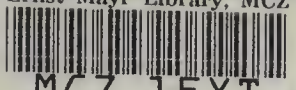


Ernst Mayr Library, MCZ



MCZ LFXT

Dues for 1935

ANNUAL DUES FOR 1935 ARE NOW PAYABLE

This is the Treasurer's first notice to all members that dues for 1935 are now due and payable to the Treasurer

**Mr. W. M. Rosene,
City State Bank,
Ogden, Iowa**

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

Life Members	\$100.00
Sustaining Members	\$5.00 Annually
Active Members	\$2.50 Annually
Associate Members	\$1.50 Annually

The Club values the continued support of every member, and every resignation is received with regret.

It is especially desired that members do not neglect payment of their dues at this time. We are now planning a large March number, to contain close to one hundred pages, and to avoid loss we will be forced to limit our mailing list to paid-up members. The extra cost of publication, the extra cost of mailing, will make it necessary for us to check our mailing list carefully. As always, if any member who finds it inconvenient to remit before March will just drop a card to the Editor or Treasurer it will be a pleasure to continue the name on the mailing list.

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

APR 3 1935

THE
WILSON BULLETIN
A Quarterly Magazine Devoted to the Study
of Birds in the Field
and the Official Organ of the
WILSON ORNITHOLOGICAL CLUB

Edited by

T. C. STEPHENS

MYRON H. SWENK L. W. WING



Volume XLVII

1935

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

PAST OFFICERS OF THE WILSON ORNITHOLOGICAL CLUB

President

J. B. Richards, 1888-1889.	Myron H. Swenk, 1918-1919.
Lynds Jones, 1890-1893.	R. M. Strong, 1920-1921.
*Willard N. Clute, 1894.	Thos. L. Hankinson, 1922-1923.
R. M. Strong, 1894-1901.	Albert F. Ganier, 1924-1926.
Lynds Jones, 1902-1908.	Lynds Jones, 1927-1929.
F. L. Burns, 1909-1911.	J. W. Stack, 1930-1931.
W. E. Saunders, 1912-1913.	J. M. Shaver, 1932-1934.
T. C. Stephens, 1914-1916.	Josselyn Van Tyne, 1935-
W. F. Henninger, 1917.	

Vice-President

C. C. Maxfield, 1893.	H. C. Oberholser, 1920-1921.
R. M. Strong, 1894.	Dayton Stoner, 1922-1923.
Ned Hollister, 1895-1903.	Wm. I. Lyon, 1924.
W. L. Dawson, 1904-1905.	Thos. H. Whitney, 1925-1928.
R. L. Baird, 1906-1908.	George Miksch Sutton, 1929-1931.
W. E. Saunders, 1909-1911.	Edwin L. Moseley, 1932-1933.
B. H. Swales, 1912-1913.	Josselyn Van Tyne, 1933-1934.
Geo. L. Fordyce, 1914-1919.	Alfred M. Bailey, 1935-

Second Vice-President

Josselyn Van Tyne, 1932-1933
Alfred M. Bailey, 1933-1934
Mrs. Margaret M. Nice, 1935

Secretary

Lynds Jones, 1888-1889.	Benj. T. Gault, 1907-1911.
J. Warren Jacobs, 1890-1891.	C. W. G. Eilrig, 1912-1913.
Willard N. Clute, 1892.	Orpheus M. Schantz, 1914.
J. Warren Jacobs, 1893.	Thos. L. Hankinson, 1915-1916.
Wm. B. Caulk, 1894.	G. A. Abbott, 1917.
J. E. Dickinson, 1895-1897.	Albert F. Ganier, 1918-1922.
W. L. Dawson, 1898-1901.	Gordon Wilson, 1923-1925.
John W. Daniel, Jr., 1902-1905.	Howard K. Gloyd, 1926-1928.
Frank L. Burns, 1906.	Jesse M. Shaver, 1929-1931.
	Lawrence E. Hicks, 1932-

Treasurer

R. M. Strong, 1892-1893.	Frank M. Phelps, 1917-1919.
Lynds Jones, 1894-1901.	Geo. L. Fordyce, 1920-1922.
F. L. Burns, 1902-1905.	Wm. I. Lyon, 1923.
B. H. Swales, 1906-1908.	Ben J. Blincoe, 1924-1926.
W. F. Henninger, 1909-1913.	J. W. Stack, 1927-1929.
P. B. Coffin, 1914-1916.	W. M. Rosene, 1930-

Editor

Lynds Jones, 1888-1924.	Frank L. Burns, 1901.
	T. C. Stephens, 1925-

*Resigned.

APR 3 1935

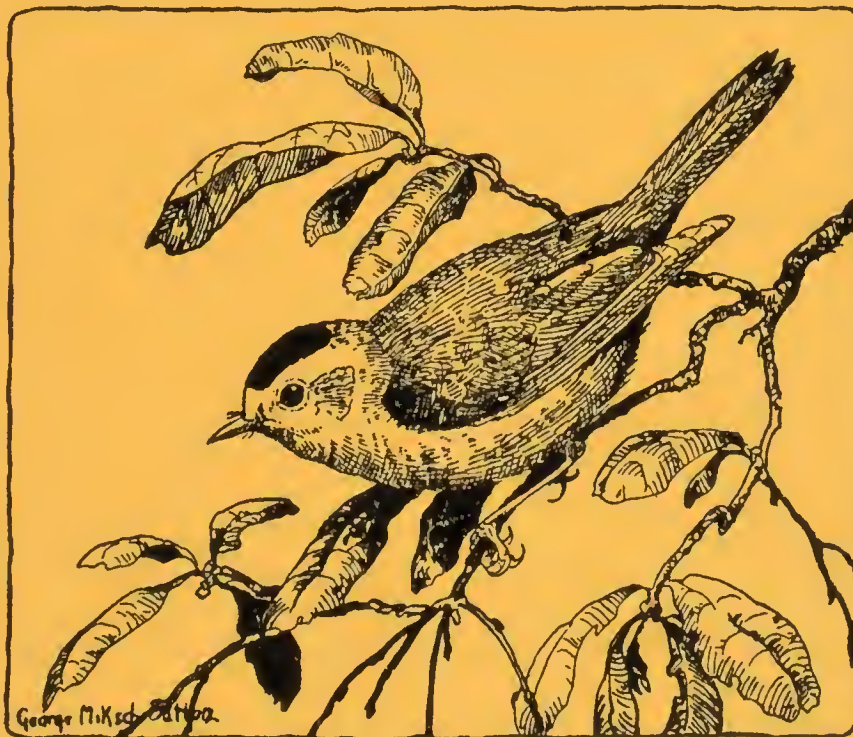
13,814

Vol. XLVII

MARCH, 1935

No. 1

THE WILSON BULLETIN



A Magazine of Field Ornithology

Published by the

WILSON ORNITHOLOGICAL CLUB

at

SIOUX CITY, IOWA

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

CONTENTS

THE NATURAL HISTORY OF THE LONG-BILLED MARSH WREN	
By Wilfred A. Welter	3-34
A STUDY OF THE SAVANNAH SPARROW IN WEST VIRGINIA	
By Thos. E. Shields	35-42
NOTES ON THE RENAL BLOOD-VESSELS OF RAPTORIAL BIRDS	
By F. L. Fitzpatrick	43-44
ROBERT HENRY WOLCOTT	By Myron H. Swenk 45-49
BIRDS AT A RAIN-POOL IN MASSACHUSETTS IN OCTOBER, 1933	49-56
BIRD NOTES FROM THE BIGHORN MOUNTAIN REGION OF WYOMING	
By John W. Aldrich	57-59
WATER BIRDS OF A VIRGINIA MOUNTAIN COUNTY	
By J. J. Murray	59-67
CHANGES IN THE LIST OF BIRDS OF YELLOWSTONE NATIONAL PARK	
By Emerson Kemsies	68-70
EDITORIAL	71
GENERAL NOTES	72-80
PROCEEDINGS	81-95
COMMUNICATIONS	96

THE WILSON BULLETIN

is published quarterly in March, June, September, and December, as the official organ of the Wilson Ornithological Club, at Sioux City, Iowa, and is sent to all members not in arrears for dues. The subscription price is \$1.50 a year, invariably in advance, in the United States. Single numbers, 50 cents. Outside of the United States the rate is \$1.75. Single numbers, 60 cents. Subscriptions should be sent to the Editor.

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 Versteegen 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—Mr. W. M. Rosene, Ogden, Iowa.

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. XLVII

MARCH, 1935

No. 1

Vol. XLII (New Series) Whole Number 171

THE NATURAL HISTORY OF THE LONG-BILLED MARSH WREN*

BY WILFRED A. WELTER

In recent years there has been a noticeable trend toward the intimate study of various animals. In 1914 Allen (1) published his report on the Red-winged Blackbird and, since that time, numerous other workers have carried on investigations of a similar nature in the field of ornithology. With the appearance of Howard's works (16, 17) new interpretations of bird behavior, previously hinted at, became established, lending impetus to the growing interest in this field of study. The surface has hardly been scratched, however, as each species presents new problems which can be answered only by intensive study.

Much attention has been devoted recently to certain phases of the House Wren's life history and much novel information has been uncovered by various workers in the Baldwin Research Laboratory. Allen (1) has completed a very careful and detailed life history of the Red-winged Blackbird and a parallel study of a breeding associate of this species is considered worth while as environmental factors affecting the species can be better studied. The Long-billed Marsh Wren (*Telmatodytes palustris*) which is very abundant in certain localities affords a wealth of material for a comparable study. This species, due to its secretive habits and its more or less inaccessible habitat, is not particularly well known and many phases of its life history have not been worked out.

Most of the field work was carried on during the year 1931. From the time of arrival in the spring until the birds had departed in the fall some time was spent in the field nearly every day, and from May to September the greater part of each day was thus engaged.

The first brood of *T. p. dissaëptus* was studied in the Renwick Marshes at Ithaca, New York, while the second brood of *T. p. iliacus*¹

*A portion of a thesis presented to the graduate school of Cornell University for the Ph.D. degree.

The writer wishes to acknowledge his indebtedness to Dr. A. A. Allen for his valuable counsel during the course of this investigation.

was studied at Staples, Minnesota, later in the year. Additional notes were obtained from the Montezuma and North Speneer marshes in the Ithaea region.

The observations recorded in the subsequent pages have been obtained from the intensive study of approximately forty pairs of birds and their nestlings. Many hours were spent in an umbrella blind studying and photographing the birds at close range. During the earlier part of the season much of the time was spent at a slight elevation above the marsh to enable the writer to keep a large number of birds in sight at a given time in order to figure out the limits of the various territories. Each new territory was investigated as often as possible and each newly-built nest was tagged and its position was plotted on a map. Records of the beginning of egg laying, completion of each clutch, and the time of hatching of the young were recorded. Each nestling was marked with a colored thread about its leg to enable identification when the daily weights were taken. Full notes were kept upon the activities of the adults and their offspring so that a fairly complete picture of the life of the species in its summer home has been obtained.

A series of adults and nestlings was collected in order to study growth of feathers, wear, molts, winter and nuptial plumages, and food habits. Skins were also borrowed from several museums to augment the Cornell collection in the study of the eastern subspecies.

MIGRATION

Surprisingly little has been written on the migration of this species. Early and late records are few and in many cases quite misleading due to the fact that marsh habitats are not particularly inviting early in the season. Only a single reference concerning the manner of migration has come to the writer's attention. Eaton (11), in his *Birds of New York*, made the statement that the Marsh Wren migrates at night high in the air. Another indication of night migration was the discovery, by Mr. George B. Saunders, of a skeleton of a member of this species beneath the lighthouse at Cape May Point during the fall of 1931.

The average date of arrival, both at Ithaea, New York, and at Minneapolis, Minnesota, approximates May 10. The variation in time

¹*T. p. iliacus* is readily distinguishable from *dissaëptus* and should unquestionably be recognized. While almost of the same size as *dissaëptus*, the lighter color of the upper parts and the much brighter cinnamon-buff to cinnamon flanks and sides separate this form. In winter plumage the underparts make a very good distinguishing character as this "foxy" brown is distinctly different from the russet and wood brown of *dissaëptus*.



FIG. 1. The Marsh Wren at its nest. Carrying a dragon-fly to feed young, upper left; female arriving with insect food, upper right; searching for excreta-sac, lower left; excreta-sac in bill, lower right.

of arrival between regions of this latitude and farther south is very slight, due perhaps to a lack of accurate dates for early migrants. The records for time of departure, on the other hand, are less numerous. According to the data obtained from the files at Cornell University and the University of Minnesota, it would seem that the average time of leaving for the latest individuals is between October 15 and 25. A few young birds remain much longer than the vast majority.

During the spring of 1931 daily trips were made to the marsh from April 20 to July 10. A close count of the number of birds and their locations in the marsh was kept each day and, in this way, a knowledge of the order of arrival was obtained. During the period of migration it is easy to locate the various individuals of the species because the growing marsh vegetation projects only a few inches above the water. As a resident male arrives he establishes himself almost immediately in a particular area of the marsh, and in this way the new arrivals are easily distinguished from the earlier birds by their locations.

The first arrivals in the spring are male birds. The migrant males arrive with the residents and may tarry for a day before continuing their northward flight. On May 10 the vanguard of the birds arrived. Five birds were observed on this day; two remained in the marsh while the other three went on. At this time the testes are enlarged to their full extent, as no birds taken later in the season showed greater development. A few more males put in an appearance on May 13, and a large number came in on May 16. Many of these established themselves in the marsh while a few again went on to more northerly locations.

Between May 20 and May 28 the females appeared in the breeding territory. Only a few were observed on the first day but many more came in during the week, so that nearly all the males obtained mates.

On June 4 a few more males took up residence, while on June 16 a very noticeable increase was observed, together with an additional number of females. These birds, together with several stragglers which arrived later in the summer, were perhaps young of the preceding year.

The order of migration might be summarized as follows:

1. Arrival of resident and migrant males.
2. Arrival of resident and migrant females.
3. Arrival of young males.
4. Arrival of young males and females.

There is no marked exodus of birds from the marsh at a given time in the fall. At first the young of the year remain in family groups but, as the time of departure approaches, there is an apparent flocking together of young birds, usually near the water's edge. At this time twenty-five or thirty birds may be observed together feeding near the surface of the water. The next day the numbers may be greatly reduced and in a short time only a few birds remain.

From the birds collected and from observations made at Ithaca, New York, and at Staples, Minnesota, during the fall of 1931, the fall migration might be divided into two sections. The first birds to leave are the adults and some of the young of the first brood. No adult birds were included in the collections made after September 10, and none were observed after this time as a special effort was made to collect any specimen which might prove to be an old bird. The wrens which remain after September 10 are either in juvenile plumage or are in the process of acquiring the winter plumage. These birds were, for the most part, young of the second brood, as the earlier birds had acquired their winter dress by September 1. As these birds complete the molt they, too, depart for their winter homes so that, by October 20, only a few scattered individuals remain. By the first of November these, also, have departed.

There are occasional winter records for the species in this latitude. Whether these stragglers are young or old I am unable to say, but certainly they are only unusual instances and not a part of the normal cycle of the species.

TERRITORY

Since Howard (16) published his "Territory in Bird Life", much information has been obtained on the relationships between a given species of bird and the nesting area. Most birds have been found to live during the reproductive period in a small isolated territory from which all other members of the species are ejected. The Long-billed Marsh Wren is no exception to this rule, showing a very strong attachment to his chosen spot and fighting relentlessly but harmlessly to keep others of his kind from intruding.

Continuous work with a given group of birds enables one to recognize each member as an individual. A variation from the usual song in one instance, a broken tail feather in another, and many other minor variations aid tremendously in following individuals from the time of arrival through the nesting cycle. While it was impossible to mark each individual, the writer was enabled by these minor differences and continuous work with a selected group to distinguish one

bird from another and thus work out the rôle of territory in their lives.

On the day of arrival the male is quiet but is busy moving about over a limited area in the marsh. It is at this time that he actually selects the territory which he will inhabit in raising his first brood. The preferred habitat is not, as one might suppose, a dense tangled mass of dried and broken eat-tails, remnants of the preceding season, but a comparatively open area with a few tattered stalks and an abundance of some species of *Carex*.

He soon forms a rather clear conception of the size of the territory that he wishes to hold, for an intrusion over an imaginary bound-

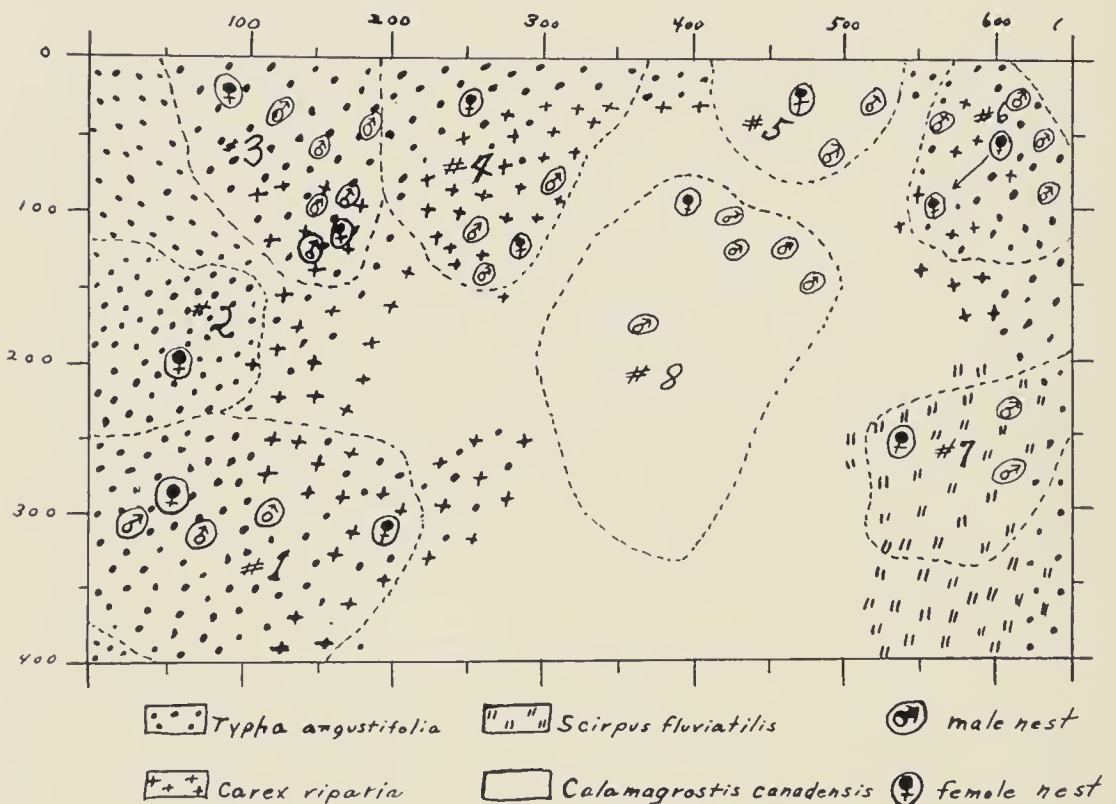


FIG. 2. Map of a portion of Renwick Marsh showing Marsh Wren territories in relation to the dominant plants.

ary by another male is quickly resented and a fight is apt to follow. Fighting over territorial rights between males is, to a large extent, a matter of outbluffing the opponent. A male approaching too closely to the boundary of another's area is challenged by the song of the rightful owner. This is usually sufficient for the intruder, but sometimes the challenge is accepted by the visitor giving voice to his emotions and continuing to transgress upon the area in question. The first male in this case fluffs out his feathers to impress the other and, if

necessary, flies at his opponent. The usurper usually reciprocates by flying at his neighbor a time or two and then, at least in all instances observed, becomes the vanquished and departs from the scene of battle.

On the second day the males are most concerned with holding the area they have selected. It is perhaps on this day that they sing more than at any other time up to the arrival of the females. Several song perches are selected in different parts of the territory and the owner continues to go from one to another singing enroute. If other males are about looking over prospective territories the occupant of a given area will sing almost continually.

The actual territory controlled by a single male is dependent upon several factors. In an area 400 by 650 feet in the Renwick Marsh at the head of Lake Cayuga eight males took up residence in the spring of 1931. The area was bounded on the east and southeast by water. A rather dense growth of cat-tails and sedges covered the north, east, and south sides while marsh grass, *Calamagrostis canadensis*, was the dominant plant in the middle area. The cat-tail-sedge association was greatly preferred to the grass association by the male birds in selecting territories. Allen (1) considered the sedge association the optimum condition for nesting of this species. *Typha angustifolia* is much preferred to *T. latifolia* as a nesting site. This observation is in accord with Saunders (27). The male territories in the favored area were noticeably smaller than in the grassy area. A single monogamous male occupied a territory of from 13,000 to 15,000 square feet, while in the grass association this was extended to approximately 30,000 square feet. The territory of a polygamous male, on the other hand, was considerably larger than that of a monogamous male nesting in the same sort of vegetation. For example, territory number one, occupied by two females, was almost twice as large as number two where one female nested. This difference in size can readily be accounted for by the fact that the female birds do not tolerate each other during the nesting season. As a result those males intent upon leading dual lives must separate the objects of their affection as widely as possible.

The boundaries of a territory, and even entire territories, are sometimes changed after the coming of a female. To illustrate, if a female entered the marsh and tentatively located in an area unclaimed by any male, one or perhaps several males in adjacent territories would immediately try to extend their boundaries to include the

avored spot. Many battles and much singing would follow until one of the birds had established his right to the plot and its tenant. Such performances have been observed even when one of the participants was already satisfactorily mated. Number one succeeded in obtaining the female which became his second mate by annexing some extra territory adjacent to number two even before the latter was mated.

Unusual weather conditions may lead to modifications of original territories. In the spring of 1931 a flood in late May led to many changes in boundaries. Male number two had occupied and successfully defended an area between numbers four and five, and including a part of four as now illustrated. With the coming of the flood his domain did not meet with his wholehearted approval and he moved completely to the new station. Numbers three and four extended their rights to include a portion of the marsh containing a considerable number of erect eat-tails of the previous year.

After incubation is well under way the territory instinct becomes somewhat weakened although the area is defended until the young have left the nest. At this time territorial boundaries no longer remain important as the young, lacking in a knowledge of the limits of the area defended by their parents, go where they will. The feeding instinct is strongly developed at this time so the adults forget the former barriers and follow their offspring and administer to their wants.

The parents usually take up a new territory in a more open area to rear the second brood. Nests at this time are located nearer the water's edge or in areas less given to dense growths of eat-tails. The territorial instinct is redeveloped but it is not as strong then as earlier in the year. After the second brood has left the nest all the birds live together harmoniously until time to depart for their winter homes in the south.

COURTSHIP

When a female wren arrives each male does his best to convince her to settle in his territory. Howard considers display as the chief way of winning a mate but, in the case of the Long-billed Marsh Wren, song is so closely associated with display that both will be considered under this category.

The display of the male is quite simple but interesting. When the female is near he will take his station a foot or two above her, fluff out his breast feathers and under tail coverts, and jauntily cock his tail over his back so that it almost touches. He now resembles a tiny ball of feathers perched among the reeds. As he becomes more animated he beats his partially folded wings up and down rapidly

and sways his head dizzily from side to side. The female probably will fail to notice him, or at least she will not indicate any interest, and, after pursuing her and displaying for several minutes, he will burst into song and fly to another portion of the territory. This same sort of display is often used to impress another male in disputes over territorial rights.

Song does not seem to be as important in attracting the female as display. Of course the song originally attracts the prospective mate into the territory and then display becomes first in importance. When the females begin to arrive from the south the males sing almost constantly. It is then that they sing at night as recorded by Hunt (18). The early morning is the time when the male sings the optimum number of songs per minute. During the period of strife between males contending for desirable sites, the songs average about twenty-five per minute. When the females first arrive this number is again often reached. After the nest is under construction, however, the songs become less numerous and the intervals between singing periods become longer. On May 31, during the period of greatest song for the day, a male sang an average of 6.4 times per minute. The female in this instance had almost completed her nest. On June 5, the songs of this same male had been reduced to less than five per minute. On June 7, a male sang approximately five songs per minute while his mate was incubating and eight songs while she was off the nest. The number of songs per minute becomes less and less as incubation becomes more advanced until the males seldom are heard at mid-day and infrequently in the morning and evening. As the young leave the nest the males sing a bit more often but a week later have ceased almost entirely.

One male bird in an area under investigation was heard singing very energetically after the other males had slowed down to a very few songs. A count on June 12 gave an average of 12.5 songs per minute during the optimum period for the day. A careful investigation of his territory upheld the suspicion that he was unmated. On June 16 he obtained a mate and his behavior now began to agree with that of the others in the colony. It seems possible that his territory, being composed almost entirely of *Calamagrostis canadensis*, *Lythrium salicaria*, and the like, was less desirable and, as a result, he received a mate only after all others were satisfactorily mated.

The song period of the adult birds seems to cease in early August. The writer has never heard one after the first of the month. Bicknell (7) states that the first song period ends in early August. He

reports that several birds were in full song in October and believes that this second period occurs subsequent to their departure. During the course of this investigation no adults were heard to sing after the original song period had come to a close. The young birds, however, begin to sing in late August. At Hayden Lake, Staples, Minnesota, the first song was heard on August 23. A series of singing males was collected throughout the fall and, in all cases, proved to be birds of the year. Jones (20) reported a male singing on November 19. The writer feels quite certain that this must have been a young bird.

The song of the adult male during the breeding season is often associated with a peculiar type of flight. The bird in going from one song perch to another flies along near the tops of the flags, singing enroute. Suddenly he rises six to fifteen feet into the air, and then flutters down upon the reeds. Perhaps this type of behavior is a part of the courtship performance, but the writer is inclined to believe that the altitude obtained enables the bird to check up on would-be intruders, and that this is the real reason for this interesting maneuver.

The male alone has the ability to sing. His song has been described in many ways, as pointed out by Shufeldt (28), but none seems to be quite adequate and most authorities are at variance with one another concerning his vocal powers. It is true that "as a musical composition, it does not rank high," but it certainly reflects the spirit of the singer and adds appreciably to the medley of sounds in the marsh.

The musical behavior of the male is aptly described by Allen (2) who says, "From a tangled mass of brown cat-tails comes a peculiar grinding sound as though someone were gritting his teeth. This is followed by a clicking noise much like an old-fashioned sewing machine, and then out of the flags bursts a little brown ball. Floating upward like a tuft of cotton, it breaks into vivacious music and then drops back into hiding to continue its scolding."

Taverner (29) describes the performance thus: "At a safe distance from the intruder it mounts a tall, solitary stalk to reconnoitre and then launches itself into the air some ten or fifteen feet and gurgles out a rippling melodious little song as it sinks on fluttering wings to another station."

Townsend (30) writes: "The song begins with a scrape like the tuning of a violin followed by a trill which bubbles, gurgles, or rattles, depending no doubt on the skill or mood of the performer; at times liquid and musical, at other times rattling and harsh, but always vigorous. It ends abruptly but is generally followed by a short musi-

eal whistle or a trill, as if the wren were drawing in its breath after its efforts. I have heard one sing fifteen times in a minute. The bird often reminds me of a meehanical musieal toy wound up to go off at frequent intervals."

Considering the variety of descriptions and the differenees in opinion among the various authorities, one is reluetant to enter still another description of the Long-billed Marsh Wren's song. The whole, however, can be dissected into three parts. The grinding sound mentioned by Allen is given first and may pass unnotieed unless the listener is near the bird. It has somewhat the quality of the eall of the White-breasted Nuthateh. It might be deseribed as *aac* or *ac* delivered in a grating manner with the emphasis on the first part. These notes are repeated various numbers of times from one to five. The warble-like part delivered next is no doubt the most musieal section. It does remind one of a sewing machine of the older sort being run rapidly, but of ouse it is less metallie and more musieal. It has mueh of the spontaneity of the House Wren's song but is otherwise quite distinet. This middle section begins at a low piteh, elimbs upward, and then deseends again. At the end a third section is given, perhaps as an afterthought. It is a trill whieh may be deseribed as *ee ee ee ee* or *ii ii ii*. It again is quite low but laeks the harshness of the beginning of the song.

This entire song is given during May and most of June. Toward the end of the month, however, the last part is often omitted and often neither the beginning nor the end is heard.

The songs of the young males whieh begin in late August are entirely different from those of the adult. Perhaps Langille (22) was listening to young birds when he deseribed the song as "a sharp metallie twitter" as it is certainly more squeaky than that of the adult. The first time the writer listened to a bird of the year trying out his voeal apparatus he was reminded of the efforts of a not altogether suceessful Catbird. These early songs have the ehoppy notes of *Dumatella* but are given in a more rasping manner. The grating notes of the beginning and the trill at the end are usually omitted by young birds.

The alarm note has been deseribed by Hoffman (15) as an energetic *tshuk*. During this investigation it was found possible to distinguish sexes by means of the eall notes. The *kek kek* or *tshuk* is given by the female. The male's note sometimes resembles this also but can usually be distinguished by its more grating nature and may be deseribed as *rrek*. A series of notes is usually given together so

the *rrek's* do not sound very distinct as they roll into each other producing a chattering. The *kek* notes, however, while also given together, maintain their identity. The female has a hissing sound that she gives if too closely pressed by the male. Preceding copulation the female has been heard to give a trill like that at the end of the male's song.

The call notes of the young are quite similar to those of the adult. The nestling, when the female arrives with food, gives a beady *peep* or *peet*. At first these notes are scarcely audible but as the young become older and stronger the *peet* is clearly heard. As the young leave the nest the *peet* gradually develops into a *queck*. It is much more squeaky than the adult *kek* and also lacks the woody quality. The notes of the juvenal become more and more like those of the adult until they are indistinguishable.

SEXUAL RELATIONS

The sexual organs of the male are well developed by the time he reaches the nesting marsh following his trip from the southland, but those of the female are not fully developed at her arrival. As a result she is often kept busy avoiding the male during the first week in her new home. If too badly tormented, she will squeeze between the cat-tails at the water's edge where the male can not reach her and hiss at him with the intention of driving him away.

During the period of nest construction she reaches the height of her development and is ready for the mating act. When the male approaches her at this time, singing, she climbs up a cat-tail stalk and gives the trill which has already been described. Then she beats her wings rapidly, points her bill toward the zenith, and places her tail well over her back. The male goes through the courtship display previously described. At the proper time he climbs upon the back of his mate, beats his wings rapidly as the cloacae come in contact and copulation is completed. The whole procedure takes but a few seconds. Both remain in the immediate vicinity for a short time, the male with feathers fluffed out and tail up, the female quiet and demure.

It is usually the male who tries to induce the female into copulation but on one occasion the female was observed going through the behavior leading to the mating act to entice the male. In this instance the act had been completed twenty-five minutes previously. The male, not giving the proper response, was chased by the female among the cat-tails and it is not known whether she was successful or not.

It is the belief of the writer that the male Long-billed Marsh Wren is essentially polygamous while the female is not. Between one-

fourth and one-third of the territories, which were carefully studied in this investigation, were inhabited by two females and one male. In these instances the two females occupied the two ends as far from each other as possible. A probable reason for this apparent lack of sociability, as previously stated, lies in the fact that the females do not get along during the nesting season. On several occasions fights have been witnessed between them. The first one in a territory does not wish to tolerate any newcomers. The polygamous male, on the other hand, is quite diplomatic. Approximately equal portions of his time are spent with his two mates. In this way suspicion is kept at a minimum and neither female is aware of his dual life. The feeding range of the female is rather small during incubation and the rearing of the young so that she never comes into contact with the third member of the triangle.

One doubtful case was investigated where it was thought possible that a single male might have three mates. Owing to the denseness of the vegetation and the fact that nesting was well under way when the area was discovered it was found impossible to ascertain this condition with certainty. Another unusual instance was observed in the same area. Two male wrens were frequently seen in the vicinity of a certain female. Her nest with eggs was located equidistant from the territories of the two males in question. It seems that she had no regular mate as both of the males observed in the area were successfully mated. The nest was later broken up so that it became impossible to complete observations proving the fickleness of the female. It seems reasonably certain that this was a matter of polyandry. It was the only instance of its kind observed and is not common among the members of this species.

NEST BUILDING

As a matter of convenience in the treatment of this section the nesting endeavors of the male and female will be treated separately. The nest used by the female for the rearing of the brood is given the designation *female nest* while the incomplete ones variously known as "false nests", "cock nests", "mock nests", and "dummy nests", will be called *male nests*.

The male nests of the Long-billed Marsh Wren have been a much discussed question in ornithological literature. The earlier writers, not realizing that these were unused, remarked concerning the abundance of nests. Almost any paper dealing with the species has some notes upon this prolific nest-building activity.

Various theories have been advanced to explain the function or purpose of these extra structures. Norris (25) suggests that many nests are built because meadow mice get into them and the wren will not continue to use one if it is disturbed in any way. These dummies have been built for practice, according to Hunter (19), while Allen has suggested that they may be a means of outlining territorial boundaries. Shufeldt (28) says, "I am convinced that these 'mock nests' are built as lures, to induce their enemies to believe that the wrens were not yet laying, or that the eggs had been stolen, so it was not worth while to continue any further search for them." Forbush (12) states that "most of these nests are never used unless the males sleep in them, but their construction gives the birds an outlet for their superabundant energies."

Many of these reasons do not seem to bear investigation. From my own experience the birds do not desert if the nest or contents are handled, for I have visited nests from the first day of construction until the young had left and the adults in no case deserted. The eggs were counted from day to day, the complete clutches were weighed in some instances, and daily weights were taken of the young. Certainly the combination of all these things would have been sufficient to cause desertion if the birds were easily disturbed. The "practice" idea hardly seems reasonable as the male builds the dummies and the female builds the good nest. It may be that the males sometimes sleep in these extra structures but in no case has this been observed. Evening observations indicated that the males went to roost on some reed stalk. Furthermore these nests become so bedraggled in a short time, due to faulty construction, that it would be almost impossible for the birds to enter them. If the territory theory were to be considered, one would expect the nests to roughly outline the boundaries, but this is not the case as often all of the dummies are grouped in one end of the area.

The Long-billed Marsh Wren is not the only member of the *Troglodytidae* that exhibits this peculiar but interesting habit of multiple nest construction, as the European Wren (*Troglodytes troglodytes*), the House Wren (*Troglodytes aedon*), the Short-billed Marsh Wren (*Cistothorus stellaris*), and the Cactus Wren (*Heleodytes brunneicapillus*) also engage in this activity. Other families have representatives that also exhibit the habit, among them the Red-shanks (*Totanus totanus*), the Little Grebe (*Podiceps fluviatilis*), the Florida Gallinule (*Gallinula chloropus*), the Herring Gull (*Larus argentatus*), and the White-throat (*Sylvia communis*). Owing to the wide separa-

tion of these species it can not be that this habit evolved at a single point in avian evolution.

These additional nests are put to some use by certain species of birds. The Cactus Wren repairs the nests as winter approaches (Bailey, 4) and uses them as sleeping quarters. The European Wren also has been known to utilize them during the cold nights of winter. The question naturally arises whether the male nests are not then built for this purpose. This hardly seems possible as these nests are built during the reproductive cycle, usually before the female arrives, in the case of the Long-billed Marsh Wren.

It is not the male bird in all species that is responsible for the additional nests. Howard (17) states that the White-throat female toys with nesting material and actually constructs platforms and shells before she has reached the physiological condition necessary for the completion of a nest. In the same manner many birds have been observed playing with nesting material before they are ready to build.

In the case of the Marsh Wren the male arrives in the nesting territory about ten days in advance of the female. At this time he has already reached his full sexual development and can complete the mating act. He begins to play with cat-tail down and other materials shortly after his arrival. The next stage is the actual construction of a nest shell. Many of these are hardly started before they are abandoned. If these shells had a purpose would they not be completed? Furthermore as the female appears on the scene nest building on the part of the male is tentatively replaced by interest in his mate. The female, on the other hand, has not reached the peak of development and avoids the male at every opportunity. The male then oscillates between carrying materials to the nests he is constructing and paying attention to the female. As the female reaches the stage in which she is ready to build she adds a few straws, in some cases to the nest the male is working on. Later she starts a nest of her own. At first she works slowly and for short periods but a change takes place and all of her time is then devoted to this activity. The male, during this period, loses interest in his work and pays more attention to his mate and shortly ceases building almost entirely.

The question now arises as to the reason for the presence of this activity in certain species when it is entirely absent in others. In the first place the very fact that the two sexes, in the case of the Marsh Wren, reach their full development at different times helps to explain the situation. If the two were to "mature" at the same time would the male still follow the same course of events? This, of course, can

not be answered but, in cases where the male was delayed in obtaining a mate, he built more nests than those birds which were mated earlier. In such instances nest building continued to be substituted for courtship, display, and copulation until a female arrived and reached the stage when mating could be completed.

Now it is logical to assume that male nests should be of common occurrence among a multitude of species as in most cases the male arrives some time ahead of the female. Let us take the case of the Red-winged Blackbird. The males arrive about the middle of March while the females do not appear until the second week in April in the Ithaca region (Allen, 1). Nesting does not begin until some time later. Allen figures a series of testes and ovaries showing their development. It is interesting to note that their maximum development is not reached until the tenth of May and that both sexes mature at the same time. In such cases the male would not find it necessary to substitute nest construction for the sexual relations as both sexes are prepared for these relations at the same time. Even if the two sexes of a given species should not reach the height of their sexual development at the same time the male might not enter into nest building. In different species other substitutes may take the place of this activity. The difficulty of obtaining food early in the season may, in certain instances, cause the birds to devote much of their time to this need. As an example the Red-wing during the latter part of March and the first two weeks in April goes to the uplands to feed and thus spends but a short period of each day in the marsh. Intensive studies of single species may bring many such characteristics to light. Furthermore, all birds are not as highly sexed as others and one would expect nest building and similar activities to be substituted for sexual relations more frequently in those which have an abundance of sexual energy. There can hardly be any question about the wrens as they are notably a group that is highly developed in this direction. Then again the mere difference in nervous energy varies among the species and a slow and comparatively inactive bird would hardly be expected to show the zeal in any endeavor exhibited by a more active species.

The males, in certain forms, continue to build nests even after their mates have begun to incubate. Thus the Marsh Wren may construct several nests during this period but these activities are not pursued with the vigor of the previous period. In like manner the Madagascar Yellow-headed Weaver Bird (*Foudia sakalava*) continues to adorn nests with fresh green materials during the period that his mate is incubating (Rand. MS). If the many nests of the male are de-

pendent upon the slowness of the female in reaching the height of her sexual development, why does this activity continue after her full development? The male continues at the peak sexually for a longer period while the female transfers all of her energy and time to the duties of incubation. This is noticeably the case in polygamy where a male is able to carry on sexual intercourse with a second mate some time after the first female has passed beyond that stage. During this interval, before the decline of sexual desire, the males of certain species continue to transfer their interest to building and as the cycle comes to an end nest construction also ceases. Others transfer their interest to incubation and so sexual intercourse or its substitutes wane. In like manner the males of some species, while not participating in the duties of incubation, spend much of their time on guard about the nest and show much concern over disturbances which might affect their potential offspring and so these duties serve as an outlet for their sexual energy.

Considering multiple nest construction from these angles, then, different species exhibit many modifications of this activity depending upon the factors influencing the reproductive cycle. The maximum development occurs in those species in which the male reaches the sexual peak in advance of the female and maintains this peak for a longer period. Coupled with these physiological conditions is the lack of interest on the part of the male in sharing the domestic duties and guarding the nesting site. The Long-billed Marsh Wren exhibits to a high degree these characters and is perhaps to be considered as one of the most prolific builders of male nests.

In all cases observed the male commences nest construction the day following his arrival at the marsh of his choice. From then on for the next three weeks building is at its height. The average time for completion of a single nest is two days. In many instances several are under construction at one time and often many are never finished. Many of those that are carried to completion are poorly done. Five nests is a fairly good average for a single male bird, during the rearing of the first brood, while several, of course, build as many as ten different nests.

The dummies are built, as previously mentioned, by the male. Sometimes, as the female reaches the nest building stage, she may add a few straws to a dummy on the day or two preceding the beginning of her own nest. She does very little of the work however, and this small part may be considered negligible.

The location of the male nests above the water is variable. Most of the earlier ones are built in the dead eat-tail stubs or among the new growth of sedges and so are between six and twenty-four inches above the water. Later nests, if built in the sedges, are also necessarily low, but, if built in the eat-tails, may be as much as six feet above the water. Most of the dummies are built in the sedges even though eat-tails are available for the purpose.

Because of the fact that the male and female nests are alike up to a certain point the actual description of nest structure will be treated with that of the female.

Between six and fifteen days after her arrival the female bird begins the construction of her nest. The earlier arrivals seem to spend more time before starting than the later ones. These first days are spent searching for food and avoiding the males.

The work on the nest is done almost entirely by the female. In a few cases the male added a little material, usually eat-tail down. It is possible to observe the bird at work if one remains perfectly still at a distance not closer than fifteen feet. The time required varies from five to eight days.

The nest is most often attached to eat-tails but sedges and grasses are sometimes used while Ridgway (26) and Bryant (9) report nests in bushes several feet above the water.

The initial effort in building consists of lashing the supporting plants together and in this way form a cup-like foundation upon which the remainder of the nest rests. *Carex* and *Calamagrostis* are the chief materials used in this part of the structure. The outer walls which are composed for the most part of long strips of eat-tail leaves and stems and leaves of sedges and grasses is the roughest part of the structure. Water-soaked materials, often more than a foot long, are used here as they are more pliable and can be more easily woven together. The first strands are woven around the long axis and others, as the nest assumes shape, are put in at various angles. Some of these strands are fastened to the supporting structure by actually weaving these stems into the nest. Some of the growing leaves are also woven into the outer walls. If the support is a sedge or a grass, leaves may form a good share of the periphery. An opening is left on one side about two-thirds of the distance from the bottom of the nest. At this stage a dummy would be complete. The walls average at least a half inch in thickness and the external measurements of the entire structure approximate seven and five inches for the vertical

and horizontal diameters, respectively. Inner diameters average five and three inches.

This outer shell is a small part of the completed structure, and only two days are required to build it. The remainder of the work is done from the inside and one must take a nest to pieces to get an idea of its arrangement. Grass and sedge leaves and small stems are used to form the second layer. This gives the walls firmness and tends to fill in the large air spaces which are necessarily present among the coarse materials of the outer walls.

The next layer to be added seems to function as an insulating region. Cat-tail down, feathers, small unidentified rootlets, entire



FIG. 3. Longitudinal section through male ("dummy") nest, left, and through female (occupied) nest, right.

plants of *Lemna*, and decayed fragments of *Typha* and *Carex* are the materials most often used. These also are placed into the structure in a wet condition so that, when dry, they form a compact and tight-fitting region which serves as a non-conductor of heat, cold, and moisture.

The innermost region is composed of finely shredded pieces of the vascular materials of the plants forming the outer layers. A large proportion of it is very fine strips of sedges and grasses of the preceding year. Feathers of almost any available sort are used here. Those from the following birds have been identified: Red-winged Blackbird, Virginia Rail, American Bittern, Pheasant, Ruffed Grouse.

and domestic chicken. The projection at the opening is a part of this inner lining. This "door-step" or sill is always present in the female nest but is lacking in the nests of the male. It is possible, therefore, to determine the sex which built a given nest by checking for the presence of this sill. This projection forms the floor of the opening and extends farther into the nest than any other part of the lining. The nest cavity is surprisingly small in relation to the bulky exterior. This cavity roughly resembles a sphere which has been compressed on the sides so that the vertical diameter has been increased at the expense of the horizontal. The opening into the nest, when viewed in longitudinal section, resembles a tunnel. Actual measurements of the cavity, together with external measurements, will be given later.

One wonders what the function of this door-step might be. Perhaps it serves as a protection to the eggs and young as the nest, owing to the uneven growth of the supporting plants, often assumes a distorted position which would allow the contents to roll out were it not for this structure. In like manner when the nests are placed in sedges or grasses winds alter the nests to such an extent that the young or eggs would be endangered if no sill were there to prevent the catastrophe.

Davie (10), Minot (24), Wilson (32), and others also report mud in the lining of nests of *T. palustris*. At no time was this found to be the case during the course of the present investigation. It is possible that a slight amount of mud adhered to the other materials in those instances and this was construed as an active desire on the part of the wren to add such material to the nest.

The outer dimensions are variable but average about seven by five inches. The wall at the widest part, at the door-step, averages about two and one-half inches while the remainder of that side and the bottom arc one inch narrower. The back and the top vary from one-half to one inch in thickness. The opening is usually one and one-quarter inches in diameter. The depth from the innermost tip of the step to the bottom of the nest averages two inches while the width of the interior from front to back is also two inches.

Dummy nests are not usually used as a basis for a female nest. In one particular case, however, where a nest was broken up the day preceding the time of hatching, the female appropriated a partially constructed nest which the male had worked on earlier in the season and had abandoned. She completed the nest in four days and on the fifth laid the first egg. This is the only instance of its kind observed and is decidedly out of the ordinary.

Nests, if carelessly attached to growing plants, are sometimes ruined. One was observed that was completely turned over due to uneven growth of two different cat-tails. Those placed in a large expanse of sedges and grasses may be destroyed by heavy winds and rain. Four out of six nests containing eggs or young were demolished during a severe storm. All of those which were attached to cat-tails withstood the attack of the elements and none of the young suffered. It is possible that the mortality from this cause might be very large during certain seasons.

A peculiar nesting relationship was noted by Beard (6), who observed a compound nest, the lower half occupied by a Red-wing and the upper half by a Marsh Wren. Evidently the two species lived together in perfect harmony as both contained clutches of eggs.

EGG LAYING

The day following the completion of the nest the first egg is laid, and from then on until the clutch is complete one egg is laid each day. The time of oviposition is from five until eight o'clock in the morning. At Ithaca the first eggs are laid in late May but the largest number of clutches are not completed until the first week in June, and the later arrivals do not begin to lay until June 15 or 20. The egg laying period for the second brood begins in late July. This varies, naturally, with the degree of success in bringing off the first brood. At Ithaca a nest was reported as late as August 7, while at Staples, Minn., most of the clutches were complete by July 25.

Forbush (12) gives the number of eggs as five to ten, usually five. Harlow (14) reporting on 196 nests found numbers from three to seven with five also the average number. Of the forty nests studied during the summer of 1931, five was the most frequent while three and six were the extreme numbers. Aldrich (in a paper read before the A. O. U. at Detroit, 1931) reported six the usual number for the first and five for the second brood.

A series of sixteen eggs in the Cornell collection vary in size from 17.5 mm. by 13 mm. to 13.5 mm. by 10 mm. with an average of 16.3 mm. by 12.5 mm. One of these was a runt egg measuring 13.5 mm. by 10 mm. Two clutches were weighed immediately after the sets were complete. Individual eggs varied from 1.41 g. to 1.56 g. with an average weight of 1.48 g.

INCUBATION

The female often begins to incubate before the clutch is complete, but waits, in all cases observed by the writer, at least until the third

egg is laid. In most nests young of two and often three ages can be found. In all of the nests under observation the eggs hatched on the thirteenth day. Forbush (12) gives the period as ten to thirteen days. These earlier dates are, perhaps, the result of figuring the period from the completion of the clutch to the time of hatching of the first young. Bowles (8) reports the eggs of the Pacific form, *T. p. paludicola*, under incubation from the time the first is laid. Wheelock (31) gives the period of incubation of this form as twelve days.

The duties of incubation are assumed only by the female. The male seldom comes near the nest and then is driven away by his mate. Wheelock (31) agrees with the present study in finding that the male takes no part in incubation while Miller (23) is in disagreement with this observation.

