and paired parrakeets showed rapid improvement in speed of reaction and in reduction of errors with repeated trials in the simple "problem" box which was used. Under both conditions, the period of most rapid learning lasted from ten to twelve days, after which there was a long, slow improvement for weeks until, in the majority of cases, the animals came to run rapidly and surely through the maze. The standard criterion of excellence set for the birds was the running of five trials per day for two successive days without errors. Often the birds would run through the maze in a mean time of five seconds or even less, per trial when on their first performance, they would take on the order of 200 seconds or more.

Throughout these tests, the paired birds showed significantly slower reaction times and tended to make more errors than isolated birds of the same stock and with similar treatment. Although paired parrakeets can become as well trained as their isolated fellows, the training period usually takes longer and final performance tends to be more erratic.

Parrakeets caged in pairs and trained alone show learning curves very similar to those given by others caged as well as trained singly. When paired and isolated birds which had become well trained to go toward green rather than toward red light had their grouping reversed, the newly isolated birds showed less disturbance than the newly paired individuals. When birds so trained to respond to the green of the green-red signal were rearranged with the paired birds isolated and the formerly isolated birds paired, and then trained to go toward blue in a blue-yellow signal, the change in signal appeared to be more disturbing than the change in social relationship.

Incidentally, some of these parrakeets retained marked effects of their training for a period of from six to eight months during which time they had passed through a breeding season in an outdoor aviary. No attempt was made to determine the relative retention by paired and by isolated birds.

The two lots of parrakeets whose training was continued into the spring season exhibited an unexplained disturbance in their maze performance probably associated with a foreshadowing of the breeding period. Both isolated and paired birds showed the disturbance; the paired birds more than the isolated ones. Throughout the work, however, there was no evidence that the heterosexual pairs behaved differently in the maze, from the homosexual pairs.

There was a decided tendency for birds of a pair to give similar reaction times and to make the same errors in any one run through the maze. The presence of the second individual was often a disturbing factor; apparently it introduced a sort of distraction such as has usually been found in similar experiments with other animals.

Summary

1. The social order among chickens and perhaps in the observed sparrows is of the relatively firmly fixed, despotic sort originally described by Schjeldrup-Ebbe.

2. In pigeons, shell parrakeets, ring doves, and canaries, the social order, while distinctly recognizable, is less firmly fixed; subordinate individuals normally "win" a minority of their pair contacts.

3. Promising lines of investigation of intra-flock relationships are suggested.

4. Within the flock, individual members react on others in ways not directly concerned with the establishing and maintaining of a social hierarchy. These reactions include differential behavior to the various individuals in the flock, as analyzed by Murchison for chickens, and the distracting effects that result from the presence of a second shell parrakeet during training in running a simple maze.

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NOTES ON THE HORNED LARKS OF THE CENTRAL OHIO REGION

BY CHARLES F. WALKER AND MILTON B. TRAUTMAN

The status of the various races of the Horned Lark (*Otocoris alpestris*) that occur in Ohio has received little attention from Ohio ornithologists. The following notes are based upon observations and collections made during the course of more than 1000 field trips in the central part of the state over a twelve-year period from 1922 to 1933, chiefly near Columbus and at Buckeye Lake, but also at numerous other localities in the counties of Union, Delaware, Franklin, Licking, Fairfield, and Pickaway, all in the till plains province of the state. As a matter of convenience we have referred to this area as "Central Ohio", but such generalizations as occur in these notes are not intended to apply beyond the limits outlined above. Particular attention was given to the winter population in an effort to determine approximately the relative abundance of the three races, *Otocoris alpestris alpestris*, *O. a. praticola*, and *O. a. hoyti*.

Under favorable conditions of light the great majority of individuals may be accurately identified in the field. Many such identifications have been checked by collecting. During the winter the gregarious habits of the Horned Lark make possible the close comparison of individuals, and the slight differences in size and color that characterize the different races become relatively conspicuous.

The Prairie Horned Lark (*Otocoris alpestris praticola*) is a moderately common although somewhat local breeding bird in central

Ohio, nesting most frequently in well-drained pasture fields. Males defend their territories as early as the first week of February, and nearly all of the breeding individuals are present by the last of that month. This is also true in northwestern Ohio where the bird nests much more abundantly than in the central part of the state.

The only nest of which we have record in central Ohio was found by Dr. Robert B. Gordon on March 24, 1930, near the O'Shaughnessy Reservoir in Delaware County, and contained three eggs in an advanced stage of incubation. Several nesting records from northern and northwestern Ohio indicate that the first complement of eggs is normally laid in late March. Adult larks feeding young birds out of the nest have been seen at Buckeye Lake as early as April 20 and as late as June 2.

During the summer and early fall months single birds and small groups including as many as ten or twelve individuals may be encountered along dusty roads and in closely cropped pastures or stubble fields. At these seasons the larks are inconspicuous. During late September and October flocks of as many as thirty birds are occasionally seen. By December a marked decrease has occurred, and during the latter half of that month and the first half of January Prairie Horned Larks are decidedly uncommon, and in some years perhaps entirely absent.

Sometime during late January or February, depending upon weather conditions, there is a decided influx of birds of this race; small, loosely associated groups appear at the nesting grounds and the males may be found singing from frozen clods of earth, or, especially when the ground is covered with snow, from fenceposts. Even where flocks of the Northern Horned Lark (*O. a. alpestris*) are present in the same field, there is little or no association of the two races, and behavior at this season serves to differentiate them quite as satisfactorily as do the morphological characters.

We have examined eight central Ohio specimens of the Prairie Horned Lark in the Ohio State Museum collection which beyond reasonable doubt represent breeding individuals. On the whole they agree closely in color and size with the description of *praticola* as given by Oberholser (Proc. U. S. Nat. Mus., V. 24, 1902, p. 825). In none of these birds is there any trace of yellow in the posterior portion of the superciliary line.[1] In a series of sixteen males collected

[1]We have, however, seen one breeding specimen (O. S. M. 6979) from Lucas County, Ohio, in which the superciliary line is uniformly pale yellow, although in other details of coloration and in size the specimen is typical of *praticola*.

between November and May, the wing length ranges from 102.6 to 108.1 mm., while two females have wing lengths of 97.1 and 99.8.

The Northern Horned Lark (*O. a. alpestris*) is unquestionably the dominant race during the winter months. Our earliest fall record is that of a flock of approximately twenty-five birds seen on a sandbar at Buckeye Lake on October 11, 1928. Flocks of from twenty to one hundred individuals are usually present by early November. The peak of abundance occurs during December, January, and February when flocks of 200 or more are frequently encountered. The largest flock noted by us was estimated to contain 600 individuals and was seen in the cornfields of the Scioto River bottom-lands a few miles south of Columbus on February 18, 1928. The largest number recorded in a single day was that of an estimated 2000 individuals, the combined number of several flocks which were encountered along a three mile stretch of road immediately south of Buckeye Lake on February 14, 1929. During the month of March there is a rapid decline in numbers and our latest date is March 29, 1930, when a flock of twelve birds was seen near Buckeye Lake.

The size of the winter population varies greatly from year to year and is apparently correlated with the amount of snow on the ground and the availability of food. Low temperature seems not to be a factor. Many of the flocks inhabit those areas in which *praticola* nests in the spring, and where weed seeds and cultivated grains are accessible. Fields in which livestock is fed and where waste grain is consequently abundant, and fields in which manure has been scattered seem to be particularly attractive. In such situations the birds are usually able to find food even during periods of heavy snowfall.

The Northern Horned Lark is characteristically gregarious during the entire period that it occurs in this region. On warm spring days a short and presumably incomplete song is frequently heard, usually delivered while the bird is in flight. At no time, however, does the singer fly far from the flock. Occasionally an individual sings from the ground while associated with the flock. We have never seen a Northern Horned Lark sing from an elevated perch as does our nesting race, *praticola*. In spite of the gregarious habits of the northern bird, spirited and prolonged combats often occur between individuals of the flock. These have been most frequently noted on warm days late in the winter and may be indications of the approaching breeding season.

The Ohio State Museum collection includes thirteen central Ohio specimens of *O. a. alpestris*. Among these are individuals with throat

and superciliary line fully as rich a shade of yellow as any Massachusetts or Long Island specimen that we have examined. In others the yellow color of these parts is distinctly pale but these latter birds agree with the former in size and in the rich dark tones of the upper-parts and seem to be unquestionably referable to the race *alpestris*. The wing length in males of this series ranges from 109.7 to 114.4 mm. and in females from 100.6 to 105.2.

Three additional specimens are decidedly atypical although nearer to *alpestris* than to any other of the subspecies. One of these (O. S. M. 3072), a female with a wing length of 100.5 mm., has an extremely pale yellow throat and superciliary line, the dorsal color, however, is darker than in *praticola* and there is a faint yellowish suffusion in the brownish crown feathers. Two other specimens, males (O. S. M. 3065, 3068), exhibit similar departures from the normal *alpestris* coloration, but are so large (wing length 110 mm. in each) that we conclude they represent intergrades between *alpestris* and *hoyti*. These two birds were taken from flocks largely comprised of typical individuals of *alpestris*. Another specimen (O. S. M. 3061) seems so clearly intermediate between *alpestris* and *hoyti* that we hesitate to refer it definitely to either race. This bird was collected at Buckeye Lake on December 29, 1928. From the same flock were taken: a female (O. S. M. 3073) which seems typical of *alpestris*, the atypical male of *alpestris* (3068) mentioned above and a pair of larks (3077, 3088) which seem clearly referable to *hoyti*. These specimens were selected, after careful study, from a large flock in which by far the majority of individuals showed the yellow superciliary line of *alpestris*.

Hoyt's Horned Lark (*Otocoris alpestris hoyti*) is by far the rarest of the three races that occur in this region. Most of our records are of one or two individuals associated with large flocks of *O. a. alpestris*. These birds, with the white superciliary line and pale dorsal coloration of *praticola*, but fully as large as the *alpestris* with which they associate, are not difficult to identify in the field. The greatest number recorded, on December 29, 1928, at Buckeye Lake, was five in a flock estimated to contain 100 individuals of *alpestris*. Many large winter flocks of larks which we have carefully examined contained no *hoyti* nor have we found any flocks composed entirely of *hoyti*. The available central Ohio records for this race range from November 26 (Oberholser, Wilson Bulletin, Vol. 31, 1919, p. 64) to March 17. Upon a few occasions we have heard a short song from individuals of this race, and twice our attention was first attracted to the birds by

a peculiar quality of the voice which seemed distinctly different from that of *alpestris*.

Only six specimens which are clearly referable to *hoyti* have been collected.[2] The wing length of the five males ranges from 110.2 to 113.4 mm., while that of the one female is 106.2. The superciliary line in all six specimens is white and the colors of the head and back are lighter than in *alpestris* and lack the brownish tones characteristic of that race. There is much variation in the intensity and extent of the yellow throat patch.

The status of the three races of Horned Larks in central Ohio may be briefly summarized as follows:

O. a. alpestris is overwhelmingly the commonest race in winter, occurring characteristically in large flocks which may also include a small proportion of integrades between *alpestris* and other races, and a few individuals of *hoyti*. The nesting race, *O. a. praticola*, is rare or even absent during a short period from about December 15 to January 20, and is not known to occur in large compact flocks at any time.

As regards the ratio of *alpestris* and *praticola* our observations in central Ohio are quite at variance with those of Dr. Lynds Jones, made in the Cedar Point region of northern Ohio (Wilson Bulletin, 1910, pp. 29-30). According to Jones, "winter flocks of these larks are almost always mixed in the proportion of 2 of *alpestris* to 7 of *praticola*." From our own limited observations in northwestern Ohio we gather that *praticola* is a much commoner midwinter bird there than in the central area, and the extensive field work carried on by Messrs. Louis W. and Bernard R. Campbell in the Toledo region also indicates that this is true.

It is possible that the smaller number of *praticola* in central Ohio in winter is correlated with the smaller breeding population, although it might be expected *a priori* that winter flocks would include *praticola* from northern Ohio and Ontario as well as *alpestris* from regions farther north. It seems quite apparent that the ratio of the two races in winter populations varies greatly in different localities in Ohio and that some factors other than climate must be taken into consideration to explain these differences. Due to local, seasonal, and yearly variations it is impracticable to attempt an exact expression of the ratio of the various races in our winter Horned Lark population.

Ohio State Museum, Columbus, Ohio.
Museum of Zoology, University of Michigan.
Ann Arbor, Michigan.

[2]The identifications of two or these have been confirmed by Dr. H. C. Oberholser.

THOMAS LEROY HANKINSON

BY NORMAN A. WOOD

Witmer Stone says, "Ornithologists are born, not made", and in the passing, on December 3, 1935, of Mr. Hankinson, we lost one of the most successful and enthusiastic teachers of ornithology.

Born April 12, 1876, at Valparaiso, Indiana, he lost his parents at an early age, and was given a home by an uncle at Hillsdale, Michigan, where he developed the intense love of natural history which shaped his life work. An important association of his early life was that with Prof. Walter B. Barrows, under whom he studied at the Michigan Agricultural College, until his graduation, with the degree of B.S., in 1898. He then studied at Cornell University, receiving another B.S. degree in 1900. From 1902 to 1919 he held the position of Professor of Zoology and Physiology at the Eastern Illinois State Normal College, at Charleston. From 1919 to 1921 he was Ichthyologist at the Roosevelt Wild Life Forest Experiment Station of the New York State College of Forestry. From 1921 until his death he was Professor of Zoology at the Michigan State Normal College, at Ypsilanti. In 1923 he was given the honorary title of Visiting Investigator in the Fish Division of the Museum of Zoology, University of Michigan.

Professor Hankinson was elected an Associate Member of the American Ornithologists Union in 1897. He joined the Wilson Ornithological Club in 1911, served as Secretary in 1915, and as President from 1922 to 1924. He was Treasurer of the Illinois Academy of Science from 1917 to 1919; Treasurer of the American Society of Ichthyologists and Herpetologists in 1930-31; Vice-President of the Ecological Society of America in 1919; Treasurer of the American Microscopical Society from 1910 to 1915, and Vice-President in 1916; a member of the Executive Board of the Michigan Audubon Society from 1922 to 1927, and First Vice-President from 1925 to 1927.

He took part in natural history surveys in New York, Ohio, Michigan, Illinois, and North Dakota, and as a result of these studies published a number of papers on the classification, habits, and distribution of the birds, and also, more especially, of the fishes of these states. His ornithological papers were published mainly in the *Bulletin of the Michigan Ornithological Club*, *Bird-Lore*, and the *Auk*. Unfortunately, he left a large amount of unpublished data, mostly in the field of ichthyology. However, his greatest contribution to science was doubtless his long and unusually successful career as a teacher of zoology. Few in his field have been as effective in giving students an enduring interest in the study of the fascinating world of wild life all

THOMAS LEROY HANKINSON, 1876-1935

about them. His personal interest in his students was greatly appreciated, and he was universally well liked by them.

The writer became acquainted with Mr. Hankinson while he was a student at the Michigan Agricultural College in 1897. We were both elected Associate Editors of the *Bulletin of the Michigan Ornithological Club*, where in Volume 1, Number 1, pages 1-4, was published his paper on "Progress of Ornithology in Michigan", a very complete outline of the work that had been accomplished up to 1897, giving the names, dates, and lists published by the early ornithologists of the state. While other interests occupied most of his time, he has always been greatly interested in birds, and he has furnished the Museum of Zoology with valuable data and some study specimens, all of which are here gratefully acknowledged. We deeply regret the loss of a valued friend and co-worker of many years standing.

Museum of Zoology, University of Michigan.
Ann Arbor, Mich.

FREQUENCY OF OCCURRENCE OF SUMMER BIRDS IN NORTHERN MICHIGAN

BY JEAN M. LINSDALE

Twice I have given detailed accounts of a procedure for determining and describing the frequency of occurrence of birds on restricted areas. (See *Condor*, Vol. 30, 1928, pp. 180-184, and Vol. 34, 1932, pp. 221-226). The method has been worked out for studies of plants, but its application to birds is so simple, and the records needed for its use are so nearly the same as those ordinarily kept by bird watchers, that it deserves more attention from bird students than it has received.

The materials used here are the result of fifty days' work in the field in the vicinity of Douglas Lake, Cheboygan County, Michigan, in the summer of 1924. The first work was done on June 9 and the last on August 17. During the first three weeks only a part of each day was spent in the field, but in the latter part of the season whole days are represented in the records. Special attention was given to the nesting birds and their local distribution. During the summer 106 kinds of birds were found: a few of these were early migrants. Because many accounts of the environment in this vicinity have been given by other workers and because a detailed analysis of the birds of the region has been prepared by Professor F. N. Blanchard (MS.),

I intend to discuss only the single topic, frequency of occurrence of the summer birds.

For the kind of analysis attempted here more records are desirable than are available, but I believe that the ranking of the species would not be changed greatly by additional material. It would be useful in studying populations of birds to have comparable determinations of relative frequency of occurrence of the species from many localities. In this country hundreds of persons have kept records of the birds observed by them each in a restricted locality. With very little effort these records could be analyzed and concise summaries of them from the point of view of the Raunkiaer law of frequence prepared and published. Some of the refinements of method suggested by Dice (*Auk*, Vol. 47, 1930, pp. 22-24) would add considerably to the value of such results; but with most observers it probably is not practicable to apply them, or at least they have not been applied in the records already made.

Raunkiaer derived what he called the Law of Frequence from eleven pieces of botanical work carried on by himself and others in different parts of Europe. In nearly all such surveys it is learned that there are many more species of low frequence than of high frequence. A curve expressing the numbers in the different classes of frequence has two peaks, a high one expressing the least frequence, and a lower one expressing the greatest frequence. If the species of frequences of respectively 1-20 per cent, 21-40 per cent, 41-60 per cent, 61-80 per cent, and 81-100 per cent are grouped into classes designated as A, B, C, D, and E, the law of frequence might be expressed A>B>C>, equal to, or <D<E (Kenoyer, Ecology, Vol. 8, 1927, p. 343).

To avoid duplication of matter contained in previous discussions, I will repeat only a few points which deserve special emphasis. The importance of studies of bird populations and the difficulties encountered in making them are commonly recognized. Adaptations of methods developed in connection with the Raunkiaer law of frequence offer suitable means of analysis of frequency in birds. For this purpose the lists of birds customarily kept by bird watchers provide sufficient materials if they pertain to a single limited locality or single type of habitat. Days appear to be suitable units for observational records, thus shifting the basis for analysis to units of time rather than of space. As to the number of units, this may vary considerably depending upon such factors as size and uniformity of the area and seasonal distribution of the time; but I suspect that, where possible,

it is best to have records for one hundred days or more and extending throughout the annual cycle. The percentage of frequency for each species is obtained simply by dividing the number of days on which the species was observed by the total number of days on which observations were made.

Besides furnishing an opportunity for application of the method of frequency analysis to a new locality these records can be compared with another set of figures intended to show the relative numbers of summer birds in the same vicinity. J. S. Compton (Wilson Bulletin,

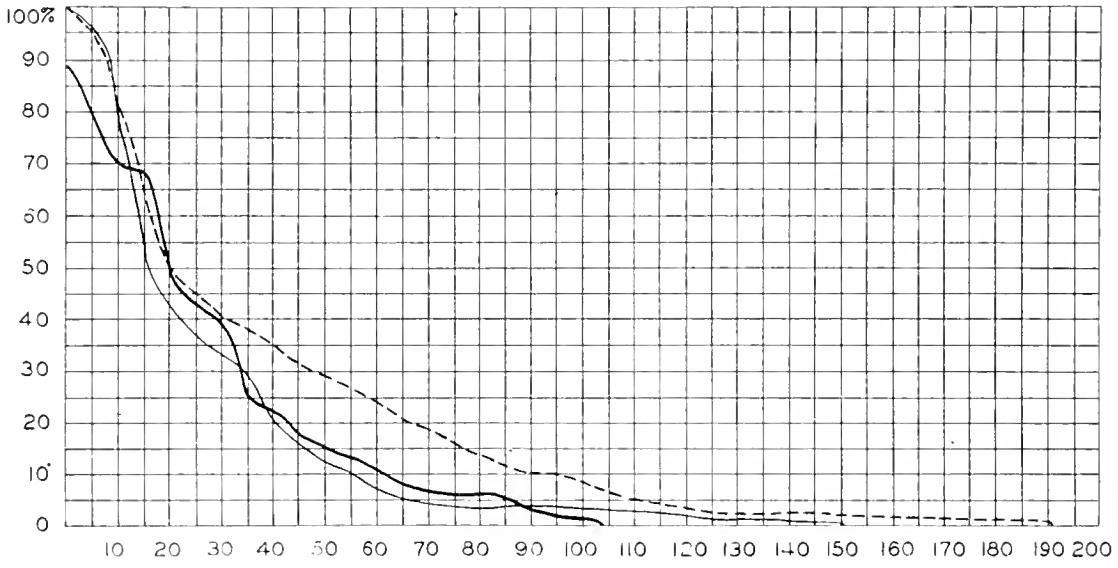


Fig. 29. Graph showing relative frequency of occurrence of the species of birds recorded in three localities: Doniphan County, Kansas (dotted line); Yosemite Valley, California (light, solid line); Cheboygan County, Michigan (heavy, solid line). Each curve represents the percentages of frequence for all the species in a single locality. For example, the heavy, solid line shows how the percentages for the 103 species recorded in Michigan are arranged between the extremes of 88 and 2. On this graph most frequent species are indicated on the left and least frequent ones toward the right.

Vol. 26, 1914, pp. 173-180) observed birds in this vicinity during the summer of 1913 and 1914. He used the term frequency to express the "comparative frequency with which the species, not the individual, was seen." In this connection he used three degrees as follows: "r or rare=seen 1 to 4 times; c or common=seen from 5 to 20 times; a or abundant=seen more than 20 times." He explained that "abundance, on the other hand, applies to the total number of individuals of the different species seen during a given period; in this case the period covers from June 30 to August 7, stopping before the fall migration gets any headway to disturb our study of midsummer birds. (1) under abundance means that this species stands highest in number of individual birds seen, 227 in our study; at the other end of the scale of

abundance (47) means that only 1 bird of this species was identified."

Compton's determinations of frequeney and abundance have been placed in the following table (second and third eolumns) along with my own figures expressing pereentage of frequeney (first eolumn) according to the Raunkiaer law. Beeause the reeords were made by two separate persons, in different years, and with different objeetives the results are not exactly eomparable, but from the point of view of aecurate deseription and eeonomy of time, as well as ease of eomprehension, the pereentage of frequeney seems to be the most satisfaetory.

TABLE 1. Classifieation of Speeies Aecording to Raunkiaer's Law and Compton's Determinations.

Species	Percentage of Frequency	Frequency	Abundance
Eastern Robin	88	a	17
Eastern Kingbird	88	a	15
Cedar Waxwing	84	a	1
Eastern Nighthawk	84	a	10
Eastern Chipping Sparrow	82	a	13
Eastern Song Sparrow	78	a	2
Red-eyed Towhee	78	a	4
Eastern Crow	76	a	3
Eastern Hermit Thrush	74	a	9
Spotted Sandpiper	72	a	6
Northern Flicker	72	a	14
Red-eyed Vireo	72	a	5
Eastern Whip-poor-will	70	a	12
Eastern Goldfinch	70	a	7
Brown Thrasher	68	c	26
Eastern Cowbird	60	c	24
Oven-bird	58	c	11
Eastern Belted Kingfisher	56	a	16
Eastern Vesper Sparrow	56	a	8
Eastern Wood Pewee	50	a	19
Northern Blue Jay	50	c	26
Slate-colored Junco	50	a	15
Caspian Tern	48	c	33
American Redstart	46	a	14
Black-capped Chickadee	44	c	21
Eastern Mourning Dove	42	r	46
Killdeer	40	c	23
Eastern Ruffed Grouse	40	a	20
Eastern Phoebe	40	c	43
Rough-winged Swallow	40	—	—
Eastern House Wren	40	c	30
Common Tern	34	r	46
Black-throated Green Warbler	34	c	29
Black and White Warbler	26	c	34
Black-billed Cuckoo	24	r	44
Chimney Swift	24	a	26
Least Flycatcher	24	r	45
Indigo Bunting	24	c	23
Barn Swallow	24	r	45
Bronzed Grackle	22	r	46
Eastern Winter Wren	22	c	23
Great Blue Heron	20	c	43
English Sparrow	20	c	20

Species	Percentage of Frequency	Frequency	Abundance
Eastern Meadowlark	18	r	38
Eastern Golden-crowned Kinglet	18	c	39
Eastern Red-wing	16	c	42
Eastern Purple Finch	16	c	39
Scarlet Tanager	16	c	36
American Merganser	14	—	—
Osprey	14	r	46
Prairie Horned Lark	14	r	43
Myrtle Warbler	14	r	46
Magnolia Warbler	14	—	—
Herring Gull	12	—	—
Ring-billed Gull	12	—	—
Northern Crested Flycatcher	12	r	47
Chestnut-sided Warbler	12	c	21
Red-breasted Nuthatch	12	r	46
Red-headed Woodpecker	10	c	42
Purple Martin	10	r	46
Veery	10	r	46
American Bittern	8	r	47
Marsh Hawk	8	c	42
Eastern Hairy Woodpecker	8	c	36
Northern Downy Woodpeeker	8	a	25
Bobolink	8	r	43
White-throated Sparrow	8	a	18
Tree Swallow	8	c	28
Migrant Shrike	8	—	—
Mourning Warbler	8	—	—
Canada Warbler	8	r	43
Catbird	8	r	42
Brown Creeper	8	r	46
Wilson Snipe	6	—	—
Eastern Sparrow Hawk	6	r	45
Great Horned Owl	6	—	—
Yellow-bellied Sapsucker	6	a	20
Eastern Savannah Sparrow	6	r	45
Black-throated Blue Warbler	6	r	40
Blackburnian Warbler	6	r	44
Northern Pine Warbler	6	c	34
Olive-backed Thrush	6	r	41
Common Black Duck	4	—	—
Sharp-shinned Hawk	4	r	46
Eastern Goshawk	4	—	—
Olive-sided Flycatcher	4	r	46
Northern Pine Siskin	4	—	—
Clay-colored Sparrow	4	—	—
Northern Cliff Swallow	4	c	32
Bank Swallow	4	r	44
Eastern Yellow Warbler	4	r	46
Pied-billed Grebe	2	r	47
Piping Plover	2	—	—
Virginia Rail	2	r	46
Sora	2	—	—
Least Sandpiper	2	—	—
American Woodcock	2	—	—
Northern Red-shouldered Hawk	2	—	—
Southern Bald Eagle	2	r	43
Ruby-throated Hummingbird	2	c	42
Alder Flycatcher	2	—	—
Eastern Field Sparrow	2	r	47
Northern Parula Warbler	2	—	—

TABLE 2. Comparison of the Five Classes of Frequency for Three Localities.

	Michigan		Kansas		California	
	Species	Ratio	Species	Ratio	Species	Ratio
A	62	.59	133	.68	111	.73
B	16	.15	32	.16	20	.13
C	11	.10	13	.07	7	.05
D	10	.09	6	.03	5	.03
E	5	.05	10	.05	8	.05

The five classes, A, B, C, D, E, include the species of frequency of, respectively, 1-20 per cent, 21-40 per cent, 41-60 per cent, 61-80 per cent, and 81-100 per cent. Each ratio represents the relation between the number of species in each group and the number of species recorded for that area. In general the distribution of the Michigan species among the classes of frequency resembles that of the other two localities. The differences probably result from restriction of observations in the former to the summer season and from the small number of days represented.

I anticipate that further tests of this method in other localities will demonstrate its usefulness as a device for analyzing the composition of the avifauna. Everywhere, it is to be expected, many more species will prove to be of low frequence than of high frequence. However, these species of low frequence may be among the most important in the make-up of the wild animal population. They are likely to be ones of great interest to their human associates. Birds of prey, large species, and the smaller rarities, even when they come in the lowest frequency class, are the ones which contribute most to the attractiveness of wilderness areas and the outdoors in general for the person who watches birds. It is the natural proportions between species, as revealed by analyses of populations, that we should strive to maintain in our conservational activities. This original composition of an avifauna is so complex that we can scarcely hope to understand or to describe it without the aid of some simple device such as the one based on the Raunkiaer law. It has been demonstrated over and over that an important result of the ordinary kind of human occupation of land is to remove the species of low frequence or to lower their frequency of occurrence and to increase the frequency of occurrence of a few species, usually ones already common.

MUSEUM OF VERTEBRATE ZOOLOGY, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.

AN UNUSUAL COLONY OF ALDER FLYCATCHERS

BY LOUIS W. CAMPBELL

About one mile south of the village of Whitehouse in Waterville Township, Lucas County, Ohio, a colony of Alder Flycatchers (*Empidonax t. trailli*) has chosen an unusual nesting place. One ordinarily associates this species with brushy swamp borders or at least creek bottoms, but this group of some six or eight pairs has selected a dry pasture, thickly overgrown with shrubs and small trees, as a nesting ground. The nearest water is the winding south branch of Swan Creek about one-half mile to the southeast.

The land in this district is very flat. From the top of the stream bank there is a gradual rise of about twenty feet to the general locality of the nesting place, which is slightly higher than the surrounding country. This is due to the fact that the underlying limestone is here within a foot or so of the surface of the earth—in fact, it outcrops at several points.

The place where the nests were found is about one and one-half acres and forms the southern portion of a three and one-half acre field, about 750 feet long by 200 feet in width. The nesting area is quite level, broken only by a trench ten feet wide and less than three feet deep which cuts diagonally across the field and then parallels for about a hundred feet the road which bounds the field to the west. This trench has been cut into the solid rock, the result of a minor quarrying operation. After a heavy rain it may contain some surface water but I have never found any on my trips. About 250 feet north of the area studied and separated by a more open area are two quarry holes, roughly fifty feet in diameter and five feet deep. These holes are dry and show no evidence of having contained water in recent years. From August 1-17, 1935, three and forty-four one-hundredths (3.44) inches of rain fell, yet when I visited the place on August 26 there was no trace of surface water. However, a more moist condition at the bottom of these quarries is indicated by the presence of a few stunted willows and a thick blanket of fog fruit (*Lippia lanceolata* Michx.). Beyond the holes and on all other sides, the pasture is surrounded by open fields except for a small grove of chestnut oaks (*Quercus Muhlenbergii* Engelm) averaging one foot in diameter, west of the road and immediately adjacent to the location of the nesting sites.

What grass there is is kept very low by grazing cattle but much of the ground is covered by shrubs and small trees; cock's spur hawthorn (*Crataegus Crus-Galli* L.), wild crabapple (*Malus coronaria*

(L) Mill.), black haw (*Viburnum prunifolium* L.), hazel nut (*Corylus americana* Walt.), and prickly ash (*Zanthoxylum americanum* Mill.). The last two are represented by only a few plants. Growing in and along the trench mentioned above are a few taller trees; none of which, however, are more than six inches in diameter; black locust (*Gleditsia triacanthos* L.), sycamore, elm, and two black ash saplings. At the eastern border is one large elm fifteen inches in diameter and one small sycamore. The character of the soil is further indicated by the following plants: hounds' tongue (*Cynoglossum officinale* L.), hairy beard-tongue (*Pentstemon hirsutus* (L) Willd.), yarrow (*Achillea millefolium* L.), fleabane (*Erigeron ramosus* (Walt.) B.S.P.).

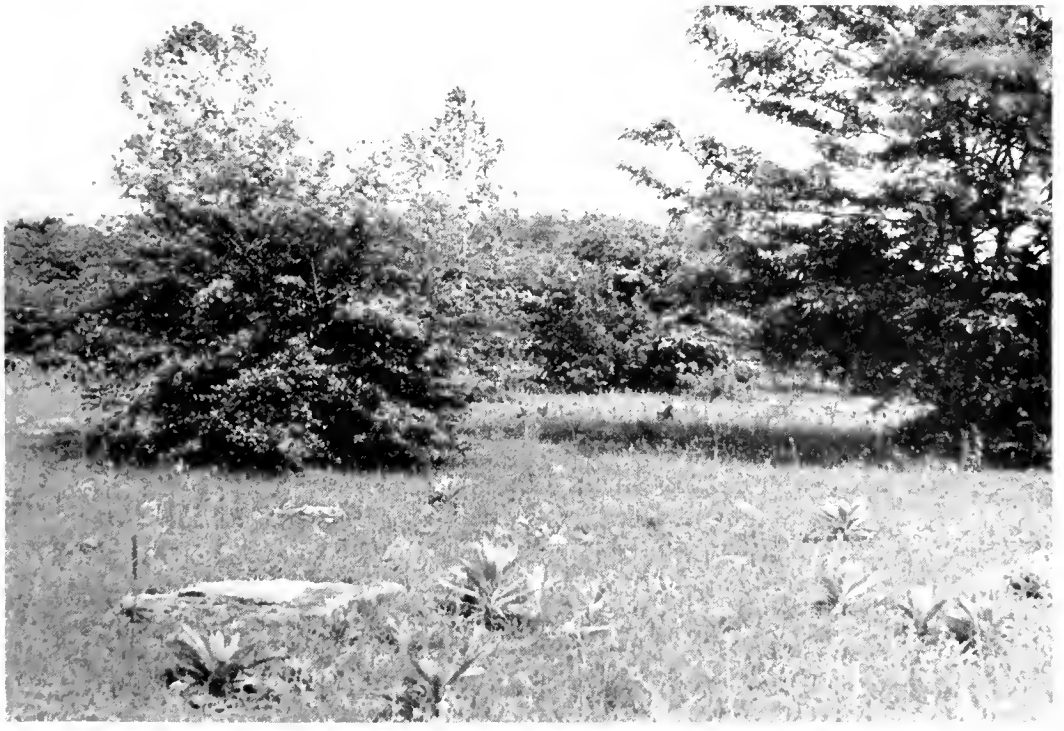


Fig. 30. Typical crataegus nesting site of "upland" Alder Flycatchers. May 25, 1935, Waterville Township, Lucas County, Ohio.

horseweed (*Leptilon canadense* (L) Britton), mullen (*Verbascum thapsus* L.), flowering spurge (*Tithymalopsis corollata* (L) K. I. & Garcke), mountain mint (*Koellia virginiana* (L) Mae. M.), wild bergamot (*Monarda mollis* L.), catnip (*Nepeta cataria* L.), rock sandwort (*Arenaria stricta* Michx.), small skullcap (*Scutellaria parvula* Michx.), catsfoot (*Antennaria* sp.), prairie ragwort (*Senecio plattensis* Nutt.). Of the above, eight species indicate dry soil.

Birds other than the flycatchers which nested in this area were: Mourning Doves, Catbirds, Brown Thrashers, Robins, Field Sparrows, and one pair each of House Wrens, Mocking-birds, Yellow Warblers,

and Chipping Sparrows. Three nests of the flycatchers were found, all build in the same pattern, in cockspur hawthorn. As may be seen from the accompanying photograph of nest No. 1, they are not typical Alder Flycatcher nests, being less bulky and placed on the upper side of a nearly horizontal branch instead of in a crotch. Nest No. 1 was found on July 10, 1934, about three and one-half feet from the earth. This nest was placed on a branch which was almost perfectly horizontal. It contained three eggs with large embryos. The female was collected at the nest. Concerning the eggs Dr. Charles F. Walker, then assistant curator of Natural History at Ohio State Museum, writes: "They are rather more heavily spotted than our eggs of *trailli* but we have one set that is quite as much spotted as yours. There seems to be quite a bit of variation in the eggs of these birds."

Nest No. 2 was found June 23, 1934, four feet from the ground, and contained three eggs. The nest was empty when collected July 28. Nest No. 3, found June 27, 1935, was four and one-half feet from the earth and nearer the end of the supporting branch than the other nests. It contained four eggs which, in contrast to those of Nest No. 1, were scarcely marked at all. On July 6 there were two eggs, one fledgling, and one egg just hatching. On July 17 the nest had disappeared. This nest was not photographed or measured.

That this nest-building habit is not characteristic of this particular group is shown by the photograph of a similar nest (No. 4) which was found July 16, 1935, twelve miles northeast of Whitehouse in typical creek-bottom habitat about 100 feet from Swan Creek. This nest was situated on the outer branch of a small elm tree at a sharper angle than the Whitehouse nests, and about seven feet from the earth. It contained three well feathered young. On July 24 the empty nest and a fledgling nearby were collected.

Measurements in millimeters of the three nests taken are as follows:

	Width		Height	
	Maximum	Inside	Maximum	Inside
No. 1	90	53	65	34
No. 2	85	50	62	38
No. 4	100	58	60	32
[1]Typical		50.8		38.1

Except for a slight difference in voice, these "upland" Alder Flycatchers were true to type. Fresh specimens taken here and in a wet prairie showed no difference in coloration. Measurements of specimens taken are shown in millimeters in the following tabulation:

[1]Howard Jones, "Nests and Eggs of Our Common Birds", 1927.

FIG. 31. Nest No. 1, built in a crataegus tree. Nests No. 2 and No. 3 were very similar to this nest. July 10, 1934, Waterville Township, Lucas County, Ohio.

FIG. 32. Nest No. 4, built in a small elm tree in a typical creek bottom habitat. July 24, 1935. Adams Township, Lucas County, Ohio.

Date	Length	Wing	Tail	Culmen	Width of Culmen at Base	Weight
(1) June 21, 1934	♂ 136	70.6	54.5	12	8	
(2) July 28, 1934	♂ 147	70.1	53.5	11.9	8	
(3) July 11, 1935	♂ 136	71.8	60	11.8	8	14.13 gr.
[2]Ridgway's Average	♂ 133	71.8	58.4	12.0		
(4) July 10, 1934	♀ 131	67.1	54.5	11.5	8	
[2]Ridgway's Average	♀ 130	68.4	55.4	11.7		

Judging bird voices is a very difficult matter—so much depends upon the ear and judgment of the listener. It was my impression, however, that the Alder Flycatchers of this colony had voices much weaker, pitched higher, and less husky than is typical. Their quality was more like that of the Acadian Flycatcher. The familiar *whis-kee* call was given much less frequently than normal, and sounded much more like *whée-be* or rarely *whip-wheu-whip*. In several hours' observations at different times and on different days, this call was heard less than ten times. On the other hand, the *whip* or *wheep* note was given almost constantly. This was not due to fright as the birds were not shy. On one occasion a rapid succession of calls somewhat like a flight song was heard which I was unable to record.

No attempt will be made to explain the presence of this small colony of Alder Flycatchers in such an unusual location. However, it may be that the birds chose this place during consecutive years in which there was heavy rainfall during late May and June and having established themselves remained through dryer years.

Conclusions

These birds are true Alder Flycatchers in an abnormal habitat.

The voices of these birds are slightly different than other Lucas County Alder Flycatchers.

The nests are unusual but not confined to this group.

If the presence of this colony is due to water collecting in the quarry holes, trees in the bottom of the holes indicate that it must have developed within the last ten or fifteen years.

I wish to express my thanks to Mr. Lawrence D. Hiett of Toledo, Ohio, for his excellent photographs, and to Prof. John H. Schaffner and Dr. Charles F. Walker of Columbus, Ohio, and Dr. J. Van Tyne of Ann Arbor, Michigan, for aid and criticism.

Toledo, Ohio.

[2]Ridgway, "Birds of North and Middle America", 1907, p. 558.

A STUDY OF THE RING-BILLED GULL IN ALBERTA

BY J. A. MUNRO

The existence of a large gull colony on Goose Island in Bittern Lake, Alberta, was discovered in 1927 by Mr. Frank L. Farley, who, in the years following, banded approximately a thousand nestlings each year. This author states (Birds of the Battle River Region of Central Alberta, The Institute of Applied Art, Ltd., Edmonton, Alberta, 1932), "When this colony was discovered in 1927, California Gulls appeared to greatly out-number the ringbills. In 1931 it looked as though there had been an entire reversal of status, and the opinion was freely expressed by banding operators that the ringbills were then in the majority."

Different conditions prevailed in 1932, when I first visited the island in company with Mr. Farley, and during the two years following. In those years the population, which remained fairly constant at 1400 to 1600 adults, estimated, was composed almost entirely of Ring-billed Gulls (*Larus delawarensis*). More precisely in 1932 I identified positively only five, and in 1933 twenty, as California Gulls, while in 1934 no individuals of this species were seen. The possibility of mistakes in identification is admitted. It is often difficult to distinguish between adults of the two species particularly so, perhaps, when the birds are in flight which is the aspect most commonly viewed by the observer on a nesting colony, unless detailed study is being conducted from a blind. The relative size of the two gulls is an unsatisfactory means of identification because there is little difference in this respect between the male Ring-billed Gull and the female California Gull, and in any case one frequently is deceived by the apparent size of a gull as anyone who has collected them will testify. The best diagnostic character separating the two species in life appears to be the dark band on the bill of the Ring-billed Gull and upon this feature I placed chief reliance as a means of identification.

Downy young of the two species can be separated by the whiter head of *californicus*, and juvenals can be distinguished readily for the reason that *californicus* in this stage is much the darker of the two. I found no downy young, and only one juvenile California Gull on Goose Island.

Examination of several hundred clutches of eggs revealed none which, by greater size, could be ascribed to the California Gull. One nest upon which lay a dead female California Gull was assumed to be of this species and in this case the eggs did not appear to be any

larger or to have any markings which would serve to distinguish them from those of the Ring-billed Gull.

Incidental to this it might be mentioned that during fourteen years' field work (1921 to 1935) in Alberta and Saskatchewan I found the California Gull to be less common than would be anticipated from reading the literature, most of it published prior to that time. One is obliged to conclude either that this species is becoming less common or else that some of the earlier Canadian prairie records are based on mistaken identification.

However that may be it is certain that during the years 1932 to 1934 Goose Island was colonized chiefly by the Ring-billed Gull, and therefore it may be assumed that at least 95 per cent of the food material discussed later in this paper was taken by this species.

My visits to the colony were on the following dates: June 19, 1932; May 26, 27, 1933; June 2, 1934.

Description of locality. Bittern Lake, comprising at high water mark some seventeen square miles of shallow water, is contained chiefly in Township 47, Range 21, and Township 47, Range 22, west of the Fourth Meridian. It is surrounded by rolling, broken prairie largely under cultivation but retaining remnants of the original trembling aspen, and balm-of-gilead growth on the less arable portions. The shores are low, bare, and for the most part composed of heavy clay. In some places are intrusions of hard sand, some of which are mixed with boulders. The water is strongly alkaline and supports little hydrophytic vegetation or aquatic animal life.

Goose Island in earlier times of high water was the most easterly situated of two low-lying islands close to the north end and nearest to the west shore of the lake. With a progressive shrinkage of the water area during the past decade the island nearest the shore increased in size with the accretion of exposed lake bottom and finally joined the mainland to form a wide peninsula from the end of which Goose Island was separated by a shallow channel. By 1932 the intervening water was reduced to a width of forty feet and in the summer of 1933 and 1934 the channel was dry, the two islands thus forming a continuous extension of the mainland.

Goose Island proper is circular in shape with a well-defined point at the east side. It comprises several acres of relatively fertile land, rich in plant life, at an elevation of five feet or so above the surrounding barren expanse of exposed lake bottom which supports no vegetation other than the alkaline-loving skunk grass. The vegetation on the island consists of low willows, a luxuriant growth of vetch repre-

sented by several species, various grasses, silver weed (*Potentilla anserina*) on the more open sandy plaees, lambs' quarters, dandelions, and other imported weeds.

Mr. Farley has told me of paddling to the island from the east shore of the lake at a time when the willow bluffs, only a few yards from the water's edge, outlined the edge of a narrow shelving beaeh when the lake water was elean enough for human use and the island vegetation not infected by introdueed weeds. Sueh times would seem definitely to be in the past, and the present surroundings of exposed lake bottom in its drab barrenness are in striking contrast to what formerly existed.

Behavior. As we left the mainland shore and erossed the exposed lake bottom white masses of gulls eould be seen in the distanee above the short vegetation on the island. While we still were distant some three hundred yards from this objeetive some of the gulls flew toward us at no great height, and after wheeling over-head several times followed or preeeded us toward the island. When we reaehed the nesting grounds the gulls eireled above us quite low, eonstantly planing earthward in short, savage swoops, so that a rush of air from their eleaving wings eould be felt on the cheek.

This was on June 19, 1932, when some of the young were well advaneed. In the two following years, when the island was visited earlier in the season and most of the nests eontained eggs, the gulls showed less coneern at our arrival and I was able to approaeh elose enough to obtain photographs of the sitting birds. At these times the majority of the birds did not risc until we were within fifty yards or so and after a few demonstrative attaeks they settled on the water elose to the shore.

Nests. Each year the eolony eonsisted of three separate, well-defined nesting areas. The largest one, near the west side of the island, was restrieted to a strip of beaeh roughly one hundred and fifty yards by fifty yards. This was uneven ground ineluding a boulder-strewn terrain, defining a former high water mark but now twenty yards distant from the lake edge, and the outer portion of a grass belt whieh extended inland to the edge of the willow bluffs. This eontained 376 nests in 1934. Two hundred yards east was a seeond group of forty nests similarly situated and on the point at the east side of the island was the third nesting ground eontaining 300 nests. These were mueh eloser together than was the ease elsewhere. Some almost touehed and it was not unusual to find four or five nests within a spaee of four square yards or less. This erowded section of

more or less eireular shape, with its trampled vegetation, the smooth, worn appearance of numerous hummoeks, the accumulation of feathers and the white splashings of excrement, was conspicuous indeed amongst the surrounding growth of grasses and vetches.

The ehief nesting material was a fine, wiry grass of local origin and other plant material was used less extensively. In some eases filamentous algae to which clay had adhered were an important constitutent and nests thus reinforced were substantial structures eight to ten inches high. But the majority were less than half this height and some were simple rings of dry vegetation surrounding the eggs. One grass nest some distance away from the others on what formerly was lake bottom had been built beside the skull of a large bison bull, which was used as a perch. This was one of several bison skulls which, preserved under water for many years and during that interval stained a rich, rusty orange through some chemical action, had recently been uncovered by the receding waters.

Eggs. The majority of nests contained three eggs, which seems to be the maximum laid by one bird. Clutches of four or five were not uncommon but in such cases a difference in coloration of one or two eggs indicated that a second female was involved. One nest containing seven eggs was noted. The great variety of ground color and blotching was astonishing, indeed there was speculation as to whether two clutches of identieal appearance could be found. Some of the combinations of light ground color and dark, massed blotching were handsome enough to stir dormant oölogical emotions in the hearts of the investigators.

It is of interest to record that a freshly laid Robin's egg was found in a gull's nest! No Robins nest on the island.

On May 26, 1933, most of the nests eontained a full complement of eggs and none had hatehed. On June 19, 1932, nests with eggs were still in evidence.

Young. On June 2, 1934, about 50 per eent of the nests, approximately 350, contained reeently hatehed young, the earliest about one week old. Two distinct color phases, gray and fawn, are apparent, the former being much the more common. In a few cases one fawn-colored and two gray downy young were together in a nest but it was usual to find the two color phases separated.

Well developed young were the rule on June 19, 1932. When disturbed by our walking through the nesting ground these youngsters sought shelter amongst the thick vegetation farther inland. Large birds after running quickly to some place of partial concealment

FIG. 33. Nesting colony of Ring-billed Gulls, at Bittern Lake, Alberta (above). Nest of a Ring-billed Gull at the side of a bison skull (middle). Young Ring-billed Gulls (below). Photographs by J. A. Munro, and loaned by courtesy of the National Parks of Canada.

would crouch in the grass or against an earth hummock or boulder until the observer attempted to pick them up, whereupon they again would scuttle off. Younger birds on the other hand after the initial run would lie prostrate and could be handled at will.

Casualties. As in all gull colonies, dead adults showing no external marks of injury frequently were discovered. On June 19, 1934, the bodies of nine adult Ring-billed Gulls and one California Gull in the plumage of the third year were counted on the open parts of the island. No casualties amongst the young were noted on June 2, 1934, at a time when most of the young were newly hatched, but on June 19, 1932, when the average age of the young was perhaps two weeks, a considerable mortality was observed. The carcasses of 200 birds of various ages were scattered about on the open ground and it seems likely that other dead young were concealed in the thick vegetation.

Enemies. With the drying up of the last winter barrier between mainland and island it was thought probable that the gulls would desert the colony because of possible depredations by mammal predators. This proved unfounded and the population did not even decrease. Search was made for tracks of coyote or skunk approaching from the mainland but no evidence of this was found. A few crows nest in the willows on the island but no evidence of their having destroyed gulls' eggs or young was obtained. In 1934 a herd of sheep was turned out on the island in care of a resident shepherd. It is not known how the gulls fared under this visitation.

Food. The barren shores and alkaline waters of Bittern Lake provide little food for gulls. The only evidence of animal life found on the muddy beaches comprised the shells of two species of mollusca, neither of which was common. These have been identified by the United States National Museum as *Succinea grosvenori* Lea and *Stagnicola palustris elodes* Say. Other data concerning the animal life in the lake are not available.

Just how far these gulls travel in search of food is not known. They are seen through the summer hunting over cultivated fields and prairies in the district adjacent to the lake and they visit the city dump at Camrose, fifteen miles or so distant. But no doubt daily trips are made for distances much greater than this.

An important food is Richardson's ground squirrel (*Citellus richardsoni*). Large numbers of skulls and other remains of this animal were found on the island where they had been carried by the gulls. Perhaps the majority of these represented carrion for it is difficult

to conceive of a Ring-billed Gull capturing so large an animal. Hundreds of ground squirrels are killed on the roads by motor cars and it is a common sight to see gulls, crows, and occasionally other birds tearing at the carcasses. No doubt such casualties explain the chief source of this food supply. Sometimes Ring-billed Gulls attempt to swallow a ground squirrel too large for their capacity of ingestion, with fatal results. I found no less than five dead gulls, each with the hind end of a ground squirrel protruding from the mouth.

Other food data were obtained through the examination of thirty-seven regurgitated pellets recorded as follows.

MAY 26, 1933

1. Husks and broken kernels of wheat, 98 per cent; a few beetle fragments, 2 per cent.

2. Pieces of straw, 40 per cent; cowhair, 45 per cent; beetle fragments, 5 per cent.

3. Hard parts of small ground beetles, *Carabidae*, representing at least twenty-five individuals, 90 per cent; pieces of straw and wheat kernels, 10 per cent; several pieces of gravel.

4. A quantity of wheat husks and one whole kernel, 98 per cent; fragments of a ground beetle, 2 per cent; several pieces of gravel.