The female is easily excited during incubation and will leave the nest on the slightest provocation. Even on the very day the young are to hatch she will flush at a distance greater than fifteen feet. She remains near the nest, however, and shows much concern at the disturbance. The male, on the other hand, may be in the vicinity of the disturbance, but shows no interest in the matter.

On the thirteenth day the egg is cut into approximately equal halves by the egg tooth of the hatching bird. This cut is so regular and precise that one must marvel at the mechanical perfection of the operation.

THE YOUNG IN THE NEST

At hatching the young are blind and helpless. The tender flesh-colored skin is partially covered on the capital and spinal tracts by a few pure white neossotiles. The mouth lining is buff-yellow, the leg flesh-colored, and the skin covering the eye bluish-black. The slit which opens later is clearly discernible at this time.

The type of food delivered to the young by the female is determined to a certain extent by the age of the nestlings. At first this consists of very small juicy morsels such as mosquitoes and their larvae, larval Tipulids, midges, and other delicate forms. The mother brings a whole beakful of food to the nest at one time and parcels it out to the hungry occupants. Contrary to the opinion of Wheelock (31), the young at Ithaca were not fed by regurgitation for the food was not swallowed but crammed along the full length of the oesophagus. During the first days the young are so small and helpless that it is necessary for the female to reach far into the nest to feed them. During the morning and evening approximately ten trips are made per hour with food, but during mid-day this number is somewhat reduced.

As the nestlings grow the insects brought to the nest become appreciably larger in size. Ground, diving, and long-horned beetles, caterpillars of various assortments, saw-flies and other hymenoptera, and other accessible forms now constitute the diet of the ever-hungry young. Sometimes the insect is so large that the young bird experiences difficulties in swallowing it. In such instances the female takes the hexapod to the side of the nest, chops and tears it into several smaller morsels, and then brings it back for a second trial which is usually a success. In one particular case a medium-sized dragonfly was fed to a ten-day-old nestling. No attempt was made to break the insect into bits and no difficulty seemed to be encountered in swallowing the morsel.

After they have reached the age of eight or nine days, the nestlings stretch for their food so that the female now is not required to reach far into the nest. The nestlings crane their necks to such an extent that the parent often stands on the side of the nest and feeds the open mouths which appear at the opening.

There is much disagreement in the literature concerning the sexes of the parents which attend to the wants of the nestlings. Most writers seem to be of the opinion that the male assists in this duty. No male has been observed, in the nests studied by the writer, bringing food to the nest. This observation is in accord with Wheelock's studies (31). The young can be removed from the nest in the presence of the male without his showing the least concern while the female becomes greatly disturbed if one should approach even the vicinity of the nest.

Even when the nestlings are very young little time, during the day, is given to brooding. Usually after a feeding or two the young are brooded for a few minutes and then feeding is resumed. My records show a total brooding of eighteen minutes per hour when the young are two days old. As the nestlings increase in size the brooding periods become shorter and the intervals between such periods become longer, so that, after the first week, they are discontinued during the hours of daylight.

There is no need of protecting the nestlings from the sun's rays because of the peculiar type of nest construction. It is also possible that such nests aid in holding the heat given off by the birds so that brooding is reduced to a minimum.

The excreta, enclosed in their envelopes, are removed by the female after feeding. These droppings are usually carried some distance from the nest and deposited but occasionally the female has been observed eating them. Only one of these envelopes is removed at a time

and the parent will often hurry up the feeding trips in order to carry away the remaining ones.

When the young are small the faecal material is deposited in the bottom of the nest. As the nestlings increase in size, however, they maneuver about until they assume a position facing away from the entrance, and the dropping is ejected on the periphery of the nest. During the later period of nest life the young succeed in ejecting the excrement with such force that it is carried over the side of the nest and drops to the ground, relieving the female of the necessity of removing it.

Other materials are carried away in a similar manner. Egg shells have been observed twenty-five feet from the nest. Infertile eggs also disappear and it seems that the female must carry them away. No instance has been observed but the infertile eggs have often been found wanting after remaining in the nest several days beyond the normal period of incubation. It is entirely possible that the parent eats these infertile eggs but, if this is the case, they must certainly be removed first as no evidence ever remains at the bottom of the nest. Nestlings which have died from one cause or another are also removed.

The young Marsh Wren, as in the Cowbird in Friedmann's studies (13), soon establishes the power of orientation. When placed upon the back the newly-hatched bird will right itself. At first this is a difficult procedure due to weakness and a lack of co-ordination.

The food response is quickly acquired by the nestling. This response is usually accompanied by a faint *peet* scarcely audible at first. During early life contact seems to be the necessary stimulus but later merely a slight rustling of the leaves as the female approaches the nest is sufficient to cause the young to open wide their mouths and stretch forth their necks.

On the third day the eyes open. With the advent of sight fear begins to develop. At the least sign of danger the young assume a crouching position with the body flat and the neck drawn in. This position was often observed during the periods of weighing and seems to develop at about the fifth day, reaching its height during the second week of nest life.

During the first three days the nestling lies flat on its belly, having no control over the legs, but on the fourth day it assumes a more erect position, placing the weight on the entire tarsus. It has no control over the toes, however, and keeps them doubled up until the ninth day. During this time the wings are an important factor in movement. Shifting about in the nest is a combination of wing and leg

exercises. Grasping with the toes becomes very noticeable on the tenth day and the legs appear well developed at this time.

During the last days of nest life, due to the increased activity of the young, the nest has become considerably worn and no longer has the neat compact appearance of its earlier days. The opening has

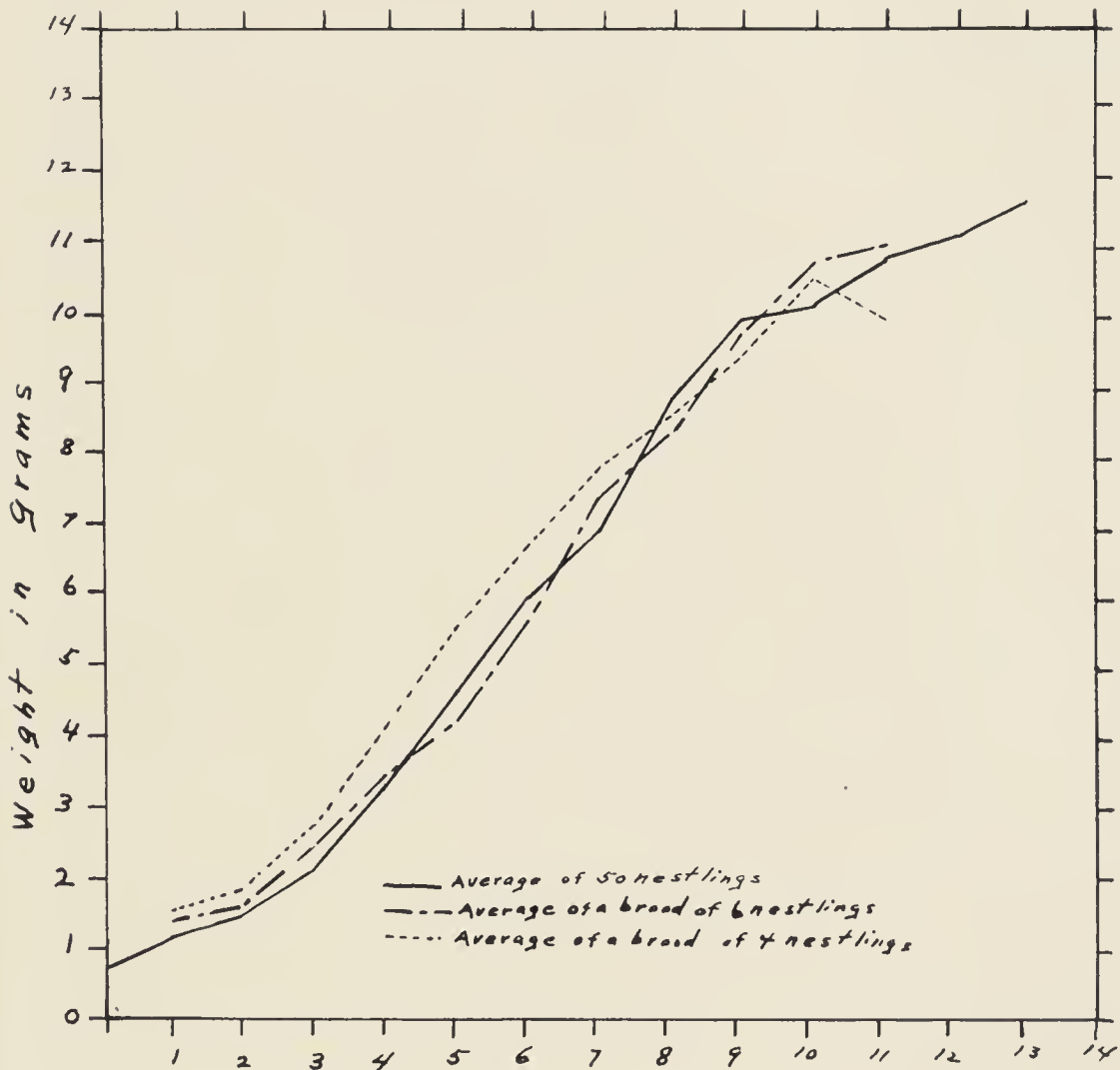


FIG. 4. Graph showing increases in weight of nestlings. Vertical scale shows weight in grams; horizontal scale shows number of days.

become greatly enlarged and the inner diameters have been increased by the young to compensate for their increase in size.

A series of nestlings from thirteen different nests was weighed at a definite time each day to determine the average rate of growth. More weights were obtained during the first seven days of nest life due to the fact that several nests and their contents were destroyed through one agency or another in the subsequent period.

In the first twelve days the young bird increases in weight approximately eleven times. The average weight for the newly arrived wren is .87 of a gram but by the end of the twelfth day this has been increased to an average of 11.08 grams. During this time the gain is from 1 to 1.7 grams a day. Due to the difficulty of being present at the time of hatching very few weights were obtained at that time. During the period of greatest feather growth the gain in weight drops off markedly (10th to 13th days).

In order to check on differences in gain in weight between broods with varying numbers of young, the nests selected for this particular study contained four, five, and six nestlings. No appreciable difference was observed so, no doubt, the females with large broods compensated for the additional members by working harder to supply the necessary food.

When the birds leave the nest they weigh between eleven and twelve grams. This is increased to approximately fourteen grams by the time they are ready to begin the southward journey.

On the twelfth day the young, if frightened or disturbed in any way, will leave the nest. In one particular instance all of the nestlings jumped from the nest and disappeared into the undergrowth at my approach. On the succeeding day, however, one of the birds was found back in the parental shelter. This was the only record of the kind observed but it would lead one to believe that the fledglings may return to the nest to spend the night or to seek protection during inclement weather. They usually spend the night perched upon the flags in the areas of dense rank growth.

The fourteenth day is the normal time of departure for all of the birds studied. At first they run along the ground or hop and half fly from one flag to another. This behavior is no doubt correlated with the fact that the tarsus is much better developed than the wings at this stage. The parents are very solicitous of the welfare of their progeny during this period and an approach to their near vicinity will call forth a series of scolding notes from both adults.

Observations at this season were quite difficult to make, due to the denseness of the vegetation and the fact that the young spend most of their time on or near the ground, and, as a result, are not altogether complete. The parents care for the young for at least two weeks. Wheelock (31) reported the young of the western form, *T. p. paludicola*, to be fed by the parents for twenty-six days. If this is true of *T. p. dissuëptus*, most of the work of the last ten days must be done by the male as the female then starts another brood.

In contrast to the period in the nest, both parents care for the fledglings. The male does little of the work at first but is usually in the near vicinity. At this time he seems to be more interested in the female than in his offspring. Gradually he assumes his share of these duties and toward the end of the second week after the young have left the nest seems to be doing more than his share. After the first ten days out of the nest the young are able to capture some of their food and so cut down to some extent the labors of their parents.

The family group remains together for some time and it is not unusual in mid-September to see four, five, and six birds of an age still keeping together. The young do not remain in the territory of their parents but wander from place to place. At first, as previously stated, they spend most of the time in dense matted and tangled places which offer the most protection. As they develop the power of flight and so no longer need to depend upon secure hiding places, they begin to frequent the more open areas near the water. These areas, usually nearest and farthest from the water, become the localities most favored by the young during the latter part of the summer.

THE SECOND BROOD

It is the general consensus of opinion of most writers that there are only two broods per year. It is extremely difficult to get accurate data on this subject but from the material on hand this seems to be the case. It is entirely possible that, with banded birds, more information could be obtained but the difficulty of locating these late nests due to the condition of the vegetation at that time would make the task considerably more complex. No instance which could be considered a third brood was observed by the writer. In some cases very late nests were located but these could be explained by abrupt and unsuccessful terminations to earlier attempts.

The second brood is not necessarily reared in the territory originally occupied by a pair of birds. It is usually the case for the birds to move into a more open area. At this time many of the nests are near the water's edge while for the earlier brood such locations are infrequent.

A new nest is built even though the original territory is used a second time. It is true that the former nest would not be useable because of its worn condition. The male does not enter into dummy nest construction with his former zeal, and in many instances none are constructed. One must not, of course, confuse late arrivals with second broods as the very latest birds often are just beginning to build at the time that the earlier birds are starting the second brood.

The initiation of the second brood naturally depends upon the success of the first. The female begins her second nest about two weeks after the young of the first have left the nest. The majority of the nests, then, in the regions studied would be started between July 15 and August 1, with the last week in July the most active period. Nests with eggs have been found at Ithaca up to August 5.

On the whole the second brood is much more matter-of-fact than the first. The males seldom indulge in song and long before the young are out of the nest they have ceased to sing entirely. By the first of September the adults have fulfilled their responsibilities as parents. As soon as they have completed the post-nuptial molt they begin their southern journey and usually leave the young to follow at a later period.

FOOD STUDIES

Because the Marsh Wren is confined to the marshes and swamps and does not come into contact with human habitations and so provide an economic problem, its food habits have not been studied intensively. The most thorough work was done by Beal (5) who examined fifty-three stomachs of this species. He lists the Hemiptera as the group of insects most often preyed upon with the Colcoptera and Lepidoptera second and third. Judd (21) examined five stomachs and reported Coleoptera and Arachnida as the most important foods.

It has not been the intention of the writer to work out the economic status of the species but rather to try to understand and interpret the relationships between food supply and food eaten, and manner of feeding and adaptations and specializations brought about by continued existence in the marsh, in order to determine the effect these things might have upon the survival of the birds in a less moist habitat.

Due to the fact that all of the food is obtained in the marsh, forms which are aquatic for a part or all of their existence constitute a large portion of the diet. Much of the food is obtained near or from the surface of the water. The elongated bill and natural agility of the bird are important adjuncts to this mode of feeding. Feeding operations are also carried on upon the stems and leaves of the cattails and other plants. It is not unusual to observe the bird as he sights a juicy morsel fly into the air and capture it in the manner of a flycatcher. Insects as large as dragonflies are taken in this way.

There is no actual selection of types of insects by the species but the food taken depends upon its predominance and accessibility. By the time the birds arrive in the spring there is an abundance of insect food. Beetles of various sorts form an important part of the diet

during this early period, together with aquatic larvae that have passed the winter in that stage. As the season advances insect food becomes more plentiful and examinations of stomachs reveal a multitude of forms.

Coleoptera and Diptera assume the highest rank while various other orders are represented to a lesser degree. Carabidae and Dytiscidae occur more frequently among the beetles than any other forms while a large percentage of the Diptera belong to the Tipulidae.

With the limited number of stomachs included in the present study it is not possible to state definitely any important features concerning the food taken. Both beneficial and detrimental insects are consumed. It is wholly possible that the Marsh Wren first took up his present habitat because of the abundance of insect food rather than a distinct preference for certain forms that are found there, it is not a matter of kinds of species but numbers of individuals and all seem equally desirable, if obtainable.

RELATIONS OF THE MARSH WREN TO OTHER FORMS OF LIFE

The chief enemies of the Long-billed Marsh Wren are some of the smaller mammals that reside in the marsh. Approximately one-third of the nests containing eggs or young were destroyed in some manner and a very large proportion of this destruction can be attributed to molestation by some form of mammal. No specific case has been observed but the appearance of the nest leads one to this conclusion. Entrance in all cases save one was obtained through the opening at the front of the nest. The structure itself was never torn or ruined in any way. The smallness of the opening and the fact that the nest was not damaged restricts the size of the intruder considerably. It is the writer's opinion that the blame can be placed upon at least one of three mammals: Meadow Mouse (*Microtus pennsylvanicus*), Jumping Mouse (*Zapus hudsonicus*), and Bonaparte's Weasel (*Mustela cicognani*). According to Allen (1) all of these forms occur in numbers in the cat-tail and sedge associations. Meadow Mice were exceedingly abundant throughout the summer of 1931 in the Renwick Marshes.

The Marsh Wrens suffer to a lesser extent from the destruction wrought by other species. Dr. A. A. Allen has observed Bronzed Grackles during the late summer consuming the luckless young of the later nests of the second brood. Other birds are not important from this standpoint; hawks and owls have a poor chance of adding this species to their diet as they are never very conspicuous and can easily hide in the dense vegetation.

Bumble bees have on various occasions used Marsh Wren nests for their own purposes. Whether they ever actually drive out the rightful owner and assume possession I am unable to say. Nevertheless it is apparently not unusual to find a colony of these bees in a nest of this species as Dr. Allen has several cases on record.

The parasites recorded for this species are few. Dr. Eloise B. Cram kindly supplied records of the flea, *Ceratophyllus garei*, and the louse, *Philoaterus mirinotatus mirinotatus*. Hippoboscid flies, evidently *Ornithomia avicularia*, have been observed several times but at no time was it possible to obtain specimens. The alimentary tracts of more than fifty birds were examined carefully without obtaining a single cestode or nematode.

The Long-billed Marsh Wren usually lives in harmony with its associates in the marsh. It practices to some extent the habit of puncturing the eggs of other birds in a manner similar to that of the House Wren. Allen (1) describes this practice in detail and gives the Marsh Wren the blame for breaking up fourteen out of fifty-one nests of the Red-winged Blackbird. From these records one would be led to believe that the habit is very common and that the percentage of prospective birds destroyed in this way is large. It is the opinion of the writer that these instances concern only a few of the birds and that the great majority do not enter into this pernicious practice. Many nests of other species of birds were under observation in the marsh and at no time were punctured eggs found or other indications of egg eating by the Marsh Wren observed.

DISCUSSION

Undoubtedly the Marsh Wren took up its present habitat a long time ago as denoted by its degree of specialization. Allen (1) considers the Redwing a comparatively recent addition to the avifauna of the marsh. Following his method of reasoning the Marsh Wren must have taken up its present residence at a much earlier period as indicated by certain factors. In the first place the species has become specialized as regards the elongation of the bill and the tendency toward reduction in use of the wings. At present the Marsh Wren is a relatively poor flyer with the female seldom taking wing. A continuation of life in the present habitat will most assuredly lead to further reduction of this ability. Secondly, all of its time is spent in a marsh environment. The Redwing takes up residence in this situation only long enough to bring about perpetuation of the species. Thirdly, it does not revert easily to dry land when conditions in the marsh be-

come unfavorable, even though the southern forms occasionally nest in bushes. At Ithaca a colony was located nesting in a dry marsh grown up to sedges and grasses. Of the four nests observed in this region all came to an untimely end due to the heaviness of the nest in proportion to the supporting plants. The nests were so badly mangled by a wind-storm that eggs and young fell to the ground. Nests in cat-tails during the same period easily withstood the onslaught of the storm. Nests constructed in the cat-tails have a much greater chance of success than others indicating that the birds, being most accustomed to this type of supporting plant have been marsh residents for a long period. Lastly, the Marsh Wren, unlike the Redwing, seeks shelter in the marsh rather than depending upon flight for safety.

Perhaps originally the Marsh Wren took to the marsh because of the abundance of food, lack of competition in this less favored environment, and the shelter afforded. Owing to continued existence in this habitat specializations of various sorts have developed making it almost mandatory for the species to continue its present mode of living. Were the species to gradually change its habitat to the more extensive but less moist meadows and semi-dry marshes of grasses and sedges the most necessary change, in my opinion, would be a less bulky nest placed lower on the supporting plants. The Short-billed Marsh Wren has adapted itself to this type of environment and its nesting activities are attended with success.

As the marshes become less extensive the Long-bills will find it necessary to adapt themselves to a life in a dryer situation. This change will come about gradually as certain members are forced to nest farther and farther from the center of the colony. These birds, in order to survive, must adapt their nest structure to the nature of the supporting plant and in this way bring about a gradual evolution which will permit the species to continue to exist even when marshes are no longer present. At the present time some of the nests around the border of the colony are somewhat modified due to the nature of the flora in which the birds find it necessary to build.

The Marsh Wren, while unequivocally a specialized species, is sufficiently adaptable to meet changing conditions and will, as necessity demands, gradually assume a place in an environment consisting of associations of grasses and sedges. It is a specialized species but not so specialized that it cannot live apart from its present habitat.

LITERATURE CITED

1. Allen, Arthur A. The Red-winged Blackbird: a study in the ecology of a cat-tail marsh. *Abst. Proc. Linn. Soc. N. Y.* 43:128. 1914.
2. ————. April in the marshes. *Bird Lore* 25:145-146. 1923.
3. ————. *Book of bird life.* D. Van Nostrand Co., N. Y. 1930.
4. Bailey, Florence M. *Birds of New Mexico.*
5. Beal, F. E. L. *Birds of California in relation to the fruit industry.* U. S. D. A. *Biol. Surv. Bull.* 30:62-64. 1907.
6. Beard, Dan C. Compound nest of *C. palustris* and *A. phoeniceus*. *Sci. Am.* 47:119. 1882.
7. Bicknell, E. P. A study of the singing of our birds. *Auk* 1:126-240. 1884.
8. Bowles, J. H. Notes on *Parus rufescens* in western Washington. *Condor* 11:56. 1909.
9. Bryant, Walter E. Unusual nesting sites. *Forest and Stream* 29:463. 1888.
10. Davie, Oliver. *Nests and eggs of North American birds.* Hann and Adair, Columbus. 409. 1889.
11. Eaton, Elon Howard. *Birds of New York.* Albany. 489-491. 1914.
12. Forbush, Edward Howe. *Birds of Massachusetts and other New England states.* Mass. Dept. Ag. III:350-352. 1929.
13. Friedmann, Herbert. The Cowbird, a contribution to the study of parasitism in birds. Ph.D. thesis, Cornell Univ. 1923.
14. Harlow, Richard C. Notes on the breeding birds of Pennsylvania and New Jersey. *Auk* 35:14-61. 1917.
15. Hoffman, Ralph A. *A guide to the birds of New England and eastern New York.* Houghton, Mifflin and Co., N. Y. 88-90.
16. Howard, H. Elliot. *Territory in bird life.* John Murray, London. 1920.
17. ————. *An introduction to the study of bird behavior.* Cambridge Univ. Press. 1929.
18. Hunt, Chreswell J. The Marsh Wren's midnight song. *WILSON BULLETIN* 16:13. 1904.
19. Hunter, J. S. The bird fauna of Salt Basin, near Lincoln. *Proc. Neb. Orn. Union* 1:28. 1900.
20. Jones, Lynds. Some migration records along the Cedar Point sand pit, Erie County, Ohio, 1906. *WILSON BULLETIN* 18:130. 1906.
21. Judd, Sylvester D. Birds of a Maryland farm, a local study of economic ornithology. U. S. D. A. *Biol. Surv. Bull.* 17:107. 1902.
22. Langille, J. Hibbert. *Our birds in their haunts.* Orange Judd Co., N. Y. 392-394. 1892.
23. Miller, Richard F. Long-billed Marsh Wren. *Qol.* 23:117-124. 1906.
24. Minot, H. D. *The land-birds and game-birds of New England.* Houghton, Mifflin and Co., Boston. 77-78.
25. Norris, J. Parker. Nest of the Long-billed Marsh Wren. *Orn. and Oöl.* 11:36. 1886.
26. Ridgway, Robert. *Ornithology of Illinois.* 1:99-101. 1899.
27. Saunders, Aretas A. A question concerning the distribution of the Long-billed Marsh Wren. *Auk* 39:267-268. 1922.
28. Shufeldt, R. W. Life history of the Long-billed Marsh Wren. *Oöl.* 43:154-156. 1926; 44:2-4, 18-19. 1927.
29. Taverner, Percy A. *Birds of Western Canada.* Victoria Mus. Bull. 41:338-339. 1926.
30. Townsend, Charles W. The birds of Essex County, Massachusetts. *Mem. Nut. Orn. Club* 3:306. 1905.
31. Wheelock, Irene G. *Birds of California.* A. C. McClurg and Co., Chicago. 289-292. 1912.
32. Wilson, Alexander. *American Ornithology.* Bradford and Inskeep, Philadelphia. 58-60. 1810.

STATE TEACHERS COLLEGE,
MOREHEAD, KY.

A STUDY OF THE SAVANNAH SPARROW IN WEST VIRGINIA

BY THOS. E. SHIELDS

To me, the Savannah Sparrow (*Passerculus sandwichensis* subsp.) has been an interesting bird ever since I became familiar with it. That was one reason why I chose (1) to make a study of this species in 1934. The other reason was that, prior to 1934, there were no nesting records of the Savannah Sparrow for West Virginia, and I hoped to find a nest of this species.

Until June, 1931, we did not know that this species was a summer resident in the West Virginia Panhandle, which includes Hancock, Brooke, Ohio, and Marshall Counties. In the last week of that month, Sarah Hine saw a strange bird at Oglebay Park, Ohio County. Reinhold Fricke of the Carnegie Museum, was at Oglebay at the time, so he visited the spot where the bird had been seen, and found both a male and a female Savannah Sparrow. Fricke collected the female (2) which proved to be an Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*). Examination showed the bird had been brooding.

During the summer of 1932, this species was listed occasionally at Oglebay. In the summer of 1933, it was listed more frequently. I found at least two different males singing in separate parts of the Park, during this period.

In January, 1933, Dr. Sutton's annotated list (3) of birds of the West Virginia Panhandle, was published. He showed the Savannah Sparrow as "decidedly rare and local as a summer resident," giving no nesting records. Sutton also pointed out that the Panhandle contains Transition Life Zone birds, as well as Upper Austral Life Zone birds. Since Dr. Chapman (4) showed the Eastern Savannah Sparrow as breeding in the Canadian and Transition Life ones, we might expect to find it breeding in the West Virginia Panhandle.

All of these things led me to believe that the Savannah Sparrow nests in this locality, so in May, 1934, I started to look for a nest of this species.

I was not successful until May 26, when, in a field at Oglebay Park, Ohio County, I flushed a female Savannah Sparrow from its nest, when I was but five feet away. I immediately discovered the nest, the first to be recorded in the state of West Virginia. It contained five eggs.

This record was published in the June, 1934, issue of the *Redstart* (5)-(6), the July, 1934, *West Virginia Nature News* (7), and in the December, 1934, issue of the *WILSON BULLETIN* (8).

A. B. Brooks, Oglebay Park Naturalist, made several photographs of the nest on May 27.

While visiting this nest, I found another pair of Savannah Sparrows in a field adjacent to the one in which I found the nest. I tried several times to find the nest of these birds, and on June 12 I was rewarded for my efforts. This nest contained two young birds and one sterile egg. When I returned to the nest on June 13, the young had flown, so no photographs of this nest were made.

The balance of this paper is devoted to the information gathered in my study of this bird. I am indebted to my associates in the Brooks Bird Club for some of this information. These associates, whose names appear in this article, are Sarah Hine, A. B. Brooks, Lloyd Poland, Russell West, Charles Conrad, Clyde Upton, and James Handlan.

To my knowledge, the Savannah Sparrow does not occur in West Virginia in winter. At least, I have not been able to find any winter records of this species for West Virginia. I am quite sure that it does not winter in the Panhandle, because neither Dr. Sutton nor the members of the Brooks Bird Club have listed it during that season, and they cover a goodly portion of the Panhandle.

This bird reaches the Panhandle in its spring migration around the last of March or the first of April. The local migration records of this species are rather incomplete, since they cover only 1933 and 1934, but I believe they are approximately correct. In 1933, this species was first listed on March 28, while in 1934, it was not listed until April 7 (9). The earliest migration record for each spring was made near water. In 1933, Russell West found this bird at Beech Bottom Swamp, Brooke County, for the first record, while Charles Conrad and George Floner made the first 1934 record at the same place. This indicates that the species migrates in spring along or near bodies of water. I recall distinctly that in 1933 and 1934, we did not find a Savannah Sparrow in its summer habitat at Oglebay Park, which is some distance from any bodies of water, until several weeks after the bird was seen at Beech Bottom Swamp, even though we were constantly watching for this species at Oglebay. At the Wheeling Country Club golf course, which has small bodies of water scattered over it, this bird was listed on April 8, 1934, one day after it was recorded at Beech Bottom Swamp.

Apparently the Savannah Sparrow is a spring migrant in scattered parts of West Virginia. It certainly occurs in migration at Terra Alta in Preston County, where it is a summer resident. I was at this

place for two weeks in the summer of 1933 and found several pairs there. Bibbee (10) states he has found this species in spring migration in Wood County. The Panhandle, Preston County, and Wood County are all some distance apart from one another.

In West Virginia, the summer habitat of the Savannah Sparrow is in large upland fields and in large fields bordering bodies of water, at elevations of approximately 1175 feet or more. The seven places in Ohio County where this bird is known to reside during its breeding



FIG. 5. Nest of the Savannah Sparrow, Oglebay Park, Ohio County, W. Va., May 27, 1934. Photographed by A. B. Brooks.

season all come under the classification of large upland fields. However, at Terra Alta, I found this species in large fields by Lake Terra Alta as well as in upland fields some distance from the lake. As to elevation, the fields at Oglebay Park where I found the Savannah Sparrows nesting, are approximately 1250 feet high. Another field at Oglebay, where I found a pair of these birds, has the same elevation. The field at Oglebay where this species was recorded in 1931, 1932, and 1933, and where I finally found it in 1934, has an elevation of about 1175 feet. At Carter's farm, a short distance from Oglebay, I found the bird at an elevation of 1300 feet. Clyde Upton reported Savannah Sparrows at the Wheeling Country Club golf course in the summer of 1934. This place is adjacent to Oglebay and the elevation there is about 1175 feet. Charles Conrad reported this species at Romine's Farm, a few miles from Oglebay, during the same period

and I believe this farm is approximately 1200 feet high. At Fawcett's farm about five miles from Oglebay, A. B. Brooks found a Savannah Sparrow in the summer of 1933. This farm is the highest in Ohio County, the elevation there being 1385 feet. The points I have referred to are all rather high for this region, the average elevation for Ohio County being about 700 feet, I believe. At Terra Alta, West Virginia, where the elevation is close to 3000 feet, I found several pairs of these birds in the summer of 1933.

The Savannah Sparrows in the West Virginia Panhandle must begin nesting during the latter part of May. I found a nest on May 26, when the complete set of five eggs was in it; and another on June 12, when the young were almost ready to leave the nest. Forbush (11) gives May 21 to June 29 as nesting dates for this species in Massachusetts, while Chapman (4) gives May 19 as the nesting date for Utica, New York.

The two nests which I found were slightly different in construction. They were both in small cup-like depressions in the ground, but the first was more cleverly concealed than the second. The first nest was at the foot of a stalk of grass, and did not protrude above the ground. It was made of a few fine grasses, very neatly placed in a cup-like hole in the ground. The second nest was bulkier, protruding slightly above the ground. It was made of coarse grasses lined with finer grasses. The two nests were at the same elevation, and were separated by a road. The distance between them was about 150 yards.

There are not enough data available to say how many eggs the Savannah Sparrows in this region lay. One nest I found contained five eggs, while the other nest must have had three eggs in it, since there were two young birds and one sterile egg in it when I found the nest. Reed (12) and Roberts (13) show this species as laying three to five eggs, and my records check with these figures. However, some other authors give slightly different figures.

The eggs of this species are ovate in shape. It cannot be said that the eggs are one particular color, because of their variation. The many authorities on bird eggs give quite different descriptions of the color of Savannah Sparrow eggs. The eggs in the first nest were all I had to observe, since the sterile egg in the other nest was covered with excreta. However, of the five eggs in the one nest, four of them were very pale brown with cinnamon-brown spots about the larger end. The other egg had a bluish tinge, while the spots on it were cinnamon and more pronounced. It may be of interest to note that the one egg which was colored more brilliantly than the others was

the only fertile egg in the nest. I can find no information to the effect that fertile eggs differ from infertile eggs in color, but that was certainly true in this instance, although it may have been only an accident.

The fact that the two nests contained five infertile eggs and three fertile ones, is very interesting. It is known that birds on the edge of their breeding range lay a high percentage of infertile eggs. The fact that the nests I found contained a large number of infertile eggs, may indicate that the West Virginia Panhandle is on the edge of the breeding range of the Savannah Sparrow, and, since this range lies to the north, the Panhandle would be on the southern edge. Allen (14) explains that birds on the edge of their breeding range, are not so likely to be in mating rhythm as those toward the center of their breeding range; and, as a result, the birds on the edge of their breeding range are less likely to produce fertile eggs. There must be some reason for such a high percentage of infertile eggs (62.5 per cent), and Allen's explanation seems plausible.

My nesting records extend the breeding range of this species approximately forty-five miles southward along the Ohio River in this district. Formerly, there were no nesting records below Columbiana County, Ohio, in the Upper Ohio Valley.

I regret to say that I do not have any data on the rearing of the young of the Savannah Sparrow. I watched the first nest for three weeks waiting for the eggs to hatch, but they didn't hatch. Since, according to Roberts (13), the incubation period for this species is twelve days, I felt sure the eggs would not hatch after twenty-one days, so I collected the nest after that much time had elapsed. There was only one egg which was not cracked by that time, so I broke it and found a partially developed young bird in it. Apparently the adult birds had allowed this egg to cool after the embryo had developed to a certain extent. Of the seventeen days in which I visited this nest, I found one of the birds on it nine times. The adult was on the nest as late as June 12, or seventeen days from the time of my finding the nest.

The other nest was not found until the day before the young left it, so, I had no opportunity to observe how these young birds were raised. The best I could do was to make notes on the plumage of the juvenile birds.

Although I cannot say definitely, since the male and female Savannah Sparrows have practically the same appearance, I believe the female did all of the incubating in the first nest. At least, when

I was able to distinguish between the two adults. I found that the female was or had been on the nest.

The two juvenile Savannah Sparrows which I observed, were a mixture of brown and yellow. The base of the bill was bright yellow, and the underparts were yellow with brown streakings. These streaks were not as prominent as those on adult birds of this species. The back was mostly brown, with some yellow parts. There was just a suggestion of the yellow streak over the eye. Altogether the young birds were much brighter in color than the adults.

In studying the habits of this species, some interesting things came to light. One of the first things to impress me was the action of the female bird when I approached its nest. It would allow me to come as close as five feet from the nest, before it would leave it. Then the bird would hop from the nest and drag its wings, pretending to be wounded. After it was about twenty-five feet away, it would run through the grass like a field mouse. While this was going on, the male would keep chirping insistently, scarcely pausing at all. The female chirped only occasionally and even then not so loudly as the male.

The Savannah Sparrows in this region are very scary. I could not get closer than fifteen feet to any of them, except when one was on the nest or when young were in the nest. Blanchan (15) says this bird, in the north, loses the shyness which makes it so little known in the southern part of its range. It certainly is very shy in this section, and the same is true of this species at Terra Alta.

When the Savannah Sparrow is flushed from the nest, and the observer retires to a spot about fifteen yards away, the male bird chirps constantly, attracting as much attention as possible. If the observer keeps his distance for a while, the female will gradually work her way back to the nest, crawling through the grass for some distance, while her mate continues chirping. I saw this done a number of times and the routine never varied, except when the bird was so frightened that it would not return to the nest for a long while.

If this bird knows you are watching it, it will peek at you from some bush, with only its head and neck visible. It will twist its head around to get a better look at you, but will keep fairly well hidden. This habit helps in identifying the bird.

On several occasions, I noticed the adult Savannah Sparrows giving a harsh "bss" when I was at their nest. This was a new note to me, and upon referring to various authorities, I found only Forbush (11) recorded this utterance. He said the birds give this note

when two of them are quarreling, but I think otherwise. One bird will give this note when its mate is not near, so it could hardly be called a quarreling note. I am sure it is an alarm note, since I heard it only when I was very near the nest.

The ordinary chirp of this species is a sharp "*tsip*". Its song is generally recorded with three introductory notes, but the birds in this region almost always give four introductory notes in their song. Sometimes the observer does not hear one or two of these first notes, if he is not close to the singing bird. I find only Eaton (16) shows that this species gives three or four beginning notes in its song.

While the Savannah Sparrow is essentially a bird of the fields, it is sometimes found in small trees, bushes, and on fence posts. This bird has a number of favorite perching places, and there the male sings frequently. Only twice did I ever hear a Savannah Sparrow sing from the ground, once at Oglebay and once at Terra Alta.

Apparently the Savannah Sparrows in West Virginia nest here only once a year. On July 14 and July 21, 1934, I visited four stations in Ohio County and could not find a single Savannah Sparrow. I am sure I would have seen one had any been there, for I knew a number of their favorite perches. James Handlan, who spent most of the months of July and August, 1934, at Terra Alta tells me he did not list a Savannah Sparrow there after July 20. This indicates that the birds move to another region after their first nesting period is ended.

In concluding this paper, I would like to call attention to several things which I consider important. First, that the Savannah Sparrow does nest in West Virginia. Then, that the West Virginia Panhandle may be on the southern edge of the breeding range of this species. Also, that my nesting records extend the breeding range about forty-five miles southward in the Upper Ohio Valley. Another thing worth considering is that this bird may be extending its range southward. Either this is the case, or we are finding the bird more because we have become more familiar with it. Campbell (17) found similar circumstances in Ohio and he thought it likely the Savannah Sparrow was extending its range southward. I am not so sure that this is the case in the Panhandle. Almost all of the present stations in Ohio County are fields that have not been covered previously to any extent by ornithologists, and it is possible we may have overlooked this species.

It might also be well to consider the fact that the Savannah Sparrow requires an elevation of 1175 feet or more in this region.

Christy (18) found this species in Western Pennsylvania only at an elevation of 1200 feet. I am sure that elevation plays a large part in the Savannah Sparrow's selection of breeding sites, as there are numerous fields in this region which would be suitable for this species, were it not that they are too low.

I consider the alarm note of the Savannah Sparrow an important discovery, as is the song which I have recorded different from previous descriptions of this bird's song.

Finally, this species is no longer "rare as a summer resident" in the West Virginia Panhandle. I would call it uncommon in this region, and I would say that it is still local, since all of the summer stations of this bird in the Panhandle are within a radius of five miles.

As to its status in the state of West Virginia, I think Brooks' classification of "decidedly rare" (19) should be changed to "rather rare and local in distribution".

BIBLIOGRAPHY

1. Contest News. Charles Conrad. Redstart, Vol. 1, No. 4, pp. 3-4, 1934.
2. The Birds of Oglebay Park. Reinhold L. Fricke. Cardinal, Vol. 3, pp. 49-54, 1932.
3. Birds of the West Virginia Panhandle. George Miksch Sutton. Cardinal, Vol. 3, pp. 101-124, 1933.
4. Handbook of Birds of Eastern North America. Frank M. Chapman. Pp. 520-521.
5. Some Ornithological Contributions by the Nature School. A. B. Brooks. Redstart, Vol. 1, No. 6, pp. 1-3, 1934.
6. State Nesting Record. Tom Shields. Redstart, Vol. 1, No. 6, pp. 3-4, 1934.
7. Savannah Sparrow's Nesting Is Recorded. West Virginia Nature News, Vol. 1, No. 1, p. 2, 1934.
8. The First Nesting Record of the Eastern Savannah Sparrow for West Virginia. Thos. E. Shields. WILSON BULLETIN, Vol. 46, p. 256, 1934.
9. Brooks Bird Club 1934 Migration List. Redstart, Vol. 1, No. 6, pp. 5-6, 1934.
10. Birds of West Virginia. P. C. Bibbee. Bulletin 258, Agricultural Experiment Station, College of Agriculture, West Virginia University, 1934.
11. Birds of Massachusetts and Other New England States. Edward Howe Forbush. Vol. 3, pp. 53-56.
12. North American Birds Eggs. Chester A. Reed. P. 253.
13. The Birds of Minnesota. Thomas S. Roberts. Vol. 2, pp. 385-386.
14. Sex Rhythm in the Ruffed Grouse and Other Birds. Arthur A. Allen. Auk, Vol. 51, pp. 180-199.
15. Bird Neighbors. Neltje Blanchan. Pp. 155-156.
16. Birds of New York. Elon Howard Eaton. Vol. 2, pp. 288-290.
17. A Southward Movement of Breeding Savannah Sparrows in Ohio. Louis W. Campbell. WILSON BULLETIN, Vol. 40, pp. 223-225, 1928.
18. The Summer Range of the Savannah Sparrow. Bayard H. Christy. Cardinal, Vol. 3, pp. 70-71, 1932.
19. Birds of West Virginia. Earle A. Brooks. West Virginia Encyclopedia, pp. 60-74.

OGLEBAY PARK,

WHEELING, W. VA.

NOTES ON THE RENAL BLOOD-VESSELS OF RAPTORIAL BIRDS

BY F. L. FITZPATRICK

As has been noted in a previous paper, text-book descriptions of bird kidneys usually refer to the kidneys of the chicken or the pigeon. Usually these are illustrated as being composed of three more or less equal lobes.

In the case of Cooper's Hawk the anterior lobe is much larger than either the middle or the posterior (caudal) lobe. The anterior and middle lobes are continuous, but the posterior lobe is separate. On each side of the body the ureter appears on the ventral surface of the middle lobe (kidney), proceeds along the ventral surface of the posterior lobe, and thence posteriorly, where both oviducts open separately into the urodaeum.

With slight variations this appears to be substantially the same situation that is found in the Eastern Red-tailed Hawk, the Barred Owl, and the Great Horned Owl.

However, in the Turkey Vulture the situation is somewhat different. The anterior lobe of the kidney is large as in the preceding cases, but the remainder of each kidney is partially divided by constrictions into what appear to be three lobes, and the ureter emerges at the posterior end of the kidney.

In the case of the male Eastern Red-tailed Hawk (*Buteo b. borealis*) the main circulatory connections of the pelvic region proved to be as illustrated in the accompanying diagram.¹ The dorsal aorta passes between and dorsal to the kidneys in the midline. Two renal arteries enter the anterior lobes of the kidneys. Farther posteriorly two femoral arteries are given off which pass dorsal to the middle lobes of the kidneys, give off a branch in each case to the dorsal body wall, and extend laterally to the body wall, where they branch to the body wall and the region of the hind limbs. Although these arteries are figured as giving off renal arteries to the middle and posterior lobes of the kidneys (pigeon) in some text-books, this did not appear to be the case in hawks of the genus *Buteo*. Then the dorsal aorta gives off a pair of sciatic arteries which pass laterally, and dorsal to the posterior lobes of the kidneys.

As will be seen in Figure 6, a large iliac vein crosses the ventral surface of each kidney between the anterior and the middle lobe. Short branches from the anterior lobe connect with this vein in *Buteo l. lineatus* and presumably in *Buteo b. borealis* as well. The two iliac

¹Terminology as given by Parker.

veins unite in the midline to form a large postcaval vein, which of course is ventral to the dorsal aorta in position.

It will be noted that each iliac vein receives three main branches, one of which is a renal vein from the posterior lobe of the kidney. The second is an extension of the so-called "renal portal vein", which according to Parker gives off only a few minor afferent renal vessels in passing through this lobe.² This renal portal vein discharges into the femoral vein just distal to the point where the latter vessel joins

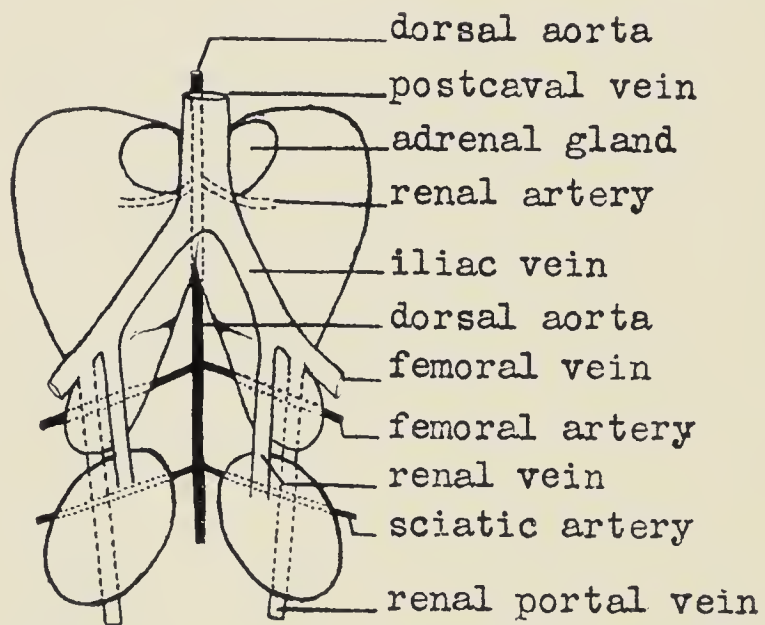


FIG. 6. Diagram of the renal blood-vessels in a Red-tailed Hawk.

the renal vein to form the iliac vein. The third is the femoral vein. It is with respect to these branches that variation among different species is most evident. Finally, two veins which are figured as "renal portal veins" in some text-books extend to the posterior lobes of the kidneys from the posterior end of the body.

The foregoing description of the larger blood vessels associated with the urinogenital organs appears to be more or less typical of the North American hawks and owls mentioned in the foregoing discussion, although it is subject to some variation among the species studied, and no doubt to somewhat less individual variation as well.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY,
NEW YORK, N. Y.

²Note: These branches might be efferent renal veins in this case. Parker's work refers to the pigeon.

ROBERT HENRY WOLCOTT

BY MYRON H. SWENK

Dr. Robert Henry Wolcott was born at Alton, Illinois, on October 11, 1868. His father was Robert N. Wolcott and his mother Agnes (Swain) Wolcott. It was in the neighborhood of Grand Rapids, Michigan, however, that as a boy Wolcott pursued his earliest interests in biology. His first publication, dealing with bird observations in the vicinity of Grand Rapids, was published in the *Ornithologist and Oölogist* in 1884, when he was a sixteen-year-old student in the Grand Rapids High School, from which he graduated in 1885. Soon after this graduation young Wolcott entered the University of Michigan at Ann Arbor, where he received the Bachelor of Law degree in 1890, the Bachelor of Science degree in 1892, and the degree of Doctor of Medicine in 1893. As a young man in the University, Wolcott found numerous opportunities for biological field work in the vicinity of Ann Arbor. During these years he associated considerably with that group of Michigan bird students that organized the Michigan Ornithological Club in 1895. After the organization of this club, Dr. Wolcott contributed articles, dealing with the nesting of different species of Michigan birds, to the *Bulletin of the Michigan Ornithological Club*.

Instead of engaging in the practice of law or medicine, upon the receipt of his B. L. and M. D. degrees from the University of Michigan, Dr. Wolcott engaged as a member of a party making a biological survey of the waters of the state of Michigan, with special reference to the fish supply, during the summer of 1893. He continued this work during the summer of 1894, in which year he received a call to continue graduate study and act as an assistant in the Department of Zoology at the University of Nebraska, which appointment he accepted. His work in Nebraska ornithology began, therefore, in the fall of 1894, and continued over a period of forty years until his death at Lincoln on January 23, 1934. On June 2, 1897, Dr. Wolcott was married to Miss Clara Buckstaff of Lincoln, who, with a brother, son, and daughter, survives him.