JUNE 2, 1934

Contents of thirty-three pellets from nesting colony at Bittern Lake, Alberta, collected June 2, 1934.

5. Fragment of bird's trachea, 10 per cent; elytra and other fragments of Carabid beetle; one beetle larva, 25 per cent: vegetable matter including dry grass, thistle seeds, and rootlets, 65 per cent.

6. Wheat, 99 per cent; elytra carabid beetle, 1 per cent.

7. Wheat, 95 per cent: other vegetable matter, 5 per cent.

8. Wheat, 98 per cent; grass fragments and vegetable debris, 2 per cent.

9. Rami and parts of upper mandible of a gallinaceous bird, possible Gray Partridge (*Perdix perdix*), 10 per cent; hair and bone fragments of ground squirrel (*Citellus richardsoni*), 10 per cent; parts of wild oats, 5 per cent; wheat, 30 per cent; vegetable debris, 44 per cent; insect fragments (chitin), 1 per cent.

10. Pupal cases of Diptera, 95 per cent: vegetable debris, 5 per cent.

11. Oats, 30 per cent; wild oats, 5 per cent; vegetable debris including coarse sawdust, 59 per cent; cowhair, 1 per cent.

12. Oat husks, 30 per cent; coarse sawdust, 68 per cent; fragments Diptera pupal cases, 1 per cent; cowhair, 1 per cent.

13. Oats, 28 per cent; wild oat husks, 2 per cent; coarse sawdust, 65 per cent; fragments of elytra and tarsus of at least two Carabid beetles, 2 per cent.

14. Wheat, 99 per cent; piece of a mollusc shell, 1 per cent.

15. Wheat, 60 per cent; oats, 10 per cent; vegetable debris, 30 per cent.

16. Wheat, 100 per cent.

17. Shell fragments of duck's eggs and egg lining, 15 per cent; pupal cases of Diptera, 10 per cent; vegetable debris including rootlets, 75 per cent.

18. Pupal cases of Diptera (app. 100), 90 per cent; vegetable debris, 8 per cent; cowhair, 2 per cent.

19. Wheat, 55 per cent; oats, 5 per cent; vegetable debris, 35 per cent; cowhair, 5 per cent.

20. Two lower mandibles, leg bones, and hair of vole, 100 per cent.

21. Wheat, 50 per cent; elytra and other Carabid beetles, 40 per cent; vegetable debris including *Carex* seed, 10 per cent.

22. Wheat, 100 per cent.

23. Wheat, 95 per cent; two small mammalian bones, possibly *Citellus*, 4 per cent; mollusc shell fragment, 1 per cent.

24. Wheat 100 per cent.

25. Hair and bones of one adult, three juvenile voles, 100 per cent.

26. Pupal cases of Diptera, 25 per cent; cowhair, 75 per cent.

27. Wheat, 48 per cent; oats, 2 per cent; coarse sawdust, 46 per cent; cowhair, 3 per cent; insect fragments, 1 per cent.

28. Wheat, 55 per cent; oats, 4 per cent; wild oat fragments, 1 per cent; coarse sawdust and vegetable debris, 37 per cent; cowhair, 2 per cent; insect fragments, 1 per cent.

29. Wheat, 98 per cent; vegetable debris including two *Carex* seeds, 2 per cent.

30. Wheat, 100 per cent.

31. Pupal cases of Diptera (app. 150), 98 per cent; cowhair, 2 per cent.

32. Wheat, 96 per cent; oats, 3 per cent; insect fragments, 1 per cent.

33. Bones and hair of at least two voles, 100 per cent.

34. Bones and hair of at least two voles, 100 per cent.

35. Wheat, 70 per cent; oats, 10 per cent; vegetable debris, 19 per cent; fragments of pupal cases of Diptera, 1 per cent.

36. Wheat, 45 per cent; cowhair, 45 per cent; fragmentary pupal cases of Diptera, 5 per cent; vegetable debris, 5 per cent.

37. Hair and bones of one ground squirrel, *Citellus richardsoni*, 100 per cent.

List of Items	Percentage Frequency	Percentage Occurrence	Average Percentage Volume
Wheat	21.8	57.6	78.6
Oats	10.3	27.3	14.1
Wild Oats	4.6	12.1	3.2
Ground Squirrels	3.4	9.1	38.0
Voles	4.6	12.1	100.0
Birds	2.3	6.1	10.0
Duck eggs	1.1	3.0	15.0
Miscellaneous insects	5.7	15.2	5.8
Carabidae	3.4	9.1	14.7
Diptera (pupae)	9.2	24.2	40.6
Mullusea	2.3	6.1	1.0
Vegetable debris	19.5	51.5	33.0
Cowhair	11.5	30.3	15.5

Vegetable debris comprised coarse sawdust, dead grass, and unidentified material.

Gull feathers (down) were found in four pellets.

Percentage frequency: The percentage of representation in a total of eighty-seven occurrences.

Percentage occurrence: Percentage of pellets in which the item occurred.

Average percentage volume: Volume for particular items.

Some of these pellets were fresh when collected, that is to say they had been regurgitated within an hour or so, others had been cast a day or several days earlier. Probably none were more than a week old because care was taken to select only the freshest appearing pellets. For example, most of those whose chief constituent was wheat were soft and wet when found. Subsequently these specimens dried out and became so hard it was difficult to break them.

The association of the pupal cases of Diptera with cowhair probably indicates a carrion origin for this insect food. The frequent occurrence of Carabid beetles with wheat suggests that the gulls had been feeding over stubble, or perhaps newly planted fields, where grain and beetles were picked up indiscriminately.

Wheat and oats were represented mainly by the outer layers of the kernels, the more soluble parts having been digested. These grains, more particularly wheat which was found in 57 per cent of the pellets and represented an average volume of 78 per cent, would appear to be an important food in spring and early summer. The probable sources are about grain elevators, along the railroad tracks and on summer fallow, all being localities which the gulls cover in their search for food.

Fig. 34. A Ring-billed Gull choked to death in attempting to swallow a Richardson's Ground Squirrel (left). Nest and seven eggs of the Ring-billed Gull (middle). Avocet's nest with five eggs and two downy young (right). Photographs by J. A. Munro, and loaned by courtesy of the National Parks of Canada.

Food of Downy Young. Two of five downy young collected for stomach analyses on June 2, 1934, contained food. These birds were thought to be approximately two days old.

No. 1. Insect fragments and eggs of a Dipterous insect, 60 per cent; vegetable debris including two *Carex* seeds, 40 per cent.

No. 2. Two damsel fly nymphs, eight Caddis adults, one Midge larva, 95 per cent; vegetable debris including one *Carex* seed, 5 per cent.

Relation with other bird species. Canada Goose, Mallard, Gadwall, Avocet, and Marbled Godwit were found nesting either on the island or close to it on the peninsula, the most numerous being the Avocet and the Canada Goose. These species were present in substantially the same numbers each year.

On June 19, 1932, on our way to the island we visited a colony of Avocets and found five nests with eggs and another in which two of eight eggs had hatched. The downy young were still in the nest. The nests were situated amongst sparse sedges at the outer edge of vegetation on the peninsula. Some were in the open and none were well concealed. The Avocets, associated in a flock, circled about us or flew up and down the beach. Several times they alighted on the shallow water and with head and neck bent downward paced along swinging their bills through the water with that curious side-wise motion characteristic of the species. On June 2, 1934, the colony numbered thirty-four birds which was approximately the same as it had been two years earlier. No evidence of molestation by gulls was observed.

A nest of Marbled Godwit with four eggs and a nest of Gadwall with six eggs both close to the nesting gulls had not been disturbed by them. Usually they nest amongst the willows or the thick vetches on the island proper.

The goose population comprises five or six pairs of breeding birds and about the same number of non-breeders. On May 26, 1933, after examining a nest containing egg shells which had been built in an opening amongst low willows, I discovered a second nest near the east shore. This one was a high substantial structure in the midst of the gull colony, some of the gulls' nests being within four or five feet. As I approached, the goose was seen standing with outstretched neck beside her nest partly concealed by some low vegetation. As I drew nearer she walked toward the water, a few rods distant, followed by three downy goslings just recently hatched. They launched out on

the water and proceeded toward a gander which was swimming back and forth a hundred yards or so from shore.

At this point I pictured in imagination an earlier scene: the goose on her high nest mound, in plain sight from every direction, settled on the eggs with a fluff of down showing along her flanks. Passing overhead and walking about close to her nest, dozens of gulls were her constant, noisy, and active associates. They built their nests within a few feet of the quiet goose. When she left her nest each day for food and water her five eggs were within easy reach of the gulls—a few quick stabs of the bill and all would have been destroyed—and they had survived intact.

But I noticed a fourth gosling, apparently a weak one, walking with uncertain steps far behind the others. It was transferred to the water and kept under observation while it swam toward the rest of the brood that, led by the goose, had reached a position close to the gander. When this fourth gosling was distant about forty yards from the shore a Ring-billed Gull picked it up and then, perhaps alarmed by my shouts, dropped it again. Later on when this downy was retrieved it was seen that its back had been broken. Meanwhile several other gulls had picked up and swallowed the three remaining goslings, while the two geese swam passively about making no attempt to defend their young. As this happened at a distance of at least 100 yards from where I stood it is considered that my presence on the scene probably was not responsible for the apathy of the parent geese.

Summary

A nesting colony of Ring-billed Gulls together with a few California Gulls situated on an island in Bittern Lake, Alberta, maintained a population of approximately 800 pairs during the nesting seasons of 1932, 1933, and 1934. A study of food remains on the island indicated a diet, for the months of May and June, of grain, ground squirrels, carrion, ground beetles, and mice, named in the order of their importance. Evidence of ducks' eggs being eaten was detected in one instance. Eggs, most of them unconcealed, in an adjacent colony of Avocets were not destroyed by gulls. A brood of four newly-hatched Canada Geese were eaten.

The data obtained are insufficient for definite conclusions regarding the local food habits of the species but are of sufficient interest to suggest that a detailed study is desirable.

Okanagan Landing, B. C.

FRANKLIN J. W. SCHMIDT

BY ALDO LEOPOLD

It is by now a truism that the American frontier did not cease to exist when the covered wagons halted on the shores of the Pacific. In its wake followed a scientific frontier, which opened up the resources of the new-found lands to human understanding in quite the same sense, and in no less degree, than the geographic frontier opened them to human occupancy.

It was quite a surprise to the gold-seeking Spaniards when James Ohio Pattie arrived in their midst, seeking not gold, but beavers. Just so is it now a surprise to biological scientists to discover as a fellow-explorer the conservation ecologist, seeking not new ways to squeeze wealth out of the soil, but ways to prevent the extraction of its wealth from destroying its wild life.

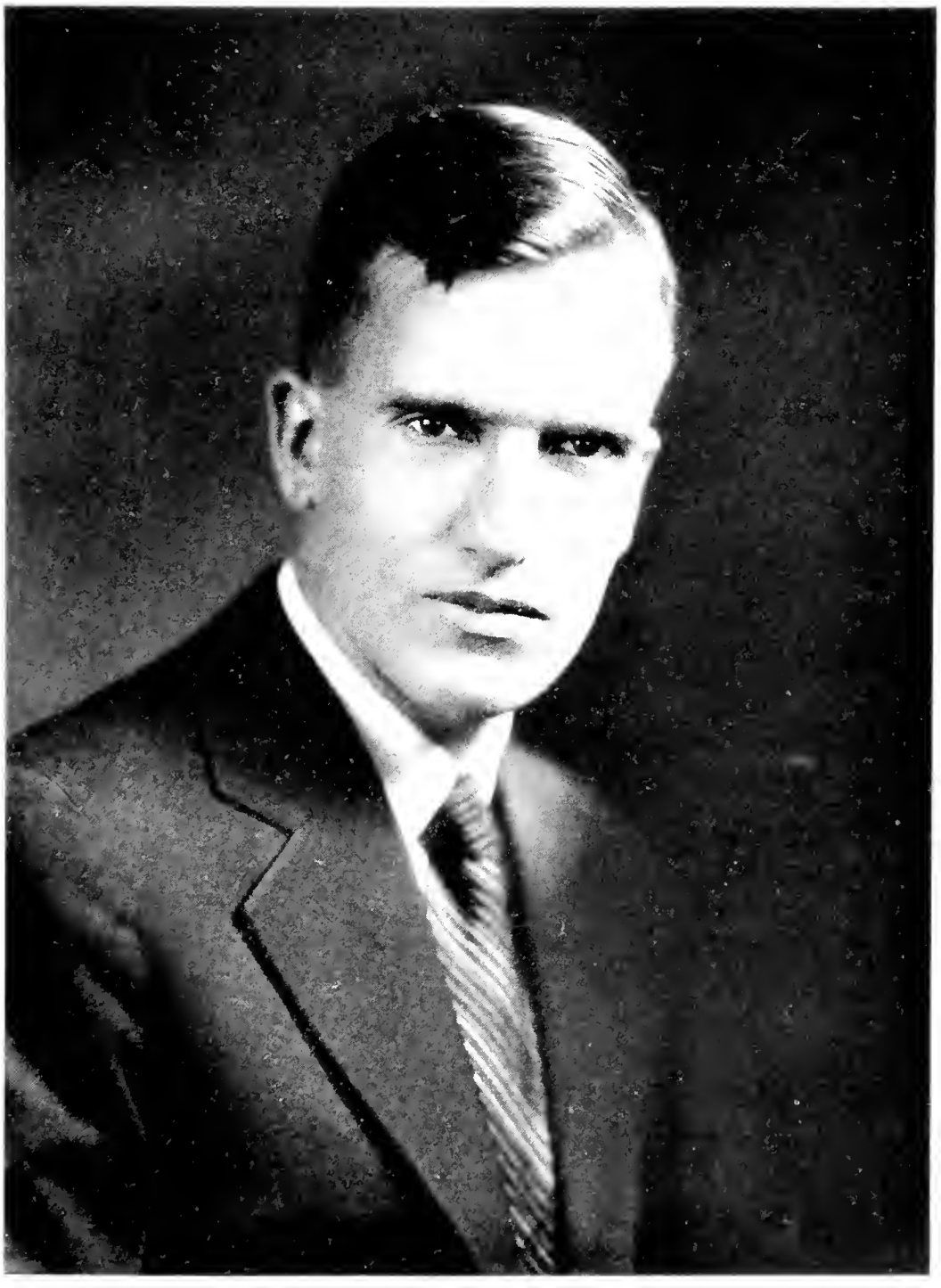
Society has not withheld its gratitude from the geographical adventurer who failed to come back, nor from the scientific explorer who dies in the course of an unfinished quest. It should, I think, at least know about important fatalities in that new argosy of the intellect which seeks not the conquest, but the preservation, of nature. Hence this biographical sketch of Franklin J. W. Schmidt, who, after five years' work in charge of the Wisconsin Prairie Chicken Investigation, died at Stanley, Wisconsin, August 7, 1935, in a midnight fire which also destroyed his accumulated notes, photographs, and manuscripts.

The philosophical questions involved in the death of a young explorer on the outbound trail are always of tragic interest. That Schmidt had seen virgin lands was well known to the more discerning of his research associates. That circumstances had unduly delayed publication of his findings is patent from the scarcity of his titles in the literature. (He spent his last evening on one of eight manuscripts to which, at the insistence of his friends, he had devoted the last months of his life). Whether he himself realized the full value of his findings, or whether their publication would have gained him widespread recognition, must remain forever among those questions which destiny thrusts unanswered into the stove. As his biographer I can only affirm the personal opinion, unsupported by those burned documents, and admittedly biased by the pain of a lost friendship, that Franklin Schmidt knew more about the life history and ecology of the prairie grouse than any living man, and as much as any living ecologist knows about any American game bird. Likewise that he had developed a deep understanding of the interactions of ecological forces, and the mechanisms of their integrated expression in the life and land-

scape of Wisconsin. It is no uncommon thing for a specialist to sound a record depth of knowledge in a single limited field, but it is a rare and inspiring thing to see one putting together a mental clock made of parts from the whole gamut of earth-sciences, and then listening for it to tick.

Schmidt's particular hobby was the marsh region of central Wisconsin—that waif of the slums of exploitation, long since cast out as an economic ne'er-do-well, but now the object of uplift by many conservation bureaus. If and when the intrinsic loveliness of those vast wastes is duly appreciated and restored, the mechanism of restoration will be set upon foundations of ecological understanding built in large part by Schmidt.

I vividly recall my first visit to the camp which each summer served as a base for his field studies in the central marsh region. In town or office Schmidt was ordinarily laconic, even taciturn. But as we roamed his beloved marsh, each bird and flower drew out of him new rivers of speech—the pent-up accumulation of years of lonely observation, speculation, and study. The sandhill cranes, their habits, personality, and probable history since the retreating glacier first left behind it the moss-meadows which are their habitat. His discovery that "red" cranes, like rusty snow geese, can be washed to their normal color, and hence represent no particular sex. age, or genetic strain. The burr oaks—how, why, and where they are an indicator of prairie, and the history revealed in their rings. The prairie chickens, how he had spied upon their mating dance, how his bandings reestablished Cook's assertion that only the hens migrate—how squeamish chickens are about roosts, and how by improving roosts we might help raise population levels. The dried-up hay marsh which once in the 1880's and again in 1913-16, was a lake from which the settlers trapped muskrats, how the existence of the former lake is indicated by the ice-ridge outlining its shore, and dated by the age of the trees growing out of that ridge. How in the intervening drouths this lake had been a haymeadow, the present drouth representing simply the dry phase of a recurrent cycle. In short, no observed phenomenon was interpreted by Schmidt in terms of a short time or of a single scientific field. Its historical origin and its ramifications into a wide variety of fields were habitually followed out. In this difficult task Schmidt's woodsmanship, i. e., his ability to detect and interpret evidence invisible to ordinary men, played an outstanding part. He knew more than his fellow-workers because he saw more keenly and thought more deeply. I have seen few field naturalists of comparable skill and acumen.



FRANKLIN J. W. SCHMIDT, 1901-1935

We who teach how to use science for the ends of conservation are interested in the origins and education of such men, for there is always the remote hope of finding a clue to the puzzle of how to build them to order.

Franklin James White Schmidt was born at Lake Forest, Illinois, July 25, 1901. His parents were George W. Schmidt, Professor of German at Lake Forest College, and Margaret Patterson Schmidt. In 1907, when he was six years old, the family established a farm in Worden Township, Clark County, Wisconsin. There he grew up in an environment of forest and meadow well populated with wild things. His mother had a good knowledge of botany. His older brother, Karl P. Schmidt, had been imbued with an active interest in biology in the course of his studies under Dr. James G. Needham at Lake Forest College. His father had a deep and abiding interest in all wild things. With this guidance the boy developed an ever-widening proficiency in natural history. He trapped muskrats and mink. He raised ferrets, and his first published "research" was a letter on their habits embodied in Mrs. Anna Botsford Comstock's "Pet Book", in 1914.

Schmidt entered the University of Wisconsin in 1927. By this time he had decided on a career as field naturalist. He had been employed by the Field Museum in 1924, 1925, and 1926, and found congenial friends in Dr. W. H. Osgood and Mr. Colin Campbell Sanborn, and through them focused his interest on mammalogy. During his university years he spent the summers in collecting mammals, reptiles, and amphibians in his home county, publishing his notes on the mammals in the *Journal of Mammalogy* in 1931. Upon graduation from the University of Wisconsin in 1930, he was recommended by Prof. George Wagner as field assistant to Dr. Alfred O. Gross, who during that year initiated a study of the prairie chicken and the sharp-tailed grouse in Wisconsin. This field study now became his primary interest. After Dr. Gross returned to his duties in the East, the Conservation Commission placed Schmidt in charge.

In 1933 the project was discontinued for lack of funds. The newly established Chair of Game Management at the University of Wisconsin immediately offered Schmidt a fellowship for its continuation under university auspices. Schmidt had, however, already engaged to accompany the Mandel Expedition of the Field Museum to Guatemala. The fellowship was held open for him until his return.

Schmidt's field work in Guatemala was unusually successful. He collected and studied several new species of bats and rodents, and took

specimens of such rarieties as the bat *Centurio senex* and the Guatemalan flying squirrel.

Upon his return in 1934, he resumed work on the Prairie Chicken Investigation, focusing his efforts not only on the prospective completion of his doctorate thesis in about 1936, but also on the ultimate production of a monograph covering the life history and management of the prairie grouse in a manner similar to Stoddard's "Bobwhite". The plan was to center the work on Wisconsin until Schmidt's doctorate was completed, and then to set up a consulting service through which he would aid other states to get started in prairie grouse management, and at the same time have the opportunity to collect life history information from the whole continental range of the species. The first move to these ends was the completion of a series of eight papers summarizing the Wisconsin work to date. One of these papers had been completed at the time of Schmidt's death in 1935, and accompanies this biography. The other seven, in various stages of completion, together with most of the field notes on which they were based, were destroyed by the fire in which Schmidt met his death on August 7, 1935.

Other valuable unpublished material met the same fate. Schmidt had, for example, conducted annually for four or five years a rodent census on several sample areas. The population of rodents was accurately determined each year by trapping, marking, and releasing the animals until no unmarked individuals appeared at the traps. Schmidt hoped by this means to get accurate data on population cycles. The data from all areas save one were burned. The census on this one area has been continued by my students.

Few Wisconsin conservationists are aware that the first actual work in reflooding the drained marshes of central counties—a project on which the Resettlement Administration has since spent $150,000—was initiated by Schmidt. It came about in this manner: Schmidt was attending a somewhat convivial meeting of Milwaukee sportsmen. He asked the group to subscribe $100 to build one dam as a test or demonstration of the potential waterfowl breeding capacity of the drained marshes. They banteringly replied that they would give the money if Schmidt would drink a glass of whiskey. Knowing his abstemious habits, they thought this a safe reply. But Schmidt promptly gulped the whiskey, and within a few weeks the dam was built and had ducks in it.

Schmidt's death is the first fatality in that young profession known as wildlife management. He has set for that profession a high stand-

ard of devotion, modesty, skill, and thoroughness. It will be no small task for those who survive him to live even partially up to his mark.

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WINTER FOOD OF THE SHARP-TAILED GROUSE AND PINNATED GROUSE IN WISCONSIN

BY F. J. W. SCHMIDT

Introduction

The present paper is the first of a series summarizing the findings of the Wisconsin Grouse Investigation since 1930.

A research bureau of the Wisconsin Conservation Department was organized in 1928 by Wallace B. Grange and Dr. Merritt L. Jones to begin a study of the Prairie Chicken and the Sharp-tailed Grouse. Its findings up to 1930 were published in the "Progress Report of the Wisconsin Prairie Chicken Investigation" by Dr. Alfred O. Gross.

I took over the study during the winter of 1930-1931, which was spent observing the feeding habits of grouse at grain food patches and feeding stations. In March 131 sharptails were banded. Since then 550 Sharp-tailed Grouse and 275 Prairie Chickens have been banded. Studies of nests were made during the springs of 1931, 1932, 1933, and 1934. Moving pictures were made of Sharp-tailed Grouse and Prairie Chickens on their dance grounds. Dance ground flocks were counted through a series of successive years. During the summer of 1932 Prairie Chickens were raised at the state game farm. During the summer of 1934 the food habits of Marsh Hawks and Cooper's Hawks were studied in their relation to grouse. During open seasons grouse crops and stomachs were collected and sex counts were made from hunters' bags. The investigation was discontinued in January, 1933, and resumed in May, 1934, as a game management project at the University of Wisconsin under the direction of Aldo Leopold.

The term "grouse" is here used for Prairie Chickens, Sharp-tailed Grouse, and Ruffed Grouse collectively, unless otherwise stated.

Acknowledgments

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Scope

The present paper deals with winter food only. It is based on observations at winter feeding stations and grain food patches; on observations of migrant Prairie Chickens on their wintering grounds; on observations of grouse budding in trees; on observations made by back-tracking flushed grouse; on artificial feeding of grouse in pens; and on the crop contents of nineteen grouse collected during the winter. A larger series of winter crops and gizzards is being collected for a report on the percentage of the various foods eaten. In addition, a large series of summer and fall crops have been collected, but are not here reported.

The dietaries of the Sharp-tailed Grouse and the Prairie Chicken overlap, but are nevertheless essentially different, the sharptail being a northern bird extending into Wisconsin from the northwest, while the Prairie Chicken is a more southern bird extending into Wisconsin from the south. Originally the chicken was probably mainly a migrant. It became a permanent resident when a new food supply was introduced by agriculture. The winter food habits of the two species are here discussed separately, from the standpoint of grouse management, with special reference to the question of how much if any grain and cultivated weed seed is necessary, and at what seasons.

The Prairie Sharp-tailed Grouse (*Pediocetes phasianellus campestris*)

The following winter foods are grouped according to the length of time during which they are usually available.

Browse is available throughout the winter, and is the most important class of winter food. Wisconsin sharptails browse on the buds, catkins, and twigs of white birch, aspen, balsam, poplar, willow, bog birch, and leather-leaf. All these may be regarded as staple winter

foods. The kind of browse eaten depends somewhat, of course, on the kinds available in any given area.

Climbing Plants. The seeds of climbing false buckwheat (*Polygonum dumetorum*) are, while they last, always held above the snow. It has been determined by observation and by tracking that sharptails feed on the seed of this plant.

Grain. To understand the rôle of grain in the grouse dietary, it is neeessary to hark back to the day when all grouse lived without it. At the present time there are still sharptails inhabiting grainless range, whereas all Prairie Chickens now know and use grain to some extent. Few Ruffed Grouse as yet know or use grain.

Grain is available in fall, but tends to beeome exhausted or covered during winter. The only exeeption is shocked corn. In November and December, when the ground is bare, sharptails gather in packs of from twenty to several hundred to feed on harvested fields of oats, buckwheat, soy beans, and corn. Buekwheat seems to be preferred, yet the biggest paek I have ever seen was one of more than 400 birds on an oat field at Hawkins in Rusk County. The cultivated grains mentioned above may be classified as preferred fall foods for those sharptails which know and have access to them.

All sharptails, in winter, tend to revert to a diet of browse. The details of this change are discussed later.

At the time Leopold (1933, p. 261) was preparing a table of the palatability sequence of winter foods, I classified corn as an emergency food for sharptails. At that time the existence of grainless sharptails, and the general winter preferenee for buds, was not understood. Corn should now be classified with the other grains as a preferred fall food.

The peculiarities of sharptails in relation to artificial feeding of grain are covered in detail later.

Seeds, Berries, and Leaves. These foods are available when not eovered by snow. Sharptails do not feed on weed seeds as extensively as Prairie Chickens do. When snow does not cover the ground, sharptails eat the seeds of smartweed (*Polygonum pennsylvanicum* and *Polygonum hydropiper*), the berries of wintergreen (*Gaultheria procumbens*), snowberry (*Symphoricarpos albus*), and cranberry, and the leaves of white, red, and alsike clovers, sweet clover, alfalfa, goldenrod, strawberries, and sheep sorrel. These greens and fruits may be classified as "tonic, mineral, or vitamin foods" (Leopold, 1933, p. 268). The available variety of these foods is of course much smaller in winter than in summer. With the exception of sheep sorrel they

are eaten in small quantity. Sheep sorrel, until snowed under, is taken in large amounts when sufficiently abundant.

Red Grouse and Sharptail Compared

It is interesting to note that the Red Grouse of England and Scotland and the Sharp-tailed Grouse have eight foods in common. The following Red Grouse foods taken from "The Grouse in Health and Disease" (pp. 76, 83, 85) are also eaten by Wisconsin sharptails:

1. *Vaccinium* sp. blaeberry, blue whortleberry, blueberry. The stem, leaves, flowers, and berries are eaten.

2. *Vaccinium oxycoccos*, bog cranberry. The leaves and berries are eaten.

3. *Arctostaphylos uva-ursi*, red bearberry.

4. *Salix* sp., willow. The leaves and shoots are eaten. In the summer the willow furnishes food in the form of galls.

5. *Myrica gale* and *Myrica asplenifolium*, sweet gale, sweet fern. The buds and catkins are eaten.

6. *Rumex acetosella*, sheep sorrel. The seeds are eaten by Red Grouse and the leaves by sharptails.

7. *Betula* sp., birch. Chapman, p. 25, states that Red Grouse feed on birch, but he does not state what kind of birch.

8. *Polygonum aviculare* and *Polygonum persicaria*, smartweed. The seeds are eaten by both species.

Sharptail Food in Other Regions

Below are a few references to the winter food of sharptails in regions north and west of Wisconsin.

Judd (1905, p. 22) lists the leaves of cottonwood, alder, blueberry, juniper, and larch (tamarack) as foods of the sharptail. It is probable that they also feed on the buds of these plants during the winter. Judd also quotes Hearne as saying that sharptails in winter feed on the tops of dwarf birch, and on poplar buds. Otherwise he does not distinguish between winter foods and foods eaten at other seasons.

Coues (1874, p. 418) refers to the winter food of the sharptail along the Missouri River as follows: "Killed under these circumstances, the food of the Grouse is readily ascertained: in the dead of winter it consists chiefly of the berries of the cedar, and buds of the poplar or cottonwood and willow, still closely sealed awaiting the coming of spring."

Bendire (1892, pp. 102-103) quotes a letter from George Bird Grinnell as follows:

"The Sharp-tailed Grouse, which in certain sections is called 'Speckled Belly' and 'Willow' Grouse, I have found in various years almost everywhere west of the Mississippi River, east of the Sierra Nevadas, and north of the Platte River. In the old days it used to be very common all along the Platte and the Loup Rivers in Nebraska, and in the country which lies between these two streams. I have also found it nearly as abundant in the mountains, sometimes even late in the autumn, coming upon single birds or a considerable brood, far up toward the edge of timber in the most narrow wooded ravines. This species is partly migratory, and there is the very greatest difference in the habits of the bird in summer and winter. As soon as the first hard frosts come in the autumn the birds seem to take to the timber, and begin to feed on the buds of the willow and the quaking aspen. At this time they spend a large portion of their time in the trees and are very wild. In the Shirley Basin, in western Wyoming, a locality where I have never seen any of these birds in summer, they are abundant in winter. At this season they live in quaking aspen thickets along the mountains, and there I have seen hundreds of them roosting on top of a big barn which stands just at the edge of a grove of quaking aspen timber."

Dery (1933, p. 4-7) found ironwood (*Ostrya virginiana*) and mountain ash to be the most important foods of the migrating northern sharptails in Quebec. The buds and catkins of ironwood were found in nineteen stomachs and varied from 8 per cent to 98 per cent, averaging 61 per cent of the total food. Mountain ash berries and buds varied from a trace to 71 per cent, averaging 26 per cent. Other winter foods were birch buds and catkins, aspen buds, cherry buds, alder catkins, willow buds, rose hips, seeds of *Viburnum opulus* and *Cornus canadensis*, *Rubus* sp., hazel buds, *Aralia hispida*, *Cornus paniculata*, tamarack buds and twigs, and *Unifolium canadense*.

As the foods in Dery's list were determined from the northern sharptails which appeared in Quebec in 1932, it is possible that they may be different from those eaten by this subspecies on regular winter range.

Bent (1932, p. 286) lists the buds and sprouts of *Betula glandulosa*, willow, aspen, and larch, and the buds of juniper as food of the northern sharptail. Presumably he means winter food.

Bendire (p. 104) thinks that in Manitoba rose hips are eaten as grit. He quotes Ernest E. Thompson (Ernest Thompson Seton) as follows: "To illustrate the importance of this shrub (prairie rose) . . . I append a table of . . . the contents of crops and gizzards of Grouse killed during various months:

January—Rose-hips, browse, and *Equisetum* tops.
February—Rose-hips and browse.
March—Rose-hips and browse.
April—Rose-hips and browse of birch and willow.
November—Rose-hips, birch and willow browse, and berries of arbutus.
December—Rose-hips, juniper berries, and browse.

"This is of course a mere list of staples, as in reality nothing of the nature of grain, fruit, leaves, or insects comes amiss to this nearly omnivorous bird, but it illustrates the importance of the rose-hips, which are always obtainable, as they grow everywhere, and do not fall when ripe."

Grinnell, Bryant, and Storer (1918, p. 563) say of the Sharp-tailed Grouse (all races): "Especially during the winter when other kinds of food are difficult to procure do these birds feed rather extensively on buds and leaves. . . . The wild rose supplies the Sharp-tail with about 17 per cent of its fruit food, the stony-seeded hips being taken in great quantity; in places where gravel is lacking these seeds seem to serve for grinding other materials in the stomach."

Dery (pp. 4-7) reports rose hips in eleven of nineteen stomachs. The amount varied from a trace to 21 per cent of the stomach contents.

In Wisconsin, possibly due to a good supply of grit, rose hips are not very extensively eaten.

Errington (1931, p. 8) has shown by feeding experiments that rose hips are low in nutrition value for quail and this may also be true for grouse. It is possible, however, that they may digest them more efficiently than quail do.

According to observations made on Red Grouse (*The Grouse in Health and in Disease*, p. 99), fruit stones are poor substitutes for gravel and may cause more harm than good. When thornapple stones were eaten the gizzard was found to be unable to retain the more useful quartz, and when this happened at a time of grit shortage, the Red Grouse was unable efficiently to digest browse.

We can conclude either that the sharptail is better adapted than the Red Grouse to grind browse with only rose or thornapple stones as grit, or that the American authors above quoted have over-rated fruit stones as an effective substitute for mineral grits.

In general, the principal differences in the winter diet between Wisconsin and other sharptails are the heavier consumption of willow buds in other regions, and the inclusion of certain foods not available in Wisconsin, such as juniper buds and berries, mountain ash buds and berries, ironwood buds, and cottonwood buds.

Artificial Feeding of Grain

Experiments have been conducted to determine the amount of grain that may be eaten and the best methods of feeding it.

Buckwheat food patches were planted in central and northern counties. They were used in fall, but not after the first snow.

It was found that sharptails did not know how to eat corn from shocks, but learned the trick from Prairie Chickens when the two occurred in the same flock. Sharptails have been observed feeding with Prairie Chickens on shocked corn in Wood, Portage, Adams, Washburn, and Burnett Counties. Corn, however, was not found to be an important item in the diet of the sharptail, as very little corn is raised in northern Wisconsin.

Numerous experiments were made on hopper feeding. Sharptails learned almost at once to eat buckwheat from hoppers and would go under shelters to feed. Shelled corn, wheat, rye, and oats fed in adjacent hoppers were not eaten. Sharptails did not at first recognize ear corn as a food. They gradually learned to feed on husked ears placed on the ground where they were feeding on buckwheat. Later they even learned to strip the husks from ears. Once they knew how to eat ear corn, they would fly up to platforms where ear corn was stuck on spikes. This system was first used to feed Prairie Chickens (see Figs. 36-37).

In Juneau and Wood Counties where sharptails were fed for the purpose of banding, it was found that approximately 2,000 birds ate 3,000 pounds of buckwheat and 1,000 pounds of corn, or two pounds of grain per bird per month. The cost of the grain amounted to only four cents per bird per month, but labor and equipment brought the total cost to fifty cents per bird per season.

Evidence that Winter Grain Is Unnecessary

Ignoring of Food Patches. As evidence that winter grain is not necessary for sharptails, Mr. E. R. Van Wormer of Babcock informs me that even when stacks of buckwheat were opened up in a food patch located right in a budding area, only a few of the birds which had fed in the patch during November made their appearance there as long as there was snow. After the snow had melted in March, the birds returned to feed on the buckwheat.

Another instance: In northern Juneau County a flock of ten cocks and eleven hens fed in a patch of buckwheat until the advent of snow about December 1, when they changed to a bud diet. Buckwheat shocks and a hopper filled with buckwheat, together with corn shocks and ear corn, were placed in the food patch. Apparently they no

FIG. 36. Prairie Chickens feeding on ear corn stuck in snow and on ear corn held in woven wire container. Photograph was taken from a blind built of snow.

FIG. 37. Prairie Chickens feeding on ear corn impaled on spikes and stuck in the snow.

longer recognized the food patch as a source of food, although buckwheat shocks were in plain sight of the white birches on which they budded and only 100 yards away. Neither did they think of visiting the food patch to see if any grain were available. On January 18 grain was strung along on top of the snow from the birch trees on which they budded to the feeding station. They followed the path of grain and located the grain in the hopper and in the shocks. They continued to feed at the hopper until spring. It does not neeessarily follow that they needed this grain, for they had been getting along very well without it.

I conclude that sharptails use food patches in fall until the first snow of winter, and again in the spring, but not during the winter budding season. Additional winter grain appears not only to be unnecessary, but may be ignored by the birds unless literally "thrust under their noses". Prairie Chickens, on the other hand, seek out grain even during the budding season.

Changes in sharptail population levels are brought about by causes other than available winter grain and deep snow. This seems to be positive evidence that winter grain is unnecessary for survival and increase. Thus in northern Wisconsin where not more than 10 per cent of the sharptails were within reach of winter grain, and where the snow was deep, there was an increase during the summer of 1933, the license reports indicating a larger kill than in 1932.

It might be mentioned as negative evidence that during the summer of 1933 there was a big drop in the number of sharptails in Wood and Juneau Counties. This drop in numbers followed a nearly snowless winter and two winters of extensive feeding of grain by means of hoppers.

Bud Feeding Experiments. Two captive sharptails were fed on white birch and willow buds only. One lost five ounces in two weeks, while the other lost three ounces in the same time. A third sharptail fed on mixed grains and buds lost three and one-half ounces in the same time. As the control lost weight at about the same rate as the two birds fed on buds only, it is probable that the loss of weight was due to being in a pen, and not to the diet.

Feeding experiments should be conducted with more birds and over a longer period. At present there is no reason to doubt the ability of the sharptail to keep in good condition for several months on a browse diet.

Management

Winter feeding of grain is not recommended for sharptails, but where Prairie Chickens are being fed there is, of course, no harm in feeding both.

There can be no doubt, however, that the availability of grain in fall increases the carrying capacity of sharptail range during the pre-budding season. Food patches of buckwheat, standing corn, oats, and soy beans are especially needed in wild regions where there are no farms, and hence few weeds and no grain. In farmed regions farmers should be encouraged to raise more buckwheat. A harvested buckwheat field is an excellent source of early winter grain, provided it is not fall-plowed. Farmers might, if offered share-cropping privileges, be willing to plant buckwheat on wild state land several miles from their farms, just as they now go five to thirty miles to make hay in a hay marsh. On the Upper Mississippi Wild Life and Fish Refuge farmers are given permits to cut marsh hay, and also land on which to raise corn on a share basis. The farmer gets free hay "stumpage" and part of the grain; the government gets the remaining grain for feeding purposes without cash outlay.

Reflooding of drained marshes unfit for agriculture will be beneficial to the winter food supply of sharptails. Such flooding is now under way in Juneau, Jackson, and Wood Counties. White birch will become abundant on all wet borders without artificial planting. A growth of white birch, bog birch, and white pine has already taken place on the borders of flooded areas belonging to cranberry growers in Wood, Jackson, and Monroe counties. If hay marshes are developed on flooded areas, bog birch will come in around the edges of the hay land. The importance of hay marshes will be more fully explained in a paper on grouse range.

Budding grouse of all species prefer trees that are at the edge of a thicket, standing alone, or in small groups. A dense stand of white birch or aspen is of little use as a bud supply except for a few trees around the edge. It is not known whether the buds are larger or better on trees in the open, but it is apparent that a stocky, bushy tree has more buds and is easier to climb around on than a slim tree in a dense thicket. Budding trees which meet these specifications can be provided either by planting isolated trees, or by thinning thickets which are too dense, either by cutting or pasturing.

On some of the drained marshes of Portage County, where the farms are large and have many small patches of aspen, budding grounds are very good. This is especially true of the region west of

Bancroft. Farmers generally should encourage small patches of aspen and white birch in treeless areas. Why not leave a patch of fast growing aspen to grow stove wood and to feed grouse at the same time?

The Greater Prairie Chicken or Pinnated Grouse

(*Tympanuchus cupido americanus*)

Browse. At first it was believed that Prairie Chickens did not bud to any extent in Wisconsin, but more recent observations indicate that Prairie Chickens feed on buds and catkins all through the winter. They differ from sharptails first in that the hens migrate in winter to the southerly counties, where they have ready access to both corn and buds. Second, they differ in that the wintering cocks which remain in the north seek out grain and weed foods, whereas sharptails do not. I have evidence proving that the wintering cocks can subsist on browse plus a small amount of weed seed. A flock at Swamp Lake, Oneida County, wintered on browse, no grain, and very little weed seed.

There are not many records of Prairie Chickens feeding on buds. Judd (p. 18) says: "Naturally the prairie hen is much less given to budding than the ruffed grouse, but it has been known to pluck buds of poplar, elm, pine, apple, dwarf birch (*Betula glandulosa*), and black birch (*B. lenta*)." In Wisconsin chickens browse mostly on the buds and catkins of white birch, bog birch, hazel, and aspen. This applies to both hens and cocks.

Grain and Seeds. The hen chickens, having repaired to the southern counties and mixed with the resident birds of both sexes, feed with them on weed seeds and small grains until about December 1, after which they begin eating corn. I have not yet found out just when buds become a large item in the dietary, but I know they are taken regularly as soon as regular corn-eating begins. The food of cocks remaining in the north is similar, except, as already stated, there may be no corn.

Of the weed seeds eaten, the most common are ragweed (*Ambrosia artemisiifolia*), sedge (*Carex intumescens*), green foxtail (*Chaetochloa viridis*), lamb's quarters (*Chenopodium album*), barnyard grass (*Echinochloa crusgalli*), smartweed (*Polygonum pennsylvanicum*), common smartweed (*Polygonum hydropiper*), climbing false buckwheat (*Polygonum dumetorum*), black bindweed (*Polygonum convolvulus*), and knotweed (*Polygonum cilinode*). Ragweed and climbing false buckwheat form a regular part of the diet whenever available, while the other weeds are eaten only occasionally.

Leaves. Leaves and greens are eaten regularly in summer and fall, and in winter when not snow-covered. The green leaves eaten include willow, clover, alfalfa, sweet clover, sheep sorrel (*Rumex acetosella*), goldenrod, wild strawberries, and other leaves that remain green all winter. A considerable amount of green hay is eaten when the hay is hauled out of the marshes during the winter. In February it was found that pieces of green grass were present in Prairie Chicken droppings, although due to deep snow there was no green grass available. The mystery was cleared up when the source was found to be green hay picked up on stack bottoms.

Wintering Grounds. Food determines what range is habitable in winter, but so does cover, particularly roost cover. The sexes seem to differ as to the kinds of both food and cover needed, and this may account for the fact that the hens but not the cocks migrate. Migration and cover will be discussed in separate papers. I am here considering only the food needed for winter range.

The male Prairie Chickens winter a few miles of their booming grounds, and seek whatever grain is available, not necessarily corn. Thus in Burnett County a flock of thirty cocks fed on soybeans when there was no snow. When the snow was deep they picked grain from straw stacks and from the manure and straw that the farmers spread on the snow. There seems to be a definite correlation between wintering cocks and farms even if there is no grain. Perhaps the weed seeds, however scarce, that occur on farms, are enough to supplement buds. On the other hand, the sharptails on the winter cock range are found as far away from farms in winter as in summer.

The hen chickens which travel southward apparently move until they find a combination of food and cover that suits them. For the upper Mississippi Valley this winter food requirement may at present be said to be corn and buds. At least they seem to migrate far enough to reach bountiful corn and buds, and there they stop.

Cooke (1888, p. 105) tells of the migration of hens into Iowa. Leopold (1931, p. 174) shows this movement still persists, and must come from Minnesota because there are virtually no nesting birds in Iowa. The distance hen chickens move is therefore several hundred miles.

In Wisconsin, however, a shorter movement seems to answer the purpose. The accompanying map, derived from banding records, indicates that the northern Wisconsin hens winter in the southern half of the state.

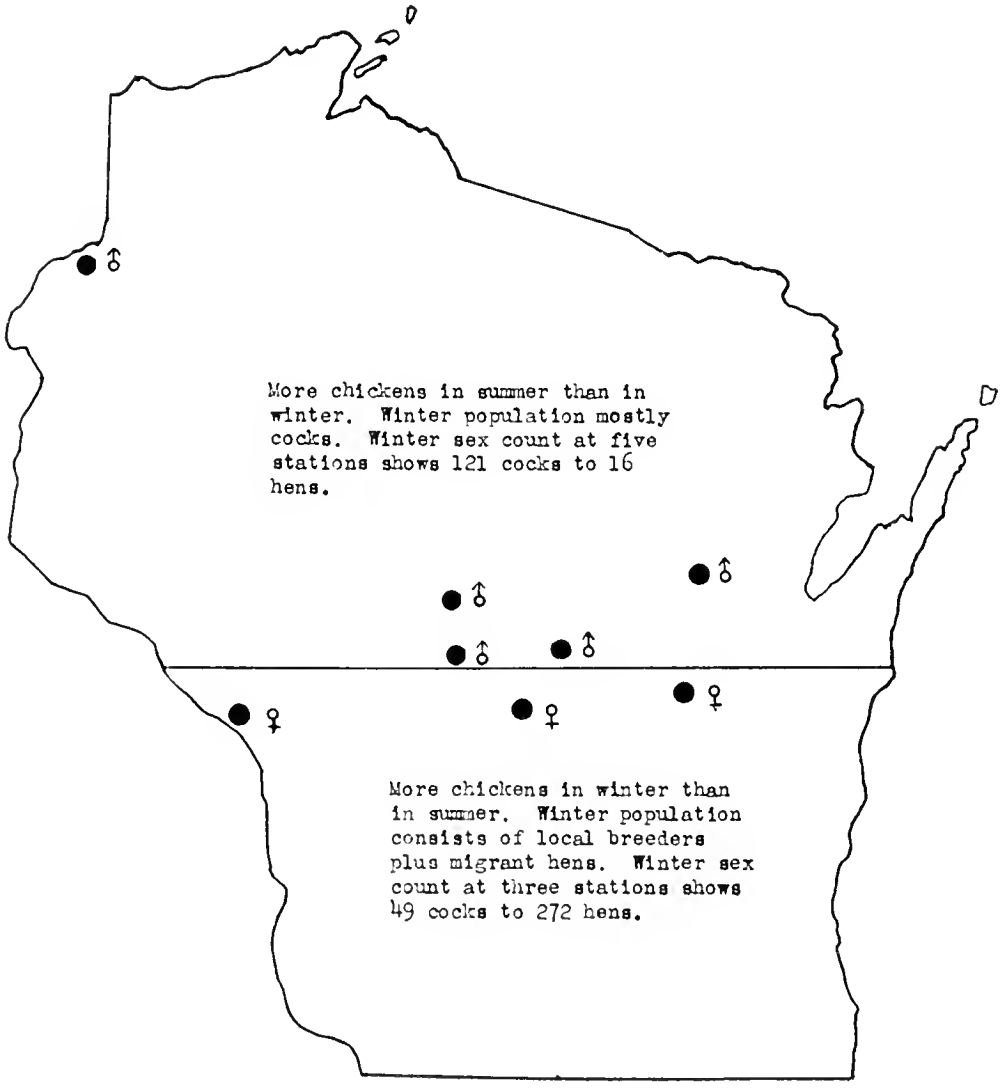

FIG. 38. In winter the range north of the horizontal line holds mostly cocks. Range south of the line holds a resident population plus the northern hens.. Dots show banding stations, and which sex predominates in the winter-caught chickens at each station.

I suspect that a wintering ground, to be acceptable, must offer certain essential elements. I tried to analyze this by comparing the composition of two typical wintering grounds: O'Brien County, Iowa, and Adams County, Wisconsin. In Iowa there is about ten times as much unhusked and shocked corn as there is roost, while in Wisconsin the opposite is true. In Wisconsin Prairie Chickens live almost entirely on buds when the temperature is above zero, but eat, and probably need, corn when it is below zero. In Iowa corn is eaten regularly and clover is eaten as a substitute for buds when it is not covered by snow. Chickens migrate to northern Iowa in the fall and may resume migration in midwinter. Resumption of migration southward across Iowa on snowy winters when there is no shortage of available corn is probably due to a shortage of roosting places, a shortage of buds, and snow covering the clover. In Wisconsin where good roost grounds and plenty of buds are available, there is no migration during the winter no matter how much it snows. What migration there is occurs in late fall.

It is therefore probable that corn, roosts, and buds, or a substitute for buds such as available clover leaves, may be the essential elements and that the low percentage of roost and buds in Iowa is tolerated only because of an abundance of corn and only when clover leaves are available. If this is correct, it would follow that the Iowa range could be strengthened by more roost and buds, and the Wisconsin range by more corn.

Hen Prairie Chickens prefer shocked corn to small patches of standing corn. Thus in Adams County a farmer left out one acre of standing corn next to a field of shocked corn. Chickens refused to feed in the standing corn as long as there were shocks. In Iowa standing corn is preferred because it is in large fields and the stalks are constantly being broken down by cattle so that the ears can be reached by the birds. In February, 1935, several hundred were feeding in a 25-acre field of unhusked standing corn at Trempealeau, Wisconsin. The farmer stated that ordinarily there is no unhusked standing corn in the vicinity. This year it was left because deep snow halted husking. It was noted that the chickens fed almost exclusively in the northwest corner of the field where the stalks were bent over or broken by the northwest blizzards.

Hen Prairie Chickens wintering in eastern Wisconsin on the Wolf River and Lake Poygan marshes feed on shocked corn and on the grain and seeds in the manure which is spread on the snow.

Range Extension. Increase in Prairie Chicken population and an extension of range resulted from the extensive growing of corn by the early settlers. This indicates that corn replaced some other staple food eaten in pre-settlement days which could be obtained by migration from the summer range. I suspect that this may have been acorns or some legume. The exact winter range of the Prairie Chicken is not known, but it was probably Oklahoma, Texas, Arkansas, Missouri, southern Illinois, and eastern Kansas. Judd (p. 12) quotes Audubon as saying that chickens were abundant in winter at Henderson, Kentucky, in 1810. These were probably local birds plus winter migrants from Ohio. The fact that the birds came into the streets and farm-yards indicates that Kentucky did not have a good supply of natural winter food and perhaps was not original winter range.

The increase in population is best noted in Illinois. Judd (p. 12) quotes Hatch as saying that as late as 1836 a hunter was lucky to bag a dozen in a day. Bogardus (1874, p. 66) states that he and another hunter killed 600 in ten days in McLean County, Illinois, in 1872. Bogardus (p. 87) states further that in Logan County native chickens were abundant in 1860, but by 1874 the main shooting was on fall migrants from counties to the north where unbroken prairie suitable for nesting was still abundant.

Leopold (1931, p. 165) speculates that the Indians did not leave enough corn out to give the chickens a chance to learn to eat it.

In Wisconsin chickens followed settlement until now they have reached Lake Superior. In certain central counties they are still extending their range. Thus they became established in northern Clark and southwestern Taylor Counties as recently as 1928.

Gross (1931, p. 28) quotes Spurrell as observing that after 1880 "corn became a common crop [in Sac County, Iowa] and birds wintered as well as nested abundantly", whereas previously there had been a marked migration.

Management

Grain. Corn, preferably shocked, should be provided wherever not already available. Food patches of other small grains and harvested fields of buckwheat and soybeans are valuable supplements to corn when there is no snow, but should not be relied upon as the chief source of winter grain in regions of heavy snowfall.

Feeding stations may also be used to furnish winter grain to chickens. Ear corn may be impaled on sharp sticks that may be set upright in the snow. This system was used by John Worden of Plainfield as early as 1928.

A similar device consists of two parallel boards, one with spikes to stick the corn on, and one for the birds to sit on, erected as a rough table high enough above the ground to be rabbit-proof.

Poles with spikes work equally well. The poles should be three feet above the ground, six or eight inches apart, and every other pole should be without spikes. Where two-inch poles are available, the only cost for such a feeding station would be ten cents' worth of spikes.

Ear corn may be tied in strings with bindertwine and tied around a cornshock. This system works well but is more work than the spike system. Ear corn may also be fed in a wire cylinder from which the corn may be worked out as it is eaten (see Fig. 36). Prairie Chickens do not like to eat grain from a hopper, as they dislike to enter the shelter necessary to protect the hopper from rain and snow. Hoppers for this reason are not recommended.

All Prairie Chicken feeders should be placed in the middle of a field, as Prairie Chickens like to feed where they can see in every direction (see Figs. 36-37).

Browse. If browse for chickens needs improvement, the following differences in browse requirements of Wisconsin grouse should be noted. Browse requirements of Prairie Chickens and Sharp-tailed Grouse are approximately the same except that chickens do not feed on leatherleaf and sharptails do not feed on hazel. Both differ from Ruffed Grouse in that they do not browse on alder to any extent. Ruffed Grouse, like Prairie Chickens, are very fond of hazel catkins. These differences may be due to availability, which depends on the type of range inhabited by the different species of grouse, and not to a difference in palatability. For Prairie Chickens the buds and catkins of white birch, bog birch, hazel, and aspen are important staple foods and an abundance of these plants greatly improves the winter food supply. They may be in hedges or scattered in pastures. Hazel hedges are especially recommended. As snow drifts into the hedge, more and more of the catkins become available to browsing chickens and other grouse.

Summary

The table of grouse foods given below corresponds to that given by Leopold (1933, p. 261) except that the subspecies of sharptails are distinguished from each other and Ruffed Grouse is added for comparison. For definitions of the various classes of winter feed see Leopold (1933, p. 259).

TABLE 1. Palatability Sequence of Winter Foods.

CLASS	SPECIES AND EXAMPLES OF FOOD IN EACH CLASS			
	PRAIRIE SHARP-TAILED GROUSE (Gross, Coues, Schmidt, Bendire) Wis., Nebraska, Dakotas	NORTHERN SHARP-TAILED GROUSE (Dery, Bent) Quebec	PINNATED GROUSE (Gross, Schmidt, Judd) Wisconsin, Iowa	RUFFED GROUSE (Schmidt) Wisconsin
Preferred Foods (eaten mostly before snow)	Buckwheat Corn Soy beans Oats Sheep sorrel Acorns Clover leaves	?	Buckwheat Soy beans Barley Oats Ragweed Smartweed Acorns Rye Climbing false buckwheat	Clover leaves Strawberry leaves Acorns Mountain ash berries
Staple Foods (eaten mostly after first snow)	White birch buds* Bog birch buds Aspen buds Leatherleaf leaves and buds Willow buds Cedar berries Cottonwood buds	Ironwood buds (*Ostrya virginiana*) Mountain ash berries Aspen buds Willow buds Juniper buds	Corn Hazel buds White birch buds Bog birch buds Aspen buds Black birch buds	Aspen buds White birch buds Hazel buds Willow buds Alder buds
Emergency Foods	Blueberry buds Pincherry buds Climbing false buckwheat Tamarack buds Alder buds	White birch buds Cherry buds Tamarack buds Alder buds	Maple buds Elm buds Willow buds Pine buds Apple buds	
Mineral Tonic Vitamin	Green leaves Rose hips Sweet fern buds Weed seeds Berries	*Rubus* Rose hips *Aralia* Berries	Various weed seeds Rose hips Hay Sorghum seeds Mullein seeds Green leaves	Sweet fern buds Sumac berries Rose hips Corn
Grit	Gravel Rose stones	Gravel Rose stones	Gravel Rose stones	Gravel Rose stones Cherry stones

*In this table buds include catkins and twigs.

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THE FIRST DESCRIPTIONS OF NORTH AMERICAN BIRDS

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Many a biologist has longed for the opportunity to examine the fauna and flora of some land never before visited by a naturalist. Few have had that opportunity, and usually the information on a new country has accumulated over a period of time, through uncertain channels, much of it poorly collected and poorly preserved. Here in America we particularly wonder what birds the first Europeans noted and what they thought of them. The Baltimore Oriole and the Yellow Warbler were the first ones mentioned by Maximilian when he landed at Boston, but that was in 1833, more than 300 years after the arrival of the first explorers. One can hardly doubt that these two species were among the first to be observed by others. Christy (*Auk*, 50:275-283) found the Sandhill Crane, Flicker, Blue Jay, Bluebird, Red-winged Blackbird and Towhee in what he believed to be the earliest written account of American birds (in 1613 or 1614). This writer presumably had not visited America but may have talked with someone who had been there and must have seen specimens which had been brought back. Still more recently, Mrs. Allen has described some paintings (*Auk*, 53:17-21) made about 1585, which included a Tropic Bird, Brown Pelican, Booby, Flamingo, Noddy Tern, and Flicker.

It is a simple matter to tabulate from the A. O. U. Check-List the various authors and the dates at which their names were given to the birds, but this yields a number of instances of common birds described later than 1900. In fact, if we list all subspecies, we have a very considerable number of recently discovered birds. This naturally suggests the advisability of limiting the discussion to the larger unit and

disregarding the subspecies. The early writers had no conception of our present subspecies, though they often described American birds as varieties of Old World species, and not infrequently they described two or more "species" from what we now know as different plumages of the same bird. In justice to recent authors it should be mentioned that some forms which had long been regarded as distinct species have been reduced to subspecies, and that a great many of the current subspecies have at some time been given specific rank.

In many cases the Check-List names are not the oldest. The Lark Bunting is known by a name given by Stejneger in 1885, but it was first described by Townsend in 1839 and known under his name until it was changed because of the still earlier use of Townsend's specific name for a different bird. Our common Crow passed for many years under the name given it by Audubon in 1834. Then an earlier name used in 1822 by a German writer, Brehm, was found applicable. Wilson had fully described the Crow in 1811 but considered it the same as the Carrion Crow of Europe. Shall we say that he was the first to describe the American bird? Certainly such a species could not fail to attract attention, but no earlier name appears in the usual literature excepting one by Bartram in 1790. Bartram's names were not consistently binominal, and all of them are rejected by most ornithologists. Few of the later descriptions were based upon his.

The use of the earliest name for the species as a whole results in a few complications. In a number of cases, such as those of the Raven, Magpie, Brown Creeper, and Crossbill, the American birds are considered races of a species which also has European races. In such cases the "species" was first discovered and described in the Old World. It might seem that we should credit the first author who described the American form as different from that of the Old World, but that would again involve the matter of the subspecies and in any case we can hardly disregard an author who gave a good description of the American bird without recognizing such difference.

The first races of many of our birds were described from Mexico, Central America, the West Indies, or South America. Quite a number of the tropical birds, or at least certain of their representatives, reach the southern borders of the United States. I find no less than 105 species of which the first form to be described does not occur within our limits. Some of the birds of eastern Asia occur more or less regularly on the Alaskan coast. In the present study I have omitted those which have been introduced from other regions or which are of only accidental occurrence in North America north of Mexico. There is of

course no sharp natural definition of the limits thus set up. Another difficulty, and one which has been very puzzling in the matter of nomenclature, is the fact that many of the early descriptions were based upon more than one still earlier description and frequently included more than one species.

The following list of the number of species described by each author, I have compiled by using the earliest identifiable name as given by Ridgway ("Birds of North and Middle America") for the oldest form of each species of the A. O. U. Check-List (4th ed.), excluding introduced and accidental species. Since Ridgway had not treated a number of families, including the bitterns, ducks, and hawks, I could not deal with these in a quite similar manner. Peters' "Check-List of Birds of the World" (Vols. 1 and 2) has been especially useful on those groups, and the historical chapter of Coues ("Key to North American Birds") has been helpful in many ways. So many difficulties and problems of treatment are involved that the list must be considered as only approximately correct.

SPECIES OF NORTH AMERICAN BIRDS DESCRIBED BY DIFFERENT AUTHORS

Linnaeus, 10th ed. (1758)		
Occurring also in Europe	65	
Based upon Catesby	59	
Based upon Edwards	18	
From other sources	5	
Total in 10th ed.		147
In 12th ed. (1766)	41	
Fauna Svecica (1761)	2	
Total Linnaeus		190
Gmelin (Syst. Nat., 1788-89)	71	
Other authors before Wilson—		
Vieillot	27	
Boddaert	12	
Pallas	17	
Forster	10	
Latham	9	
Twenty-six others	48	
Total before Wilson		384
Wilson	29	
Audubon	24	53
Authors since Wilson—		
Swainson	28	
Ridgway	15	
Townsend	15	
Baird	14	
Bonaparte	13	
Cassin	11	

Wagler	10
Gambel	9
Lawrence	9
Coues	8
Say	8
Lesson	7
Sclater	7
Vigors	7
Lichtenstein	5
Woodhouse	5
Forty-nine others	86
Total since Wilson and Audubon	267
Grand Total	704

The Linnaean species which occur also in Europe are chiefly water birds which have a wide distribution, such as Horned Grebe, Mallard, Gadwall, Pintail, Shoveller, Common Tern, etc. Of the land birds we have the Snowy Owl, Redpoll, Lapland Longspur, and Snow Bunting of general circumpolar distribution. The Red-spotted Bluethroat and Wheatear occur in Alaska and the Greenland subspecies of Wheatear throughout northern Canada. The Bank Swallow stands practically alone as one of the smaller land birds which is widely distributed in both eastern and western hemispheres. The remaining land birds of this group, represented by American subspecies, are: Hawk Owl, Bohemian Waxwing, Raven, Magpie, Brown Creeper, Yellow Wagtail, and Pine Grosbeak. Other species which were described later are also represented in both regions.

Linnaeus had no first hand information on American birds but collated in his great "Systema" material from all sources. Foremost among these were Catesby's two fine volumes, "The Natural History of Carolina", published about 1730. From these Linnaeus secured descriptions of the following species:

Pied-billed Grebe
Little Blue Heron
Green Heron
Yellow-crowned Night Heron
White Ibis
Flamingo
Canada Goose
Wood Duck
Hooded Merganser
Swallow-tailed Kite
Bald Eagle
Pigeon Hawk
Sparrow Hawk
Heath Hen
Flicker
Pileated Woodpecker
Red-bellied Woodpecker
Red-headed Woodpecker
Ivory-billed Woodpecker
Eastern Kingbird
Crested Flycatcher
Horned Lark
Blue Jay
Mockingbird
Brown Thrasher
Bluebird
Golden-crowned Kinglet
Cedar Waxwing

Bob-white
Whooping Crane
Killdeer
Laughing Gull
Noddy Tern
Blaek Skimmer
White-erowned Pigeon
Mourning Dove
Passenger Pigeon
Ground Dove
Carolina Paroquet
Yellow-billed Cuekoo
Sereeeh Owl
Chimney Swift
Ruby-throated Hummingbird
Belted Kingfisher
Red-eyed Vireo
Parula Warbler
Yellow-breasted Chat
Redstart
Bobolink
Eastern Meadowlark
Baltimore Oriole
Purple Graekle
Summer Tanager
Cardinal
Blue Grosbeak
Painted Bunting
Goldfineh
Red-eyed Towhee
Slate-eolored Juneo

The next most important souree of material for Linnaeus was Edwards' "History of Uneommon Birds", 1741-51. From this Linnaeus seeured some northern speeies and various others as follows:

Great Blue Heron
Blue Goose
Blaek-bellied Tree-duek
Hudsonian Spruee Grouse
Sharp-tailed Grouse
Little Brown Crane
Sora
Golden Plover
Marbled Godwit
Buffle-head
Harlequin Duek
Surf Seoter
Hudsonian Godwit
Red Phalarope
Northern Phalarope
White-winged Dove
Purple Martin
Blaek-whiskered Vireo

Five names from other sourees were: Red-billed Tropie-bird from Osbeek; Wood Ibis and Roseate Spoonbill from Maregrave; Turkey Vulture and Wild Turkey from sourees not indieated. I do not know why Linnaeus omitted a eonsiderable number of Catesby's birds, but eight years later in the twelfth edition of the Systema, the following were added:

Blue-winged Teal
Yellow-bellied Sapsueker
Hairy Woodpecker
Downy Woodpeeker
Tufted Titmouse
Catbird
Robin
Red-wing
Orehard Oriole
Indigo Bunting

Similarly from Edwards he added:

Brown Pelican
Marsh Hawk
Ruffed Grouse
Mexiean Jacana
Spotted Sandpiper
Ruby-erowned Kinglet
Blue-gray Gnateateher
Golden-winged Warbler
Blue-winged Warbler
Myrtle Warbler
Chestnut-sided Warbler
Oven-bird
Maryland Yellow-throat

An extensive French publication by Brisson had appeared in the meantime and from this Linnaeus secured:

Masked Duck	Red-breasted Nuthatch
Semi-palmated Sandpiper	Loggerhead Shrike
Sooty Tern	Black and White Warbler
Derby Flycatcher	Yellow-throated Warbler
Eastern Wood Pewee	Canada Warbler
Canada Jay	Scarlet Tanager
Black-capped Chickadee	Rose-breasted Grosbeak

The Water-Turkey and White-faced Glossy Ibis were added from Marcgrave, the West Indian Grebe and Purple Gallinule from sources not indicated. These were the last of the species described by Linnaeus, but he had included about one-fourth of the North American birds now known to us.

In 1788-89 a thirteenth edition of the "Systema" by Gmelin increased the number by nearly 50 per cent. The Osprey, Chuck-will's Widow, and Purple Finch were still from Catesby; the Willow Ptarmigan, Worm-eating Warbler, and White-throated Sparrow from Edwards; the Nighthawk, Phoebe, White-breated Nuthatch, and five others from Brisson. The Carolina Wren, Palm Warbler, and three others were from Buffon, a few from Steller and Hernandez, but the largest addition was from Latham who had published his "General Synopsis of Birds", 1781-1802, without using binominal names. Species from this work were:

Sooty Shearwater	Barrow's Golden-eye
White Pelican	Red-tailed Hawk
Least Bittern	Coot
Surf-bird	Wood Thrush
Bristle-thighed Curlew	Veery
Wandering Tattler	Dickcissel
Great Horned Owl	White-winged Crossbill
Merrill's Pauraque	Savannah Sparrow
Scissor-tailed Flycatcher	Sharp-tailed Sparrow
Steller's Jay	Vesper Sparrow
Varied Thrush	Song Sparrow

Two of Latham's birds, LeConte's Sparrow and Swamp Sparrow, which were described in his "Index Zoologicus", 1790, still stand in the Check-List under his name. Some half-dozen others which were incompletely described or confused with other species received their present names from later authors.

Another source of new birds for Gmelin was Pennant's "Arctic Zoology", 1784-87. From this came:

Fork-tailed Petrel
Baldpate
Green-winged Teal
Labrador Duck
Red-shouldered Hawk
Rock Ptarmigan
Yellow Rail
Black Oyster-catcher
Woodcock
Willet
Lesser Yellow-legs
Dowitcher
Avocet
Marbled Murrelet
Ancient Murrelet
Whiskered Auklet
Rufous Hummingbird

A publication in 1783 by Boddaert, Dutch doctor and naturalist, included a number of new North American birds. For the most part these were based upon earlier descriptions by Daubenton, who was at one time associated with Buffon. Many of these were apparently drawn from specimens brought by early French explorers in the West Indies, Louisiana, and adjacent regions. The species of Boddaert were:

Holboell's Grebe
Northern Clapper Rail
Royal Tern
Texas Nighthawk
Vermillion Flycatcher
Barn Swallow
Alaska Chickadee
White-eyed Vireo
Prothonatary Warbler
Water-thrush
Hooded Warbler
Cowbird

The Alaska Chickadee is regarded as a race of the Old World, Siberian Tit.

Previous to Gmelin's edition of the "Systema", J. R. Forster had published in 1771 "A Catalogue of the Animals of Hudson's Bay", a notable list of 302 species of birds but without descriptions. The next year he published some descriptions from the same region which included:

Eskimo Curlew
Greater Yellow-legs
Great Gray Owl
Hudsonian Chickadee
Black-poll Warbler
Tree Sparrow
White-crowned Sparrow

Three others, the Whip-poor-will, Nighthawk, and Northern Shrike, were indicated in his "Catalogue", the first two based upon Catesby's descriptions, the third mistaken for the European Great Grey Shrike.

Pallas, a German zoologist, described from 1769 to 1811 a number of birds which inhabit parts of Alaska as well as Siberia. These were:

Short-tailed Albatross
Pelagic Cormorant
Lesser Snow Goose
Steller's Eider
Paroquet Auklet
Crested Auklet
Least Auklet
Rhinoceros Auklet

Rufous-necked Sandpiper
Curlew Sandpiper
Sanderling
Caspian Tern
Cassin's Auklet
Tufted Puffin
Hermit Thrush
Aleutian Rosy Finch
Golden-crowned Sparrow

Vieillot, a French author, published descriptions of a large number of American birds from 1807 to 1819. To some extent these preceded the work of Alexander Wilson, and to a large extent they were unknown or unrecognized at that time. Many of his species were birds from Mexico and South America, northern forms of which were described later. From Vieillot we have:

Leach's Petrel
Fulvous Tree-duck
Cinnamon Teal
White-tailed Kite
Everglade Kite
Broad-winged Hawk
White-tailed Hawk
Short-tailed Hawk
Aplomado Falcon
Virginia Rail
Pectoral Sandpiper
White-rumped Sandpiper
Buff-breasted Sandpiper
White-eared Hummingbird
Red-cockaded Woodpecker
Couch's Kingbird
Tree Swallow
Rough-winged Swallow
Cuban Cliff Swallow
House Wren
Yellow-throated Vireo
Warbling Vireo
Sennett's Warbler
Mangrove Warbler
Prairie Warbler
Louisiana Water-thrush
Kentucky Warbler

Few of the twenty-six writers who described only one or two species each in this period are well known. The Barred Owl was described by William P. C. Barton in a fragmentary work which Coues regarded as the first to be devoted entirely to North American birds. The Ring-necked Duck was described by Donovan from a specimen found in the London markets. The Common Loon and some other water birds, all from Europe, were described by Brünnich. The Snowy Egret was first recognized from Chili by the Italian, Molina. To him is credited also the first race of the Burrowing Owl. A Danish treatise by Pontoppidan gave us the Short Eared Owl, three years before the twelfth edition of Linnaeus' "Systema". The Bittern was described by Montagu in 1813 from England where it was only an accidental visitor.

In Alexander Wilson we meet for the first time a man who lived and worked among the birds which he described. He was not born in America, nor was he born an ornithologist, but his assumption of the study later in his life has helped to give us a clear record of his work and made it purely American. His travels were largely limited to Pennsylvania, Kentucky, and neighboring states, so that for the most

part he discovered new birds in an area where much collecting had been done before. His list of warblers is especially imposing. Of course his greatest work was the description of the habits of the birds, not the discovery of new species. The ones first described by Wilson were:

Canvas-back
Mississippi Kite
Goshawk
Sharp-shinned Hawk
American Oyster-catcher
Wilson's Snipe
Wilson's Phalarope
Black-billed Cuckoo
Long-eared Owl
Lewis's Woodpecker
Acadian Flycatcher
Crow
Fish Crow
Clark's Nutcracker
Winter Wren
Long-billed Marsh Wren
Blue-headed Vireo
Tennessee Warbler
Nashville Warbler
Cerulean Warbler
Bay-breasted Warbler
Pine Warbler
Connecticut Warbler
Mourning Warbler
Wilson's Warbler
Western Tanager
Pine Siskin
Seaside Sparrow
Field Sparrow

Wilson and Audubon were two stars of the first magnitude. Audubon was American born, and certainly he was born an ornithologist with unsurpassed enthusiasm. In the old territory he was able to discover yet a few new birds: Great White Heron, Alder Flycatcher, Carolina Chickadee, Bewick's Wren, Swainson's Warbler, Bachman's Warbler, and Henslow's Sparrow. For most of these he was obliged to penetrate the swamps and remote portions of the eastern states. His journey to Labrador added Lincoln's Sparrow. He longed to visit the country west of the Mississippi River and finally in his late years succeeded in reaching the mouth of the Yellowstone River, now northwestern North Dakota. This trip yielded Nuttall's Poor-will, Sprague's Pipit, Bell's Vireo, and Baird's Sparrow. It was a great disappointment to him that he was not able to describe the birds brought from the West Coast by Townsend and Nuttall, so from the far west only the Black-footed Albatross, Western Gull, Yellow-billed Magpie, Townsend's Solitaire, Tri-colored Redwing, and Green-tailed Towhee bear his names. The following species, then, were described by Audubon:

Black-footed Albatross
Great White Heron
King Rail
Swainson's Hawk
Western Gull
Nuttall's Poor-will
Sprague's Pipit
Bell's Vireo
Swainson's Warbler
Bachman's Warbler
Western Meadowlark
Tricolored Redwing

Alder Flycatcher
Oregon Jay
Yellow-billed Magpie
Carolina Chickadee
Bewick's Wren
Townsend's Solitaire
Green-tailed Towhee
Baird's Sparrow
Henslow's Sparrow
Brewer's Sparrow
Lincoln's Sparrow

A contemporary ornithologist, correspondent and friend of Audubon's, was William Swainson, who had the opportunity of working with the numerous specimens arriving at the British Museum. He had made a trip to Mexico and from specimens collected there described many of our species. Later with John Richardson, he published a work on the animals of northern North America in which several of the northern birds were described. His list of species is:

American Scoter
Thick-billed Parrot
Groove-billed Ani
Lucifer Hummingbird
Broad-tailed Hummingbird
Rivoli's Hummingbird
Broad-billed Hummingbird
Ant-eating Woodpecker
Arctic Three-toed Woodpecker
Cassin's Kingbird
Black Phoebe
Western Wood Pewee
Violet-green Swallow
Dipper
White-throated Wren
Curve-billed Thrasher
Western Bluebird
Phainopepla
Painted Redstart
Hooded Oriole
Bullock's Oriole
Black-headed Grosbeak
Gray-crowned Rosy Finch
Arctic Towhee
California Towhee
Red-backed Junco
Clay-colored Sparrow
Smith's Longspur

Following Wilson one can hardly overlook mention of George Ord who was Wilson's literary executor and apparently the chief opponent to Audubon in the matter of the Pacific Coast specimens. Ord described the Whistling Swan from the Pacific Coast, Wilson's Plover, Ring-billed Plover, and Bonaparte's Gull from the Atlantic Coast. Audubon received more friendly coöperation from Charles Lucien Bonaparte, who continued Wilson's work and published many other papers. The species described by him were:

Black Petrel
White-winged Scoter
Cooper's Hawk
Sage Hen
Stilt Sandpiper
Zenaida Dove
Say's Phoebe
Wollweber's Titmouse
Yellow-headed Blackbird
Scott's Oriole
Pyrrhuloxia
Varied Bunting
Sharpe's Seedeater

The first noteworthy discovery of birds of the Great Plains region fell to Thomas Say in 1819. He was not especially interested in birds

but was an authority on shells, while in insects he was quite without a rival in early American work. The expedition of Major S. H. Long to the Rocky Mountains had many misfortunes. It failed to accomplish much of its plan, yet under repeated difficulties Say was able to make a large contribution to the natural history of that region. The Lark Sparrow was found in Missouri at the start, the Orange-crowned Warbler at the expedition's winter quarters at Engineer Cantonment near the present Omaha, Nebraska. The Dusky Grouse, Band-tailed Pigeon, Arkansas Kingbird, Rock Wren, Lazuli Bunting, and Arkansas Goldfinch were added to the list in Colorado.

A second notable expedition through the same region but continuing to the Pacific Coast, was that of N. J. Wyeth in 1834. Thomas Nuttall was accompanying the group to collect plants and had induced John K. Townsend, a zoologist, to go also. The first day out from their starting point at Independence, Missouri, they secured Harris's Sparrow. This was described by Nuttall six years later, and shortly afterward was discovered and described independently by both Audubon and Maxmilian. The common name given it by Audubon has fortunately been retained. On the plains of Nebraska Townsend found the Lark Bunting and Chestnut-collared Longspur; in Wyoming the Mountain Plover and Sage Thrasher. The northern Pacific Coast region yielded a rich harvest, especially of warblers, and the full list of Townsend's species is as follows:

Mountain Plover
Western Sandpiper
Vaux's Swift
Chestnut-backed Chickadee
Coast Bush-tit
Sage Thrasher
Russet-backed Thrush
Audubon's Warbler
Black-throated Gray Warbler
Townsend's Warbler
Hermit Warbler
Macgillivray's Warbler
Lark Bunting
Oregon Junco
Chestnut-collared Longspur

Townsend and Nuttall had the privilege of making the last great exploratory collection of the early days. No doubt others since have worked equally hard and even more industriously in restricted districts, but new areas of so great an extent no longer remained in the United States. Later additions came from various collections and from more intensive study of collections accumulating in the larger museums. The Southwest was little explored and in the furtherance of that as well as collections from all possible sources, S. F. Baird was responsible above all other men. He had the vision of a national museum and was tireless in his efforts to develop it.

Baird narrowly missed being a youthful associate of Audubon. With his brother, W. M. Baird, he began collecting at an early age and when he was but seventeen years old the brothers described the Least Flycatcher and Yellow-bellied Flycatcher, discovered in the well explored State of Pennsylvania. Baird's list of species is:

Aleutian Tern
Spotted Owl
Yellow-bellied Flycatcher
Least Flycatcher
Wright's Flycatcher
Gray Flycatcher
San Lucas Robin
Virginia Warbler
Grace's Warbler
Kirtland's Warbler
Rio Grand Yellow-throat
Abert's Towhee
Sage Sparrow
Pink-sided Junco

The name of William Gambel is closely associated with California natural history about the middle of the nineteenth century. The following birds were described by him, either from California or other western states:

Gambel's Quail
Elegant Tern
Nuttall's Woodpecker
Ash-throated Flycatcher
Western Flycatcher
Mountain Chickadee
Plain Titmouse
Gambel's Wren-tit
California Thrasher

Two other ornithologists of that period were J. N. Lawrence and John Cassin. Lawrence described the following, of which the last was another species of the Great Plains region which had previously escaped notice:

Western Grebe
Black Brant
California Gull
White-fronted Dove
Xanthus's Hummingbird
LeConte's Thrasher
Plumbeous Gnatcatcher
Texas Sparrow
McCown's Longspur

Cassin described the following, also from the west, excepting the Philadelphia Vireo which was yet another discovery from Pennylvania:

Ross's Goose
Heerman's Gull
Williamson's Sapsucker
White-headed Woodpecker
Black-crested Titmouse
Hutton's Vireo
Philadelphia Vireo
Lawrence's Goldfinch
Rufous-crowned Sparrow
Black-throated Sparrow
Bell's Sparrow

One of the foremost ornithologists following Lawrence and Cassin was Elliott Coues. His "Key to North American Birds" is encyclopedic, combining scientific and popular accounts to an extent not attempted by anyone else since Audubon. As an army surgeon he accompanied several important expeditions in the western states and

thus, like many others, carried on ornithological studies as a pastime. His new species were not numerous:

Black-vented Shearwater	Bendire's Thrasher
Pink-footed Shearwater	Gray Vireo
Ashy Petrel	Large-billed Sparrow
Least Petrel	Rufous-winged Sparrow

One other name remains for special comment. Robert Ridgway contributed more than anyone else to a careful study and revision of all previous descriptions. The species and subspecies which he described were numerous and many of them were from tropical America which was then receiving more attention from the North American ornithologists than it had before. In the following list credited to Ridgway, the isolated island forms are conspicuous:

New Mexican Duck	Guadalupe House Finch
Florida Duck	Guadalupe Towhee
Guadalupe Caracara	Dusky Seaside Sparrow
Sooty Grouse	Guadalupe Junco
Lesser Prairie Chicken	Baird's Junco
California Clapper Rail	Worthen's Sparrow
Guadalupe Wren	McKay's Snow Bunting
Belding's Yellow-throat	

There remain about 120 species distributed among nearly sixty authors of which many were European. They were Douglas, Eyton, Godman, Gould, Gosse, Gray, Richardson, Rothschild, Salvin, and Sclater from England; Blasius, Cabanis, Kaup, Naumann, Schlegel, and Wied (Maximilian) from Germany; Boucier, De Lattre, Lafraysne, Malherbe, Milne-Edwards, Pucheran, and Temminck from France; Brandt and Middendorf from Russia; Salvadori from Italy; Sundevall from Finland. In America were: Aiken, Allen, Anthony, Bannister, Brewster, Bryant, Cabot, Cooper, Crouch, Dall, Giraud, Goss, Henry, Henshaw, Howell, Maynard, Mowbry, Nichols, Stevenson, C. H. Townsend, Woodhouse, and Xantus.

I have attempted to give a brief account including the chief known sources and some features of interest in no more space than would be required for details of many of the individual species. A complete account would be impossible on account of lack of information.

North Dakota Agricultural College,
Fargo, N. D.

OBSERVATIONS ON NESTS AND YOUNG OF THE COOT*

BY GEORGE O. HENDRICKSON

The gathering of evidence which reveals the causative agents of the high mortality among young wild animals has proved a very difficult task. This problem is ever present in the minds of animal observers. Consequently, following a fall of 2.5 inches of cold rain on July 17 and 18, 1935, in the vicinity of Ruthven, Iowa, the author began to look for evidence of its effect on young wildlife.

In two hours on June 20 the writer with Logan J. Bennett, in a canoe, visited ten nests of the American Coot (*Fulica americana americana*) in Mud Lake, a marsh of 400 acres. Four nests were empty of eggs and young coots, but remnants of egg shells and feathers indicated that the nests had been used. Two of the nests were of cattail stems (*Typha latifolia*), and two of bulrushes (*Scirpus validus* and *S. occidentalis*). These nests showed two to six inches of dry material above the surface of the water, and each, though anchored in a clump of cattails or bulrushes, could be lifted up and let down quite freely in the water. It was estimated that the depth of water in the slough increased ten inches with the heavy rainfall. If these nests were used for roosting and brooding at night the young birds evidently had not been harmed by the elements at the nest. Some careful searching revealed four broods of young Coots in the slough, totaling fourteen birds with five in the largest group, which may or may not have occupied the four vacant nests.

One Coot's nest was occupied by a half-grown muskrat that was using it as a feeding station. The animal had burrowed into the nest and heaped enough additional bulrushes around and over itself to be hidden from first sight of the structure.

A sixth Coot's nest contained six eggs and one freshly hatched bird not yet able to go into the water. The nest of bulrush stems showed five inches of dry material above the water's surface. From a seventh nest a parent bird swam away and called five brooded young about two days old from the nest. They scrambled into the water at once.

Three nests appeared to be empty but the removal of one to two inches of dry material at the top uncovered one, three, and five dead young Coots about one week old in the respective nests. The dead birds were surrounded by water-soaked nesting material of cattails and

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bulrushes, and they were only about one inch above the water's surface. It is suggested that these birds drowned in the nests or died of chilling either with or without a brooding parent at the nest. Apparently these nests had not risen steadily with the deepening water.

On June 27 a trip was made to observe Coots at Goose Lake, a marsh of eighty acres near Jewell, Iowa. During six hours of poling a canoe through the thirty acres of bulrushes and cattails only eight Coots' nests were found, and they were located in an area of about 2.5 acres of cattails and bulrushes two to four feet above water about three feet deep. At a second visit on July 15 much of the remainder of the thirty-acre portion previously mentioned was covered with islands of decaying vegetation, submerged a month before, and at this second visit the several acres containing the nests were quite void of such floating material.

These eight nests were made of cattails and bulrushes. Two of the nests appeared to be unfinished and not used. Four nests showed signs of use and were water-soaked nearly to the top. A fourth nest contained seven fresh-looking eggs, and the upper four inches of cattail material was dry. Another nest showed signs of previous use by Coots but at the time of the visit was used by a muskrat as a feeding station. One brood of young was observed and clucking parents at several places in the bulrushes suggested the nearness of unseen broods. No nests were found near those adults.

On July 15 during five hours of poling through the taller vegetation between the many islands of floating debris, three additional nests came to view. One among the cattails had three fresh-looking eggs. A second among the cattails appeared to be freshly built but not in use. These two nests were within the 2.5 acre area mentioned above. The third nest was constructed of fresh leaves and stalks of arrowhead (*Sagittaria latifolia*) near the center of a five-acre patch of that plant. Four fresh-looking eggs were seen in this nest.

The brood observed on June 27 consisted of only two birds about one week old. When the canoe came near they dove under duckweeds (*Lemna* sp.) and were not seen again until 2.5 minutes afterward. Then they were discerned with difficulty as they sat on the water very still and well-covered with duckweeds. One of them was picked up and taken to rear.

Its cries were continuous until evening when it found comfort and warmth in a hastily devised brooder consisting of a ten-gallon pail lined with an electric heating pad and completed with two feet of a feather boa. During the succeeding days it spent much time lean-

ing against the heating pad and if kept away a few moments the fledgling began its vigorous outcries. Only direct sunlight seemed to satisfy its need for warmth when away from the artificial source.

The youngster did not care to pick up its food during the first week. Particles of food had to be placed very near the beak and several times a day soft food was forced into its mouth after it appeared from daily weighing of the bird that insufficient food was being consumed. Whitish material such as clabbered milk, bread crumbs, ant pupae, and the blanched ends of dandelion leaves were taken most freely later. Egg yolk, raw, or cooked hard or soft, brought on diarrhea and weakness when tried several times. At the age of about two weeks the bird was able to eat medium-sized earthworms, but continued to show a preference for ant pupae and the white ends of dandelion leaves. A few scraps of green lettuce leaf would be taken at times. As the bird grew it begged less for food but was always willing to have food brought near the beak.

The youngster proved to be a natural climber. Aided by claws on the wings supplementing the feet, it soon learned to get out of the pail-incubator by easily crawling up the electric cord. This climbing action was very pronounced during the first ten days of its captivity. As the tendency was exhibited less it also used the wings less frequently in climbing.

The youngster did not care to spend much time in water, and demanded water warmer than tap water to paddle in during the short swims.

By July 11 its weight was 38 grams; the weight at taking was 15 grams. On that day the bird passed away suddenly while swallowing an earthworm. Presumably it choked on this large particle of food.

The knowledge of the color and nature of food preferred in captivity and its habits of demanding to be fed may help in further interpretation of the observations upon the adults, the young, and their food.

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

GENERAL NOTES

Conducted by M. H. Swenk

A Third Three-Egg-Set of the Eastern Mourning Dove.—Of the dozens of nests of the Eastern Mourning Dove (*Zenaidura macroura carolinensis*) that I have observed, the only nest with three eggs was found April 16, 1934. The frail nest was placed in the fork of a limb, overhanging a small pond.—KATIE M. ROADS, *Hillsboro, Ohio.*

The European Starling in Osceola County, Iowa.—On April 22, 1936, the writer saw two European Starlings (*Sturnus vulgaris vulgaris*) in Osceola County, about a mile north of the O'Brien County line on Highway No. 59. This is the highway that extends north from Highway No. 18 a mile east of Sanborn. This record, I believe, fills up the state, the Starling having not previously been reported from Osceola County.—O. S. THOMAS, *Rock Rapids, Iowa.*

The American Woodcock in Mahaska County, Iowa.—On the afternoon of April 19, 1936, I observed an American Woodcock (*Philohela minor*) four miles southwest of Pella, in Mahaska County. I approached within twenty feet of the bird and observed it for some time. When flushed, the bird circled around and came back near the same place. The area was a marshy meadow near a small creek and was very close to the highway.—W. W. AITKEN, *Iowa Conservation Commission, Des Moines, Iowa.*

Black Vultures Kill and Eat New-born Lambs.—For over twenty years Black Vultures (*Coragyps atratus atratus*) have been residents of my cousin's farm. The numbers have varied from eighteen to forty, the drove now (1936) numbering eighteen. They were always associated with the Turkey Vulture (*Cathartes aura septentrionalis*). In the summer the Turkey Vultures outnumber the Black Vultures, but only three or four of the Turkey Vultures remain in the winter. In one flock of sheep the Black Vultures killed and ate every new-born lamb. They picked out their eyes, killed, and then ate them. Not only were they observed to do this, but it was noted that the Turkey Vulture had no part in these attacks. The same observations were made in the case of pigs; their eyes were picked out, they were killed, and then eaten. A few years ago on another farm Black Vultures killed and ate a few new-born pigs, but not all.—KATIE M. ROADS, *Hillsboro, Ohio.*

Another Record of the American Egret in Polk County, Iowa.—The writer wishes to add another record of the American Egret (*Herodias albus egretta*) to the ones that have been published by observers in the state. Three birds were seen in Polk County, Iowa, approximately three miles below Des Moines, on the Des Moines River on August 11, 1935. At the time the observation was made they were perched in the tops of a group of elm trees forty-five feet from the ground. These trees were near the water's edge. The birds were studied from a distance of sixty-five feet, so identification was positive.—WALTER ROSENE, JR., *Ogden, Iowa.*

The Red-shafted Flicker in Boone County, Iowa.—During a severe snow storm on January 30, 1936, I observed a Red-shafted Flicker (*Colaptes cafer collaris*) at my home in Ogden, Iowa. A strong wind was blowing from the north and it flew directly over me toward the southwest, and the red under parts were plainly visible without the use of glasses. It alighted on the sheltered side of a

tree across the street and remained there for some time, allowing me to examine it carefully through 8x binoculars at a distance of about sixty feet. I noted the red-shafted feathers and also the V-shaped red patch on the back of his head, thus indicating that it must have been a hybrid. As it flew away, I again noted the red-shafted feathers in flight. A few days later I again observed another bird about a block away and it disappeared in a hollow tree. This probably was the same bird. Temperature on the date of the first observation was eight degrees below zero. I have searched for the bird since, but failed to find it. This is my first record of this species in central Iowa in nineteen years of careful observation.—Walter M. Rosene, *Ogden, Iowa.*

Bird Notes from Morris County, New Jersey.—On March 14, 1936, while driving slowly along the cement road running between Florham Park and Morristown, New Jersey, I observed a female Old-squaw (*Clangula hyemalis*) in full winter plumage, swimming and diving in the flood water that covered the marshes directly next to Ely's Aquatic Farm. The bird was within 100 feet of the road and appeared to be absolutely unsuspicious. It showed no fear when I left the car, and I was able to study it carefully at this range with 8x glasses. So close was I to the bird that I could follow with the naked eye its course under the water by the small trail of bubbles that came to the surface when it submerged. It was diving continually, the dives following each other at approximately twenty seconds. The duration of submergence averaged twelve seconds. The bird was still present the next day at the same spot and was as easily observed. This is an unusual record for this vicinity.

On March 22, 1936, I had under observation a pair of Hooded Mergansers (*Lophodytes cucullatus*), male and female, on the Passaic River within a quarter mile of the Chatham Bridge on the Morris Turnpike, Chatham, New Jersey. I first noticed the male resting quietly on the water. The bird became alarmed when I started inching forward on my stomach and flew fifty yards or so upstream. It rapidly drifted back down again to its former position, and I noted for the first time a darker bird—its mate—which it joined. They evidently lost their suspicions and both of them commenced diving, the two of them submerging together. During the period of submergence I was able to creep much closer, concealing myself as well as possible, and was rewarded with a fine, clear view of the birds. I had Peterson's *Field Guide* with me, and a comparison of the plate with the living bird made exact identification possible. After observing them for ten minutes I continued to creep forward with a view toward getting a glimpse of four American Mergansers (*Mergus merganser americanus*), which were farther upstream. My movements frightened the two birds and they flew quickly up the river out of my sight. The Hooded Mergansers are rare transients in this vicinity.—Paul Murphy, *Summit, N. J.*

A Herring Gull Attacked by a Bald Eagle.—On January 31, 1936, Mr. O. K. Scott and the writer saw an immature Bald Eagle (*Haliaeetus leucocephalus* subsp.) kill and devour a first-year Herring Gull (*Larus argentatus smithsonianus*) on the ice of the Merrimac River at Newburyport, Massachusetts. When first seen, the eagle was standing on the ice about twenty feet from the gull, which was sitting quietly. As we watched, the eagle flew up into the air and over the gull, looking down at it. The gull remained sitting on the ice but threw back its head and raised its beak upward toward the eagle, at the same time spreading its

wings somewhat. The eagle alighted about twenty feet away, and the gull resumed a normal sitting position. This performance was shortly repeated. The eagle rose a third time, and this time alighted on the gull, then almost at once released it. The gull must have been incapacitated before we arrived on the scene, and it was now very badly injured. It flopped along on the ice for a few yards, when the eagle again rose and came down on it, after which the gull did not move. The young eagle stood on the gull looking disinterestingly about for fully half a minute, then slowly and half-heartedly began to pluck and eat the bird. At this point we heard the muffled crack of a small firearm and the eagle with one flap of his wings jumped vertically into the air about four feet, carrying his prey with him, and making his upward leap with apparent ease, as if unencumbered. Several more shots were fired, but the eagle paid them no attention. —Hustace H. Poor, *Cambridge, Mass.*

Effects of the Severe Winter of 1935-36 on Bird Life in the Fort Wayne, Indiana, Area.—In common with the rest of the Middle West, the Fort Wayne area has just passed through its most severe winter in many years. For more than two months the ground was blanketed with snow. Ice froze from two to three feet deep on every quiet body of water. Frost pierced the ground everywhere to a depth of four feet or more. The belated break finally came on February 23, and when it came, it came with a suddenness and a completeness that is most unusual in this area.

In our immediate vicinity, bird life came through the siege of arctic weather surprisingly well. The chief reason for this was that at no time was the food supply of the wintering birds sealed away from them by ice. Weed seeds, berries, and fruits were available in normal abundance at all times. Crusted snow made access to the ground difficult, and in large areas almost impossible, but species that feed normally on the ground suffered not so much from lack of food as from the difficulty of finding gravel suitable for use in grinding their food.

All of the normal winter residents here were present in their usual abundance. In addition, such species as Mourning Doves, Robins, Red-winged Blackbirds, and Grackles stayed over in their usual small numbers, and a normal percentage of these individuals survived. Meadowlarks and Bob-whites were present as usual in all favorable areas, and these species did as well as usual. Meadowlarks were present constantly in an area around my feeding station on the edge of town, yet at no time did they find conditions bad enough to make them other than irregular visitors there. Even a few Carolina Wrens stayed out the winter in our area, which is very near the northern limit of their range.

Had it not been for the presence of some of our rarer winter visitors in unusual numbers, this last winter would have been little different from many others, so far as bird life is concerned. The influx of birds from less fortunate areas was the most interesting feature of the period. The most conspicuously unusual occurrence was the influx of water birds. The sewage-laden Maumee River was open for several miles below the city. Ordinarily it has little to attract the various species of winter ducks, but this winter large numbers of American Golden-eyes and American Mergansers found a haven in its carp-infested waters. Red-breasted Mergansers, Old-squaw, and Herring Gulls also were present in small numbers. In the city all of the rivers were frozen solid, except for a small patch of water in the St. Joseph River kept open by the discharge from a power plant. Here a

single Horned Grebe found its haven and stayed for weeks. Golden-eyes, Mergansers, an Old-squaw, and an occasional Belted Kingfisher paid it frequent visits, but it became characteristic of that patch of water. Some of these water birds lingered on our rivers long after the break in the winter, but most of them went with the snow and ice. Other unusual winter visitors in our area included Snow Buntings and Lapland Longspurs. Both species came with large flocks of Horned Larks, and I fed both of them more or less regularly in the yard, along with the larks. One Longspur that was present only on February 9 was an adult male in an almost typical nuptial plumage. All of the others were in normal winter plumage. Among the Horned Larks, individuals that were typically *alpestris* could be picked out, as also could typical representatives of the subspecies *praticola*. The great majority of individuals, however, were in an intermediate plumage which left me somewhat confused as to their proper subspecific rank.

The effect of the severe winter on the spring migration dates in the Fort Wayne area has been negligible. True, all of the extremely early February dates were eliminated, but when the break in the weather did come, it came so completely that March dates for all species averaged about normal.—Perry Frank Johnson, *Fort Wayne, Ind.*

The 1935 Fall Migration at the Washington Monument.—The Washington Monument, a white stone shaft rising 555 feet in height, is situated near the busiest part of the city of Washington, D. C., and affords an opportunity for quite an unusual method of bird study. For several years after the monument was erected, birds in migration struck it by the score, thousands probably being killed by coming into forcible contact with it. Reports state that it was not an unknown occurrence to pick up a bushel of dead birds at its base that had been killed during a single night.

Later, as the city grew, either the birds changed their course of flight or the survivors became educated concerning the dangers of the Washington Monument. At least in recent years very few birds were striking the monument each season until 1932, when it was decided to flash giant beacons on the shaft from dusk until 11:45 each night. That year, 1932, Miss Phoebe Knappen of the United States Biological Survey, who is keenly interested in all bird data taken at the Washington Monument, picked up 324 birds at the monument, and the next year she gathered a total of 331 birds, mostly warblers and vireos.

Last fall (1935) I visited the monument each night (with a few exceptions) from August 30 to November 7. Before listing a few statistics on the results of my nightly observations, I shall describe briefly a typical "good bird night", that of September 6, 1935. The weather was clear, but there was no moon. There was not much wind. Early in the evening the first birds struck the monument, and others came tumbling down its sides until the beacon lights were turned out at 11:45. At times birds were raining down so fast that the three of us who were watching that night could not keep track of them all. We could hear the birds chirping as they neared the monument, and then could see them, as they came into the path of the lights, three, four, or five hundred feet above us, fly directly toward the monument. Many birds would immediately strike head-on with an audible blow, and would drop like plummets to the concrete at the base with quite a loud thud. Others, though they seemed to strike as hard,

would back away from the monument after the impact and continue their journey. Still others would strike their heads on the stone again and again, each time at a lower level than the time before, and finally would come fluttering down the sides vainly trying to find a foothold on the smooth surface. Several of these latter were saved from probable death by landing in our outstretched hands. Those that seemed none the worse for the experience we let fly away at once. Many of the birds, either from their own efforts or the action of the wind, dropped at a considerable distance from the monument. We located these with flashlights.

We took home with us that night a total of seventy-four birds, twenty-one of which were liberated the next day, seemingly fully recovered. The other fifty-six were dead when we picked them up, or died during the night. Of the seventy-four birds, forty-six were Red-eyed Vireos. There were ten Maryland Yellow-throats, three Magnolia Warblers, three Yellow-breasted Chats, and two Bay-breasted Warblers. There was one each of the following species: Black and White Warbler, Redstart, Blackburnian Warbler, Black-throated Green Warbler, and Scarlet Tanager.

During the entire 1935 fall migration thirty-three species, comprising 246 individuals, were obtained near the base of the Washington Monument. They include: Northern Flicker, 1; Yellow-bellied Sapsucker, 1; Brown Creeper, 2; Long-billed Marsh Wren, 2; Short-billed Marsh Wren, 1; Catbird, 1; Golden-crowned Kinglet, 3; Eastern Ruby-crowned Kinglet, 1; White-eyed Vireo, 4; Blue-headed Vireo, 1; Red-eyed Vireo, 110; Philadelphia Vireo, 2; Black and White Warbler, 1; Tennessee Warbler, 1; Nashville Warbler, 1; Parula (Parula and Northern Parula), 3; Magnolia Warbler, 31; Cape May Warbler, 1; Black-throated Blue Warbler, 1; Black-throated Green Warbler, 15; Blackburnian Warbler, 3; Bay-breasted Warbler, 2; Black-poll Warbler, 3; Yellow Palm Warbler, 2; Ovenbird, 2; Connecticut Warbler, 2; Yellow-throat (Northern and Maryland), 31; Yellow-breasted Chat, 10; American Redstart, 4; Scarlet Tanager, 1; Eastern Grasshopper Sparrow, 1; Field Sparrow, 1; Eastern Song Sparrow, 1.

The above list includes all birds taken at the monument. Thirty-six of the birds were recovered and include twenty-eight Red-eyed Vireos, three Magnolia Warblers, four Maryland Yellow-throats, and one Ruby-crowned Kinglet. I personally handled and identified (or in a few cases had Dr. Oberholser or others verify my identifications) practically every one of the 246 birds. I prepared sixty of the birds for my collection.

A few facts concerning migration at the monument may be mentioned. Nearly all birds struck the monument on nights when there was no moon. There were more fatalities on windy nights than on calm nights. Over one-half of the birds struck the monument on the east face, and nearly all of the rest on the south face. Why this should be I cannot quite figure out—all faces are illuminated identically; the direction of migration is from northeast to southwest; and the wind usually was from the west, northwest, or southwest. Why do so many birds hit the south side and so few the north? Miss Knappen tells me it is the same each year.

Nearly all birds were in immature or juvenile plumage, which made the identification of several difficult and fascinating. Nearly all stomachs were examined, but none contained any food whatsoever. As may be expected, most of the birds had fractured skulls. There were few broken wings and legs. The vireos, being

heavier than the warblers, would strike the monument much harder, and a larger percentage of them would fall.

On rainy or misty nights, Whip-poor-wills, apparently feeding upon insects attracted by the beacons (which are on the ground in large boxes around the base of the monument) flew round and round the monument at low levels, often as low as our heads. Once a Whip-poor-will came so close to me that I could see his large luminous brick-red eye.

On October 20, hundreds of Field Sparrows settled on the benches and light boxes at the base of the monument, apparently resting. None of these sparrows struck the monument that night, nor did they seem confused by the lights nor fly against the shaft, as the vireos and warblers were doing. Besides the birds, four bats died from striking the monument while in pursuit of insect prey. Three were Red Bats, the other a Little Brown Bat. Very few birds strike the monument during spring migrations, according to Miss Knappen.