Four years after his removal from Michigan to Nebraska, in 1899, while Dr. Wolcott was holding the position of Adjunct Professor in the Department of Zoology, and with the successful organization of the Michigan Ornithological Club fresh in mind, he coöperated with Professor Lawrence Bruner, then Chairman of the Department of Entomology and Ornithology at the University, in the organization of a Nebraska Ornithological Club at Lincoln. It so happened that at almost exactly the same time, but quite independently, there was also a

Nebraska Ornithologists' Association organized at Omaha. A combination of these two organizations in the summer of 1899 resulted in the establishment of the Nebraska Ornithologists' Union, which held its first annual meeting at Lincoln on the following December 16. Dr. Woleott was the first Recording Secretary of the new state organization. He retained that office by successive re-elections during the years 1900-01 to 1903-04, and the first three volumes of the *Proceedings of the Nebraska Ornithologists' Union* were brought out under his editorship in 1900, 1901, and 1902, respectively. At the close of his fifth year as Secretary, Dr. Woleott retired from that office in order to accept the office of President of the organization, on January 30, 1904. Subsequently he was three times re-elected to this office, in 1916, 1923, and 1924.

Dr. Woleott's first papers on Nebraska birds included one published in the *Bulletin of the Michigan Ornithological Club* in 1899, dealing with birds noted in Nebraska in the fall and winter of 1898-99, and others in the *Proceedings of the Nebraska Ornithologists' Union* in the years immediately following the establishment of the latter organization. In 1899, Dr. Woleott returned to Grand Rapids for a summer of field work, varied with a month spent in similar work at Batavia, Illinois. In 1900, he spent the early summer in the field at Woods Hole, Massachusetts, and August of that year at Indiantown Island, Maine. During these two summers a great portion of his attention was devoted to the birds, as extensive ornithological notes during this period from the several localities just mentioned testify.

The year after his arrival in Nebraska, Dr. Woleott was made an instructor in the Department of Zoology at the University of Nebraska, and received the degree of Master of Arts at that institution. Three years later (1898) he was promoted to be Adjunct Professor of Zoology. In 1902, he became Assistant Professor of Zoology and Demonstrator in Anatomy, and the following year was again promoted, to be Associate Professor of Zoology, in charge of the Anatomy Laboratory. Two years later (1905) he was given the rank of a full professor, with the title of Professor of Anatomy. It was he, largely, who developed the pre-medical work in the University of Nebraska, then under the administration of the Zoology Department. In 1909, Dr. Woleott was made Chairman of the Department of Zoology and acting Dean of the College of Medicine. When a permanent location for the College of Medicine of the University was to be chosen, Dr. Woleott selected Omaha, but he himself chose to stay at the main University in Lincoln, as Dean of the Junior Medical College there, and to con-



ROBERT HENRY WOLCOTT

tinue his administration of the Department of Zoology. In 1915 he severed official connection with the College of Medicine, and assumed the more restricted duties of Professor of Zoology and Chairman of the Department, which remained his status until his death.

Dr. Wolcott's interest in living things was not confined to the field of ornithology. He was keenly interested in entomology as a boy and young man in Michigan, and continued that interest during his residence in Nebraska. His particular interests lay with the butterflies, moths, and beetles. At the time of his death he left an incomplete treatise on the butterflies of Nebraska, and a similar account of the tiger-beetles and other families of beetles as represented in that state. His most serious interest, however, was in the family of American water mites, in which group he became, through researches carried on at Nebraska during the decade beginning about 1898, the generally regarded American authority. In 1905, he published a synopsis of the genera of water mites, this paper following revisions of the North American species of several of the genera of the group. During the last few years of his life he devoted a great deal of labor to a textbook in beginning zoology, which was published under the title *Animal Biology* only a short time before the onset of his fatal illness. Dr. Wolcott was one of the co-authors of the *Preliminary Review of the Birds of Nebraska*, published in 1904, and author of *An Analysis of Nebraska's Bird Fauna*, published in 1909, his two most important contributions to ornithology.

For almost the whole of his very active life, Dr. Wolcott was in splendid health, due in part, no doubt, to his love of the out-of-doors, to which he resorted at every opportunity. He was an enthusiastic sportsman, and was elected an honorary member of the Lincoln chapter of the Izaak Walton League. Through his summer teaching work, he was able to broaden his field experiences in different parts of the United States. In the summers of 1901, 1904, 1905, 1907, 1924, and 1925, he was in charge of the biology courses at the University of Missouri, at Columbia. In the summers of 1923, 1926, and subsequently, he carried on similar work at the Puget Sound Biological Station in Washington state. He joined the American Ornithologists' Union in 1901 and in 1903 was elected a member of that organization. In 1924 he became an active member of the Wilson Ornithological Club and remained so up to the time of his death. In 1909, he was invited to represent Nebraska in the Advisory Council of *Bird-Lore*. He was a Fellow of the American Association for the Advancement of Science, and a member of the American Society of Zoologists,

American Society of Naturalists, American Microscopical Society, Ecological Society of America, Entomological Society of America, Nebraska Academy of Science, and an honorary member of the Michigan Academy of Science, in addition to those societies mentioned above. He belonged also to the Society of the Sigma Xi, Phi Delta Theta fraternity, and the American Association of University Professors. He was a thirty-third degree Scottish Rite Mason, and his burial in Wyuka Cemetery in Lincoln, on January 25, was in charge of Lincoln Lodge No. 19, A. F. & A. M.

UNIVERSITY OF NEBRASKA.
LINCOLN, NEBR.

BIRDS AT A RAIN-POOL IN MASSACHUSETTS IN OCTOBER, 1933

BY SAMUEL A. ELIOT, JR.

Readers of the WILSON BULLETIN may be interested to imagine the Connecticut Valley of New England as a miniature Mississippi Valley—a north-south trough (a natural migration route) with high ranges on the west and lower hills on the east. But the average mid-western bird-student might be surprised that although it is so near the ocean, this minor inland river-system, with all its ponds and swamps, lacks or almost lacks a number of water birds. Just because the sea is within rather easy flying-distance, sea-loving birds are hardly more than accidental in the middle section of the Valley (that which crosses Massachusetts), and most shore birds are rare. Among our “accidentals” may be named the Red-throated Loon, Leach’s Petrel, Gannet, Barrow’s Golden-eye, Surf Scoter, Ruddy Turnstone, Hudsonian Curlew, Knot, Purple Sandpiper, Red Phalarope, Great Black-backed Gull, Laughing Gull, Common Tern, and Dovekie. Among water birds which are now and then recorded, not by accident but as transients in very small numbers, we list the Double-crested Cormorant, American Brant, Snow Goose (probably Greater), Gadwall, Shoveller, Redhead, Canvas-back, Old-squaw, White-winged Scoter, Ruddy Duck, Red-breasted Merganser, Golden Plover, Black-bellied Plover, Willet (probably Western), Red-backed Sandpiper, Dowitcher (subsp.?), Sanderling, Northern Phalarope, Black Tern, and Brünnich’s Murre. At the seashore, a hundred miles away, most of these are regular and some are abundant. Many of them are far more common in the middle of

North America, a thousand miles inland, than here. Common both farther inland and on the coast, but not yet once discovered here, are the Piping Plover, Western Sandpiper, and others.

With great delight, therefore, was I shown by a bird-loving friend a rain-pool in Hadley that teemed with water birds. It had existed only since the terrific rain of September 16, 1933, and was not found until September 30. It filled the lower angles of two fields separated by a brook—a bare tobacco-field on the east, a weedy cornfield on the west. Farther east was a steep ascent, clothed with birch and maple; farther west, more farm-fields; to the north the bush-bordered brook, and to the south a stretch of half-drowned, boggy land in which one could often find shore birds that one had missed at the pool itself. The Connecticut River makes a great bend around Hadley, and this pool was not far east of a straight line across the peninsula, such as migrants flying down-stream would be likely to take. When flushed, the birds usually flew southwest or northwest towards the nearer parts of the river.

The only other places in the vicinity of Northampton where water birds could be looked for with expectancy were in the Oxbow region, five miles southwest of this pool; at the six small sewer-beds of Amherst, four miles east; and at the sandy river-bank, a mile or two south, which is a much better place in the late spring shore bird flight than in summer and fall. A few records of shore birds at these three locations are included in the accompanying table, but they were merely supplementary to the surprising assemblies found morning after morning at the Hadley pool. The latter was forty minutes' bicycle-ride from my home, but so striking was the opportunity that I missed not a morning from September 30 through November 2.

On the first day, the friend who took me to the pool had seen, he said, "a lot of Dowitchers, and some Stilt Sandpipers". The latter has never been recorded here, and Dowitchers (since 1901) only in September, 1905, 1919, and 1928; so I was keenly disappointed that a few hours later neither species could be found. We did observe many Killdeers, several Greater and Lesser Yellow-legs, 3 Pectoral and 2 Solitary Sandpipers, and 1 Snipe; also a dozen Blue-winged Teal, 2 Green-winged, and 1 Pintail. The next day, arriving about sunrise, I noted 10 Blue-wings, 5 Green-wings, the Pintail, 5 Black Ducks, 3 Wood Ducks, and a Pied-billed Grebe, besides the shore birds

recorded on the table. Of these, the great prize was of course the Baird's Sandpiper. At Pittsfield on August 30, 1933, I had made what seems the first record of this species in western New England north of the Connecticut coast. At Hadley, on October 1, I saw the first in the Connecticut Valley.

The two Least Sandpipers of October 1 were seen by another observer later in the morning. The White-rump was noted by still others in the late afternoon, consorting with the Baird's. One Least was at the pool October 2, 4, and 6—probably one and the same bird, temporarily absent on the "odd" days. The species had never previously been seen herabouts later than September 7. The White-rump, though missed on October 2, was present on the six following days. After a week of none, another showed up on October 16, a third Octo-



FIG. 7. The Rain-pool, with Mt. Holyoke in the distance (left), and Mt. Tom (right), between which the Connecticut River flows. Photographed by Dr. W. Elmer Ekblaw.

ber 19 and 21. On the 22d visibility was poor and the two smaller sandpipers companioning the first thrilling, too-absorbing Red-backed flew away before they were well viewed; but White-rump is the most probable identification. On the 24th no shore birds were at the pool when it was reached, at 7 A. M., but at 7:45 a flock of Killdeers with the still strangely red-backed, unmolted Dunlin I had noted among them on the 23d flew to it from the north, and a small sandpiper, "probably White-rump but perhaps Semipalmated" as I wrote at the time, came from the south and joined them. This flock fed on the upper, dry part of the tobacco field, not at the pool's edge. It flushed

SHORE-BIRDS AT A TEMPORARY RAIN-POOL IN HADLEY, MASS., IN OCTOBER, 1933

[Figures in brackets represent birds reported by other observers there]

SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						
Killdeer.....	25	20	20	40	20	15	12	10	12	5	3	9*	5*	26	25	7	30	30	1	60	15	23	25	24	2	4	4										
Ring-neck Plover.....																			1	1																	
Golden Plover.....					1	1																															
Black-bellied Plover.....																																					
Wilson's Snipe.....	15	16	20	20	10	15	6	5	25	12	6	9	13	15	10	2	16					12	3	5			4			1	4						
Spotted Sandpiper.....	1†																1*																				
Solitary Sandpiper.....	2†	1§	1		1		1		1	1																											
Greater Yellowlegs.....	6	8	3	4	2	2	5				1	1	1		2		1	3			1	1		2	1		1	†	1		1	3	3				
Lesser Yellowlegs.....	6	4	2	2	3	3	3	2	2																												
Pectoral Sandpiper.....	6	3	5	2	3	2	1				1	2					1	5			2	1			6									2	2		
White-rumped Sandpiper.....	[1]		1	1	1	1	1	1							1						1	1	1		1	2	1	†	3	†		1					
Baird's Sandpiper.....	1																																				
Least Sandpiper.....	[2]	1		1	1																																
Red-backed Sandpiper.....																																					
Semipalmated Sandpiper.....	1	1	2	2	2	2	3	4	5	7	5	6	5	2	2	2	1	1	1																		

*—At River.

†—2 miles west.

‡—4 miles east.

§—1 mile east.

||—5 miles southwest.

¶—Dead.

+—1/4 mile west.

promptly, flew far southwest, and descended on another waterless field there. On the 25th, the Dunlin and White-rump were feeding at the water's edge but flew up to join the Killdeers on the higher ground and departed with them for another dry field to the west. Later another, more brownish, scaly-backed, summery White-rump appeared at the pool's margin with two very small Pectoral Sandpipers. On the 26th, after a frigid night, the pool was iced over, but a reconnaissance across the farm land to the west flushed two Dunlins, in the gray dress proper to the season, and chanced upon the headless body of a gray White-rump, probably destroyed by a cat. On the 27th the pool was not visited until noon, when little ice was left. Two Red-backs were there, with—not a White-rump—but a most surprising Semipalmated Sandpiper. This species had shown an orderly wax and wane in the first nineteen days of October, its numbers swelling to a maximum of seven on October 10, then dwindling evenly to the last one, October 17-19. Our latest previous date had been October 11 (1919) at Springfield. Three White-rumps on the 27th had, however, already been seen at the Amherst sewer beds. The last was at the partly frozen pool at noon October 29; and a second small sandpiper, probably of the same species, flew off before it could be well observed. Later that day a friend found there the last Red-backed Sandpiper. Our latest White-rump record is October 31, 1925, but the Red-back has been very rare with us (the only recent record I know of is October 16-17, 1932); so these several late-coming birds at or near the pool were a very welcome find.

On only two days in all October did I completely miss water birds at this pool. October 20 was the first day of the pheasant-shooting season and I suppose that early hunters had scared the birds away before I got there. October 28 a strong north wind was blowing, and the birds were probably in the more sheltered, marshy country just to the south, where on October 30 and 31 I found the three species recorded on the table for those days. On November 1 these had gone and a single Killdeer was all I could find; November 2 there was nothing, and I ceased daily visits. On November 8, though the pool itself was frozen, two Greater Yellow-legs were to the south; and on November 11, when not a bit of unfrozen water or soil remained, one bird of this species, young-of-the-year, flew mournfully by, southeastward, faintly calling. Our latest previous date for Greater Yellow-legs was October 24, 1932.

The Lesser Yellow-legs, hitherto not known later than September 26, lingered at the pool until October 10. The Solitary Sandpiper was

last seen that same day. It has been recorded as late as October 20 (1929). The Spotted Sandpiper was not noted at the pool at all, but one was on the sandy river-beach October 17, two weeks later than its normal departure-date. The Pectoral Sandpiper resembled the Greater Yellow-legs in numbers and dates. It has become much more common here in the last few years than it used to be. The "Birds of Massachusetts" gives October 30 as its normal, November 11 as its latest, final date, but we know of one killed twenty miles south of here on November 23, 1901, at a still-open meadow spring. Two snipe were shot with it, and once or twice snipe have occurred even in December, but the extraordinary thing about the Hadley snipe of October, 1933, was not their date or even their large flocks but their overt, unwary assembling on the bare tobacco-field, where they probed the mud left by the slowly evaporating pool precisely as dowitchers might. Only their peculiar crouch, and immobility in that ungraceful pose, showed that instinctively they still relied on protective coloration—effective indeed among grasses but almost useless on this exposed site. Prominent they certainly were, second in this respect only to the Yellow-legs and Killdeers. Killdeers were the most noticeable bird about the pool, the only one remarked by most passers-by. The sixty counted on October 21 formed the biggest aggregation of Killdeers we have ever beheld here. This species was always the first to take alarm, and give it. In the early part of the month one flushed the Killdeers and, counting them in the air, watched them depart with real relief to be rid of their screaming, before one tried to scrutinize the other birds present. If any had flown away with the Killdeers, it or they usually returned at once, whereas the two-belted alarmists were not likely to come back while the observer stayed.

The three other plovers provided the happiest surprises, next to the Baird's Sandpiper, of this unprecedented shore bird month. The Golden Plover's arrival and departure, both, were witnessed. At 7:30 on October 5, a cloudy day of chill northeast winds, its sharp iambic call in the northern sky heralded its descent to the pool, where it associated with the Pectorals, Semipals, and White-rumps. It made a long flight westwards towards the river when too closely neared, but returned when the regretful observer retired. The next morning, about the same hour, after a night of rain, this immature plover rose into the air with the first scary Killdeers and headed their flock, flying with a single sharp call almost directly south. The Killdeers zig-zagged and circled; they were not bound for South America; but this dark-eyed youngster, all alone, absolutely inexperienced in migration,

seemed to have a compass in his brain, knew what was "south" and went there, straight and swift. Once an abundant fall migrant down our river (Forbush, 1912, p. 344), the Golden Plover has been almost absent for half a century. The only recent record before this was one of a similar lone young bird associating with Killdeers on the river sands, August 31, 1931.

The Semipalmated Plover was a very tired, quiet young-of-the-year discovered at the pool's edge at 7:30 on October 18. The single Pectoral and Semipalmated Sandpipers bathed, preened, and fed close by it, while it stolidly rested. At 8:30 next day it was more active, and it was seen by others that afternoon. It probably departed early October 20 when every other shore bird deserted the pool. This species has become a regular late-May transient in recent springs, but is still unusual on its southward flight, and our latest date heretofore was September 12.

The Black-bellied Plover is merely casual with us, and when the young bird of October 26 was first glimpsed, running over a harrowed field near a frozen little pool, and a single Killdeer, it was taken for another Golden. Like the Golden, it returned after being flushed. Its long bluish legs and cool rather than brown coloration looked suspicious, and of course in flight its white eroup, black axillars, and warble positively identified it. The previous night had been very cold (the main pool, two miles farther east, was ice-skimmed and without birds), and this occurrence seems phenomenally late.

The ducks that were at the pool on October 1 have been mentioned above. On October 2 there were 12 Green-winged Teal. October 3, stalking the western, weedy part of the pool behind corn-shocks, I got close to a flock "dipping" on it of 12 Green-wings, 1 Blue-wing, 6 Black Ducks, a female Mallard, 3 Pintails, and a male Wood Duck. This was the high point. October 5, 1 Green-wing and 2 Pintails; October 6, 2 Green-wings; October 7, a Pintail and a Black Duck; October 11, 1 Pintail; October 15, 2 Green-wings; October 16, the same (?) two in the air, closely accompanied in all their evolutions by six snipe; October 17, 2 Black Ducks, 1 Green-wing, and 2 larger, white-bellied ducks, either Wood or (I rather guess) Baldpate; and October 18, 1 Black, completes the duck story. Such a list, for a temporary, shrinking pool exposed to a road (and the duck-shooting season opened on October 16), is somewhat notable.

Of land birds the most conspicuous were Pipits and Rusty Black-birds. The former were seen every day and were more numerous than I ever imagined they could be here, but on the last three days of Octo-

ber only a few appeared, and on November 1 and 2 only a single bird. The Rusties swarmed in the cornfield, but they too declined in numbers after October 25, whereas Grackles and Redwings proportionately increased then. Several times Redwings attacked Yellow-legs in the air, as if the latter were birds of prey, but the other blackbirds did not. Horned Larks first appeared October 23, and were noted in small flocks, flying, on most subsequent visits; and on October 30 hundreds of them were studied on the meadows to the west, and found to include a white-browed Prairie Horned Lark among each fifty or so Northerns. In the thickets to the east the first Fox Sparrow of the fall was noted on October 16, and the first Tree Sparrow October 21. A single Mourning Dove (rare here in autumn) was present for eight days, October 18-25. Remarkable late records were those of an adult male Nashville Warbler October 19 and 20, a Phoebe October 23, and a Northern Yellowthroat October 26. A Junco with peculiarly blackish coloration, extending farther down its breast than usual, and with two distinct but narrow white wing-bars, was observed at close range on October 23; and another with brown back and pinkish sides on October 28; but no names or claims are to be attached to either. Eight or nine kinds of hawks were noted during the month, including a Duck Hawk October 31 and two Rough-legs October 16 and 29; and the body of a recently shot Short-eared Owl was stumbled on in the fields to the west on October 31.

Disappointments, besides that at the failure to confirm my friend's Dowitchers and Stilt Sandpipers, were the absence of Sanderling, Western Sandpiper, Phalaropes, Coot, Gallinule, Ruddy Duck, and Horned Grebe. For each, I entertained some hope until the ice closed down. So far as I know, no member of the heron family ever visited the place, and I heard of but one Woodcock in the adjacent thickets. But a backward survey of the thirty-four consecutive visits paid to this spot is deeply satisfactory, and a gratifying memory to keep for years to come.

SMITH COLLEGE,
NORTHAMPTON, MASS.

BIRD NOTES FROM THE BIGHORN MOUNTAIN REGION
OF WYOMING

BY JOHN W. ALDRICH

During the summer of 1930, I spent the months of July and August collecting birds for the Cleveland Museum of Natural History in the central northern part of Wyoming. During about six weeks of my stay I made my headquarters on the Bear Claw Ranch which is owned by Dr. Gordon N. Morrill, of Cleveland. This ranch is located on the northeastern slopes of the Bighorn Mountains four miles northwest of Dayton, and about seven miles south of the Montana border. The elevation of the ranch varies from 4,500 to 5,500 feet. The other two weeks were spent in the mountains themselves at altitudes varying from 7,000 to 11,000 feet.

The birds obtained on this trip have been carefully identified by Dr. Harry C. Oberholser by comparison with large series of specimens. The nomenclature used is as given by him. The following annotated list is comprised of such species as were deemed worthy of report because of the unusualness of their occurrence in the region described or because the locality was close to the supposed limits of their range. In most cases specimens were taken and when this was not the case the bird is not here recorded unless it is one with which I am very familiar in the field.

CANADIAN LONG-BILLED CURLEW. *Numenius americanus occidentalis*. Two juvenile specimens, male and female, were taken on the open prairie at Bear Claw Ranch, altitude 4,500 feet, on July 20. These two specimens were taken from a group of three birds seen on several preceding days near the same place.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus*. On July 3 two of these birds were seen in the fringe of aspen and box elder bordering Smith Creek at about 4,500 feet. On almost every day thereafter one individual was observed up until July 20. No specimens were taken, but on one occasion, when I was not collecting, I was successful in calling the bird up to within fifteen feet of where I stood by imitating its call. At this distance the red eye-ring was clearly visible and identification positive.

WESTERN RED-HEADED WOODPECKER. *Melanerpes erythrocephalus erythrophthalmus*. Only one of these birds was seen on the trip. It was a juvenile male specimen collected on the Tongue River near Dayton on July 26.

WESTERN KINGBIRD. *Tyrannus tyrannus hespericola*. This species was seen regularly all over the countryside below 6,000 feet. One

pair nested near the ranch house. One or more birds were seen on every trip around the ranch. On August 6, eight kingbirds were seen in the vicinity of Dayton.

CATBIRD. *Dumetella carolinensis*. In brushy places about the ranch one might expect to run into this species fairly regularly. On July 3 and 4 I saw six birds each day. One was seen almost daily in the flower garden beside the house.

AMERICAN PIPIT. *Anthus spinoletta rubescens*. Above timberline (10,000 feet) on the rocky alpine slopes of Elk Peak, which was climbed on July 16, this was the only bird recorded. Six pipits were constantly flying nervously about from rock to rock "pipping" continuously. It is assumed that their actions denoted the presence of young birds in the vicinity. Certainly the flocks of pipits which I observed in August behaved in an entirely different manner. The latter birds, which were observed at about 9,000 feet, ran along quietly on the ground and would not have been noticed had they not been flushed by my approach, so closely did their colors harmonize with their surroundings. Even in flight they were absolutely silent. The flock contained both pipits and Western Vesper Sparrows (*Pooecetes gramineus confinis*). The records of pipits seen in the Bighorn Mountains are as follows: July 16, Elk Peak, altitude 11,000 feet, six; August 12, twenty-five miles west of Dayton, altitude 9,000 feet, five; August 13, at the same locality, about fifty. One specimen was collected on August 12.

WESTERN YELLOW WARBLER. *Dendroica aestiva morcomi*. In the low willows bordering streams at the lower altitudes this was a very common bird. It was frequently heard singing in the shrubbery about the house. On July 31 a specimen was taken on Bear Claw Ranch at an altitude of 4,500 feet. On August 15 two yellow warblers were seen in the willows along Fool Creek in the Bighorn Mountains at an elevation of 8,000 feet. These individuals probably did not breed there as they had not been seen previously at so high an altitude.

AMERICAN REDSTART. *Setophaga ruticilla*. This species was seen on four occasions in the box elders fringing Smith Creek at an elevation of about 5,000 feet, not more than one pair being seen on any one day. The dates of observations were between July 3 and 29.

BOBOLINK. *Dolichonyx oryzivorus*. Several pairs of these birds were found nesting in the alfalfa fields at Bear Claw Ranch between 4,500 and 5,000 feet. On July 11, I found a young Bobolink just out of the nest and unable to fly more than a few feet. On August 6, a flock of approximately twenty-five juvenile Bobolinks were observed

feeding in the hay fields near Dayton. One of this group was collected.

BRONZED GRACKLE. *Quiscalus quiscula aeneus*. During the first few days of July a few scattered grackles were seen about the ranch. On July 6 a juvenile specimen barely able to fly was collected near the ranch house. By July 21, flocks of grackles had begun to gather and were seen roosting about in the trees and feeding in the hayfields. These flocks grew steadily in size and on August 27 I estimated 500 birds seen in the vicinity of Dayton. Fifteen specimens of Bronzed Grackles were collected on July 6, 24, 26, and August 2 and 3. All of these turned out to be juvenile birds in various stages of molt.

WHITE-WINGED JUNCO. *Junco aikenii*. On August 12, a juvenile female specimen of this species was collected from a flock of Pink-sided Juncos (*Junco mearnsii*) in the Bighorn Mountains, twenty-five miles west of Dayton at an altitude of 9,000 feet. If this example represents a breeding record, as it seems to do, it is an extension of the breeding range of the species from the Bear Lodge Mountains in the northeastern corner of Wyoming.

CLEVELAND MUSEUM OF NATURAL HISTORY,
CLEVELAND, OHIO.

WATER BIRDS OF A VIRGINIA MOUNTAIN COUNTY

BY J. J. MURRAY

A mountain county in Virginia seems an unpropitious place for the study of water birds. And it is true that as compared with the coastal regions of any of the Atlantic states or with the lake country of the north our water bird life is not large. But in the course of a considerable amount of field work, with special reference to water birds, I have been struck with the number both of species and individuals that can be found here. So little work has been done in this section during the migration period that the results of this field work may be of some interest.

The county on which this study is based is Rockbridge County, Virginia, and the data were gathered over a period of five years, from 1928 to 1933. Rockbridge County, taking its name from its famous Natural Bridge, is centrally located in the Valley of Virginia, just south of latitude 38°, and about two hundred miles from the coast and the great tidal waters of Chesapeake Bay. The northern boundary of the county is the watershed between the Shenandoah and James River systems; the eastern is the crest of the Blue Ridge; while the western runs along the top of some outlying ridges of the Alleghanies.

The altitude at Lexington, the county seat, is 1,000 feet, most of the valley land running from 800 to 1,500 feet. The mountains generally reach an altitude of something over 3,000 feet, some points in the Blue Ridge rising to 4,000 feet. One can pass in an air line distance of seven miles from an elevation of 750 feet at Balcony Falls Gap to 4,000 at the peak of Thunder Hill. The eastern half of the county, from the foot of the Blue Ridge westward beyond Lexington, is rolling hill country, while the western half is very rugged, with high hills, mountain ridges, and isolated peaks. The fauna of the valley floor is Carolinian, while that of the higher foothills and mountain areas covers the extremes of the Alleghanian zone. One would expect to find the Canadian zone in areas above 3,500 feet, but since these areas only occur as islands and there are no high coniferous forests no Canadian birds have been found breeding within the county.

Roekbridge County has but one large river, the James, which cuts across its southeastern corner. Most of its territory is drained by the North River, a small tributary of the James, with two branches, the South River, flowing at the foot of the Blue Ridge, and the North River proper, or Maury River, coming out of Goshen Pass in the Alleghanies and flowing east through the center of the county. The county is abundantly supplied with small streams, all of which are swift and rocky, with only occasional stretches of quiet, deep water. There are no natural lakes. The Adcox Knob Lake, from which Lexington gets its water supply, is an artificial lake high up in the mountains covering about fifteen acres and surrounded by woods. The caretaker tells me that flocks of ducks stop on it at times, but the only birds that I have found on my occasional visits are Pied-billed Grebes. Cameron's Pond, three miles north of Lexington, is a shallow marshy stretch of water of three or four acres, varying greatly in size according to the wetness of the season. It is surrounded by open pasture, except for a willow thicket at one end. There are no houses near. I have driven an automobile within a few feet of the water's edge and watched ducks feeding a hundred yards away, sometimes forty to sixty individuals and as many as six species at once on this tiny pond. Big Spring Pond, seven miles west of Lexington, is slightly larger, with long finger-like reaches stretching away from the main area. It is fed by large springs. The water is from two to five feet deep, grown up except in the center with eat-tails, *Nymphaea*, *Bidens*, and other water plants. At the ends there are thickets and patches of open woods. For the rest it is surrounded by pasture and bordered by a farm yard. In spite of the fact that the farm house is situated on the hillside only fifty yards

from the water ducks come to the pond rather freely. Most of my water bird records have been made at Big Spring and Cameron's Pond.

Surprisingly small places are utilized here by water birds during the migrations. I have known ducks and grebes to spend the night on the city reservoir, which is merely a concrete basin some thirty yards in diameter, set on an open hilltop near a highway. In spite of the small number of suitable places I have listed twenty kinds of ducks. Marshy spots are very scarce in a region like this and mud banks not at all common, consequently fewer species of shore birds have been recorded. We have only one resident water bird, the Killdeer, and only four summer residents of which I am sure, the Great Blue Heron, Green Heron, Upland Plover, and Spotted Sandpiper. The Pied-billed Grebe, Bittern, and Woodcock possibly breed very sparingly. This paper presents data on fifty species of water birds, all but one of which I have personally observed. The list follows:

COMMON LOON. *Gavia immer immer*. Rare transient. Mr. Chas. O. Handley, who was a student at Washington and Lee University at Lexington from 1919 to 1921, saw one on North River, May 8, 1921. One was shot on the same river about 1890. An injured bird was brought to me on December 13, 1932. It died a few days later after being liberated at Big Spring.

(I have seen a mounted specimen of a Red-throated Loon (*Gavia stellata*) in winter plumage which had been taken near Covington, in the adjoining county of Alleghany. On April 14, 1933, from the top of Jump Mountain (3,190 feet) I saw a flight of seventeen loons. They were too high overhead for me to be certain about the species but appeared small enough for *stellata*).

HORNED GREBE. *Colymbus auritus*. Uncommon transient. Mr. Handley tells me that a dead bird of this species was found on April 11, 1920. I saw four in bright breeding plumage at Cameron's Pond, April 13, 1928; one in winter plumage on North River, December 24, 1929; two in breeding plumage at the city reservoir, March 31, 1933; and one in gradually deepening breeding plumage at Cameron's Pond, March 24 to April 13, 1933.

PIED-BILLED GREBE. *Podilymbus podiceps*. Fairly common transient, in spring, March 19 to May 18; in fall, September 1 to November 17. I saw twenty-one together at Adcox Knob Lake, September 17, 1928. Prof. R. S. Freer, of Lynchburg, Va., and I watched a pair at Big Spring, April 3, 1931, in courtship antics, one in full breeding plumage with bill distinctly banded, the other still in the duller hues of winter. The fact that a grebe was seen there as late as May 18

makes me think they may have bred. At this season and later the growth of *Bidens* in this pond is so high as to make it almost impossible to locate nesting birds.

DOUBLE-CRESTED CORMORANT. *Phalacrocorax a. auritus*. Accidental. On April 30, 1924, a cormorant struck a high chimney on the campus of Washington and Lee University and fell, only slightly injured. It was kept alive for several days, some of the students fastening a cord to one of its feet and taking it to a nearby stream, where it dived for fish. It later escaped, was shot and brought back to the biological laboratory. It was preserved in alcohol but was later thrown away. I did not know of it until too late to see it. It was identified as a cormorant. There was some question at the time as to the species, but it was most likely, of course, *auritus*.

GREAT BLUE HERON. *Ardea h. herodias*. Uncommon summer resident March 2 to September. Seen mainly along North River and Buffalo Creek. I have no evidence of breeding. One bird has wintered each season from the fall of 1928 to the spring of 1932 in the neighborhood of Big Spring, which because of its springs never completely freezes over.

AMERICAN EGRET. *Casmerodias albus egretta*. Rare summer visitor. I had it reported to me by a good observer in the summer of 1929. I saw one at Big Spring on many occasions from July 26 to September 26, 1932; one at Roop's Pond, near Lexington, July 9, 1933; and two at Big Spring July 18, 1933.

LITTLE BLUE HERON. *Florida c. caerulea*. Fairly common visitor in mid-summer in the white phase. June 29 to September 5, mainly in early July, occurring usually in small flocks but sometimes as many as twenty together. I have seen them at Cameron's Pond and Big Spring, and they occur at other small ponds. They seem to be increasing in number, and during July, 1933, were abundant. I have seen no blue birds here.

EASTERN GREEN HERON. *Butorides v. virescens*. Common summer resident, March 22 to October 21. I found a nest with two eggs, May 20, 1927, in an apple orchard a mile from the nearest stream; a nest with four eggs, June 28, 1932; and other nests with young late in June.

AMERICAN BITTERN. *Botaurus lentiginosus*. Uncommon transient in spring. Eight records, April 1 (1933) to May 18 (1931). It is possible that this last date may indicate a breeding bird.

COMMON CANADA GOOSE. *Branta c. canadensis*. Rare transient, formerly common. Flocks are not infrequently heard passing over, but I have only two recent records of their stopping. I saw three at

Big Spring, March 30, 1931. One of these was noticeably smaller than the other two, apparently small enough to be a Hutchins's Goose (*B. c. hutchinsi*). They were within a stone's throw of the farm house but did not appear very restless, not even taking flight when I exposed myself to view. The caretaker at Adcox Knob Lake reported fourteen on November 19, 1931.

COMMON MALLARD. *Anas p. platyrhynchos*. Common winter visitor. October 3 to April 8, less common in mid-winter. Although not so common as several other ducks, this is the most generally distributed of the ducks that occur here.

RED-LEGGED BLACK DUCK. *Anas r. rubripes*. While it is usually too difficult to distinguish this subspecies from the next in the field, I have felt certain of seeing this form in one or two cases, particularly an apparently crippled bird that I watched for a long time from cover at very close range at Big Spring on April 4, 1930. The bright coral legs and yellow bill were clearly seen in bright sunlight.

COMMON BLACK DUCK. *Anas rubripes tristis*. Common transient, October 29 to December 24, and March 5 to April 13. I have a record for February 1, 1930, but no January records. I also have records of a crippled bird on May 27 and 31, 1930. On July 2, 1930, I saw two standing on a rock in Buffalo Creek that showed no signs of being crippled. When I stepped out of the automobile they rose rapidly and flew away at high speed.

GADWALL. *Chaulelasmus streperus*. Rare transient. Two males and a female were seen at Big Spring, along with three Black Ducks, on various occasions from November 25 to December 30, 1929; a female at Cameron's Pond, October 31, 1932; and a pair at Cameron's Pond, November 7, 1932.

BALDPATE. *Mareca americana*. Uncommon transient. I have five spring records, March 11 to 28, including a flock of eight males in very bright plumage and six females at Cameron's Pond, March 11, 1930; and a male, with crown strongly tinged with buff, along with two females at Big Spring, March 20, 1931; also one fall record of a female at Big Spring from October 27 to December 2, 1930.

AMERICAN PINTAIL. *Dafila acuta tzitzihua*. Uncommon transient. I have six spring records of some eighteen birds, February 20 to April 6; also one fall record of a female brought to me on November 13, 1928, a male having been shot at the same time.

GREEN-WINGED TEAL. *Nettion carolinense*. Transient, fairly common in spring, March 16 to April 18; scarce in fall, three records, October 31 and November 1 and 3, all in 1932.

BLUE-WINGED TEAL. *Querquedula discors*. Transient, common in spring March 20 to May 12; one fall record, a female at Big Spring, October 1, 1931. They occur on the rivers as well as on the ponds. I have seen as many as twelve in a flock.

SHOVELLER. *Spatula clypeata*. Transient in spring, uncommon, nine records of some sixteen birds, March 23 to April 8; one fall record, a male at Cameron's Pond, November 12 and 14, 1932.

WOOD DUCK. *Aix sponsa*. Rare transient in spring. Mr. Handley saw a male fly up from the ground on the bank of North River some time in the spring of 1922. I have seen the following at Cameron's Pond: a female, March 8, 1930; a pair, April 4, 1930; a pair, April 14, 1930.

LESSER SCAUP. *Nyroca affinis*. This is our commonest duck, occurring mainly in spring, March 11 to May 4; one fall record, a male at Cameron's Pond, November 12 and 14, 1932. I saw a male on June 10, 1929, and a pair on June 13, 1929, which were probably cripples although they could fly well, and another male on July 6, 1929, that was still badly crippled. These late birds were at Cameron's Pond.

REDHEAD. *Nyroca americana*. Rare transient. A male seen at Cameron's Pond and on North River from March 20 to April 6, 1929. It was very tame, swimming in the river without noticing ears passing on a highway not over thirty yards away. A female was seen on May 2, 1932.

RING-NECKED DUCK. *Nyroca collaris*. Uncommon transient, nine records of twenty-eight birds in spring, March 18 to May 2; three fall records, a female brought to me from Buffalo Creek on November 25, 1929, a female at Cameron's Pond on October 31, 1932, and a male on North River, December 12, 1932.

CANVAS-BACK. *Nyroca valisineria*. Rare transient, one female at Cameron's Pond, March 24, 1933.

AMERICAN GOLDEN-EYE. *Glaucionetta clangula americana*. Uncommon transient. Five records: a male found dead at Cameron's Pond, March 18, 1929; a male in North River, April 3, 1930, swimming near a much travelled road and but little disturbed by the passing cars; a female at Big Spring, December 22, 1932; a male, March 21, 1933; a female, April 21, 1933.

BUFFLE-HEAD. *Charitonetta albeola*. Rare transient. Three records, a female, April 15, 1929; a female, March 23, 1932; and a young male, March 28, 1932; all at Cameron's Pond.

OLD-SQUAW. *Clangula hyemalis*. Rare transient. One record, a

male with molt to summer plumage incomplete, April 14 and 15, 1929. at Cameron's Pond.

RUDDY DUCK. *Erismatura jamaicensis rubida*. Uneommon transient, four spring records and one fall record, all in female or immature plumage: Big Spring, November 17, 1930; Reservoir, November 11 and 12, 1932; Cameron's Pond, November 8 and 10, 1932, November 21, 1932. and April 3, 1933.

AMERICAN MERGANSER. *Mergus merganser americanus*. Rare transient. An adult female was brought to me by a hunter on January 14, 1930, and I have the skin. He said that he had shot three out of a flock of a dozen, all of which resembled this one. On January 5, 1933, I saw a male on James River at Snowden, just outside the county.

HOODED MERGANSER. *Lophodytes cucullatus*. Fairly common transient in spring, Mareh 17 to April 21, occurring in pairs and small flocks at Cameron's Pond, Big Spring Pond, and on North River.

NORTHERN CLAPPER RAIL. *Rallus longirostris crepitans*. Accidental. A very unusual record is that of a specimen of this salt water bird which was found dead, hanging on a barbed-wire fence, on a country road near Lexington, about November 1, 1928. The feathers were very much soiled but the body was mummified and without odor, as it had dried out in the wind and sun. It was identified by Mr. J. H. Riley and Dr. C. W. Richmond of the U. S. National Muscum, where I deposited the specimen. I believe this is the only record of this species at any distanec from the salt marshes. For a fuller account cf. the *Auk*, XLVI, January, 1929, page 106.

VIRGINIA RAIL. *Rallus l. limicola*. Rare transient. I saw one in dull plumage at Big Spring Pond, September 26, 1932, and what was probably the same bird on October 1. I do not see why this bird should be so rare here.

SORA. *Porzana carolina*. Common transient, in spring from April 13 to May 27, and in fall from August 29 (and probably earlier) to October 29, at Camcron's Pond and Big Spring. It was scaree in the spring of 1931 and 1932, and absent in the fall of these years and in the spring of 1933. On June 9 and July 7, 1930, I heard rails at Big Spring which sounded like this speceis but of which I could not get sight.

FLORIDA GALLINULE. *Gallinula chloropus cachinnans*. Rare transient. Three records. One was captured by a negro boy near East Lexington, May 1, 1927, and brought to the biological laboratory of Washington and Lee. I saw one on April 19 and 25, 1929, and another on May 3, 1932, both at Big Spring. I have heard sounds at the same place in summer that suggest this bird.

AMERICAN COOT. *Fulica a. americana*. Fairly common transient, in spring from April 4 to May 6, in fall from October 9 to November 14. One winter record of two birds on December 5, 1932.

SEMIPALMATED PLOVER. *Charadrius semipalmatus*. Rare transient in spring. I saw one on May 12 and 15, 1929; six on May 13, 1932; three on May 14, 1932; one on May 17, 1932, all at Cameron's Pond.

KILLDEER. *Oxyechus v. vociferus*. Resident, common in summer, fairly common in winter. They raise two broods, as I have seen downy young on May 25 and on June 27.

AMERICAN WOODCOCK. *Philohela minor*. Uncommon transient, possibly remains occasionally to breed. Mr. Handley saw one, September 27, 1921. One was brought to me on November 15, 1928, that had been shot on a high wooded hill where a covey of Bob-white had been scattered. The hunter thought when he shot at it that it was one of the covey rising. I saw one on June 2, 1930, in a marshy spot near Lexington; one at Big Spring, September 14, 1931; two in a marsh near Glasgow on James River, September 28, 1931; and two on March 21, 1932, on a hill in thin woods.

WILSON'S SNIPE. *Capella delicata*. Common transient in spring, February 20 to May 7; uncommon in fall, September 14 to November 21. I have two winter records at Big Spring, January 13, 1930, and December 8, 1931.

UPLAND PLOVER. *Bartramia longicauda*. Fairly common transient, uncommon summer resident, from April 6 to July 23 (and possibly later). They were once common in this section. I am told, but now only a few small flocks are seen passing north in spring, and a few pairs remain to nest. This must be the extreme southern limit of its breeding range now. I saw a nest in a hay field, June 3, 1930, with four young just hatched and still about the nest. A farmer caught a half-grown young bird not far from this spot on June 21, 1933.

SPOTTED SANDPIPER. *Actitis macularia*. Common summer resident, April 25 to July 18 (and probably considerably later, for I have been able to do little field work in late summer). I have found young just from the nest from June 8 to July 2. I have seen the birds lead their young out into the grain fields some distance from water, the adults flying about over the young and alighting on fence posts and shocks of grain.

SOLITARY SANDPIPER. *Tringa s. solitaria*. Transient, common in spring, from April 6 to May 18, less common in fall from July 26 to as late as October 28.

GREATER YELLOW-LEGS. *Totanus melanoleucus*. Uncommon tran-

sient in spring, April 5 to May 14, mostly at Cameron's Pond, a few at Big Spring.

LESSER YELLOW-LEGS. *Totanus flavipes*. Common transient in spring, April 2 to May 17, mostly at Cameron's Pond—a few at Big Spring.

PECTORAL SANDPIPER. *Pisobia melanotos*. Rare transient. Prof. R. S. Freer, Mr. M. G. Lewis, and I saw five in a marshy place along the Lee Highway two miles south of Lexington, April 3, 1931. One of them, which already had a broken wing, I collected. I saw three at the same place on April 5 and 8, 1931.

LEAST SANDPIPER. *Pisobia minutilla*. Fairly common transient in spring, April 2 to June 13, all at Cameron's Pond.

SEMI-PALMATED SANDPIPER. *Ereunetes pusillus*. Uncommon transient in spring. Five records: one, May 7, 1928; three, May 12, 1929; three, May 15, 1929; two, May 11, 1932; one, May 13, 1932, all at Cameron's Pond. I have taken specimens of the Least and Semi-palmated Sandpipers in order to make identification certain. A small sandpiper seen on September 5, 1932, seemed to be this form rather than the Least.

RING-BILLED GULL. *Larus delawarensis*. Accidental. I collected an adult female at Big Spring, February 13, 1932, which was already crippled. It was in winter plumage and was very thin. It was feeding in shallow water. Several times, as it flew about the pond, it lit on the ice, and twice lit in the snow on a nearby hillside.

BONAPARTE'S GULL. *Larus philadelphia*. Rare visitor. Mr. M. G. Lewis, then of Lexington, saw one in adult breeding plumage at Cameron's Pond, April 29, 1928; and I saw another in adult breeding plumage at the same place and, curiously enough, on the same day in 1929. The latter bird stayed in the neighborhood for several days. I saw two adults in winter plumage resting on Maury River at East Lexington, January 8, 1932.

BLACK TERN. *Hydrochelidon nigra surinamensis*. Accidental. Mr. Handley saw one over Maury River near East Lexington, May 10, 1919; and I saw one in adult plumage at Big Spring, May 18, 1931.

NOTE: Since this paper was prepared I have recorded two additional species in Roekbridge County: an adult Black-crowned Night Heron, *Nycticorax n. hoactli*, seen at Cameron's Pond, April 10, 1934, and a Red-breasted Merganser, *Mergus serrator*, probably an immature male, shot at Goshen Pass, December 13, 1934, the head and wing of which were given to me.

LEXINGTON, VIRGINIA.

CHANGES IN THE LIST OF BIRDS OF YELLOWSTONE
NATIONAL PARK

BY EMERSON KEMSIES

The following notes are intended as a partial revision of the author's paper published in the WILSON BULLETIN on the birds of Yellowstone Park.* Seven new species are here added and three subspecies are dropped. The total recorded for the Park thus is 216 species and subspecies.

Although Yellowstone is the oldest of the National Parks and it has become known the world over as a game preserve, comparatively little work has been done on the bird life and practically nothing on the winter bird life.

Two birds which are nearly extinct still breed in small numbers in the Park, the Trumpeter Swan and the Whooping Crane. It seems also that this region may prove to be one of those transition areas where a good many subspecies intergrade. For these reasons it is hoped that an extensive and thorough study of the bird life may be undertaken in the near future.

WOOD IBIS. *Mycteria americana*. This species was first reported for the Park in July, 1925, by Mr. A. C. Bent. It was again seen the summer of 1930 in the vicinity of Tower Falls by Mr. and Mrs. Arnold of the permanent ranger force. It seems clear that this species is an occasional visitor to the Park during its post breeding season wanderings, a habit which it shares with the egrets and some of the other herons.

TRUMPETER SWAN. *Cygnus buccinator*. During the past summer (1933) I had the good fortune to observe two pairs of these great birds in the Park. One pair had probably but a single young while the other pair had six. It is possible that a few other pairs breed in the Park and a few more in the vicinity; these together with the few known from British Columbia and Alberta are all that remain of this splendid species.

An interesting thing which I observed and of which I have no adequate explanation is that a color phase apparently exists in the young birds. In the brood that I saw with six young, three of the eygnets were pure white while the remaining three were a dark gray. All of the birds were of the same size and about half grown. The single eygnet of the other pair was also pure white.

*Birds of the Yellowstone National Park, with some recent additions. By Emerson Kemsies. WILSON BULLETIN, XLII, September, 1930, pp. 198-210.

The only reference to the white phase of the young of the Trumpeter Swan that I have been able to find occurs in Wright's "Fauna of Our National Park". Seemingly, Mr. Wright has taken it for granted that the occurrence of phases is well known, for he merely suggests that perhaps the gray young have a better chance of attaining maturity than the white ones.

The permanent rangers who have seen the Trumpeter Swan each summer for years have all noticed the occurrence of both white and gray young in almost every brood.