Mr. Allen McIntosh of the Bureau of Animal Industry, examined 190 of the birds for parasites. An abstract of his results is published in the *Journal of Parasitology*, Vol. 21, No. 6.—Robert Overing, *Landover, Md.*

Concerning the Southern Range of the Cowbird.—In the Wilson Bulletin for March, 1936, on page 13, Mr. Thomas D. Burleigh in an article on the Cowbird (*Molothrus ater*) states in the second paragraph, "actual records of eggs or young in that state (Virginia) are scarce". On page 199 of my book on the "Birds of Virginia" one will see that breeding Cowbirds are very common in Virginia, and I have in my collection some thirteen sets of eggs representing ten different species, with Cowbird eggs in them. All were personally taken by my father, Mr. H. B. Bailey, and me. On my farm in Warwick County, Virginia, fronting on the James River, and now used as the Country Club, I threw dozens of Cowbird eggs out of nests yearly while residing there, from 1906 to 1919, for I did not wish further sets with Cowbird eggs in them. As to Mr. Burleigh's remarks regarding the A. O. U. Check-List stating that the Cowbird does not breed south of central Virginia, that is an error on the part of the Check-List, for I have found them breeding as far south as Florida, and have taken locally reared young at Cape Sable, Monroe County, during the first week in August.—Harold H. Bailey, *Miami, Fla.*

Bird Banding in Luce County, Michigan, in the winter of 1935-36.—The winter of 1935-36 has been a cold one in this locality, there being only three days in February up to the 21st that the temperature has not been to zero or below. Only a few species of birds are wintering, and my list for this year so far numbers only ten. Banding has been favorable. I have had 129 Snow Buntings, eight Redpolls (four were the Common, and four perhaps the Hoary), and one Northern Shrike to band. Have had nine Snow Buntings that I banded in the winter of 1934-35, nine from the winter of 1933-34, one from the winter of 1932-33, and one from the winter of 1930-31. Also had one Common Redpoll from the winter of 1933-34, this being my first return.—Oscar McKinley Bryens, *McMillan, Mich.*

COMMUNICATIONS

June 22, 1936.

To the Editor:

Although I am no longer living in the Yellowstone Park, my attention is always attracted to articles pertaining to birds of that region. In fact, I have been for the last thirty years listing in my Yellowstone Bird Bibliography all articles I could find mentioning even one bird in that Park. Hence, my interest in Mr. Crook's article on pages 136-137 of the June WILSON BULLETIN. If you will look up page 128 of The Condor, Vol. XXXI, No. 3, May-June, 1929, you will find that there is an item there recording the discovery of the "Double-crested Cormorant in Yellowstone National Park", on July 20, 1928. Apparently these were the same birds, and the same nest, seen later that year by Dr. Kelly. As to whether *auritus* or *albociliatus* is the correct form, can not yet be decided definitely because no one has taken a specimen at Yellowstone Lake. According to the 4th edition of the A. O. U. Check-List, *albociliatus* is the Pacific Coast form whereas *auritus* is the eastern form. From my knowledge of the region, I believe that the cormorant came from the east (plains) first to the lake backed up by the dam above Cody, Wyoming, and then westward to the Yellowstone Lake. Bent gives *auritus* as the breeding form at Buffalo, Wyoming, and Great Salt Lake, although he later says the Great Salt Lake birds may be intermediate.

So far as Black Ducks in the Yellowstone are concerned, I have in my own notes: "On August 7, 1922, I saw four very black ducks on Mt. Everts, but I assumed that they were dark members of the mallard species because I did not care to assume the responsibility of adding such a new species to the list on sight identification." Both Mr. Crook's ducks and mine were in northern Wyoming, but very close to the southern boundary of Montana. Wilbur C. Knight, in his "The Birds of Wyoming", does not list the Black Duck. Grave and Walker, in their "Wyoming Birds", admit it only to their Hypothetical List. Aretas A. Saunders, in his "A Distributional List of the Birds of Montana", does not admit the Black Duck even to his Hypothetical List. In the absence of authentic records from both States, would it not be better to await actual specimens before recording this species as present on the authority of sight records? I think I am fairly liberal in admitting the validity of sight records in very many instances, but my own hesitancy in recording the Black Duck after twenty-four (in 1922) years' experience with Yellowstone birds shows that I did not then consider myself qualified to record it on a sight record.

Yours truly,

Long Beach, Calif. M. P. SKINNER.

EDITORIAL

The Wilson Ornithological Club will hold its Twenty-second Annual Meeting in Chicago on November 27-28, of this year. The sessions will be held in the Chicago Academy of Sciences, with the Inland Bird Banding Association participating. Mr. W. I. Lyon is Chairman of the Local Committee. Those who expect to present papers on the program are asked to notify Dr. L. E. Hicks, Secretary of the W. O. C., Ohio State University, Columbus, Ohio.

Our Readers are again reminded that notes on the effects of the drouth on bird life are of much interest at this time. Have any definite observations been made on the effects of drouth on birds that use mud in nest building? Or on the fall movements of shore birds? Have there been as many northern records as usual of "white herons" and egrets, or have the dried-up sloughs retarded this movement? Has there been a scarcity of berries and winter fruit, which has had any effect on the usual abundance of birds in a given area? Has the abundance of certain foods, such as "grasshoppers", brought any increase in certain birds? Have rails, coots, and grebes nested in their accustomed haunts?

The *Ibis* for July, 1936, contains a most instructive summary of recent literature on the migration of birds, by Dr. A. Landsborough Thomson, author of "Problems of Bird Migration". This paper covers the literature of a ten-year period from 1926 to 1935, inclusively. The year 1926 brought out three important books on bird migration, namely, those by Wachs, Wetmore, and Thomson. The present paper by Thomson is valuable in collating the scattered literature since that time. The accompanying bibliography contains 209 titles, not counting secondary references. As a matter of curiosity we were interested to know whether our own periodical contributed its share of this literature. A count shows that American ornithological journals were each cited the following number of times: The *Auk*, 13: the *Condor*, 7: the Wilson Bulletin, 6: *Bulletin Northeastern Bird Banding Association*, 4: *Bird-Banding*, 2. Using this bibliography as a test it was found that the Wilson Bulletin occupied seventh place, tying with three others, among the ornithological periodicals of the world, in the matter of frequency of citation.

The United States Biological Survey has again failed in its opportunity to give the wild fowl of the continent a respite from hunters. It had seemed to us that the stage was nicely set for a closed season. We wish we might know a little more about the mysterious pressure which seems to bear on government officials.

Dr. Carl P. Russell has been appointed Chief of the Wildlife Division of the National Park Service, taking the vacancy caused last spring by the death of George M. Wright.

MEMBERSHIP ROLL

MEMBERSHIP ROLL OF THE WILSON ORNITHOLOGICAL CLUB*

Officers, 1936

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Getz, Christian J., 3503 Middleton Ave., Cincinnati, Ohio.....1930
Green, Morris M., 39 S. Wyoming Ave., Ardmore, Pennsylvania.....1931
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Harriot, S. C., 200 W. 58th St., New York City.....1934

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Roads, Katie M., 463 Vine St., Hillsboro, Ohio....1914
Roberts, Dr. Thomas S., Museum of Natural History, University of Minnesota, Minneapolis, Minnesota....1914
Shaver, Dr. Jesse M., Peabody Teacher's College, Nashville, Tennessee....1922
Shearer, Dr. Amon Robert, Mont Belvieu, Chambers County, Texas....1893
Stephens, Prof. T. C., Morningside College, Sioux City, Iowa....1911
Stoddard, Dr. H. L., Route 5, Sherwood Plantation, Thomasville, Georgia....1916
Sutton, Dr. George Miksch, Bethany, West Virginia....1920
Swenk, Prof. Myron H., 1410 N. 37th St., Lincoln, Nebraska....1914
Thorne, Mrs. W. V. S., 810 Fifth Ave., New York City....1930
Todd, W. E. Clyde, Carnegie Museum, Pittsburgh, Pennsylvania....1911
Uhrig, Mrs. A. B., 425 E. Water St., Oconomowoc, Wisconsin....1926
Young, Colonel John P., Renwick Drive, Ithaca, New York....1913

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Allen, Durward Leon, Kellogg Bird Sanctuary, Augusta, Michigan....1933
Bailey, Alfred M., Chicago Academy of Sciences, Chicago, Illinois....1928
Bartel, Karl E., 2528 W. Collins St., Blue Island, Illinois....1934
Bartsch, Dr. Paul, U. S. National Museum, Washington, D. C....1894
Bennett, Mary A., 623 E. Carroll St., Macomb, Illinois....1933
Bennett, Walter W., Arnolds Park, Iowa....1925
Bent, Arthur Cleveland, 140 High St., Taunton, Massachusetts....1893
Blain, Dr. Alexander W., 2201 Jefferson Ave., East, Detroit, Michigan....1902
Blake, Mrs. Charles, Massachusetts Institute of Technology, Cambridge, Massachusetts....1935
Blincoe, Benedict Joseph, Route 13, Dayton, Ohio....1920
Bowdish, B. S., Demarest, New Jersey....1924
Brant, Irving W., % St. Louis Star, St. Louis, Missouri....1932
Breckenridge, Walter J., Museum of Natural History, University of Minnesota, Minneapolis, Minnesota....1929
Brockner, Winston W., 175 Dutton Ave., Buffalo, New York....1933
Brooks, Allan, Okanagan Landing, British Columbia....1930
Brooks, Earle A., 166 Plymouth Road, Newton Highlands, Massachusetts....1933
Broun, Maurice, P. O. Orleans, % Miss Bessie Penniman, Cape Cod, Mass....1935
Brunn, Charles A., 1510 Central Ave., Hot Springs, Arkansas....1921
Bryens, Oscar McKinley, McMillan, Luce Co., Michigan....1924
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Burdick, Dr. Harold C., P. O. Box 164, Milton, Wisconsin....1929
Burleigh, Thomas D., 400 Union Bldg., 837 Gravier St., New Orleans, La....1922
Burtch, Verdi, Branchport, New York....1924
Butler, Dr. Amos W., 52 Downey Ave., Indianapolis, Indiana....1911
Cahalane, Victor H., Wildlife Division, National Park Service, Washington, D. C....1933
Carpenter, F. S., 2402 Longest Ave., Louisville, Kentucky....1934
Chase, H. D., University of Tulsa, Tulsa, Oklahoma....1935
Chase, Henry B., Jr., Southern Biological Supply Co., New Orleans, La....1932
Chapman, Dr. Frank M., American Museum of Nat. Hist. New York City....1910
Christy, Bayard H., 403 Frederick Ave., Sewickley, Pennsylvania....1922
Clay, Miss Marcia B., Bristolville, Ohio....1924

Coffey, Ben, Tennessee Inspection Bureau, 1434 Bank of Commerce Bldg., Memphis, Tennessee....1928
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Colburn, Albert E., 716 South Flower St., Los Angeles, California....1928
Cole, Dr. Leon J., Genetics Bldg., University of Wisconsin, Madison, Wisc....1921
Cook, G. M., 2301 Elm St., Youngstown, Ohio....1923
Cottam, Clarence, U. S. Bureau of Biological Survey, Washington, D. C....1929
Danforth, Prof. Stuart T., Box 541, Mayaguez, Porto Rico....1924
Dawson, Sallie, 807 N. 4th St., Terre Haute, Indiana....1933
DeLury, Dr. Ralph E., Dominion Observatory, Ottawa, Ontario....1920
Dickinson, F. R., 1518 Astor St., Chicago, Illinois....1931
Dodge, Thomas H., P. O. Box 169, Gallup, New Mexico....1933
Dodge, Victor K., 137 Bell Court West, Lexington, Kentucky....1935
Douglass, Donald W., Dept. of Biology, Texas Technical College, Lubbock, Texas....1929
DuMont, Philip A., Sand Lake Waterfowl Refuge, Columbia, South Dakota....1928
Eifrig, C. W. G., 1029 Monroe Ave., River Forest, Illinois....1907
Ekblaw, Dr. George E., 506 W. Main St., Urbana, Illinois....1915
Ekblaw, Prof. W. Elmer, Clark University, Worcester, Massachusetts....1910
Emilio, S. Gilbert, 7 Winter St., Salem, Massachusetts....1929
English, Dr. P. F., Department of Forestry, Connecticut State College, Storrs, Connecticut....1934
Ernst, Miss Lillie R., 6058 Kingsbury, St. Louis, Missouri....1935
Errington, Dr. Paul L., Iowa State College, Ames, Iowa....1932
Fleming, James Henry, 267 Rusholme Rd., Toronto 4, Ontario....1906
Floyd, Judge Joseph L., 1009-11 Geo. D. Harter Bank Bldg., Canton, Ohio....1903
Frazier, John M., Station A, Box 156, Hattiesburg, Mississippi....1930
Freer, Prof. Ruskin S., Lynchburg College, Lynchburg, Virginia....1930
Friedman, Dr. Herbert, U. S. National Museum, Washington, D. C....1932
Gabrielson, Dr. Ira N., Chief, U. S. Biological Survey, Washington, D. C....1913
Gallagher, William, 201 Smith Ave., Kirkwood, Missouri....1936
Gault, Benjamin True, 563 Main St., GlenEllyn, DuPage Co., Illinois....1895
Golterman, Miss Elizabeth, Educational Museum, St. Louis, Missouri....1935
Gregory, Stephen S. Jr., Box N, Winnetka, Illinois....1922
Grinnell, Dr. Joseph, Museum of Vertebrate Zoology, University of California, Berkeley, California....1914
Guest, Marjorie Lee, Athens State Hospital, Athens, Ohio....1924
Hand, Ralph L., 428 11th St., St. Maries, Idaho....1933
Handlan, John W., Oglebay Park, Wheeling, West Virginia....1932
Handlan, J. T. Jr., 91 Lynwood Ave., Wheeling, West Virginia....1934
Helmuth, Dr. William T., 667 Madison Ave., New York City....1934
Hendrickson, Prof. George O., Dept. Zoology, Iowa State College, Ames, Iowa..1933
Herrick, Dr. Francis H., 2863 Noble Rd., Cleveland Heights, Ohio....1917
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Himmel, Dr. Walter J., Dept. of Botany, Univ. of Nebraska, Lincoln, Nebr....1915
Hines, Frank J., President, Western State College, Kalamazoo, Michigan....1934
Hinnen, Dr. G. A., 1343 Delta Ave., Cincinnati, Ohio....1934
Hinshaw, Thomas D., 1908 Scottwood Ave., Ann Arbor, Michigan....1926
Holt, Ernest G., Chief, Wildlife Division, U. S. Soil Conservation Service, Washington, D. C....1926
Jenner, William, 806 West Davis St., Fayette, Missouri....1933
Johnson, Archibald, Stewart, Nevada....1934
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Jones, Sterling P., 690 Bonita Ave., Webster Groves, Missouri....1935
Jung, Clarence S., 4612 N. Oakland Ave., Milwaukee, Wisconsin....1921
Kalmbach, E. R., 527 Custom House, Denver, Colorado....1926
Kelso, Leon, Food Habits Research, U. S. Biological Survey, Washington, D. C....1930

Kendeigh, Dr. S. Charles, Biological Laboratory, Western Reserve University, Cleveland, Ohio....1923
Kirn, Albert J., Box 157, Somerset, Texas....1918
Laird, Miss Lonnie, 3664 Washington St., St. Louis, Missouri....1935
Lapp, O. Vernon, Soil Conservation Nursury, Havana, Illinois....1936
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Lewy, Dr. Alfred, 2051 E. 72nd Place, Windsor Park, Chicago, Illinois....1915
Loftus, Miss Anne, 2035 Alta Ave., Louisville, Kentucky....1935
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Magann, J. Wilbur, Oklahoma Gas and Electric Co., Oklahoma City, Okla....1927
Maillaird, Joseph, 1815 Vallijo St., San Francisco, California....1930
Marsh, V. L., 340 Madison St., Missoula, Montana....1934
Mayfield, Prof. G. R., Vanderbilt University, Nashville, Tennessee....1917
McAtee, W. L., U. S. Biological Survey, Washington, D. C....1911
McCabe, T. T., Museum of Vertebrate Zoology, Berkeley, California....1928
McConnel, H. B., Cadiz, Ohio....1935
McCreary, Otto, Agricultural Hall, Univ. of Wyoming, Laramie, Wyoming....1930
McMath, Robert R., Route 4, Pontiac, Michigan....1934
Mershon, William Butts, Saginaw, Michigan....1910
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Metcalf, Prof. Zeno P., State College, West Raleigh, North Carolina....1900
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Morse, Margarette E., 11432 Mayfield Rd., Cleveland, Ohio....1921
Moseley, Prof. Edwin L., State College, Bowling Green, Ohio....1925
Mote, G. A., Marshalltown, Iowa....1930
Neff, Johnson A., U. S. Biological Survey, 270 Federal Bldg., Sacramento, California....1920
Nice, Dr. Leonard B., Chicago Medical School, 710 S. Lincoln St., Chicago, Illinois....1932
Nice, Margaret M., Chicago Medical School, 710 S. Lincoln St., Chicago, Illinois....1921
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Northcutt, Charles E., 514 Worley, Columbia, Missouri....1930
Oberholser, Dr. Harry Church, 2805 18th St., N. W., Washington, D. C....1894
Osgood, Dr. Wilfred Hudson, Field Museum of Natural History, Chicago, Ill....1910
Over, Prof. William H., University Museum, Vermillion, South Dakota....1930
Palmgren, Dr. Pontus, Museum Zoologicum, Universitatis, Helsenki, Soumi, Helsingfors, Finland....1935
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Pettingill, Dr. Olin S. Jr., Maple St., Middleton, Massachusetts....1930
Phelps, Frank M., 312 5th St., Elyria, Ohio....1912
Phillips, Allan R., Museum of Northern Arizona, Flagstaff, Arizona....1934
Pickwell, Prof. Gayle B., Dept. Natural Science, San Jose State Teachers College, San Jose, California....1923
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Rahe, Carl W., 4666 Turney Rd., Cleveland, Ohio....1931
Randall, Mrs. W. S., 4424 Bellclaire Ave., Dallas, Texas....1925

Riley, Joseph Harvey, U. S. National Museum, Washington, D. C.....1914
Rogers, Mrs. Walter E., 911 East North St., Appleton, Wisconsin.....1931
Rosene, Walter M., Ogden, Iowa.....1923
Rust, Henry J., Box 683, Coeur d'Alene, Idaho.....1921
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Satterthwait, Elizabeth Allen, 806 W. Ohio St., Urbana, Illinois.....1925
Saunders, W. E., 352 Clarence St., London, Ontario.....1902
Schaefer, Oscar Frederick, 724 Woodbine Ave., Rochester, New York.....1921
Schorger, Dr. A. W., 168 N. Prospect Ave., Madison, Wisconsin.....1927
Schaffer, Chester M., Doreas, West Virginia.....1934
Shelford, Prof. Victor E., Vivarium Bldg., Wright and Healy Sts., Urbana, Illinois.....1931
Skinner, Milton P., 1316 Harding St., Long Beach, California.....1926
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Smith, Frank R., 9 Sibley Ave., Hyattsville, Maryland.....1930
Smith, Luther Ely, Southwestern Bell Telephone Co., St. Louis, Missouri.....1936
Spiker, Charles J., Branchport, New York.....1916
Stebbins, Miss Fannie A., 31 Ely Ave., West Springfield, Massachusetts.....1935
Stillwell, Jerry E., 7460 San Benito Way, Route 4, Dallas, Texas.....1935
Stoner, Dr. Dayton, New York State Museum, Albany, New York.....1912
Stuart, Anne, 1905 D St., Lincoln, Nebraska.....1924
Sutton, Mrs. J. G., 122 South West 7th St., Richmond, Indiana.....1930
Thomas, Edward S., 1116 Madison Ave., Columbus, Ohio.....1921
Tinker, Almerin David, 519 Oswego, Ann Arbor, Michigan.....1909
Tonkin, George, U. S. Biological Survey, 209-211 Federal Bldg., Moline, Ill.....1935
Tyler, Dr. Winsor M., 112 Pinckney St., Boston, Massachusetts.....1914
Urner, Charles A., 596 Westminster Ave., Elizabeth, New Jersey.....1928
Van Tyne, Dr. Josselyn, Museum of Zoology, Ann Arbor, Michigan.....1922
Visscher, Dr. Paul, Biological Laboratory, Western Reserve University, Cleveland, Ohio.....1924
Warren, Edward R., 1511 Wood Ave., Colorado Springs, Colorado.....1911
Weber, Alois J., 904 Grand Ave., Keokuk, Iowa.....1928
Webster, Walter A., Route 1, Sycamore Lawn Farm, Quaker City, Ohio.....1935
Welds, H. B., 229 42nd St., Sandusky, Ohio.....1930
Wetherill, Milton, Kayenta, Arizona.....1935
Wetmore, Dr. Alexander, U. S. National Museum, Washington, D. C.....1903
Weydemeyer, Winton, Fortine, Montana.....1930
Wheeler, Leslie, Lake Forest, Illinois.....1934
White, Francis Beach, St. Paul's School, Concord, New Hampshire.....1926
Wilson, Frank Norman, 804 Lawrence St., Ann Arbor, Michigan.....1924
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Wright, Mrs. George M., 2701 Claremont Blvd., Berkeley, California.....1934
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Allert, Oscar P., Route 1, McGregor, Iowa.....1923
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Ammann, George Andrew, Museum of Zoology, Ann Arbor, Michigan.....1935
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Bellrose, Frank, Jr., 1220 W. Madison St., Ottawa, Illinois....1935
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Bennett, Logan J., Zoology Dept., Iowa State College, Ames, Iowa....1934
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Benson, Seth B., Museum of Vertebrate Zoology, Berkeley, California....1930
Bergner, Harold J., 420 Warwood Ave., Wheeling, West Virginia....1934
Berner, Glenn, 121 East Front St., Jamestown, North Dakota....1930
Berolzheimer, D. D. Jr., 234 Woodmere Blvd., N., Woodmere, New York....1935
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Black, Charles Theodore, 3836 Lowell Ave., Chicago, Illinois....1935
Blanchard, Dr. Frank N., Department of Zoology, University of Michigan, Ann Arbor, Michigan....1928
Blincoe, Mrs. Benjamin J., Route 13, Dayton, Ohio....1926
Bodine, Miss Margaret L., Rittershouse Plaza, 19th and Walnut Sts., Philadelphia, Pennsylvania....1930
Boggs, I. B., Oglebay Hall, Morgantown, West Virginia....1933
Bohning, Leonard L., Route 3, Box 350, Knox, Indiana....1935
Bolt, Benjamin F., 5300 Brookside Blvd., Kansas City, Missouri....1935
Book, Dr. R. D., Corning, Ohio....1933
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Borror, Dr. Donald J., Dept. of Zoology and Entomology, Ohio State University, Columbus, Ohio....1927
Boulton, Rudyard, Field Museum, Chicago, Illinois....1922
Bowman, Lawrence L., Route 7, Orchard Hills, North Canton, Ohio....1935
Brady, Dr. John A., St. Augustine College, Lakewood, Ohio....1925
Braly, John, De Poe Bay, Oregon....1927
Brasher, Rex, Chickadee Valley, Kent, Connecticut....1926
Braund, F. W., 1022 Central Ave., Cleveland, Ohio....1935
Breese, Russell, Delaware, Ohio....1933
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Brokaw, Howard P., 614 Mt. Prospect Ave., Newark, New Jersey....1935
Brookins, Albert M., Hastings Museum, Hastings, Nebraska....1935
Brooks, A. B., Oglebay Park, Wheeling, West Virginia....1931
Brooks, Maurice, Dept. Zoology, West Virginia, Morgantown, West Virginia....1926
Broomhall, W. H., Stockport, Ohio....1926
Brown, J. Wilcox, White Oaks, Montchanin, Delaware....1932
Brown, Ralph M., V. P. I., Blacksburg, Virginia....1935
Brown, Robert B. Jr., 806 Rosewood Ave., Winnetka, Illinois....1935
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Brown, Mrs. William, Edgewater Park, Celina, Ohio....1936
Bruce, James A., 557 Spring St., Wooster, Ohio....1929
Buker, Myron, Adamsville, Ohio....1935
Bujak, B. J., 932 N. Fairfield Ave., Humbolt Park Sta., Chicago, Illinois....1935

Bullock, D. J., Commodore Hotel, Des Moines, Iowa....1932
Burt, W. H., Museum of Zoology, Ann Arbor, Michigan....1928
Bush, Lee, Cambria, Illinois....1935
Cain, B. C., Box 796, Oakland, California....1934
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Campbell, S. H., Oak Grove, Louisiana....1934
Campbell, John S., Bienville, Louisiana....1932
Campbell, Louis W., 304 Fearing Blvd., Toledo, Ohio....1926
Capt, Lueile, Box 476, Baylor College, Belton, Texas....1935
Carlson, Prof. Carl Olof, Dept. of Biology, Doane College, Crete, Nebraska....1923
Carpenter, J. Richard, Lincoln College, Oxford University, England....1934
Carter, John D., Lansdowne, Pennsylvania....1930
Cartwright, Bertram William, 238 Guilford St., Deer Lodge, Winnipeg, Can...1930
Case, Rodman C., Route 1, Troy, Pennsylvania....1935
Chamberlain, Glen D., Suite 20, 22 Academy St., Presque Isle, Maine....1930
Chapman, Floyd B., 1944 Denune Ave., Columbus, Ohio....1932
Chambers, W. Lee, 2068 Escarpa Drive, Eagle Rock, Los Angeles, Calif....1909
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Cheathum, Mrs. Edith, % Biology Dept., 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. C. C., 922 N. Third St., Burlington, Iowa....1925
Clarke, C. H. D., Goderich, Ontario....1932
Clayton, Miss Luella B., Feasterville, Pennsylvania....1930
Clebsch, Alfred, Route 1, Clarkesville, Tennessee....1935
Clippinger, Miss Florence, 4300 Midway Ave., Dayton, Ohio....1933
Clout, G. J., 89 North St., St. Catharines, Ontario....1935
Clow, Miss Marion, Box 163, Lake Forest, Illinois....1929
Coggin, Miss Mattie, 35th St. and Holly Rd., Virginia Beach, Virginia....1935
Cole, Harry M., 3016 Capital Ave., Cheyenne, Wyoming....1935
Coles, Victor, 2910 Grasselli Ave., Cincinnati, Ohio....1929
Collett, Grace, 37 W. Tulane Rd., Columbus, Ohio....1934
Compton, Lawrence V., Box 1151, Soil Conservation Service, Gallup, N. Mex...1923
Compton, Lelia A., 846 E. Bowman St., Wooster, Ohio....1930
Conant, Roger, Toledo Zoological Society, Toledo, Ohio....1930
Conklin, Charles, Canal Winchester, Ohio....1933
Cook, Fannye E., Research Assistant, State Fish and Game Commission, Jackson, Mississippi....1925
Converse, Charles D., Amlin, Ohio....1935
Cook, G. M., 2301 Elm St., Youngstown, Ohio....1923
Cook, Mrs. Horace P., 412 W. 11th St., Anderson, Indiana....1931
Cox, Rodman D., 785 South Ave., Rochester, New York....1933
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Crane, Francis V., South St., Needham, Massachusetts....1932
Cunningham, James V., 4425 Main St., Kansas City, Missouri....1935
Curl, Lawrence A., Quincy, Ohio....1932
Currier, Edmonde S., 8541 N. Chicago Ave., Portland, Oregon....1930
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Davidson, W. M., Route 1, Silver Spring, Maryland....1933
Davis, Mrs. L. Irby, Box 669, Harlingen, Texas....1933
Davis, Russel S., Clayton, Illinois....1932
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Dawley, Jessie Sprague, 1002 Garfield St., Madison, Wisconsin....1935
Dawson, Sallie, 807 N. 4th St., Terre Haute, Indiana....1933

Deaderick, Dr. William H., 36 Circle Drive, Hot Springs, Arkansas....1936
Denton, Prof. J., Dept. of Zoology, University of Georgia, Athens, Georgia....1935
Devitt, O. E., 31 Willowbank Blvd., Toronto, Ontario....1935
Dille, Fred M., Rapid City, South Dakota....1912
Dingle, Edward von Seibold, Huger, South Carolina....1927
Dole, J. Wilbur, 51 E. Stone St., Fairfield, Iowa....1930
Dongan, L. M., 940 Maple Place, St. Louis, Missouri....1935
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Dyer, Mrs. Minnie M., Byington, Tennessee....1930
Easton, Robert S., 904 Moss Ave., Peoria, Illinois....1936
Eastwood, Sidney K., 301 S. Wincbiddle Ave., Pittsburgh, Pennsylvania....1928
Edge, Mrs. Charles Noel, 136 E. 67th St., New York, N. Y....1931
Edson, J. M., 90 Marietta Road, Bellingham, Washington....1928
Edwards, Mrs. W. H., Fairhope, Alabama....1925
Eheim, J. M., 236 S. Adams St., Hutchinson, Minnesota....1926
Eike, James, P. O. Box 4, Woodbridge, Virginia....1933
Eliot, S. A., Jr., 32 Paradise Rd., Northampton, Massachusetts....1932
Ellerman, Alexander H., Sr., 1021 Lincoln St., Piqua, Ohio....1933
Elrod, Mrs. Walter DeWitt, Box 103, Okmulgee, Oklahoma....1923
Emery, F. H., 620 Euclid Ave., Toronto, Ontario....1933
Engleby, T. L., 1002 Patterson Ave., Roanoke, Virginia....1934
Erickson, Mary M., Museum of Vertebrate Zoology, University of California, Berkeley, California....1930
Evans, Dr. Evan M., 550 Park Ave., New York, N. Y....1929
Evins, Samuel N., 38 E. 14th St., Atlanta, Georgia....1921
Fabert, Harry John, 413 Linwood Ave., Columbus, Ohio....1932
Feighner, Lena Veta, 298-1 S. Tremont, Kansas City, Missouri....1935
Felker, J. O., Route 1, Box 403, Clayton, Missouri....1934
Felton, W. R., 1709 Summit St., Sioux City, Iowa....1934
Ferguson, M. S., 301 Natural History Bldg., Urbana, Illinois....1936
Finster, Ethel B., Ashville Normal School, Ashville, North Carolina....1930
Fisher, Warren, Carlisle, Kentucky....1935
Fitzpatrick, Prof. Fred L., Teachers College, Columbia Univ., New York, N. Y....1924
Fleetwood, Raymond J., Soil Conservation Service, Paducah, Kentucky....1934
Fletcher, Alma, 3506 Hawthorne Ave., St. Louis, Missouri....1935
Foote, M. E., 11 Birch Crescent, Rochester, New York....1932
Force, Edith R., 3021 E. 8th St., Tulsa, Oklahoma....1931
Ford, Louise Pettigrew, Barnwell Ave., Aiken, South Carolina....1921
Forsthoefel, Paul, 303 East Fulton St., Celina, Ohio....1932
Foster, George, 2352 E. Magnolia Ave., Knoxville, Tennessee....1935
Franks, Roscoe W., State Civil Service Commission, Columbus, Ohio....1932
Frazer, Dr. T. Atchinson, Marion, Kentucky....1934
Frothingham, Mrs. Randolph, 56 Sargent Crossway, Brookline, Massachusetts....1932
Fryklund, P. O., Roseau, Roseau Co., Minnesota....1926
Furniss, Owen C., 2203 1st Ave., Saskatchewan, Canada....1934
Gander, Frank F., Balboa Park, San Diego, California....1928
Ghigi, Alessandro, R. Universita, Bologna, Italy....1931
Gigstead, Gill, Havana, Illinois....1936
Gilbert, Winifred, 524 W. 24th St., Cedar Falls, Iowa....1936
Giles, Norman H., Jr., 959 Drewery St., N. E., Atlanta, Georgia....1930
Gill, Goeffrey, 24 Overlook Drive, Huntington, Long Island, New York....1934
Gillett, Francis C., 920 Princeton St., Lansing, Michigan....1935
Gillette, Fredericka B., 1319 Forest Ave., Ann Arbor, Michigan....1928
Gleason, Mrs. C. H., Route 3, Berrywood Wilds, Grand Rapids, Michigan....1932
Glenn, Robert W., 509 Orchard Ave., Avalon, Pittsburgh, Pennsylvania....1934
Goerlitz, George, 520 E. Main St., Boonville, Indiana....1934
Goldsmith, G. W., Box 1611, University Station, Austin, Texas....1931
Gordon, Dr. Robert B., Department of Botany, Ohio State University, Columbus, Ohio....1931
Gowen, Carl, 606 S. Illinois Ave., Carbondale, Illinois....1932
Grant, Cleveland P., 620 Greenup St., Covington, Kentucky....1928

Gray, Allan L., Orleans, Nebraska....1932
Greene, Earle R., New Holland, North Carolina....1930
Green, Horace O., 220 North Ave., Wakefield, Massachusetts....1935
Gresham, Burt, Winnipeg Free Press, Winnipeg, Manitoba....1934
Grimes, S. A., 4661 Attleboro St., Jacksonville, Florida....1924
Gross, Dr. Alfred O., Bowdoin College, Brunswick, Maine....1927
Guion, George Seth, 1701 American Bank Bldg., New Orleans, Louisiana....1935
Gunderson, Ethel, Barnesville, Minnesota....1935
Guy, Mrs. Katherine Christie, Box 416, Beckley, West Virginia....1934
Habeger, Ruth, 401 W. Main, Marshalltown, Iowa....1931
Hagar, Mrs. Jack, Rockport, Texas....1930
Hague, Florence, Sweet Briar College, Sweet Briar, Virginia....1931
Hainsworth, William P., 214 Railroad Ave., North Andover, Massachusetts....1930
Hale, Arthur T., Jr., Box 753, Mission, Texas....1935
Hall, Watson, Soil Conservation Service, Coon Valley, Wisconsin....1934
Haller, Carl W., Route 1, Short Creek, Virginia....1934
Hallman, R. C., P. O. Box 847, St. Augustine, Florida....1928
Hambleton, Prof. J. C., 380 W. 8th Ave., Columbus, Ohio....1932
Hamilton, Dr. William John, Jr., Department of Zoology, Cornell University, Ithaca, New York....1933
Hamerstrom, F. J., Jr., P. O. Box 281, Necedah, Wisconsin....1934
Hanawalt, Prof. Fred A., Zoology Dept., Otterbein College, Westerville, Ohio....1932
Handlan, Mrs. John W., Oglebay Park, Wheeling, West Virginia....1934
Happ, Prof. George B., The Principia College, Elsah, Illinois....1935
Harkin, J. B., Commissioner, Dept. of Interior, Ottawa, Canada....1924
Harper, Dr. Francis, 224 S. Chester Rd., Swarthmore, Pennsylvania....1930
Harris, Dr. A. Trevenning, 738-40 Gary State Bldg., Gary, Indiana....1936
Harris, C. L., 921 W. Central, Eldorado, Kansas....1928
Harris, Mrs. W. Gray, 332 Main St., Worcester, Massachusetts....1932
Hartsook, Mrs. Fred P., Winterset, Iowa....1934
Hayward, W. J., Box 1282, Sioux City, Iowa....1913
Head, Glenn B., 337 Haskin St., Kalamuth Falls, Oregon....1935
Heising, Clara M., Apt. 208, 5540 Pershing Ave., St. Louis, Missouri....1932
Hemphill, Frederick A., 125 Broad St., Elizabeth, New Jersey....1928
Henderson, Grant, Route 6, Greensburg, Indiana....1930
Henderson, W. C., 8 Magnolia Parkway, Chevy Chase, Maryland....1928
Henry, C. J., P. O. Box 34, Upham, North Dakota....1933
Herrick, Eleanor E., Box 729, Woodmere, Long Island, New York....1935
Hicks, Mrs. E. H., Fredricktown, Ohio....1932
Hicks, John N., West Point, Illinois....1935
Hiett, Lawrence D., 3758 Brookside Rd., Toledo, Ohio....1930
Hill, Howard, Deslodge, Missouri....1933
Hill, Julian W., 707 Coverdale Rd., Wilmington, Delaware....1935
Hillmer, Davis B., 454 Colburn Place, Detroit, Michigan....1926
Hilton, Dr. Davie C., 305 Richards Blk., Lincoln, Nebraska....1918
Hinchman, Richard May, 501 Randolph Ave., Milton, Massachusetts....1931
Hoag, Ena, P. O. Box 407, Pacific Grove, California....1934
Hobson, Mrs. L. G., 2035 Alta Ave., Louisville, Kentucky....1935
Holland, Harold May, Box 515, Galesburg, Illinois....1915
Holt, Prof. William P., Bowling Green, Ohio....1932
Howard, William J., % National Park Service, Richmond, Virginia....1935
Hudson, George E., Dept. Zoology and Anatomy, University of Nebraska, Lincoln, Nebraska....1933
Huey, Laurence M., Natural History Museum, Balboa Park, San Diego, California....1932
Huggitt, Floyd C., Bellevue, Michigan....1933
Hughes, George T., Box 153, Plainfield, New Jersey....1929
Hunter, Lawrence E., Dallas City, Illinois....1934
Hyndway, Mrs. Eleanor, Route 2, Marcus, Iowa....1933
Ijams, H. P., Box 1150, Knoxville, Tennessee....1924
Ingersoll, Albert M., 908 F St., San Diego, California....1921
Jackson, Norman R., Box 215, Camp Verde, Arizona....1935

James, Mrs. A. O., Chatham, Virginia.....1931
Janzen, Daniel H., Michigan State College, East Lansing, Michigan.....1934
Jelier, F. P., Groote Visseherystraat 19a, Rotterdam, Holland.....1931
Jenks, Randolph, Mt. Kemble, Morristown, New Jersey.....1934
Jensen, J. P., Box 364, Dassel, Minnesota.....1926
Jessman, L. M., 4168 W. Jefferson, Ecorse, Michigan.....1935
Johnson, Carl H., 3796 Lowell Rd., Cleveland, Ohio.....1935
Johnson, D. E., 2269 Grandview Rd., Cleveland Heights, Ohio.....1934
Johnson, D. Elmer, 266 Lava Hot Springs, Idaho.....1934
Johnson, Frank, 1202 Kenwood Ave., Fort Wayne, Indiana.....1935
Johnson, Mrs. Irene W., 38 Portland Place, St. Louis, Missouri.....1931
Johnson, Robert A., State Normal School, Oneonta, New York.....1930
Jones, F. M., Wise, Virginia.....1933
Jones, Gordon Willis, Ellwood Farms, Wilderness, Virginia.....1933
Jones, Harold C., 352 W. College St., Oberlin, Ohio.....1929
Jones, John C., 3224 19th St. N. W., Washington, D. C.....1931
Jones, S. Paul, 509 W. Ave., North, Waukesha, Wisconsin.....1921
Jotter, Lois, 1317 S. University St., Ann Arbor, Michigan.....1935
Kamm, Mrs. Oliver, 365 Lake Shore Drive, Grosse Point Farms, Michigan.....1934
Kearns, Luey Pendleton, Lynnehaven, P. O., Lynnehaven, Virginia.....1935
Keller, L. Floyd, Zion National Park, Springdale, Utah.....1931
Kelly, Mrs. George A., 2300 LaSalle Gardens North, Detroit, Michigan.....1935
Kellog, Dale C., Box 343, Norwalk, Ohio.....1932
Kennedy, H. N., P. O. Box 294, Rosslyn, Virginia.....1935
Kiessling, Victor R., 720 E. Moreland St., Phoenix, Arizona.....1935
Kingsbury, Elizabeth W., 40 Monroe St., Apt. CG8, New York, N. Y.....1933
Klepfer, Ward, Box 1031, Granville, Ohio.....1934
Knapp, Elmer, Route 2, Troy, Pennsylvania.....1930
Knappen, Phoebe, 2925 Tilden St., N. W., Washington, D. C.....1926
Knight, Prof. Harry H., Dept. Zoology and Entomology, Iowa State College, Ames, Iowa.....1926
Komarek, Roy V., Chicago Academy of Sciences, Lincoln Park, Chicago, Ill.....1935
Kriebel, Ralph M., 1111 North St., Bedford, Indiana.....1935
Krug, Carl B., % George Krug, Minonk, Illinois.....1930
Kubichek, W. F., 164 19th St., S. W., Cedar Rapids, Iowa.....1926
Kummerlowe, Dr. Hans, Cichorius Strasse 6 III, Leipzig, Germany.....1931
Lee, Addie, 2111 Dixie Place, Nashville, Tennessee.....1933
Lee, Henry E., Box 831, Rapid City, South Dakota.....1936
Leedy, Charles A., % The Telegram, Youngstown, Ohio.....1927
Lewis, Merriam G., Langhorne Place, Salem, Virginia.....1930
Lincoln, Frederick C., U. S. Biological Survey, Washington, D. C.....1914
Linsdale, Dr. Jean M., Museum of Vertebrate Zoology, University of California, Berkeley, California.....1928
Livingston, Helen, 208 S. 4th St., Monmouth, Illinois.....1935
Lloyd, C. K., 11 N. Elm St., Oxford, Ohio.....1925
Lloyd, Hoyes, 582 Mariposa Ave., Rockcliffe Park, Ottawa, Ontario.....1922
Lodge, William R., Silver Lake Blvd., Route 1, Cuyahoga Falls, Ohio.....1935
Lomax, Dr. Claude C., 503 S. Willow Rd., Evansville, Indiana.....1921
Long, Charles F., 203 E. Broad St., Columbus, Ohio.....1934
Long, Mary A., 526 E. First St., Royal Oak, Michigan.....1932
Long, William H., Jr., 1612 Morton Ave., Ann Arbor, Michigan.....1933
Low, Seth H., Arrowwood Waterfowl Refuge, Kensal, North Dakota.....1931
Lubin, S. F., 106 Chapin St., Binghamton, New York.....1934
Lumley, Ellsworth, High School, Great Falls, Montana.....1935
Lundquist, Arthur, Peabody Hospital, Webster, South Dakota.....1930
MacLoghlin, Mrs. F. E., 43 Inglewood Drive, Hamilton, Ontario.....1928
MacLulick, D. A., Royal Ontario Museum of Zoology, Toronto, Ontario.....1933
Magath, Dr. Thomas B., Mayo Clinic, Rochester, Minnesota.....1935
Malley, Philip P., 2925 Wellman Ave., New York City.....1935
Marburger, Clifford, Denver, Lancaster Co., Pennsylvania.....1924
Marden, Aaron, Eagle Island, South Harpswell, Maine.....1933
Marshall, Raymond O., % Ralph Walter, Route 4, Lisbon, Ohio.....1930

Maslowski, Karl, 950 Glenwood Ave., Cincinnati, Ohio....1934
Mayr, Dr. Ernst, American Museum of Natural History, New York, N. Y....1933
McCamey, Franklin, Jr., 1637 Netherwood Ave., Memphis, Tennessee....1935
McCann, Horace D., Box 175, Paoli, Pennsylvania....1933
McCarthy, T. J., 1524 Haghitt Ave., Superior, Wisconsin....1935
McClanahan, Robert C., 1700 E. Avery St., Pensacola, Florida....1935
McGill, Dr. J. T., Vanderbilt University, Nashville, Tennessee....1930
McIntosh, Duncan, Fairhope, Alabama....1931
McKay, A. K., Chambers Co., Cove, Texas....1935
McLain, Miss Sallie R., 1512 Franklin Rd., S. W., Roanoke, Virginia....1935
McLaughlin, Vincent, 1813 Kensington Ave., Youngstown, Ohio....1935
McNeil, Dr. Charles A., 111 W. Fourth St., Sedalia, Missouri....1914
McNutt, Dorothea R., Greensboro College, Greensboro, North Carolina....1935
Meltreat, Burton W., Paullina, Iowa....1930
Mendenhall, Eugene W., 97 Brighton Rd., Columbus, Ohio....1932
Menninger, William C., 1724 Collins Ave., Topeka, Kansas....1935
Meyer, Miss Adelphia, 6 S. 14th St., Nashville, Tennessee....1931
Michener, Harold, 418 N. Hudson Ave., Pasadena, California....1926
Mickey, Prof. A. B., Zoology Dept., Univ. of Wyoming, Laramie, Wyoming....1935
Miller, Alden H., Museum of Vertebrate Zoology, Berkeley, California....1930
Miller, Empey, Freeland, Michigan....1931
Miller, Robert C., University of Washington, Seattle, Washington....1935
Milnes, Hattie K., 331 Gowen Ave., Philadelphia, Pennsylvania....1935
Moffitt, James, 1879 Broadway, San Francisco, California....1931
Mohr, Carl O., Illinois Natural History Survey, Urbana, Illinois....1936
Molloy, Mrs. R. B., 418 W. Third Ave., Corsicana, Texas....1930
Monk, Harry C., 3108 Long Blvd., Nashville, Tennessee....1920
Monroe, Burt, 110 S. 5th St., Louisville, Kentucky....1935
Monson, Gale, Box 432, Safford, Arizona....1933
Moore, Miss Dora, 60 E. Mulberry St., Athens, Ohio....1934
Morse, Frank E., 939 Elm St., Manchester, New Hampshire....1926
Mounts, Mrs. Beryl Taylor, Ballard Normal School, Macon, Georgia....1923
Mouseley, William H., 4073 Tupper St., Westmount, Montreal, Quebec....1922
Mueller, Walter J., 2043 N. Project Ave., Milwaukee, Wisconsin....1936
Mulaik, Dorothea Upp, Box 155, Edinburg, Texas....1933
Munro, J. A., Okanagan Landing, British Columbia....1935
Munter, Capt. W. H., U. S. Coast Guard, 806 Wilkins Bldg., Washington, D. C....1933
Murie, Adolph, 304 Underwood Bldg., San Francisco, California....1932
Murie, O. J., Jackson, Wyoming....1934
Murphey, Dr. Eugene E., 432 Telfair St., Augusta, Georgia....1935
Murphey, Paul, 10 De Forest Ave., Summit, New Jersey....1936
Murray, Rev. J. J., Lexington Presbyterian Church, Lexington, Virginia....1931
Myrns, A. A., 81 Ford Ave., Oneonta, New York....1934
Naeser, Charles R., 515 Bash Court, Champaign, Illinois....1932
Nelson, Arnold L., Food Habits Research, U. S. Biological Survey, Washington, D. C....1932
Nelson, Miss Viola, 35 W. Washington, Athens, Ohio....1935
Nessle, James, 1417 Prospect Ave., Toledo, Ohio....1936
Nicholson, Donald J., 534 S. Eola Drive, Orlando, Florida....1934
Norton, Arthur H., 22 Elm St., Portland, Maine....1934
Oakes, Mervin E., State Normal School, Freedonia, New York....1933
Odum, Eugene, Box 792, Chapel Hill, North Carolina....1930
Oliver, Mary C., 909 Santa Rita St., Silver City, New Mexico....1934
Ortman, Mrs. Enid, 4660 S. Franklin, Englewood, Colorado....1930
Overing, Robert, Landover, Maryland....1930
Owens, C. M., Route 4, Monticello, Arkansas....1935
Owre, Oscar, Jr., 2625 Newton Ave., South, Minneapolis, Minnesota....1935
Packard, Stanley E., Troy, Pennsylvania....1936
Palmer, Miss Mary C., 760 Midlothian Blvd., Route 2, Youngstown, Ohio....1927
Palmer, Ralph S., Route 1, Brunswick, Maine....1934
Partridge, James A., Normal School, Hamilton, Ontario....1935

Patrick, Dr. Leon, Smith-Crote Bldg., Orange, California....1931
Patterson, J. E., 341 Giannini Hall, Berkeley, California....1930
Peasley, Mrs. Harold, 1807 6th Ave., Des Moines, Iowa....1934
Peet, Dr. Max M., 2030 Hill St., Ann Arbor, Michigan....1935
Pennell, Miss Edna, 503 N. Main St., Mount Vernon, Ohio....1931
Pepper, William, Jr., 110 Glenview Ave., Wyncote, Pennsylvania....1932
Perry, Harold E., 1329 Ethel St., Glendale, California....1932
Peterson, Alfred, Lock Box 211, Pipestone, Minnesota....1931
Peterson, Mervin H., Payson, Utah....1936
Peterson, N. Theodore, 80 Oaklawn Ave., Battle Creek, Michigan....1931
Pickens, A. L., Paducah Teachers College, Paducah, Kentucky....1927
Pierce, Fred J., Winthrop, Iowa....1920
Pierce, John T., Anita, Iowa....1930
Pierce, Wright M., Box 343, Claremont, California....1926
Pirnie, Dr. Miles D., Director, Kellogg Bird Sanctuary, Augusta, Michigan....1928
Poenitz, Hans, Frankfurter Strasse 2, III, Leipzig, Germany....1930
Poland, Lloyd, 526 W. Burke St., Martinsburg, West Virginia....1934
Poole, Frazer G., Federalsburg, Maryland....1936
Poor, Hustace H., 112 Park Ave., Yonkers, New York....1935
Potter, Julian K., 437 Park Ave., Collingswood, New Jersey....1915
Pratt, D. R., McKinley High School, Canton, Ohio....1932
Presnall, Mrs. Clifford C., Springdale, Utah....1930
Price, Charles E., Woodward Ave., Moylan, Pennsylvania....1935
Price, John B., 532 Alvarado, Stanford University, California....1931
Prill, Dr. A. G., Main St., Scio, Oregon....1933
Quattlebaum, W. D., 1925 Paloma St., Pasadena, California....1930
Rahe, Carl W., 4666 Turney Rd., Cleveland, Ohio....1931
Ramsden, Charles Theodore, Apartado 146, Guantanamo, Cuba....1914
Rapp, F. W., Vicksburg, Michigan....1926
Ray, Edward M., 3013 Wentworth Ave., Louisville, Kentucky....1935
Reeder, J. T., 318 College Ave., Houghton, Michigan....1926
Reeder, John P., 502 Seldon Road, Iron River, Michigan....1934
Reis, C. O., 646 Juanita Ave., Los Angeles, California....1931
Rice, Mrs. Bird Wells, 103 S. Miller St., Cyanthiana, Kentucky....1935
Rich, Dr. Guy C., 1820 El Cerrito Place, Hollywood, California....1914
Richardson, Hubert, 182 Rusholme Rd., Toronto, Ontario....1931
Ricks, Jesse J., 30 East 42nd St., New York, N. Y....1931
Ritter, John H., 1015 Old Orchard Ave., Dayton, Ohio....1932
Roasch, Gilbert O., Science Hall, University of Wisconsin, Madison, Wisc....1931
Rogers, Mabel T., 200 Columbia St., Milledgeville, Georgia....1935
Rosewall, Prof. O. W., Dept. of Zoology, Louisiana State University, Baton Rouge, Louisiana....1931
Ross, Hollis T., 109 S. 3rd St., Lewisburg, Pennsylvania....1933
Ross, Julia E., Box 82, Kimball, Minnesota....1920
Russel, Henry N., Jr., 79 Alexander St., Princeton, New Jersey....1932
Russell, Dr. W. L., Box 22, Rhome, Texas....1935
Sanders, R. D., U. S. Forest Service, Rhinelander, Wisconsin....1935
Sargent, William Dunlap, Entomology Dept., Cornell Univ., Ithaca, N. Y....1931
Sattire, A. M., Concordia College, Moorhead, Minnesota....1934
Saunders, Aretas A., 48 Longview Ave., Fairfield, Connecticut....1934
Saunders, Dr. George B., Box 753, Lake Charles, Louisiana....1926
Schafer, John T., Route 2, Port Byron, Illinois....1926
Schaller, R. A., 124 S. College Drive, Bowling Green, Ohio....1930
Schneider, Miss Evelyn, 227 Alta Ave., Louisville, Kentucky....1935
Schultz, G. J., Sutherland, Iowa....1934
Schultz, Miss Helen, Box 105, State Normal College, Fredericksburg, Va....1929
Sedgwick, Leibert D., I. S. & S. C. Home, Knightstown, Indiana....1933
Serbousek, Lillian, 1226 2nd St. S. W., Cedar Rapids, Iowa....1935
Shadle, Prof. Albert R., Biology Dept., Univ. of Buffalo, Buffalo, New York....1930
Shaftesbury, Prof. Archie D., N. C. C. W., Greensboro, North Carolina....1930
Shaw, Mrs. Elizabeth M., 2417 Rosewood Ave., Richmond, Virginia....1931
Sheppard, R. W., 1805 Mouland Ave., Niagara Falls, Ontario....1933

Shields, T. H., 150 18th St., Warwood, Wheeling, West Virginia....1934
Shipman, Charles W., 114 Ridge Rd., Willoughby, Ohio....1930
Shirling, Prof. A. E., 3849 E. 62nd St., Kansas City, Missouri....1924
Shoop, Cora E., Steelton, Missouri....1935
Sibley, John E., Route 2, Whittemore, Michigan....1933
Sibley, Norman O., Route 2, Whittemore, Michigan....1933
Skaggs, Merit B., 14755 Coit Rd., E. Cleveland, Ohio....1934
Slaek, Miss Mabel, 1004 Everett Ave., Louisville, Kentucky....1934
Smith, Dr. A. F., Manning, Iowa....1934
Smith, Mrs. Florence L., Cincinnatus, New York....1935
Smith, Herbert Allyn, 3219 Bellefontaine, Kansas City, Missouri....1932
Smith, Lewis MacCuen, 26 Benezet St., Chestnut Hill, Philadelphia, Pa....1931
Smith, Napier, % Bank of Montreal, 9 Waterloo Place, Pall Mall, London, S. W. 1, England....1928
Smith, Wendell Phillips, Wells River, Vermont....1921
Smyth, J. Adger, Salem, Virginia....1933
Snow, K. C., Route 1, Dexter, New Mexico....1932
Snyder, L. L., Royal Ontario Museum of Zoology, Bloor St. and Avenue Rd., Toronto 5, Ontario....1930
Spawn, Gerald B., Dept. of Zoology, Iowa State College, Ames, Iowa....1934
Speirs, J. Murray, 17 Wolfrey Ave., Toronto 6, Ontario....1931
Sperry, Charles C., Biological Survey, Denver, Colorado....1931
Starrett, William C., 303 Maryland Ave., Peoria, Illinois....1933
Stein, Hilda A., So. Illinois State Teachers College, Carbondale, Illinois....1933
Stein, Stanley F., Shakopee, Minnesota....1932
Stephansky, J. D., % Dept. Conservation, Newberry, Michigan....1935
Stephens, Mrs. Albert Blasdel, 1695 Filbert St., San Francisco, California....1935
Sterry, Elizabeth, Teachers College, San Marcos, Texas....1930
Stevens, O. A., State College Station, Fargo, North Dakota....1926
Stevens, Ross O., Soil Conservation Service, High Point, North Carolina....1934
Stevenson, James, 517 Braniff Bldg., National Park Service, Oklahoma City, Oklahoma....1931
Stewart, Paul A., Leetonia, Ohio....1925
Stiles, Bruce F., 3726 7th Ave., Sioux City, Iowa....1935
Stillwell, Wendell H., Mt. Vernon, Ohio....1934
Stine, Perna M., State Teachers College, Minot, North Dakota....1931
Stoner, Emerson A., Box 144, Benicia, California....1934
Stooksberry, C. L., 1814 S. Miller Ave., Alliance, Ohio....1931
Stophlet, John J., 2612 Maplewood Ave., Toledo, Ohio....1934
Storer, Dr. Tracy I., Division of Biology, University Farm, Davis, California....1928
Strickland, Laura Raymond, 578 E. Central St., Franklin, Massachusetts....1935
Stroley, Elsie A., Morristown, New Jersey....1935
Stuart, Mrs. Margaret J., Box 546, Wheaton, Illinois....1933
Stupp, Jack, Route 2, Box 1014, Clayton, Missouri....1934
Stupka, Arthur, Great Smoky Mountains National Park, Gatlinburg, Tenn....1935
Sturgeon, Myron, 259 W. 2nd St., Salem, Ohio....1934
Sturgis, Irwin, Rural, % Mrs. Ethel Van Meter, Higginsville, Missouri....1935
Sullivan, Walter F., 351 Turk St., San Francisco, California....1925
Sumner, E. L., Box 188, Menlo Park, California....1931
Sumner, E. L., Jr., Box 188, Menlo Park, California....1929
Swanson, Gustav, Wildlife Research Station, Univ. of Maine, Orono, Maine....1927
Swedenborg, Ernie D., 4905 Vincent Ave., South, Minneapolis, Minnesota....1929
Tanner, Orey, 5019 Constance St., New Orleans, Louisiana....1933
Taverner, P. A., National Museum of Canada, Ottawa, Ontario....1925
Teachenor, Dix, 1020 W. 61st St., Kansas City, Missouri....1923
Test, Dr. Frederick H., 511 Russell St., West Lafayette, Indiana....1931
Thomas, Judge Otho S., 205 S. Greene St., Rock Rapids, Iowa....1932
Thompson, Jean, 603 W. Lafayette St., Norristown, Pennsylvania....1935
Thorp, George B., Carnegie Institute of Technology, Pittsburgh, Penn....1935
Tompkins, Ivan R., U. S. Dredge Morgan, Savannah, Georgia....1931
Trautman, Milton B., Museum of Zoology, Ann Arbor, Michigan....1932
Tremps, A. D., 612 Kimball St., Sault Ste. Marie, Michigan....1932

Trimble, Ruth, Carnegie Museum, Pittsburgh, Pennsylvania....1935
Tubbs, Farley F., Dept. Conservation, Game Division, Lansing, Michigan....1935
Turtle, Lancelot J., Rosemount Khoek, Belfast, Ireland....1930
Tuttle, Henry C., 31 State St., Boston, Massachusetts....1930
Tyler, B. T., 215 W. Uraka Ave., Johnson City, Tennessee....1934
Uhler, Francis M., U. S. Biological Survey, Washington, D. C....1931
Upton, Clyde, 41 Acosta Ave., Elm Grove, West Virginia....1934
Ussher, R. D., Nancy Lake Farm, King, Ontario, Canada....1934
Vann Epps, Claude A., Bazile Mills, Nebraska....1936
Van Deusen, H. M., 210 E. 68th St., New York, N. Y....1934
Vasicek, J. M., 10605 Lamontier Ave., Cleveland, Ohio....1934
Vetter, Dr. Charles, Grand View, Nyack, New York....1931
Vincent, Roch Arthur, 517 St. Lawrence Blvd., Montreal, Quebec....1931
Vogt, William, Editor Bird Lore, 1775 Broadway, New York, N. Y....1935
Waehter, William, Hotel Martin, Sioux City, Iowa....1934
Walker, W. M., Jr., Apt. 10, 1825 W. Clinch Ave., Knoxville, Tennessee....1925
Walkinshaw, Dr. Lawrence M., 1421 N. Michigan Ave., Battle Creek, Mich....1928
Wallace, Robert B., Wardman Park Hotel, Washington, D. C....1935
Wanamaker, Paul, 443 Seminole St., Oradell, New Jersey....1934
Ward, Lawrence, St. Johns, Route 1, Michigan....1934
Watters, Robinson C., Box 298, Cambridge, Maryland....1935
Watkins, Allan G., U. S. Forest Service, Lake City, Florida....1935
Watson, Lucius Howard, 4103 Sheridan Blvd., Lincoln, Nebraska....1922
Watterson, William H., 3671 Daleford Rd., Cleveland, Ohio....1929
Weaver, Richard, 3262 River Rd., Cleveland, Ohio....1936
Wells, William, Colony, Kansas....1934
Welter, Dr. Wilfred A., Teachers College, Morehead, Kentucky....1931
Wetherbee, Mrs. Kenneth B., 11 Dallas St., Worcester, Massachusetts....1930
Weyl, Edward Stern, 6506 Lincoln Drive, Mt. Airy, Philadelphia, Penn....1927
Whitaker, Ines, Hotel Robert Fulton, 228 W. 71st St., New York, N. Y....1930
Whitten, Easton W., Coffen, Illinois....1930
Wight, Howard M., School Forestry and Conservation, University of Michigan, Ann Arbor, Michigan....1935
Wilkinson, Alexander Stanley, Kapiti Island, Wellington, New Zealand....1930
Williams, Cecil S., Food Habits Researeh, U. S. Biological Survey, Washington, D. C....1936
Williams, Laidlaw O., Box 453, Carmel, California....1930
Williams, Noel J., Milford, Iowa....1918
Williams, Robert W., U. S. Biological Survey, Washington, D. C....1926
Willis, Myra G., 1540 D. Ave. N. E., Cedar Rapids, Iowa....1935
Willis, Warren J., 24824 89th Ave., Belle Rose, Long Island, New York....1928
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TO OUR CONTRIBUTORS

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CONTENTS

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FALL AND WINTER BEHAVIOR OF MOCKINGBIRDS

BY AMELIA R. LASKEY

The unique habit among Mockingbirds (*Mimus p. polyglottos*) in Tennessee of choosing territory in autumn, their extraordinary song performance, and their behavior during that period, were described only briefly in previous papers on color banded birds observed at the banding station. There are two reasons for this, the most important one being that the garden had been occupied for several years by the birds which furnished such interesting data for the studies. Both of the males, designated as *B* and *Y*, had already established their claims to territory at the banding station when research by means of colored bands was started in 1932. Also on account of obscuring vegetation in early autumn, it is much more difficult then than in early spring, when trees are bare and leaf growth sparse, to identify birds by their bands and to determine the source of calls and songs. Thus it took a longer period of time to gather data and to piece together the bits that gave an understanding of what was taking place.

In a previously published paper ("A Territory and Mating Study of Mockingbirds", *Migrant*, September, 1933) a description was given of the defense of winter territory and the spring song and courtship performance of *B* and *Y* in 1933. The second paper ("Mockingbird Life History Studies", *Auk*, October, 1935) was a continuation of the history of the same individuals, correlating the singing of the males with the nesting cycle and showing the effects of temperature variations on the spring singing. Individual characteristics of the two males were described. The songs and behavior in 1934, when both remated early with their respective mates of 1933, were contrasted with the performance of the previous year. Nesting data for two seasons were given for both pairs. Some conclusions were reached relative to Mockingbird migration movements here, based on observations of banded birds at the home station and at other points in Nashville.

Almost 400 Mockingbirds have been banded during a period of about four and a half years. Three substations are operated at the

homes of friends: one four miles southwest, one three miles northwest, and the other almost a mile southwest. In addition, observations of banded individuals have been made at two homes in the more closely built section of town nearer the business district.

For sight identification, colored bands were used in addition to the numbered aluminum Biological Survey bands on all Mockingbirds except the fall transients. At first only one colored band was used, the male being banded on the right tarsus and his mate with the same color on the left tarsus. The pair banded with blue were called *B* and *Bf*, the yellow banded pair became *Y* and *Yf*. However, as the numbers of birds and size of areas studied increased, it became necessary to use combinations of two colors. Three bands were placed on one leg and three letter designations indicated the position, thus *GAG* is banded with two green bands with the aluminum band between them.

TABLE 1. Record of the individuals mentioned in this paper.

Name	Sex	Date Banded	Place	Last Seen	Status
B*	♂	Aug. 27, 1931	Home station	March, 1935	Permanent resident
Bf	♀	April 14, 1933	Home station	Dec., 1935	Permanent resident
Y†	♂	Oct. 12, 1931	Home station	June, 1934	Permanent resident
Yf	♀	April 16, 1933	Home station	July, 1934	Sum. res. (2 sea.)
L	♂	Sept. 15, 1933	Home station	Feb., 1936	Permanent resident
ABA**	♂	May 8, 1935	75 yds. N. E.		Permanent resident
R2	♂	Nov. 30, 1934	Home station	Jan., 1936	?
AA	♂	May 29, 1935	300 yds. south	Now home station occupant	
GAG	?	Sept. 2, 1935	Home station	March, 1936	?
AYG	♂	July 11, 1935	90 yds. N. E.	June, 1936	?
BAB	♂	March 29, 1936	Home station	April, 1936	?
R	?	Nov. 8, 1932	Home station	March, 1933	Winter resident
X	♀?	Nov. 1, 1934	Home station	March, 1935	Winter resident
YAY	♀	March 31, 1936	Home station	Now home station occupant	

B and *Bf* mated 1933 and 1934. The 1935 courtship in progress when *B* disappeared.

***ABA* was then joined by *Bf* from March, 1935, to August, 1935.

†*Y* and *Yf* mated 1933 and 1934. She migrated for the winter.

Other known females have been color banded but are not included in this table as they appeared only one nesting season and did not winter here.

During midsummer of 1935, for the first time since banding activities began in 1931, the situation seemed to indicate that it might be possible to observe an entirely new group of territory occupants in the fall at the home station. *Y* had been found dead in June, 1934; *B* had presumably fallen victim to a predator in March, 1935, soon after rejoining *Bf* for the third mating; *Bf* had left immediately to mate with *ABA* at a neighbor's about seventy-five yards northeast. The territory vacated by the *B's* was immediately monopolized by *L* and his mate but they had left after their first brood fledged and then

nested about 150 yards south. Their departure in May, 1935, had left one young male *R2* in possession of the front section where *L* had wintered in 1933-34. *R2* did not win a mate until late May, and at the end of June when her chicks were about ten days old, she and her family mysteriously disappeared. *R2* still frequented the station until July 10 but was not found in the neighborhood during midsummer.

Much as the disappearance of *B* was regretted, the new season was awaited with much interest for it seemed the desired opportunity was at hand to see territory selection and defense from its beginning.

Mockingbirds have a marked preference for the habitat of man and nearly all suburban and country homes are chosen by one or more of these sprightly songsters as a suitable place to rear a family. Particularly in the fall is it noticeable how territories are chosen close to dwellings in this area. The food supply is an important item of consideration.

Our lot, located one mile beyond the city limits and five miles from the central business section of Nashville, has a north frontage of 200 feet and is 300 feet deep. It is bordered on the sides and rear by dense clumps of shrubbery, trees, and vines, and across the front, by a clipped hedge. The vine covered house has foundation plantings of shrubs at front and sides and a group of young hackberry trees at its rear. In front of the house and at the extreme rear of the lot are lawns. Inside the shrub and tree borders are informal plantings of flowers and a small pool. Dividing the lot is a "wet weather" creek that goes dry in summer. With the exception of a few old silver maples and numerous young hackberries, all plantings have been made within the past nine years and with the aim of attracting birds to the garden. Fruit bearing trees, shrubs, and vines were used, including wild and cultivated cherry, peach, plum, and apple trees, amoor river privet, loniccra, dogwood, pyracanthus, nandina, bittersweet, rose vines, and others, which, with the popular hackberries, furnish food and nesting places. Although this section is changing rapidly through real estate projects, there is still considerable vacant property adjacent to the banding station, but most of it is cut over at least twice in summer and burned in spring. This vacant property contains old maples, hackberries, and some underbrush along the creeks with a few blackberry and elderberry bushes. In addition to the natural food thus provided, a halved apple or two are placed daily where the pieces may be seen easily. In season fresh pokeberries are kept in and near the traps. Water in summer, suet, and small quantities of raisins and dried pokeberries in winter are also provided. It will be seen that

the banding station offers little more than a very favorable natural setting and baekground for Moekingbird study. In other words, the amount of food provided is not in sueh quantity that it would ereate an abnormal situation by attraeting unusually large numbers of this speeies.

Eaeh year there has been a rhythmie rise and fall in numbers of Moekingbirds at the station whieh may be illustrated by Table 2.

TABLE 2. Showing number of Moekingbirds banded at Home Station.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1932	0	0	1	0	1 im.	1 im. 1 ad.	0	3	4	0	1	0
1933	0	0	2	3	3 im.	5 im. 5 ad.	1 im.	36	41	0	0	0
1934	0	0	0	0	4 im.	1 im. 4 ad.	1 im.	3	7	2	2	0
1935	0	0	0	1	2 ad.	4 im.	2 im. 2 ad.	7	30	9	0	0
Total 4 yrs...	0	0	3	4	10	21	6	49	82	11	3	0

This table shows the relative number of new arrivals at the home station with one exeeption. In August and September, 1934, the frequent rains and lush vegetation made trapping diffieult and the low figure of banded birds that year does not give a true pieture of their relative abundanee that autumn.

In studying this table, it must be kept in mind that there were at least two, but usually more, residents at or adjaeent to the banding station eaeh year until midsummer of 1935. In an indirect way, this table therefore illustrates the relative degree of pugnaeity displayed by these residents in defending territory. The low number of transients banded after early October is signifieant because there are still large numbers moving about elsewhere in fall. Resident birds then reassert their claims to territory and are very aetive in driving away all visitors. This pugnaeity is strong throughout the winter and early spring when they are partieularly vigilant in guarding definite areas where they feed, roost, and begin their spring singing and eourtship.

During the months of December through February of the four-year period tabulated, it will be noted that no birds were banded, beeause there were three or four resident individuals eaeh winter, holding territory at the station or extending into the station, the boundaries of whieh they defended with mueh zeal. The seven birds banded in Mareh and April all proved to be females whieh eame when there were unmated males advertising themselves by loud and

persistent singing. In May, June, and July of this same period, there were twenty-three nestlings and young birds banded and only fourteen adults. Some of those adults are known to have been birds breeding in the neighborhood, and who came for food for themselves and their young.

August, September, and the first few days of October are remarkable for the numbers of visiting groups of birds in which immature plumage and gray eyes predominate, although it has been difficult to determine the ages of some individuals. During the fall period of 1932-1935, the number banded was 142, a sharp increase. During this period adult Mockingbirds are molting and residents are inconspicuous. However by the end of September, the molt is almost complete and visitors are no longer allowed the freedom of the banding station. They are scolded, pursued, and sometimes fought by those that had previously held territory there and by prospective territory holders. Therefore in October, it is seldom that a new Mockingbird is allowed to get into a trap. But transients are still numerous for a month longer in the Nashville area as proven by observations and banding at the substations.

After June in 1935, no nest was built in or immediately adjacent to the garden although Mockingbirds continue nesting activities into August here and young had been banded from about twenty nests in this section during July and August that year. On July 26, the *L's* brought two full-grown chicks to the station for a day or two and on August 14, *L* again visited the garden with some "whining" young. At that time the pokeberries, elderberries, redtwigged dogwood berries, peaches, and plums were ripening and also attracted *Bf* with her chicks. An unmated male, *AA*, that had been singing until late summer and very often at night, came at least once from his territory 300 yards southeast.

On September 7, 1935, a group of four or five started the fall influx of transients which begin to arrive each year about that time or a little earlier. These groups, composed mostly of young birds, flew about, pursuing each other and giving staccato calls that sound somewhat like *chi-chi-chick* and can be imitated by smacking the tongue against the roof of the mouth. In addition, sharp *chucks*, a warning *whe-u*, and an occasional harsh *chy-uk* were prevailing sounds from all sides. Occasionally a bird with flight feathers still partially sheathed would be seen perching, squatting on a limb, or feeding, which usually proved to be an old bird. It is very unusual to hear a song in August or early September although there are home station

records in 1933 for August 21, 25, and the days following. At dusk in the latter part of this period the loud *chucks* became common again as the birds settled for the night separately in dense roosting places of shrub or vine. These relayed answering *chucks* from near and far in every direction are typical of fall and winter as the chill of evening darkness envelopes the out of doors.

On September 11, 1935, it was with much surprise *R2* was found entrapped on the front lawn. His wing and tail feathers were still partially sheathed. On the 18th, a moderate toned song came from the shrubbery where he perched low. His tail was still short. That was the first of the daily concerts by him and others through the lovely warm days of September. The pokeberry patch in the middle west border of the lot was the center of activity those days; almost daily more unbanded birds appeared. On the 18th, a new singer, with some of the exuberance of the mating season, sang loud and fast as he performed some of the actions that had previously been observed only in spring when a female stopped near territory of an unmated male. This new arrival sometimes flew while singing and several times ran with spreading wings into tree forks or flew into shrubs in song. Once he tried to pull off a twig, but when it did not break, he made no further effort to break off others. His song included imitations of a Martin, a Catbird, and a Towhee. He chased other Mockingbirds from the station. He was trapped and his plumage indicated he was a young bird. Although he stayed several days, his performance lacked the zeal of that first day and his songs became shorter and moderate toned like those of *R2*. Continuing through September, the garden was lively with Mockingbirds feeding on pokeberries and privet berries, flying in little pursuits, giving the smacking sounds and *chucks*, and singing lovely songs interspersed with imitations of other birds. *L* was often seen then as he sat on a low limb of the big maple above the pokeberries, quiet and undemonstrative. Often he flew down into the meadow beyond for insects.

The chill evening of September 28 brought the first real waves or relays of "good night" *chucks* at dusk, giving the listener an idea of the number roosting nearby, although the attempt to locate *L's* roost was unsuccessful. Apparently he never participated. On the 30th, he dropped his indifferent attitude and began to chase several species of birds from the pokeberries although the crop was abundant and he ate them only sparingly. He used the characteristic *chuck* and the staccato *chi-chi-chick* calls when chasing the birds. His plumage appeared complete except for the outer pair of rectrices which were still

short. He stayed in the rear half of the lot and mostly on the west side. *R2* spent his time on the front section where privet berries and orange fruit of the pyracanthus bush furnished food. Both spent much time catching moths and other insect food on the lawns. Although *R2* had comparatively few visitors in his section, he was seen chasing birds September 30.

October 1 was an interesting day for *L* sang his first song of the autumn. He started with a few harsh notes which brought to mind similar short metallic sounding songs heard other years in October from resident birds. It was with much surprise *Bf*, in 1934, had been heard repeatedly using it on her own territory, furnishing the first record here of a female Mockingbird song. *L's* song did not stop with the few harsh notes but he sang at length in pleasing melody, alternating moderate tones with very soft notes. He also became more aggressive then toward all birds coming to the pokeberries or to the water near them. All flew away at his approach except a Flicker later in the day that stopped on a branch near him. *L* made a movement toward the larger bird but stopped suddenly, faced him, and puffed out his feathers. When the Flicker ignored him, there were no further signs of hostility, both remained quietly perching and were soon joined by a Cardinal that was allowed to remain only a few feet away in the same tree. On this day (October 1, 1935) *Bf* was located on the rear of the lot but in the east border directly opposite *L's* favorite perch above the pokeberries. She was in a bittersweet vine which proved to be a favorite spot to her while the berries lasted. She was in full new plumage but was rather difficult to locate being rather quiet and frequenting a densely leaved thicket. But on October 4, as she concealed herself in the bittersweet foliage, she provided a delightful surprise—a lovely whisper song—the first Tennessee record of a female singing other than the rather harsh fall song of three or four notes. It was a lengthy song and the performance was repeated many times during the first half of October, affording numerous opportunities to listen, although it took much time and patience to identify her bands. On October 6 for the first time in the 1935 fall season she was heard giving the very short metallic song just mentioned. This will be called the territory song because it was associated with the early manifestations of territory defense. It seemed like a proclamation of vested interests and it was noted in the days that followed that each occupant of neighboring territory used it and it was relayed at times by several individuals. Excepting the territory song, the singing of this old female bird was not like that of *L* or *R2*. It was always

the muted type, a whispering of call notes of her own species, interspersed with notes of other birds and all uttered in the suppressed manner of the Catbird's song. One note says: "The song of *Bf* began with a series of soft *whe-us*, then many variations of whistles, a few notes like the Towhee, and some like a Canary or a Goldfinch." Many of her songs could be recognized as alarm notes but in this rendition, the effect was always as pleasing as the softest strains of a violin.

During the early part of October, *L* also sang some whisper songs but *R2* was never heard to sing that type. They both gave imitations of other birds.

Once more, as in previous years, the advent of October disclosed the banding station divided into territories. The three occupants that announced and defended their respective areas were all former residents of the garden! It was no longer possible to trap Mockingbirds at the home station. The only one that did succeed in making a landing came in on October 18 while several hundred Bronzed Grackles monopolized the front lawn and distracted the attention of *L* and *R2* for a brief time. When the grackles rose in flight, *R2* was discovered on top of a small trap, worrying the imprisoned intruder. After the first few days of October there were no more visiting Mockingbirds or other species feeding among the pokeberries for they were driven off before even a hurried meal could be snatched. Many were flying about elsewhere and numbers were being trapped at the Green Hills substation less than a mile southwest. Among those trapped there were two Mockingbirds banded earlier that fall at the home station, two returns from previous years, one immature bird that had been banded at its nest July, 1935, about three and one-half miles north. Forty-two Mockingbirds were banded there between the 2nd and the 17th of October. Why were the fruit-laden bushes at the home station no longer being visited when the few bunches of berries placed in and around the two or three small traps at the substation were attracting numbers of Mockingbirds as well as others? Subsequent observations indicated a systematic campaign in which each of the eight or ten resident Mockingbirds in the neighborhood had a definite part and which diverted arrivals before they could alight on the feeding grounds of territory holders. At that time, in addition to the songs, which in the case of *L* and *R2* had become more zealous and louder by the middle of October, sharp *chuck* calls, numerous variations of harsh squawks sounding like *chy-uk* and a gutteral *che-ar* were given. The smacking *chi-chi-chick* calls were most frequently heard and they usually seemed to be a call to alertness. When a bird in the garden

used it, the others became attentive, turned in the direction of the call, answered, and were ready to fly at an intruder if one appeared coming to their boundaries. Sometimes it was not possible to determine what caused the first call but it was very obvious that the answers were given in response. These answers were often in kind but they also included the numerous variations of *chuck* calls, and the others described. Often the alarm was given when a Mockingbird was seen flying over. the other residents each answered while flying to the boundary line nearest the intruder, either waiting there to head off the visitor or going to the assistance of the resident of adjoining territory to chase this unwelcome bird who always changed his course suddenly. As he disappeared in the distance, other alarms were heard from that direction where doubtless he was treated similarly in territories already occupied.

After October 15, *Bf* had discontinued her interesting whisper songs and she had retreated from the bittersweet vines (then denuded of fruit) to a small thicket containing some fruiting hackberry trees on vacant property about forty yards southeast. From there she participated in the community defense like *L*. *R2*, and the neighborhood Mockingbirds. However, she was not so aggressive as the two males and did not fly beyond her territory boundaries in pursuit of strangers as *L* did. He made the longest flights of the three in driving them away. Her territory was about three-fourths of an acre but the two males had one and one-half acres each, the latter area being much larger than those of residents at the station in previous years during fall and winter. *L* remained in the rear, *R2* at the front, each using adjoining vacant property also.

The next two weeks were spent in the established daily routine; the morning hours were the busiest in defense. The males sang at length on warm days in a calm manner, with decreasing zeal on the chilly days, and had ceased entirely by November 11 although a few songs were heard elsewhere later. Once a territory song of the female was heard that sounded like "*towhee, towhee*". All were alert to keep off intruders but in previous years, this period of late fall had been marked by some fights and dances between the territory holders and also between the residents and new arrivals seeking to establish territory. *Bf* had been seen in several dances and one fight on her boundary line in 1934. In the 1935 season, only one similar encounter was seen. On December 11 *R2* met his neighbor (to the north) on a hedge, then on the lawn, where they fought and danced. This dance occurs frequently among Mockingbirds as a territory

boundary maneuver. The participants face each other, with heads erect; they step forward, backward, sideways, in a dignified manner for a moment or several minutes. Sometimes the sidestepping may continue for twenty-five yards with each bird remaining on his own side of the boundary line. It terminates usually by each turning suddenly to his own side to fly away or to feed on the ground. It may end in a fight or follow one. Once in late November, 1935, *L* and *R2* were noted in the first stages of an encounter when they met in a tree on their boundary line but they separated without fighting and without meeting on the ground for the characteristic dance. On December 2, 1935, one of the neighborhood birds fought his reflection in the windows of a parked automobile. This had been a habit of *Y* in previous winters, starting in November and continuing spasmodically through February. He dashed at his own reflection in windows of both house and garage.

In previous years several instances also are on record when the short territory songs were heard from *B's* section occasionally between the hours of midnight and 3 A. M. on bright nights between October 2 and December 1. There are also records of the staccato *chi-chi-chick* being heard then, but in 1935, except for one territory song during the night of October 12, these calls were the only night time sounds heard and they probably indicated a predatory creature had disturbed them for Cardinals joined in the alarm with a series of *chips*.

By December, Mockingbirds were conspicuous only at dusk when the various sharp calls were heard as they went to roost. Unusually cold weather had descended upon us and during the day only occasional *chy-uk* or other calls were heard and they sat hunched in sheltered places or greeted the first falling snowflakes with harsh *chucks* seemingly to show their disapproval. They continued to scold the Robins and Starlings, flew at the Cardinals, consumed halved apples, suet, hackberries, and on the milder days, probably found a little insect food as they searched on the ground. However, this proved to be the most disastrous winter to resident birds in the five winters of banding. The extreme cold and frequent snows not only denuded shrubbery that usually retained foliage to provide roosting places but it also deprived Screech Owls and Sparrow Hawks of food so that they were unusually predacious at the banding stations. At intervals during the winter months the three resident Mockingbirds and the pair of resident Cardinals disappeared when nights were bright and both cats and Screech Owls had been seen.

Bf was the first bird to be missed early in December. A thorough search for her remains yielded only the feathers of a freshly killed quail on her territory. The following day her section was occupied and defended by another Mockingbird wearing only an aluminum band.

On January 2, 1936, the snow melted and mild temperatures prevailed for the first half of the month. A Mockingbird elsewhere was reported singing during that period but none of those about the station sang. In 1935 *B* sang during two weeks of mild weather in January. That year for a few days, temperatures typical of our normal April weather prevailed when he not only came into song but also began to court *Bf* and they used their combined territories together. She showed interest in him also. A sudden drop in temperature sent each back to its own territory until the normal mating season here in early March. However, during the mild weather of 1936, the males, *L* and *R2*, again met on their boundary lines in a tree but after hopping after one another a brief time, they parted, each flying to his own side. They almost ignored the apples and suet as insect food was again available on the lawns; *R2* enjoyed the holly berries on the discarded Christmas wreath which he had previously attempted to get as it hung outside of a window. One morning as traps were being set below his perch on a wire, he gave a squawk. *L* answered immediately: then others near homes in the neighborhood responded with squawks or *chucks*. But on the night of January 12, a cat was seen prowling in that shrub border. On the 13th, it was a surprise to see *L* in a prolonged fight there with a Mockingbird. *R2* was gone. A new bird was seen feeding on the privet berries daily. *L* would appear on the west part of the former territory of *R2* and watch this other bird while he fed on the east section. It took some time to identify the new arrival which was also wearing bands. By the 18th, the severe weather and snow had come for another long siege. On the 20th, the new arrival would not permit Robins to roost in that east shrubbery clump although he came there apparently only to feed. He was fond of raisins and made quick flights for the few outside of the traps in the front section. On the first of February he was seen flying to the traps at the rear for at that time *L* also disappeared and there was no territory defender to keep him away from any of the raisins. He announced his coming by alighting near a group of traps or a feeding place, giving a number of *chucks* before flying down to eat. He was finally trapped on February 8 and proved to be *ABA*, the 1935 mate of *Bf* whom she had joined at a neighbor's after the death of *B* in

March, 1935. He now had a feeding range of at least 300 yards in length for he visited traps all over the station but seemed to use it mostly to feed on the coveted raisins, returning to the neighbor's garden. He would come to the window sill if raisins were there and continued to announce his coming with *chucks* even though no other bird of any species was feeding.

On February 28 he began to sing a soft toned song near the front east clump of shrubs and it was thought he had decided to claim that territory at the station. On February 29, another arrival was trapped at the rear which also proved to be a former acquaintance, *GAG*, banded in September, 1935, and which had repeated until October. The plumage was sooty as a wintering bird and the measurements and markings seemed to indicate it was either a young bird or a female. It remained unobtrusively in the rear until March 23. *ABA* was found in the rear trap on March 6. On March 8 another banded bird arrived but this one was conspicuous as he sang from various perches in the front section of the lot. He was *AYG* that had been banded at the neighbor's when nesting there in July, 1935. His territory there had been just beyond that of *ABA* and *Bf* during that summer. He was singing gayly in the mate calling manner; his songs were richly interspersed with brilliant imitations of quail calls, Summer Tanager, Cardinal, and other songs. Females came to visit. *ABA* apparently did not resent his coming and retired to his former territory at my neighbor's where he too sang zealously.

March 19 was an exciting day, for several unidentified Mockingbirds appeared on the front lawn. There were courtship flights, much song, and a female that remained with *AYG* and was banded. This pair spent most of their time on the front section, but even then *ABA* came at least once for raisins entrapping himself on their territory. On the morning of March 28, *AYG* was seen limping as if his right leg or foot was injured. His songs ceased. Attempts to trap him were not successful. Late afternoon of the second day an unbanded male arrived, which he was seen fighting on top of the drop trap, while his mate stood nearby. He could not be found after that and his mate also disappeared the next day. It was thought at the time that he may have died as he was not seen anywhere in the neighborhood. However, in June of 1936, he re-appeared at the station for one day and in full song, and came to the front for apple. His injured leg seemed almost normal but again efforts to trap him met with no success. After the March disappearance of *AYG*, the new bird took possession, fed on the apple and was soon banded *BAB*. The same day that *AYG*

was noted limping (March 28, 1936) another Mockingbird had appeared in full song on the rear territory which *GAG* had apparently deserted. This new bird was soon identified as *AA*, another acquaintance of 1935. His outstanding imitation was the call of a Sparrow Hawk. He is the one previously mentioned as the bachelor bird that sang until mid-July and often far into the night on his territory some 300 yards east of the banding station. This spring he quickly secured a mate; an unbanded hen joined him on March 30 and they occupied the rear half of the lot where *L* was the early occupant in the winter of 1935. *BAB* sang on the front section that *R2* and the others had used in turn this winter but left in early May of 1936 without winning a mate. *AA* and *BAB* met on their boundary line on April 7 (the same place *R2* and *L* had met). They fought and performed a few dances while the mate of *AA* remained on their side as a spectator or looked for food in the grass about a yard away. These dances were common occurrences during previous winters and early spring between the resident birds on their boundary lines but in the winter just passed, it was seen only the two times mentioned in this paper at the banding station and only a few times elsewhere. It has been noted that many of the performances in the past occurred on the milder days, so perhaps the very cold weather as well as the frequent changes of occupant on a territory may account for the difference.

The events of the past winter again show the importance of distinctive banding for sight identification in order to acquire an accurate understanding of daily occurrences in bird life. Otherwise it would have been impossible to know how many different birds in turn occupied the garden this winter, how different the situation was from previous winters, or how quickly neighborhood birds fill vacancies in favorable locations. During the winter of 1931-32, *B* and *Y* were the occupants and they remained for nesting. In 1932-33 *B*, *Y* and *R* spent the winter but *R* left in March and did not sing. In 1933-34 *B*, *Bf*, *Y*, and *L* wintered but *L*, unable to win a mate that spring after singing several weeks, left in April. He was found mated that summer a few hundred yards south. In 1934-35 *B*, *Bf*, *R2*, and *X* wintered, the latter leaving in March without ever singing. But in 1935-36 the winter territory holders, *Bf*, *L*, and *R2* had all apparently met death by the first of February and their territories were occupied in turn by five individuals, not counting the two females that joined the male occupants. All but one of the eight 1935-36 territory holders had been located in the neighborhood previously. Only one of the eight remained for nesting in the 1936 season and *ABA* was still singing for

a mate in mid-June spending most of his time at the neighbor's, but sometimes coming to the front section of the banding station to sing and feed on apple (no raisins were placed at the traps in summer).

Observations made at other places in Nashville yielded some unusually interesting data that revealed situations existing within a few miles of the home station that had not been observed in the several years study of the birds there.

At the Belle Meade substation, four miles southwest, the mated pair did not separate in the fall as other pairs studied had done. This pair remained together in a companionable manner, following one another to perch in the same tree, stopping to drink at the same pool, and apparently on the same friendly terms with each other as Chickadees, Tufted Titmice, and Cardinals are with their winter companions. A tragedy in late December unfortunately brought this interesting observation to an end when the male bird fell victim to a Screech Owl one bright night when the ground was deeply covered with snow. His cry of distress brought the Tompkins family outdoors in time to see him carried off from his roost in an evergreen at their living room window.

At the home of Mrs. K. Jordan, close to the business section of Nashville, another pair was watched in the season just passed that had remained together all winter. They came to the feeding place together during the cold weather. One waited while the other fed and on the very cold nights, both roosted in a garage, the door of which was purposely left open until they had gone inside. Their roosting places in the building were separate, and the garage was not used on mild nights. This pair began their nest in a large rose vine when the weather was still cold in March and the set of four eggs was being laid and brooded in the well made deep nest the first week of April when a belated snowstorm and freezing temperatures damaged vegetation. When the four nestlings were only a few days old, the mother bird was eaten by a cat. Although the male fed them, he did not brood them and they died the second night after the death of the mother bird. This male bird immediately began to sing again and in a few days had secured another mate which seems rather interesting when birds in the suburbs seemed to have much difficulty in getting mates.

Another interesting but mysterious observation was recorded in late February last year (1935) near another substation. On the 24th, a mild sunny day when the mean temperature for the month had been above normal, a hillside thickly grown with bushes and small trees

was found to be teeming with Mockingbirds in late afternoon. Between 4 and 5 P. M., thirty-nine were counted in this area of 410 by 200 yards. They flew about, perched, sang, and pursued each other in what appeared to be a playful mood. A few of the hissing *cha* notes were heard in some of the pursuits which seemed to indicate some females were present. Sometime as many as six perched at one time in the same tree—a most unusual sight in many years of Mockingbird observation here. They were not feeding. There was no fighting, no serious courtship pursuits, nor plumage display. They were all dark colored, sooty birds, typical of wintering birds in Nashville, which seems to eliminate the migration theory. No banded birds were sighted in spite of the fact that it was near a substation. A visit at dawn eliminated the roosting theory also as only five could be located in the leafless shrubbery when Jack Calhoun searched. At 1 P. M. four or five were found but at 4 P. M. there appeared to be as many as on the previous afternoon, and they behaved as on that day. The following day a heavy rain fell, freezing, and turning into a snowstorm. With driving too dangerous to attempt the six-mile round trip over the hills, it was not until the fourth day later (March 1, 1935) that the thicket could again be visited. There was one bird at each end of it, where on March 30, Jack Calhoun found nests, both of which contained their complete sets of three eggs. What could be the meaning of those mysterious gatherings on at least two successive days in late afternoon?

Study of individual birds by the color banding method becomes more interesting each season and the student is convinced that nothing should be taken for granted in bird study: that in bird life individuals do not conform to a set behavior pattern: and that the subject is inexhaustible.

Nashville, Tennessee.

FEATHER ARRANGEMENT, DEVELOPMENT, AND MOLT OF THE LONG-BILLED MARSH WREN

BY WILFRED A. WELTER

A few years ago, while doing an intensive study of the Long-billed Marsh Wren (*Telmatodytes palustris dissaeptus*)[1], a series of nestlings and adult birds were collected to study the feather arrangement and development of the species. The ages of the nestling birds collected were known so that the changes from day to day will be recorded in subsequent pages. Boulton[2] worked out in detail the growth of feathers and the pterylography of the House Wren, and a comparable study on the Marsh Wren using his terminology and his limitations of various regions was considered worth-while.

Growth and Development of Nestling Feathers

For convenience in the treatment of this section the development of the feathers in the various regions will be treated separately. Plates are presented to illustrate the growth and development that has taken place during the nest life of the young.

Capital Tract

First Day. No feather development is apparent.

Second Day. Feather sheaths are visible beneath the skin in the coronal region.

Third Day. All of the sheaths are apparent beneath the skin except the auriculars. Growth proceeds forward, backward, and laterally from the coronal region.

Fourth Day. A few sheaths are now visible at the anterior end of the auricular region while those in the coronal region have pierced the skin.

Fifth Day. The sheaths are all apparent except those at the posterior margin of the auricular region.

Sixth Day. All of the sheaths have pierced the skin except those in the loral and post-auricular regions.

Seventh and Eighth Days. All the sheaths have pierced the skin. The post-auriculars were the last to do so.

Ninth to Twelfth Days. The feather sheaths wear away during this period. Those which appeared first are usually the first to break through the sheaths. Neossoptiles are still present on the tips of some of the feathers.

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[1]Welter, Wilfred A. The Natural History of the Long-billed Marsh Wren. Wilson Bulletin, 47:3-34, 1935.

[2]Boulton, Rudyerd. Ptilosis of the House Wren (*Troglodytes aedon aedon*). Auk 44:387-414, 1927.

Spinal Tract

First and Second Days. No feather sheaths are visible.

Third Day. All of the sheaths appear beneath the skin.

Fourth Day. Sheaths in the middle expanded area have broken through the skin.

Fifth to Seventh Days. Development proceeds anteriorally from the mid-dorsal region. Those cervicals that form the anterior boundary of the spinal tract appear above the skin on the seventh day. The sheaths at the posterior boundary of the tract pierce the skin on the sixth day and then development proceeds anteriorally until it meets the mid-dorsal region.

Eighth to Twelfth Days. During this period the sheaths disintegrate or are worn away. The first feathers to appear are those in the mid-dorsal and pelvic regions. On the tenth day all of them have broken through their sheaths.

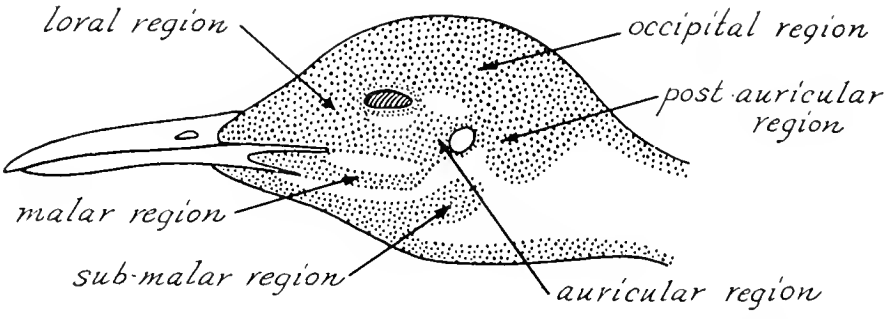

Fig. 39. Pterylography of the Marsh Wren. Lateral aspect of the head.

Caudal Tract

First and Second Days. There is no sign of feather development.

Third and Fourth Days. The rectrices and upper tail coverts are visible beneath the skin.

Fifth and Sixth Days. Sheaths of the rectrices and upper tail coverts pierce the skin on the fifth day while those of the under tail coverts appear beneath the skin during this period.

Seventh to Twelfth Days. All the feathers in this tract have now broken through the skin. The inner rectrices and their coverts appear first and then growth proceeds laterally. On the ninth day the sheaths begin to disintegrate.

Ventral Tract

First Day. There is no trace of feather development at this time.

Second Day. Sheaths on the throat and sides become visible.

Third and Fourth Days. All of the sheaths can be detected at the end of this period.

Fifth to Twelfth Days. The first sheaths to break through the skin are on the sides. Development then proceeds in both directions so that on the eighth day all of the sheaths have come through. Those located in the throat region are the most retarded. On the eighth day most of the sheaths have been broken, the appearance of the feathers follows the order of that of the sheath, those of the throat not appearing until the tenth day.

Humeral, Femoral, Crural Tracts

First Day. There is no sign of development.

Second and Third Days. The sheaths in the humeral tract are quite distinct while those in the femoral tract are just beginning to show.

Fourth Day. The humeral sheaths have broken through the skin while those in the other tracts are developing rapidly.

Fifth to Seventh Days. All of the sheaths in these regions pierce the skin during this period. Those in the anterior section of the crural tract are the last to appear.

Eighth to Twelfth Days. The tips of the feathers begin to appear on the eighth day and by the twelfth day the sheaths have been almost entirely worn away.

Alar Tract

First Day. There is no sign of development of sheaths.

Second Day. Development has gone on very rapidly as by the end of this day both primaries and secondaries have begun to break through the skin.

Third and Fourth Days. All of the primaries and the first seven secondaries have broken through the skin. The secondaries develop from the outermost inward while the primaries all develop in such rapid succession that it is impossible to say which come first. On the fourth day the under-wing coverts are visible beneath the skin.

Fifth Day. All of the flight feathers have appeared inclosed in their sheaths as have the greater coverts and the alula.

Sixth Day. The middle coverts break through the skin on this day while the lesser and marginal coverts are very pronounced beneath the skin.

Seventh Day. The middle coverts have pierced the skin, those of the secondaries preceding those of the primaries. The marginal and under-wing coverts and the lesser coverts of the secondaries have also appeared.

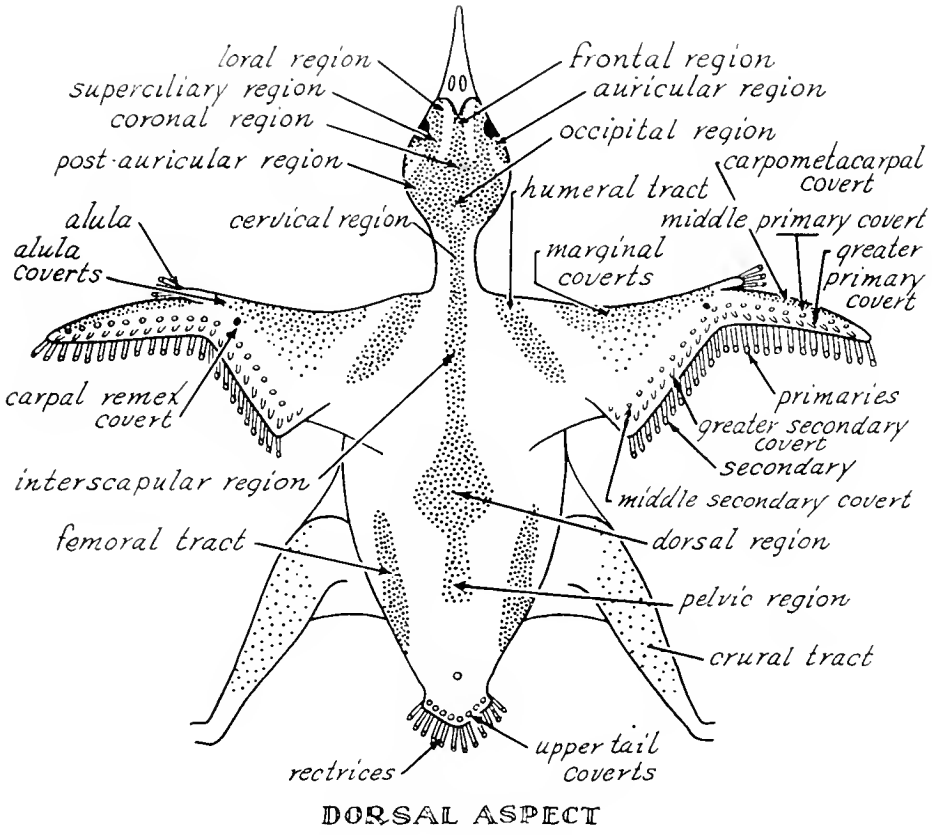

FIG. 40. Pterylography of the Marsh Wren. Dorsal aspect.

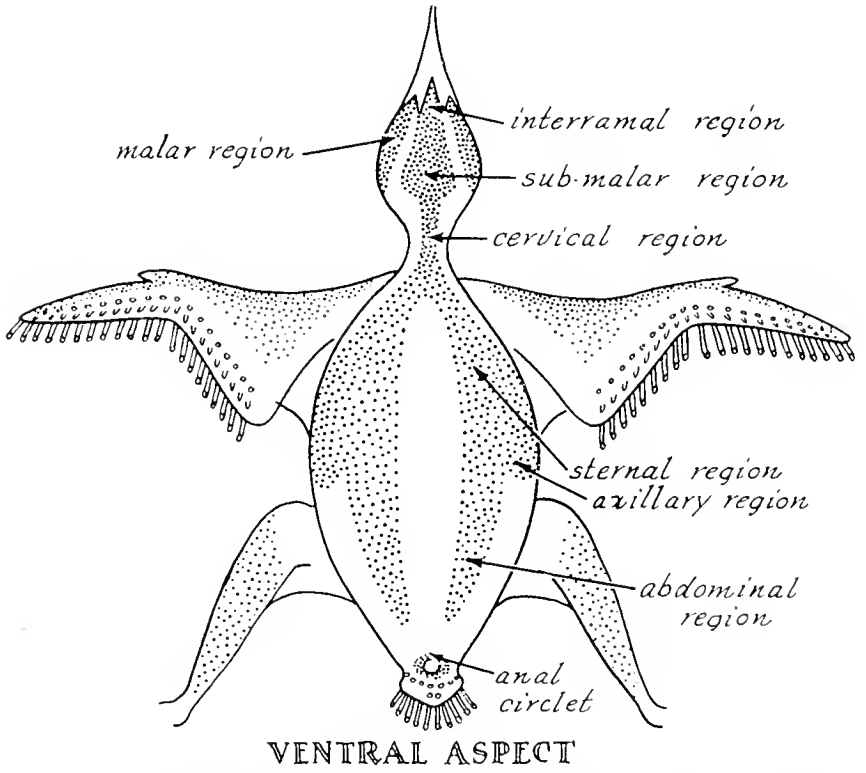

FIG. 41. Pterylography of the Marsh Wren. Ventral aspect.