The only explanation I can offer at this time is one suggested by Mr. C. L. Sibley, of Wallingford, Conn., who suggests that the Trumpeter Swan may be inclined to throw genetic mutations in the same way that the European Mute Swan does. Species as they near extinction show great variation; is it possible that perhaps because of the interbreeding which must be occurring the white cygnets are produced? The entire subject should certainly be studied before the species is extinct.

COMMON CANADA GOOSE. *Branta canadensis canadensis*. It seems best in the absence of collected specimens to regard all the Canada Geese in the Park as belonging to this form. Therefore, it becomes necessary to drop the Hutchins's Goose of previous lists, now known as Lesser Canada Goose (*Branta canadensis leucopareia*). For a complete study of the races of this species, see Annual Report of National Museum of Canada, "Status of the Races of the Canada Goose", by Taverner.

RING-NECKED DUCK. *Nyroca collaris*. This species is likely at times to be confused with the scaups, and was not recorded for the Park until the summer of 1930, when attention was first called to it by Ranger Naturalist Cooke. It has since been seen each summer and I saw it this past summer. It is probably a fairly common migrant and may breed in small numbers in the lake region.

OLD-SQUAW. *Clangula hyemalis*. The Old-squaw has been recorded during the past two or three winters by Permanent Ranger Frank Anderson. It probably occurs only as a casual winter visitor.

SANDHILL CRANE. *Grus canadensis tabida*. Both this form and the Little Brown Crane (*Grus canadensis canadensis*) have been recorded in the Park. In the absence of specimens and since the two races nearly overlap in size, a sight record is hardly sufficient to admit this bird to the Park list. If it does occur it would probably occur only during migration, as it breeds much farther north.

FORSTER'S TERN. *Sterna forsteri*. There is a specimen of this species in the Lake Museum collected the summer of 1931, identified at the time as a Common Tern but should be referred to this species instead. Although this is the only record for the Park I imagine it occurs fairly frequently and may possibly breed in the marshes that border the Lake.

SNOWY OWL. *Nyctea nyctea*. Rather strangely this species was not recorded in the Park until November, 1931, when Permanent Ranger Ben Arnold saw one in Lost Creek Valley near Tower Falls.

GREAT GRAY OWL. *Scotiaptex nebulosa nebulosa*. The first record for this species is of a bird seen by Permanent Ranger Frank Anderson in the late fall of 1930. Since then several have been seen and one was collected and is mounted in the Lake Museum. It may breed occasionally in the Park.

HOWELL'S NIGHTHAWK. *Chordeiles minor howelli*. There is a specimen in the Lake Museum which seems clearly referable to this race. A specimen of the Pacific Nighthawk (*C. m. hesperis*) is also in the same collection. Just what the status of the two races in the Park is, I cannot say. It seems quite possible that the two forms intergrade in this area.

DESERT HORNED LARK. *Otocoris alpestris leucolaema*. No specimens of the larks have been collected in the Park, but specimens collected in Wyoming in nearby areas are of this race. Accordingly it seems best to regard those of the Park as of this race; the sight record of the Hoyt's Horned Lark should be omitted as it is practically impossible to distinguish the two in the field.

NORTHERN SAGE SPARROW. *Amphispiza nevadensis nevadensis*. I found this species fairly common in the sage brush areas near Tower Falls in July, 1933. Several people had reported hearing a strange song in this region but had not been able to find the bird. It is probable that it occurs in similar sage brush areas in other parts of the Park; it should be especially looked for in the area between Gardiner and Mammoth.

LAKWOOD, OHIO.

EDITORIAL

THE PITTSBURGH MEETING proved to be one of the most successful we have held. The annual meeting for this year will be held in conjunction with the American Association for the Advancement of Science at St. Louis, Mo., on December 30 and 31, 1935. The location of the 1936 meeting has not been decided. In 1937 it will be held at Indianapolis, Ind., again with the A. A. A. S. Wheeling, W. Va., has been suggested for 1938.

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

	Des Moines 1929	Cleveland 1930	New Orleans 1931	Columbus 1932	Pittsburgh 1934
Local Attendance	106	41	11	92	49
Out-of-town Attendance	96	122	81	65	129
Total Attendance	202	163	92	157	178
Dinner Attendance	77	98	35	69	72*
Titles on the Program...	36	33	27	35	39
Honorary Members	9	7	7	7	6
Life Members	5	7	7	10	12
Sustaining Members	66	58	57	75	44
Active Members	245	227	214	175	154
Associate Members	397	479	461	469	407
Total Membership	717	775	744	734	621
Pages in the BULLETIN..	272	312	334	256	288
Total Income	\$2167	\$2451	\$2686	\$2191	\$2230
Fiscal Balance	\$530	\$675	\$731	\$547	\$842

*A minimum number is given here, since accurate determination was impossible under the circumstances.

It is with much regret that we announce the temporary incapacity of our Treasurer, Mr. Rosene. Mr. and Mrs. Rosene suffered a very serious automobile accident early in January, and they both have been confined to the hospital up to the time of this writing—late February. As a result the customary notices for 1935 dues were not sent out at the usual time. In view of the situation there seems to be no alternative but to send the March BULLETIN to all members regardless of whether their dues are paid for the current year. And we will trust that all members will remit their dues to the Treasurer at their earliest convenience. Those who do not intend to renew their membership for 1935 will confer a great favor by returning to the Editor the copy of the March issue sent to them.

GENERAL NOTES

Conducted by M. H. Swenk

Caspian Terns in North-central Iowa.—A flock of eighteen Caspian Terns (*Hydroprogne caspia imperator*) was observed by the writer at Lake Cornelia, Wright County, Iowa, on September 12, 1934. While this species occurs somewhat regularly as a migrant in eastern Iowa, it is of irregular or rare occurrence through the central part of the state.—PHILIP A. DUMONT, *Des Moines, Iowa*.

Some Shore Birds Collected in South Dakota.—On September 15, 1934, while on an observation trip to Brant Lake, Lake County, South Dakota, a single Buff-breasted Sandpiper (*Tryngites subruficollis*) was seen and collected. Also, on September 16, 1934, a single Ruddy Turnstone (*Arenaria interpres morinella*) was collected at Lake Herman, Lake County, South Dakota. Both of these specimens are now in the permanent possession of the Zoology Department of Iowa State College.—GERALD B. SPAWN, *Zoology Dept., Iowa State College, Ames, Iowa*.

Northern Phalaropes in Northwestern Iowa.—On September 13, 1934, the writer observed a flock of at least 110 Northern Phalaropes (*Lobipes lobatus*) on East Okoboji Lake, Dickinson County, Iowa. These birds were swimming and feeding in the shallow water near the State Fish Hatchery at Orleans Station. Their distinctive habit of "spinning" in the water, presumably to stir up food particles, was interestingly contrasted with the steady feeding of a pair of Sanderlings on the sandy shore near by.—PHILIP A. DUMONT, *Des Moines, Iowa*.

McCown's Longspur in Southwestern North Dakota.—The writer in May, 1934, made a trip through Grant, Adams, Slope, Hettinger, and Bowman Counties, in southwestern North Dakota, and noted particularly the near absence of McCown's Longspurs (*Rhynchophanes mccowni*). At first the idea of the prolonged drouth came to mind as an explanation of its absence; yet here were thousands of nesting Lark Buntings, Horned Larks, and Chestnut-collared Longspurs present, feasting on the tiny grasshoppers. It is apparent that the McCown's Longspur is actually deserting this part of North Dakota as a breeding ground. On the entire trip of a good many hundred miles, on highways and section lines, the writer did not see more than fifteen of the birds.—WM. YOUNGWORTH, *Sioux City, Iowa*.

An October Record of the American Egret in Lee County, Iowa.—A single American Egret (*Casmerodius albus egretta*) was observed by Deputy Wardens Walter L. Harvey, F. T. Tucker, and the writer on October 30, 1934, at Green Bay, Lee County, Iowa. This bird was seen feeding in one of the bayous, and we were able to watch it for some time. Apparently it had been wounded, but it still was able to fly short distances at a time. We concluded that this was the reason for finding this single bird at such a late date, several weeks after the flock of three hundred or more which had been present had moved southward.—LLOYD SMITH, *Lake View, Iowa*.

Specimen of Greater Scaup Duck Found in Northern Iowa.—An adult male Greater Scaup Duck (*Nyroca marila*) was found dead by William Schuenke at Clear Lake, Cerro Gordo County, Iowa, on March 29, 1934. Mr. Schuenke believed the bird was killed by flying into the telephone wires. The head of this specimen was entirely green, no purplish reflections being apparent. The measurements of the specimen in inches are as follows: Wing (primaries straightened along the ruler), 8.75; wing (chord), 8.50; width of culmen, 1.07; exposed cul-

men, 1.87; length of "nail" on bill, .51. This specimen, which was preserved by Mr. Schuenke, constitutes the second authentic existing Iowa specimen of this bird.—PHILIP A. DUMONT, *Des Moines, Iowa*.

Second Record of the Starling in Douglas County, Kansas.—On October 4, 1934, Mr. John McFarland brought to the Museum an adult male Starling (*Sturnus vulgaris*) in the flesh. Mr. McFarland says it was taken about two miles east of Lawrence, from a flock of Cowbirds and Bronzed Grackles, but he could not determine whether there were any more in the flock. This is the second record of the Starling in Douglas County. The first was of two birds taken seven and one-half miles southwest of Lawrence, by Ora Scott and the writer, on December 25, 1933 (*Auk*, Vol. LI, No. 4, p. 534). This bird seems to be increasing rapidly, and has become so common around Wichita that we may expect a nesting record from there soon.—W. S. LONG, *Museum of Birds and Mammals, Lawrence, Kans.*

Eastern Tree Sparrows Wintering in Christian County, Kentucky.—Since Christian County, Kentucky, lies near the southern limit of the area from which wintering Eastern Tree Sparrows (*Spizella a. arborea*) are regularly recorded, the writer offers the following observations. Coming in at the end of an ice storm in late December, 1932, Tree Sparrows were seen periodically on the U. S. Government Hospital Reservation at Outwood, Christian County, Kentucky, for two months. The first record was made on December 25, 1932, eight birds. On January 5, 1933, the number had increased to twenty birds. Thereafter, until February 6, from five to fifteen Tree Sparrows were seen almost daily, consorting with numerous Field Sparrows of the sedge fields. From February 6 to February 22 the birds seemed to have dropped from sight, and none were recorded. However, on February 22, two birds were seen in the same area that the larger flock had occupied earlier. This was the last record of the season. Dr. Gordon Wilson has previously recorded this species a number of times in the WILSON BULLETIN from Bowling Green, Kentucky, which lies somewhat southeast of Outwood, but the writer knows of no time when the birds were seen over so long a period of time as that recorded above.—COMPTON CROOK, *Dept. Biology, Boone High School, Boone, N. C.*

Notes on the American Egret and Little Blue Heron in Iowa.—These two southern-nesting herons are each year becoming more common in Iowa during the late summer and early fall. The birds are found in all parts of the state where the necessary water and food are available, as is evidenced by the following reports. During late August, 1934, American Egrets were seen at East Twin Lake in Hancock County and at Elk Lake in Clay County. The next week a flock of nine of the birds were seen at Storm Lake in Buena Vista County. On August 11, 1934, four American Egrets (*Casmerodius albus egretta*) were seen near Montrose in Lee County, and on the next day seven birds of this species were found feeding on the river at Fairport in Muscatine County. A few days later the first Little Blue Heron (*Florida caerulea caerulea*) was seen on the Iowa River west of Conesville, in Louisa County. During mid-September both species were found in greater numbers along the Mississippi River. On September 11, 1934, a lone American Egret was seen near Montrose in Lee County. A few miles up the river at Devils Lake, Lee County, a count revealed thirty American Egrets and twenty-one Little Blue Herons. The next day was spent in the Green Bay region, and here we saw more than 200 American Egrets

and about 125 Little Blue Herons. On the following day fifteen American Egrets were seen near the mouth of the Skunk River in Des Moines County. The last American Egret seen was on September 15, just above Muscatine. It should be added that all the Little Blue Herons were in the white plumage. This increase in numbers of these two species of southern herons in Iowa is probably due mainly to E. A. McIlhenny's work on Avery Island, and it is reasonable to expect even greater numbers of these birds, with a good sprinkling of Snowy Egrets and other herons, in the next few years.—WM. YOUNG WORTH, *Sioux City, Iowa*.

Some Bird Notes from Belmont County, Ohio.—The following birds were seen at the Belmont Hills County Club grounds, in Belmont County, Ohio, by Victor Kehrer and myself, on August 26 and September 2, 1934.

Broad-winged Hawk (*Buteo platypterus* subsp.). Seen on September 2. Apparently a new record for Belmont County, although this species is a common migrant in other parts of the region.

Osprey (*Pandion haliaetus* subsp.). Observed on September 2, as it dove into the lake for a fish. Although this species is not known to nest in this region, a fisherman reported to us that this bird had been at the lake for at least six weeks previous to the time we saw it. This species is a rather rare migrant for this region.

Pigeon Hawk (*Falco columbarius* subsp.). Seen on August 26 at close range, as it flew over the lake which is on these grounds. I believe this to be the first record for this species in Belmont County, and for the region as well.

Red-headed Woodpecker (*Melanerpes erythrocephalus*). This species is very common at Belmont Hills, nesting there each year. This seems surprising, since the same species rarely breeds in the West Virginia Panhandle, but thirteen miles away.

Yellow-bellied Flycatcher (*Empidonax flaviventris*). Seen on August 26. Probably a new record for Belmont County. Apparently an early migrant. Although I realize the difficulty in distinguishing between this species and the Acadian Flycatcher, I am positive this bird was a Yellow-bellied Flycatcher. At a distance of ten feet, we saw through 4x glasses the yellow throat, buffish-yellow breast and yellow belly. The bird was smaller than an Acadian Flycatcher.

Cliff Swallow (*Petrochelidon albifrons* subsp.). Two seen on August 26. This bird is considered a rare migrant in this region.—THOS. E. SHIELDS, *Oglebay Park, Wheeling, W. Va.*

Some Bird Tragedies.—In the spring of 1924, while passing a nest of my favorite bird, the Meadowlark (*Sturnella magna magna*), I noticed a common Hog-nosed Snake (*Heterodon platyrhinus*) with a six-inch distention in the center of the body. Picking the reptile up and giving it a number of shakes caused it to regurgitate three young Meadowlarks. Last spring on one of my nature rambles at West Point, Illinois, my attention was drawn to the nest of a pair of House Wrens (*Troglodytes aëdon aëdon*) by the alarm notes of the owners. Upon making an investigation I found it necessary to remove a Garter Snake (*Thamnophis sirtalis*) from the nest, while the process of digesting five young wrens continued uninterrupted.

The following casualties may also interest my readers. As a Mallard (*Anas p. platyrhynchos*) duckling floated near my place of concealment, it failed under the guidance of its mother to escape being captured by a Cooper's Hawk (*Accipiter cooperi*) that dropped from above and snatched it from the surface of the

water. A Killdeer (*Oxyechus v. vociferus*) feeding under my observation was instantly killed when it ran its head into a steel trap that some trapper had placed along the shore of a small stream and failed to recover. A brood of Phoebes (*Sayornis phoebe*) that I had banded, after being tortured in an insect-infested nest, leaped to their watery grave below. Mr. Charles Guthrie of West Point, Illinois, told me that he placed a cover on a chimney at his home one spring and the following September removed it and found the skeletons of several Chimney Swifts (*Chaetura pelagica*) in the chimney well. Mr. Nor Roe of Dallas City, Illinois, informs me that a Robin (*Turdus migratorius*) last spring flew into a window at his home. Upon questioning Mr. Roe I learned that a shade had been pulled down, forming a mirror in which the bird saw its image. A Chimney Swift which had been banded (No. 687741) by me at West Point, Illinois, on September 9, 1932, was killed when it struck a wire near Stillwell, Illinois, on May 18, 1933. Stillwell is a little more than two miles from the place where the bird was banded.—LAWRENCE E. HUNTER, *Dallas City, Ill.*

Migration of Hawks in Wisconsin.—Supplementing the article by Ralph Beebe, "Influence of the Great Lakes on the Migration of Birds" (WILSON BULLETIN, XLV, No. 3, p. 118), the following notations may be of interest. Similar observations of bird migrations have been carried on rather intensively by a group of Milwaukee ornithologists since 1921 at the mouth of Bar Creek, Sheboygan County, Wisconsin, about forty miles north of Milwaukee.

Mr. Beebe indicates that the flight of raptors is well developed at Whitefish Point on Lake Superior and crosses Northern Michigan through Luce and Schoolcraft Counties to follow the north and west shore of Lake Michigan. Personal observation shows the route to continue through Door County, Wisconsin, and along the shore so that as far south as the vicinity of Bar Creek it is very narrowly defined in an air highway from a quarter to half a mile wide.

At Bar Creek the flight of raptors is sometimes most spectacular. On numerous occasions censuses of hawks have been made of which the following notes are examples:

September 25, 1921. H. L. Stoddard and the writer took counts of the number of hawks passing a certain point for five-minute periods. Eight such counts were made during the day and the average number of birds per hour calculated. A reasonably conservative estimate indicated that 2,040 hawks passed between 8:00 A. M. and 4:00 P. M. These were largely Sharp-shinned Hawks and Cooper's Hawks, although nine species were listed.

November 2, 1924. With L. Friedman, the writer noted approximately 300 hawks, mainly Buteo, seen from 7:30 A. M. to 11:30 A. M. Ten species were listed.

September 28, 1930. Flight of hawks, mainly Broad-winged, but including thirteen species of raptors. Four counts for fifteen-minute periods during the day, averaged, gave a very conservative estimate of 5,280 birds passing a given point.

October 1, 1933. M. Deusing, O. J. Gromme, and the writer made an approximate count of 2,200 migrating hawks. Twelve species were noted.

These are fair indications of the number of birds that pass at this point along the west shore of Lake Michigan. Hawks drift through from September 10 to November 5 and of course vary in abundance from year to year. Two or three miles back from the lake, the flight is practically absent, indicating how narrow and well defined the lane of flight is.

The migration of hawks has been seen in the city of Milwaukee along the bluffs that form the water front. In flights over the city it has been observed that the raptors travel at a great height (800 to 1,500 feet I should judge). The direction of flight south from the city has not been ascertained by observation.

Abundance of hawks in migration seems directly related to the movement of passerine birds. When there is a concentrated migration of warblers and sparrows, it is a corollary that a fine flight of raptors may be expected.—CLARENCE S. JUNG, *Milwaukee, Wis.*

The Louisiana Paroquet in Ohio, Kentucky, and Indiana.—Recently, Mr. Charles C. Deam of Bluffton, Indiana, loaned the writer a copy of a very rare publication by David Thomas entitled, "Travels through the Western Country in the Summer of 1816". This book was published in 1819 by David Rumsey, Auburn, New York, and is the diary of a journey through the western parts of New York and Pennsylvania, the northern projection of Virginia (now West Virginia), the southern part of Ohio, the northern part of Kentucky, and the interior and western parts of Indiana. It is carefully and authoritatively written, and the broad interests and training of the author are shown by the space devoted to the botany, zoology, geography, geology, industry, and agriculture of the regions visited. Many bird species are mentioned, especially the now extinct Louisiana Paroquet (which of course was then known as the Carolina Paroquet). As these references are not readily accessible and have apparently been lost to the ornithological world, the most important notes are quoted below.

Thomas speaks of seeing wild "parroquets" in Kentucky shortly after leaving Cincinnati. He writes: "These birds, which are about the size of wild pigeons, are also sometimes seen on the Miami." A footnote adds, "Drake says on the Scioto." (Both of these streams are in Ohio). On the banks of Indian Creek, Kentucky, he writes: "On the approach of any large bird the Parroquets immediately commence flying round and round in flocks, screaming most hideously. In this way they escape the hawks."

Forty miles west of Louisville, in the state of Indiana, Thomas writes: "The parroquet commits depredations on the wheat in harvest, but it is a bird of uncommon beauty. The head is red, the neck yellow, and the body a light green." Again at French Lick, Indiana, he writes: "This place is the favorite residence of the parroquet, flocks of which are continually flying around. These birds seem to delight in screaming."

North of Vincennes, Indiana, Thomas mentions parroquets eating boring insects of cottonwood trees, "To procure this food, the parroquets have been busily employed, at times, through the day; but though they have become so familiar; and though they excel all the birds of this country in beauty of plumage, their scream is so discordant, and their fierceness of disposition so apparent, as to preclude every sensation of attachment. These birds build their nests in hollow trees. The strength of their necks is remarkable; and we are assured that when both wings and feet are tied, they can climb trees by striking their bills into the bark."

A quotation is also given from an old "Topographical Description of the State of Ohio", as follows: "The green parroquet with a yellow crown, a species of parrot, is very common. It has a harsh, unpleasant note, and although easily tamed, it cannot be taught to imitate the human voice. The habits of these birds in some respects are singular. They are always seen in flocks, which retire at

night in hollow trees, where they suspend themselves by their bills. These birds also retreat to hollow trees in winter. There have been found, after a severe winter, prodigious numbers in a large tree, filling the whole cavity, where they had perished by the severity of the cold."—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio.*

Notes on a Hand-reared Flicker.—What bird lover does not revel in the joy of close contact with his feathered friends, when a bond of sympathy is developed between them, so that the bird will perch on his finger or shoulder? An even greater joy comes to him who has had the privilege of being a foster parent to some baby bird, watching it from day to day, growing from helpless babyhood to adult proportions and plumage, to have that bird's affection for him become so firmly fixed that when adult it continues to return to him as its foster parent for food, drink, and attention.

We have had this joy this summer (1934) with a Northern Flicker, which we called Chee-Chee. In years past we have raised many nestlings and fledglings of such birds as Eastern Robins, sparrows, and pheasants, such being merely a matter of patience and the selecting of the proper food. But when one considers that the mother flicker eats her food, digests it, and then regurgitates the same to feed her babies, the hand raising of a young flicker is an entirely different matter. So when this unfortunate orphan came into our possession we were at our wit's end as to the proper method of procedure. Shredded wheat softened in boiling milk was added to the yolk of a hard-boiled egg; this was triturated and then dried ant's eggs and insects, in conjunction with cod liver oil, were added. The mixture might have been said to be about like pie dough in consistency. Pellets of this were pushed down the baby's throat, followed by seedless grapes or raspberries as dessert. I greatly feared rickets, or some other disease, due to malnutrition, but to our great surprise and delight the baby flicker grew and developed beautifully.

His first home was a box, in which he nestled in tissue paper and soft cloths. It was amusing to see him peep out from under the cloth, as he would raise himself on his weak and wobbly legs, and complacently watch us moving about the room, or the dogs on the floor. After a few days he would slip from under the cloth, climb to the edge of the box, and balance himself there. Shortly after this, he would climb up the curtain and perch on the curtain rod above the window. A perch was made for him, of old branches fastened to a base, on which he could climb about. In a few weeks the perch afforded abundant place to practice climbing. On rainy days lace curtains indoors served the same purpose; or if he had flown to the floor, anybody convenient served as a tree, and up he would come in a hurry. When the drumming instinct first manifested itself, our heads, ears, and spectacles were used indiscriminately. This is a sensation which cannot adequately be described.

The dogs he never minded, when on the floor, allowing them to come right up to him, and sniff at him as much as they wished, with no resentment on his part. But Chee-Chee did not like the parrot, which would fly down at him when he was on the floor. This invariably precipitated a fight. The belligerents were separated at once, and so no harm was really inflicted. It was after one of these impromptu battles that I felt Chee-Chee would probably prefer having his freedom, for he was absolutely fearless and seemed able to give a good account of himself. So I took him out into the garden, set him on the edge of a bird bath,

and away he flew into a cherry tree. Apparently he had a good time climbing up and down the main trunk (his first real tree) and flitting about the branches. An hour and a half later he began to call lustily for help. Evidently he had become very hungry, and possibly tired, too. On going to the tree, he scrambled down far enough so I could reach him, when he was taken indoors and fed. He seemed very tired after this excursion, and was content to remain indoors the balance of the day.

On the following day he was very anxious to get out of doors again, so we liberated him a second time. As on the first day, an hour and a half seemed to satisfy him, and he called to be taken in. But the garden was full of clothes drying and fluttering in the sun. Evidently this was a fearful spectacle when viewed from a tree top, so he would not come down the tree where we could reach him. Finally Islay put up a twenty-foot ladder, and was barely able to reach him from the upper rung.

On the third day Chee-Chee made no attempt to get out until in the evening. As he had returned so nicely on the previous days, we turned him out without any hesitancy, but to our great dismay, just about dusk, he flew across the street, crossing telephone and trolley wires. Islay followed him, calling repeatedly, until she lost sight of him in the woods beyond. That was a sad and disconsolate night, for we were thoroughly convinced that we would never see Chee-Chee again, as we thought that on awakening in the morning he would find himself in a strange environment, the houses on the other side of the street being grouped differently and the trees also being different: all told, a new place. But at 5:30 the following morning, he was in the ash tree adjoining Grandma's room, calling lustily for breakfast. What was to be done? Grandma hurried down stairs, stepped into the garden, called "Chee, Chee, Chee", and with a rush he alighted on her shoulder. He had tested his strength and courage, and was absolutely sure of himself.

Since then he has never been confined indoors, only for such periods of time as were of his own choosing. Sometimes after a meal he rests for an hour or longer, preening his feathers, stretching his wings, talking to us, or quietly to himself, or tucking his head under his wing and taking a real nap, and then flying away at his own discretion. He usually returns about six times a day for his meals, announcing his return from either tree or cornice by calling until somebody goes out to get him. He flies down on to one's shoulders, or low down on a tree where he can be easily reached, or onto the fence posts. Frequently he clings to the screen, from whence he steps onto a proffered hand or finger. Lately, on hearing him, we merely open the screen door. Then he may fly directly into the kitchen and alight on his perch: or he may alight on the parrot's perch on the porch, which immediately starts belligerency on the part of the parrot, who climbs after Chee-Chee as rapidly as he can. Chee-Chee hurriedly scampers up the longest branch, which projects into the kitchen, when with a single bound he alights on his perch, half way across the room. Some times he makes a longer detour, flying through the breakfast room, and thence into the kitchen. Some days he hops the entire way up the four steps onto the porch, across the floor of the porch and breakfast room, into the kitchen, and then allows himself to be picked up.

While being fed he carries on a rapid-fire conversation, which is continued during the entire feeding time. He sips water from a cup, when it is presented

to him. At times he takes one or two sips, but sometimes as many as nineteen. He likes cocoa, too, sitting on my arm, from which point he can easily reach my cup. Feeding is still done in the same fashion as when he was a tiny baby; the food must be pushed down into his throat, he making absolutely no attempt to help himself. When fully satisfied he flies to the shoulder of the person feeding him, thence out through the window, or around by way of the breakfast room, and on to the porch, clinging to the screen until the door is opened for him, and away he soars into the trees. This performance is varied at times, when he deliberately allows himself to be carried out of doors, making no attempt to fly until on the outside. Not always does he fly away promptly, but he will sometimes perch on the hand before leaving, and administer a few vigorous whacks on the fingers with his powerful beak. Apparently it is a form of play. Oftimes he comes home with his long beak coated with dry mud, evidently having been digging ants in wet ground. And even his feet may be caked with mud. But a wet cloth soon restores them to perfect cleanliness. This cleaning process has never been resented in the least.

One day while sipping water he acted as if he wanted to bathe, so Grandma carried him to one of the bird baths, and gently put him down into the water. On releasing him, he had a most wonderful bath. Finally, he flew into a tree to preen his feathers, and then flew down into the lawn, where he lay with outstretched wings until dry. Some weeks ago he made more than his usual noise on coming home, and there he was, in the top of an enormous tree, with three rollicking companions. Grandma called him, and two of his companions flew away, but Chee-Chee and one other flew into our own garden, and then he individually flew down onto his beloved shoulder, whence he was taken indoors, fed, and flew back into the tree where his ehum was still waiting for him. The thrill of this wild creature coming back repeatedly to be fed, taken indoors, fussed over, talked to, and to fly out again at his pleasure, is indescribable. We have never experienced anything quite like it. We dread the onset of autumn, fearing he may respond to the great spirit of migration, and leave us for the sunny and genial South. And yet, he may do like a Robin we had years ago, that returned to us for three successive springs.—DR. G. A. HINNEN, *Mt. Lookout, Cincinnati, O.*

The Incubation Period of the Sora Rail.—In searching through the literature of ornithology I find no definite incubation period given for the Sora Rail (*Porzana carolina*). Having made many observations of this species during the nesting season, I have had the good fortune of following three nests from the beginning of incubation on through hatching, and wish to publish these records.

The first of these nests was found May 10, 1920, at Bellevue, Eaton County, Michigan, when it contained four eggs. The set was completed on May 15, when it contained nine eggs. The period from then to May 31, when the last egg hatched, would be the incubation period for that certain egg, which would be sixteen days. The eggs hatched from May 29 to May 31, indicating that incubation began at least two days before the last egg was laid.

The second nest was found on May 11, 1930, in Convis Township, Calhoun County, Michigan. It contained four eggs and the female was flushed from the nest, even though it was during the middle of the afternoon. This set was complete on May 17, when it contained ten eggs, and these hatched from June 1 to June 3. The period of incubation for the last egg in this case was seventeen days.

The third nest of this group was found May 10, 1934, when it contained seven eggs, in Convis Township, Calhoun County, Michigan. The nest contained a complete set of nine eggs on May 12. When visited on May 27 it contained five downy young, two of which were still wet, and four eggs. Since this was early in the morning probably one or two of these had hatched on the previous day. The other four eggs probably hatched that day and the day following, May 28. This would make a period of sixteen days between the laying and hatching of the last egg.

In the case of the second nest, if the bird had commenced incubation when she was flushed from the four eggs the incubation period for these eggs would be about twenty-one days. In the case of the fifth egg in the third nest, assuming the bird to lay one egg each day, it would have been deposited on May 8 and hatched on May 27, a period of nineteen days. Since the bird was sitting when the nest was found, when it contained only seven eggs it is hard to state just when incubation began, but the incubation period for that certain egg would be from seventeen to nineteen days.

In the three nests the eggs hatched in each case over a period of three days and there was a similarity in the number of days incubated for the last egg laid, either sixteen or seventeen days. The incubation period for the Sora Rail with the birds incubating could be stated as being sixteen or seventeen days, with the possibility that some of the eggs required two or three days longer.—LAWRENCE H. WALKINSHAW, *Battle Creek, Mich.*

The Golden-winged Warbler in South Dakota.—The following are the four known records of the Golden-winged Warbler (*Vermivora chrysoptera*) in South Dakota: (1). A mounted specimen of an adult male is in the Henderson Natural History Museum at Redfield, South Dakota. The label bears no date, but this specimen was taken in South Dakota a number of years ago. (2). On September 7, 1931, Dr. Brenkle placed band No. F18828 on a female or immature at Northville, South Dakota. This individual returned to the water trap on September 9, 1931. (3). On May 10, 1933, the late Mr. E. C. Anderson collected a male at Dell Rapids, South Dakota. The specimen was identified by Dr. T. C. Stephens of Sioux City, Iowa. The skin is now in the South Dakota State University Museum at Vermillion, South Dakota (WILSON BULLETIN, XLV, December, 1933, pp. 197-198). (4). On September 11, 1933, the writer banded with band No. L21404 an adult male at Northville, South Dakota. Further records of this species in South Dakota will be appreciated by the writer.—PAUL R. THOMPSON, *Northville, S. Dak.*

PROCEEDINGS OF THE WILSON ORNITHOLOGICAL CLUB

By Lawrence E. Hicks, Secretary

The Twentieth Annual Meeting of the Wilson Ornithological Club was held at Pittsburgh, Pennsylvania, on December 28-29-30, 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 Lecture Hall of the Carnegie Museum. Short business sessions were held Friday and Saturday mornings. The four program sessions Friday and Saturday, morning and afternoon, included thirty-nine papers, slide talks, and movie presentations. The maximum attendance at each session was 86, 103, 96, and 87.

Friday evening the Wilson Ornithological Club Annual Dinner was held at the University Club in conjunction with the dinner of the American Society of Zoologists. Many in attendance were members of both organizations. No exact check could be made on the attendance but at least seventy-two Wilson Ornithological Club members were present. President Shaver represented the W. O. C. on the program. The feature address of the evening was given by Dr. George L. Streeter of the Carnegie Foundation. Following the dinner, all botanists and zoologists attending the meeting joined in the Biologists' Smoker, an important event of the annual A. A. S. conventions.

Saturday evening eighty-two members and friends attended a most enjoyable open house and reception in the research laboratories of the Museum. This fine event was made possible through the courtesy and planning of the Carnegie Museum, the Museum Staff, and the Local Committee composed of W. E. Clyde Todd, Bayard H. Christy, Sidney K. Eastwood, Charles Agostini, J. Warren Jacobs, and John W. Handlan. The evening was spent viewing parts of the museum study collection of 110,000 bird skins, the library and research facilities, and the distribution maps of Pennsylvania birds. The session was terminated by the viewing of three reels of splendid movie films depicting the nature study educational values of "The Birds and Animal Life of Frick Park". These were presented by Mr. H. S. Crass, Supervisor of Frick Park.

Sunday morning a number of members joined a party of local observers on a field trip to Frick Park, observing some of the wild birds and mammals there which become remarkably tame through feeding and protection.

EXHIBITS

Another outstanding feature of the annual meeting was a splendid exhibit of Wilsoniana assembled largely through the efforts of Mr. Bayard H. Christy of the Local Committee. This was made possible through the coöperation of a number of individuals and the Harvard Museum of Comparative Zoology, Dr. Thomas Barbour, Director, who loaned exhibit material. The exhibit included manuscripts, drawings, mounted birds, prints of engravings, books, personal effects, and portraits, in such variety and quantity as to picture to the mind's eye the circumstances under which Wilson's great Ornithology was projected and carried through to accomplishment.

The most notable items in the exhibition came from the Thayer collection, and were generously loaned by the Museum of Comparative Zoology in Cambridge, Massachusetts. Dr. Witmer Stone, of Philadelphia, kindly contributed a long and interesting letter and a number of engraved portraits as well. Mr. Strickland Kneass, Jr., of Sewickley, loaned an autographed book. Mr. Bayard

H. Christy's collection of Wilson's published works was displayed, with supplementary material loaned by Mrs. Tracy W. Guthrie, of Edgeworth, and by Miss Phoebe Knappen, of Washington, D. C.

Other items exhibited were four of Wilson's letters, a receipt book of Wilson's, the gun which he used in collecting, each edition of his books published, and six water color and one pen and pencil drawing—the originals made by Wilson for the plates of his book.

There were probably few present who viewed these exhibits of the man who has long given both his name and his inspiration to the Wilson Ornithological Club, but that shared the ideas expressed by Mr. Bayard H. Christy in commenting on the exhibit: "These many and various articles, that taken singly are slight and insignificant, possess in the aggregate a surprising evocative power. We are dazzled by the products of mechanical processes of today—by the thousand-fold abundance of facile achievement. But for all their achievement these modern men have not caused us to overlook nor to forget the patient, plodding, loving work of Alexander Wilson. As one looks and meditates, the years between slip away; the objects themselves become instinct with the spirit of the man. It is as though he had but yesterday wrested them from his hand. And they are eloquent of a careful, painstaking, intelligent worker, master of himself, master of what he was doing. We begin to look upon him as we conceive his associates looked upon him, to take satisfaction as they must have taken satisfaction, and to feel the shock and keenness of their regret that the stroke of death should fall when the great undertaking was at the very point of completion."

ATTENDANCE

The 1934 meeting was one of the largest and most successful in the history of the organization. The total registration was 178 but a considerable number, mostly local visitors, failed to register. However, records available would indicate that in spite of the small local attendance (49), that the Pittsburgh meeting ranks second only to the Des Moines meeting in total registration, and ranks first in the history of the organization in the number of out-of-town visitors registered (129).

Seventeen colleges and universities, and ten museums and other institutions, were represented in the attendance at the Pittsburgh Meeting. These included: Carnegie Institute of Technology, Columbia University, Cornell University, George Peabody College for Teachers, Morningside College, North Carolina College for Women, North Carolina State College, Otterbein College, Ohio State University, Pennsylvania State College, Slippery Rock College, University of Illinois, University of Michigan, University of Pittsburg, University of West Virginia, Western Reserve University, Wooster College, Carnegie Museum, Emergency Conservation Committee, Hawk and Owl Society, National Association of Audubon Societies, Ohio Division of Conservation, Ohio State Museum, United States Biological Survey, Department of the Interior, Soil Erosion Service, and National Park Service.

BUSINESS SESSIONS

Short business sessions were held Friday and Saturday mornings, President Shaver presiding.

The minutes of the 1932 meeting were approved without being read, since they had previously been published in the WILSON BULLETIN (Vol. XLV, No. 1, pp. 37-50). The Secretary's and Treasurer's reports for the year 1933 were ap-

proved as published in the WILSON BULLETIN (Vol. XLVI, No. 1, pp. 67-69). The Secretary's and Treasurer's reports for the year 1934 were also approved. The Secretary's report indicated that during the past year thirty-five members had assisted in the membership campaign by making nominations resulting in the securing of one or more members each. In spite of these additions, a small decrease in the total number of members was reported. A list was presented of the 114 new members secured in 1933 and of the 112 new members secured during 1934, and previously confirmed by the electoral board. These were elected to membership.

The Secretary also presented a list of 128 members from thirty-eight states, each of which, though unable to attend the Pittsburgh 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. 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 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 presented a carefully detailed report, including tables indicating the cost of each item involved in the total cost of each issue of the WILSON BULLETIN. The report was too lengthy to be read in its entirety, so was summarized and made available for examination. Its examination enabled the members present to appreciate the demands made upon the time and energy of the Editor in assembling the four issues of the WILSON BULLETIN each year. In the absence of the Treasurer, his report was summarized, made available for examination, and at the Saturday session was adopted upon recommendation of the Auditing Committee.

The following temporary committees were appointed by the President: Nominations, T. C. Stephens, W. E. Clyde Todd, and Mrs. Margaret M. Nice; Resolutions and Amendments, Albert F. Ganier, F. N. Blanchard, and F. L. Fitzpatrick; Auditing, Chas. J. Spiker and Bayard H. Christy.

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

Resolved, that the Wilson Ornithological Club commends the National Association of Audubon Societies for the educational campaign it has launched in the interest of beneficial hawks and owls of North America.

Resolved, that the Wilson Ornithological Club hereby expresses its approval and commendation on the acquisition of Hawk Mountain in Pennsylvania by the Emergency Conservation Committee, and hopes that it may become a permanent sanctuary for wild life.

Resolved, that the Wilson Ornithological Club, at this concluding point of a most successful meeting at Pittsburgh, desires to express its appreciation and gratitude to—

The Carnegie Museum and its Director, Dr. A. Avinoff, for placing the splendid facilities of this institution at our disposal for these sessions.

The Ornithological Staff of the Museum for their many courtesies and constant attention to the details of the occasion.

The Local Committee of Arrangements, which, under the chairmanship of Mr. W. E. Clyde Todd, planned the meeting and coördinated it with other zoological meetings.

Mr. Bayard H. Christy for assembling the interesting collection of Wilsoniana, and those who kindly loaned articles for the exhibit.

The Officers of the W. O. C., especially the Secretary, Treasurer, and Editor, for the considerable amount of time and talent which they have generously given to the Club during the past year.

The Committee on Nominations offered the following report:

President—Josselyn Van Tyne, University of Michigan, 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—W. M. Rosene, Ogden, Iowa.

Councillors—Albert F. Ganier, Nashville, Tennessee.

Lynds Jones, Oberlin, Ohio.

Myron H. Swenk, Lincoln, Nebraska.

The report was adopted by motion, and the Secretary was instructed to cast the unanimous ballot for the nominees. This being done all were declared elected for the ensuing year. The session then adjourned *sine die*.

COMMUNICATIONS

December 27, 1934.

To Lawrence E. Hicks,

Secretary of the Wilson Ornithological Club:

Greetings from the A. O. U. and best wishes for a successful meeting of the Wilson Ornithological Club. I only regret that I can not be with you in Pittsburgh.

Very cordially yours,

T. S. PALMER, *Secretary A. O. U.*

PROGRAM OF PAPERS

The Friday morning session began with an address of welcome by Dr. A. Avinoff, Director of the Carnegie Museum, to which President Shaver responded.

The papers as presented, with brief abstracts, are given below, varying slightly in sequence from that announced for the meeting. All meetings were held in the Lecture Hall of the Carnegie Museum.

FRIDAY MORNING SESSION

1. The Eighth International Ornithological Congress at Oxford. (15 minutes). Margaret M. Nice, Columbus, Ohio.

An account of this notable meeting, telling of the papers dealing with the study of the live bird, of the brilliant social occasions, and of the memorable trip to the bird islands off the coast of Wales.

2. Bilateral and Unilateral Ovaries in Raptorial Birds. (15 minutes). Fred L. Fitzpatrick, Columbia University, New York City.

Dissection of adult female owls reveals only unilateral development of the ovaries, the right ovary apparently never occurring as an adult structure. In many species of hawks, however, both in Europe and America, several sources suggest that bilateral ovaries are the rule in early embryonic development, and that in adults of some species both ovaries persist, the right often considerably smaller than the left.

3. Hawk Mountain. (10 minutes). Mrs. Charles N. Edge, Emergency Conservation Committee, New York, N. Y.

Hawk Mountain, a peak of the Kittatinny Mountains of Pennsylvania, lying between Hamburg and Pottsville, is a concentration point for many birds of prey which in migration follow this ridge of the Appalachians. Here for several decades hunters have slaughtered several thousand birds annually. During the summer of 1934 the Emergency Conservation Committee was successful in leasing the mountain and engaged Maurice Broun as ornithologist-guardian of the area. Strenuous efforts were successful in eliminating all shooting. It is planned to purchase the area and provide it with sufficient endowment to insure its preservation as a perpetual wild life sanctuary. More than 10,000 birds of prey were counted passing the mountain during the fall of 1934. These were of great interest to bird students and included the following species: Vultures, 166; Eastern Goshawk, 125; Sharp-shinned Hawk, 1913; Cooper's Hawk, 333; Eastern Red-tailed Hawk, 5609; Eastern Red-shouldered Hawk, 90; Broad-winged Hawk, 2026; Rough-legged Hawk, 20; Golden Eagle, 39; Bald Eagle, 52; Marsh Hawk, 105; Osprey, 31; White Gyrfalcon, 1; Black Gyrfalcon, 2; Duck Hawk, 25; Pigeon Hawk, 19; Sparrow Hawk, 13.

4. Ornithological Activities of the E. C. W. Program in Our National Parks. (20 minutes). Chas. J. Spiker, Naturalist-Technician for the National Parks East of the Mississippi, Washington, D. C.

This paper summarized the new species of birds added by park naturalists to the published lists of birds for their respective areas and reviewed the efforts being made to give special protection and encouragement to the species already present. Water conservation, grazing restrictions, and extension of park boundaries were methods used to accomplish bird conservation measures.

5. Bird Cases and Specimens for Educational Uses in Schools. (10 minutes). Reinhold L. Fricke, Department of Education, Carnegie Museum, Pittsburgh, Pa.

An informal discussion of the preparation and use of portable school exhibits of birds, illustrated with examples of birdskins in glass tubes and various types of cases. A part of the cases are family groups of individual mounts, and others are habitat groups with photographic backgrounds portraying a pair of birds with their nest and eggs.

6. Report on the John B. Semple Expedition (1934) to British Columbia. (20 minutes). George M. Sutton, Cornell University, Ithaca, N. Y.

The expedition made many ornithological finds in this region of beautiful, unexplored wilderness. The Black Pigeon Hawk was collected on its breeding territory and reports were received of Trumpeter Swans occurring in numbers. It was also found that traders in British Columbia were encouraging the Indians to kill Eagles by offering rewards of \$2.50 for the wings and tail of each bird. This plumage was later sold at a handsome profit to Indians in the southwest, especially to the Hopis and the Indians of the Plains, and sometimes brought as much as \$1.00 per feather.

7. Notes on the Life of Alexander Wilson. (20 minutes). Gordon Wilson, Teachers College, Bowling Green, Ky. Read by Bayard H. Christy, Sewickley, Pa., with additional comments on the Wilsoniana Exhibit.

8. An Experiment in Bird Study in West Virginia. (15 minutes). John W. Handlan, Wheeling, W. Va.

The city of Wheeling, West Virginia, owns a 750-acre public property known as Oglebay Park. The public is invited to meet here each Sunday morning the park naturalist for a conducted nature field trip covering two miles or more of the Park's eleven-mile chain of trails. The success of this fine educational work in natural history is attested by the fact that more than 50,000 people have taken these "bird walks" during the past seven years, with

an average attendance of 115 on each trip. The chief leader of these trips has been A. B. Brooks, Park Naturalist. The interest aroused led to the formation in 1932 of the Brooks Bird Club which now publishes the *Redstart*, sponsors a broad program in the interests of ornithological education, and has been instrumental in the formation of several bird study clubs in the West Virginia region.

9. A Study of the Savannah Sparrow in West Virginia. (20 minutes). Thomas E. Shields, Wheeling, W. Va.

Field work done in 1933 and 1934 indicated that the species breeds regularly in the panhandle counties of West Virginia, though uncommon and quite local. Several nests found were studied in detail. All nesting records to date were at altitudes exceeding 1175 feet.

FRIDAY AFTERNOON SESSION

10. The European Starling as a Banding and Research Subject. (15 minutes). Lawrence E. Hicks, Ohio State University, Columbus, Ohio.

The study of 52,000 Starlings captured in central Ohio, of 33,000 banded, and of more than 8,000 used as specimens, emphasizes how much may yet be learned of the fundamentals of bird life by using these easily procured birds as "Guinea Pigs" in ornithological investigations. We have the unusual opportunity of being able to study an introduced migratory species and can work with the large numbers necessary to answer many perplexing questions. It was strongly urged that ornithologists report on the sex ratios found at each season in flocks of Starlings of their home areas.

11. Bird Collections in the Carnegie Museum. (15 minutes). Ruth Trimble, Carnegie Museum, Pittsburgh, Pa.

A brief account of the history and scope of the Carnegie Museum's study collection of birds, which consists of approximately 110,000 specimens, and is the fourth largest collection in North America.

12. Six Years' Records on the Singing of One Song Sparrow. (15 minutes). Margaret M. Nice, Columbus, Ohio.

A male studied (4M) starts his awakening song in the morning at about 0.2 foot candles of light, which in clear weather occurs about one-half hour before sunrise. He sings from eight to nine months each year. He had nine songs in his repertoire from 1929 to 1934. During four autumns he started singing between September 28 and 30, but in 1929 began on September 10.

13. Protocalliphora as Parasites of Birds. (10 minutes). Edward S. Thomas, Ohio State Museum, Columbus, Ohio.

A review was made of the literature relating to these nest parasites. Dr. Plath reported 61 per cent of the nests of ten species were parasitized, an average of thirty-six larvae per infested nest and 5 to 10 per cent or more of the nestlings killed. Three species of this blowfly are known from North America and are recorded as parasitizing no less than thirty-six bird species. A wasp-like chalcid fly parasitizes this parasite. In Ohio many infested nests have been found recently of bluebirds and several species of sparrows and warblers.

14. Twenty-four Hours in the Kirtland Warbler Country. (10 minutes). William C. Baker, Salem, Ohio.

Trips to Crawford County, Michigan, in 1933 and 1934, resulted not only in the finding of the nest of the Kirtland's Warbler, but of many other species. A total of ninety-two breeding species were recorded for the region.

15. The Effect of Light on the Reproduction and Growth of Chickens. (10 minutes). (Lantern). E. L. Dakan, Poultry Department, Ohio State University, Columbus, Ohio.