Eighth Day. All of the feathers have broken through the sheaths except the ninth and tenth primaries and the marginal coverts.

Ninth to Twelfth Days. The remainder of the feathers break through the sheaths and there is a great increase in size of the flight feathers. At the end of this period portions of the sheaths may still be present on some of the primaries and secondaries.

Comparison

The order of appearance of the feathers of the nestlings of this species agrees very well with that of the House Wren as reported by Boulton (*op. cit.*). Development on the whole seems to take place somewhat more rapidly in the Marsh Wren. The rate of growth of various feathers in the two species parallels one another rather closely as illustrated by Fig. 42. Measurements of certain feathers were taken on the nestlings that were collected and appear in Table 1.

The percentage of ultimate growth obtained by certain feathers and fleshy parts on the twelfth day is illustrated in Fig. 42, the comparable measurements for *Troglodytes* being taken from Boulton's paper. As in the House Wren, the posterior portion of the body is much slower in developing than the anterior portion. It is also interesting to note that the tarsus has obtained practically its entire growth by the time the young bird is able to leave the nest.

Pterylography

In this study of feather arrangement two methods were employed: (1) examination of preserved specimens of young birds, and (2) examination of preserved specimens of adults in which the feathers were clipped close to the body.

The arrangement of the various feathers is very similar to that of the House Wren as recorded by Boulton. Only points in which the two species differ will be discussed in the present study but complete diagrams of the pterylography of the Marsh Wren are depicted in Figs. 40-41.

In the capital tract the two species vary in the distinctness of certain apteria. Two apteria completely separate the malar region in the House Wren. In the Marsh Wren, however, a few feathers cross from the malar to the auricular region tending to terminate the upper malar apterium at its juncture with the sub-malar. Again, in the House Wren the auriculars are separated from the post-auriculars by a definite apterium while in the Marsh Wren this has become very minute and is scarcely visible.

The caudal tract differs in the number of tail-coverts. While only five pairs of upper tail-coverts are present in the House Wren, the

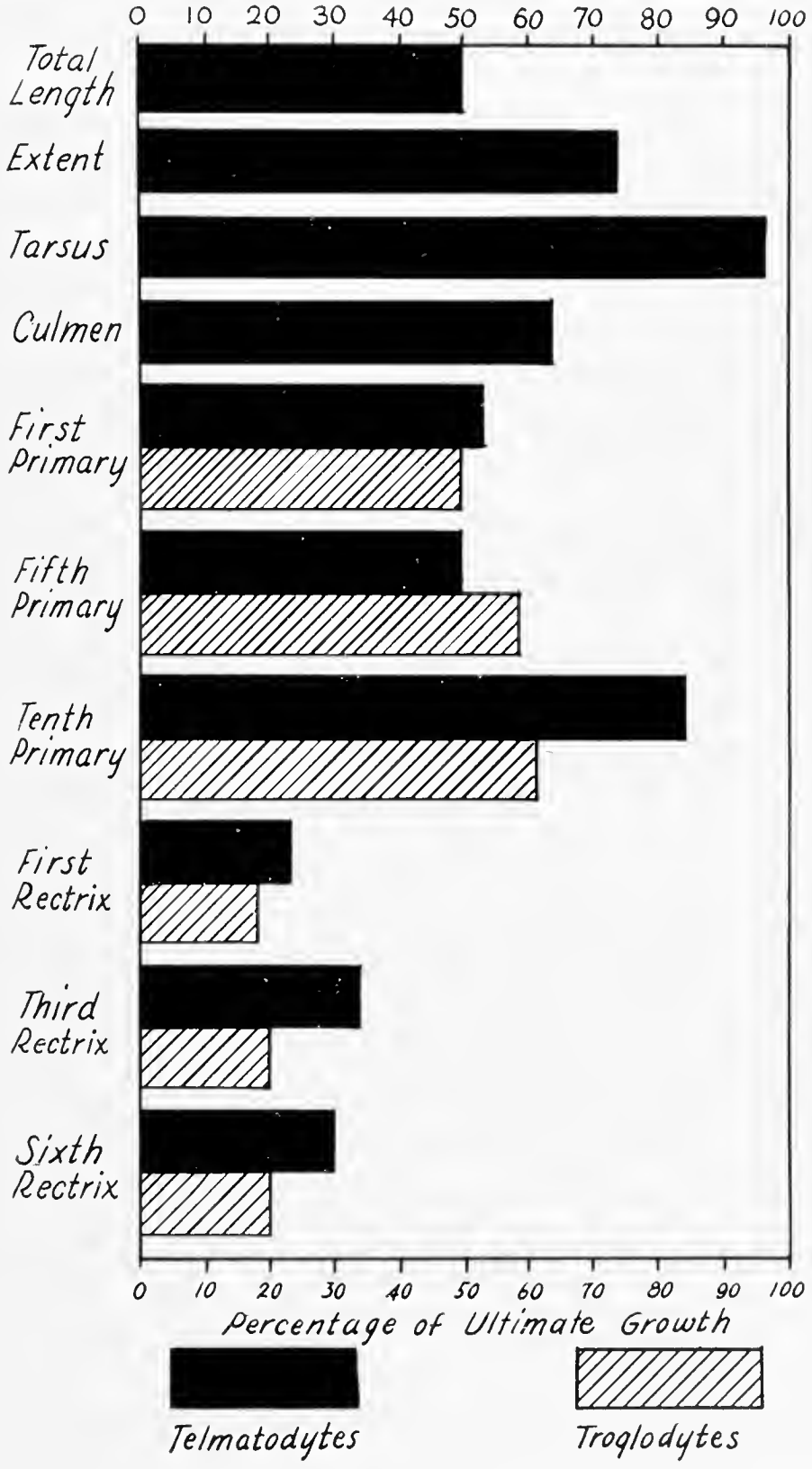

Fig. 42. A Graph showing the percentage of ultimate growth by the twelfth day.

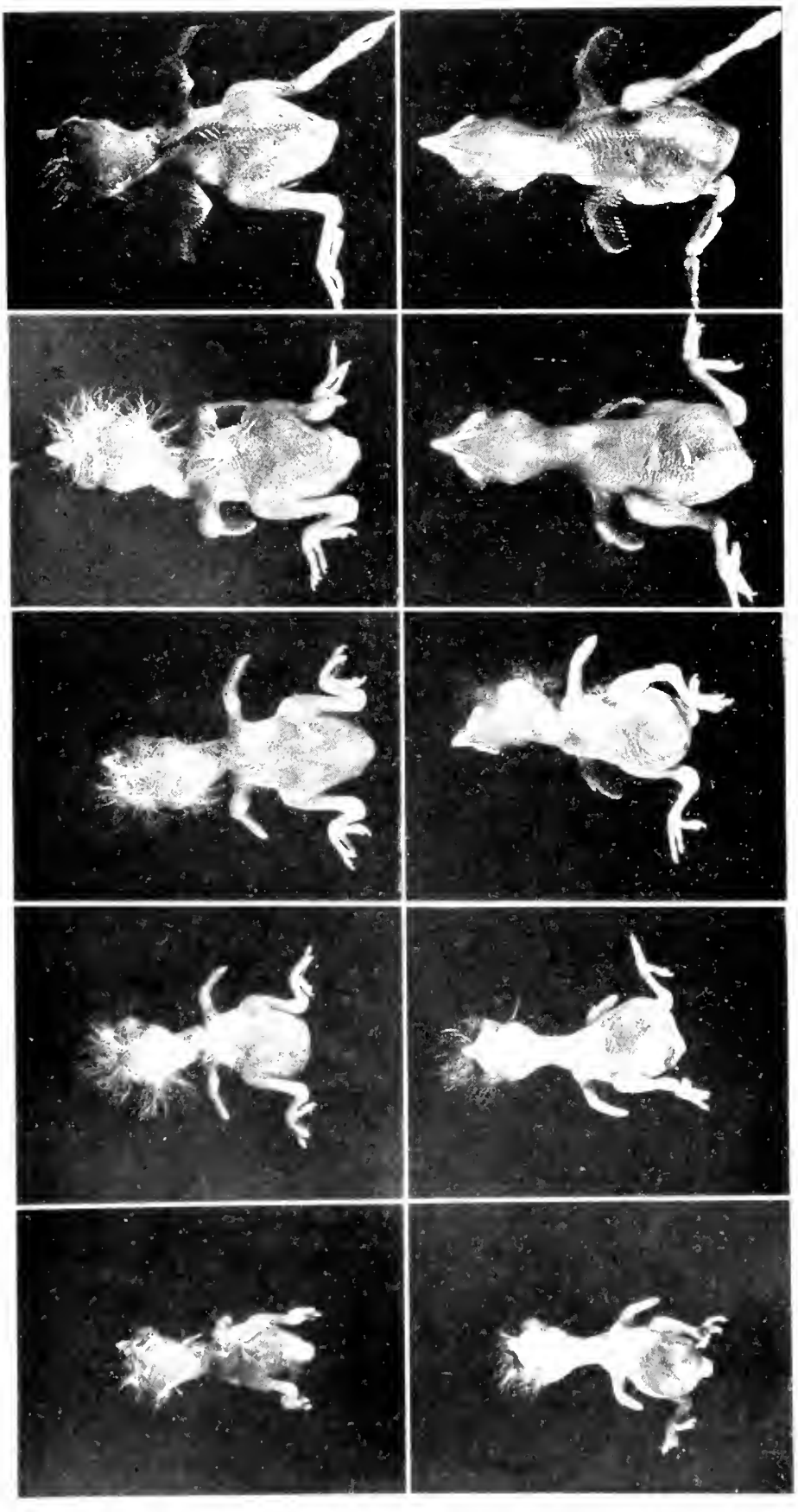

Fig. 43. Photographs showing feather tracts on successive days. Top row shows dorsal surface. Bottom row shows ventral surface. From right to left the figures show the bird at hatching, first, second, third, and fourth days.

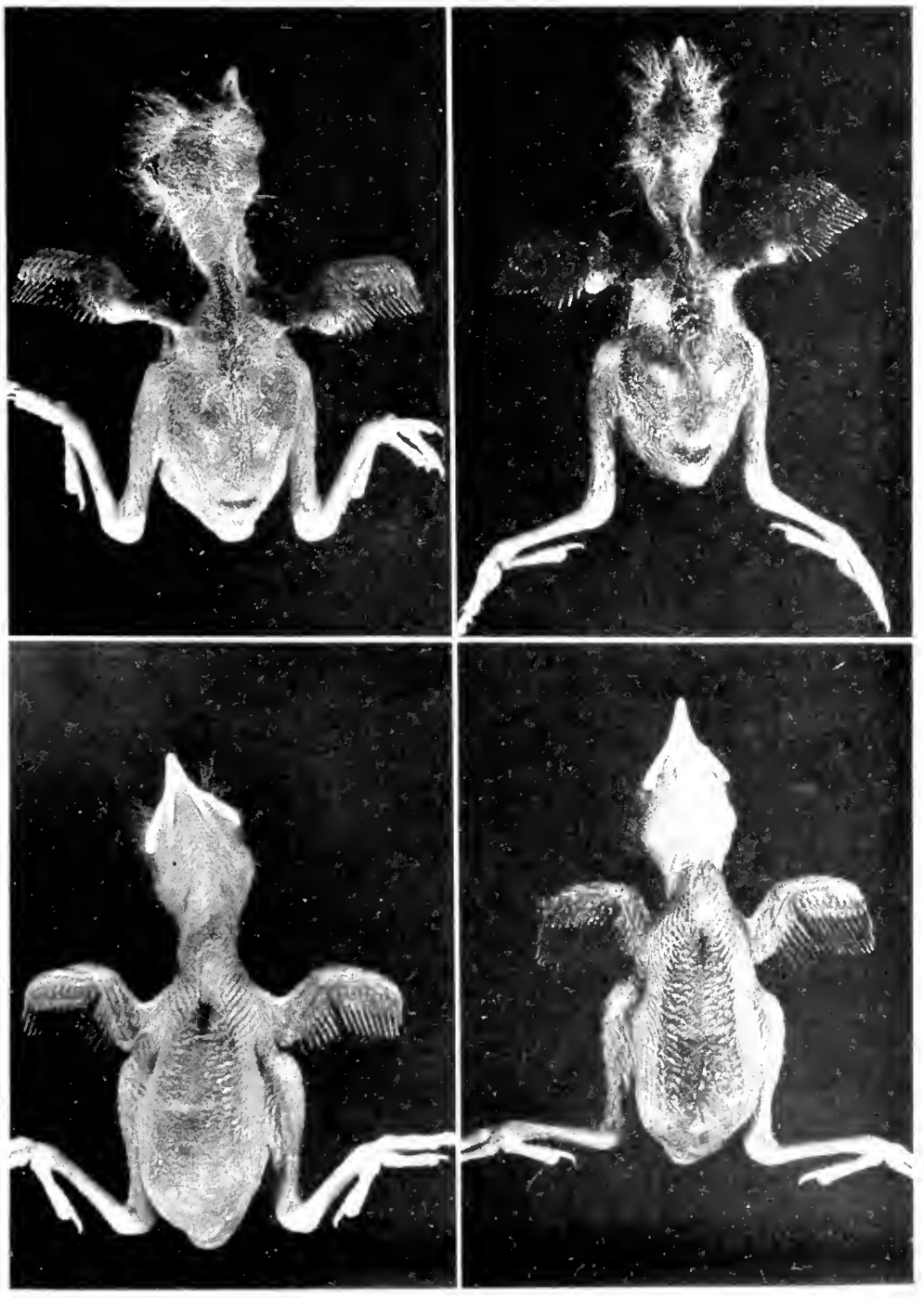

FIG. 44. Photographs showing feather tracts on successive days. Left top, fifth day, dorsal; left bottom, fifth day, ventral; right top, sixth day, dorsal; right bottom, sixth day, ventral.

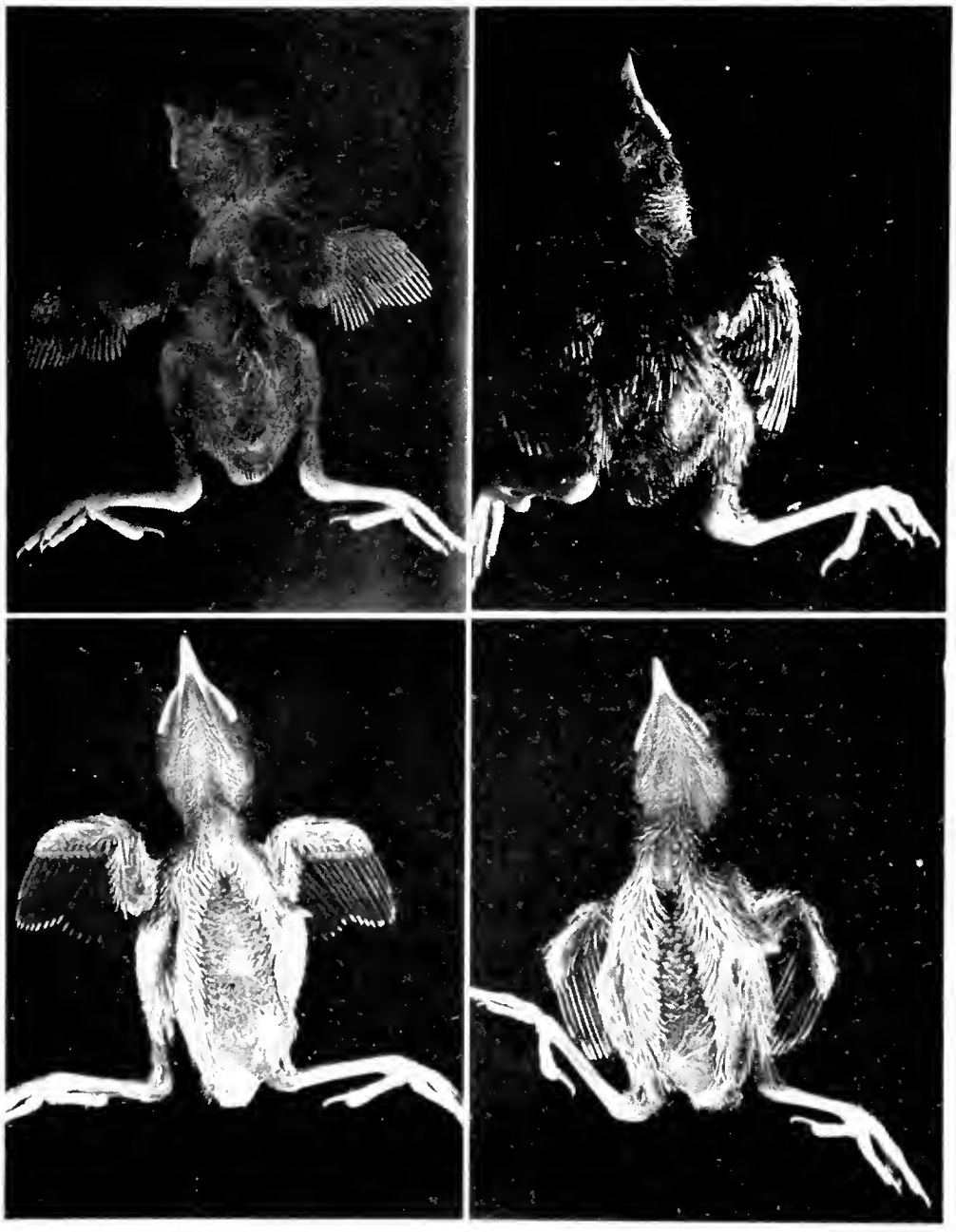

FIG. 45. Photographhs showing feather tracts on successive days. Left top, seventh day, dorsal; left bottom, eighth day, ventral; right top, ninth day, dorsal; right bottom, ninth day, ventral.

FIG. 46. Photographs showing feather tracts on successive days. Left top, tenth day, dorsal; left bottom, tenth day ventral; right top, twelfth day, dorsal; right bottom, twelfth day, ventral.

first pair, although somewhat smaller, is clearly discernible in the Marsh Wren. Boulton suggests the possibility of seven pairs of under tail-coverts in *Troglodytes*, this questionable pair is present in *Telmatodytes* and, from its position, must be regarded as a seventh pair. The first coverts in this form, also, lie above and posterior to the second.

Certain differences were observed in the alar tract. The vestigial eleventh primary mentioned by Boulton was not noted in this form. There are ten greater primary and ten middle primary coverts in *Telmatodytes* while only seven of the latter are present in *Troglodytes*, together with ten greater secondary and seven middle secondary coverts. It is impossible to determine the number of lesser coverts as they are not distinct from the marginals. The under wing-coverts are similar to those of *Troglodytes* except that there are nine middle and seven lesser secondary coverts in opposition to eight and seven, respectively, in the House Wren.

In all other details the two genera are in complete agreement. The classification used in this discussion, in the diagrams, and in the section on feather growth of the nestlings has been taken from Boulton's paper.

Plumages and Molts

The most complete account of the sequence of plumages in the Long-billed Marsh Wren is that of Dwight[3] who is quoted at length below:

"1. Natal down. White.

"2. Juvenal plumage acquired by a complete postnatal moult. Crown, nape and part of back brownish, a few faint white lines on the nape: the scapularies, rump, and upper tail coverts Prout's-brown often russet tinged. Wings and tail dull black, the tail barred, the tertiary edgings mostly black, the coverts and secondaries brownish edged, the primaries paler with indications of barring. Sides of head dusky: a faint whitish superciliary line. Below, white, washed on sides of breast and flanks and on crissum with pale cinnamon. Bill and feet dusky pinkish becoming dusky.

"3. First winter plumage acquired by a partial postjuvenal moult, beginning about the middle of August, which involves the body plumages, the wing coverts, and the tertiaries, but not the rest of the wings nor the tail, young and old becoming practically indistinguishable. This plumage may easily be mistaken for the juvenal. Similar

[3]Dwight, Jonathan. The Sequence of Plumages and Moults of the Passerine Birds of New York. Ann. N. Y. Acad. Sci., 13:296-297. 1900.

to previous plumage, but the brown rustier above, a brown median line dividing the black crown; the anterior part of the back is black with distinct white streakings; the superciliary line white; the tertiaries duskier and more mottled below, the cinnamon wash is deeper with sometimes a pectoral band and there is obscure whitish and dusky barring on the sides, the crissum distinctly barred.

"4. First nuptial plumage acquired by a complete prenuptial moult as indicated by the relatively unworn condition of the feathers when the birds arrive in May. Although I have no positive evidence of this moult, spring birds are in quite as fresh plumage as those of autumn and I do not believe the latter could be so little affected by wear during the winter months as not to show more of it on their return. This plumage is the same as the last, perhaps whiter below and with less obvious barring on the flanks and crissum and it becomes badly frayed before the end of the breeding season.

"5. Adult winter plumage acquired by a complete postnuptial moult in August. Practically indistinguishable from first winter but the wings and tail usually grayer, the tertiaries and wing coverts more heavily barred.

"6. Adult nuptial plumage acquired by a complete prenuptial moult the same as in the young bird.

"Females.—The sexes are alike, the female perhaps averaging a little duller, and the moults are the same."

The writer is at variance with Dwight and Stone[4] in certain respects concerning the manner of acquiring first winter and nuptial plumages. Juvenals collected during the fall of 1931 which are now in the Cornell Collection show a molt of both rectrices and remiges. In one specimen the three innermost primaries in both wings are beginning to come in before there is any noticeable molt elsewhere. Another specimen shows an entire new set of tail feathers just appearing while other parts of the body are well along with the molt. The remiges are worn to such an extent that they are little more than bristles at the time molt begins.

I can find no evidence of a prenuptial molt in the series of specimens examined. One individual taken in March is replacing a few crown feathers, but this seems to be an erratic case as others during the same period and even later show no such molt or fresh plumage. Birds taken during the winter months show some wear of the feathers

[4]Stone, Witmer. The Moulting of Birds with Special Reference to the Plumages of the Small Land Birds of Eastern North America. Proc. Acad. Nat. Sci., Phil., 48:164. 1895.

but this becomes more apparent during the summer. It seems to be a gradual process without any indication of renewal of plumage. As summer advances wear continues in conjunction with fading through the action of the summer sun so that it becomes impossible to distinguish certain of the races until the acquisition of the winter plumage. The amount of wear during the winter months varies to a certain extent with the individual but no specimens examined were entirely free from it. Fall birds are noticeably more plump with longer feathers than the birds which arrive in the spring.

The plumages and molts in my opinion should be given as follows:

1. Natal down.
2. Juvenile plumage acquired by a complete postnatal molt.
3. First winter plumage acquired by a *complete* postjuvenal molt.
4. First nuptial plumage *acquired by wear.*
5. Adult winter plumage acquired by complete postnuptial molt.
6. Adult nuptial plumage *acquired* by *wear* as in the first nuptial plumage.

Order of Molt

The primaries are the feathers that initiate the molt. The inner three are shed almost simultaneously and then one is lost at a time until all are shed. Before the primaries are entirely replaced the secondaries are shed, from the outside inward. It is impossible to give the exact order in other regions as the intervals between the various parts are very slight. The feathers of the ventral tract begin to molt before any of the other body feathers. These are followed very closely by the interscapulars and the crown feathers. The wing coverts are somewhat later than the remiges while the rectrices are lost before the last primary is shed. The tail feathers are molted in such rapid succession that it is impossible to tell which comes first and the ingrowing feathers appear approximately of the same length.

There is considerable variation in the time of molt especially among the birds of the year. Many specimens taken from August 10 to October 15 show some stage of molt. This naturally would be expected as the younger birds of the second brood are not as far advanced as the older birds.

Unusual Plumages

A specimen of *marianae* taken at Chassahowitska Bay, Florida. (Biol. Surv. 261977) has the fifth and eighth secondaries on the left and the eighth on the right side white. In other respects the plumage

is normal. Ray[1] reported a specimen of *paludicola* from Alameda, California, which had several crown feathers and one secondary pure white.

TABLE 1. Measurements of Nestlings (in millimeters).

	The Day	j.h.	1day	2day	3day	4day	5day	6day	7day	8day	9day	10day	11day	12day
Total length		31	33	38	42	50	58	60	62	64	65	71	73	74
Extent		29	31	43	45	70	75	80	82	97	100	112	114	120
Wing		4	4.5	5	6	7	11	19	19	23	25	28	30	38
Tarsus		3.5	5	7	7	10	12	14	15	16	16	19	20	21
Middle toe and nail		4	4.5	5	6	7	9	11	11	13	13	14	15	15
Nail		.5	.5	1	1	1	2	2.5	2.5	3	3	3	4	4
Culmen		3	3	4	4	5	6	6	6	7	7	7.5	8	9
Gonys		2	2	2	2	2	2	3	3	3	3	3.5	4	5
Gape		5	5	7.5	7.5	9	11	11	11	13	13	13	13	14
Rictus		3	3	5	5	5	7	7	7	7	7	7	7	7
6th rectrix		..	..	..	..	..	..	.1	1	2	3	4	5	7	10
3rd rectrix		..	..	..	..	..	..	.1	1	2	3	5	7	9	14
1st rectrix		..	..	..	..	..	..	.1	1	2	2	4	5	7	10
1st primary		..	..	..	..	..	1	4	6.5	8	11	15	18	20	24
5th primary		..	..	.	..	..	1	4	6.5	9	11	15	19	21	25
10th primary		..	..	..	..	..	1	2	3.5	6	7	10	11	13	16
1st secondary		..	..	..	..	..	1	4	6	8	11	14	17	19	24
4th secondary		..	..	..	..	..	.75	3	6	8	10	13	16	18	23
8th secondary		..	..	..	..	..	.25	2	3	4	6	10	12	13	15

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THE OCCURRENCE OF WHITE HERONS IN THE YOUNGSTOWN, OHIO, REGION

BY M. B. SKAGGS

Since the late George L. Fordyce recorded the first American Egret to be seen at Pine Lake on July 29, 1918, other white herons have appeared frequently in the Youngstown, Ohio, area. Published records of these visitors, however, are very few. For this reason it seems desirable to place on record the pertinent facts regarding the appearances of these herons in the past sixteen years. The data here presented are from the notes of Mr. George L. Fordyce, Mr. G. M. Cook, Dr. J. G. Brody, Mr. V. McLaughlin, and the writer.

The three species concerned in this paper are the American Egret (*Casmerodius albus egretta*), Little Blue Heron (*Florida caerulea*), and the Snowy Egret (*Egretta thula thula*).

[1]Ray, Milton S. Notes from Alameda, California. Bull. Cooper Ornith. Club. 1:53, 1899.

Several small lakes are within twenty miles of Youngstown and prove quite attractive to migrating waterfowl. Of these, Pine Lake has had the most unusual bird visitors but interesting records have also come from Milton, Meander, Beaver, and Liberty Lakes. None of these lakes are more than three-quarters of a mile in width but they vary from one to seven miles in length. The accompanying map will show the location of these reservoirs.

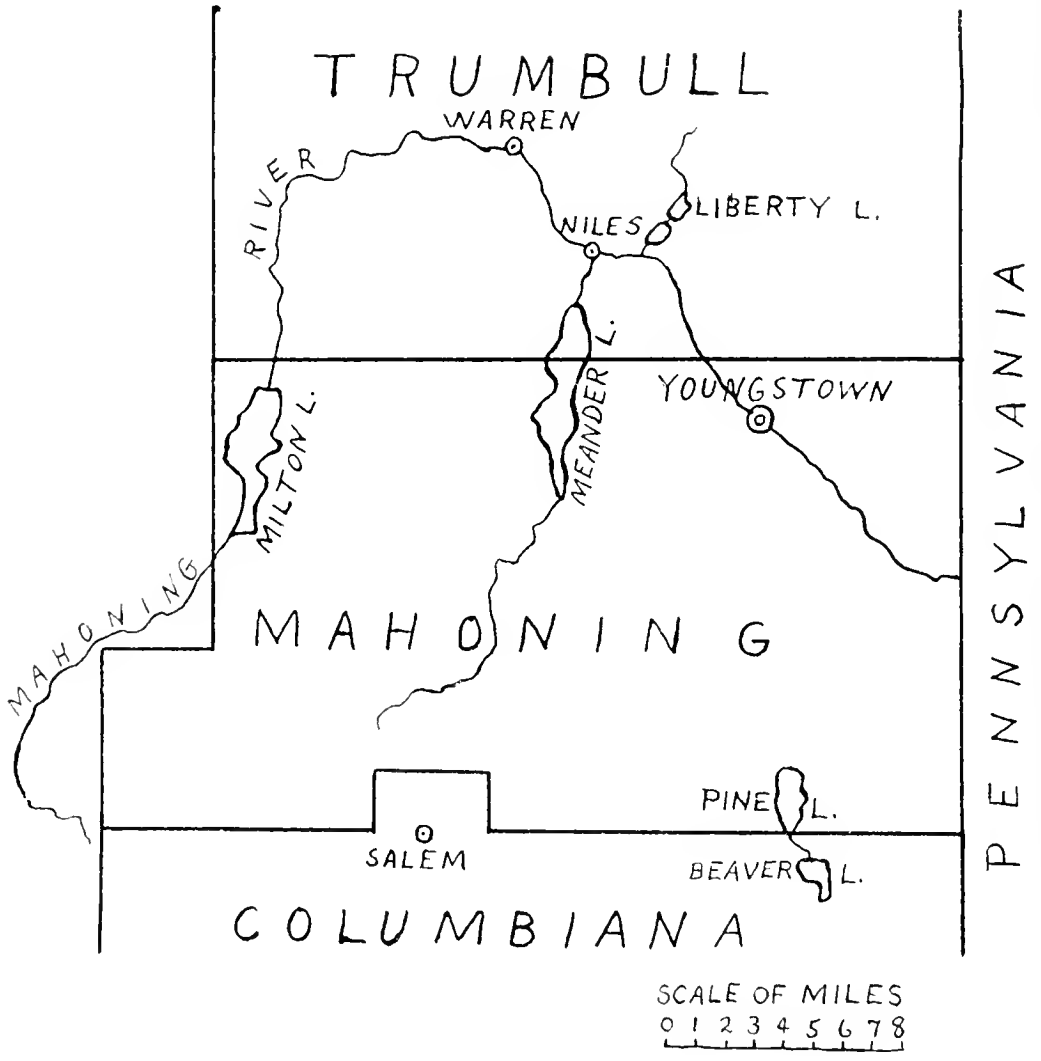

Fig. 17. Map of the Youngstown, Ohio, Region.

The first white heron, an American Egret, recorded for Youngstown by Fordyce on July 29, 1918, was again seen on August 4 and was last seen on September 5, 1918. No other white herons were noticed until 1924, when *all three* species appeared! Three Little Blue Herons were seen on August 7 and 8, one American Egret on

August 10 and 14 and two Snowy Egrets on August 14 and 15. All three birds were seen at Pine Lake by Fordyce and others.

In 1925 Mr. Fordyce saw a single American Egret at the same place on August first, second, and ninth.

The writer can find no published records until August, 1930, when Marshall[1] reported twenty-six Little Blue Herons and three American Egrets at Beaver Lake. The summer of 1930 was very dry and was noted for the large number of white herons appearing in all sections of Ohio. Since Hicks[2] in his summary of records of the 1930 occurrence of these herons in Ohio, gave no Youngstown records, the part of this paper dealing with that year may be considered as a supplement to his fine article.

All through August, 1930, American Egrets were present at Pine, Milton, and Beaver Lakes. A maximum of seven were noted on August 8. Little Blue Herons were numerous. On one occasion twenty-seven were seen in a group at Pine Lake. They were also present in smaller numbers at other lakes.

In 1931, only two American Egrets were noted. The date was August 9.

In 1932, three were seen on July 28, two on August 4, three on August 8, and the last ones were reported on September 15. One of these birds was found perched fully sixty feet from the ground in a tall tree, quite in contrast to most of the others seen wading in the shallow lakes.

The summer of 1933 brought even a greater wave of white herons than that of 1930, but this time the American Egrets were in the great majority. This was just the reverse of the 1930 situation. The feature of this season was the finding of a Snowy Egret on August 6 by Dr. Brody[3] and the writer. This bird still carried a few feathers of its occipital crest, a breeding season adornment. It was observed feeding in the characteristic manner, described by Peterson[4], of standing on one foot while stirring up the water with the other.

A Snowy Egret seen on August 26 by Cook[5], McLaughlin, and the writer was probably the same bird. All three observers saw the yellow toes as the bird flew against a background of green trees. When the bird alighted the orange-yellow lores and black bill were seen.

Snowy Egrets again appeared in 1934 and were reported by McLaughlin[6]. Seven were seen on August 14. They usually were in company of Little Blue Herons but were readily distinguished. On August 20, one observed was so active it seemed to be "running circles" around the slower moving Little Blue Herons.

TABLE 1. Showing Numbers of White Herons in Youngstown Region in 1933 and 1934.

		July 9	July 15	July 16	July 20	July 28	July 29	July 30	July 31	Aug. 2	Aug. 4	Aug. 5	Aug. 6	Aug. 7	Aug. 11	Aug. 12
American Egret	1933	2	5	4		6		41	52	50	2	8	8	14		
	1934															
Little Blue Heron	1933							1	2	2		5		2		
	1934				1	3	5				24	42		26	20	5
Snowy Egret	1933												1			
	1934											2		5	4	2

		Aug. 13	Aug. 14	Aug. 20	Aug. 25	Aug. 26	Sept. 2	Sept. 4	Sept. 12	Sept. 15	Sept. 16	Sept. 22	Sept. 30	Oct. 1	Oct. 8	Oct. 12
American Egret	1933	6				3	18	11	3					1	1	
	1934	7	8	2		2				2	13	2	3			2
Little Blue Heron	1933			4		7	10	4	1							
	1934	30	39	14	5	10				8	3					
Snowy Egret	1933					1										
	1934	2	7	1						2	3					

It is perhaps worth mentioning that of all the Little Blue Herons seen in the Youngstown region, *not one* has been in the dark plumage of the adult bird.

So frequent were the records of southern herons in 1933 and 1934 that the accompanying table will simplify their presentation.

Bird students all over the country are elated over the increase in numbers of the American and Snowy Egrets in recent years after the Snowy Egrets had become nearly extinct in this country. It is hoped that these frequent occurrences of recent years in a northern state are a true indication of their status. May their tribes increase still more.

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CLEVELAND, OHIO.

A STATISTICAL SURVEY OF THE WINTER BIRD LIFE OF SOUTHEASTERN OHIO—MUSKINGUM COUNTY

BY LAWRENCE E. HICKS AND CHARLES A. DAMBACH

Little is known of the winter bird life of southeastern Ohio. Of the 427 Ohio Christmas Censuses[1] published in *Bird-Lore* (1900-1934), only twelve were from the fifteen hill counties of southeastern Ohio. Even these few censuses were non-representative of their areas, being taken by single observers during the early years. It seemed desirable to accumulate quantitative data about the winter bird life of this typical hill country and make it available for comparison with better known sections of Ohio.

Muskingum County (Zanesville Region) is typical of this hill country, being mostly of eroded dissected hills 100 to 400 feet in height except for the very narrow valleys of the Muskingum River, the Licking River, and Salt Creek.

The writers have been doing constant field work in this region for nearly a year (1934-1935). On certain days (week-end trips or whenever other work permitted) a careful check was made as to the bird species and the numbers of each encountered during a full day of field work. All parts of the county were covered with perhaps more attention given to the eastern half and to the bottoms of the Muskingum River. The period December 15 to February 15 was taken as the winter season so as to include *only* species actually wintering in the area.

During this period eight days in December, nine in January, and eight in February—a total of twenty-five—were devoted to census work. Usually two observers participated. A typical field day was of eight hours and involved six or seven miles on foot and sixty by auto. In the accompanying table the total number of species recorded is given, the proportion of the twenty-five trips on which each was seen, the average number checked per day, and the rank which that species has been found to have among the winter birds of the whole state. The species are ranked by taking into equal consideration (1) the numbers occurring and (2) the percentage of trips upon which each was found. This has proved to be a more accurate index of abundance than any yet available. For brevity only the common names of the birds are used, the nomenclature being that given by the American Ornithologists Union Check-List of 1931.

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[1]Hicks, Lawrence E., and Floyd B. Chapman. A Statistical Survey of Ohio Winter Bird Life. Ohio Journal Science, 33:135-150. 1933.

A roost of 32,000 Starlings and another of 12,000 Crows, occurring in the county, were observed many times, but only individuals of those two species encountered away from the roosts, were enumerated. The Crows and Starlings have made a decided drain upon many winter food resources ordinarily available to other species.

The total number of individuals recorded on the twenty-five trips was 61,711 or 2,468 per day (of which nearly 2,000 per trip would be Crows or Starlings). Species found to be decidedly more abundant than the average for Ohio[1] included: Starling, Crow, Prairie-horned Lark, Bluebird, Robin, American Merganser, and Cooper's Hawk. Species found to be decidedly less abundant than the average for Ohio were Blue Jay, Song Sparrow, Downy Woodpecker, White-breasted Nuthatch, Hairy Woodpecker, Red-bellied Woodpecker, Flicker, Brown Creeper, Winter Wren, Northern Horned Lark, and Red-headed Woodpecker. The other species approached the numbers expected generally in Ohio or the data were too insufficient to be conclusive.

The total number of species recorded (December 15 to February 15) was sixty-five. This represents 49 per cent of the 133 species enumerated on the 127 Ohio Christmas Censuses[1] to date or 39 per cent of the 167 species on the list of birds definitely known to have occurred in Ohio in winter.[2]

Many of the semi-hardy winter birds were absent from the region, and only the Robin and Bluebird occurred in the expected numbers. Most conspicuous was the absence of northern visitors such as the Goshawk, Rough-legged Hawk, Northern Shrike, Bohemian Waxwing, Evening or Pine Grosbeak, Purple Finch, Redpoll, Crossbills, Longspurs, or Snow Buntings. Three species rare in winter, the Cedar Waxwing, Killdeer, and Migrant Shrike, were collected for the Ohio State Museum.

The deep waters of the Muskingum River are kept unfrozen at the navigation dams and by the movement of the river barges when operating, making possible the wintering of some waterfowl—all below Zanesville. Many of the raptorials present were attracted to the region of the Starling roost where they could be observed making kills each evening.

This survey covers only one year but should give a fair index to the 1934-1935 winter bird life of Muskingum County if we correct for

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[2]Hicks, Lawrence E. An Annotated Check List of All Birds Recorded from Ohio in Winter. Ohio Dept. Agr. Bull. Bur. Sci. Res. Vol. 1, No. 2, Jan., 1932. (Revised 1935). Pp. 59-66.

many known factors[1] which cause a species to be enumerated out of proportion to its actual numbers.

Rank of Species Based on Both Numbers and Frequency	Total Number Seen	Percent of Days on Which Seen	Average Number Per Day	Rank of Species in Ohio
1. Starling*	40,347	100	1614.0	12
2. Eastern Crow	8,990	100	359.6	4
3. English Sparrow†	3,057	100	122.3	....
4. Eastern Tree Sparrow	2,625	100	105.0	1
5. Slate-colored Junco	1,502	100	60.1	5
6. Mississippi Song Sparrow	585	100	23.4	3
7. Eastern Cardinal	582	100	23.3	2
8. Eastern Bobwhite	521	88	20.9	9
9. Prairie Horned Lark	414	88	16.6	35
10. Tufted Titmouse	400	100	16.0	7
11. Carolina Chickadee	394	100	15.8	13
12. Eastern Mourning Dove	341	76	13.6	16
13. Northern Downy Woodpecker	195	100	7.8	6
14. Eastern Bluebird	206	88	8.2	33
15. Eastern Robin	280	72	11.2	20
16. Eastern Goldfinch	215	56	8.6	18
17. White-breasted Nuthatch	98	88	3.9	8
18. Carolina Wren	89	88	3.6	22
19. Northern Blue Jay	59	80	2.4	10
20. American Merganser	187	36	7.5	43
21. Northern Flicker	70	64	2.8	15
22. Common Black Duck	120	32	4.8	28
23. Eastern Sparrow Hawk	39	76	1.6	21
24. Eastern Hairy Woodpecker	35	76	1.4	14
25. Eastern Golden-crowned Kinglet	52	40	2.1	23
26. Red-bellied Woodpecker	24	72	1.9	19
27. Lesser Scaup	56	20	2.24	30
28. Hooded Merganser	29	32	1.2	62
29. Brown Creeper	25	40	1.0	17
30. Eastern Meadowlark	27	32	1.1	27
31. Cooper's Hawk	26	36	1.0	50
32. Eastern Red-tailed Hawk	15	44	.6	31
33. Eastern Belted Kingfisher	16	36	.64	40
34. Ring-billed Gull	23	24	.92	60
35. Marsh Hawk	11	40	.44	38
36. Northern Horned Lark	24	8	.96	24
37. Eastern Screech Owl	13	28	.52	39
38. Red-eyed Towhee	11	32	.44	32
39. Herring Gull	20	16	.80	26
40. Ring-necked Pheasant	9	24	.36	44
41. Common Mallard	11	20	.44	29
42. Barn Owl	8	24	.32	68
43. Eastern Mockingbird	5	20	.20	66
44. Turkey Vulture	5	20	.20	76
45. American Pintail	5	20	.20	74
46. Sharp-shinned Hawk	4	16	.16	55
47. American Goldeneye Duck	4	16	.16	56
48. Eastern Winter Wren	3	12	.12	37
49. Red-headed Woodpecker	4	8	.16	25
50. Northern Pileated Woodpecker	3	12	.12	69
51. Northern Red-shouldered Hawk	2	8	.08	49
52. Cedar Waxwing	3	4	.04	47
53. Great Horned Owl	2	8	.08	58
54. Killdeer	2	8	.08	64
55. Migrant Shrike	2	8	.08	105
56. Barred Owl	2	4	.04	53
57. Ruffed Grouse	2	4	.04	54
58. Eastern Hermit Thrush	1	4	.04	93
59. Eastern Field Sparrow	1	4	.04	71
60. Eastern Vesper Sparrow	1	4	.04	124
61. Pied-billed Grebe	1	4	.04	82
62. Ring-necked Duck	1	4	.04	89
63. Gadwall	1	4	.04	102
64. Bewick's Wren	1	4	.04	77
65. Bronzed Grackle	1	4	.04	41

*Recently introduced. Not present for whole period.
†Not enumerated.

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WILDLIFE CASUALTIES ON THE HIGHWAYS

BY DAYTON STONER

During the past several years the ever-increasing motor car traffic on our highways has attracted universal attention. The attendant effect that this traffic has had upon our wildlife also has elicited comment both in the daily press and in technical and semitechnical publications. Several contributions on the subject have appeared from the pen of the present writer.

My own latest figures obtained on an extended automobile trip across the eastern half of the United States, together with a desire to organize and analyze briefly the results obtained on previous lengthy trips by myself and others prompts the present offering.

In the course of a round-trip automobile journey between Albany, New York, and Iowa City, Iowa, involving a total of 2,158 miles, Mrs. Stoner and I kept a record of the larger vertebrate animals lying dead on the highways. Without doubt these forms had met death in the passing motor traffic, most of them apparently within the twenty-four hours preceding our passing. The going journey was made between September 21 and 24, 1935; the return, September 29 to October 2, all dates inclusive. Our findings are set forth in Table 1.

From the above figures the casualty rate per mile by States or Provinces is as follows: Iowa, .500; Indiana, .442; Ohio, .374; Illinois, .256; Michigan, .146; New York, .142; Ontario, .129; Pennsylvania, .031.

Strange as it may appear the highest casualty rate occurs in the agricultural states, the four highest being, respectively, Iowa, Indiana, Ohio, and Illinois. However, it should be noted also that in these states, on the average, the casualties were high not so much among *wild* life as among domesticated and semidomesticated forms, particularly domestic fowls, cats, and the English Sparrow. On the other hand, the death rate per mile in the cottontail rabbit was higher in Ohio (.047) and Indiana (.047) than in any other states through which we passed. The per mile reptile casualties also were highest in Iowa (.161) with Michigan (.050), New York (.038), and Indiana (.035) following.

One of the interesting points about such counts is the way that they appear to illustrate the local prevalence of certain species of animals. For example, it will be noted that, of the 116 English Sparrows identified with certainty, 61 per cent (72 individuals) were recorded on the 616 miles traveled in Illinois and Indiana. General

TABLE 1. Counts of Vertebrate Casualties Observed on the Highways, Albany, New York, to Iowa City, Iowa, September 21-25, 1935; and Return, September 29-October 2, 1935.

	State or Province and Mileage Traveled in Each								Totals
	Ontario 247	Illinois 363	Indiana 253	Iowa 118	Michigan 157	New York 673	Ohio 251	Pennsylvania 96	
AMPHIBIANS									
Frogs					1	1			2
REPTILES									
Painted terrapin	2		2	5		3			12
Milk snake						1			1
Bull snake		1	1	2					4
Green snake			1		2				3
Garter snake			1	1					2
Ribbon snake					1				1
Miscellaneous (may include some of above)		6	4	11	4	21	6	2	54
BIRDS									
Virginia rail				1					1
Domestic fowl		12	9	11		3	8		43
Domestic pigeon				1					1
Eastern mourning dove			1						1
Northern flicker					1				1
English sparrow	7	31	41	6	2	7	22		116
Miscellaneous (may include some of above)	5	18	10	8	4	11	22		78
MAMMALS									
Opossum			1	3			1		5
Weasel						1			1
Common skunk	4	2	5	3		30	6		50
Domestic dog		1						1	2
Domestic cat	2	5	11	1	2	4	7		32
Red squirrel							1		1
Gray squirrel			1			3			4
Fox squirrel			2						2
Pocket gopher		1							1
Meadow mouse (Microtus?)	1						1		2
Muskrat			1	1	1	2			5
Brown rat	1					1	1		3
Jumping mouse	1								1
Cottontail rabbit	4	6	12	1	3	5	12		43
Miscellaneous (may include some of above)	5	10	9	4	2	3	7		40
Totals	32	93	112	59	23	96	94	3	512

field observations in this highly agricultural section attest to the extreme prevalence of this foreign element in its bird population.

Similarly, of the fifty bodies of common skunks observed in the highway on this trip, 60 per cent (30 individuals) were recorded on the 673 miles traveled in New York State. As a matter of fact, 93 per cent of these (28 individuals) were met with on approximately 400

miles of New York State highway west of Syracuse (September 21 and October 1 and 2).

In our 1935 round-trip count, as in our one-way count made in 1934 on approximately the same highway[1], the common skunk was the most frequent casualty observed among the mammals.

An interesting sidelight is worthy of mention in this connection. On October 26, 1935, in again motoring over a part of the same New York State highway traversed on October 1 and 2, we counted fifteen dead skunks, most of them freshly killed, between Batavia and Geneva, a distance of sixty-five miles. This death toll is at the rate of about one skunk for each four miles of travel and is, of course, much higher than the average for this species over the entire trip.

It is a matter of common observation that the cottontail rabbit is a frequent victim among highway wild life casualties. My own counts bear this out. In fact the figures seem to indicate that this mammal is more generally and evenly distributed than the common skunk. This statement, too, I believe, is borne out by the recorded field observations.

The above table shows twenty-one snake casualties on the 673 miles traveled in New York State. It should be pointed out, however, that this entire lot actually was recorded on the approximately 235 miles of highway between Syracuse and the extreme southwestern border of the state via Geneva, Dansville, Olean, and Jamestown. This is largely mountainous or hilly country and rather sparsely populated in the rural sections.

It may now be of interest to compare the findings as recorded by Messrs. William H. Davis[2], W. A. Dreyer[3], and the present writer[4] on rather lengthy automobile trips through more or less similar country. In Table 2 I have taken the liberty of tabulating in condensed form their data, including those above presented by myself for the first time. This tabulation illustrates graphically the factual rate of killing on some 8,000 miles of highway on which the counts were made.

It will be observed that on the writer's 1934 trip of 1,063 miles no effort was made to count other than mammalian casualties. Had the other vertebrate casualties actually been counted the total for the trip would have been considerably augmented. A more or less obvious deficiency also appears in the "Amphibians" column of Table 2

[1]Stoner, D. Science, 81:401-402, 1935.
[2]Science, 79:504-505, 1934.
[3]*Ibid.*, 82:439-440, 1935.
[4]*Ibid.*, 61:56-58, 1925; *Ibid.*, 69:670-671, 1929; *Ibid.*, 81:401-402, 1935.

TABLE 2. Condensed Tabular Summary of Vertebrate Casualties Recorded on 8.303 Miles of Highway.

Date	Observer	Locality	Mileage	Mammals	Birds	Reptiles	Amphibians	Miscellaneous	Total	Average per Mile
1924 June and July	Stoner	Iowa: Iowa City to Lake Okoboji and Return	632[5]	43	142	40	....	....	225	.356
1928 October	Stoner	Iowa to Florida	1400[6]	45	67	81	6	35	234	.167
1933 "Summer"	Davis	Iowa to Massachusetts	500[7]	64	60	12	13	30	179	.358
1934 October	Stoner	Iowa to New York	1063	66[8]	.....	.....	....	....	66	.062
1935 June, July and September	Dreyer	Illinois to Masachusetts and Return to Cincinnati, Ohio	2550	25	9	21	....	6	61	.024
1935 September and October	Stoner	Albany, N. Y., to Iowa City, Iowa, and Return	2158	192	241	77	2	....	512	.237
			8303	435[6]	519	231	21	71	1277	.153

[5]Stoner, D., *loc. cit.* 1925.
[6]Stoner, D., *loc. cit.* 1929.
[7]Records cited for only 500 miles.
[8]Stoner, D., *loc. cit.* 1935. Mammals only counted.

for I believe that many frogs and toads are overlooked by observers. These forms are comparatively small, they have no outstanding exoskeletal features and their bodies are soft and yielding so that even immediately following death by motor traffic little of the animal remains except an inconspicuous splotch of red or a moist spot in the highway. For this reason also I suspect that *all* counts are probably lower than actually should be the case. If the degree of this deficiency could be even approximated I feel sure that the figures on the *rate* of killing would be materially increased.

Notwithstanding whatever deficiencies may exist in these records, they show that a total of 1,277 dead vertebrates was counted by three different observers on 8.303 miles of highway—mostly paved—extending through rather diversified habitat mainly in the northern half of the country lying east of the Mississippi River. This is an average of .153 casualties per mile, more than six times the average destruction recorded by Dreyer, but approximately one and one-half times less than the average for the writer's 1935 trip and about two and four-tenths times less than for his 1925 figures from Iowa.

In the light of the previous discussion the average of .153 vertebrate casualties per mile probably more closely approximates the truth than any one of the trip records cited. From my own observations over a wide territory within the past ten years I am inclined to believe that an average daily motorcar casualty list of something more than 200 vertebrates per 1,000 miles of main traveled highway is a fair approximation of the true conditions which prevail during summer and early autumn.

Whether this situation prevails throughout the country as a whole we have yet to learn. That it does not prevail during spring and winter in the Northern States at least, can not be doubted. But it is questionable whether we are justified in applying the current findings of vertebrate death rates on a per diem basis to the 750,000 miles of improved roads throughout the United States.

As suggested by Dreyer[9], "The rate of killing may vary greatly from year to year, and also within a single season, probably in relation to marked departures from the normal temperature, humidity, and precipitation, or in relation to seasonal activities of the animals." Without doubt this is true. Such details then, as breeding habits, time of molt, imminence, direction and abundance of the food supply from nesting places, the gregarious tendency or lack of it, extent of diurnal or nocturnal wanderings as well as a host of other and possibly incidental factors also probably play an important rôle in the results that we obtain.

However, Dreyer's theory that hot, dry summers produce "a restless, exploratory activity" on the part of animals thus causing them to wander and bring them more in contact with highway traffic is not borne out in the findings recorded in Table 2. For example in the "hot, dry" summer of 1933, Davis recorded 64 mammals on 500 miles of highway (.128 individuals per mile), while in the torrid summer of 1934 the writer recorded 66 mammals on 1,063 miles (.062 individuals per mile). In the more "normal" summer of 1935 the writer recorded 192 mammals on 2,158 miles of highway which is at the average rate of .088 individuals per mile. Essentially the same results are to be noted among the birds and reptiles as recorded by Davis for 1933 and those of the writer for 1935.

As pointed out above, Dreyer's records for 1935—a "normal" season—are considerably lower than those of Davis for a hot season,

[9]*loc. cit.*, 439.

or of the writer for another hot season (mammals only compared), or of the writer for the same (1935) season.

After all, in view of the rather limited amount of information that we have on this subject, we are scarcely justified in drawing too widespread and sweeping conclusions. We are not ready for elaborate theorizing or broad application of our findings to a large territory. Let us carefully and conscientiously *amass* the facts and findings, leaving the matter of speculation in the distant, inconspicuous background of the picture.

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JOHN MARION PRIOUR

BY FREDERIC H. KENNARD

John Marion Priour died March 14, 1931, at Corpus Christi, Texas. While never a member of the American Ornithologists Union, he had been so closely identified with a number of the ornithologists of this country, as guide, camping companion, or collector, that some notice should be taken of his passing.

His father, Gene M. Priour, was born in Rennes, France, in 1812, and came to this country in 1836, landing at Mobile, Alabama. His mother, Rosalie B. Hart, was born in Wexford County, Ireland, in 1825, and brought to this country by her parents in 1834, with a party of colonists, who landed at Copano Bay, a few miles north of Corpus Christi. Her father having died of cholera, contracted on the ship, she was taken by her mother, after various adventures, to Mobile, Alabama, where she was educated, and later met and married Gene M. Priour in 1844.

John Marion Priour was born in Mobile, Alabama, March 3, 1848; and in 1851, according to his own account, "was brought to Texas and landed on the beach at Corpus Christi Bay." Here his family settled and young Priour, growing up (there were seven brothers and sisters) in what was then a frontier town, seems to have turned his hand to various pursuits.

Starting at the age of nineteen as a clerk in a grocery and dry-goods store in Corpus Christi, he later spent a couple of years in his employer's interests in Mexico, whence he returned to take charge of his father's ranch on the Aransas River.

For the next few years he seems to have led the frontier life of those days, looking after his father's ranch, driving cattle to market, sometimes to Louisiana; and writes that he "was with the Volunteer Rangers six years at the time our pistols were the law, judge, and jury". At one time he worked as engineer on a new railroad that had just been built from Corpus Christi to Laredo, and then learned the trade of carpentry.

On October 1, 1877, on one of his trips to Louisiana, he married Margaret Elida Wanning, of Morgan City, Louisiana, daughter of Horatio and Ora Wanning, and brought her back to Corpus Christi, near which they made their home. Mrs. Priour died on September 10, 1916. They are survived by one son, John W. Priour of Hebbronville, Texas, and two daughters, Mrs. J. W. Roark of Corpus Christi, and Mrs. J. W. Cunningham of Callalen, Texas.

While Priour was a born hunter and outdoor man, he never seems to have been particularly interested in the birds or mammals around him, at least as a collector, until he was over thirty years old and happened to meet Col. N. S. Goss of Neosho Falls, Kansas. Dr.

Fig. 18. John Marion Priour, 1848-1931.

Frank M. Chapman, who collected with Priour in 1891, quotes an account of this meeting from his "Journal" of March 16 of that year:

"Some morning in 1878 a man who requested a drink walked into Priour's yard with a Caracara and a Marsh Hawk flung over his shoulder. To a hunter these birds were as Vultures, and he commenced to play on the supposed ignorance of his caller, saying, 'You

have some fine soup birds there.' Goss took it in his calm manner, and after awhile, seeing that Priour was really interested, explained why he was shooting such apparently worthless birds. Then Priour told him of birds he had seen, and this led to his engagement as guide."

Just when young Priour learned to stuff birds, and began to collect them and their eggs is not known, but this friendship with Col. Goss, begun so accidentally, seems to have been kept up, and Priour writes that "in 1881, Col. N. S. Goss, of Neosho Falls came to Corpus and we collected and mounted quite a lot of specimens".

In 1882 Col. Goss's brother, Captain B. F. Goss of Pewaukee, Wisconsin, came to Corpus Christi, and was there joined by George B. Sennett, and Priour writes that "we collected from the Rio Grande to the mouth of the Gaudalupe River", and he continued to collect eggs either with Captain Goss, or for him, until 1886, and collected skins for Sennett until 1891.

Col. Goss's collection of mounted birds, originally in the Kansas State Capitol, at Topeka, has been transferred to the Museum of the Kansas State Historical Society, at Topeka. Captain Goss's egg collection is in the Milwaukee Public Museum, although he gave a great many eggs to the United States National Museum at Washington. A good many of Sennett's skins are also in Washington; but such skins as he possessed at the time of his death passed to the American Museum of Natural History in New York.

While the thousands of specimens collected by Priour were invariably labelled with such data as was necessary, he seems never to have thought of putting on his own name as collector.

That Sennett thought a lot of Priour is evident, for Dr. J. A. Allen, in his account of Sennett's life, in the *Auk*, January, 1901, writes: "In this same year (1887) he sent Mr. J. M. Priour to the region of the lower Brazos River, and later to explore the coast region, or Tamaulipan district, of northeastern Mexico. Mr. Priour made a wagon trip from Corpus Christi to Tampico in 1888, amassing large collections, which threw much light on the faunal character of this then little known region, and helped to establish the boundaries of the Tamaulipan Fauna. As the country about Tampico proved very unhealthful, Mr. Priour nearly lost his life there from a tropical fever. The next season, 1889, to enable him to recuperate, and to continue his work in a more salubrious region, Mr. Sennett sent him to the eastern base of the Sierra Madre, where for several months he collected in the

vicinity of Monterey. The results of these important expeditions unfortunately still remain unpublished."

This seems to have been a busy decade for Priour, ornithologically speaking, for, in the spring of 1884 he collected with Joseph L. Hancock from March 16 to April 1, and in 1887 with George B. Benners of Philadelphia, and there were a number of others.

Dr. Frank M. Chapman writes: "I lived with John Priour either at his home or with him in camp from March 16 to April 25, 1891. His striking personality, his knowledge of the country, and his enthusiasm as a collector made my month with him stand out as one of the most enjoyable of my collecting experience."

Dr. Witmer Stone writes me that S. N. Rhoads of Philadelphia, "stayed with him about 1891".

In 1894 there was published by the Forest & Stream Publishing Co. an amusing book by Dr. A. C. Pierce of Boston, Mass., entitled, "A Man from Corpus Christi or The Adventures of Two Bird Hunters and a Dog in Texas Bogs". This was a ludicrous account of the travels and adventures of Dr. Pierce with Priour and his dog, Absalom, on a five-months camping and collecting trip in the vicinity of Corpus Christi.

Dr. Pierce writes that "Mr. Priour was a professional hunter; he made hunting his whole business the year around, and as his jaunts extended in every direction, he was well acquainted with the country for miles about Corpus Christi. He also collected specimens of natural history for various parties, and as my principal object in visiting the country was to secure such specimens myself, I could not have found a man better fitted for my companion."

Vernon Bailey writes that "On April 13, 1900, Mrs. Bailey and I first met Priour and his son at Corpus Christi, and he went around with us for several days on trips to the flooded bottoms of the Nueces River to get Wild Turkeys, and down along the coast and Laguna Madre for water and shore birds. He was a taxidermist and skin collector, and had for years been in the business of collecting plumage for the millinery trade with Armstrong, Watson, and others. He had been with many well-known ornithologists and helped them collect, and knew birds fairly well."

"He gave me many notes on mammals that I used in my Texas report, North American Fauna, No. 25, published in 1905, and later sent some specimens of mammals to the Biological Survey. Most of his notes on birds are included in Oberholser's report on the 'Birds of Texas' not yet published. He was a kindly, helpful friend with the

interests and enthusiasm of a real naturalist. His contributions to science in both ornithology and mammalogy were far more important than some of those that get more credit."

From 1900 to 1916, after the trade in plumage had become pretty much a thing of the past, and collectors were becoming rare, Priour seems to have spent most of his time working as a carpenter, either in Corpus Christi, or in other parts of Texas, building oil well derricks or doing his bit during the war by helping on the buildings for the Army Camp at San Antonio.

After Mrs. Priour's death in 1916, he closed his old home and went to live with one of his daughters.

Mr. N. A. Francis of Brookline, Mass., made successive egg collecting trips with Priour in the springs of 1919, 1920, and 1921. Mr. Francis died on June 19, 1921, and his collection was presented later to the Museum of Comparative Zoology at Cambridge, Mass. He had told me so much about Priour and his delightful personality, that, in February, 1922, my son Bob and I, while collecting along the coast of Texas, stopped off at Corpus Christi for the especial purpose of meeting him, and spent five enjoyable days in his company, exploring the country about his daughter's (Mrs. Roark) place where he then lived, about six miles out of Corpus Christi. Together we tramped the shores of the Nueces River, or sailed down the Laguna Madre to Bird and Padre Islands.

I was so charmed by his delightful personality, his youthful enthusiasm, (he was 71 at the time), and above all, by his kindliness, that we carried on a somewhat desultory correspondence afterwards, even though the old man hated letter-writing. He gave me at the time a number of skins that he happened to have on hand, and later, after I had gotten the necessary permits for him, collected a few birds for me.

The late Walter B. Savory of Wareham, Mass., seems to have been the last one to have gone camping and egg collecting with him, and he wrote that in the spring of 1927, when Priour was 79 years old, "we collected together for some months, Uncle John going with me in my auto and camping wherever we happened to stop. He gave me all the sets he found. I never ceased to admire the natural-born courtesy that distinguished him. It was a privilege to know him."

Modest, unassuming, generous to a fault, always ready to do anything for anybody at any time, I think it was his kindliness that most attracted me, and as an example of this, I would like to tell of one personal incident. It has been the custom, these many years, for my

friends and neighbors to foregather at my home in Massachusetts on New Year's eve, and, together, see the Old Year out and the New Year in. As part of the decorations there is always hanging from a beam in the front hall a sprig of mistletoe. Now mistletoe grows luxuriantly about Corpus Christi, and one day while with Priour, I told him of our custom, and wished that I might have, on these occasions, just such a wonderful clump as we happened to be looking at, to hang in my hall. Nothing further was said about it at the time, and I had forgotten the incident until, a couple of days before New Year's, a large box was received from Texas containing just such a clump of mistletoe. And each year since then, such boxes have arrived. Not only that, but before he died the old man asked his daughter to continue the custom, because I had been his friend.

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ENDEMISM AND THE AMERICAN NORTHWEST

BY T. T. McCABE

The speculations to which this paper is devoted are based upon the empirical belief that geographic populations of the higher vertebrates are reasonably certain to show endemic variations in proportion to one or more rather vague environmental considerations, such as the homogeneity and individuality of the environment in question, its size, its isolation, or its age. These vague conditions, often more easily perceptible to the casual observer than to the cloistered student of the physical data, somehow actuate or correlate with precise agencies still far beyond our grasp. But throughout the general failure of field ecology as an exact science, especially for land areas, there recurs the stubborn conviction that regions which we empirically sense as natural units are in the vast majority of cases reflected in endemic racial or specific variations of a significant number of the more plastic vertebrate forms. In general, such endemic conformity conveys a sense of distinction from other types of variation of divers historical or genetic origins. It is the basis of the study of incipient evolutionary change in the higher vertebrates today. So regular is its occurrence that we are justified in emphasizing the fact and seeking an explanation when a striking exception appears. Such considerations may justify a few paragraphs of rather loose descriptive comment on certain areas of northwestern North America whose conformation and recent history throw light upon the nature and rate of cer-

tain of the phenomena which vertebrate zoologists group under the name of "geographic variation".

The splendors of the northwest coast gain by the suddenness of their beginning, by the dreariness of the stage which the mountains above Vancouver back like an azure drop. The delta of the Fraser River, in the immediate foreground, is one of singular lack of interest. Southward, the long straight coast from Cape Flattery to San Diego is for the most part in an unsatisfactory state of middle age, without the savagery of geologic youth or the gentler beauties of alluvial maturity. Over and over again the elements recur, bulky headlands and "haystack" off-shore rocks of yielding conglomerates and sandstones, too weakly sculptured by the trampling Pacific and the deluges of the fog-belt, narrow barrier beaches, and small lagoons of little charm.

Over a thousand miles of such reiteration ends in the gateway whose pillars are Vancouver Island and the southern shoulder of the coast range, where the mountains withdraw from the measureless embrace of the North Pacific—where the offset and break occurs between the Coast Range and the Cascades. Perhaps no one has had the audacity to calculate in miles the length of the shore line of British Columbia. Farther south, a thousand miles has meant more than the Pacific coast of the United States. Now it is not impossible to follow such a length of ragged shore, of polished rock steeped in clear sea water, of tortuous inlet and island, and find one's self again at the starting point. The coast from Vancouver north is perfectly unlike anything else on the continent.

Regardless of underlying geological distinctions, the surface of the new setting is dominated by a single theme. Rising through the accidents of the present landscape, obscured but never lost under sheltered forest or wind-racked scrub, the ice-motive is never absent. From the fringe of "boat-bottomed" rocks, rounded and polished until they seem to float foam-like on the surface of the water, to the peaks whose scoured crowns are hardly shadowed by the patina of oxidation, there is the sparkle of fresh stone-cutting. The unfinished masonry lies as over a holiday. The complete transformation in topography and physiography coincides with the southern extension of the Cordilleran ice-cap.

The dreaded off-shore wind is the breath of retreating ice and carries a sinister promise of return. Withdrawn to the cirques and cols, flashing blue and green where the thin sunshine and warm winds maintain, for the moment, something better than a state of equilibrium

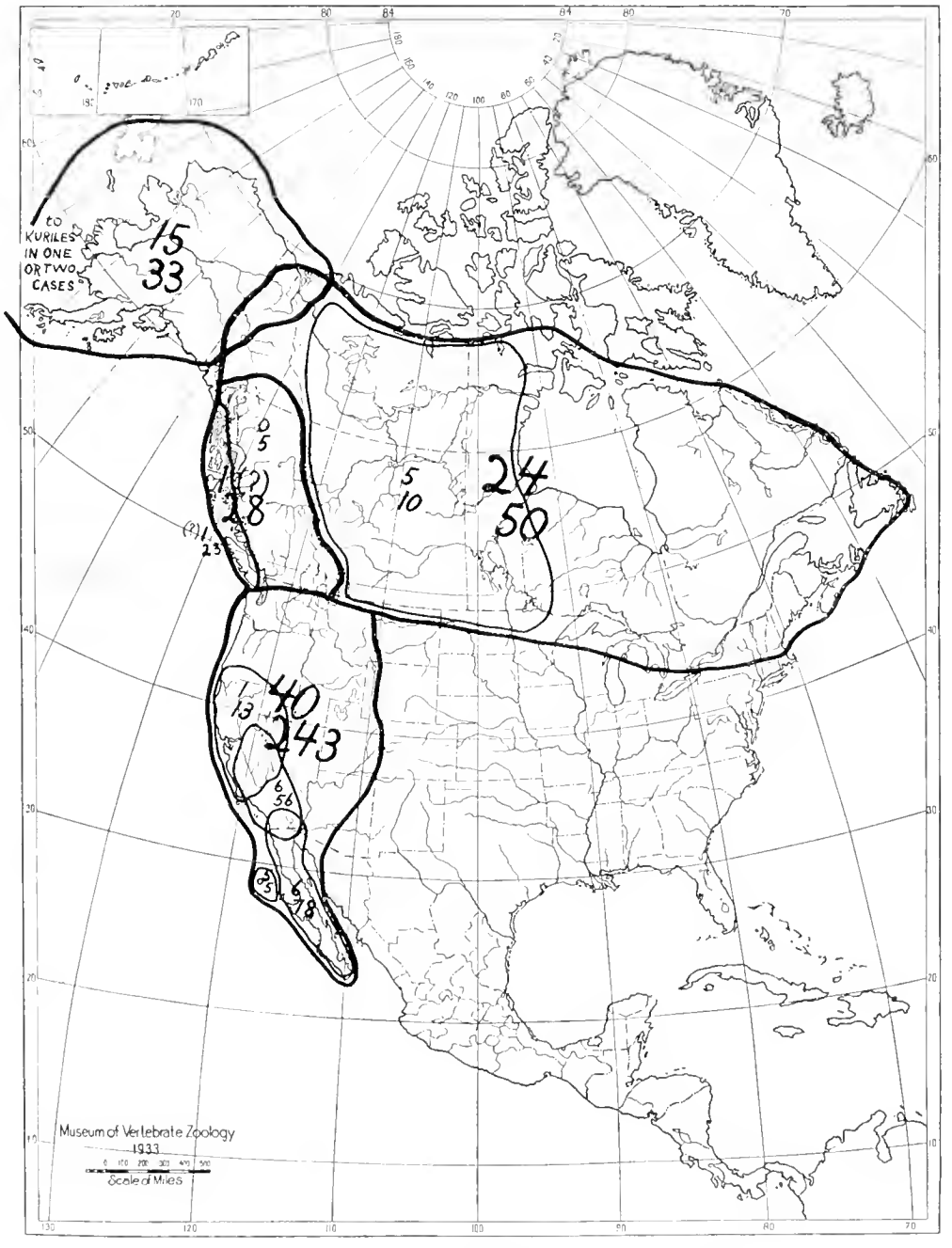

FIG. 49. Numbers of endemic birds in certain regions. Upper numbers represent species, lower numbers geographic races.

with the ponderous ice-creep, the ancient foe remains imminent. The fate of an epoch may hang very delicately in the balance, the little more or little less serving to turn the climatic scales. Let the cold breath sharpen ever so little, let the snowfall gain imperceptibly on the melting and evaporation, and the random cannonading of the slides will swell with the sounds of a main advance. New offspring of the ancient ice will press down the darker gorges to meet and accumulate until a single pale declivity, pierced by rare wedges of naked rock, slopes westward from the mainland peaks to over-ride the outer islands and resume the old line of equilibrium with the warm sea.

But for the day at least the omens are favorable. Life is in the ascendant, and promises, before a new retreat occurs, to effect the conquest of new territories and found new dynasties of living things. In this living promise lies the charm and inspiration of the new environment. For the most part, what we call natural history is, in point of fact, an oppressively finished and static affair. For us, the great changes belong to a realm of ideas rather than to reality. Here, on the contrary, dwells a sense of unfinished surroundings, of obvious and creative change. Something of the expectancy of the northern spring lingers in this greater springtime of a reviving age. Life presses in, with a roster of forms which, intelligently read, tells the story of the immediate past almost as clearly as does the geology—a seemingly chaotic aggregation, which, the key once found, falls into order with startling completeness, while the degree to which the new environment has impressed its stamp upon the pioneers offers one of the most illuminating lessons of the geography of life.

Since during Recent time the sea level has been such as to make low-lying islands of the outer foothills and plateaux of the coast range, the withdrawal of the ice first revealed a fringe of naked stepping stones, destitute of life or the promise of life, larger copies of the offshore reefs of today. There were here no gathering grounds for till or drift, which was washed directly into the channels. No plant could live unless upon air-borne nourishment. Yet mysterious agencies serve to repopulate even such desolate spots with surprising speed. Coming we know as yet neither how nor whence, mosses and alpine plants found nourishment in the dust of lichens and water-borne organic matter, washed or blown into crevices. These laid down their own soil as they advanced, and so, stage by stage, type by type, the present incomplete vegetation has been attained. These suggestions of newness and incompleteness are by no means intended to be fanciful or figurative, but to describe a condition as concrete as the

stage of reversion of a plowed field or the scar of an avalanche. In the interior of the outer islands are great fields of polished rock where the rate of blanketing by felt-like mats of half-rotted vegetation might be measured, year by year, flat wandering drainages where rock pools need the increment of a few more years or centuries to become bogs, well-sheltered areas of cedar and hemlock scrub waiting the slow accumulation of more soil to become cedar and hemlock forests and to offer their hospitality to spruce and balsam. At present monotonous forests line most inner shores, while the rest, hidden, like the white outer beaches, from travellers of the "inside passage", offers a meager foothold for hemlock, cedar, and yew. These cover the bulk of the outer islands with grey skeletons of dwarfed forests, valueless, lacerating, often impenetrable, which reflect the tones of the changing northern days with unearthly radiance, and are not less haunting in form than the dreadful thickets which Dante animated with the souls of suicides.

The living pioneers, selective products of so bitter a history, yet fall heir, in a sense, to all that the latitude can bestow. The fragments of scoured rock, in the shadow of the withdrawing ice, lie also fair in the path of the western wind drift or Japanese current, whose warm waters surround them, are deflected north and south by their shores, and cast upon their beaches a flotsam of bamboo and tropical woods and the lost gear of old-world fishermen, so that Siwash children play with glass balls that once floated Japanese nets. As the waters bring warmth so the sea winds bring rain, warm and moderate compared to the cold deluges which, like grey curtains, shut off the mountainous inner islands. In spite of edaphic poverty the stepping stones of crude rock have become gardens of the gods.

As compared to what lies south of the ice-cap glaciation, and incidentally south of the international boundary, the flora is different enough in the species involved, but profoundly different as to emphasis, distribution, appearance,—that general character so apparent to the eye but so difficult to analyze and define. Numbers of forms are small. Even the color and luxuriance of the outer "muskeg" islands in early summer covers a numerical poverty which reaches its extreme on the outer mainland. The disgusted Oregon timber-cruiser who returned from miserable days in the sodden forests of Queen Charlotte Sound to report nothing but "salal trees and cedar brush" was guilty of exaggeration, but the picture of rough slopes with stunted cedar half-buried in *Gaultheria* and *Vaccinium*, animated with

the songs of *Hylocichlas* and little else, the underlying sphagnum or naked mould shining with the trails of giant slugs, represents a vast zone of nook-shotten coast line.

Because the basic workmanship is more exposed, the brilliant newness of the coast is more spectacular, more suggestive of the terrestrial springtide, than that of the adjacent interior between the Coast Range and the Rockies, which, in its present aspect, is perhaps actually younger. The intricate coastal sculpturings of hard diorite and granodiorite are more strange than the piles of tortured glacial drift, the eskers, morainal dams, and clean-cut benches of the interior, which in turn are better concealed by a vegetation that found fertility and shelter ready-made, as well as surroundings and an atmosphere which made possible high extremes of summer heat. The reclaimed areas offered a wider range of hospitality to the plants and animals which pressed upon the southern front. The various changes, as the habitable frontier moved northward, were less abrupt and less fundamental.

Here, between the mountains, and north of the southern limits of glaciation, stretching far into northern British Columbia, lies an anomalous plateau country, full of familiar elements but in its entirety quite unlike prairies, mountains, or coast,—high, rather flat, very cold in winter and hot in summer, a land of sparse aspen and lodgepole pine shading into balsam and spruce on the eastern and western mountain rims, dotted with shallow lakes, sometimes of great size, and studded with a few clusters of small volcanic peaks. Here to northward lay the gathering ground of the Cordilleran ice-cap whose smaller arms created or deepened through-valleys westward to the sea such as those of the Kleena-Kleene, the Hotnarko, the Skeena, and the Stikine, and extended its terminal forks southward to excavate, with their swifter flow, such gorges as those of the Columbia and the Chelan. Here the landscape of the ice age was that of interior Greenland today. The burden of ice rose to a level of from six to seven thousand feet above the sea where, from peak to peak and range to range, its flood is marked by a transformation of topography. Elevated, refrigerated by the eastern and western mountain rims, unaffected by the Japanese current, the plateau ice lingered and lingered. Johnson and Uglow's intensive study suggests that the glaciers of the foothill valleys of the Cariboo district have been absent only some fifteen thousand years. So much of the recent work on the chronology and paleontology of the pleistocene has dealt with parts of the United States where actual glaciations were rare and widely-sundered epi-

sodes, that their actuality, duration, and significance in the biological history of the north has not been understood.

It is not necessary to possess the intuition of a G. M. Dawson, or to be steeped in the data of the Canadian Geological Survey in order to read one fact from the landscape of British Columbia, viz., that during the late Pleistocene the region was uninhabitable by most of its present land vertebrates. We may leave the question of a scant handful of extreme "arctic-alpine" forms open to doubt—it need not concern us here. One corollary follows—that the present inhabitants must have arrived by migration in their present guise, or varied *in situ* since the change of climate.

If we use the word *endemic* in its present accepted sense of *restricted to*, though not necessarily indigenous in, or originating in, then the lighter the endemic variations in newly available and sharply differentiated regions, the more likely they are to be indigenous and of post-Pleistocene development. It is at least unthinkable that a group of animals or birds showing a roughly corresponding degree, and, especially, a parallel *type* of variation, should as a unit, with the change of conditions, have transferred their common range to a new region which bore no resemblance to their previous habitat.

One impressive fact stands out from the accompanying map. In the British Columbian region, a sharply-defined natural unit, rich in light endemic variation, *endemism of specific degree practically does not exist*, in contrast to all surrounding areas. Only the Northwestern Crow (*Corvus caurinus*) still rated, undoubtedly wrongly, a race of the *brachyrhynchos* group by orthodox ornithology, and extending its present range to Prince William Sound, is a candidate for specific near-endemism. This bird, by a fortunate chance, happens to be the only one in North America which can be shown by paleontological evidence to have at least withdrawn its southern extension, since the later Pleistocene, from southern California to Puget Sound, and which very probably is an immigrant endemic rather than an indigenous one in its present range.

Be that as it may, in the possession of endemic forms the contrast of the British Columbian and southern Alaskan coasts with both the north and the south are obviously overwhelming and must have a reason. Today, in the United States west of the Rockies and in Lower California there exist at a minimum estimate some forty endemic species and 243 races, variously distributed. At the opposite extreme, in the

far northwest, warm *unglaciated* western Alaska and its islands offer as sharp a contrast and a more surprising one. Here is all that is left of the faunas (for there were probably at least two rather distinct ones) of the great Tertiary landbridge, hundreds of miles in width and diverse in climate, which joined the continents, and is now the floor of the shallow Bering Sea. It is true that an undue proportion, though not all, of the fifteen endemic species are littoral or even pelagic, but of the thirty-three largely terrestrial endemic races a large number are extremely strong, relatively nearer specific rank, in contrast to those of the more southern coast or the British Columbian interior. The region is a rich pocket of relatively deep-seated endemism—an ancient, almost relict, fauna, strangely surviving in a strange retreat.

When, however, we turn to the obvious interpretation, i. e., that the explanation is historical and lies in the time factor, that the degrees of endemic variation more or less accurately represent the length of endemic habitation of the populations involved, we are faced with an apparently flat negation in the fact that the eastern glaciated regions, from the Rockies to the Atlantic, are by no means equally deficient in endemic forms of specific rank. I believe, however, that the difficulty is less stubborn than at first appears. Dangerous as it may be to give free rein to the imagination in matters so out of reach of experience, careful consideration must lead to the conclusion that the present distribution of endemism is strikingly in accord with the probabilities, and offers extraordinary insight into the nature and rate of variation.

Over the monotonous eastern landscapes, as the ice came and went, we must imagine sweeping and unified migrations of coherent populations of animals and plants, drifting northward or southward rank by rank, each enclosed within its drifting environment. The movements were over a comparatively uniform terrain. Topography ran north and south. Change crept northward in a cycle of repetitions. Over broad steppes, along sea coasts, up the spine of the Cordillera, the footsteps of change, gradual or rapid, continuous or intermittent, followed relatively simple paths. Transitions, as between the Sierras and the Cascades, barriers, like the vanished lakes of the Pleistocene, were inconsequential or fugitive. Each zone reclaimed from the ancient frost was suitable for settlement by the life of its southern margin.

On our rocky northwestern fringe there was no duplication and reduplication, no moving up of ready-made environments. Here the old

life faced new conditions. The renaissance began at the margin of a new physiography. Major climatic and topographic boundaries had chanced to coincide. Reclamation began where coast, mountains, and interior are transfigured, at the gateway of the northwest, where the mountains turn westward to plunge their spurs and valleys into the sea, or where, in the words of Dawson, the coast system "replaces and partially overlaps" the Cascades. Nothing like the new shore line had existed elsewhere; even the inter-mountain region was strongly differentiated.

What took place over the relatively uniform east with the passing of the Late Pleistocene is seductively easy to visualize; what took place over the complex west, very difficult—so difficult that we may never extricate the history of the individual animal forms. To illustrate the distinction, we may venture, with the eye of the mind, to pierce the darkness as far as the so-called Wisconsin glaciation and to glimpse, near the ice-front in the middle west, something over twenty-five thousand years ago, some characteristic scene—perhaps a round sphagnum muskeg, bordered concentrically with grass, willow, and alder, and backed by dark conifers, beyond which rises a rolling landscape of windswept grass and evergreen scrub. A group of caribou, circling with clicking hooves and muzzles stretched high, have been roused by a shift of wind. A moose, seen in vague outline through the willows, shakes and snaps the long shoots on which it feeds. So far the setting has left its record, for those to read who can. But we may quite safely people the stage with other actors of whose presence no trace remains: the deeper forest with White-winged Crossbills and Three-toed Woodpeckers, the forest edge with Yellow-bellied Flycatchers and Canada Jays, the deciduous brush with Tennessee, Cape May, Myrtle, and Blackpoll Warblers, while the royal crimson of the sphagnum is enhanced by a dotting of Rusty Blackbirds, walking their long patrols, their bills bristling with insects. In the distant landscape there are sites, in the open grassland, for the nests of Sprague's Pipits and Smith's Longspurs, in the scrub, for those of Harris's Sparrows.

Such a picture once established, in part by the sciences which deal with the animals and plants of the lost ages, in part by inference from present association, we seem at liberty to shift the scene northward, step by step, age by age, until, time and space converging, we meet the present reality in northern Manitoba or Saskatchewan. No radical and lasting changes in topography have been passed over, no

more subtle changes, insurmountable to the animals in question, need have intervened.

It is true that we too rarely have among the smaller mammals, and practically never among birds, adequate fossil evidence of such migration by unchanged living forms. But all that we do know or guess of the rate of mutability of vertebrate species forbids us to believe that such profound modifications in the germ line as exist among Canadian endemic species east of the Rockies can have come to pass in the region of their present sojourn and in the short period since the glaciated regions became habitable. Whether such forms evolved before or during the great stretch of the Pleistocene, whether far to the south, or even farther north during some interval still warmer than the present, or whether, more probably, the more recent process of evolutionary changes were never localized but protracted through long cycles of drift, such as still continue, though too slowly to be reflected in our brief records, we may never know. But of one thing we may feel reasonably sure, that of the many *species* now endemic to regions of Pleistocene glaciation, very few, if any, can be the exclusive products of their present geographic range.

On the Pacific slope, in the same latitudes, we cannot conjure up such a scene of the diluvial drama which, actors and setting unchanged, is reproduced today on the northwestern stage. Here our mind's eye must look back upon an ancient southern fauna trapped in a disappearing, rather than a migrating, environment. The questions are rather what forms will have the vigor and tolerance to escape, the plasticity of behavior or form to undergo adaptation. The tolerance of many forms from many directions enabled them to penetrate and gain a foothold in the new regions. Hardly a single form was prepared to adopt it as an exclusive unit, to become endemic to its natural boundaries.

Then, as now, we can not doubt the existence of essentially coastal forms in the south, narrowly fenced between the Cordilleran barricades and the sea, and subjected to specialized environments. But the shadow of change, passing quietly from latitude to latitude, from level to level, produced little orderly procession of such forms. No ancient form found its environment reproduced in the virgin northwest, and indeed relatively few possessed the catholicity to include its new and singular habitat types in their adopted ranges. Many, as both deductive reasoning and avian paleontology suggest, disappeared with their surroundings. Relatively few, and these practically all from the southern seaboard, were capable of accepting the novel extremes of

the new coast. In consequence, the breeding forms of the British Columbian coast hardly number half of those which occupy almost any strip of corresponding size in the interior of the province.

The avian population of the interior of British Columbia, on the other hand, instead of being composed of scattered gleanings from a single source, as on the coast, is relatively large and the result of invasion of three great geographic groups, those of the far north, the Great Basin and Rocky Mountains, and the east. This is the no man's land of the grand strategy of distribution. Like the coast, it lacks deep-seated endemic differentiation, native or immigrant. Unlike the coast, it exhibits the most meager indications of incipient geographic variation. Over 70 per cent of the population is composed of forms which find their present centers of distribution in the far north or southward in the Great Basin. Embedded in the same mosaic is a smaller but strangely distinct component of eastern races or species, which here, just above the southern limits of glaciation, suddenly strikes through the Rockies and the intermountain region, often as far as the Coast Range. For a long time I stood somewhat in awe of this group of familiar eastern creatures in such unfamiliar surroundings, so indifferent to the tangible and intangible barriers of topography and ecology. So bold an alien vanguard, it seemed, must herald a mysterious faunal movement, be fed by hidden springs of vitality, and contain secrets of faunistic revolutions of the past. But if we regard the population as the mixed product of recent invasions and of centripetal force, it is obvious that the adjacent east would have contributed its fraction, especially of kinds of birds to which mountains and boreal forests constitute avenues rather than barriers. Such a variegated faunal complex, once we accept the historical viewpoint, needs no explanation other than recent and heterogeneous origin. It is the selective result of throwing open virgin territory to settlement on several frontiers. The mixture as a whole lacks local color, for local color is slow to appear. In the crucible of the natural environment reactions are deliberate indeed.

Inherent in such a situation lies the framework of a great experiment in the rôle of environment in organic evolution. There was waiting not only a *tabula rasa*, an empty stage, but one dissimilar to any previous and ill-adapted to carry on old themes of remote origin. The results of the re-occupation are to be read in new themes, in those incipient changes or "geographic variations" which probably differ

only in degree from more trenchant "species", and to which younger vertebrate naturalists are inclined to look as the lowest perceptible evolutionary points of departure. The time of re-occupation, also, is fixed. Because for a long period most of the north was almost empty of vertebrate life, the length of the local habitation of the present occupants can be measured. Granted the responsible agency of environment, we can, like chemists, determine the rate of certain evolutionary reactions, even if we must guess at their mechanism.

Certainly in those regions whose character and position in the present natural cycle we are trying to grasp there have developed only those hints of change, tantalizing fugitive variations, shades too delicate to endure a change of light, dimensions so confused that only long series and the subtleties of mathematics can evaluate them, which the science of vertebrate systematics has struggled to reduce to a single category, the geographic race. Of such variations no study can be too minute, for the chances are large that in them we see eternally repeated the very birth of organic evolution, but it is quite certain that no system of ponderous trinomials will ever convey a sense of their delicate and imponderable values, which we now understand to include innumerable degrees, from near-specificity down to faintly divergent behavior and physiology in groups otherwise indistinguishable, even to the change of a note in a song between colonies a few miles apart and otherwise beyond the discrimination of human sense or scientific apparatus.

I do not suggest that while "species" may have evolved elsewhere (or nowhere exclusively), "races" must have developed where they are today, or propose any equally rigid and absurd distinction between the categories. On the contrary, it is almost certain that many strongly differentiated races, as, for instance, certain of the endemics of the eastern glaciated areas, must antedate the renaissance of the regions they occupy. But the more superficial the variation appears, the greater the probability of its local development. The endemic variations of the northwest coast are uniformly light. Furthermore, their most spectacular aspect, as a group, is their parallelism. An overwhelming proportion are darker, of a more "saturated" pigmentation than surrounding races, while size is almost as regularly diminished. One or more localized modifying factors, whatever their means of operation, of common application, to which many of the native forms show strikingly parallel responses, obviously exist in the new envi-

ronment. The lightness of the differential characters, their striking parallelism, their sharply endemic grouping, and above all their occurrence in a region so recently uninhabitable and so completely without evidence of immigrant endemicism in ancient and trenchant forms, *leaves little doubt of the local origin* of the variations. Such a conclusion carries in its train the establishment of a somewhat more-than-minimum period, if not yet in years at least in a very small division of the geologic column, for the development of distinct, morphologic, geographic races. Furthermore, it seems highly probable that the contrast between coast and interior in British Columbia as to prevalence of geographic variation indicates a further correlation with the relative lengths of the habitable periods in the two zones, which has already been discussed.

For many years large groups of vertebrate zoologists have blindly concentrated upon the description of geographic variation. Hardly a thought has been wasted on the rate of such change, and indeed there is little basis for speculation upon it. Yet the phenomena of widespread glaciation, when subjected to such chronological studies as those, for example, of Antevs, and knowledge of the age of certain islands which have been submerged and re-elevated, provide data which is certain to be collected and applied effectively to such problems.

On this continent Hay, interpreting the riches of mammalian paleontology, guardedly admits the possibility of differentiation into species since the *beginning* of the Pleistocene, almost certainly over a million years ago. The span of the whole Pleistocene, as compared to the recent, was immense, and if we may feel assured that Recent time, say, in the regions under discussion, following the strong consensus of modern geological opinion, something over 25,000 years, is sufficient to have produced the lesser geographic variations, such a point of view as Hay's supports what many devotees of vertebrate research believe, that there is a vast interval between the first emergence of perceptible morphologic "geographic variation" and the "specific" stage when ready interbreeding ceases to take place in nature.

In this attempt to locate, in place and time, certain starting points of potential evolutionary changes in one class of vertebrate animals, I have coupled the words environment and variation as though such coupling, as cause and effect, were a foregone conclusion and a comprehensible one. But in so doing I have followed the common working hypothesis rather than clear-cut principles, and have restricted myself to the consideration of that phase of very gradual variation based

on geographic series which has been so much emphasized in the study of the higher vertebrates but is so difficult to isolate in other fields, notably in that of botany. Its recognition does not deny other and older genetic evolutionary mechanisms which are unfamiliar in the vertebrate field.

In respect to this working hypothesis of the study of distribution, we flounder in dark waters, snatching at straws and dropping them, straining for doctrines only to revolt from their far-fetched inadequacy. The life sciences are approximately as far as ever from showing how external agencies can create heritable changes in organisms. To ask selective adaptation to account for the minute and inconsequential variations of geographic races is to reduce the theory to absurdity. To believe that such variations are "linked" to others more important, but unfortunately quite invisible, is one more step in the same direction. The vertebrate geneticist looks not at the nature of the environment but at the degree of its isolation, especially if combined with small size and reduced numbers, or to contacts of adjacent groups for the origin of strains of a mutative origin and Mendelian behavior, a doctrine which has only far-fetched answers for our increasing knowledge of the parallelism of variation in local populations, of which the northwest coast offers a fine example. The form of agnosticism which takes refuge under the name "orthogenesis" would perhaps free itself, if it could, from all environmental correlations. Because science finds no mechanism for the operation of direct environmental influence upon racial morphology, it has devoted great ingenuity to eluding the evidence of it. Yet naive acceptance of an almost universal sensitiveness to the environment *per se*, as opposed to mere isolation, of the parallel effects of parallel environments, and of the early development of differentia independently of selective value, seems the attitude most likely to lead at last to the center of the bitter problem of the origin of races, and therefore of species.

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FURTHER NOTES ON THE CONSTANCY OF CATBIRDS TO MATES AND TO TERRITORY

BY GEOFFREY GILL

In the WILSON BULLETIN for June, 1935 (pp. 104-106) I presented an article in regard to the attachment shown by Catbirds (*Dumetella carolinensis*) to mates and territory. The data in this previous article were collected during the summer seasons of 1932, 1933, and 1934. Two more years have rolled by and while individuals of this species have been known to live longer than five years, it is thought that the average life span of these birds is seldom much more than five years, and in all probability is less.

At this time, I wish to record the data collected in the past two summers in relation to a male Catbird, which for convenience was named "6M32" in the former article. This bird nested on Territory 6 in 1932, and in 1933 it nested twice on Territory 1, with different mates for both the first and second nestings. In 1934 "6M32" remained constant to Territory 1, and while both the early and late season's nests were built there, 6M32 again changed mates with each nest. At the close of the third season, this male had been constant to the same territory for two seasons and four nestings out of five, but had mated with five different females. In 1934 6M32's last mate was No. 34-142811, marked with colored bands.

For the sake of the records, it can be noted that this female has never occupied Territory 1 since, although she appeared in our traps at the close of the nesting season in the following year, and again on May 4, 1936. No. 34-142811 probably nested during these two seasons at some distance from the banding station, as her nests or territories were never found.

During May, 1935, Territory 1 was watched very closely in hope that 6M32 would be found there again. On May 15, two very wary birds were found on the territory. As appears usual at such times, the one believed to be the male kept to the tops of the trees while singing, making the observation of colored bands, even with glasses, difficult. 6M32 is recognized by a blue band on the right leg and a red band over the usual survey band on the left.

On May 26, the nest was located containing one egg, but three Catbirds were present. One of these was No. C-144294, color banded as a fledgling in 1933, and which returned the previous year on June 4 but was never seen or trapped after this occasion. It is interesting to note that the mother of this two-year-old "interloper" was 6M32's first known mate, but was sired by her second known husband.

The two other birds were afterwards found to be the resident pair. The female, No. 31-142816 was banded the previous year with colored bands on June 24. This bird had been retrapped by us on May 13, 1935, and her colored bands checked. The male appeared to be No. B-165487, for he carried a red band over the usual survey band on the left. The right leg was bare of bands. Such identifications by colored bands are checked and checked again. Repeated visits to this territory brought matters to the same visible conclusion. The male was banded with colored bands as an adult on May 11, 1932, and was considered an old bird. His presence in the light of previous records was hardly accountable. All efforts to trap him failed and his record proved that he had never been trapped since banding.

On June 15, the four young were banded and two weeks later the territory was deserted.

Before going further, I wish to emphasize the colored banding of the male found in 1935 on Territory 1 and the colored banding of the male expected there after being constant for two years. 6M32 has a blue band on the right leg and a red band under the survey band on the left. The 1935 male had no band on the right leg and a red band over the survey band on the left. Both birds were banded with colored bands in 1932, three years previous to this time. Many workers, who have used colored bands on birds, have found that they are not always reliable after the second year. In the light of the revelations of 1936, this thought should be borne in mind.

On May 11, 1936, the female which had occupied Territory 1 in 1935, appeared in our traps. Her colored bands were all right and it was soon found she was nesting on Territory 1 again. The male, as usual, was difficult to see. Finally the nest was located in a small cedar directly back of the spot used as an observation post. A close approach to the nest brought both parent birds near, fearlessly scolding, as is characteristic of the species. The male had a red band on the left leg, but the colored band had telescoped over the survey band so that it was impossible to know if it belonged above or below the band. Sight identification was hopeless. It might be either of two birds.

We set traps to catch the male but they were evaded. On June 6 we caught the female again, and on June 12 we banded the four young fledglings. On June 17 the male was trapped. It was 6M32.

6M32 had lost the blue band from the right leg and the red band had expanded so far as to be almost dropping off. New colored bands replaced the old ones and off he flew. Both birds of this pair were

checked around Territory 1 to the end of June, when they apparently moved away. It is doubtful whether there was a second nesting in this spot in 1936.

It appears probable, although it can not be proved, that the male on Territory 1 in 1935, might have been 6M32.

If this can be assumed, then 6M32 had six different mates in five years. He was constant to one territory for four consecutive summers and six nestings. During the first four nestings on his favorite territory he had four different mates, but in the last two years, as he grew older, he had only one nest each season and was always faithful to the same mate.

Huntington, L. I., N. Y.

BIRD NOTES FROM THE LAKE FRANCIS REGION OF SOUTHERN MINNESOTA

BY IRA N. GABRIELSON

Two weeks during August of 1915 were spent by the writer at Lake Francis and Lake Elysian in southern Minnesota. The town of Elysian is situated in a narrow neck of land lying between Lake Francis and Lake Elysian. Both are comparatively small bodies of water, Lake Francis being the smaller and the deeper, the other being a larger and more shallow lake.

Birds were very abundant as individuals although the number of species noted was rather limited. The list as it is, is published in the hope that these notes may be of some value to anyone working on the birds of this region.*

Pied-billed Grebe. *Podilymbus podiceps.* This grebe was very common, especially on little pools and swamps adjacent to the lake, but not connected with it. It was not observed on Lake Francis, but there were numbers on Lake Elysian.

Black Tern. *Chlidonias nigra surinamensis.* A common species noted every day during my stay. Numbers of them were commencing to change into the white plumage. Spotted and pied birds were observed on several occasions.

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*Editor's Note. This paper was submitted before the publication of the Revised A. O. U. Check-List. It was set up in the original, old Check-List order, with certain corrections in the nomenclature. The insertion of the subspecific appellations in the vernacular names has not seemed to the Editor to be sufficiently vital to justify resetting of so many lines. In justice to the author it should be said that they were marked in the returned proof.

Blue-winged Teal. *Querquedula discors.* A small flock of half a dozen birds were seen almost daily around the north end of Lake Francis.

Bittern *Botaurus lentiginosus.* A few individuals remained about the western side of Lake Francis where there was a small growth of water plants. It was also observed on numerous occasions on Lake Elysian.

Least Bittern. *Ixobrychus exilis.* One individual was noted on August 24 on the shore of Lake Elysian.

Great Blue Heron. *Ardea herodias herodias.* There was evidently a roost of Great Blue Herons somewhere in the vicinity as scattered individuals were found everywhere throughout the district.

Green Heron. *Butorides virescens virescens.* Another common species about both lakes.

Black-crowned Night Heron. *Nycticorax nycticorax hoactli.* This species was more common than the last .

Pectoral Sandpiper. *Pisobia melanotos.* Several flocks of Pectoral Sandpipers were observed on the shores of Lake Elysian on August 11.

Solitary Sandpiper. *Tringa solitaria solitaria.* One individual noted on Lake Elysian August 21.

Spotted Sandpiper. *Actitis macularia.* This little sandpiper was common during the entire two weeks of my stay.

Killdeer. *Oxyechus vociferus.* Most abundant shorebird of the district at the time of my visit.

Ruddy Turnstone. *Arenaria interpres morinella.* While fishing from a sandy point on Lake Elysian on August 13 a Ruddy Turnstone was observed near by. It stayed about for some little time and was quite fearless, approaching within thirty or forty feet on several occasions as it fed along the shore line.

Bob-white. *Colinus virginianus virginianus.* I was somewhat surprised to find the Bob-white as abundant as it was in this district. While we had them at Marshalltown, Iowa, about one hundred miles to the south, they were not anywhere nearly as abundant as they were at this point. There was considerable brushland about the lake shore and this may have been effective in affording them more shelter and food in severe weather than could be obtained farther south.

Mourning Dove. *Zenaidura macroura marginella.* The Mourning Dove was one of the common birds of the district.

Marsh Hawk. *Circus hudsonius.* A fairly common hawk in this country.

Sparrow Hawk. *Falco sparverius sparverius.* The Sparrow Hawk was another common bird at this season. I saw numbers of them every day during my stay.

Short-eared Owl. *Asio flammeus.* Another fairly common bird. One pair which frequented a swampy spot near my cottage, was observed every day and others were seen on various occasions.

Screech Owl. *Otus asio naevius.* Two Screech Owls were found sitting in a small fir tree on August 12, on the shores of Lake Francis.

Black-billed Cuckoo. *Coccyzus erythrophthalmus.* This bird was observed several times between August 14 and 24 in a small patch of woodland adjoining my cottage on Lake Francis.

Belted Kingfisher. *Megaceryle alcyon alcyon.* A common resident about both lakes.

Downy Woodpecker. *Dryobates pubescens medianus.* A common resident of the wooded tracts about the lakes.

Red-headed Woodpecker. *Melanerpes erythrocephalus.* The Red-headed Woodpecker was one of the characteristic birds of the district as it is of many parts of the northern Mississippi Valley. Their bright markings and noisy ways make them very conspicuous wherever they are found.

Northern Flicker. *Colaptes auratus luteus.* The Northern Flicker is as common and conspicuous as the preceding species.

Chimney Swift. *Chaetura pelagica.* Noted on August 11 in the town of Elysian. It was not noted at other times.

Ruby-throated Hummingbird. *Archilochus colubris.* Very common about both lakes during my entire stay. A row of scarlet sage near a neighboring cottage was a great attraction to them and I have seen as many as a dozen at a time hovering about this hedge of flowers.

Kingbird. *Tyrannus tyrannus.* A very common and conspicuous bird in this district.

Wood Pewee. *Myiochanes virens.* One or more pairs had nested in a small piece of woodland near the cottage and they could be seen or heard at any time during my stay.

Prairie Horned Lark. *Otocoris alpestris praticola.* This bird was common in the stubble fields and pastures about the two lakes.

Blue Jay. *Cyanocitta cristata.* One pair remained about the timber near the cottage.

Crow. *Corvus brachyrhynchos brachyrhynchos.* An abundant species.

Bobolink. *Dolichonyx oryzivorus.* Bobolinks were very common in suitable places. Most of those that I saw during my stay had already changed to the winter plumage.

Cowbird. *Molothrus ater ater.* Cowbirds were numerous in the mixed flocks of blackbirds which roamed over the country.