16. Methods for Studying the Abundance of Birds. (20 minutes). S. Charles Kendeigh, Biological Laboratory, Western Reserve University, Cleveland, Ohio.

Various methods exist for determining the relative and absolute abundance of non-game birds. Nesting and banding censuses appear the most reliable, as demonstrated by fourteen years records of the abundance of the Eastern House Wren (*Troglodytes a. aëdon*). To analyze the factors affecting yearly fluctuations in numbers, amount of reproduction, and survival over winter must be considered separately. Both biological and climatic factors have been found important, with the former more significant in controlling reproduction and the latter in determining survival.

17. The Harris's Sparrow's Eggs and the 1931 Ornithological Expedition to Churchill, Manitoba. (40 minutes). (Lantern). George M. Sutton, Cornell University, Ithaca, N. Y.

A report of the findings of the first nests of the Harris's Sparrow and beautifully colored slides showing the nests and adults of many species of sparrows, shorebirds, gulls, and warblers.

SATURDAY MORNING SESSION

18. A Preliminary Report on the Breeding Birds of Columbiana County, Ohio. (25 minutes). William C. Baker, Salem, Ohio.

Columbiana County is the southernmost of the eastern tier of Ohio counties, being on the glacial boundary. The breeding of 121 species has been established, nests of eighty-eight being found and small young of fifteen additional species. Several northern species reach their southern breeding limits in the county.

19. Distribution of Some of the 179 Species of Birds Known to Breed in Ohio. (15 minutes). (Lantern). Lawrence E. Hieks, Ohio State University, Columbus, Ohio.

Maps indicating distribution by townships were shown of some thirty species which reach their northern, southern, western, or eastern breeding limits in the state. Stress was placed upon the importance of securing exact detailed data on the present and past distribution of each breeding species. During the past twelve years a map has been prepared for each species on which has been plotted all known published or unpublished breeding data as contributed by most of the ornithologists of the state. It is hoped to soon make some of this information available in published form.

20. Local Distribution of Western Pennsylvania Birds. (20 minutes). (Lantern). W. E. Clyde Todd, Carnegie Museum, Pittsburgh, Pa.

Colored maps illustrating the breeding ranges of thirty species of birds in western Pennsylvania, were exhibited on the screen, with some remarks on each. The ranges as plotted show considerable variation affecting species supposed to belong to the same life zone.

21. Our Vanishing Raptors—A Conservation Problem. (30 minutes). (Lantern). Warren F. Eaton, Upper Montclair, N. J.

At least 75 per cent of the reports received on the numbers of hawks, eagles, kites, and owls, indicate decided increases due to changes in the natural environment or due to killing for sport, trophies, or so-called "vermin control". Unusual problems present themselves in attempting to save the remnant of our birds of prey population, but these must be surmounted or these economically and aesthetically valuable birds will disappear as have those of Europe.

22. Some Problems of a Teacher of Ornithology. (10 minutes). E. L. Dakan, Ohio State University, Columbus, Ohio.

A discussion in which the audience participated, as to the best procedures to follow in most effectively presenting ornithological education to university classes.

23. Food Habits of the Bald Eagle. (12 minutes). Frank R. Smith, Fredericktown, Pa.

A summary of the status of the Bald Eagle on the eastern shore of Maryland. The value of the eagle in removing diseased or wounded muskrats and

waterfowl was stressed. The eagles, now much reduced in numbers, destroy little of value and during the past forty years have not been known to molest lambs.

24. A Photo Record of Interesting Nest Sites. (12 minutes). (Lantern). A. B. Brooks, Wheeling, W. Va.

Photos of many odd nest locations, including several of robins located on railroad cars, the parent birds following the nests many miles to new locations or taking daily trips of several miles without deserting the nests.

SATURDAY AFTERNOON SESSION

25. The Beach-Combers of Lake Superior. (20 minutes). Bayard H. Christy, Sewickley, Pa.

An account of the shore birds and passerine birds which frequent the lake shore.

26. Blood Studies—the Number of Erythrocytes in Migrating Birds. (15 minutes). (Lantern). Leonard B. Nice, Department of Physiology, Ohio State University, Columbus, Ohio.

The number of red-blood corpuscles in White-throated and White-crowned Sparrows, Juncos, Song, Lincoln, Chipping, and Tree Sparrows, ranged between 4,846,000 and 5,702,000 per cubic millimeter of blood. Cardinals averaged 5,123,000, Tufted Titmice 4,368,000, Cowbirds, 6,055,000, and Bobwhites 3,532,000.

27. The Canadian Component of West Virginia Bird Life. (15 minutes). Maurice Brooks, Morgantown, W. Va.

A comparison was made of the bird life of the former West Virginia spruce belt as it is today, and as it was when Dr. W. C. Rives wrote of it thirty-six years ago, before the Spruce was cut. Twenty-three species definitely classed as Canadian in the Check-list were recorded as summer residents by Rives. Recent field work by the author of the paper disclosed that no species has been lost to the state, although some range restrictions have occurred. Several new breeding species have been added to the list by the recent work.

28. A Study of the Roosting Behavior of the European Starling. (12 minutes). (Lantern). Charles A. Dambaeh, Ohio State University, Columbus, Ohio.

A report of detailed observations on an outdoor roost of 32,000 birds located on a hillside oak thicket near Zanesville, Ohio, during the last five months of 1934.

29. A Survey of the Bald Eagles of the Lower Mississippi Valley. (20 minutes). (Lantern). Albert F. Ganier, Nashville, Tenn.

A large map was shown indicating the location of the nests of about thirty-five pairs of eagles studied in a strip of Mississippi bottomland several hundred miles in length.

30. The Comparative Ability of the Ring-necked Pheasant and the Bob-white Quail to withstand Cold and Hunger. Paul L. Errington, Iowa State College, Ames, Iowa. (Paper presented by Charles A. Dambaeh, Ohio State University, Columbus, Ohio).

The comparative experimental and observational data indicate that the pheasant is strikingly superior to the Bob-white in its ability to withstand cold when emaciated, to endure hunger, to retard starvation by feeding upon low quality herbaceous foods, and to regain lost weight quickly and far more completely when opportunity presents itself. Both species die of starvation when reduced down to about 57 per cent of their original normal body weight. No sexual differences in resistance were found for either species.

31. Action Scenes of Louisiana Marsh Birds. (45 minutes). (35 mm. motion pictures). Edward A. Mellhenny, Avery Island, La.

Five reels of films showing marsh birds, waterfowl, Snowy Egrets, Blue Geese, and other animal life of the swamps.

SATURDAY EVENING SESSION

32. The Bird and Animal Life of Frick Park, Pittsburgh. (3 reels of 16 mm motion pictures). H. S. Crass, Supervisor of Frick Park, Pittsburgh, Pa.

The following papers were read by title:

33. Recent Observations on the Waterfowl Supply Along the Atlantic Coast. (20 minutes). T. Gilbert Pearson, National Association of Audubon Societies, New York, N. Y.
34. Views of the Home Life of the Atlantic Murre. (20 minutes). Robert A. Johnson, Oneonta, N. Y.
35. Experiences with the Golden Plover and Other Rare Birds of Indiana. (22 minutes). Mrs. Horace F. Cook, Anderson, Ind.
36. The Relationship of the Great Black-backed Gull to Certain Other Species on the Nesting Grounds of Canadian Labrador. (25 minutes). (Lantern). Robert A. Johnson, Oneonta, N. Y.
37. Wild Life Cycles. (15 minutes). Leonard W. Wing, Madison, Wis.
38. Some Experiences of an Amateur with Birds in Canadian Labrador. (15 minutes). (16 mm. motion pictures). A. A. Myrus, Oneonta, N. Y.
39. Virginia Mountain Studies of the Blackburnian Warbler. (8 minutes). F. M. Jones, Abington, Va.

 REPORT OF THE SECRETARY FOR 1934*

To the Officers and Members of the Wilson Ornithological Club:

During the past year, the intensive campaign for new members was continued by the Secretary, to aid in offsetting the membership and financial losses due to the prevailing economic conditions. The work was handicapped by the continued high postal rates, increased printing costs, and by the depression retrenchments which prevented dozens of interested prospects from affiliating with our organization. If the members of the Wilson Ornithological Club, during the coming year, make a special attempt to acquaint friends with the benefits of the organization and forward to the officers the names of all membership prospects, it is believed that the 1935 report will show a decided gain in the number of new members. And a little encouragement will induce many members to carry on in spite of difficulties.

The membership campaign was quite successful. In 1932, 113 new members were secured and in 1933, 114. During 1934, 112 new members were added to the rolls. These 112 new members were: Sustaining, 1; Active, 18; and Associate, 93. The new members were distributed through 34 states and provinces: Ohio, 15; Iowa, 11; Wisconsin, 10; West Virginia, 9; New York, 7; Illinois and Michigan, 6 each; Kentucky, Kansas, Minnesota, Missouri, North Dakota, and California, 3 each; New Jersey, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, and Utah, 2 each; Arizona, Florida, Indiana, Louisiana, Maine, Manitoba, Massachusetts, Montana, New Mexico, Nevada, New Brunswick, Oklahoma, Oregon, and Saskatchewan, 1 each.

Disregarding some duplications in nominations, the various members responsible for the applications of new members, were as follows: Lawrence E. Hicks,

*Revised to the end of December, 1934.

86; T. C. Stephens, 7; John W. Handlan, 5; W. M. Rosene, Philip A. DuMont, Maurice Brooks, Mabel Slack, Frank N. Blanchard, and Brasher Bacon, 3 each; J. M. Shaver, Charles J. Spiker, Gordon Wilson, and Joseph W. Stack, 2 each; Paul Errington, Oscar M. Bryens, Albert F. Ganier, Thomas E. Shields, R. A. Johnson, J. Reeder, Lyndon L. Hargrave, William G. Fargo, Noel J. Williams, Margaret M. Nicc, J. J. Murray, M. G. Lewis, Laidlaw Williams, J. E. Patterson, W. M. Dawley, O. A. Stevens, David Damon, Sidney K. Eastwood, Winton Weydemeyer, Donald W. Douglass, L. Irby Davis, and G. M. Cook, 1 each.

In spite of these increases, the Wilson Ornithological Club has had a slight decrease in net membership number, due to the large number of resignations and delinquencies for 1934 forced by present conditions. The total number of members lost during the year 1934 from all causes was 151, 1 being Honorary, 2 Sustaining, 37 Active, and 111 Associate. Thus, there has been a net loss of 39 members during 1934.

This leaves the present membership of the club at 621, distributed as follows: Honorary, 6; Life, 12 (2 are also Honorary); Sustaining, 44; Active, 154; Associate, 407.

The Secretary wishes to take this opportunity to thank the many members who have assisted in the membership campaign, helped with the staging of the annual meeting, or otherwise advanced the work of the Wilson Ornithological Club during the past year. It has been particularly gratifying to have received in all nearly 300 letters from the members giving news of their own work, ideas and suggestions on ornithological topics, or words of encouragement and constructive criticisms of the work being done. It is greatly regretted that the pressure of other duties has made it impossible to answer many of these directly, or to reply except by abbreviated note.

Respectfully submitted,

LAWRENCE E. HICKS, *Secretary*.

REGISTER OF ATTENDANCE AT THE PITTSBURGH MEETING

From CANADA: Arthur C. Twomey, Camrose, Alberta. From ILLINOIS: Victor E. Shelford, Champaign; L. G. Browman, L. V. Domm, Robert Redfield, Mandel Sherman, Chicago; Helen Jacobs, Mrs. A. C. Twomey, Urbana. From INDIANA: Martha B. Lyon, M. W. Lyon, Jr., South Bend. From IOWA: T. C. Stephens, Sioux City. From MASSACHUSETTS: Harry D. Eastman, Sherborn; K. L. Hussey, Swampscott. From MICHIGAN: Frank N. Blanchard, George Wallace, Frank J. Hinds, Ann Arbor; D. L. Sargent, East Lansing; D. H. Janzen, Lansing. From MISSOURI: Louis M. Weber, St. Louis; A. F. Satterthwait, Elizabeth A. Satterthwait, J. M. Magner, Webster Groves. From NEW JERSEY: Norman McClintock, New Brunswick; Warren F. Eaton, Upper Montclair. From NEW YORK: George M. Sutton, Ithaca; E. E. Segerstorm, Johnstown; Mrs. C. N. Edge, F. L. Fitzpatrick, Cecelia Moore, Theodora Nelson, New York City; Jessie J. McCall, Potsdam. From NORTH CAROLINA: A. Shaftsbury, Greensboro; Z. P. Metcalf, Raleigh. From OHIO: Pauline Belle Wyss, Bridgeport; Charles A. Dambach, Burton; H. B. McConnell, Cadiz; Mr. and Mrs. J. L. Floyd, Canton; Helen Dornette, Cincinnati; S. Prentiss Baldwin, S. Charles Kendeigh, Cleveland; Mr. and Mrs. E. L. Dakan, Mr. and Mrs. Robert B. Gordon, Mr. and Mrs. T. L. Langlois, Leonard B. Nice, Margaret M. Nice, Raymond C. Osborn, John Price, John H.

Schaffner, Columbus; R. D. Book, Corning; William Ireland, Jr., Grandview; A. W. Lindsey, Granville; E. L. Wickliffe, Grove City; Paul H. Stewart, Leetonia; William C. Baker, Salem; Lee Roach, Urichsville; C. T. Cutright, Wooster; J. L. Beeghly, Mr. and Mrs. Grant M. Cook, Youngstown; Mr. and Mrs. Lawrence E. Hicks, Zanesville. From PENNSYLVANIA outside of Pittsburgh: Robert W. Glenn, Avalon; Harry A. McGraw, Altoona; R. H. Reiber, Ben Avon; Dorothy Cleveland, Mrs. F. N. Cleveland, California; W. E. Dilley, Erie; Frank R. Smith, Fredericktown; Stanley J. Seiple, Greenville; Thomas S. George, Grove City; Dwight E. Sollberger, Ingram; Earnest Lakin, Johnstown; Maximilian Duman, Ann Gorski, Latrobe; Carl Auerswald, Dorothy Auerswald, Millvale; Edward C. Rainey, New Castle; C. H. Manley, New Kensington; Bayard H. Christy, Margaret M. Halworth, Martha A. Porter, Mrs. J. R. Rose, O. C. Reiter, Jennie B. Wallace, Frank A. Hegner, Sewickley; Anna May Arnold, Ernst Lachner, Keller Shelar, R. A. Waldron, Slippery Rock; Sidney D. Small, Edgewood; F. G. Hess, Mrs. K. G. Kutchts, Wilkinsburg; George J. Free, George L. Green, Oliver P. Medsger, State College; J. Warren Jacobs, Waynesburg; R. M. Corbett, West Sunbury; Sidney D. Small, Edgewood. From PITTSBURGH: Charles T. Agostini, E. W. Arthur, William L. Black, Helen Blair, Kate Blair, Mrs. A. C. Brandewyk, Margaret Brandewyk, J. A. Brown, John W. Brown, Helen Cashdollar, Edward L. Clark, Mary Lou Connell, Olive A. Corbett, H. S. Crass, Janette Dickson, H. D. Eastman, Fred Eberle, Agnes Fortman, Catherine Fricke, Reinhold L. Fricke, Laura Friel, Frank Glines, Dorothy Hartung, Alice Haworth, Ann Heese, Alva Held, Charles W. Hetzler, Frank Hinds, Marie B. Knaus, Robert Lehman, G. A. Link, Mr. and Mrs. A. C. Lloyd, M. Graham Netting, James M. Norris, J. J. Palmarin, Julius J. Palmisano, Agnes Portman, O. C. Reiter, Robert L. Scott, H. L. Scribner, J. Sumpstein, Harold Thompson, George B. Thorp, W. E. Clyde Todd, Ruth Trimble, Millie R. Turner. From TENNESSEE: Albert F. Ganier, John T. McGill, Jesse M. Shaver, Nashville. From WASHINGTON, D. C.: Paul Bartsch, H. C. Bryant, Phoebe Knappen, Charles J. Spiker, John S. Wade. From WEST VIRGINIA: Harold Bergher, A. B. Brooks, Mr. and Mrs. Maurice Brooks, Charles Conrad, Karl Haller, James Handlan, Mr. and Mrs. John W. Handlan, Thomas E. Shields, Clyde Upton, Russell West, Wheeling; D. Lee Shilliday, Barboursville; Chester M. Shaffer, Dorcas; Charles K. Llewellyn, Leonard Llewellyn, Robert C. Patterson, Keyser; J. L. Poland, Martinsburg.

SUMMARY OF ATTENDANCE: Canada, 1; Illinois, 7; Indiana, 2; Iowa, 1; Massachusetts, 2; Michigan, 5; Missouri, 4; New Jersey, 2; New York, 7; North Carolina, 2; Ohio, 32; Pennsylvania outside of Pittsburgh, 38; Pittsburgh, 49; Tennessee, 3; Washington, D. C., 5; West Virginia, 18. Total attendance, 178. Total outside of Pittsburgh, 129. Maximum number at each program session: Friday morning, 86; Friday afternoon, 103; Saturday morning, 96; Saturday afternoon, 87. Number at Annual Dinner, about 72. Number at Museum Open House, 82. Number of papers listed on program, 39.

REPORT OF THE TREASURER FOR 1934

From December 30, 1933 to December 15, 1934

RECEIPTS FOR 1934

December 30, 1933, Balance on hand from last report.....	\$	697.88
The following was collected as dues from members:		
2 Associate members for 1932.....	\$	3.00
1 Active member for 1932.....		2.50
8 Associate members for 1933.....		12.00
2 Active members for 1933.....		5.00
333 Associate members for 1934.....		499.50
151 Active members for 1934.....		377.50
33 Sustaining members for 1934.....		165.00
8 Foreign members for 1934.....		15.50
48 Associate members for 1935.....		72.00
15 Active members for 1935.....		37.50
13 Sustaining members for 1935.....		65.00
6 Foreign members for 1935.....		9.03
1 Associate member for 1936.....		1.50
1 Sustaining member for 1936.....		5.00
		<hr/>
Total from membership dues.....		\$1,270.03
The following was collected from subscribers:		
59 Subscribers for 1934.....	\$	88.50
1 Active subscriber for 1934.....		2.50
13 Subscribers for 1925.....		19.50
3 Fractional subscriptions or memberships.....		2.88
		<hr/>
Total from subscriptions.....	\$	113.38
The following were miscellaneous receipts:		
Collected for reprints.....	\$	15.10
Sale of back numbers of BULLETIN.....		9.25
Subsidies toward publication.....		16.50
Contribution toward publication.....		100.00
Miscellaneous receipts		8.35
		<hr/>
Total miscellaneous receipts.....	\$	149.20
		<hr/>
Total receipts, including old balance.....		\$2,230.49

DISBURSEMENTS FOR 1934

Printing four issues of BULLETIN.....	\$1,037.12
Cost of halftones, zincs, etc.....	99.67
Other expenses in Editor's office.....	68.53
Cost of reprints.....	5.40
	<hr/>
Publication costs	\$1,210.72
Expenses in Secretary's office.....	\$ 112.44
Expenses in Treasurer's office.....	47.61
Subscriptions refunded account of error.....	7.05
Exchange on Canadian checks.....	1.53
Three checks returned (later made good).....	8.00
U. S. Tax on 41 checks at 2 cents each.....	.82
	<hr/>
General costs	\$ 177.45
	<hr/>
Total disbursements	\$1,388.17
Balance on hand, December 15, 1934.....	842.32
	<hr/>
Total	\$2,230.49

(An itemized list of the disbursements with vouchers is attached for the Auditors).

Respectfully submitted,

W. M. ROSENE, *Treasurer.*

Ogden, Iowa, December 15, 1934.

ENDOWMENT FUND

December 30, 1933, Balance on hand from last report.....	\$1,379.59
Interest second half of 1933, from City State Bank.....	17.70
Interest first half of 1934, from City State Bank.....	23.43
Interest last half of 1934, from City State Bank.....	21.30
	<hr/>
December 15, 1934, Balance on hand.....	\$1,442.02

This balance is deposited in the Savings Department of the City State Bank, of Ogden, Iowa, at 3 per cent interest, and is covered by the Federal Deposit Insurance. Nothing has been paid out of this fund during the year.

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 31, 1934, and vouchers accompanying the same, and have found them correct.

Respectfully submitted,

CHAS. J. SPIKER.

BAYARD H. CHRISTY.



FIG. 8. Group at the Annual W. O. C. Meeting, Pittsburgh, 1934.

REPORT OF THE LIBRARIAN FOR 1934

Ann Arbor, Michigan, January 16, 1935.

I have the honor to present herewith the fourth 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 Librarian can not overemphasize the value of this material. The exchange of the BULLETIN for not only domestic but also foreign journals will be of inestimable scientific value to the Club and its library in the field of research. In this field 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 100 copies of BULLETIN No. 10 (September, 1896) were made by the lithoprint process during the winter of 1934. This BULLETIN is available for \$1.00 to non-members and for 80 cents to members of the Club, which is the same price that is charged for BULLETIN No. 9.

STOCK. During 1934 our stock was augmented only by the return from Dulau & Co., of London, of forty-two numbers of the BULLETIN (Vols. 37-39) for which the Librarian had to send \$3 25 for carriage charges.

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 during 1934:

- Mr. Samuel Harriot, New York, N. Y.
- Mr. E. L. Sumner, Jr., Berkeley, Calif.
- Mr. Warren J. Willis, New York, N. Y.

The gifts to the library for 1934 total 22 bound volumes and 242 separates, reprints, and unbound numbers of periodicals. This makes a total for the four-year period of the existence of the library of 178 bound volumes and 1387 separates.

Respectfully submitted,

F. P. ALLEN, *Librarian.*

KEY TO GROUP PHOTOGRAPH OF THE WILSON ORNITHOLOGICAL CLUB

1. William Ireland, Jr. 2. George B. Thorp. 3. Roy Black. 4. William C. Baker. 5. Paul H. Stewart. 6. Ruth Trimble. 7. Jesse M. Shaver. 8. T. C. Stephens. 9. Lawrence E. Hicks. 10. Margaret M. Nice. 11. Albert F. Ganier. 12. Ann Gorski. 13. Carl Auerwald. 14. Chas. J. Spiker. 15. Bayard H. Christy. 16. Charles A. Dambach. 17. Robert W. Glenn. 18. Dorthy Hartung. 19. Ann Heese. 20. Clyde Upton. 21. James Handlan. 22. Thos. E. Shields. 23. Mr. Bond. 24. Mrs. J. L. Floyd. 25. J. L. Floyd. 26. D. H. Janzen. 27. Warren F. Eaton. 28. Mr. Miller. 29. E. W. Arthur. 30. John W. Brown. 31. S. Prentiss Baldwin. 32. Louis M. Weber. 33. Elizabeth A. Satterthwait. 34. Edward S. Thomas. 35. Olive A. Corbett. 36. Agnes Fortman. 37.—. 38. Alva Held. 39. Laura Friel. 40. Alice Haworth. 41. Dwight E. Soffbeiger. 42. Martha Porter. 43. Mr. Ramey. 44. Leonard B. Nice. 45. E. L. Dakan. 46. Mrs. Lawrence E. Hicks. 47. Frank Glines. 48. J. L. Poland. 49. Frank R. Smith. 50. J. Warren Jacobs. 51. Mr. Rowe. 52. W. E. Clyde Todd. 53. J. Sumpstein. 54. Mrs. C. N. Edge. 55. George M. Sutton. 56. James Beeghly. 57. George Wallace. 58. Theodora Nelson. 59. Frank Hinds. 60. Mrs. Maurice Brooks. 61. Charles T. Agostini. 62. Norman McClintock. 63. John W. Handlan. 64. Mrs. John W. Handlan. 65. Catherine Fricke. 66. Reinhold L. Fricke. Copies of the 1934 W. O. C. group picture may be had for 50 cents each by writing to R. P. Hay, Industrial Photographer, Loeffler Building, Oakland, Pittsburgh, Pa.

COMMUNICATIONS

To the Editor:

I have just received and read through the December issue of the WILSON BULLETIN, and was particularly interested in the article by Mr. P. T. English, describing the observations on Red-tailed Hawks in the Williamston project. The article is very illuminating but it is difficult to believe that the conclusions on page 235 are unbiased.

In the author's introductory paragraph he states that the Red-tailed Hawk is not numerous. In fact, he was able to find only one pair to work on; and this pair raised only one young. Yet he has compared the results of one investigation with the data of other investigators, notably Warren and Fisher, whose work was undertaken on a far larger scale.

Furthermore, considering the game birds taken on this area, the author admits that the Hungarian Partridges released in that vicinity were wing-clipped birds and, therefore, handicapped in their chances to escape the hawks. It is, therefore, not reasonable to expect that any Red-tailed Hawk, in any area, would have the same feeding habits as this particular pair.

Moreover, assuming that one pair of nesting Red-tailed Hawks would take three and two-tenths per cent of the game on a 5000-acre area, is this justification for destroying one of our rapidly disappearing and most interesting of American birds? Game breeding for slaughter, especially of imported birds, is being carried too far. If killing of Red-tailed Hawks is recommended on all game-management projects it becomes difficult, if not illogical, to stop their being killed on every other place.

Conclusion No. 7, indicating that weasels might be beneficial rather than harmful, is unjustified from his investigation as he has not shown that the mice are in any way injurious to the game birds, or that the weasels are harmful. Why should not the conclusion be drawn that the weasels had been killing game and by the killing of the weasel save many of the game birds?

Furthermore, while the article in general is quite fair in stating both sides of the question, it hardly seems to justify the elaborate and apparently scientific-seeming conclusions which are based on inadequate study and that only one pair of nesting birds was considered, and that was in a game area.

It is my contention that even though a nesting Red-tailed Hawk takes a number of game birds, and if it is as rare a bird as Mr. English's investigations would leave us to believe, in the area considered, it would be better to overlook, for esthetic reasons, if for no other, the comparatively small damage done by the depredations. On page 234 he quotes Stoddard to the effect that unless red-tails are numerous they may as well be tolerated in game preserves, etc.

In my mind the important fact to consider is to what extent we are to allow private gain to reduce or destroy some of our wildest, most interesting, and esthetically desirable forms of bird life, such as the Red-tailed Hawk, irrespective of its economic status in any particular situation? The facts, while they may appear damaging from a game management point of view, are certainly none other than would be expected of a pair of hawks nesting in almost barn-yard conditions.

Very truly yours,

WARREN F. EATON,

*In Charge National Association of Audubon
Societies' Hawk and Owl Campaign.*

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.
Chicago Academy of Sciences. | |
| 1914—Chicago. December 29-30.
New Morrison Hotel..... | T. C. Stephens |
| 1915—Columbus. December 28-29.
With the A. A. A. S..... | T. C. Stephens |
| 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 |

JUL 23 1935

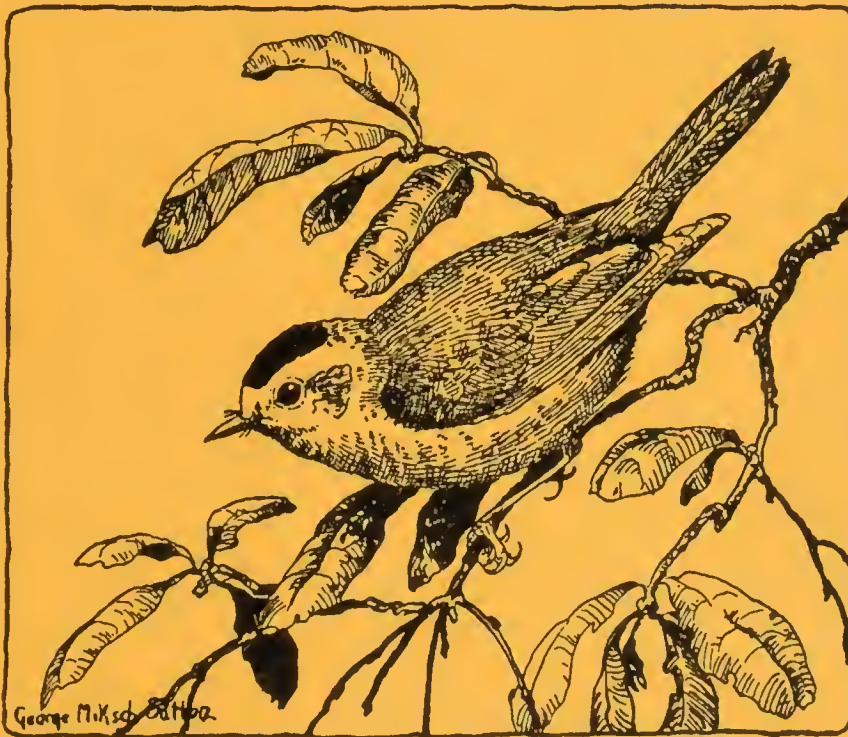
13,814

Vol. XLVII

JUNE, 1935

No. 2

THE WILSON BULLETIN



A Magazine of Field Ornithology
Published by the
WILSON ORNITHOLOGICAL CLUB
at
SIOUX CITY, IOWA

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

†

CONTENTS

A STUDY OF THE NESTING AND FAMILY LIFE OF THE RED-THROATED LOON	By R. A. Johnson and Hazel S. Johnson	97-103
THE CONSTANCY OF CATBIRDS TO MATES AND TO TERRITORY	By Geoffrey Gill	104-106
FOREST EDGE BIRDS AND EXPOSURES OF THEIR HABITATS	By J. Richard Carpenter	106-108
NOTES ON NESTLING ROBINS	By W. J. Hamilton, Jr.	109-111
THE DUCK SITUATION IN THE PRINCE ALBERT DISTRICT, CENTRAL SASKATCHEWAN	By O. C. Furniss	111-119
ERYTHROCYTES AND HEMOGLOBIN IN THE BLOOD OF SOME AMERICAN BIRDS	By L. B. Nice, Margaret M. Nice, and Ruth M. Kraft	120-124
FOOD HABITS OF BURROWING OWLS IN NORTHWESTERN IOWA	By Paul L. Errington and Logan J. Bennett	125-128
BIRD MIGRATION RECORDS FROM SOUTHEASTERN WYOMING	By Otto C. McCreary and Arthur B. Mickey	129-157
GENERAL NOTES		158-165
ORNITHOLOGICAL LITERATURE		166-174
EDITORIAL		175-176

THE WILSON BULLETIN

is published quarterly in March, June, September, and December, as the official organ of the Wilson Ornithological Club, at Sioux City, Iowa, and is sent to all members not in arrears for dues. The subscription price is \$1.50 a year, invariably in advance, in the United States. Single numbers, 50 cents. Outside of the United States the rate is \$1.75. Single numbers, 60 cents. Subscriptions should be sent to the Editor.

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—Mr. W. M. Rosene, Ogden, Iowa.

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. XLVII

JUNE, 1935

No. 2

Vol. XLII (New Series) Whole Number 172

A STUDY OF THE NESTING AND FAMILY LIFE OF THE RED-THROATED LOON

BY R. A. JOHNSON AND HAZEL S. JOHNSON

The following notes on the Red-throated Loon are taken from our study of the birds of the North Shore of the Gulf of St. Lawrence during two summers spent in the vicinity of Cape Whittle in Saguenay County, Quebec. In 1931 we were at Wolf Bay, some nine miles west of the Cape for nine weeks, and for ten days on the St. Mary Islands which are located approximately twelve miles east of Cape Whittle. For a six week period in 1934 we made the St. Mary Islands our headquarters while working there and on the Boat Islands near by.

Eleven nesting pairs of birds were studied: one on the mainland in 1931 and ten pairs during 1934, six of which were within the St. Mary Island Sanctuary and four outside its protection on the Boat Islands. Observations were made from a blind, of incubating birds at the Wolf Bay nest in 1931, and at one nest in the sanctuary in 1934.

The Wolf Bay nest was typically located on the bank of a fresh water lake a few yards long and half as wide. While this lake was on the mainland all other nesting lakes observed in 1934 were insular. On one island two occupied lakes were not more than fifty yards apart. All nests were placed so near the brink of their lakes that the loon could slide into and under the water with one "push off". The laying date for one early nest in the sanctuary was May 25, and for another on the Boat Islands was June 29. This latter one was a second nesting attempt for the season, as the one at Wolf Bay on June 28, 1931, may also have been.

While the two drab colored eggs were laid in a slight hollow of a nest which had only enough depression to keep them from rolling into the water, there was, in every case, collected nesting material—usually sphagnum moss, crowberry vine, and reindeer moss.

Three pairs of the birds observed in 1934 attempted to re-nest after losing their eggs during the early incubation period. In each case a second nest was made a few feet from the location of the old

one. In other cases the birds which lost their eggs remained in possession of the lake but did not, apparently, try to re-nest.

An adequate description of the size and color of the eggs has been given by Bent¹. In every instance known to us two eggs were laid in each nest. From the Wolf Bay nest one egg was lost in some unknown way, but the remaining egg was cared for and hatched.

Ineubation begins when the first egg is laid, so that the chicks hatch from twenty-four to thirty-six hours apart. Both sexes share in the duties of ineubation and it may be said that they are quite devoted to the nest. Unless disturbed one or the other of the pair will be found on the nest throughout the day and night. When one egg is lost the



FIG. 9. Left, sea-shell found in Red-throated Loon's nest with egg.
Right, young loon about three weeks old.

birds continue ineubation as shown in two cases observed. But the most remarkable instance of their devotion to the nest was shown by an incident observed in August, 1934. A pair of birds ineubating on the second nest site had lost their eggs or had had none—no eggs were seen—and they were faithfully sitting on a spiral shaped sea shell of about the same size as a loon's egg. (See figure 9). We cannot explain how the shell got into the nest and was adopted. It may have been dropped near the nest site by a gull, but this seems unlikely since the shell was not fresh but very old and worn. Apparently the pair of birds had been sitting on the shell for several days as it was polished quite smooth. To make certain of this record, the nest was visited five times in three days, twice before dawn. In all cases an

¹Life Histories of North American Diving Birds, by Arthur Cleveland Bent, United States National Museum Bulletin 107, 1919.

incubating bird was at the nest. Three times it was seen hovering the shell. Finally on August 2 the shell was collected to encourage the faithful pair in a more profitable occupation.

The incubation period of the Red-throated Loon is thirty-eight to forty days. This was determined in the summer of 1934 in the following manner. On June 30 a nest containing one fresh egg was found on the Boat Islands. By August 2 this nest had not hatched so the two eggs were taken and placed under a broody chicken hen which had been brought from the States for that purpose. One of these two loon eggs hatched under the chicken on August 7, thirty-nine days after the first egg was laid.

The incubating bird always faced the water. As it sat on the nest it was often seen to pull twigs of crowberry, labrador tea, and moss about its breast or to rearrange them to better advantage. When returning to the nest lake the bird did not always go onto the nest at once. Although no sound was made in the blind the loon might suddenly fly from the water and its wail could be heard as it circled about the nest lake. This action might be repeated two or three times before the bird attempted to climb the bank from the water to its nest. Failing to gain the brink the first time, the bird would swim along the shore several feet, trying at several places until it gained a foothold. Coming to the nest from the back or side the bird turned in such a manner as to face the lake, lowered its breast onto the front rim of the nest and, with its feet, attempted to adjust the position of the eggs to the incubation spot which is far back on the long body. If this position failed to satisfy, the bird would raise up and with the mandibles slightly parted, push the eggs into the desired position. Again lowering itself onto the eggs, it settled with the usual rolling motion of an incubating bird. One settled to its liking, the bird sat quietly, even dozing now and then; caught a passing fly in its bill or picked at its wings and back. At the least note of warning from a passing gull the loon would stretch its neck upward turning the head from side to side. At such times a slight expansion of the throat muscles could be seen, and if the alarm continued the bird would stretch head and neck flat along the ground, to escape detection, apparently. Slight notice was taken of a visiting Eider Duck on the nest lake.

The young of the Red-throated Loon is black over the upper portions of the body and smoky black beneath with a mergence of both shades about the neck and over the head. After three weeks it appears lighter and more blue-black in color.

The chick seems to have but one call which is a low, rasping, drawn out "*cru-ee-ep*", that can be heard from only a short distance. This cry is heard when the bird is chilled and wants to be hovered or when it is hungry.

The chicks were never carried on the parent's back, although one young bird was occasionally seen attempting to climb onto the back of a parent while in the water. Hovering always took place on the bank of the nest lake. So far as protection is concerned the young are dependent upon their color which makes them nearly undiscernible along the lake shore, and upon their ability to dive, an accomplishment at which they are most adept.

When young the chicks need hovering more often than in later life. The parent bird left the water many times a day, climbing onto the bank at the nest site or that of an old nest and settling itself comfortably facing the water. The chicks followed but were never seen to climb onto the bank unless preceded by the adult although they frequently went back to the water alone. A quotation from our notes, taken from the blind in 1934 while observing a four-day-old chick, is of interest in describing the life of the young loon. "6:50 P. M., July 6, one parent and one chick are swimming about in the center of this small nest lake keeping close together. Once the parent dived, so did the chick, and they swam together again; 7:00 o'clock, chick began to whimper. Temperature is 52° F. Soon the parent bird swam to an old nest site on the opposite shore of the lake, climbed out and settled itself. The chick immediately followed, went to back of parent, crawled forward and up under the wing which was held out for it. The chick then hovered as observed before, up on the crucial feather tract under the tips of the secondaries from where its head sometimes protruded above the back feathers of the adult. After ten minutes of hovering the second adult alighted on the lake with a fish approximately five inches long, swam near to the hovering bird and gave a low throaty '*car-ow-ow-w*'. Meanwhile it kept dipping the fish below the surface of the water. Soon the chick came to the edge of the water but turned back and was hovered again as before. The adult with food continued to call. In three minutes the young one swam out some three feet, took the fish and struggled with it for a minute: then started to shore, dropped the fish, and went back to be hovered, this time under the other wing of the old bird. The adult which brought the fish, recovered and ate it, then remained on the lake for ten minutes. During this time both old birds exchanged cooing notes sounding similar to the courting calls of the male Eider Duck, except



FIG. 10. Left, nest of Red-throated Loon. Right, young loon, about four weeks old, swimming alone in lake.



FIG. 11. Nest of Red-throated Loon, with newly hatched young and egg.

that they were pitched much lower. The hovering bird then slid into the water, gave two 'car-ow-ow-w's and both adults flew from the lake. In three minutes one adult returned and hovered the chick."

Numerous observations were made from the blind on the food and feeding of the young at different stages of growth. So far as we could determine whole fish were fed from the beginning. These were unbelievably large for the size of the young bird. On two occasions a bird three weeks old seemed to be taking Caddis Fly larvae from the lake. This note, however, could not be verified. Among the fish fed the Sand Lance (*Ammodytes americanus*), Gunnel (*Pholis gunnellus*), and Capelin (*Mallotus villosus*) were identified. One adult loon was observed on several different days fishing in a sandy harbor where Lances were numerous and carrying her catch to an island about two miles away.

The growth of the young of the Red-throated Loon is comparatively slow. One chick was observed periodically from the day it hatched until it was five weeks old. At this time it was about two-thirds grown but had only begun to show feathers about the shoulders. The flight plumage appeared to be pins about one inch long. Mr. Fred Osborne, the Sanctuary keeper at St. Mary Islands, believes that these young do not fly before they are two months old. Our studies indicate that his estimate is fairly accurate. When we left the Sanctuary on August 7 no young birds had as yet flown from the nest lake. The oldest one at that time was approximately seven weeks old.

One young loon three weeks old weighed 152 grams and showed primary pins one quarter of an inch long. No other feathers were showing in this bird. On another lake a young bird of about three weeks of age weighed 185 grams. The tarsus measured $1\frac{9}{16}$ inches, the wing spread nine inches. The eye was chocolate brown color with a black pupil.

Like most other forms of bird life the Red-throated Loon has many natural enemies. But in this study only two could be seen to play a very important rôle. These were the Great Black-backed Gull and man. The gull is a notorious egg eater and will usually take the loon's eggs if they are found unprotected. The fact that they are so nearly the color of the ground is of course some protection. Young loons are undoubtedly taken by gulls. On one occasion we visited a lake where a three weeks old bird was swimming about, apparently normal. After the bird had dived three or four times it could not get under the water again until it had rested for a few moments. This bird was lost that day probably to a gull. It may be that this loon

had been weakened from some other cause and should not be charged entirely against the gulls. On another lake two birds not more than three weeks old were lost, presumably to gulls. There were no other predators on the island. Two nests of eggs were known to have been taken by gulls and others were thought to have gone the same way.

Man is also a notorious egger but, in case of the loon, his damage is, for the most part, unwittingly committed as an ally of the gull. When the loon is frightened at the approach of man, it will, as a rule, leave the nest, often staying away for some time. As soon as man leaves the island the gulls settle down to the business of securing any available food. If the loon has not returned to its nest the eggs may be taken. The Great Black-backed Gull seems to be a very intelligent bird. We have seen individuals which appeared to learn to give a false alarm as a means of getting a chance at the eggs of nesting birds of other species which have come to depend upon the gull to announce an approaching enemy.

With the incubation of this loon known, and the length of time spent on the nest lake approximately determined, it is safe to assume that the late hatched birds from second nests which do not fly until about October 1, have but a poor chance to survive. The one such nest in 1931 was hatched August 6 and one in 1934 on August 7.

The ten pairs of birds observed in 1934 made thirteen nests. One late nest was collected. An egg in one nest was left addled. Presumably two other eggs should have hatched, since their mates did. Twelve eggs were lost before incubation was completed. Three young loons were raised, each from a different nest. The four young that were lost went at the following ages: one at one day of age, three at approximately three weeks, although no two went at the same time. Thus the twelve nests produced three birds this year. We believe that this is far below the normal production and that the severe damage done by gulls must be considered in light of the fact that the natural food (fish) for gulls was so scarce that at least seventy-five per cent of their young starved to death.

Any attempt to evaluate the nesting success of a species should consider the effect of the study as a factor. Accordingly, of the total damage done by gulls, two nests of eggs and one young bird were lost when the old loons were away from the nests due to our activities or those of other people on the island. Perhaps this loss should be charged to the study. Certainly we were the indirect cause of the loss although some of it might have occurred in any case.

ONEONTA, N. Y.

THE CONSTANCY OF CATBIRDS TO MATES AND TO TERRITORY

BY GEOFFREY GILL

At Huntington, Long Island, New York, during the last three years, the writer has been interested in the study of Catbirds (*Dumetella carolinensis*) in relation to territory. Many resident nesting Catbirds have been banded with colored bands and it is possible to ascertain the constancy of pairing and to territory during a single season and following seasons.

Of twelve nests studied during the past three seasons in which all parent birds were banded, in four cases, both parents wore colored bands and in the remaining eight cases at least one of the parents were so marked.

In the *Bulletin of the Northeastern Bird-banding Association* (Vol. I, pp. 48-49) Mrs. H. G. Whittle records a case of a pair of Catbirds which were constant throughout a season, successfully rearing two broods. In the twelve cases recorded here there is no similar case, because not a pair in my records were successful in raising two broods in a single season, but cases of constancy do exist.

The most interesting records are of a pair of this species which, for convenience, are named "6M32", being the male on territory 6 in 1932, and "6F32", his mate. These two birds were banded in mid-June, 1932, and it is thought that due to the lateness of the date of the nest building, some ten feet east of the banding station, that this was a second nesting. Their brood of two left the nest on July 18. While the female or the young were never seen or taken in the traps again that season, the male repeated on August 20.

In 1933, 6M32 returned on May 13 and was observed singing on territory 1 the next day. This territory proved to be his home for 1933, located some 250 feet southeast of his 1932 residence. This territory was occupied during the previous year by another pair so was decidedly not a part of his original territory. 6M32 won a new mate and built a nest a foot from the nest-site of the 1932 occupants of this thicket. During incubation, on June 8, the four eggs and the female disappeared. 6M32 was very silent for two weeks but was seen frequently on the same territory. Another mate, an unbanded bird, appeared on June 23 and it is believed that a second nest was built some seventy feet south of the first attempt, however the nest was never found. The male repeated in our traps on August 6.

6M32 appeared again in our traps on May 17, 1934, and he was seen singing three days earlier on territory 1, being constant to terri-

tory for the second season and third nesting. His mate for the first nest was a bird banded on the left leg. Again the nest was built in almost the same spot as in previous years and again the eggs were stolen.

The second nest, with a new mate, banded by us on June 16 and wearing colored bands, was built to the southward a short distance but was too well hidden for discovery. The male repeated in our traps again on August 17*, obviously molting.

The above male changes mates apparently with each nesting but was fairly constant to territory.

6F32, the mate of the above male in 1932 was not retaken in our traps until July 1, 1933, but she was found on May 21, 1933, mated with a bird banded on the right leg on territory 7, 310 feet east of her former territory and the closest Catbird neighbor to her mate of the former year. During incubation the four eggs disappeared, but both birds stayed on the same territory. A new nest was started shortly afterwards some sixty feet farther east and the three young left this nest on July 30. One of these young repeated in our traps on August 19, but all others of the family were never seen or trapped again. In this case the female changed territories and mates from one season to the next but she was constant to her mate and to her territory during a single season.

In the case of 2F33, on territory 2, 300 feet northeast of the banding station, she mated with a bird banded on the right leg throughout her two known nestings in 1933 and the first nesting of 1934. The second nesting for 1934, if it existed was not recorded. These two birds changed territory with each nesting in 1933, being first on territory 2 and then building a second nest, after the first was broken up, on territory 8, some 200 feet north of the first nest-site. Their first nest in 1934 was again on territory 8. This pair shows the greatest constancy of mating, if not to territory, if the male was always the same bird banded on the right leg. This fact is doubtful as I have banded 494 of these birds and many of this species are banded on the right leg. Only ninety individuals wear colored bands.

In the case of 9M33 and 9F33, it is interesting to note that this male, banded August 11, 1932, is one of the few immature birds which I have recorded to return. He was found on May 20, 1933, with his mate, nesting on territory 9, 250 feet west of the banding station. The four young left the nest on June 16. The female repeated in our traps

*It should be noted that with the exception of the first year, this bird only appeared in our traps as stated, although residing less than 300 feet away from the trapping station.

on June 18, and again on July 11 and 29. On July 15 the male, without a tail and obviously molting was taken in our traps for the first time that season. If a second nest existed it was never found. On May 12, 1934, 9M33 returned and with a new mate nested again on his 1933 territory, building a nest thirty feet south of the former site. During incubation the nest was destroyed, probably by a cat. The birds were not found again until the male repeated in our traps on August 10. This bird was not constant to his mate but was constant to territory.

In the nine nestings mentioned above constancy is shown by Cat-birds in varying degrees to mates and to territories. Of the three remaining nests in which birds were recognizable by colored bands none of them returned or during a single season showed any constancy.

HUNTINGTON, L. I., N. Y.

FOREST EDGE BIRDS AND EXPOSURES OF THEIR HABITATS

BY J. RICHARD CARPENTER

In studying the bird population of forest edge communities of University and Brownfield woods near Urbana, Champaign County, Illinois, during the winter and spring of 1932-33 it was found that there was a marked selection by the majority of birds in regard to the exposure-direction of the habitat selected. The prevailing winds of the region during that period of the year are from the west and southwest and it was apparent that the birds selected exposures on the "lee" sides of the woods in both of the tracts studied.

The dominant vegetation of the thickets of the forest edges studied was redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), young elms (*Ulmus americana*), spicebush (*Benzoin aestivale*), button bush (*Cephalanthus occidentalis*), several species of ash (*Fraxinus* spp.), and haw (*Crataegus* spp.). For a further description of the tracts of woodland studied see McDougall '22, Smith '28, and Blake '31.

Data regarding the bird population were obtained by cruising through the forest edge, recording all of the birds in a strip approximately twenty feet wide, which included the major portion of the thicket at the edges of the woods. In both cases the route of observations was about one mile long and since in both cases also the woods were slightly longer than broad, the north and south exposure observations are over a slightly smaller area than are the east and west observations.

The accompanying table lists the birds observed, with notations following the individual figures as to where the majority of that given

	N.12b	N.20b	D.10b	J.8b	J.21b	F.25b	F.26u	M.4b	M.5b	M.19u	M.27b	M.27u	A.2u	A.9u	A.23u	A.30u
Flicker	1e					1e				1s				2s	8	
Yellow-bellied Sapsucker	1e					2				1w	2n			1n	5e	
Red-bellied Woodpecker	1n			1e	2	2e	2	13e	1w	2	4c	1e	6n	2e	1w	
Downy Woodpecker	3n	1n	5	7	9c	2e		28e	1s		3	4e	4n	7e		3
Tufted Titmouse	5e	12c	4		11			1e						1e		
Hairy Woodpecker		1n	1s	1s	3e	3c	3	9e	1e		2e		1e	2e	6c	3e
Cardinal		8c	5e		5e	15c	5	5e	25e	60s	1n	85n	17n		4n	2n
Chickadee		1e	2e	4s	2			3w	1w		1s		1n	1w		
Junco		4e			4e								2n			
Brown Creeper		1n	2e		2c											
Ruby-crowned Kinglet		2n	2e		2e											
Blue Jay			1w		4n										1w	
Red-breasted Nuthatch						1e										
Bluebird						2e										
Robin						7c										
Miscellaneous Sparrows							9e	80n	1s	7s	5n			1e	4c	
Field Sparrow							28c	127e	1e	3n				1w	4c	
Towhee										1s	2e		1n	1e	1w	
Bronzed Grackle										5s	21n	4s	1e	4s	1s	3
Wood Thrushes														2	3	9e
Tree Sparrow														2	5s	3s
Brown Thrasher														1e	2w	2
Miscellaneous Warblers															1w	8c
White-eyed Vireo															4w	1e
White-throated Sparrow																60e
Catbird																3e
Miscellaneous and Indet.						12n				4w	9	7s		10n		3e
Total Individuals	11	30	22	13	44	44	51	266	30	84	50	97	39	36	49	104
Number Species	5	8	8	4	10	8	7	8	6	9	10	4	11	14	15	16
North Exposure	4	17	15	4	9	23	1	50	26	5	30	84	28	11	6	11
East Exposure	7	7	15	1	25	6	11	197	2	6	7	1	9	17	13	80
West Exposure		6	6	8	10	15	21	19	2	6	13	12	1	2	19	8
South Exposure			1			15	18		2	73			1	6	8	4

species for that date occurred. The statistical summary at the conclusion of the table gives the total number of birds in each exposure for that woods that day.

In the winter and early spring a great number of birds occupy one preferred exposure to the marked exclusion of those habitats which are more rigorous; the Brown Creeper, Titmouse, Chickadee, and Bluejay were most noticeable among these. In the late spring the total population is spread over more exposures with much less noticeable selection; these birds, save the Junco, were apparently consistent in their lack of discrimination of habitat. The Junco individuals which spend the late spring and summer months in the region showed a marked selection for the northern exposures; this was not evident for the winter residents of the species. The east exposure (the "lee" side with reference to the prevailing winds) had by far the greatest bird population in all seasons observed. Insect population studies conducted during the same period gave no similar habitat selection with respect to exposure.

It is interesting to note that while the average number of species observed was eight during the winter and early spring (the hiemal and prevernal periods), the late spring (vernal) practically doubled the number of species observed each day. Seasonal progression and the arrival of species is also evident.

LITERATURE CITED

- Blake, Irving H. 1931. Further studies on deciduous forest animal communities. *Ecology*, 12:508-527.
 McDougall, W. B. 1922. Symbiosis in a deciduous forest, I. *Bot. Gaz.*, 73: 200-212.
 Smith, Vera G. 1928. Animal communities of the deciduous forest succession. *Ecology*, 9:479-500.

UNIVERSITY OF OKLAHOMA,
 NORMAN, OKLAHOMA.

TABLE I

(See preceding page)

SELECTION OF HABITATS AND EXPOSURES BY FOREST EDGE BIRDS November 12, 1932-April 30, 1933

EXPLANATION OF SYMBOLS USED IN TABLE

- b Observation made at the Brownfield woods.
 u Observation made at the University woods.
 n Individuals found exclusively in northern exposures.
 e, w, s Individuals exclusive to respective exposure: east, west, or south.
 n Most of the individuals in north exposures, but not exclusively so.
 e, w, s As in *n* for the respective exposures.
 c Cosmopolitan: individuals occurring in three or more exposures.
 No initial: in two habitats, more or less evenly distributed and showing no apparent selection.

NOTES ON NESTLING ROBINS

BY W. J. HAMILTON, JR.

The following notes were made at Ithaca, New York, over a four-year period (1930-1933). Data were secured on four sets of Robin nestlings; the nests being located in exceptionally favorable situations which made observation easy. As little has been recorded on the change in weight, both gains and losses of altricial birds, the records tabulated may prove useful to some bird students.

Plumb (1884)* made thirteen weighings of two nestling Robins from July 28 to August 9. The average weight at one day was 5.9 grams, and on the thirteenth day they averaged 55 grams. One bird showed a loss during the last two days in the nest; the other showed no loss but did not increase in weight during the same period. Plumb attributed the loss in weight to a severe infestation of lice.

In securing data on weights, the young birds were removed from the nest immediately upon hatching and weighed before they were first fed. It is possible two of the six birds weighed at hatching had been fed, but I am not certain on this score. Thereafter, the young were weighed at the same hour (7 A. M.) daily, until they had left the nest.

The average weight of twelve freshly laid Robins' eggs was 6.58 grams. Due to the evaporation of gases from the egg during incubation, a perceptible loss was noted after ten days of incubation. The small number of eggs weighed does not give indicative figures regarding the correct percentage of this loss. The weighings do suggest a loss of more than twenty-five per cent of the original weight.

Newly hatched Robins average 6.6 grams. At fourteen days, when leaving the nest, they weigh 56 grams. This is an increase amounting to more than eight times the original weight.

Age in days	No. weighed	Average weight of one (grams)	Gain or loss in weight	Daily per cent gain or loss in weight
At hatching	6	6.6	-----	-----
1	10	8.9	+2.3	+35
2	10	14.3	+5.4	+60
3	10	21.3	+7	+49
4	10	26.6	+5.3	+25
5	10	32.2	+5.6	+21.5
6	10	40.1	+7.9	+24.5
7	10	47	+6.9	+14.4
8	10	52	+5	+14.7
9	10	55.2	+3.2	+ 6.1
10	10	54.9	— .3	— .54
11	10	56.3	+1.4	+ 2.55
12	10	54.8	—1.5	— 2.66
13	10	55.7	+ .9	+ 1.64
14	6	56	+ .3	+ .54

*Plumb, Charles. 1884. Increase in Growth of Young Robins. Science 4 (82), p. 159. Aug. 29.

The loss in weight on the 10th and 12th day is difficult to account for. The birds were in good health, not unduly disturbed, and free from all external parasites, while the remiges and rectrices were well erupted.

The nests under observation were favorably placed, being on window ledges, cornices of porches, and other low situations. Two that were placed on windows made it possible for the observer to take notes ten inches from the nest without being seen.

The food during late May and early June consisted principally of cutworms. From the earliest period these larvae form a prominent share of the menu. From two to six, depending on the size, are brought to the nest at one time. Usually two large cutworms represented an average meal throughout the day. By closely observing several pairs of Robins throughout the nesting season, it was possible to estimate the daily number of visits these birds paid to the nest. An average of ten visits per hour, from 5 A. M. to 7 P. M. accounts for 140 daily trips made by the old birds. Being extremely conservative, we might reckon a hundred trips daily to be a fair average throughout the fourteen days that four sets of nestlings spent in the nest. This would entail 1400 trips by the parents in feeding the young.

In order to determine the quantity of food eaten by the young birds, the freshly fed cutworm, adult insects, worms, etc., were occasionally removed from the young with blunt forceps, immediately upon being fed by the parent birds, and immediately weighed. This procedure was inaugurated while the birds were but a day or two old, and continued on alternate days until the young left the nest. By this method it was estimated the birds brought to the young approximately two grams of food at each visit, or a daily feeding of 200 grams of animal matter to the nestlings, be they three, four, or five.

The estimate is high for the early days in the nest and low for the days immediately preceding the time of leaving the nest. It is thought to be fairly accurate and, at least, gives some clue to the amount of food eaten. Robins feed their young, apparently regardless if there be three or five, approximately 3.2 pounds of food during the two weeks while in the nest. The observations were made several weeks before cherries ripened and, because of this, the food consisted almost entirely of animal matter.

Birds take the most available food, providing it is acceptable to them. During an entire day in early June a pair of Robins brought

to their young numbers of the large crane fly (*Tipula trivittata*), which were everywhere common. The mating insects were easily caught, and frequently a bird would approach the nest with two, or even three, pairs of these mated flies.

CORNELL UNIVERSITY,
ITHACA, N. Y.

THE DUCK SITUATION IN THE PRINCE ALBERT DISTRICT, CENTRAL SASKATCHEWAN

BY O. C. FURNISS

There has been a great deal of controversy lately over the decrease in the numbers of ducks; so much so, that the writer decided to make a fairly detailed survey of a particularly favorable area in an attempt to draw conclusions as to the existing conditions in that area.

This report is based on a survey of ninety-nine potholes and sloughs on sixteen quarter-sections about five miles south of the city of Prince Albert.

The Prince Albert district is on the dividing line between the typical Canadian and Transition life zones. It is in the heart of the pothole country and as a breeding ground for ducks is looked upon as excellent. The area worked consisted of a creek, which backs up in the spring to keep the water level of some of the sloughs fairly constant throughout the summer, wooded areas with aspens as the main tree, field crops such as wheat, oats, and barley; and hay meadows. The surface of the land is rolling which accounts for the large number of sloughs and potholes.

It was necessary to work quickly in order that the water levels of all the area worked would be in the same ratio with one another, to avoid counting one brood more than once, and also to have the "cover" of one slough to compare with that of another. The work was started late in July in order that the water levels and food might be more readily discernible.

The potholes and sloughs examined varied in size from one-half acre to twelve acres, the average being 2.6 acres. The areas taken were those of the open water. Every pothole in the list has open water throughout the summer.

The Graph 1 (Fig. 12) shows the number and size of the bodies of water examined.

DATA FOR GRAPH 1

No.	Smallest	Largest	Average
99	1/2 acre	12 acres	2.6 acres

Many of the potholes contained fresh water, particularly those that were fed by the overflow from the creek in the spring. There was no evidence of excessive alkalinity in any of the water in the whole area.

In listing the surrounding "cover" about the sloughs and potholes only the main characteristic plants are mentioned. The provision for suitable nesting sites was the basis for the terms "good", "poor", and "fair".

Those classed as "good" had a good stand of *Scirpus* or *Typha* in the water and a secondary ring around the land edge of *Panicularia grandis*, *Scolochloa festucacea*, or various species of *Cyperaceae* such as *Scirpus americanus* or some of the *Carex* group. The inner ring being considered suitable for the diving ducks and the outer satisfactory for the surface feeding. Those classed as "fair" had either one of these rings but not both; and those classed as "poor" had neither of these rings or only traces.

No.	CLASSIFICATION ACCORDING TO COVER					
	GOOD		FAIR		POOR	
	No.	Per cent	No.	Per cent	No.	Per cent
99	62	62.62	16	16.16	21	21.21

The main plants found to form the cover around these sloughs and potholes were: *Scirpus validus*, *Scirpus americanus*, various *Carex*, *Panicularia grandis*, *Scolochloa festucacea*, and other grasses. In one or two cases odd patches of *Phragmites phragmites* were noted. No attempt was made to estimate the particular percentage of any one plant with any other plant around a particular body of water. Instances of traces of other plants than those mentioned were discarded: only the characteristic plants were considered.

The grazing of livestock around the edge of some sloughs seriously affected the outer growth and destroyed the nesting sites for surface ducks. However, most of the potholes and sloughs in this area have a growth of aspens and willows around them, very often to within thirty or forty yards of the water, thus alleviating conditions to a certain extent. Mallards in particular frequently nest in willow growth around small potholes.

Most of the bodies of water classed as "fair" had the outer land edge of cover destroyed by stock.

The following table gives the number of bodies of water containing specific cover plants abundant enough to form a characteristic part of the cover around them.

Specific plant abundant enough to form one of the characteristic covers	No. of sloughs in which it was abundant	Percentage of sloughs in which it was abundant
<i>Typha latifolia</i>	62	62.62
<i>Scirpus validus</i>	52	52.52
<i>Scirpus americanus</i>	32	32.32
<i>Panicularia grandis</i>	41	41.41
<i>Hordeum jubatum</i>	2	2.02
<i>Scolochloa festucacea</i>	35	35.35
<i>Carex</i> spp. Various species were very common		

Food plants were noted as being common. As with the "cover" plants, no attempt was made towards a detailed list at any slough; those mentioned were the more readily apparent and in most cases seemed abundant.

Sloughs with ample food		Sloughs with food noted as scarce	
No.	Per cent	No.	Per cent
87	87.87	12	12.12

The following table gives the number of bodies of water containing specific food plants abundant enough to form a characteristic part of the food in them.

Specific plant abundant enough to form one of the characteristic foods	No. of sloughs in which it was abundant	Percentage of sloughs in which it was abundant
<i>Potamogeton</i> spp.	61	61.61
<i>pectinatus</i>		
<i>perfoliatus</i>		
Cyperaceae	56	56.56
<i>S. americanus</i>		
<i>S. validus</i>		
<i>Carex</i> spp.		
<i>Scolochloa festucacea</i>	35	35.35
<i>Ranunculus aquatilis</i>	7	7.07
<i>Lemna minor</i>	5	5.05
<i>Najas flexilis</i>	5	5.05

Other foods present but not in abundance:

- Ruppia maritima.*
- Sagittaria latifolia.*
- Polygonum amphibium.*
- Eleocharus palustris.*

In twelve of the deeper sloughs no food was readily apparent, this may have been because the food was beneath the surface and not so readily discernible.

Many of the bodies of water containing an abundance of food did not shelter a single brood. The following table is based on the eighty-seven sloughs and potholes that did contain ample food which was readily apparent.

Food and Duck Broods		Food and No Duck Broods	
No.	Per cent	No.	Per cent
40	45.96	47	54.04

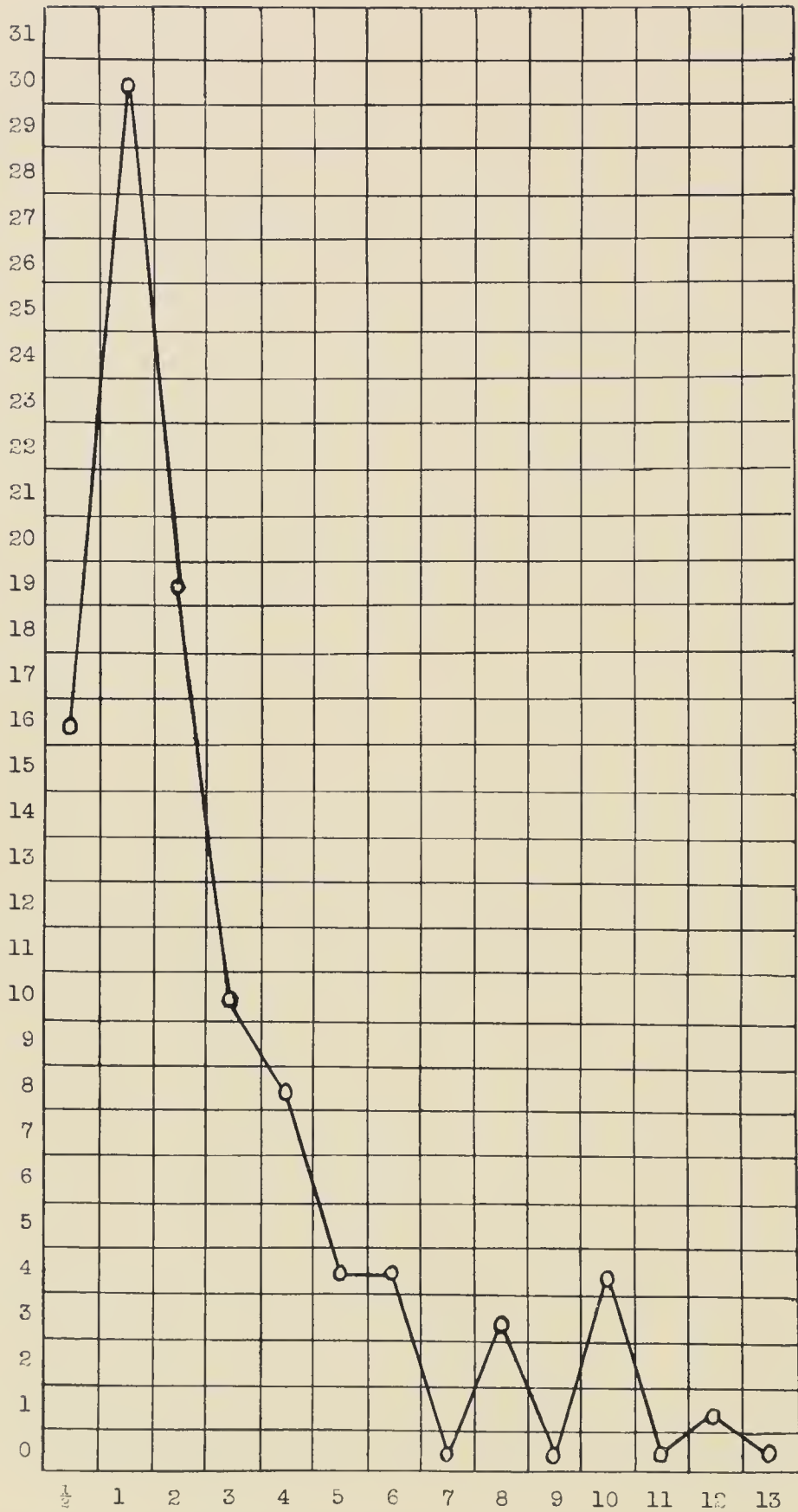


FIG. 12. Graph No. 1, showing number and size of the bodies of water examined. Vertical scale indicates number of sloughs; the horizontal scale, the size in acres.

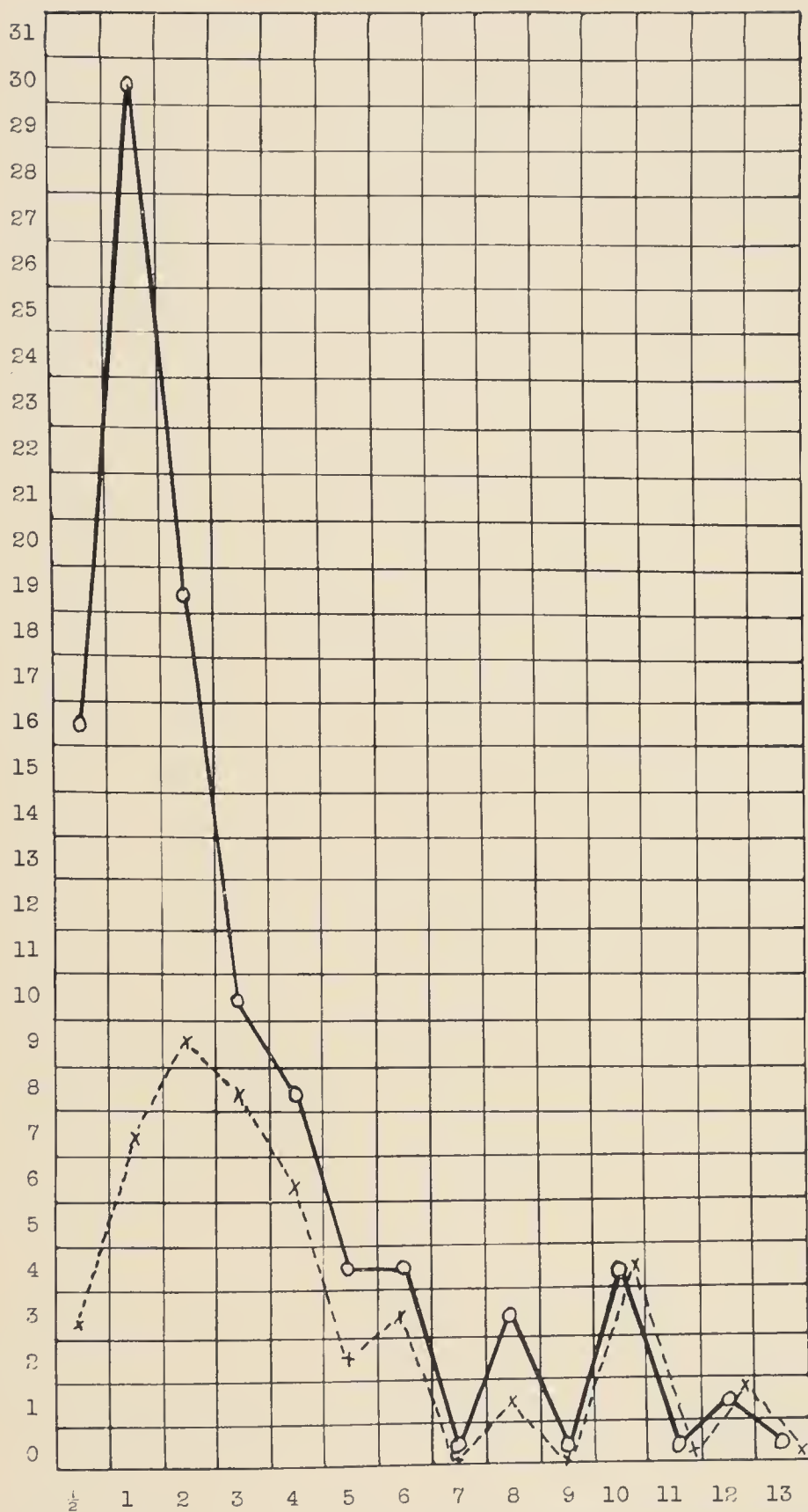


FIG. 13. Graph No. 2, showing relationship between size and number of sloughs, or potholes, and the actual number containing broods. The continuous line shows the number and size of sloughs; the broken line indicates the actual number that contained broods.

The water in the area showed a tendency to lower levels than last year. The supply may be considered as coming from two sources:

1. Those potholes and sloughs that depend mainly on the surrounding surface run-off during the spring thaw, and

2. Those sloughs and potholes that keep their level mainly by the overflowing of the creek banks at low points during the spring flood.

The following table shows the relative water levels as compared with the season of 1933.

Total Sloughs	Total Same		Total Lower		Total Higher	
	No.	Per cent	No.	Per cent	No.	Per cent
99	47	47.47	50	50.50	2	2.02

Those bodies of water flooded by the creek in the spring stand up to summer evaporation much better than those that receive their water from the surface run-off as is shown by the following table:

Total Creek Sloughs	Creek Sloughs Same		Creek Sloughs Lower		Total Surface Sloughs	Surface Run-off Same		Surface Run-off Lower		Surface Run-off Higher	
	No.	Per cent	No.	Per cent		No.	Per cent	No.	Per cent	No.	Per cent
21	14	66.66	7	33.33	78	34	43.59	42	53.85	2	2.56

The spring surface run-off varies according to the spring. If the weather is mild during February and March, the snow packs and does not melt so quickly, with the result that most of the moisture goes into the ground.

To fill the surface sloughs a hard, cold winter with ample snowfall and a short, quick spring practically assures a good surface run-off. The spring of this year, 1934, was very slow, consequently the sloughs were very low, more so than they have ever been before. Seven inches of rain in June, which came in heavy storms and ran off, alleviated conditions somewhat and helped to bring some back to last year's level, two being slightly higher.

A total of 101 broods was counted, with an average of 1.02 per pothole. Actually, however, only 44 sloughs and potholes contained families. Diving ducks were much more numerous than the surface feeding species and comprised 65 of the 101 families observed; possibly this was because conditions were more favorable for them.

Sloughs suitable for diving ducks		Sloughs suitable for surface ducks		Sloughs suitable for both types	
No.	Per cent	No.	Per cent	No.	Per cent
57	57.57	42	42.42	16	16.16

There appeared to be a great deal of overlapping and several times it was noted that a slough or pothole classed as being a surface-feeding slough had a family of diving ducks on it. Those classed as being suitable for diving ducks had either no land cover but a good stand of *S. validus* or *T. latifolia*; or the water was considered too deep for the surface feeders. Those classed as being suited for the surface feeders had a good land cover and the food was on or near the surface. Those classed as being suited to both types had a combination of the aforementioned characteristics.

The female ducks with broods almost invariably swam out into the open water with their young behind them; only when surprised on the smaller potholes did they try to hide among the cover.

The following tables show the specific broods.

SURFACE DUCKS

Species	Broods	Average brood	Smallest brood	Largest brood	Percentage of surface feeders
Mallard	5	6.40	5	8	12.95
Widgeon	5	7.00	6	8	14.89
Green-winged Teal	1	5.00	5	5	2.02
Blue-winged Teal	14	7.35	3	10	41.70
Shoveller	3	6.33	5	8	7.73
Pintail	8	6.63	3	9	21.45

DIVING DUCKS

Species	Broods	Average brood	Smallest brood	Largest brood	Percentage of diving ducks
Redhead	3	5.00	4	6	4.54
Canvasback	18	5.50	3	8	27.28
Lesser Scaup	19	7.05	2	9	28.78
American Goldeneye....	2	4.50	4	5	3.03
Bufflehead	2	4.50	3	6	3.03
Ruddy	21	5.28	2	9	31.81

Percentages for Both Groups

Species	Total young	Percentage of total young
Mallard	32	5.12
Widgeon	35	5.60
Green-winged Teal	5	.08
Blue-winged Teal	103	16.50
Shoveller	19	3.02
Pintail	53	8.49
Redhead	15	2.40
Canvasback	99	15.88
Lesser Scaup	134	21.47
American Goldeneye	9	1.44
Bufflehead	9	1.44
Ruddy	111	17.78
Average young per brood.....	6.18	

The Graph 2 (Fig. 13) shows the relationship between the size of the sloughs and potholes, and the actual number containing broods.

None of the sloughs or potholes appeared to be overcrowded; in one slough, covering about six acres, nine families were noted. This was the only instance where more than five families were noted on the same body of water.

Graph 3 (Fig. 14) shows the number of sloughs and the actual number of broods on each.

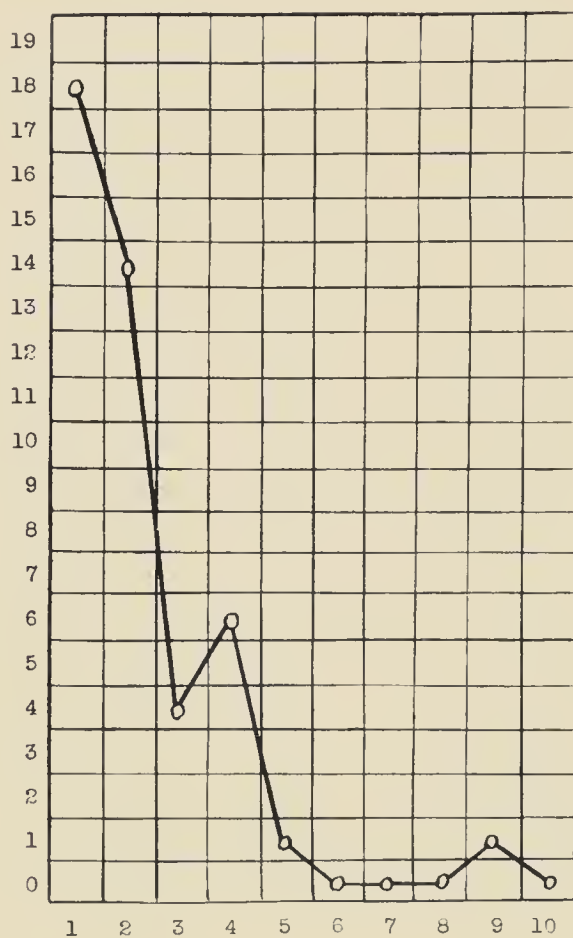


FIG. 14. Graph No. 3, showing actual number of broods. The vertical scale indicates the number of sloughs sheltering the number of broods indicated in the horizontal scale.

It will be noted that Mallards were not common. This is probably due to the time of the year that the count was made. Mallards are the earliest nesting duck in the district and it is quite common to see them with their young by May 24. This means that the earlier hatched birds are two months old by the time that this survey was made; and, if out in the water, are very difficult to separate from the adult females, particularly so if the adults are in the eclipse stage.

An estimate was made as to the probable breeding conditions for the season 1935 and it was found that after due allowance was made for surface evaporation during August and with an average winter, that conditions on the whole would be fair to normal. The normal not of ten years ago but of the last five. Out of the total of ninety-nine sloughs and potholes the situation should be about as follows:

Good		Fair		Poor	
No.	Per cent	No.	Per cent	No.	Per cent
52	52.52	21	21.21	26	26.26

The classification "good" includes food, water, and cover all being favorable. "Fair" includes cover and water both being favorable, and "poor" minus two of the three necessary qualities.

In conclusion, after surveying the whole situation in what is termed a very favorable area, particularly during the last five years when compared with the prairie regions, it appears that conditions were more favorable in this area for ducks to raise families than the actual number that did. It would be impossible to ascertain the exact number of broods raised; but when a large number of sloughs and potholes contained ample food, suitable cover, had a good water level, and no evidence of overcrowding noted (see Graph 3), but contained no duck broods (see Graph 2), it forces us to the conclusion that either *there were not the ducks here to breed* or that some unknown factors were working. The former reason sounds the more logical.

In making a survey of this kind it was found that two counts per season should be made. The first about the end of June when only Mallards and Pintails should be noted; and a second about the end of July to determine the other species of ducks, food, cover, and water levels. As has been stated before, Mallard broods may be noted as early as May 24, yet on July 25 of this season a Blue-winged Teal was flushed from a nest containing seven eggs.

PRINCE ALBERT, SASKATCHEWAN.

ERYTHROCYTES AND HEMOGLOBIN IN THE BLOOD OF SOME AMERICAN BIRDS*

BY L. B. NICE, MARGARET M. NICE, AND RUTH M. KRAFT

In Europe a number of records have been published giving the number of red corpuscles in the blood of birds. Stresemann ('27-34) states that in one cubic millimeter of avian blood there are from 1,500,000 to 5,500,000 red blood cells in contrast to 2,000,000 to 18,000,000 in mammals. He says that the number of erythrocytes within the same group varies in inverse proportion to the size of the birds, citing the following examples: Galliformes: European Quail (*Coturnix coturnix*) 4,000,000, Domestic Fowl 3,300,000, Turkey 2,300,000; Anseriformes: Australian Duck (*Anas superciliosa*) 2,800,000, Mute Swan (*Cygnus olor*) 2,150,000; Passeriformes: Waxbill (*Estrilda subflava*) 5,400,000, European Tree Sparrow (*Passer montanus*) 5,200,000, Raven (*Corvus corax*) 3,930,000.

Other records of interest are given by Ponder ('24): Carrion Crow (*Corvus corone*) 2,490,000 erythrocytes; Peregrine Falcon (*Falco peregrinus*) 2,547,000; Grey Heron (*Ardea cinerea*) 2,478,000; Spoonbill (*Platylea*) 3,400,000; White Stork (*Cinconia alba*) 2,189,000; Arabian Ostrich (*Struthio camelus*) 1,620,000.

Several studies have been made on the blood cells of domestic fowls and pigeons. Forkner ('29) reports twenty-nine counts on fowls ranging from 2,300,000 to 4,620,000 averaging 3,267,000. Landauer and David ('33) found that four cocks averaged 4,310,000 erythrocytes and five hens 3,395,000. As to pigeons, De Eds ('26-'27) found a median of 3,350,000 red blood cells in twenty-five birds. Kennedy and Climenko ('28-29) gave averages of 4,295,000 erythrocytes for five male and 3,563,000 for five female pigeons.

The most extensive and detailed work on the subject has been done by Riddle and Braucher ('34) who made 1,583 erythrocyte counts "throughout the year on suitably inbred races of the pigeon and the ring dove". Males showed higher erythrocyte counts at all seasons than females. "Mean values were 3,228,000 in males and 3,096,000 in females (pigeons); and 3,045,000 in males and 2,989,000 in females (doves)". "Highest erythrocyte counts were found in autumn, lowest in summer. In pigeons the autumn excess is 10 per cent; in doves 9.4 per cent."

Since no work of this nature seems to have been done on native American birds, we decided to determine the number of erythrocytes

*From the Department of Physiology, the Ohio State University.

and amount of hemoglobin in some of the species which were being caught for banding purposes.

The subjects were taken to the laboratory in collecting cages covered with a dark cloth and kept for about an hour, so that they might recover from their excitement. A drop or two of blood was then obtained by puncturing a radial wing vein with a needle. The blood was drawn up to the .05 mark in a standardized pipette and diluted with eosin in Ringer Solution. After letting the blood in the pipette stand for some time and then carefully mixing it by shaking, the erythrocytes were counted on a double Neubauer ruled hemocytometer. In all cases double check counts were made, and in the event of disagreement, repetitions were made until they did check.

RESULTS

A summary of our findings on eighty-six birds of sixteen species examined from October to May are shown in Table I.

It will be seen that the number of erythrocytes in the Passerine species averaged from 4,200,000 to 6,055,000; the lowest individual count being 3,930,000 (Tufted Titmouse), and the highest 7,645,000 (Junco). The median count of all the birds was 5,230,000 (Lincoln Sparrow). There is a wide range between the counts of individuals in the same species in some cases, yet with the exception of the single Towhee (a female) the average counts of the Fringillidae fall close together. The nine Song Sparrows gave somewhat lower results than the others. Among the other Passerines there is a wider range, but the representatives of each species are small in number. The three Tufted Titmice gave low counts and the three Cowbirds high counts.

As to the comparative size of these fifteen Passerine species, the smallest bird (Chipping Sparrow) weighed fourteen grams, while the heaviest (Grackle) weighed ninety-nine grams, seven times as much. The three heaviest of the Passerines (Grackle, Thrasher, and Cowbird) all have blood counts well above the median. There is no evidence from our results that there is an inverse relationship between size of bird and the number of erythrocytes. Probably this relation holds only with marked differences in size.

The three Bob-whites (all females) had a decidedly lower blood count than did the Passerines. This is in keeping with the findings of European workers.

We found no consistent difference between the counts in males and females. Perhaps larger numbers would have shown a difference. Neither did there appear to be differences between migrating and non-migrating birds. As to season, counts in the fall and winter with

TABLE I
Average Number of Erythrocytes per Cubic Millimeter of Blood.

		M=Male. F=Female.	
PASSERIFORMES		RED BLOOD CORPUSCLES	
FRINGILLIDAE	Averages	Range	
28 White-throated Sparrows (<i>Zonotrichia albicollis</i>)	5272000	4010000	-6770000
18 Juncos (<i>Junco hyemalis</i>)	5567000	4495000 (F)	-7645000 (M)
9 Song Sparrows (<i>Melospiza melodia</i>)	4846000	4460000	-5225000
4 White-crowned Sparrows (<i>Zonotrichia leucophrys</i>)	5213000	4640000	-5690000
1 Tree Sparrow (<i>Spizella arborea</i>)	5610000		
1 Chipping Sparrow (<i>Spizella passerina</i>)	5530000		
1 Lincoln Sparrow (<i>Melospiza lincolni</i>)	5230000		
4 Cardinals (<i>Richmondia cardinalis</i>)	5123000	4488000 (M)	-5605000 (F)
1 Towhee (<i>Pipilo erythrophthalmus</i>)	4200000		
PLOCEIDAE			
6 House Sparrows (<i>Passer domesticus</i>)	5182000	4231000	-5769000
PARIDAE			
3 Tufted Titmice (<i>Baeolophus bicolor</i>)	4368000	3930000	-4685000
ICTERIDAE			
3 Cowbirds (<i>Molothrus ater</i>)	6055000	5420000 (F)	-6690000 (F)
1 Bronzed Grackle (<i>Quiscalus q. aeneus</i>)	5405000		
MIMIDAE			
1 Brown Thrasher (<i>Toxostoma rufum</i>)	5904000		
TURDIDAE			
1 Hermit Thrush (<i>Hylocichla guttata</i>)	4810000		
GALLIFORMES			
3 Bob-whites (<i>Colinus virginianus</i>)	3532000	3080000 (F)	-3805000 (F)

Juncos and Song Sparrows; in the winter and spring with Cardinals; and in the fall and spring with White-Throats, showed no consistent differences.

As to the hemoglobin content, Stresemann says that in birds it appears to be less than in mammals, "at least the dry substance of the erythrocytes in the goose consists of only 62.65 per cent of hemoglobin, in contrast to 94.3 per cent in man and 86 per cent in the dog (Hoppe-Seyler)". In comparison to these figures our hemoglobin results with the Sahli method were consistently higher. In White-Throated Sparrows in October and November it varied between 75 and 90 per cent, while with fifteen of the twenty cases it amounted to 80 per cent. In nine Juncos in the fall the counts ranged between 80 and 95 per cent, five cases amounting to 80 per cent. The Chipping Sparrow reached 75 per cent; five House Sparrows, three Song Sparrows, and a Hermit Thrush had 80 per cent, all taken in October. The three female Bobwhites varied more: one on October 31, 60 per cent, two, November 13, 80 and 100 per cent respectively. All birds were released a short time after a few drops of blood were secured from a radial wing vein for the erythrocyte and hemoglobin determinations.

In the later experiments the more accurate Newcomer method which gives the number of grams of hemoglobin per 100 c. c. of blood was used. Our results on seven species are shown in Table II. These figures are within the same range as found for human blood.

TABLE II
Hemoglobin in Grams per 100 Cubic Centimeters of Blood.

Bird	Erythrocytes	Hemoglobin	Bird	Erythrocytes	Hemoglobin
White-throated Sparrow			Towhee		
April 26	5,130,000	13.1	May 5 F	4,200,000	15.8
April 26	5,395,000	13.9	Tufted Titmouse		
May 4	4,425,000	13.2	December 9	4,685,000	13.3
Junco			February 20	4,490,000	13.6
December 8 M	7,645,000	16.9	Bronzed Grackle		
December 9 M	6,290,000	14.5	December 8 M	5,405,000	16.5
December 9 M	5,783,000	14.7	Brown Thrasher		
Cardinal			April 11	5,904,000	16.0
December 15 F	5,540,000	15.7			
February 6 M	4,488,000	17.9			

Riddle and Braucher ('34) made 931 hemoglobin measurements on their pigeons and doves, and found that males of both species had a higher concentration at all seasons than the females. "Mean values were 15.97 grams in males and 14.72 grams in females (pigeons); and

14.56 grams in males and 13.97 grams in females (doves).” “Hemoglobin values were highest in winter—when the birds were exposed neither to air of greatest cooling power (autumn) nor to ultra-violet light. Lowest values were found in summer—when in air of least cooling power and well exposed to ultra-violet rays.”

SUMMARY

The number of erythrocytes per cubic millimeter of blood was determined in fifteen species of Passerine and one species of Gallinaceous birds.

The lowest number found for a Passerine bird was 3,930,000 in a Tufted Titmouse and the highest 7,645,000 in a Junco. The median of the eighty-three counts was 5,230,000.

The one Gallinaceous bird (the Bob-white) averaged 3,532,000

The hemoglobin in seven species of Passerine birds varied between 13.3 and 17.9 grams per 100 cubic centimeters of blood for a Titmouse and Cardinal respectively.

BIBLIOGRAPHY

- De Eds, F. 1926-27. Normal Blood Counts in Pigeons. *J. Lab. Clin. Med.*, 12, 437.
- Forkner, C. E., 1929. Blood and Bone Marrow Cells of the Domestic Fowl. *J. Exp. Med.* 50, 121-142.
- Kennedy, W. P. and D. R. Climenko. 1928-29. Studies on the blood of Birds. I. The Corpuscles of the Pigeon. *Quart. J. Exp. Physiol.* 19, 43.
- Landauer, W. and L. T. David. 1933. Elevated Metabolism, Blood Cells, and Hemoglobin Content of the Blood in the Frizzle Fowl. *Folia Haematologica*, 50, 1-14.
- Ponder, E. 1924. Erythrocytes and the Action of Simple Haemolysis. Oliver and Boyd. Edinburgh.
- Riddle, O. and P. F. Braucher. 1934. Hemoglobin and Erythrocyte Differences According to Sex and Season in Doves and Pigeons. *Am. J. Physiology*, 108, 554-566.
- Stresemann, E. 1927-1934. *Aves*. Kuckenthal-Krumbach, Handb. Zool. Bd. VII, 2. Hälfte, p. 224.

COLUMBUS, OHIO.

FOOD HABITS OF BURROWING OWLS IN NORTHWESTERN IOWA*

BY PAUL L. ERRINGTON AND LOGAN J. BENNETT

Incidental to the 1933 summer studies carried on at the Iowa State College wild life research station, at Ruthven, Iowa, pellet collections were gathered from local burrowing owl (*Speotyto cunicularia hypugaea* Bonaparte) colonies encountered. Analyses of these pellets revealed considerable variations in proportions of vertebrate to invertebrate prey.

Beetles comprised the greater part of the invertebrate prey, including ground beetles (Carabidae and *Harpalus* in particular), dung beetles (*Canthon*, *Copris*, *Geotrupes*), water beetles (*Hydrophilus*), carrion beetles (*Necrophorus*, *Silpha*), eliek beetles (*Melanotus*), tiger beetles (*Canthon*, *Copris*, *Geotrupes*), water beetles (*Hydrophilus*), plus) made up most of the balance.

Vertebrate prey was of relatively few types: meadow mice (*Microtus*), deer mice (*Peromyscus*), harvest mice (*Reithrodontomys*), jumping mice (*Zapus*), house mice (*Mus*), ground squirrels (*Citellus*), frogs, small birds.

Area "A". Twenty miles southwest of Ruthven. Colony of undetermined number of owls visited but once. Late June and early July—9 pellets. Contents: deer mouse, 1; mouse (*Reithrodontomys?*), 1; horned lark (*Otocoris alpestris*), 1; insects, as follows: *Bolbocerosoma*, 16; *Canthon*, 13; *Hydrophilus*, 1; *Harpalus*, 16; *Ligyris*, 3; *Melanoplus*, 2.

Area "B". One and a half miles southeast of Ruthven. A maximum of 13 owls frequenting holes in a pasture once a golf course was to be seen.

Late June and early July—bulk material representing about 30 pellets. Meadow mouse, 9; deer mouse, 13; frog, 7; insects: *Copris*, 3; *Melanotus*, 1; *Harpalus*, 11; *Anisodactylus*, 1; *Pasinachus*, 3; unidentified Coleoptera, 2.

Mid-July—21 pellets. Meadow mouse, 16; deer mouse, 7; few unidentified feathers in one pellet; frog, 5; insects: *Geotrupes*, 1; *Copris*, 4; *Canthon*, 1; *Silpha*, 1; *Hydrophilus*, 1; *Harpalus*, 28; *Anisodactylus*, 5; *Cicindela*, 1; unidentified Coleoptera, 1; *Melanoplus*, 1.

Late July—6 pellets. Meadow mouse, 5; deer mouse, 1; insects: *Hydrophilus*, 1; *Harpalus*, 23; unidentified Coleoptera, 1; *Melanoplus*, 1.

First week of August—5 pellets. Meadow mouse 3; deer mouse, 3; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Necrophorus*, 1; *Harpalus*, 17; *Pasinachus*, 2; unidentified Coleoptera, 1.

Second week of August—9 pellets. Deer mouse, 3; insects: *Ves-*

*Journal Paper No. J157 of the Iowa Agricultural Experiment Station, Ames, Iowa, Proj. 330.

pidae (Wasps). 9; *Scarab*, 1; *Scarites*. 23; *Harpalus*. 37; unidentified Carabidae, 45; *Melanoplus*. 3.

Third week of August—7 pellets. Deer mouse. 1; frog. 1; insects: unidentified *Tenebrionidae*. 2; *Bolbocerosoma*. 2; *Copris*. 1; *Canthon*. 2; *Harpalus*. 10; unidentified Carabidae. 80; *Melanoplus*. 3.

Last week of August—9 pellets. Meadow mouse. 1; deer mouse. 3; insects: *Eleodes*. 3; unidentified *Tenebrionidae*. 4; *Harpalus*. 2; *Pasimachus*. 1; unidentified Carabidae. 148; *Melanoplus*. 7.

Early September—16 pellets. Meadow mouse. 2; deer mouse. 10; house mouse (*Mus*). 1; unidentified small bird. 1; frog. 5; insects: unidentified *Tenebrionidae*. 1; *Tigyrodeus*. 1; *Bolbocerosoma*. 2; *Canthon*. 5; *Harpalus*. 4; unidentified Carabidae. 38.

Mid-September—2 pellets. Deer mouse. 1; house mouse. 1; insects: *Eleodes*. 1; unidentified Carabidae. 1.

Area "C". Two and a half miles southwest of Ruthven. Seven owls in pasture. of which some were doubtless juvenals.

Late June—about 20 pellets gathered in bulk. Juvenile striped ground squirrel (*Citellus tridecemlineatus*). 2; meadow mouse. 10; deer mouse. 8; frog. 1; insects: *Canthon*. 3; *Necrophorus*. 1; *Ligyris*. 1; *Cicindela*. 1; unidentified Carabidae. 3.

Early July—19 pellets. Meadow mouse. 11; deer mouse. 10; jumping mouse (*Zapus*), 1; unidentified mice. 2; Maryland yellowthroat (*Geothlypis trichas*). 1; frog. 1; insects: *Bolbocerosoma*. 1; *Canthon*. 3; *Chrysobothris*. 2; *Necrophorus*. 2; *Hydrophilus*. 2; *Calosoma*. 1; *Pterostichus*. 1; *Harpalus*. 1; unidentified Carabidae. 1; unidentified Coleoptera. 1.

Mid-July—6 pellets. Meadow mouse. 4; deer mouse. 3; frog. 1; insects: *Bolbocerosoma*. 1; *Canthon*. 1; *Necrophorus*. 1; *Hydrophilus*. 2.

Late July—5 pellets. Deer mouse 3; mouse (*Reithrodontomys?*), 1; field sparrow (*Spizella pusilla*). 1; insects: *Bolbocerosoma*. 1; *Canthon*. 1; *Hydrophilus*. 2; *Pasimachus*. 2; *Harpalus*. 22; unidentified Carabidae. 6; *Melanoplus*. 1.

Early August—2 pellets. Insects: unidentified *Tenebrionidae*. 1; *Bolbocerosoma*. 2; *Canthon*. 1; unidentified Carabidae. 15; unidentified Coleoptera. 2; *Melanoplus*. 1.

Area "D". One-half mile west of Ruthven. Five owls seen in vicinity of a hole that had the appearance of a breeding den.

Mid-July—11 pellets. Meadow mouse. 2; deer mouse. 8; harvest mouse. 1; mouse (*Peromyscus?*), 1; frog. 4; insects: *Phyllophaga*. 1; *Harpalus*. 18; *Pasimachus*. 2; *Melanoplus*. 5.

Late July—6 pellets. Meadow mouse. 9; deer mouse. 3; insects: *Harpalus*. 3; unidentified Coleoptera. 1; *Melanoplus*. 1; *Gryllus*. 1.

August 13—1 pellet. Insects: *Canthon*. 1; unidentified Carabidae. 7.

August 20—3 pellets. Insects: *Eleodes*. 3; other *Tenebrionidae*. 1; *Bolbocerosoma*. 2; *Canthon*. 1; unidentified Carabidae. 11; *Melanoplus*. 3.

Area "E". Two miles west of Ruthven. A few owls moved into a badger digging and stayed for a time.