Yellow-headed Blackbird. *Xanthocephalus xanthocephalus.* A very common species.

Red-winged Blackbird. *Agelaius phoeniceus* subsp.? This bird together with the Yellow-headed Blackbird and Cowbird was found commonly throughout the district. Sometimes they were in separate flocks but often in great mixed flocks of all three species.

Meadowlark. *Sturnella magna.*

Western Meadowlark. *Sturnella neglecta.* Both the eastern and western forms of this bird were present but I can not say which was the more abundant. Typical songs of each were heard on various occasions.

Baltimore Oriole. *Icterus galbula.* A few Baltimore Orioles were noted every day during my stay but the species was not commonly distributed over the district.

Bronzed Grackle. *Quiscalus quiscula aeneus.* Noted only on August 11. It is probable I overlooked this bird as it should be much more common than my notes indicate.

Goldfinch. *Spinus tristis tristis.* A common species.

Vesper Sparrow. *Pooecetes gramineus gramineus.* Vesper Sparrows were not common at the time of my visit, but a few were noted regularly in a small pasture lying between the two lakes.

Chipping Sparrow. *Spizella passerina passerina.* Noted at Lake Elysian August 13.

Field Sparrow. *Spizella pusilla pusilla.* A number of these birds frequented a brushy pasture near the lake shore about half a mile from the cottage.

Song Sparrow. *Melospiza melodia* subsp.? A very common bird.

Indigo Bunting. *Passerina cyanea.* One male noted on August 11 in the town of Elysian.

Dickcissel. *Spiza americana.* Several were noted on August 13 near Elysian.

Purple Martin. *Progne subis subis.* Two or more pairs had nested near the town of Elysian, and a half dozen or more birds were present throughout my visit.

Barn Swallow. *Hirundo erythrogaster.* A fairly common bird in the mixed flocks of swallows which were present in this district at the time of my visit.

Tree Swallow. *Iridoprocne bicolor.* Noted only on August 11 on Lake Francis.

Bank Swallow. *Riparia riparia.* Noted only on August 11 on Lake Francis.

Rough-winged Swallow. *Stelgidopteryx ruficollis serripennis.* A very common bird in the mixed flocks of swallows found in the district.

Cedar Waxwing. *Bombycilla cedrorum.* Cedar Waxwings were common about the town of Elysian during my entire stay.

Migrant Shrike. *Lanius ludovicianus migrans.* A very common bird along the highways in this district.

Yellow Warbler. *Dendroica aestiva aestiva.* An abundant species found everywhere in the district.

Redstart. *Setophaga ruticilla.* Noted daily about the cottage and grove adjoining, from August 14 to 24.

Catbird. *Dumetella carolinensis.* An abundant species.

Brown Thrasher. *Toxostoma rufum.* Noted every day from August 14 to 24 inclusive.

Western House Wren. *Troglodytes aedon parkmani.* Several pairs of House Wrens had nested near the cottage along the lake front.

Prairie Marsh Wren. *Telmatodytes palustris dissaëptus.* There was a small colony of these wrens in a little cat-tail swamp near one end of Lake Francis.

White-breasted Nuthatch. *Sitta carolinensis.* One or two individuals were seen every day from August 13 to 24 in a timber grove near the cottage.

Chickadee. *Penthestes atricapillus* subsp.? A common species.

Robin. *Turdus migratorius migratorius.* Another very common bird.

Bluebird. *Sialia sialis sialis.* Common in little flocks all over the district.

U. S. Biological Survey,
Washington, D. C.

GENERAL NOTES

Conducted by M. H. Swenk

Starlings Bathing in Ice Water.—At Sandusky, Ohio, Dr. Henry Graefe has a bird bath from which the water overflows into a pool for goldfish. Last winter, when the temperature was below zero, he observed Starlings bathing. The water froze on their wings, making flight so difficult that several of the Starlings were easily caught.—E. L. Moseley, *Bowling Green, Ohio.*

The Pine Siskin Nesting in Southeastern South Dakota.—The writer found a pair of Pine Siskins (*Spinus pinus*) nesting at Yankton, South Dakota, on April 12, 1936. This record seems worthy of publication both because of the rather early nesting date and the fact that the siskin is an uncommon nesting bird in this region. The last nest found by the writer was on May 8, 1930, at Sioux City, Iowa.—Wm. Youngworth, *Sioux City, Iowa.*

Herring Gulls on the Monongahela River During Flood.—On March 18, 1936, at Dravosburg, Pennsylvania, on the Monongahela River, I saw five Herring Gulls (*Larus argentatus smithsonianus*) flying overhead. On the afternoon of the same day at Braddock, Pennsylvania, I noticed four gulls that probably were this species. Gulls rarely occur on this section of the river because of its polluted condition in this vicinity. In my opinion the arrival of the gulls during the flood should be recorded.—P. P. Malley, *New York, N. Y.*

An Early Ohio Record of the Bachman's Sparrow.—In the spring of 1898, in our daily trips to my father's farm in Marshal Township, my brother called my attention to a dark-streaked sparrow's concealed nest with four white eggs. There, not two feet from a much-travelled foot path was my first nest of the Bachman's Sparrow (*Aimophila aestivalis bachmani*). The nest had been hollowed out and shaped in a mat of thick dead grass and was completely concealed by a dense growth of new grass. No opening was visible, the bird slipping in through the loose, dead grass.—Katie M. Roads, *Hillsboro, Ohio.*

An Unusual Nest of the Vesper Sparrow.—On July 2, 1936, my attention was called to a nest on the ground under a raspberry bush in a cleanly cultivated garden. It would have been in plain sight except for one leaf which drooped neatly over. It contained one egg measuring 22x16 mm., nearly white with very indistinct pinkish spots or splotches, and two smaller, gray eggs, 16x11 mm. and 15x12 mm., respectively. The bird was not seen at the time and the identity of such small eggs was a mystery. When I returned on July 4, a Vesper Sparrow was flushed from the nest. I removed one egg and measured the other two, hoping to try trapping the parent after incubation. By this time I had realized that the small eggs must be runt eggs and they proved to be without yolk, as expected. The nest was not visited again for two or three days, when it appeared deserted. After another two days without any evidence of brooding, the entire nest was placed in a covered cardboard box and taken to the office on July 11. Here it was again set aside until July 14, when on opening the box, the large egg had hatched, not earlier than the day before. The nestling was dead. The maximum daily temperatures had been above 100° F., and the building of course quite constantly around 90°. Incidentally, Chapman's Handbook (all editions) gives the length as 1.82 (inches), an evident misprint for .82.—O. A. Stevens, *Fargo, N. Dak.*

The Orange-crowned Warbler at Pittsburgh, Pennsylvania.—On May 7, 1936, at Frick Park in Pittsburgh, I heard an unfamiliar song. It began with a chipping note and in the ending it did not accelerate like the song of the Tennessee Warbler. Its ending was softer and more of a warble-like quality. After a long search I was able to find a bird with a uniform dark olive green back and lighter under parts. The bird kept singing incessantly and while it made a turn around a branch I was able to see the orange crown-patch and identify it as the Orange-crowned Warbler (*Vermivora celata celata*). I heard this bird singing in the same vicinity until May 10, but was not able to see it again. I have been able to find only one published record for this species in this vicinity, and it is of rare occurrence in the state.—P. P. Malley, *New York, N. Y.*

The Cinnamon Teal in Northeastern South Dakota.—While the writer was making the annual duck nesting census in the Waubay Lakes region of northeastern South Dakota, the Cinnamon Teal (*Querquedula cyanoptera*) was added as a new summer resident. The Buffalo Lakes are located in the northern part of the area under observation, and it was on the main lake that a male Cinnamon Teal was seen, feeding in company with an adult male Blue-winged Teal. A thorough search and a long wait failed to disclose the presence of a female Cinnamon Teal. The bird was listed as a lone male, although it is possible that Cinnamon Teals might have nested in this area in the past and that our bird might have been a mated one.—Wm. Youngworth, *Sioux City, Iowa.*

The Old-squaw in West Virginia.—In a mixed flock of ducks observed on Lake Lynn, Monongalia County, West Virginia, on April 28, 1936, was a male Old-squaw (*Clangula hyemalis*). It was discovered near the Ice's Ferry bridge in the morning, and spent the day in that vicinity, several observers having had a chance to study it closely. In plumage it was somewhat intermediate between typical summer and winter phases, but the large amount of white and brown coloration, together with the stout black and pinkish bill, made identification easy. There are very few West Virginia records for this species. Bibbee has taken specimens on the Ohio River, and A. S. Morgan has noted a few individuals along the Great Kanawha River. So far as we know, the species has not been noted during recent years in northern West Virginia.—Maurice Brooks, A. S. Margolin, and Lloyd Poland, *Morgantown, W. Va.*

The Arctic Horned Owl in South Dakota.—The Arctic Horned Owl (*Bubo virginianus subarcticus*) is classed as a "winter straggler" in South Dakota, where it ranges mostly over the northern half of the state. It likely occurs here more commonly during severe winters, attended by lack of food farther north. There are three specimens in the Museum; one taken in Sanborn County, winter of 1900; one from Plymouth County, Iowa, winter of 1915, and one taken in Spink County, South Dakota, March, 1936. The latter specimen had recently partaken of a white domestic chicken and a rat. This owl is about the size of the common Great Horned Owl and is probably often mistaken for it, but is distinctly grayer. Especially is this noticeable in the facial disks.—W. H. Over, *University Museum, Vermillion, S. Dak.*

The Subspecies of Red-winged Blackbirds Wintering Near Toledo, Ohio.—During the past eight years flocks of from twenty to 300 Red-winged Blackbirds have been found wintering about Toledo, in the marshes of Jerusalem Township, Lucas County, Ohio, and Erie Township, Monroe County, Michigan.

In an effort to determine the composition of these flocks of wintering birds, twenty-three specimens were collected during 1934, 1935, and 1936, between the dates of December 27 and February 29. Twenty-one of these proved referable to *Agelaius phoeniceus arctolegus*. The other two are first winter males which have not been determined because of a lack of comparative material. Twenty-one of the specimens were preserved as skins, fifteen being now in the Museum of Zoology of the University of Michigan, three in the Ohio State Museum and three in the collection of O. E. Ehrhart, at Antwerp, Ohio. The earliest spring specimen of *Agelaius phoeniceus phoeniceus* was taken on March 12, 1933. The evidence thus indicates that the common wintering Red-winged Blackbird of the Toledo region is *Agelaius p. arctolegus*, the breeding form, *Agelaius p. phoeniceus*, not arriving from the south until the second week in March.—Louis W. Campbell, *Toledo, Ohio.*

Pugnacious Cardinals.—Within less than a year six adult male Cardinals have been found dead in the yard, less than one acre in extent, of Dr. Henry Graefe, at Sandusky, Ohio. The killing was not in any case directly observed, but Dr. Graefe has witnessed many desperate combats between rival males and has found no other cause of death on an examination of the dead bodies. One frozen carcass had feathers missing from the neck. When the skin was removed, the neck appeared to have been broken. Last winter he saw a mature Cardinal come up to his male offspring from behind, pounce on his back and take out a quantity of feathers. A few days later the injured bird was found dead.

The female Cardinal which is living in the yard now has had three mates within a year. Her present mate was not in mature plumage when first observed, which was late in the winter. He has been most attentive to his bride, and has induced her to share with him roasted peanuts which he has cracked. Her earlier mates would not eat peanuts, nor did she until she received them from her present spouse.

Recently Dr. Graefe saw the father bird chase his son away from the feeding tray, and then return and feed his mate with sunflower seeds. Both parents fed their two young for some time, and the father was seen to feed his daughter after he had chased her brother away.—E. L. Moseley, *Bowling Green, Ohio.*

Observations of the Sandhill Crane on the Queen Charlotte Islands, British Columbia.—While at Massett on May 17, 1935, I watched for over an hour eighteen Sandhill Cranes (*Grus canadensis tabida*) feeding over a wide meadow surrounded on three sides by forest. They kept well out from the trees and were possibly 150 yards from where I stood at the forest edge. In an irregular line the birds paced slowly along with a somewhat swinging stride, with necks bent forward and heads held close to the ground as they thrust their bills into the grass clumps or swung from side to side to pick at small objects on the ground. They were entirely silent. Most of the birds were richly colored on the back, almost copper in some lights and in contrast were several with considerably less brown, appearing almost completely grey in certain positions.

Finally I started to walk slowly toward them, and feeding immediately stopped. All stood upright, in which position their large size was more readily apparent. One bird extended both wings straight out from the shoulder and drooping from the carpal angle. In this attitude and facing another bird it sprang into the air several times at which the bird opposite did likewise. Two

other birds in another part of the line gave a similar performance. Shortly after this all the birds rose and flew to another part of the meadow. I was then about 100 yards from them. During all this time fifty White-cheeked Geese (*Branta canadensis occidentalis*) grazed seventy-five yards or so from the cranes and these did not take flight. Fifteen minutes later the cranes circled twice over the portion of the meadow where they had been feeding, several giving the characteristic call, then rising higher in the air continued their flight over the forest. Ten days later the cranes, this time numbering twenty-two, were again observed on the same meadow. A resident in Massett told me that this flock had been in the vicinity since March. No cranes were seen near Massett during the spring of 1920 when I spent six weeks there.

The identification of the birds as the Sandhill Crane, rather than the Little Brown Crane, is based on their large size and the fact that they remained in the region for such a long period. The reason why Sandhill Cranes in this instance should be associated in a flock so late in the season is not understood.—J. A. Munro, *Okanagan Landing, B. C.*

The Cautious Female Cardinal.—With all her protective coloring the female Cardinal is more cautious, or at least more trap shy, than the male, according to my records. A flock of thirteen Cardinals has often been in sight at once, feeding at my station, since November, 1935. Of this flock seven are males and six are females. Six of the males have been banded this winter, while not a female, to my knowledge, has been within three feet of the traps.

At Steelville, Missouri, from 1931 to 1936, twenty-eight Cardinals have been banded, twenty-two males and six females. The six females were caught during the spring nesting season. Records for Monett, Missouri, from 1928 to 1930, show seventeen caught, nine males and eight females. Four of the females were caught during the nesting season.

Records by months are shown in the following table:

Month	Male	Female
January	5	2
February	6	1
March	4	4
April	7	3
May	1	3
June	1	0
September	1	0
October	3	0
November	0	1
December	3	0
Total	31	14

—Cora Shoop, *Steelville, Mo.*

Nesting of the Mexican Black Hawk in Arizona.—On April 21, 1936, the writer found a nest of the Mexican Black Hawk (*Urubitinga anthracina anthracina*) in lower Arivaipa Canyon, Arizona, about one mile above the ranch of Joe A. Buzan. The nest was a large, bulky affair placed in the crotch of a tall cottonwood about sixty feet from the ground. The bird was seen as it flew off the nest. It went to a rock about 300 feet distant and from there would occasionally berate the observer with a petulant screech or cry. It was inferred that the bird was a female. No companion bird was noted. No attempt was made to

climb the tree, since it was of large girth and branchless to thirty feet above the ground, and no climbing implements were available, so it is not known whether the nest was empty, or contained eggs or young.

The Arivaipa is an eastern tributary of the San Pedro River, which in turn flows into the Gila. The lower Arivaipa is in the northeastern corner of Pinal County, Arizona, and in a comparatively remote and isolated area. Among the other birds seen on the same date and in the same place were: Treganza's Heron (*Ardea herodias treganzai*), Western Solitary Sandpiper (*Tringa solitaria cinnamomea*), Western White-winged Dove (*Melopelia asiatica mearnsi*), Inca Dove (*Scardafella inca inca*), Western Belted Kingfisher (*Megaceryle alcyon caurina*), Cassin's Kingbird (*Tyrannus vociferans*), Vermilion Flycatcher (*Pyrocephalus rubinus mexicanus*), Bridled Titmouse (*Baeolophus wollweberi annexus*), Arizona Verdin (*Auriparus flaviceps flaviceps*), Townsend's Solitaire (*Myadestes townsendi*), Lucy's Warbler (*Vermivora luciae*), Arizona Hooded Oriole (*Icterus cucullatus nelsoni*), Arizona Pyrrhuloxia (*Pyrrhuloxia sinuata sinuata*), and Green-backed Goldfinch (*Spinus psaltria hesperophilus.*)

Since breeding records, to say nothing of sight records, of the Mexican Black Hawk are so few, it is thought that the above item may be of interest.—Gale Monson, *Soil Conservation Service, Safford, Ariz.*

American Pintail Exhibits Feigning Behavior.—On July 17, 1935, while driving along the road grade which separates a small marsh from the northwest end of Heron Lake, in Minnesota, I stopped to watch some American Bitterns (*Botaurus lentiginosus*) and Black-crowned Night Herons (*Nycticorax nycticorax hoactli*) feeding. Suddenly I became aware of an American Pintail (*Dafila acuta tzitzihoa*) in the road about twenty feet in front of the car. It made a great commotion flopping around in the road, and my first thought was that it was injured. I had watched it for a full minute when a car approached from in front of me. The car was twenty yards away with the pintail directly in its path, when I realized that it would surely be run over. It was now too late for me to do anything about it as the car was close and moving quite rapidly. To my surprise and relief, the bird took wing easily and gracefully, made a half circle about ten feet from the ground and lit in the weeds to the left of the road. I had hardly recovered from my surprise when out of the weeds on the right marched six young pintails about half grown. They paid no attention to me whatever, but peeping at the top of their voices, waddled across the road ten feet in front of me and disappeared in the tall weeds where their mother kept up a continued quacking. A few moments later I saw the hen followed by her brood emerge into the open pasture thirty yards beyond and waddle down to the marsh, all complaining bitterly. This pantomime is common to a great many birds, but this is the first time I ever knew of it being performed by a duck, and I was completely "taken in".—Bruce F. Stiles, *Sioux City, Iowa.*

Supplementary Bird Records from Missouri, for 1934.—During the summer of 1934 some observations were made of the bird fauna of the lowland counties of southeastern Missouri. Some species and subspecies whose status in Missouri was in doubt, but which were recorded in Bennitt's "Check-list of the Birds of Missouri" (*Univ. Mo. Studies*, VII, No. 3, 1933), were collected. The specimens the names of which are starred (*) were kindly identified by Dr.

Harry C. Oberholser of the United States Biological Survey. All the specimens secured are now in the collection of the University of Missouri.

*Southern Downy Woodpecker (*Dryobates pubescens pubescens*). First Missouri record. Previously reported from points close to Missouri, in Kentucky, Tennessee, and Arkansas. There are four specimens from Dunklin County: two females (Cardwell, June 13; Campbell, June 20) and two males (Campbell, June 27).

*Southern Crow (*Corvus brachyrhynchos paulus*). First Missouri record. Previously reported in western Tennessee. A female was taken at Puxico, June 24, and two males at Campbell, June 20 and 27.

*Southern Robin (*Turdus migratorius achrusterus*). First Missouri record. Previously reported from points close to Missouri, in Illinois, Tennessee, Arkansas, and Kansas. Two males were taken (White Oak, June 20; Campbell, June 27), and two females (Kennett, June 21 and June 27).

*Maryland Yellow-throat (*Geothlypis trichas trichas*). First Missouri record. The A. O. U. Check-List of 1931 (p. 296) does not list this form as occurring in Missouri, but Bennitt includes it in his hypothetical list (p. 56). Two males were taken at Cardwell, June 15 and July 5.

*Florida Blue Jay (*Cyanocitta cristata florincola*). First reported from southeastern Missouri in Bennitt's Check-List (p. 45) on the basis of three specimens. Six more were collected in Dunklin County in June, 1934, establishing this as the summer-resident race in that region.

*White-breasted Nuthatch (*Sitta carolinensis carolinensis*). Three specimens were taken in Dunklin County during June and July, 1934. A specimen of the Florida race, *S. c. atkinsi*, collected in Howell County is now in the National Museum collection. Oberholser has referred two specimens from central Missouri to this subspecies (Bennitt, 1933, p. 46). It appears that both subspecies occur in southern Missouri.

*Migrant Shrike (*Lanius ludovicianus migrans*). Eight specimens were taken in Dunklin County in June, 1934. The Loggerhead Shrike (*L. l. ludovicianus*) has been recorded at points near Missouri in southern Illinois, Kentucky, and Tennessee, but *migrans* appears to be the summer resident shrike of southeastern Missouri.

*Western Parula Warbler (*Compsothlypis americana ramalinae*). Specimens of the Parula Warbler had not been collected from southeastern Missouri. Typical specimens of the northern subspecies have been taken elsewhere in Missouri. The western subspecies is not now recognized by the A. O. U. Committee, but it is interesting to note that the four birds taken in Dunklin County in June and July, 1934, were all referred by Oberholser to *ramalinae*.

*Southern Meadowlark (*Sturnella magna argutula*). Five males were taken in June, 1934, establishing this as the summer resident meadowlark of southeastern Missouri. The only previously recorded specimen from there was one taken by Howell in New Madrid County in 1910.

Painted Bunting (*Passerina ciris*). Reported from southern and western Missouri by Bennitt (1933, p. 60). A male in full plumage was observed at close range July 4, 1934, near White Oak, Dunklin County. This extends the known range for this species in Missouri.—James W. Cunningham, *Dept. Zoology, Univ. Mo., Columbia, Mo.*

EDITORIAL

The Twenty-second Meeting of the Wilson Ornithological Club was held at the Chicago Academy of Sciences on November 27 and 28. A full report of this meeting will be given as usual in the March number.

The Recent Meeting at Pittsburgh of the American Ornithologists' Union afforded a splendid program of ornithological papers, and brought together a large number of the well known ornithologists of the country. This meeting was honored by the presence of M. Jean Theodore Delacour, of France. Perhaps the most important event of the meeting was the announcement of the retirement of Dr. Witmer Stone as Editor of the *Auk*, after a term of twenty-five years of distinguished service. It was announced at the same time that Dr. Glover M. Allen, of Boston, would assume the editorial duties with the beginning of the 1937 volume.

At the Recent October meeting of the National Association of Audubon Societies Mr. John H. Baker, Executive Director, announced that the Association is establishing a number of Fellowships in educational institutions which are willing to coöperate. These Audubon Fellowships will afford an annual stipend of about $1500 to cover the investigator's living and traveling expenses. It is expected that the institution will contribute a like amount in services and equipment. The ecological problems to be studied under these fellowships will not be limited to "game" animals, nor will they be selected on the basis of economic considerations. We understand that the purpose is to encourage unbiased biological research on problems of predator control, ecological effects of introduced exotic species, mosquito control, use of poisons, the rôle of fish-eating birds near hatcheries, the status of numerous disappearing species, etc., etc. We believe that this is one of the most noteworthy of the recent steps taken in furthering the cause of wild life. It will be most interesting to watch the development of this plan.

ORNITHOLOGICAL LITERATURE

THE AMERICAN WOODCOCK. By Olin Sewall Pettingill, Jr. Vol. 9, No. 2, Memoirs Boston Soc. Nat. Hist. Boston (234 Berkeley St.), 1936. Pp. 168-391, Pls. 13-21. Price, $3.50, paper.

Dr. Pettingill's conclusion of his work on the Woodcock now adds a most important monograph to our ornithological literature. One of the directions of progress now open in general is the collection of scattered facts and their compilation into monographs of single species, with such factual contribution as the author may be prepared to make. Being a monograph this paper discusses every aspect of the species, so far as we can judge.

There have been a number of debated points concerning certain habits of the Woodcock. In the past some have thought that the call note of the Woodcock has been made by the voice apparatus; while others have claimed that it is made mechanically by the wing or other structures. Pettingill concludes that sounds are made in both ways. The author discounts the claim that the Woodcock carries the young away in the event of danger. The peculiar anatomy of the Woodcock bill, which adapts it as a probing and prehensile organ, is described. The structure, distribution, breeding habits, and ecological relations are fully considered. An extensive bibliography is given. Ten plates of photographs and a colored frontispiece are the illustrations. Only one thousand copies of this work were printed, which, we trust, will be sufficient to meet all demands.—T.C.S.

THE NORTHERN BOB-WHITE'S WINTER TERRITORY. By Paul L. Errington and F. N. Hamerstrom, Jr. Research Bull. No. 201, Ia. Agric. Exp. Sta. and Ia. State Coll. Pp. 301-443. Ames, Iowa, 1936.

While this report deals primarily with the problems of game management, yet it is based on a native species and contains a considerable amount of life history material. The report is based upon studies in Wisconsin and Iowa, and is limited to the winter season, which is the critical season for this species in the northern part of its range.

Part I of the bulletin deals chiefly with field methods. It has been shown that a given Bob-white cover has a fixed "carrying capacity", meaning that any given area will support a definitely limited number of birds, and any number over this becomes an excess population subject to predation and starvation. The carrying capacity must be determined by the census method. One of the important contributions in this paper is the discussion of census technique on winter Bob-white populations. In the main there are two census methods, one called the "track count", the other called the "flush count". Of these the authors find the method of counting the number in a covey by tracks in the snow to be the most serviceable and reliable. In all methods of census-taking much skill may be developed; in fact it seems to require the highest type of woodscraft and detective skill. This discussion is instructive and entertaining.

Part II is a lengthy presentation of fundamental data. Part III is entitled "Analysis of Carrying Capacity", while Part IV deals with management. The conception of carrying capacity is a truly important one. And there probably is a limited carrying capacity for every kind of living thing on the earth—not alone for game birds. It is embodied in the idea of the struggle for existence. In the older biological phraseology the individuals in an excess population are presented

with the alternatives of surviving, perishing, or emigrating. The present day study of game birds is prone to leave out of consideration the latter alternative. And the practical argument is that if these excess populations are to die anyway (because the land carrying capacity will not support them) they may as well be utilized for sport. Of course, if the Bob-white population on a given tract is kept down to the land carrying capacity by shooting the excess, there will be no necessity for emigration, and there will probably be little, if any. This program is all right for the particular tract, but makes no provision for increasing the population beyond that tract.

In this study attention is focused on the Bob-white as a game bird, even though it may be an impartial study from that point of view. The study of the winter life of the Bob-white is probably not the place to expatiate on the many virtues of this bird. But the point is that this report will be used as justification for at least controlled shooting of the Bob-white. Reverting, it seems to us that any program for the management and controlled hunting of the Bob-white should make ample provision for areas on which these birds may propagate beyond the carrying capacity of the land, thus making range extension possible. In this way the larger area, such as county or state, may derive some benefit from the state-supported game management program.

There is another angle to the game management program. Many of the plants which furnish a splendid food supply for the Bob-white also furnish allergens (in the form of wind-borne pollen) to be wafted hither and yon for miles, to the great suffering of allergic patients. Such plants, for instance, as the ragweeds (*Ambrosia*), hemp (*Canabis*), and lamb's quarters (*Chenopodium*), are among the numerous causes of hay fever, asthma, and other allergic diseases of the human body. Many sufferers from these allergies will prefer to have such plants eradicated, rather than encouraged for the immediate benefit of Bob-white or ultimate pleasure of the hunter. This line of thought only emphasizes the web of life, because it may be pointed out that sick people make a living for the doctors and raising food for the Bob-white adds to the income of the farmers.—T. C. S.

Ethics of Egg-Collecting. By Eric Parker. Published by The Field, London, E. C. 4. Not dated, but "Foreword" dated April 30, 1935. Pp. 1-20+i-vi. Price, 5/-net.

This book has been sent to us by an American with the request that it be reviewed. We do not know how much of a problem egg-collecting may be in this country. We had supposed that it had been brought under sufficient control. We had merely taken it for granted that the craze for egg-collecting by the school boys in the 80's and 90's had been eliminated by the process of education. The widespread prevalence of this hobby was, in those years, doubtless more or less of a menace even to the common species. But, nowadays it is probable that the danger, if any, lies in the collection of the eggs of rare species. This danger is probably greatly increased by an existing market. It may become necessary to prohibit the importation and commerce in the eggs of wild birds, as is now done in some countries for feathers.

However, reverting to the book under discussion we find that it is a record of a local controversy, rather than a presentation of the general problem. The sportsmen's magazine which sponsored the controversy may be suspected of being motivated by the complaints of a wealthy clientage against the trespassing

nuisance of egg-collectors. So, to the outsider, there seems to be some of the spirit of the "pot which calls the kettle black". The "keepers [of the private estates] were on the lookout for all trespassing egg-collcetors", who were seeking the eggs of "green-shanks, crested tits, and dotterels". But the same keepers were accused of shooting all the "hobbies" and other hawks, because of their supposed depredations on the game of the premises.

Nevertheless, the letters brought out evidence of the audacity of certain egg-collectors. It was reported that a certain collector visited the coastal cliffs in search of "erythristic" guillemot eggs. Finding none he swept all the existing eggs into the sea in order to induce the birds to lay again, with the possibility of obtaining the desired variation.

An interesting question raised during the debate was whether "it is more of a crime to take eggs from a peregrine nest than to take the young birds for falconry purposes". The egg protectors devised the scheme of marking eggs with an indelible pencil to make them worthless to collectors. It was intimated that in reprisal the collectors would pin-prick such marked peregrine eggs to prevent their development for the benefit of the falconers. Several persons even defended egg-collecting as a field sport pure and simple.

On the other hand, a good deal of emotionalism and false reasoning was indulged in by both sides. At the conclusion of the discussion one can hardly decide that a clear-cut verdict has been reached, at least on the basis of the arguments. However, it is clear that the egg-collectors are in the minority, and are likely to lose all privileges when it becomes evident that they are exceeding the bounds of propriety. The problem will be vastly simplified with the elimination of commercialism.—T. C. S.

Vanished Hosts. By E. D. Nauman. The Palimpsest, XVI, No. 6, June, 1935. Pp. 169-173.

In this article the late Mr. Nauman says: "The rule with wild pigeons was to lay only two eggs at a nesting, but to nest three or four times a year." In another place he says: "They would form in great 'windrows' of pigeons across the sky from horizon to horizon sometimes in lines not so long, but always at right angles with the direction in which they were flying. Between these windrows of pigeons a strip of sky could usually be seen. The flocks were frequently so dense they obscured the sun like passing clouds. When the weather was calm, the pigeons maintained a very nearly level and uniform elevation throughout their lines, but in windy weather the lines would twist and writhe like huge serpents in the sky. At such times one could best see their remarkable colors scintillating in the sunshine." This description is of the birds as migrants in southeastern Iowa, Keokuk County. No nesting colony in Iowa was known to Mr. Nauman. With this article there is a reproduction of Sawyer's painting of the Passenger Pigeon. So far as we have traced this portrait it appeared first in the April-June number of the *Iowa Conservation* for 1923 (VII, No. 2); next in *Wildways* for April-June, 1928 (VIII, No. 2); next in *Iowa Bird Life* for December, 1933 (III, No. 4); then in the magazine article here reviewed. This Sawyer portrait was probably not produced until after the publication of the list of Passenger Pigeon portraits (Sci. Month., May, 1921), at any rate it is not included.—T. C. S.

Studies on the Bank Swallow Riparia riparia riparia (Linnaeus) in the Oneida Lake Region. By Dayton Stoner. Roosevelt Wild Life Annals, Vol. 4, No. 2, May, 1936. Pp. 126-233.

Some of the New York habitats of the Bank Swallow, as shown in the photographs, could easily be mistaken for the eroded banks of the Missouri River or numerous cut-off lakes, where the same species breeds in great numbers. In the study of weight some comparisons are made of the same bird on different dates; and between individuals of the same species in New York and Iowa. An extensive study of body temperature was made, and it is reported that the average temperature of 603 Bank Swallows was 107.1° F. The temperature of the burrow in which young were reared was found to vary from 51° F. to 87° F., and seemed to vary with the temperature of the outside air, depth of burrow, etc. The digging of the nest hole, nest building, egg and egg-laying, behavior of young birds, food and feeding of adults and young, are among the topics discussed. The subject of predators and parasites is also discussed. The paper contains a large amount of original data.—T. C. S.

The Audubon Yearbook. 1936. Published by the Indiana Audubon Society. Vol. IX, pp. 1-56. Price $1.00 (Mr. Harold Zimmerman, 915 W. Gilbert St., Muncie).

This Yearbook is dedicated to George S. Clifford, whose biography is written by Dr. A. W. Butler. In addition this number contains several other sketches of other Indiana bird lovers, namely, Mrs. Etta S. Wilson, Miss Mary Louise Carmichael, and Mr. E. B Williamson, noted authority on dragon-flies. Dr. Butler also gives a review of the Black Vulture records in Indiana. By far the most arresting fact in the booklet is the brief mention of the death of a lad in Indianapolis who, in befriending a bird, was pushed into a river by a bully. This is a new phase of the conservation problem, and we would like very much to know what the public authorities do under the circumstances. We understand that the Indiana Audubon Society raised a small fund and is planning some sort of a memorial. Something of a permanent and public nature might help to convert many a boy to the finer opportunities of life. There might be a possibility of interest outside of Indiana in a matter of this kind.—T. C. S.

Food Habits of Common Hawks. By W. L. McAtee. Circ. 370, U. S. Dept. Agric. 1935. Pp. 1-36. Price, 5 cents.

Consisting of an introduction with general remarks on the habits of hawks in general, and a body of specific discussions of range, recognition marks, and food habits.—T. C. S.

The Crested Mynah, or Chinese Starling, in the Pacific Northwest. By Theo. H. Scheffer and Clarence Cottam. Tech. Bull. 467, U. S. Dept. Agric. 1935. Pp. 1-27. Price, 5 cents.

The report given herein is a most interesting one, concerning the appeaarnce of a new and picturesque bird in the Pacific Coast avifauna. This Chinese Starling is said to be as offensive toward native birds as the European Starling is on the eastern part of the continent. Thirty-five titles are listed in the bibliography, and most of these relate to the Chinese Starling on the West Coast.—T. C. S.

More Songs of Wild Birds. By Albert R. Brand. Published by Thomas Nelson & Sons, 381 Fourth Ave., New York, N. Y. 1936. Pp. 1-116. 3 records. Price, $2.50.

We have here a second instalment of the previous "Songs of Wild Birds", published in 1934. (For review of the latter see Wilson Bulletin for June, 1934, p. 129). The present book consists of four features, viz.: Two chapters of general discussion of bird song, covering nearly half of the pages of the book; detailed information about each of the birds whose songs are given on the records, about a page to each species, making up the other half of the book; an index; and three double-faced phonograph records, which are carried in the pocket on the inside cover. Of course, it is the records which furnish the *raison d'etre* of the book. On the six faces of these records there are recorded the songs of forty-three American birds. The two preceding records contained thirty-five songs.

We wish that we might give these records our unstinted praise. Their great novelty and the inventiveness and skill back of them make them unique and interesting in the extreme. A number of songs come out clear and loud, notably the Pileated Woodpecker and the Chuck-will's-widow. Some others are scarcely audible in the ordinary home phonograph. So, it may be that our criticism should be directed at the amplifying mechanism of the reproducing phonograph, rather than at the records. On the whole they are good, and could furnish several evenings with program and discussion.—T. C. S.

October Farm. By William Brewster. Edited by Smith O. Dexter. 1936. Pp. i-xv+1-285. Harvard University Press, Cambridge, Mass. Price, $2.50.

The book is composed of extracts from Brewster's diary, the first one being dated 1872, the last one, 1919. The diary is full of Mr. Brewster's field notes, mostly on birds, but frequently on reptiles and mammals. In simple language he tells of his observations and experiences in the fields and woods. On page 6 we find a note entitled "Snake Charms Thrush", and Mr. Brewster writes that "the Thrush was beyond question in a fascinated and semi-unconscious condition". It would thus seem that Mr. Brewster accepted to some extent the notion that birds may come under the hypnotic influence of snakes, although in the next sentence he disclaims any belief that the snake was knowingly exercising such an influence. In another place (page 129) a description is given of the egg-laying of a "painted tortoise", which is doubtless one of the common "mud" turtles. The eggs were deposited one at a time and covered with dirt which was tightly packed down. A careful description is given of the turtle covering the spot with dry leaves and bits of grass, but no mention is made of urination on the spot by the mother turtle. Crows (page 194) and Bluejays (page 163) are reported as nest robbers. It is the diary of one of America's well known ornithologists. Brewster's farm, near which most of the observations were probably made, was called "October Farm": hence the editor chose this as the title for the book.—T. C. S.

Birds. By Gayle E. Pickwell. Science Guide for Elementary Schools. I, No. 9, April, 1935. Calif. State Dept. Educ., Sacramento. Pp. 1-51. Price, 15 cents.

A pamphlet on the structure and behavior of birds, for the schools of California. Much information suitable for class teaching is presented in available form. It is freely illustrated.—T. C. S.

1. A Last Plea for Waterfowl. By Irving Brant. (January, 1934).
2. The Wild Ducks' Waterloo. By William T. Hornaday. (September, 1934).
3. Save the Bald Eagle. Anonymous. (January, 1935).
4. The White Pelicans of Great Salt Lake. By Rosalie Edge. (May, 1935).
5. The Collapse of Waterfowl Protection. By Irving Brant. (June, 1935).
6. The Future of Waterfowl Protection. By Irving Brant.
7. The Waterfowl Are Yours. By Rosalie Edge. (January, 1936).
8. "Framing" the Birds of Prey. By Davis Quinn. Revised Edition. Pub. No. 55. (April, 1936).
9. The Migratory Bird Treaty with Mexico. By Rosalie Edge. Pub. No. 56. (May, 1936).

All of the papers listed above have been published by the Emergency Conservation Committee as separate bulletins. We have selected for mention only those which deal with birds. Many other pamphlets have been issued which relate to mammals, to parks, or to general conservation problems. The serial numbers suggest that fifty-six such pamphlets have been issued by this organization since it began work about seven years ago. These bulletins may be obtained free or for about ten cents apiece from the Emergency Conservation Committee (734 Lexington Ave., New York, N. Y.). One of the early pamphlets was called "'Framing' the Birds of Prey". Recently a new and revised edition has been issued and widely distributed. It includes a brief account of the enterprise at Hawk Mountain and a short discussion of the evil of the pole trap. Some doubt has been expressed as to the identity of one of the illustrations, but even if an error has been made on this point it can not lessen the general effectiveness of this literature. It must be remembered that these publications are not presented as scientific literature, but as propaganda directed toward the salvation of wild life. It has not been shown, we believe, that this literature has deviated in any consequential way from scientific truth. On the other hand, the good it has done in public education on the matters of wild life protection, conservation of forests, parks, etc., would be beyond simple calculation. The quantity of these publications distributed to the public must have been very large. The language used has been straight forward, and from the shoulder, as is expected in debate. The fight has been waged in behalf of wild life and inanimate nature: and it is of little consequence that human toes have been stepped on, or official feelings hurt.—T. C. S.

Observations on the November Birds of Western Kansas. By W. S. Long. Univ. Kans. Sci. Bull., XXII, No. 12, 1935.

This paper is an effort to throw some light on the shifting fall birds in western Kansas. Sixty-nine species of birds are reported upon, for most of which specimens were collected.—T. C. S.

Bulletin of the Essex County Ornithological Club of Massachusetts. Peabody Museum, Salem, 1935. Pp. 1-63. Price, 25 cents.

This number contains: critical remarks by Mr. Ludlow Griscom on the Hairy Woodpeckers in New England. A record of an Ivory Gull in Essex County, by Mr. Ralph Lawson. An interesting discussion of the pros and cons of a sight record of Glossy Ibises in New England. An Easterner's account of birds seen on a western trip, by Mr. Campbell Bosson. And short notes.—T. C. S.

1. The Shortage of Waterfowl (Unit No. 1). March, 1934. 10 cents.
3. Eagles (Unit No. 3). February, 1935. 10 cents.
4. Fish-Earing Birds (Unit No. 4). May, 1935. 10 cents.

These "teaching units" have been prepared by Ellsworth D. Lumley and published by the Emergency Conservation Committee (734 Lexington Ave., New York). They are practical guides for the school study of the forms of wild life covered. In the waterfowl unit the author states that "the word 'predator' has been substituted for the too frequently used 'vermin', an introduced misnomer of the ignorant English game-keeper." It will be well for this word to go out of use altogether with its present connotation. These pamphlets present certain pertinent information together with devices by which the pupil can reorganize the material. Each unit offers a varying number of "projects" so that different members of a class may work along different lines. They seem to be feasible from an educational point of view, and helpful to conservation at the same time.—T.C.S.

Some Notes on the 1935 Season, Especially on the Raptorial Birds of the Northwest. By Warren F. Eaton. Circular No. 24, National Association of Audubon Societies. December, 1935.

A collection of facts and observations concerning the status of hawks in various parts of the country during 1935.—T. C. S.

A Life History Study of the California Quail, with Recommendations for Conservation and Management. By E. Lowell Sumner, Jr. Calif. Fish and Game, July and Oct., 1935, pp. 165-256, 277-342. (Reprint, Sacramento, 1936).

In character and extent this paper compares favorably with Errington's work on the Eastern Bob-white, reviewed elsewhere in this issue. About half of the pages are devoted to "life-history", while Part II may be said to deal with management. The author speaks of the "law of edges", by which he means that the birds tend to spend a large part of their time along the margins between food and cover. Therefore an optimum area of "edge" habitat will support more birds, provided the right amount of food is available. The water requirements of these birds is discussed. A monthly study throughout the year of the ratio between sexes showed that the males were always slightly in excess of the females, the fluctuation never exceeding four per cent. Practically the same ratio held throughout the year, indicating that both sexes are subject to the same mortality rate. It has usually been thought that an excess of the male sex exists to compensate for a higher mortality rate. If this higher mortality rate of males does not exist, some other explanation must be found for their uniformly greater numbers. The paper is accompanied by an ample bibliography, but there is no index.—T. C. S.

The *Prothonotary* for May, 1936 (II, No. 5), gives the usual list of noteworthy records. The Buffalo Ornithological Society makes occasional over-night trips to points of ornithological interest, such as a trip to the Pymatuning Swamp, in Pennsylvania. In the June number a poor flight of warblers is reported, which agrees exactly with the report from West Virginia in the *Redstart*. The August number (II, No. 8) contains a criticism of the "Migratory Bird Treaty with Mexico".

The *Nebraska Bird Review* for July, 1935 (III, No. 3) has an article by Mrs. George W. Trine on the Purple Martin which will be of interest to those who have martin houses. An exceptionally large amount of migration data, covering twenty-seven pages, makes up the bulk of the issue. Prof. Swenk continues his history of Nebraska ornithology, dealing in this instalment with the Lewis and Clark Expedition. A selection of general notes and minutes of the 1935 annual meeting complete a very sizable number. The October number (III, No. 4) contains a paper by Messrs. Swenk and DuMont on the weights of Canada Geese, giving the weights of 356 of these birds. Regardless of subspecies these weights ranged from three to thirteen pounds. The April number (1936, IV, No. 2) contains Prof. Swenk's important paper on the distribution and hybridization of the Rose-breasted Grosbeak and the Black-headed Grosbeak. A number of cases of evident hybridism are recorded. Two maps help much to visualize the distribution of the two species and clarify a great amount of data. Short notes in the July number (IV, No. 3) report the presence of Palmer's Curve-billed Thrasher and the Woodcock in different localities of Nebraska.

From the January number of the *Raven* (VII, No. 1) we learn that a September Song Sparrow taken in southwest Virginia is *Melospiza melodia beata*. And also that the Southern Robin (*Turdus m. achrusterus*) is apparently the breeding form throughout the state: while the Eastern Robin (*T. m. migratorius*) occurs in winter. The number for April (VII, No. 4) includes a biographical sketch of Mark Catesby by Dr. J. J. Murray, as the first in a proposed series of sketches on "Some Virginia Ornithologists". This first one is followed in the May-June number by one on Percy Evans Freke, 1844-1931, by the same author. These sketches are informative and are worthy of preservation and bibliographic citation. We find also an interesting note on an instance of double payment of a bounty on hawks. A paper by Prof. Freer and numerous local notes are added. Much solid material is presented in this local periodical. In the July-August number (No. 7-8) Dr. Murray has a sketch of Harry Balch Bailey, as the third in the series.

Bird Calendar of the Cleveland Bird Club for January-March, 1936, is the repository for the Club's statistics. This Club keeps accurate records of the field work of its active members during each month. They know the number of trips, observers per trip, hours per trip, total mileage on foot per trip, hours in each type of habitat, etc. The tabulations are given quarterly in this *Calendar*. Large numbers of Whistling Swans were seen during March—as many as five hundred. A new method of census-taking is used in listing the winter birds by habitats. A list of 262 species is given for the Cleveland region. The issue for April-May gives a similar statistical summary for the second quarter of the year.

Mr. William I. Lyon has an instructive paper on bird banding as a hobby in the *Rotarian* for November, 1935.

The *Flicker* for May-December, 1935 (VII, Nos. 2-4) is devoted to an annotated list of 129 nesting species of birds for Minnesota. The issue for May, 1936 (VIII, No. 2) publishes lists of birds seen at Big Stone Lake in April and at Lake Traverse in September. Mr. Erickson reported a flock of 120 Whistling Swans near Minneapolis.

The TNA Annual for 1935 contains thirty-six pages of short papers on the natural history studies of the Toledo Naturalists' Association. In discussing the "Past and Present Status of the Bob-white in Ohio" Mr. Milton B. Trautman divides the history into three periods, viz., prior to 1840, 1840 to 1890, and 1890 to the present. He concludes that during the first period Ohio was forested and hence did not offer a habitat favorable for the Bob-white. During the second period the forests were cleared away, land was cultivated though not intensively, and the Bob-white came in and reached its peak. The third period is not so clearly presented, but apparently the author considers this a period of modern and intensive farming which has removed the cover so necessary for the protection of the Bob-white from its enemies and from the exigencies of the winter season. However, we are reminded of the paper by Dr. Kendeigh (Ohio Jr. Sci., XXXIII, Jan., 1933) which showed that during a period from 1914 to 1931 in Ohio, which probably marks the maximum of intensive farming, there was a steady increase in the estimated quail population. But, of course, during these years there was an annual closed season on the hunting of quail. So, perhaps intensive farming may not be the only, or even the main, factor of reduction. We hope that Ohio may continue to keep the Bob-white in the "song-bird list" indefinitely as an extensive experiment, if for no other reason.

The *Redstart* for February, 1936 (III, No. 5), gives some interesting observations by Charles Conrad on nest-building, both as to materials and methods of construction. In the May issue (III, No. 8) Mr. Merit B. Skaggs makes a comparison of some breeding birds in the Youngstown region. In the June number (III, No. 9) Mr. J. W. Handlan comments on the spring migration of 1936, and gives the first arrival dates for many species. Short notes are found in each issue.

The *Snowy Egret* (IX, No. 2) was issued for the summer of 1934, and is made up of seven bird lists—all for Michigan, except one list of breeding birds in Ohio by Dr. L. E. Hicks. The winter number for 1935 (X, No. 2) appears again in its new and attractive format. It is interesting to see how much can be done with the mimeograph process. In this issue blue print reproductions of photographs are included. We find an interesting article on the Pileated Woodpecker by O. M. Bryens; and a reprinting of notes on Indian bird lore, by the well known authority on Indian life, Dr. Melvin R. Gilmour. Various field notes covering a total of about fifty-six pages. Quarterly, $1.00 per year. H. A. Olsen. Pippapass, Ky.

Nature Notes for May (I, No. 5) features some common wild flowers in photographs. The June number gives five splendid photographs of successive stages in the life history of the common shaggy mane mushroom, and with the usual departmental offerings. The August number (II, No. 2) records the August nesting of a pair of Mourning Doves in Oceana County, Michigan.

In the *Cardinal* for July (1936, IV, No. 4) Mr. Bayard H. Christy gives some results of a study of the life and work of Jared Potter Kirtland, an early Ohio physician and naturalist. A great deal of Kirtland material was exhibited at the recent A. O. U. meeting at Pittsburgh as a result of Mr. Christy's activities in this direction. Mr. W. E. C. Todd reports on the chickadees of western Pennsylvania.

The *News Letter* of the Audubon Society of Missouri for May, 1936 (III, No. 5) gives an account of a two-day state field meet at some time during the spring, probably May. There is also a plea against the pole trap. In the June number cats are discussed and the question asked, "'Shall we license them to practice their code any more than we would license any human criminal?" In an article on "reconditioned nests" we are told how to make artificial eggs for such nests. From the August number (III, No. 7) we learn that the Missouri folks are working definitely to secure a list of the breeding birds of each county, or as many of the counties as have observers. Already twenty counties have reported lists.

The *Inland Bird Banding News* for June, 1936 (VIII, No. 2) gives a brief account of the work of banding Chimney Swifts at Beloit College. Mr. O. M. Bryens tells of his work in banding Redpolls in Michigan.

The June number of *Wildlife Review* (No. 4) contains the usual abstracts of literature under the heads of Conservation (5 abstracts); Control (2); Cycles (1); Disease (4); Ecology (6); Food Habits (7); Life History (5); Management (21); Propagation (8). There is also a continuation of the listing of periodicals (printed and mimeographed) which deal with various phases of wild life. In this issue are listed the periodicals dealing with ornithology, among others. The September number (No. 5) contains about ninety abstracts of papers classified under the same headings as given above. This mimeographed publication is issued by the United States Biological Survey.

The *St. Louis Bird Club Bulletin* for March-April, 1936 (V, No. 3) discusses "Methods of Attracting Birds" and the value of birds to mankind in comparison with other groups of vertebrates.

The *Chickadee* for December, 1935 (V, No. 2) presents a unique plan for establishing the rank of "Forbush Ornithologist" for those of its members who can meet a list of specifications. About twenty-three tests (listed in nine groups) are given which the candidate must pass in order to write "F. O." after his name. The tests are real, and anyone who passes them will be truly entitled to some distinction. As members qualify we would be glad to assist in making the announcement.

News from the Bird Banders for May, 1936 (XI, No. 2) lists a total of 39,347 individual birds, of 176 species, banded during 1935 in the ten states and provinces which comprise the region of the Western Bird-Banding Association. Numerically, the Pintail stands first on the list with 8,372; the Mallard is second, with 5,224; the Cedar Waxwing is third, with 5,150 individuals banded. There is also an interesting note on sterilizing weed seeds by heat when they are to be scattered as food for birds. The August number (XI, No. 3) gives a too brief account of an experiment in Arizona. Birds, chiefly Gambel's Sparrows, being trapped and banded in the spring months at Casa Grande Monument, were carried north and released at one-mile intervals. Fourteen of these were again trapped at the home station, showing that they had reversed the direction of their migratory flight for short distances.

INDEX FOR VOLUME XLVIII, 1936

Compiled by Chas. J. Spiker

(Numbers in *italic* 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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