Mid-August to early September—5 pellets. Deer mouse, 2; frog (?), 1; insects: *Bolbocerosoma*, 2; *Canthon*, 1; *Anisodactylus*, 3; *Harpalus*, 2; unidentified Carabidae, 34; unidentified Coleoptera, 3; *Melanoplus*, 5.

The food habits of these owls may be presumed to reflect a certain availability of prey, as do predator food habits on the whole. Mice, young ground squirrels, small birds, frogs, and insects may be taken in numbers varying with the season and the locality. Just how much the summer's growth of cover and the increasing pressure of livestock on pasture lands affected the availability of Burrowing Owl prey is not evident.

Data from the areas collectively, with the exception of those from "A", showed strongly vertebrate diet from late June to early August, from which time until September insects chiefly were taken. The limited September pellet collections revealed a swing upward to vertebrate prey again. The vertebrate prey was represented mainly by mice, with a scattering representation of small birds, and an irregular occurrence of frogs throughout the summer. Incidence of frogs as well as of mice rose abruptly for early September, the significance of which is weakened by the departure of the owls and the consequent lack of later pellets.

In an attempt to derive more meaning from pellet analyses, let us review changes in prey types according to dates and areas. The incidence of individuals of vertebrate prey per average pellet should provide an index as to importance; the insects, however, are so much smaller than the vertebrates and vary so much in size that listing their occurrence numerically may not be of equal value.

For area "A", vertebrates (two mice and a small bird) were found in a third of the nine late June and early July pellets. This leaves two-thirds of the pellets made up entirely of insects. None of the owls of other areas fed upon such a high proportion of insects so early in the season.

DATA TABULATED FOR OTHER AREAS

Date	AREA "B"		Vertebrate ratios	Average No. insects per pellet
	No. of pellets	Vertebrates per pellet		
Late June and early July.....	30	.97	22 mice, 7 frogs	.7
Mid-July	21	1.38	23 mice, 5 frogs, 1 bird	2.1
Late July	6	1.0	6 mice	4.3
First week August.....	5	1.4	6 mice, 1 frog	4.6
Second week August.....	9	.33	3 mice	12.0
Third week August.....	7	.28	1 mouse, 1 frog	14.3
Fourth week August.....	9	.44	4 mice	18.3
First week September.....	16	1.19	13 mice, 5 frogs, 1 bird	5.4
Second week September.....	2	1.0	2 mice	1.0

AREA "C"				
Date	No. of pellets	Vertebrates per pellet	Vertebrate ratios	Average No. insects per pellet
Late June and early July.....	39	1.2	42 mice, 2 stripped ground squirrels, 2 frogs, 1 bird	.7
Mid-July	6	1.33	7 mice, 1 frog	.8
Late July	5	1.0	4 mice, 1 bird	7.0
First week August.....	2	0.0		11.0

AREA "D"				
Date	No. of pellets	Vertebrates per pellet	Vertebrate ratios	Average No. insects per pellet
Mid-July	11	1.45	12 mice, 4 frogs	2.4
Late July	6	2.0	12 mice	1.0
Second week August.....	1	0.0		8.0
Third week August.....	3	0.0		8.0

AREA "E"				
Date	No. of pellets	Vertebrates per pellet	Vertebrate ratios	Average No. insects per pellet
Fourth week August.....	5	.6	2 mice, 1 frog	10.0

The simple explanation for the August ascendancy of insect prey may be, of course, that the owls merely responded to rising insect populations which by reason of their greater numbers became more convenient to feed upon than vertebrates. On the other hand, the relatively high availability of the insects may be correlated with the "weaning" of young owls by the parent birds.

The horned owl (see Errington, Paul L. "Studies on the behavior of the great horned owl", WILSON BULLETIN, XLIV, December, 1932, pp. 212-220) completes the "weaning" of its young about the first part of August. Prior to this time the food eaten by the young is prey furnished to a diminishing extent by adults; thereafter, the young have to look out for themselves and they do not immediately find hunting so easy, judging from their hunger calls in the woods. Barred owl and screech owl young, too, appear to be self-hunting by August, and this conceivably may hold true for other owls, including the burrowing owl.

Only a little better than a third of the pellets for the last three weeks of August contained vertebrates. It was our general impression that about a third of the owls seen were adults. Hence, the temptation is to suspect that the adults were the owls taking the vertebrates, while the clumsy youngsters, not being adept enough at this stage to catch their own mice and frogs and not being able to live off the old ones any more, had to eat insects and similar slow, small prey or nothing at all. A darting mouse may be unavailable to a young owl, but it doesn't require any great skill to pick up dung beetles.

IOWA STATE COLLEGE,

AMES, IOWA.

BIRD MIGRATION RECORDS FROM SOUTHEASTERN WYOMING

BY OTTO C. MCCREARY AND ARTHUR B. MICKEY

In our study we have found it convenient to divide the birds occurring in southeastern Wyoming into four groups: I. Permanent residents. In some cases these have vertical migration on the mountain sides. However, few if any leave the region. II. Birds that are partially migratory, but which are represented in this region throughout the year by at least some individuals. III. Accidental, casual, rare, extinct, or other birds which have been recorded from this portion of the state without dates or with dates which have little or no value as migration records. IV. Migratory birds for which we have dates giving some information concerning their movements.

The names of the birds found in this region are accordingly listed in the four groups just explained.

I. Permanent residents: Golden Eagle, *Aquila chrysaetos canadensis*; Dusky Grouse, *Dendragapus obscurus obscurus*; Southern White-tailed Ptarmigan, *Lagopus leucurus altipetens*; Columbian Sharp-tailed Grouse, *Pedioecetes phasianellus columbianus*; Prairie Sharp-tailed Grouse, *Pedioecetes phasianellus campestris*; Sage Hen, *Centrocercus urophasianus*; Eastern Bob-white, *Colinus virginianus virginianus*; Ring-necked Pheasant, *Phasianus colchicus torquatus*; Rocky Mountain Screech Owl, *Otus asio maxwelliac*; Montana Horned Owl, *Bubo virginianus occidentalis*; Long-eared Owl, *Asio wilsonianus*; Saw-whet Owl, *Cryptoglaux acadica acadica*; Rocky Mountain Hairy Woodpecker, *Dryobates villosus monticola*; Batchelder's Woodpecker, *Dryobates pubescens leucurus*; Alpine Three-toed Woodpecker, *Picoides tridactylus dorsalis*; Rocky Mountain Jay, *Perisoreus canadensis capitalis*; Black-headed Jay, *Cyanocitta stelleri annectens*; Long-crested Jay, *Cyanocitta stelleri diademata*; American Magpie, *Pica pica hudsonia*; Clark's Nutcracker, *Nucifraga columbiana*; Long-tailed Chickadee, *Penthestes atricapillus septentrionalis*; Mountain Chickadee, *Penthestes gambeli gambeli*; Rocky Mountain Nuthatch, *Sitta carolinensis nelsoni*; Dipper, *Cinclus mexicanus unicolor*; English Sparrow, *Passer domesticus domesticus*; and Rocky Mountain Pine Grosbeak, *Pinicola enucleator montana*.

II. Partially migratory birds: Common Mallard, *Anas platyrhynchos platyrhynchos*; Green-winged Teal, *Nettion carolinense*; Barrow's Golden-eye, *Glaucionetta islandica*; American Merganser, *Mergus merganser americanus*; Ferruginous Rough-leg, *Buteo regalis*; Marsh Hawk, *Circus hudsonius*; Prairie Falcon, *Falco mexicanus*; Wilson's Snipe, *Capella delicata*; Eastern Belted Kingfisher, *Megaceryle alycon*

alycon; Red-shafted Flicker, *Colaptes cafer collaris*; Desert Horned Lark, *Otocoris alpestris leucolaema*; Saskatchewan Horned Lark, *Otocoris alpestris enthymia*; Piñon Jay, *Cyanocephalus cyanocephalus*; Red-breasted Nuthatch, *Sitta canadensis*; Rocky Mountain Creeper, *Certhia familiaris montana*; Townsend's Solitaire, *Myadestes townsendi*; Western Meadowlark, *Sturnella neglecta*; Thick-billed Redwing, *Agelaius phoeniceus fortis*; Western Evening Grosbeak, *Hesperiphona vespertina brooksi*; Common House Finch, *Carpodacus mexicanus frontalis*; Northern Pine Siskin, *Spinus pinus pinus*; Pale Goldfinch, *Spinus tristis pallidus*; Bendire's Crossbill, *Loxia curvirostra bendirei*; and Mountain Song Sparrow, *Melospiza melodia fallax*.

III. Accidental, casual, rare, extinct, or other birds for which we do not have adequate migration records: Eastern Brown Pelican, *Pelecanus occidentalis occidentalis* (7); Eastern Green Heron, *Butorides virescens virescens*; Eastern Least Bittern, *Ixobrychus exilis exilis* (23); Trumpeter Swan, *Cygnus buccinator* (23); Hutchin's Goose, *Branta canadensis hutchinsi* (23); Black Brant, *Branta nigricans*; White-fronted Goose, *Anser albifrons albifrons* (23); Lesser Snow Goose, *Chen hyperborea hyperborea*; European Widgeon, *Mareca penelope* (21); Wood Duck, *Aix sponsa* (23); American Scoter, *Oidemia americana* (23); Hooded Merganser, *Lophodytes cucullatus* (23); Bald Eagle, *Haliaeetus leucocephalus* ssp.; Osprey, *Pandion haliaëtus carolinensis*; Greater Prairie Chicken, *Tympanuchus cupido americanus*; California Gull, *Larus californicus* (21); Short-billed Gull, *Larus canus brachyrhynchus* (21); Sabine's Gull, *Xema sabini* (21); Common Tern, *Sterna hirundo hirundo* (23); Passenger Pigeon, *Ectopistes migratorius* (2); Yellow-billed Cuckoo, *Coccyzus americanus americanus* (21); Snowy Owl, *Nyctea nyctea* (23); Northern Flicker, *Colaptes auratus luteus*; Natalie's Sapsucker, *Sphyrapicus thyroideus nataliae*; Northern Crested Flycatcher, *Myiarchus crinitus boreus* (23); Ash-throated Flycatcher, *Myiarchus cinerascens cinerascens* (23); Purple Martin, *Progne subis subis*; Woodhouse's Jay, *Aphelocoma californica woodhousei* (21); American Raven, *Corvus corax sinuatus*; Short-billed Marsh Wren, *Cistothorus stellaris* (23); Eastern Bluebird, *Sialia sialis sialis*; Chestnut-backed Bluebird, *Sialia mexicana bairdi*; Gnatcatcher, *Polioptila caerulea* ssp.; Black-throated Blue Warbler, *Dendroica caerulescens caerulescens* (21); Bicolored Red-wing, *Agelaius phoeniceus californicus* (11); Scarlet Tanager, *Piranga erythronelas* (6); Dickcissel, *Spiza americana*; Black Rosy Finch, *Leucosticte atrata* (23); Brown-capped Rosy Finch, *Leucosticte australis*; and White-winged Crossbill, *Loxia leucoptera* (19).

IV. Migratory birds, for which we have the following records:

LESSER LOON. *Gavia immer elasson*. Transient. Earliest spring record: April 21, 1934, Lake Hattie (Mickey). Average of first spring records, four years: April 30. Latest spring record: one found a few hours after it had been killed, June 11, 1933, Rex Lake, Albany County (R. O. Westley). Earliest fall record: one collected October 22, 1933, Carroll Lakes (H. Thomas). Latest fall record: November 12, 1932, Lake Hattie (H. Thomas).

HOLBOELL'S GREBE. *Colymbus grisegena holboelli*. Transient. We have only three records with dates: June 10, 1928, Lake Hattie (McCreary); June 12, 1929, Torrington (McCreary); and one specimen taken October 18, 1893, Douglas (Jeserun) (23).

HORNED GREBE. *Colymbus auritus*. Transient. Two records of specimens taken: May 15, 1876, near Ft. Sanders (Brackett) (9); and September 6, 1923, near Wheatland (Fuller) (20).

EARED GREBE. *Colymbus nigricollis californicus*. Earliest spring record: April 18, 1930, Hutton Lake (McCreary). Average of first spring records, nine years: April 26. Average of last fall records, eight years: November 16. Latest fall record: December 4, 1932, Laramie City Reservoir (McCreary).

WESTERN GREBE. *Aechmophorus occidentalis*. Exceptionally early spring record: one seen April 14, 1934, Hutton Lake (Mickey). Average of first spring records, three other years (May 6-14): May 10. Average of last fall records, four years: October 12. Latest fall record: October 25, 1930, Hutton Lake (McCreary).

PIED-BILLED GREBE. *Podilymbus podiceps podiceps*. Earliest spring record: April 11, 1931, Hutton Lake (McCreary). Average of first spring records, six years: April 27. Latest fall record: October 25, 1930, Hutton Lake (McCreary).

WHITE PELICAN. *Pelecanus erythrorhynchos*. Transient. Earliest spring record: April 29, 1933, Creighton Lake (Mickey). Latest spring record: one taken May 9, 1875, Hutton Lake (Brackett) (9). Earliest fall record: twelve seen August 29, 1925, ten miles northwest of Rock River (J. W. Scott). Latest fall record: October 7, 1934, Hutton Lake (Mickey).

DOUBLE-CRESTED CORMORANT. *Phalacrocorax auritus auritus*. Transient. Earliest spring record: May 7, 1930, Twin Buttes Lake, Albany County (McCreary). Latest spring record: June 24, 1928, Bamforth Lake (McCreary). Earliest fall record: August 6, 1933, Wheatland Reservoir (McCreary). Latest fall record: October 26, 1930, Hutton Lake (McCreary).

TREGANZA'S HERON. *Ardea herodias treganzai*. Earliest spring record: March 26, 1932, Laramie (Thomas and Nelson). Average of first spring records, eleven years: April 3. Average of last fall records, ten years: October 5. Latest fall record: November 2, 1927, Wheatland (J. Neilson) (26).

BREWSTER'S EGRET. *Egretta thula brewsteri*. Earliest spring record: one taken about May 1, 1902, Sportsman's Lake, Albany County (Lindsey) (23). Average of spring records, five years, May 16. Our latest record is July 28, 1929, Torrington (McCreary).

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax hoactli*. Earliest spring record: April 10, 1927, Laramie (McCreary). Average of first spring records, nine years: April 17. Average of last fall records, seven years: October 1. Latest fall record: October 21, 1933, Laramie (McCreary).

AMERICAN BITTERN. *Botaurus lentiginosus*. Earliest spring record: one taken April 23, 1875, Fort Sanders, Albany County (Brackett) (8). Average of first spring records, three years: April 25. Latest fall record: October 19, 1930, Torrington (McCreary).

WHITE-FACED GLOSSY IBIS. *Plegadis guarauna*. Two records: one taken May 20, 1910, Hat Creek, Niobrara County (G. D. Percival) (21); and one seen July 11, 1933, Hutton Lake (Mr. and Mrs. Mickey).

WHISTLING SWAN. *Cygnus columbianus*. Transient. Horace Thomas reports seeing this bird in the spring but we do not have the dates. Earliest fall record: October 25, 1930, Lake Hattie. Average of first fall records, three years: November 3. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

CANADA GOOSE. *Branta canadensis* ssp. The records given are sight records and may include both of the two subspecies (*canadensis* and *hutchinsi*) migrating through this region. Earliest spring record: about fifty seen March 29, 1928, Laramie (McCreary). Average of first spring records, three years: April 5. Average of last fall records, three years: November 15. Latest fall records: November 24, 1932, Lake Hattie (McCreary). One winter record: January 2, 1928, Laramie River, Albany County (McCreary). James Neilson (26) reports seeing them in winter near Wheatland.

BLACK DUCK. *Anas rubripes* ssp. There are three spring records: one taken April 12, 1875, Ft. Sanders, Albany County (Brackett) (8); one seen May 12, 1929, Cheyenne (J. Gundlach); and one seen May 15, 1934, Bamforth Lake (McCreary). A. G. Burckert reports taking this duck in the fall at Sodergreen Lake, Albany County.

GADWALL. *Chaulelasmus streperus*. Earliest spring record: March 14, 1933, Laramie (McCreary). Average of first spring records, nine years: March 30. Average of last fall records, five years, November 15. Latest fall record: November 30, 1933, Twelvemile Lake (McCreary). We have one winter record: December 26, 1928, Torrington (McCreary).

BALDPATE. *Mareca americana*. Earliest spring record: March 25, 1934, Ninemile Lake (Mickey). Average of first spring records, nine years: April 7. Average of last fall records, six years: November 20. Latest fall record: one taken December 6, 1927, Laramie (A. McIntosh). Winter records: January 1, 1930, Torrington, and December 31, 1933, Lake Hattie (McCreary).

AMERICAN PINTAIL. *Dafila acuta tzitzihua*. Occasionally seen in winter. Small flocks arrive in March. Earliest: February 28, 1932, Lake Hattie (E. Lovejoy). Large flocks arrive in late March or early April. Average of last autumn records, four years: November 15.

BLUE-WINGED TEAL. *Querquedula discors*. Earliest spring records: April 15, 1933, Laramie (Mickey); and April 15, 1934, Hutton Lake (Mickey). Average of first spring records, 10 years: April 25. Latest fall record: October 21, 1928, Laramie Plains (McCreary).

CINNAMON TEAL. *Querquedula cyanoptera*. Earliest spring record: April 2, 1933, Creighton Lake (Mickey). Average of first spring records, ten years: April 15. Latest fall record: October 9, 1927, Bamforth Lake (McCreary).

SHOVELER. *Spatula clypeata*. Exceptionally early spring record: February 26, 1928, Wheatland Flats (McCreary). Average of first spring records, nine other years (March 25-April 16): April 5. Average of last fall records, five years: November 15. Latest fall records: November 26, 1932 and 1933, Bamforth Lake (McCreary).

REDHEAD. *Nyroca americana*. Earliest spring record: February 28, 1932, Lake Hattie (E. Lovejoy). Average of first spring records nine years: March 23. Average of last fall records, five years: November 11. Latest fall record: November 19, 1933, Lake Hattie (McCreary). One winter record: February 4, 1934, Wheatland Flats on irrigation reservoir (McCreary).

RING-NECKED DUCK. *Nyroca collaris*. Earliest spring record: April 14, 1934, Hutton Lake (Mickey). Average of last fall records, six years, November 12. Latest fall record: December 3, 1932, Twelvemile Lake (McCreary). Winter records: December 30 and 31, 1928, Platte River near Guernsey (McCreary).

CANVAS-BACK. *Nyroca valisineria*. Earliest spring records: April 2, 1933, Soda Lakes (McCreary); and April 2, 1934, Carroll Lakes (McCreary). Average of first spring records, seven years: April 8. Average of last fall records, four years: November 15. Latest fall record: November 30, 1933, Bamforth Lake (H. Thomas).

GREATER SCAUP DUCK. *Nyroca marila*. Transient. Earliest spring record: April 2, 1934, Carroll Lakes (McCreary). Average of first spring records, three years: April 6. Latest spring record: one collected April 12, 1875, Ft. Sanders, Albany County (Brackett) (8). One fall record: October 25, 1930, Hutton Lake (McCreary).

LESSER SCAUP DUCK. *Nyroca affinis*. Earliest spring records: one collected March 25, 1928, Sevenmile Lake (A. McIntosh); and forty seen March 25, 1934, Ninemile and Twelvemile Lakes (Mickey). Average of first spring records, nine years: April 1. Average of last fall records, six years: November 19. Latest fall record: December 10, 1933, Twelvemile Lake (R. Honess).

AMERICAN GOLDEN-EYE. *Glaucionetta clangula americana*. Winter visitant. Earliest fall record: November 5, 1933, Laramie City Reservoir (Mickey). Average of first fall records, two years: November 9. Average of last spring records, two years: May 11. Latest spring record: May 12, 1929, Cheyenne (J. Gundlach).

BUFFLE-HEAD. *Charitonetta albeola*. Transient. Earliest spring record: April 16, 1933, Twelvemile Lake (Mickey). Average of first spring records, six years: April 20. Average of last spring records, two years: May 15. Latest spring record: May 17, 1932, Hawk Springs Reservoir (McCreary). Earliest fall record: October 3, 1926, Nine-mile Lake (McCreary). Average of first fall records, six years: October 17. Average of last fall records, six years: November 6. One winter record: three seen January 1, 1934, Lake Hattie (McCreary).

WHITE-WINGED SCOTER. *Melanitta deglandi*. Transient. One spring record: May 15, 1934, Bamforth Lake (McCreary). Earliest fall record: one taken November 3, 1934, Carroll Lakes (H. Gilbert). Latest fall record: one taken November 11, 1934, Wheatland Reservoir.

SURF SCOTER. *Melanitta perspicillata*. One collected October 19, 1893, Douglas (Jesurun) (23).

RUDDY DUCK. *Erismatura jamaicensis rubida*. Earliest spring record: April 6, 1930, Soda Lakes (McCreary). Average of first spring records, seven years: April 15. Average of last fall records, four years: November 9. Latest fall record: November 30, 1933, Twelvemile Lake (McCreary).

RED-BREASTED MERGANSER. *Mergus serrator*. Transient. Earliest spring record: three seen, March 25, 1934, Hutton Lake (McCreary). Average of first spring records, three years: April 5. Latest spring record: May 12, 1929, Cheyenne (J. Gundlach). Winter records: one seen December 31, 1933, Twin Buttes Lake, Albany County; and two seen February 4, 1934, Wheatland Flats on irrigation reservoir (McCreary).

TURKEY VULTURE. *Cathartes aura septentrionalis*. Earliest spring record: April 15, 1931, Cheyenne (L. R. Wolfe). Average of first spring records, four years: April 29. Average of last fall records, four years: September 20. Latest fall record: October 2, 1926, Archer, Laramie County (McCreary).

EASTERN GOSHAWK. *Astur atricapillus atricapillus*. Earliest spring record: February 28, 1932, Woods Creek, Medicine Bow Forest (McCreary). Average of first spring records, three years: March 18. Average of last fall records, three years: October 26. Latest fall record: November 10, 1928, Woods Creek (McCreary).

SHARP-SHINNED HAWK. *Accipiter velox velox*. Earliest spring record: specimen in the University of Wyoming collection dated March 30, 1903, Laramie (Knight). Average of first spring records, six years: April 30. Average of last fall records, three years: October 12. Latest fall record: October 15, 1928, Laramie (McCreary). Two winter records: December 27, 1928, Torrington (McCreary); and January 12, 1929, Lusk (McCafferty) (24).

COOPER'S HAWK. *Accipiter cooperi*. Two winter records: February 5, 1928, Woods Creek, Medicine Bow Forest (McCreary); and February 14, 1932, Fox Creek, Albany County (Mickey). Average of first spring records, six years: April 22. Average of last fall records, three years: October 21.

WESTERN RED-TAILED HAWK. *Buteo borealis calurus*. Earliest spring record: March 25, 1934, Ninemile Lake (Mickey). Average of first spring records, eight years: April 7. Average of last fall records, seven years: October 1. Latest fall record: October 19, 1930, Torrington (McCreary). One winter record: February 6, 1927, Laramie River, Albany County (McCreary).

SWAINSON'S HAWK. *Buteo swainsoni*. Three winter records: January 1, 1927, and January 2, 1928, Laramie (McCreary); and January 29, 1928, Pine Bluffs (McCreary). Average of first spring records, seven other years: April 14. Average of last fall records, five years: October 18.

AMERICAN ROUGH-LEGGED HAWK. *Buteo lagopus s. johannis*. Winter visitant. Earliest fall record: October 13, 1927, Laramie Plains (McCreary). Average of first fall records, three years: October 23. Latest spring record: March 29, 1927, Laramie Plains (McCreary).

DUCK HAWK. *Falco peregrinus anatum*. Transient. Earliest spring record: April 2, 1933, Soda Lakes (McCreary). Latest spring record: May 8, 1933, Torrington (McCreary). Neilson (26) reports seeing this bird near Wheatland in fall, but we do not have any dates for it.

RICHARDSON'S PIGEON HAWK. *Falco columbarius richardsoni*. Transient. Earliest spring record: March 13, 1927, Millbrook, Albany County (McCreary). Average of first spring records, five years: March 30. Average of last spring records, four years: May 17. Latest spring record: May 20, 1932, Laramie (Mickey). Earliest fall record: August 15, 1870, LaBonte Creek (Stevenson and Smith) (29). Average of first fall records, five years: September 5. Average of last fall records, six years: November 6. Latest fall record: one collected November 27, 1895, Laramie (Knight) (23). One winter record: December 25, 1927, Wheatland (McCreary).

DESERT SPARROW HAWK. *Falco sparverius phalaena*. Occasionally seen in winter. Average of first spring records, eight years: April 2. Average of last fall records, three years: October 24.

LITTLE BROWN CRANE. *Grus canadensis canadensis*. One spring record: specimen taken April 3, 1912, Sodergreen Lake, Albany County (Lockwood) (21). One fall record: specimen taken October 7, 1898, Glendo (Jeserun) (23).

SANDHILL CRANE. *Grus canadensis tabida*. One spring record: April 28, 1927, Sevenmile Lake (McCreary). One fall record: specimen taken October 10, 1896, Shell Creek, Albany County (Knight) (23).

VIRGINIA RAIL. *Rallus limicola limicola*. Arrives in spring about May 1. Wheatland (Neilson) (26). Latest fall record: October 8, 1933, Laramie (Mickey).

SORA. *Porzana carolina*. Arrives in spring about May 1. Wheatland (Neilson) (26). Latest fall record: September 19, 1934, Laramie (Mickey).

AMERICAN COOT. *Fulica americana americana*. Earliest spring record: March 25, 1934, Hutton Lake (McCreary). Average of first spring records, ten years: April 11. Average of last fall records, six years: November 9. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

PIPING PLOVER. *Charadrius melodus*. Transient. Earliest spring record: specimen taken May 30, 1892, Cheyenne (Bond) (23). Latest spring record: three seen June 12, 1929, Torrington (McCreary).

SNOWY PLOVER. *Charadrius nivosus* ssp. A specimen was taken by Bond at Cheyenne (23). One was seen June 20, 1933, at Bamforth Lake by McCreary, and later by several other observers. It was last seen July 2, 1933, by J. W. Scott. Latest record: July 29, 1934, Bamforth Lake (McCreary).

SEMIPALMATED PLOVER. *Charadrius semipalmatus*. Transient. Earliest spring record: May 12, 1929, Cheyenne (J. Gundlach). Latest spring record: May 19, 1933, Laramie (McCreary). Earliest fall record: August 13, 1933, Crcighton Lake (Mickey). Latest fall record: August 26, 1928, Bamforth Lake (McCreary).

MOUNTAIN PLOVER. *Eupoda montana*. Earliest spring record: March 25, 1928, Laramie Plains (McCreary). Average of first spring records, ten years: April 13. Average of last fall records, seven years: August 16. Latest fall record: August 24, 1932, Laramie Plains (McCreary).

KILLDEER. *Oxyechus vociferus vociferus*. Frequently stays all winter. When not present in the winter it appears in the spring in March. Average of first spring records, eight years: March 25. Average of last fall records, five years: October 15.

AMERICAN GOLDEN PLOVER. *Pluvialis dominica dominica*. One record: three were taken near Camp Dawes on Roek Creek, October 25, 1870 (Stevenson and Smith) (29).

BLACK-BELLIED PLOVER. *Squatarola squatarola*. Transient. Earliest spring record: May 11, 1884, Cheyenne (Bond) (12). Average of first spring records, three years: May 13. Latest spring record: May 18, 1933, Bamforth Lake (McCreary). Earliest fall record: October 21, 1928, Laramie (McCreary). Latest fall record: November 9, 1930, Alsop Lakes, Albany County (McCreary).

NORTHERN CURLEW. *Numenius americanus occidentalis*. Earliest spring record: April 15, 1889, Cheyenne (Bond) (12). Average of first spring records, five years: April 24. Average of last fall records, five years (August 5-19): August 12. Exceptionally late fall record: October 9, 1927, Bamforth Lake (McCreary).

UPLAND PLOVER. *Bartramia longicauda*. Earliest spring record: May 5, 1879, Lake Como (Williston) (31). Average of first spring records, six years: May 8. Average of last fall records, six years: August 18. Latest fall record: September 1, 1930, Laramie (McCreary).

SPOTTED SANDPIPER. *Actitis macularia*. Earliest spring record: May 1, 1927, Laramie (McCreary). Average of first spring records, nine years: May 6. Average of last fall records, eight years: September 10. Latest fall record: October 5, 1933, Laramie (Mickey).

WESTERN SOLITARY SANDPIPER. *Tringa solitaria cinnamomea*. Transient. Earliest spring records: April 20, 1929 and 1932, Laramie (McCreary). Average of first spring records, eight years: April 24. Average of last spring records, seven years: May 13. Latest spring record: May 25, 1928, Laramie (McCreary). Earliest fall record: June 28, 1934, Laramie (McCreary). Average of first fall records, eight years: July 13. Average of last fall records, eight years: September 5. Latest fall record: October 1, 1927, Laramie (McCreary).

WESTERN WILLET. *Catoptrophorus semipalmatus inornatus*. Transient. Earliest spring record: April 25, 1931, Sevenmile Lake (Mickey). Average of first spring records, nine years: May 4. Average of last spring records, seven years: May 25. Latest spring record: June 3, 1922, Wheatland (Neilson) (25). Earliest fall record: June 17, 1934, Hutton Lake (A. Hamm). Average of first fall records, five years: July 14. Average of last fall records, four years: September 5. Latest fall record: October 1, 1933, Wheatland Reservoir (J. W. Scott).

GREATER YELLOW-LEGS. *Totanus melanoleucus*. Transient. Earliest spring record: April 4, 1928, Medicine Bow (McCreary). Average of first spring records, eleven years: April 12. Average of last spring records, four years: May 14. Latest spring record: May 29, 1914, Laramie (Henninger) (22). Exceptionally early fall record, obtained during the drouth: June 22, 1934, Laramie (McCreary). Average of first fall records, seven other years (July 19-August 21): August 5. Average of last fall records, eight years: October 2. Latest fall record: October 24, Medicine Bow (4).

LESSER YELLOW-LEGS. *Totanus flavipes*. Transient. Earliest spring record: April 21, 1934, Laramie (McCreary). Average of first spring records, nine years: May 1. Average of last spring records, six years: May 18. Latest spring record: June 1, 1914, Laramie (Henninger) (22). Exceptionally early fall record, obtained during the drouth: June 14, 1934, Laramie (McCreary). Average of first fall records, six other years (July 4-August 21): July 19. Average of last fall records, six years: October 15. Latest fall record: October 22, 1926, Laramie (McCreary).

PECTORAL SANDPIPER. *Pisobia melanotos*. Transient. One spring record: May 12, 1933, Torrington (McCreary). Exceptionally early

fall record, obtained during the drouth: July 8, 1934, Soda Lakes (McCreary). Average of first fall records, two other years (August 5-13): August 9. Average of last fall records, three years: September 3. Latest fall record: a specimen in the University of Wyoming collection dated September 14, 1897, Sevenmile Lake (C. W. Gilmore).

WHITE-RUMPED SANDPIPER. *Pisobia fuscicollis*. Transient. Earliest spring record: specimen taken May 16, 1875, Ft. Laramie (4) (Newberry). Average of first spring records, three years: May 23. Latest spring record: June 17, 1933, Bamforth Lake (Mickey). We have no fall records.

BAIRD'S SANDPIPER. *Pisobia bairdi*. Transient. Earliest spring record: March 31, 1929, Laramie (McCreary). Average of first spring records, eight years: April 16. Average of last spring records, six years: May 24. Latest spring record: May 31, 1931, Laramie (McCreary). Earliest fall record: June 24, 1933, Bamforth Lake (Mickey). Average of first fall records, eight years: July 15. Average of last fall records, four years: October 13. Latest fall record: October 21, 1928, Sevenmile Lake (McCreary).

LEAST SANDPIPER. *Pisobia minutilla*. Transient. Earliest spring records: April 23, Ft. Laramie (4); and April 23, 1888, Cheyenne (Bond) (12). Average of first spring records, ten years: May 2. Average of last spring records, five years: May 24. Latest spring record: May 29, 1933, Goshen County (McCreary). Earliest fall record: July 8, 1934, Soda Lakes (McCreary). Average of first fall records, four years: July 24. Latest fall record: October 21, 1928, Laramie (McCreary).

RED-BACKED SANDPIPER. *Pelidna alpina sakhalina*. One record: one seen August 23, 1930, Sevenmile Lake (McCreary).

LONG-BILLED DOWITCHER. *Limnodromus griseus scolopaceus*. Transient. Earliest spring record: May 3, 1889, Cheyenne (Bond) (12). Average of first spring records, five years: May 7. Average of last spring records, three years: May 16. Latest spring record: May 17, 1933, Laramie (Mickey). Earliest fall record: June 26, 1875, Ft. Sanders, Albany County (Brackett) (9). Average of first fall records, five years: July 13. Average of last fall records, four years: October 14. Latest fall record: October 25, 1928, Sevenmile Lake (A. McIntosh).

STILT SANDPIPER. *Micropalama himantopus*. Transient. Earliest spring record: three taken May 15, 1875, Ft. Laramie (J. S. Newberry) (30). Latest spring record: May 25, 1889, Cheyenne (Bond) (6).

Earliest fall record: sixteen seen July 29, 1934, Bamforth Lake (McCreary). Latest fall record: one seen August 20, 1933, Ninemile Lake (McCreary).

SEMIPALMATED SANDPIPER. *Ereunetes pusillus*. Transient. One spring record: May 19, 1933, Laramie (McCreary). Two fall records: one taken August 22 or 23, 1870, North Platte River, Natrona County (Stevenson and Smith) (29); and one skin in the University of Wyoming collection dated August 31, 1897, Bamforth Lake (C. W. Gilmore). By some error Knight (23) copied this record as October 31, and the erroneous date has appeared in other publications (4).

MARbled GODWIT. *Limosa jedoa*. Transient. Earliest spring record: April 25, 1931, Sevenmile Lake (Mickey). Average of first spring records, six years: May 4. Average of last spring records, four years: May 15. Latest spring record: May 19, 1933, Bamforth Lake (Mickey). Earliest fall record, obtained during the drouth: July 13, 1934, Bamforth Lake (McCreary). Average of first fall records, four years: July 26. Average of last fall records, four years: August 31. Latest fall record: September 14, 1933, Laramie (McCreary).

SANDERLING. *Crocethia alba*. Transient. Earliest spring record: May 5, 1879, Lake Como (Williston) (32). Average of first spring records, five years: May 13. Average of last spring records, four years: May 22. Latest spring record: May 26, 1892, Douglas (Jesurun) (23). Earliest fall record: August 26, 1928, Bamforth Lake (McCreary). Latest fall record: October 1, 1927, Bamforth Lake (McCreary).

AVOCET. *Recurvirostra americana*. Earliest spring record: April 14, 1928, Ninemile Lake (McCreary). Average of first spring records, eleven years: April 26. Average of last fall records, five years: September 22. Latest fall record: October 7, 1933, Wheatland Reservoir (R. Honess).

BLACK-NECKED STILT. *Himantopus mexicanus*. Earliest record: one seen June 11, 1933, Creighton Lake (Mr. and Mrs. Mickey, Draize, and McCreary). Two were seen June 20 and 30, 1934, Bamforth Lake (McCreary).

RED PHALAROPE. *Phalaropus fulicarius*. One specimen in the University of Wyoming collection is dated September 14, 1897, Sevenmile Lake (C. W. Gilmore).

WILSON'S PHALAROPE. *Steganopus tricolor*. Earliest spring record: April 25, 1933, Laramie (McCreary). Average of first spring records, nine years: May 3. Average of last fall records, eight years:

August 30. Latest fall record: September 19, 1926, Laramie (McCreary).

NORTHERN PHALAROPE. *Lobipes lobatus*. Transient. Earliest spring record: May 13, 1933, Bamforth Lake (Mickey). Average of first spring records, four years: May 16. Average of last spring records, four years: May 23. Latest spring record: May 28, 1879, Lake Como (Williston) (32). Fall records: specimens taken by Mr. and Mrs. Allen McIntosh, September 29, 1928, Twelvemile Lake, and October 6, 1928, Bamforth Lake.

GLAUCOUS GULL. *Larus hyperboreus*. One taken by Elmer Isberg, November 23, 1933, Lake Hattie.

HERRING GULL. *Larus argentatus smithsonianus*. Transient. Earliest spring record: a dead bird brought to the University to be identified, March 18, 1932. Latest spring record: May 29, 1932, Wheatland Reservoir (Scott). Earliest fall record: August 6, 1933, Wheatland Reservoir (McCreary). Latest fall record: November 24, 1932, Lake Hattie (McCreary). One winter record: January 1, 1934, Lake Hattie (McCreary).

RING-BILLED GULL. *Larus delawarensis*. Earliest spring record: March 19, 1934, Hutton Lake (F. Mazel). Average of first spring records, eight years: April 2. Average of last fall records, seven years: November 17. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

FRANKLIN'S GULL. *Larus pipixcan*. Transient. Earliest spring record: May 5, 1933, Torrington (McCreary). Average of first spring records, three years: May 7. Latest spring record: May 12, 1933, Torrington (McCreary). One fall record: July 27, 1928, near Iowa Center, Platte County (J. Gundlach).

BONAPARTE'S GULL. *Larus philadelphia*. Transient. Earliest spring record: April 21, 1934, Lake Hattie (Mickey). Average of first spring records, five years: April 30. Latest spring record: June 3, 1933, Laramie (McCreary). Earliest fall record: June 21, 1934, Laramie (McCreary). Latest fall record: a specimen in the University of Wyoming collection dated November 18, 1896, Laramie (E. Land).

ATLANTIC KITTIWAKE. *Rissa tridactyla tridactyla*. One record: specimen taken November 18, 1898, Douglas (Jesurun) (23).

FORSTER'S TERN. *Sterna forsteri*. Earliest spring record: May 2, 1934, Laramie (McCreary). Average of first spring records, six years: May 18. Average of last fall records, four years (July 31-September

4): August 17. Exceptionally late fall record: September 30, 1932, Laramie (McCreary).

LEAST TERN. *Sterna antillarum antillarum*. It occurs in summer along the North Platte River in Goshen County. First record for Wyoming: June 11, 1929, Torrington (McCreary). Earliest spring record: May 27, 1933, Torrington (McCreary).

BLACK TERN. *Chlidonias nigra surinamensis*. Earliest spring record: May 11, 1934, Hutton Lake (McCreary). Average of first spring records, seven years: May 21. Usually disappears in August. Average of last fall records, four years (August 2-26): August 13. Exceptionally late fall record: October 1, 1927, Bamforth Lake (McCreary).

WESTERN MOURNING DOVE. *Zenaidura macroura marginella*. Earliest spring record: April 14, 1933, Laramie (McCreary). Average of first spring records, nine years: April 25. Average of last fall records, eight years: October 4. Latest fall record: October 30, 1927, Laramie (McCreary). One winter record: a specimen taken January 20, 1934, Cheyenne (J. Simon).

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus*. Earliest spring record: a specimen taken May 21, 1893, Douglas (Jeserun) (23). Average of first spring records, five years: May 30. We have no fall records.

WESTERN BURROWING OWL. *Speotyto cunicularia hypugaea*. Earliest spring record: April 15, 1934, Laramie (Mickey). Average of first spring records, five years: April 28. Average of last fall records, five years: August 29. Latest fall record: a specimen taken September 6, 1923, Wheatland (Fuller) (20).

SHORT-EARED OWL. *Asio flammeus flammeus*. Earliest spring records: March 30, 1930 and 1934, Laramie (McCreary). Latest fall record: November 6, 1927, Laramie (McCreary). One winter record: January 6, 1930, Goshen County (McCreary).

NUTTALL'S POOR-WILL. *Phalaenoptilus nuttalli nuttalli*. Earliest spring record: May 3, 1932, Torrington (McCreary). Average of first spring records, four years: May 16. Average of last fall records, two years: September 6. Latest fall record: specimen taken September 7, 1857, Laramie Mountains (Hayden) (3).

NIGHTHAWK. *Chordeiles minor* ssp. Three subspecies of the Nighthawk occur in this region (27), but the dates given here are sight records and the subspecies could not be determined. Earliest spring record: May 24, 1933, Torrington (McCreary). Average of first spring records, nine years: June 1. Average of last fall records, seven

years: September 25. Latest fall record: October 10, 1928, Laramie (McCreary).

WHITE-THROATED SWIFT. *Aëronautes saxatalis saxatalis*. Earliest spring record: April 24, 1927, Sand Creek, Albany County (McCreary). Average of first spring records, three years: April 30. Average of last fall records, three years: September 1. Latest fall record: one captured in Agricultural Hall, University of Wyoming, September 9, 1934.

BROAD-TAILED HUMMINGBIRD. *Selasphorus platycercus platycercus*. Earliest spring record: May 20, 1934, Laramie (McCreary). Average of first spring records, six years: May 24. Average of last fall records, nine years: September 3. Latest fall record: September 16, 1933, Laramie (McCreary).

RUFIOUS HUMMINGBIRD. *Selasphorus rufus*. We have no spring records. Earliest fall record: July 12, 1934, Laramie (McCreary). Average of first fall records, four years: July 17. Average of last fall records, four years: August 5. Latest fall record: August 13, 1934, Laramie (McCreary).

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus*. Earliest spring record: May 17, 1932, Torrington (McCreary). Average of first spring records, six years: May 27. Average of last fall records, five years: September 2. Latest fall record: one taken September 6, 1923, Wheatland (Fuller) (20).

LEWIS'S WOODPECKER. *Asyndesmus lewis*. Earliest spring records: May 14, 1930 and 1931, Laramie (McCreary). Average of first spring records, six years: May 17. Average of last fall records, six years: September 9. Latest fall record: September 24, 1933, Laramie (Mickey).

RED-NAPE SAPSUCKER. *Sphyrapicus varius nuchalis*. Earliest spring record: April 9, 1932, Laramie (McCreary). Average of first spring records, five years: May 6. Average of last fall records, four years: October 10. Latest fall record: October 25, 1932, Laramie (McCreary).

EASTERN KINGBIRD. *Tyrannus tyrannus*. Earliest spring record: May 7, 1927, Laramie (McCreary). Average of first spring records, nine years: May 16. Average of last fall records, nine years: August 22. Latest fall record: September 9, 1934, Laramie (McCreary).

ARKANSAS KINGBIRD. *Tyrannus verticalis*. Earliest spring record: May 5, 1932, Lingle (McCreary). Average of first spring records, eight years: May 12. Average of last fall records, nine years: August

29. Latest fall records: September 5, 1926 and 1927, Laramie (McCreary); and September 5, 1934, Laramie (Mickey).

CASSIN'S KINGBIRD. *Tyrannus vociferans*. Earliest spring record: specimen taken May 6, 1892, Douglas (Jeserun) (23). Average of first spring records, 4 years: May 12. Average of last fall records, four years: September 12. Latest fall record: specimen taken September 18, 1911, Albany County (Walker) (21).

SAY'S PHOEBE. *Sayornis saya saya*. Earliest spring record: April 7, 1889, Cheyenne (Bond) (13). Average of first spring records, thirteen years: April 17. Average of last fall records, nine years: September 14. Latest fall record: October 3, 1926, Laramie (McCreary).

ALDER FLYCATCHER. *Empidonax trailli trailli*. Earliest spring record: May 30, 1929, Laramie (McCreary). Latest fall record: September 7, 1930, Laramie (McCreary).

LEAST FLYCATCHER. *Empidonax minimus*. Earliest spring record: May 5, 1933, Torrington (McCreary). Average of first spring records, two years: May 8.

HAMMOND'S FLYCATCHER. *Empidonax hammondi*. Earliest spring record: May 13, 1934, Laramie (McCreary). Latest fall record: one taken October, 1871, Ft. Steele (Allen) (1). Allen did not arrive at Ft. Steele until October 9.

WRIGHT'S FLYCATCHER. *Empidonax wrighti*. Earliest spring record: May 9, 1933, Guernsey (McCreary). Average of first spring records, seven years: May 19. Average of last fall records, two years: September 10. Latest fall record: September 13, 1926, Laramie (McCreary).

WESTERN FLYCATCHER. *Empidonax difficilis difficilis*. Earliest spring record: May 20, 1928, Laramie (McCreary). Latest fall record: one taken September 13, 1894, Douglas (Jeserun) (23).

WESTERN WOOD PEWEE. *Myiochanes richardsoni richardsoni*. Earliest spring record: May 19, 1932, Torrington (McCreary). Average of first spring records, seven years: May 27. Average of last fall records, six years: September 25. Latest fall record: September 30, 1931, Laramie (McCreary).

OLIVE-SIDED FLYCATCHER. *Nuttallornis mesoleucus*. Earliest spring record: May 16, 1933, Laramie (McCreary). Average of first spring records, three years: May 21. Average of last fall records, three years: September 9. Latest fall record: September 18, 1926, Laramie (McCreary).

VIOLET-GREEN SWALLOW. *Tachycineta thalassina lepida*. Earliest spring record: May 7, 1930, Laramie (McCreary). Average of first spring records, four years: May 14. Average of last fall records, three years: August 31. Latest fall record: September 7, 1926, Laramie (McCreary).

TREE SWALLOW. *Iridoprocne bicolor*. Earliest spring record: April 11, 1930, Laramie (McCreary). Average of first spring records, five years: April 18. Latest fall record: October 1, 1927, Laramie Plains (McCreary).

BANK SWALLOW. *Riparia riparia riparia*. Earliest spring record: April 23, 1929, Laramie (McCreary). Average of first spring records, six years: April 30. Average of last fall records, five years: August 26. Latest fall record: September 4, 1933, Laramie (McCreary).

ROUGH-WINGED SWALLOW. *Stelgidopteryx ruficollis serripennis*. Earliest spring records: May 1, 1927, Laramie (McCreary); May 1, 1931 and 1933, Torrington (McCreary); and May 1, 1928, Laramie (Gundlaeh). Average of first spring records, eight years: May 6. Average of last fall records, five years: August 28. Latest fall record: September 6, 1931, Laramie (McCreary).

BARN SWALLOW. *Hirundo erythrogaster*. Exceptionally early spring record: April 21, 1889, Cheyenne (Bond) (28). Average of first spring records, nine other years (May 1-7): May 4. Average of last fall records, six years: September 16. Latest fall record: September 24, 1928, Guernsey (McCafferty) (24).

NORTHERN CLIFF SWALLOW. *Petrochelidon albifrons albifrons*. Earliest spring record: May 10, 1928, Laramie (McCreary). Average of first spring records, nine years: May 13. Average of last fall records, seven years: August 22. Latest fall record: September 4, 1933, Laramie (McCreary).

NORTHERN BLUE JAY. *Cyanocitta cristata cristata*. Earliest spring record: May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records, four years: May 9. Average of last fall records, four years: October 7. Latest fall record: October 22, 1933, Laramie (Mickey). One winter record: January 29, 1928, Pine Bluffs (McCreary).

WESTERN CROW. *Corvus brachyrhynchos hesperis*. Earliest spring record: February 28, 1933, Laramie (McCreary). Average of first spring records, eight years: March 12. Average of last fall records, ten years: October 18. Latest fall record: October 26, 1930, Laramie (McCreary). Two winter records: December 27, 1929, Casper (McCreary); and January 31, 1932, Laramie (Mickey).

BLACK-EARED NUTHATCH. *Sitta pygmaea melanotis*. Earliest spring record: April 17, 1932, Fish Creek, Albany County (Scott). Latest fall record: October 18, 1926, Telephone Canyon, Albany County (McCreary).

WESTERN HOUSE WREN. *Troglodytes aëdon parkmani*. Earliest spring records: May 1, 1931, Guernsey, and May 1, 1933, Torrington (McCreary). Average of first spring records, eight years: May 10. Average of last fall records, six years: September 20. Latest fall record: October 3, 1926, Laramie (McCreary).

WESTERN WINTER WREN. *Nannus hiemalis pacificus*. One record during migration: October 26, 1930, Laramie (McCreary).

WESTERN MARSH WREN. *Telmatodytes palustris plesius*. Two specimens taken near Laramie were named *plesius* by Oberholser, but our sight records may include *laingi* and *dissaëptus*. Earliest spring record: March 30, 1930, Laramie (McCreary). Average of first spring records, eight years: April 14. Our only late date is July 28, 1929, Torrington. Two winter records: December 24, 1928, Wheatland, and January 29, 1928, Pine Bluffs (McCreary).

CAÑON WREN. *Catherpes mexicanus conspersus*. We have three records: April 17, 1928, Laramie (McCreary); August, 1928, Medicine Bow River Canyon (Gundlach); and August 22, 1931, Laramie, one found in Agricultural Hall, University of Wyoming (Mickey).

COMMON ROCK WREN. *Salpinctes obsoletus obsoletus*. Exceptionally early spring record: April 2, 1930, Laramie (McCreary). Average of first spring records, nine other years (April 29-May 14): May 8. Average of last fall records, eight years: September 26. Latest fall record: October 21, 1928, Laramie (McCreary). One winter record: December 30, 1928, Guernsey (McCreary).

WESTERN MOCKINGBIRD. *Mimus polyglottos leucopterus*. Exceptionally early spring record: April 30, 1894, Douglas (Jeserun) (11). Average of first spring records, four other years (May 15-May 23): May 18. Latest fall record: September 16, 1933, Laramie (McCreary).

CATBIRD. *Dumetella carolinensis*. Earliest spring record: May 11, 1929, Cheyenne (McCreary). Average of first spring records, nine years: May 16. Average of last fall records, seven years: September 21. Latest fall record: September 26, 1929, Laramie (McCreary).

BROWN THRASHER. *Toxostoma rufum*. Earliest spring records: May 1, 1931 and 1933, Torrington (McCreary). Latest fall record: one taken August 30, 1923, Chugwater (Fuller) (20). One winter record: January 4, 1930, Torrington (McCreary).

SAGE THRASHER. *Oreoscoptes montanus*. Earliest spring record: March 25, 1934, Hutton Lake (McCreary). Average of first spring records, nine years: April 15. Average of last fall records, seven years: September 23. Latest fall record: September 30, 1933, Laramie (Mickey).

WESTERN ROBIN. *Turdus migratorius propinquus*. Occasionally found in winter: January 29, 1928, Pine Bluffs; January 6, 1930, Cheyenne (McCreary); and January 28, 1932, Laramie (Mickey). In some years migrants are seen in late February: February 21, 1931, Torrington (L. R. Wolfe). In 1927 none were seen until March 26. The large flocks arrive in April and leave for the south early in October.

ALASKA HERMIT THRUSH. *Hylocichla guttata guttata*. One collected September 9, 1898, Laramie (Knight) (23).

AUDUBON HERMIT THRUSH. *Hylocichla guttata auduboni*. Our migration records are all sight records and may include other subspecies. Earliest spring record: April 19, 1934, Torrington (McCreary). Average of first spring records, seven years: April 30. Average of last fall records, six years: October 19. Latest fall records: October 30, 1927 and 1932, Laramie (McCreary).

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni*. Earliest spring record: May 4, 1933, Torrington (McCreary). Average of first spring records, eight years: May 8. Average of last fall records, seven years: October 6. Latest fall record: October 20, 1934, Laramie (Mickey).

GRAY-CHEEKED THRUSH. *Hylocichla minima aliciae*. Transient. Earliest spring record: May 10, 1933, Torrington (McCreary). Average of first spring records, three years: May 13. Latest spring record: May 25, 1932, Torrington (McCreary). We have no fall records.

WILLOW THRUSH. *Hylocichla fuscescens salicicola*. Earliest spring record: May 6, 1933, Torrington (McCreary). Average of first spring records, seven years: May 13. Average of last fall records, two years: September 1. Latest fall record: September 7, 1931, Laramie (McCreary).

MOUNTAIN BLUEBIRD. *Sialia currucoides*. Earliest spring record: February 22, 1932, Sand Creek, Albany County (R. Honess). Average of first spring records, eight years: March 5. Average of last fall records, eight years: October 18. Latest fall record: October 23, 1932, Tie Siding, Albany County (J. W. Scott).

WESTERN GOLDEN-CROWNED KINGLET. *Regulus satrapa olivaceus*. One spring record: May 19, 1931, Laramie (McCreary). Average of last fall records, seven years: September 30. Latest fall record: October 26, 1932, Laramie (McCreary). Winter records: December 25, 1929, and January 6, 1930, Cheyenne (McCreary).

EASTERN RUBY-CROWNED KINGLET. *Corthylio calendula calendula*. Earliest spring record: April 16, 1929, Laramie (McCreary). Average of first spring records, six years: April 30. Average of last fall records, seven years: October 16. Latest fall record: October 26, 1933, Laramie (McCreary).

AMERICAN PIPIT. *Anthus spinoletta rubescens*. Exceptionally early spring record: March 22, 1934, Laramie (McCreary). Average of first spring records, eight other years (April 9-30): April 22. Average of last fall records, six years: October 16. Latest fall record: October 21, 1926, Laramie (McCreary).

SPRAGUE'S PIPIT. *Anthus spraguei*. Transient. Earliest spring record: April 17, 1927, Laramie (McCreary). Latest spring record: May 17, 1934, Laramie (McCreary). We have no fall records.

BOHEMIAN WAXWING. *Bombycilla garrula pallidiceps*. Winter visitant. Earliest fall record: November 8, 1931, Laramie (McCreary). Average of first fall records, two years: November 10. Average of last spring records, three years: April 6. Latest spring record: April 16, 1932, Laramie (McCreary).

CEDAR WAXWING. *Bombycilla cedrorum*. Earliest spring record: one collected May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records, six years: May 21. Average of last fall records, five years: September 27. Latest fall record: October 16, 1933, Laramie (McCreary).

NORTHWESTERN SHRIKE. *Lanius borealis invictus*. Winter visitant. Earliest fall record: October 16, 1928, Laramie (McCreary). Average of first fall records, seven years: October 22. Average of last spring records, six years: April 2. Latest spring record: April 15, 1934, Laramie (Mickey).

WHITE-RUMPED SHRIKE. *Lanius ludovicianus excubitorides*. Exceptionally early spring record: February 20, 1932, Laramie Plains (Mickey). Average of first spring records, eight other years (April 15-29): April 22. Average of last fall records, six years: September 22. Latest fall record: October 15, 1932, Laramie (Mickey).

PLUMBEOUS VIREO. *Vireo solitarius plumbeus*. Earliest spring record: May 7, 1927, Laramie (McCreary). Average of first spring

records, three years: May 16. Average of last fall records, six years: September 13. Latest fall record: October 4, 1934, Laramie (McCreary).

RED-EYED VIREO. *Vireo olivaceus*. Transient. Earliest spring record: May 24, 1933, Torrington (McCreary). Average of first spring records, seven years: May 27. Average of last spring records, three years: June 6. Latest spring record: June 10, 1929, Cheyenne (McCreary). Earliest fall record: August 22, 1934, Laramie (McCreary). Average of first fall records, three years: August 27. Average of last fall records, four years: September 5. Latest fall record: September 12, 1926, Laramie (McCreary).

WESTERN WARBLING VIREO. *Vireo gilvus swainsoni*. Exceptionally early spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, seven other years (May 21-June 1): May 27. Average of last fall records, eight years: September 1. Latest fall record: September 14, 1933, Laramie (McCreary).

BLACK AND WHITE WARBLER. *Mniotilta varia*. Transient. Earliest spring record: May 3, 1930, Laramie (McCreary). Latest spring records: specimen taken May 17, 1899, Douglas (Jeserun) (23); and one seen May 17, 1932, Laramie (Miekey). One fall record: September 23, 1928, Laramie (McCreary).

TENNESSEE WARBLER. *Vermivora peregrina*. Transient. Earliest spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, three years: May 17. Average of last spring records, three years: May 27. Latest spring record: May 28, 1927, Laramie (McCreary). Earliest fall record: August 28, 1928, Laramie (McCreary). Average of first fall records, four years: September 7. Average of last fall records, four years: September 30. Latest fall record: October 5, 1933, Laramie (McCreary).

ORANGE-CROWNED WARBLER. *Vermivora celata* ssp. Earliest spring record: April 30, 1931, Torrington (McCreary). Average of first spring records, six years: May 4. Average of last fall records, five years: September 29. Latest fall record: October 25, 1933, Laramie (McCreary).

NASHVILLE WARBLER. *Vermivora ruficapilla ruficapilla*. Two records: one taken May 29, 1898, Chugwater (Knight) (23); and one seen May 9, 1933, Ft. Laramie (McCreary).

NORTHERN PARULA WARBLER. *Comptothlypis americana pusilla*. Three records: one taken May 30, 1888, Cheyenne (Bond) (23); one seen May 5, 1931, and May 12, 1933, Torrington (McCreary).

EASTERN YELLOW WARBLER. *Dendroica aestiva aestiva*. Earliest spring record: May 2, 1933, Lingle (McCreary). Average of first spring records, eleven years: May 11. Average of last fall records, nine years: September 4. Latest fall record: September 14, 1933, Laramie (McCreary).

MAGNOLIA WARBLER. *Dendroica magnolia*. Four records: May 21, 1889, Cheyenne (Bond); one collected May 19, 1932, Torrington (McCreary); and one seen May 23 and 24, 1933, Torrington (McCreary).

MYRTLE WARBLER. *Dendroica coronata*. Transient. Earliest spring record: April 17, 1932, Woods, Albany County (Mickey). Average of first spring records, ten years: April 26. Average of last spring records, five years: May 23. Latest spring record: May 25, 1933, Laramie (Mickey). Earliest fall record: September 24, 1933, Laramie (McCreary). Average of first fall records, three years: October 2. Average of last fall records, five years: October 16. Latest fall record: October 23, 1930, Laramie (McCreary).

AUDUBON'S WARBLER. *Dendroica auduboni auduboni*. Earliest spring record: April 20, 1931, Cheyenne (L. R. Wolfe). Average of first spring records, nine years: May 3. Average of last fall records, seven years: October 18. Latest fall record: October 29, 1932, Laramie (McCreary).

TOWNSEND'S WARBLER. *Dendroica townsendi*. Transient. Two spring records: May 11, 1929, Cheyenne, and May 15, 1927, Jelm, Albany County (McCreary). Earliest fall record: August 11, 1933, Laramie (McCreary). Average of first fall records, seven years: August 24. Average of last fall records, ten years: September 25. Latest fall record: October 15, 1928, Laramie (McCreary).

CHESTNUT-SIDED WARBLER. *Dendroica pensylvanica*. One record: one collected May 23, 1889, Cheyenne (Bond) (6).

BLACK-POLL WARBLER. *Dendroica striata*. Earliest spring record: May 8, 1888, Cheyenne (Bond) (10). Average of first spring records, eight years: May 12. Average of last spring records, five years: May 20. Latest spring record: May 27, 1878, Lake Como (Williston) (31). We have no fall records.

WESTERN PALM WARBLER. *Dendroica palmarum palmarum*. One record: one seen May 10, 1933, Torrington (McCreary).

OVEN-BIRD. *Seiurus aurocapillus*. Two records: May 19, 1932, Ft. Laramie, and May 25, 1933, Lingle (McCreary).

GRINNELL'S WATER-THRUSH. *Seiurus noveboracensis notabilis*. Transient. Earliest spring records: one taken May 10, 1878, Lake Como (Williston) (31); and one seen May 10, 1933, Torrington (McCreary). Average of first spring records, five years: May 13. Average of last spring records, three years: May 16. Latest spring record: May 18, 1933, Laramie River, Albany County (Mickey). Earliest fall record: August 9, 1934, Ft. Steele (McCreary). Average of first fall records, four years: August 13. Average of last fall records, three years: August 29. Latest fall record: September 13, 1929, Laramie (McCreary).

MACGILLIVRAY'S WARBLER. *Oporornis tolmiei*. Earliest spring record: May 7, 1933, Torrington (McCreary). Average of first spring records, five years: May 12. Average of last fall records, seven years: September 17. Latest fall record: October 5, 1934, Laramie (McCreary).

WESTERN YELLOW-THROAT. *Geothlypis trichus occidentalis*. Earliest spring records: May 2, 1930, Laramie, May 2, 1931, Torrington, and May 2, 1933, Lingle (McCreary). Average of first spring records, ten years: May 10. Average of last fall records, seven years: September 18. Latest fall record: October 12, 1930, Laramie (McCreary).

LONG-TAILED CHAT. *Icteria virens longicauda*. Earliest spring records: May 10, 1930, Guernsey (McCafferty) (24); and May 10, 1932, Torrington (McCreary). Average of first spring records, four years: May 18. One fall record: September 5, 1932, Torrington (McCreary).

NORTHERN PILEOLATED WARBLER. *Wilsonia pusilla pileolata*. Earliest spring record: one collected May 4, 1932, Lingle (McCreary). Average of first spring records, eight years: May 12. Average of last fall records, six years: October 11. Latest fall record: October 16, 1928, Laramie (McCreary).

AMERICAN REDSTART. *Setophaga ruticilla*. Earliest spring record: May 4, 1933, Torrington (McCreary). Average of first spring records, eight years: May 17. Average of last fall records, five years: September 4. Latest fall record: September 12, 1933, Laramie (McCreary).

BOBOLINK. *Dolichonyx oryzivorus*. Earliest spring record: May 16, 1927, Laramie (McCreary). Average of first spring records, nine years: May 20. We have no fall records.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus*. Earliest spring record: April 14, 1929, Laramie (McCreary). Average

of first spring records, eight years: April 25. Average of last fall records, five years: October 7. Latest fall record: October 20, 1928, Laramie (McCreary). Winter records: December 25, 1927, and February 26, 1928, Wheatland (McCreary).

BALTIMORE ORIOLE. *Icterus galbula*. Three records: July 20, 1927, Wheatland (Fuller and Bole) (20); May 6, 1929, Guernsey (McCafferty) (24); and May 6, 1931, Torrington (McCreary).

BULLOCK'S ORIOLE. *Icterus bullocki*. Earliest spring record: May 11, 1929, Cheyenne (McCreary). Average of first spring records, twelve years: May 14. Average of last fall records, six years: August 26. Latest fall record: September 6, 1934, Laramie (Mr. and Mrs. Mickey).

RUSTY BLACKBIRD. *Euphagus carolinus*. One record: twelve seen December 25, 1927, Wheatland (McCreary).

BREWER'S BLACKBIRD. *Euphagus cyanocephalus*. A few individuals occasionally stay all winter. Average date of arrival of flocks from the south, nine years: April 27. Average of last fall records, eight years: November 1.

BRONZED GRACKLE. *Quiscalus quiscula aeneus*. Earliest spring record: April 13, 1930, Laramie (McCreary). Average of first spring records, eight years: April 23. Average of last fall records, seven years: September 25. Latest fall record: October 14, 1934, Laramie (McCreary).

NEVADA COWBIRD. *Molothrus ater artemisiae*. Earliest spring record: April 26, 1928, Laramie (McCreary). Average of first spring records, eight years: May 1. Average of last fall records, eight years: August 13. Latest fall record: September 5, 1926, Laramie (McCreary).

WESTERN TANAGER. *Piranga ludoviciana*. Earliest spring record: May 13, 1932, Laramie (Mickey). Average of first spring records, eleven years: May 23. Average of last fall records, eight years: September 23. Latest fall record: October 12, 1934, Laramie (McCreary).

ROSE-BREASTED GROSBEAK. *Hedymeles ludovicianus*. A pair were seen near Wheatland, July 1, 1932 (Mr. and Mrs. Mickey). One was seen May 11, 1933, Torrington (McCreary).

ROCKY MOUNTAIN GROSBEAK. *Hedymeles melanocephalus papago*. Earliest spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, eleven years: May 21. Average of last fall records, four years: September 14. Latest fall record: September 24, 1928, Guernsey (McCafferty) (24).

LAZULI BUNTING. *Passerina amoena*. Earliest spring record: May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records,

eight years: May 16. Average of last fall records, five years: September 2. Latest fall record: September 14, 1932, Laramie (McCreary).

CASSIN'S PURPLE FINCH. *Carpodacus cassinii*. Exceptionally early spring record: February 25, 1929, Laramie (McCreary). Average of first spring records, five other years (April 6-May 1): April 21. Average of last fall records, five years: October 12. Latest fall record: November 1, 1927, Laramie (McCreary).

HEPBURN'S ROSY FINCH. *Leucosticte tephrocotis littoralis*. Winter visitant. Earliest fall record: November 8, 1926, Laramie (McCreary). Average of first fall records, two years: November 18. Average of last spring records, seven years: March 25. Latest spring record: April 9, 1929, Laramie (McCreary).

GRAY-CROWNED ROSY FINCH. *Leucosticte tephrocotis tephrocotis*. Winter visitant. Earliest fall record: October 25, 1928, Laramie (Knight) (23). Average of first fall records, seven years: November 17. Average of last spring records, seven years: March 23. Latest spring record: April 13, 1929, Laramie (McCreary).

COMMON REDPOLL. *Acanthis linaria linaria*. Winter visitant. Earliest fall record: one collected October 25, 1870, Rock Creek (Stevenson and Smith) (29). Average of first fall records, seven years: November 9. Latest spring record: a specimen in the University of Wyoming collection dated April 14, 1897, Laramie (Knight).

ARKANSAS GOLDFINCH. *Spinus psaltria psaltria*. Three records: one collected May 26, 1889, Cheyenne (Bond) (23); and one seen May 23, 1931, and August 4, 1931, Laramie (McCreary).

GREEN-TAILED TOWHEE. *Oberholseria chlorura*. Earliest spring record: May 2, 1929, Laramie (McCreary). Average of first spring records, seven years: May 11. Average of last fall records, five years: September 26. Latest fall record: October 12, 1930, Laramie (McCreary).

ARCTIC TOWHEE. *Pipilo maculatus arcticus*. Earliest spring record: April 9, 1927, Laramie (McCreary). Average of first spring records, five years, April 28. Average of last fall records, five years: October 3. Latest fall records: one collected October 27 or 28, 1870, Ft. Sanders, Albany County (Stevenson and Smith) (29).

LARK BUNTING. *Calamospiza melanocorys*. Earliest spring record: May 3, 1932, Laramie and Goshen Counties (McCreary). Average of first spring records, thirteen years: May 10. Average of last fall records, ten years: August 26. Latest fall record: September 9, 1923, Laramie County (Fuller and Bole) (20).

SAVANNAH SPARROW. *Passerculus sandwichensis* ssp. Earliest spring record: April 17, 1929, Laramie (McCreary). Average of first spring records, eight years: April 20. Average of last fall records: six years: September 23. Latest fall record: October 16, 1927, Laramie (McCreary).

BAIRD'S SPARROW. *Ammodramus bairdi*. Six were seen May 2, 1931, Torrington (McCreary). Mentioned by Bond as one of the species of birds found in Wyoming (5).

WESTERN VESPER SPARROW. *Pooecetes gramineus confinis*. Earliest spring records: April 12, 1888, Cheyenne (Bond) (16); April 12, Laramie (Knight) (23); April 12, 1930, Laramie; and April 12, 1931, Hutton Lake (McCreary). Average of first spring records, thirteen years: April 18. Average of last fall records, nine years: September 26. Latest fall record: October 9, 1927, Laramie (McCreary).

WESTERN LARK SPARROW. *Chondestes grammacus strigatus*. Earliest spring record: May 2, 1930, Laramie (McCreary). Average of first spring records, eight years: May 5. Average of last fall records, eight years: September 10. Latest fall record: September 22, 1934, Laramie (McCreary).

NORTHERN SAGE SPARROW. *Amphispiza nevadensis nevadensis*. Earliest spring record: May 17, 1931, near Wheatland Reservoir (McCreary). Latest fall record: one collected October 25, 1870, Rock Creek (Stevenson and Smith) (29).

WHITE-WINGED JUNCO. *Junco aikenii*. Winter visitant. Earliest fall record: one collected October 23, 1897, Laramie Mountains (C. W. Gilmore) (23). Latest spring record: April 11, 1929, Laramie (McCreary).

SLATE-COLORED JUNCO. *Junco hyemalis hyemalis*. Winter visitant. Earliest fall record: September 23, 1926, Laramie (McCreary). Average of first fall records, five years: October 7. Average of last spring records, nine years: April 17. Latest spring record: May 8, 1929, Laramie (McCreary).

SHUFELDT'S JUNCO. *Junco oreganus shufeldti*. Winter visitant. Earliest fall record: September 11, 1934, Laramie (McCreary). Average of first fall records, eight years: October 4. Average of last spring records, eight years: April 17. Latest spring record: May 3, 1929, Laramie (McCreary).

MONTANA JUNCO. *Junco oreganus montanus*. Winter visitant. Earliest fall record: September 11, 1934, Laramie (McCreary). Aver-

age of first fall records, eight years: October 2. Average of last spring records, eight years: April 24. Latest spring record: May 8, 1929, Laramie (McCreary).

PINK-SIDED JUNCO. *Junco mearnsi*. Winter visitant. Earliest fall record: August 31, 1934, Laramie (McCreary). Average of first fall records, eight years: September 22. Average of last spring records, six years: April 29. Latest spring records: May 8, 1928 and 1929. Laramie (McCreary).

GRAY-HEADED JUNCO. *Junco caniceps*. Earliest spring record: March 23, 1928, Laramie (McCreary). Average of first spring records, eight years: April 12. Average of last fall records, six years: October 13. Latest fall record: November 7, 1933, Laramie (McCreary).

WESTERN TREE SPARROW. *Spizella arborea ochracea*. Winter visitant. Earliest fall record: September 28, 1888, Cheyenne (Bond) (14). Average of first fall records, eleven years: October 17. Average of last spring records, nine years: April 6. Latest spring record: April 14, 1933, Laramie (McCreary).

WESTERN CHIPPING SPARROW. *Spizella passerina arizonae*. Earliest spring record: April 19, 1934, Torrington (McCreary). Average of first spring records, nine years: April 28. Average of last fall records, six years: October 10. Latest fall record: October 18, 1928, Laramie (McCreary).

CLAY-COLORED SPARROW. *Spizella pallida*. Earliest spring record: April 29, 1929, Laramie (McCreary). Average of first spring records, six years: May 3. Average of last fall records, four years: September 24. Latest fall record: October 3, 1926, Laramie (McCreary).

BREWER'S SPARROW. *Spizella breweri breweri*. Earliest spring records: April 28, 1934, Laramie (Mickey); and April 28, 1929 and 1930, Laramie (McCreary). Average of first spring records, six years: May 3. Average of last fall records, five years: September 25. Latest fall record: October 3, 1926, Laramie (McCreary).

HARRIS'S SPARROW. *Zonotrichia querula*. Transient. Earliest spring record: April 19, 1934, Torrington (McCreary). Latest spring record: May 14, 1933, Torrington (McCreary). Earliest fall record: one taken October 7, 1894, Douglas (Jesurun) (23). Average of first fall records, three years: October 13. Average of last fall records, three years: October 30. Latest fall record: November 14, 1929, Laramie (McCreary).

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys leucophrys*. Earliest spring record: April 18, 1889, Cheyenne (Bond) (17). Aver-

age of first spring records, nine years: April 27. Average of last fall records, six years: October 4. Latest fall record: October 14, 1928, Laramie (McCreary).

GAMBEL'S SPARROW. *Zonotrichia leucophrys gambeli*. Exceptionally early spring record: March 29, 1927, Laramie (H. Flick). Average of first spring records, seven other years (April 11-28): April 20. Average of last fall records, eight years: October 22. Latest fall record: October 30, 1927, Laramie (McCreary).

WHITE-THROATED SPARROW. *Zonotrichia albicollis*. We have two records: May 13, 1933, Torrington (McCreary); and one taken October 8, 1894, Douglas (Jescrun) (23).

SLATE-COLORED FOX SPARROW. *Passerella iliaca schistacea*. Two records: May 6, 1928, Fox Creek, Albany County (McCreary); and September 30, 1933, Laramie (Mickey).

LINCOLN'S SPARROW. *Melospiza lincolni lincolni*. Earliest spring record: April 8, 1928, Laramie (McCreary). Average of first spring records, nine years: May 1. Average of last fall records, nine years: October 3. Latest fall record: a specimen in the University of Wyoming collection dated October 20, 1899, Laramie (C. W. Gilmore).

MCCOWN'S LONGSPUR. *Rhynchophanes mccowni*. Exceptionally early spring record: March 12, 1889, Cheyenne (Bond) (15). Average of first spring records, nine other years (April 6-24): April 14. Average of last fall records, six years: October 12. Latest fall record: October 27, 1927, Laramie Plains (McCreary).

ALASKA LONGSPUR. *Calcarius lapponicus alascensis*. Winter visitant. Earliest fall record: October 15, 1928, Laramie (McCreary). Average of first fall records, eight years: November 2. Average of last spring records, five years: March 17. Latest spring record: a specimen in the University of Wyoming collection dated April 3, 1899, Laramie (A. Jennings).

CHESTNUT-COLLARED LONGSPUR. *Calcarius ornatus*. Exceptionally early spring record: March 16, 1890, Cheyenne (Bond) (23). Average of first spring records, two other years (April 16-17): April 17. We have no fall records.

EASTERN SNOW BUNTING. *Plectrophenax nivalis nivalis*. Winter visitant. Earliest fall record: a specimen collected December 14, 1859, Deer Creek, Converse County (G. H. Troom) (19). Average of first fall records, three years: December 18. Average of last spring records, four years: March 8. Latest spring record: specimen taken March 19, 1889, Cheyenne (Bond) (18).

REFERENCES CITED

1. Allen, J. A. Notes of an Ornithological Reconnaissance of Portions of Kansas, Colorado, Wyoming, and Utah. Bull. Mus. Comp. Zool., Vol. 3, pp. 113-183. 1872.
2. Baird, S. F. "A List of Birds", in Explorations across the Great Basin of Utah in 1859, Appendix K, pp. 377-381. 1876.
3. Baird, S. F., J. Cassin, and G. N. Lawrence. "Birds", in Reports of Explorations and Surveys to Ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, Vol. 9, pt. 2, 1005 pp. 1858.
4. Bent, A. C. Life Histories of North American Shore Birds, Order Limicolae (Part 1). U. S. Nat. Mus. Bull. 142, 420 pp. 1927.
5. Bond, F. "Birds", in Report of the Governor of Wyoming to the Secretary of the Interior, 1885, pp. 1138-1140. 1885.
6. ———. Notes from Wyoming. Auk, Vol. 6, p. 341. 1889.
7. ———. Capture of a Brown Pelican in Wyoming. Auk, Vol. 16, p. 351. 1899.
8. Brackett, A. G. The Birds of Wyoming. Forest and Stream, Vol. 7, p. 389. 1876.
9. ———. Forest and Stream, Vol. 7, p. 404. 1876.
10. Chapman, F. M. The Warblers of North America. 306 pp. 1907.
11. Cooke, W. W. The Birds of Colorado. Colo. Agr. Expt. Sta., Colo. Agr. Coll., Bull. 37, 144 pp. 1897.
12. ———. Distribution and Migration of North American Shorebirds. Biol. Surv., U. S. Dept. Agr., Bull. 35, 100 pp. 1910.
13. ———. The Migration of Flycatchers. Bird-Lore, Vol. 10, pp. 210-212. 1908.
14. ———. The Migration of North American Sparrows. Bird-Lore, Vol. 11, pp. 254-260. 1909.
15. ———. Bird-Lore, Vol. 13, pp. 15-17. 1911.
16. ———. Bird-Lore, Vol. 13, pp. 83-88. 1911.
17. ———. Bird-Lore, Vol. 14, pp. 98-105. 1912.
18. ———. Bird-Lore, Vol. 15, pp. 16-17. 1913.
19. Coues, Elliot. Birds of the Northwest. U. S. Geol. Surv. of the Territories, Misc. Pub. No. 3, 791 pp. 1874.
20. Fuller, A. B. and B. P. Bole, Jr. Observations on some Wyoming Birds. Sci. Pub. Cleveland Mus. Nat. Hist., Vol. 1, pp. 37-80. 1930.
21. Grave, B. H. and E. P. Walker. The Birds of Wyoming. 137 pp. 1913.
22. Henninger, W. F. June Birds of Laramie, Wyoming. WILSON BULLETIN, No. 90, pp. 221-242. 1915.
23. Knight, W. C. The Birds of Wyoming. Wyo. Agr. Expt. Sta., Univ. of Wyo., Bull. 55, 174 pp. 1902.
24. McCafferty, C. E. Annotated and Distributional List of the Birds of Wyoming. Master's Thesis, Univ. of Wyoming. 1930. (Unpublished).
25. Neilson, James A. Wheatland, Wyoming Birds. Oologist, Vol. 40, pp. 70-72. 1923.
26. ———. Personal Letters, 1928. (Unpublished).
27. Oberholser, H. C. A Monograph of the Genus *Chordeiles* Swainson. Type of a New Family of Goatsuckers. U. S. Nat. Mus., Bull. 86, 123 pp. 1914.
28. ———. The Migration of North American Birds. Bird-Lore, Vol. 20, pp. 145-152. 1918.
29. Stevenson, James. "A List of mammals and birds collected in Wyoming Territory, by Mr. H. D. Smith and Mr. James Stevenson, during the expedition of 1870", in Preliminary Report of the United States Geological Survey of Wyoming and Portions of contiguous territories . . . , pt. 5, pp. 461-466. 1872.
30. Swales, B. H. Stilt Sandpiper (*Micropus himantopus*) in Wyoming. Auk, Vol. 36, p. 102. 1919.
31. Williston, S. W. A List of Birds of Southern Wyoming, with notes by George Bird Grinnell. Forest and Stream, Vol. 12, p. 307. 1879.
32. ———. Forest and Stream, Vol. 12, p. 385. 1879.

UNIVERSITY OF WYOMING.

LARAMIE, WYOMING.

GENERAL NOTES

Conducted by M. H. Swenk

The Starling in Southeastern South Dakota.—The Starling (*Sturnus vulgaris*) has been reported from all but three counties in Iowa and is now starting to invade Nebraska and South Dakota. Mr. Arthur Lundquist of Webster, South Dakota, reported the Starling in Day County, South Dakota (WILSON BULLETIN, XLVI, p. 62, March, 1934) which is in the extreme northeastern part of the state. On Christmas day of 1934 the writer saw a Starling near Elk Point, Union County, in the extreme southeastern corner of the state. It is interesting to note that the Starling was recorded from a point nearly 300 miles north in the state a year before it was found in the southern corner of the state, near the Iowa boundary, where Starlings have been reported at different times since 1932.—WILLIAM YOUNG WORTH, *Sioux City, Iowa*.

A Red-shafted Flicker Secured at Des Moines, Iowa.—An adult male Red-shafted Flicker (*Colaptes cafer collaris*) was collected by the writer at Des Moines, Polk County, Iowa, on December 26, 1934. This bird, noted along Walnut Creek in west Des Moines, had bright red shafts to the primaries, secondaries, and rectrices, and these were conspicuous in flight. This specimen, now in the writer's collection, is believed to be the third Iowa specimen now preserved.

When the *Revised List of the Birds of Iowa* was published in 1933, the writer knew of no existing Iowa specimens. Recently Mr. Frank C. Pellett of Hamilton, Illinois, wrote that the specimen of Red-shafted Flicker secured by him at Atlantic, Cass County, September 25, 1896, was still in his private collection at Atlantic. Mr. James R. Harlan of Des Moines, secured an adult male in Van Buren County, October 22, 1933. It is of interest to note that exactly six years before, Miss Olivia McCabe observed two Red-shafted Flickers at Des Moines at the time of the 1928 Christmas Census.—PHILIP A. DUMONT, *Des Moines, Iowa*.

A Cowbird Removes a Robin's Egg.—While seated at the dinner table, at about 5:30 P. M. on May 3, 1934, I saw a female Eastern Cowbird (*Molothrus ater ater*) skulking through the foliage of the low evergreens around the foundation of the house. She quickly passed beyond the limits of my vision, but a friend, also seated at the table, observed that the Cowbird alighted in a pyramidal arborvitae and proceeded to a Robin's nest that contained four eggs which had been under incubation for several days. The bird was seen to seize one of the eggs and to fly to the ground, holding it in her mandibles. The sudden appearance of a dog caused the Cowbird to fly away, leaving the egg laying on the ground only a few yards from the window. On examining the egg we found that it had been punctured in three places. Apparently the egg had been carried with the mandibles separated considerably and driven deeply into the shell. The Robin's nest was not further molested by the Cowbird and the remaining eggs hatched in due course of time.—BENEDICT J. BLINCOE, *Route 13, Dayton, Ohio*.

Apparent Scarcity of Certain North Dakota Birds.—During the first week of June, 1934, I made a hurried trip to North Dakota, going directly to Bowman County on the Montana boundary and then working east through the butte country to Bismarck, later making a quick trip to Cando and up the Red River Valley on the way home. The scarcity of the big hawks was of interest and corroborated the conclusions of Mr. Norman A. Wood following his work in the state, in 1920 and 1921, when he found such a dearth of these birds. One

Prairie Falcon was seen near Flasher, and a lone Swainson's Hawk was noticed near Buffalo Springs, to sum up the birds actually seen. The Marsh Hawk is holding its own and many birds of this species were seen in all parts of the state. The Upland Plover was gone from the regions visited, and one lone pair was found at Buffalo Springs Lake in Bowman County. In many suitable places the writer found scattered pairs of Western Willets and Marbled Godwits, but the Upland Plovers were not to be found. Possibly the birds are being killed off in their winter home, as I doubt if many are killed in the summer or during migrations.—WM. YOUNG WORTH, *Sioux City, Iowa*.

"The House Wren.—The mischievousness of the House Wren (*Troglodytes aedon* Verill) is well known. The following incident came under my observation a short time since. A pair of Martins had taken possession of a box that I had erected in the garden for their benefit: had built their nest, laid their eggs, and had commenced setting, when a pair of house wrens, who coveted their neighbor's house, entered it in the absence of the Martins, and coolly picked up their eggs one by one, carried them out, and dropped them to the ground below. While engaged in this impudent business, the Martins returned, and while going in at one of the entrances of the box, the daring marauders darted out at the other, and alighting on a tree near by chattered noisily, apparently in great glee. The Martins, finding that their nest had been despoiled, abandoned the box, which was then duly taken possession of by the wrens, who reared two broods of young hopefuls during the summer, the first about the beginning of June, the second the latter part of July.—M. S. Hill, East Liverpool, O." (In the *American Naturalist*, Volume III, March, 1870, page 49).

Winter-killing of Mourning Doves in Central Iowa.—Creek bottomlands grown up to wild hemp (*Cannabis*) are especially favored by late migrating or wintering Mourning Doves (*Zenaidura macroura*) in the vicinity of Ames, Iowa. By late November of 1934, there seemed to be something less than a dozen Mourning Doves (I should judge between eight and ten) wintering about the hemp growths along approximately four miles of Squaw Creek, from the College northwestward. Most of these were concentrated in a tract of about fifteen acres of bottomlands, characterized by dense hemp patches and scattered large trees. To appearances, the food supply was immediately adequate, and the doves were not suffering any conspicuous mortality. Then a heavy snow fell from November 29 to December 3 and persisted for the next few weeks. As a consequence most of the hemp seeds were made unavailable to the doves with the exception of the small quantities still retained on the plants.

The favorite habitat of the Mourning Doves was the regular feeding ground of a covey of sixteen Bob-white Quail (*Colinus virginianus virginianus*) and was visited irregularly by a covey the wintering territory of which was adjacent to the south. With the advent of the December snow, the Bob-whites to the south turned for food to a cornfield in their territory, and thus averted a crisis. The resident covey lost half of its number, largely from starvation, by January 7, and starved out entirely during the winter.

From December 8 to 11, five Mourning Doves were found dead, including three so thoroughly cleaned up by scavengers that only feathers remained. Two carcasses were intact, however, and were carefully examined. Of these latter, one weighed seventy-nine grams and the other eighty-seven grams, or probably between sixty and seventy-five per cent of their full weights. Neither showed extreme

emaciation, but their breast contours indicated an exhaustion of reserve. The stomachs of both were empty, save for a small amount of gravel and hemp seed debris. There were no recognizable injuries.

The snow revealed plainly how the birds picked up intact had met death. The heavier had died quietly in the night at the base of a tree on the exact spot upon which it had alighted. The other was found in early afternoon, no more than a few hours after death. It had terminated its last flight with a twenty-inch slide on the snow. On December 11, one weakly flying dove was flushed in late afternoon from its probable night roost under the roots of a tree overhanging the creek. Feathers were found January 7 at about the place where this bird was last seen.

So far as I have been able to determine, the only Mourning Dove to survive in this general area of about five square miles was one seen on January 21 near a farm yard, where it doubtless had access to grain.—PAUL L. ERRINGTON, *Iowa State College, Ames, Iowa.*

Some Bird Notes from Utah.—During the past several years, while collecting birds in the vicinity of Provo, Utah, the following three rather interesting bird records have been made by the writer. Assistance in identifications was kindly given by Dr. Clarence Cottam, Bureau of Biological Survey, Washington, D. C., and Mr. C. Lynn Hayward, Brigham Young University, Provo, Utah.

On September 30, 1932, in a flooded meadow just south of Provo, two specimens of the Eastern Dowitcher (*Limnodromus griseus griseus*) were taken. Both were females in the winter plumage. They are Nos. 831 and 832, Brigham Young University collection.

On February 22, 1934, at the mouth of Provo River on Utah Lake, a large white gull was seen feeding with a mixed flock of Ring-billed and California Gulls. An attempt was made to collect the stranger, but he proved to be too wary. On February 28 he was joined by a second bird of the same species. The two seemed to have little, if any, affinity for each other, but were seen a number of times in the same flocks of other gulls. After a number of attempts, one of the birds was finally collected with a small-calibre rifle, on March 14, 1934. It was determined as a Glaucous Gull (*Larus hyperboreus*), a male in typical second-year plumage. On subsequent visits to the lake the remaining bird was seen until April 15.

On the evening of February 22, 1934, three strange finches were seen going to roost on the top of some piles a few rods out in the water on the east shore of Utah Lake, near the mouth of Provo River. Since boots were not available, no attempt was made to collect them that evening. However, three nights later the birds returned to the same roost, the male and one of the females coming to rest on the same pile. A shot sent the female tumbling into the water, but the male, though apparently wounded, escaped with the other female into the dusk. Examination revealed the bird to be an Eastern Snow Bunting (*Plectrophenax nivalis nivalis*). This skin, together with that of the Glaucous Gull, remains in the writer's collection.—D. ELMER JOHNSON, *Brigham Young University, Provo, Utah.*

A Blue-winged Warbler Record for Decatur County, Indiana.—On June 12, 1934, while searching for a bird's nest that a neighbor had told me about, I had the pleasure of placing bands upon three immature Blue-winged Warblers (*Vermivora pinus*). From the description of the nest for which I was searching that had been given me, I believed it to be that of the Grasshopper Sparrow.

These birds are not uncommon here, but their nests are not easily found, and as I had been unable to band many of these birds I was especially desirous of locating the nest which, dating from the time when I had first heard of it, should have contained young. Previously I had given up after a very short search on account of rain. This time, however, with a companion I searched carefully among the briars, grasses and scrub sassafras that covered the slopes of an old field above a tangled, thicket-clad ravine. We found nothing except a deserted Field Sparrow's nest containing four damaged eggs, but while at work my attention was attracted by the alarmed Grasshopper Sparrow-like notes of a pair of birds down in the thicket. This continued, and finally I decided to investigate. Carefully, on hands and knees, I made my way beneath the tangled maze of green briars, wild rose bushes and shrubs, until I reached the center of the hollow where the wild growth was less dense. Here I was almost immediately rewarded by seeing the object of my quest. I knew the bird, a Blue-winged Warbler, at once, having seen them during migration, but I had never seen them in breeding season, so did not believe that they nested here. This bird, however, was attending young, for she carried food. I called my companion and we began looking over the ravine for the nest. The two birds (the first one's mate having appeared, also with food) scolded incessantly. At times, especially when we neared a certain spot, they showed unusual agitation, and we redoubled our efforts, believing ourselves to be very near the nest. But the puzzle, we learned after a bit, was that they also acted in this manner when we approached an entirely different part of the ravine. Why? The search, unrewarded, had continued very nearly two hours when I solved the enigma. I was resting, sitting on a half decayed stump within a few yards of one of the "certain spots", and I chanced to be looking in that direction when the negligible movement of the little fellow caught my eye. There he sat, a half-grown Blue-winged Warbler, on a dead green brier. Perhaps he was several rods away from the nest he had once used, which would account for the fact that we had not even been able to find the deserted nest. With help I experienced little difficulty in capturing him, also another that I discovered shortly after, near the second place that the adults had guarded closely. We found no more in the thicket, but the actions of one of the parent birds led us to examine an isolated clump of scrub sassafras east of the ravine, and here my companion found the third, and last, young warbler. We banded the three and released them, greatly to the joy of the adults.

I have known these birds since 1923, and while they are said to be native in this region, this is the first time that I have seen them, except during migrating periods. To learn that they nest here is a distinct pleasure, and raises the hope that they may continue to increase until they become as common as one authority claims them to be.—GRANT HENDERSON, *Route 6, Greensburg, Ind.*

Observations on Some Breeding Birds of Mount Timpanogos, Utah.—During a part of the month of June, 1934, while making a survey of the animal life of Mount Timpanogos, north of Provo, Utah, we had an opportunity to observe some of the breeding birds, particularly of the aspen covered areas at an elevation of 7,000 to 8,000 feet. Mount Timpanogos is one of the highest peaks in the Wasatch Range, and its lower slopes, covered with dense groves of aspen (*Populus tremuloides*), seem to be a favorite breeding ground for a rather dense population of birds.

A particular aspen tree noted by us seemed to be a highly valued nesting site. The tree was about twelve inches in diameter, partially dead, and perforated with many holes. On June 12 we noted in this single tree three nests of the Western House Wren (*Troglodytes aëdon parkmani*), a pair of Violet-green Swallows (*Tachycineta thalassina lepida*) building the nest, two nests of the Red-naped Sapsucker (*Sphyrapicus varius nuchalis*) containing young birds, and a nest of the Batchelder Woodpecker (*Dryobates pubescens leucurus*). There were, then, at least six nests in this one tree at the same time. The busy atmosphere in the vicinity of this particular tree, produced by the cries of the young birds, the feeding activities of the parents, and the nest building process, were typical of this whole area.

An interesting breeder of these aspen groves is the Western Tanager (*Piranga ludoviciana*). Four of their nests were found with only a little search and I regard this species as one of the most common breeding forms in the aspen habitat. On June 12, when the nests were noted, one of them contained five fresh eggs and the remainder from one to four. The nests were usually built on a projecting branch of a small tree about ten or twelve feet from the ground. They were open affairs composed almost entirely of fine dry twigs woven together in such a way as to make a firm structure and yet one so open that the eggs could faintly be discerned by looking up through the nest from beneath. While we were investigating the nests the tanagers remained in the close vicinity, uttering throaty chirps. When I first heard the full tanager song I mistook it for a Robin's, so nearly did it resemble that bird's song in general form. But the tone in the case of the tanager is much more mellow and has a finer quality, which to my mind is surpassed by few of the mountain singers.

Another species which I am confident breeds on Mount Timpanogos is the Purple Martin (*Progne subis subis*). This bird is of interest in that region because to my knowledge it is the only place in the state where the species has been found. Each summer considerable numbers of these birds may be seen at any time feeding over a small pond known as Salamander Lake. The exact nesting locality on the mountain has to my knowledge not yet been discovered.—C. LYNN HAYWARD, *Brigham Young University, Provo, Utah.*

Prairie Falcon Records from Northwestern Iowa.—The seeming lack of definite records of the Prairie Falcon (*Falco mexicanus*) within recent years in Iowa seems ample justification for the publishing of these occurrences in 1934 and 1935.

An extremely large individual, undoubtedly a female, was seen by Mr. Logan J. Bennett and the writer near Union Slough, northeast of Burt, Kossuth County, January 11, 1934. The color and moustache marks were noted as the bird perched on a fence post. Mr. Bennett noted another Prairie Falcon the next week (January, 1934) north of Akron, Plymouth County. A bird of this species was noted in Kossuth County by Dr. Paul L. Errington on January 26, 1934. A Prairie Falcon was seen to wonderful advantage by the writer on February 22, 1934. It was watched as it darted over Whitford Slough, three miles west of Ruthven, Clay County. On January 6, 1935, Mr. James Stevenson and the writer noted two Prairie Falcons. The first, undoubtedly a male, was seen six miles southeast of Webb in Clay County. As it dashed low over a cornfield a large flock of Lapland Longspurs was alarmed and flew up in great confusion. The second bird was seen sitting in a cottonwood tree in a farmer's backyard four miles northeast of

Dickens, Clay County. This specimen, collected by the writer, proved to be a female. The stomach contained the legs, feet, and feathers of a Lapland Longspur. There are at least three other preserved Iowa specimens of the Prairie Falcon.—PHILIP A. DUMONT, *Des Moines, Iowa*.

The Golden Plover in Indiana.—On May 6, 1934, while driving about twelve miles southeast of this city, we came across a flock of over forty American Golden Plovers (*Pluvialis dominica dominica*) which brought a thrill to me as it did on May 4, 1929, when we encountered a flock of about fifty of these birds twenty-six miles north of here. These are the only ones I ever saw. The birds seen May 6, 1934, were in a clay plowed field, where their gold and black mottled backs blended in with the newly plowed soil, when they were at rest. I had stopped to look for birds along a small stream which flowed through the field, when the plovers were startled and rose in a body, flying in close formation, swinging high and then low, piping their pleasing notes as they went. They circled and came back, then were away again, doing this for three times, when they alighted again in a hollow. We stayed on to get a better view of them, for at first we could not tell whether they were the Golden or the Black-bellied species. After they settled in the hollow and did not move about, depending upon their color to protect them, I crept through the fence and went as close as they would allow, to get a better view. They sat still for some time, then as I approached stood at attention, seeming to depend upon one leader to tell them when it was time to go. I had a fine look at them in their beautiful spring plumage of jet black below and mottled gold and black above, with a white "question mark" on either side of the head running down the sides. The face was black, as was the throat joining the black underparts. But a few of the birds were not so marked. The backs were as the others, but they had no black about the face, neck or breast, although the belly was blackish, which made me think they were not yet in full breeding plumage. The markings about the face were gray and white instead of black and white as in the most of them. I noticed as the birds waited in the field a few would venture about slyly and seemingly not intending to attract attention. As they sat on the ground they faced me and I could hardly get a good view of their backs. Some of the birds bobbed their heads occasionally as I watched them. I approached to within 100 or 150 feet before they suddenly arose and disappeared over the brow of the hill. The plovers were near a little traveled side road.—MRS. HORACE P. COOK, *Anderson, Ind.*

Notes on Some Winter Birds of Southwestern Ohio.—Following are the records of the winter occurrences of fifteen species of birds in southwestern Ohio that seem worthy of publication. These have been obtained by field work done in the Cincinnati region during the last five years. Several of the records have appeared before (*Proceedings of the Junior Society of Natural Sciences, Cincinnati, Ohio, 1930-32*), in part, but for completeness it is deemed desirable to list all of them below:

Old Squaw (*Clangula hyemalis*). Mr. Cleveland P. Grant showed me a single female bird feeding just above the mouth of the Big Miami River in Hamilton County, Ohio, on December 31, 1933. I collected the duck, with his aid, and have deposited it in the Ohio State Museum. This is the only Old Squaw record that I know of for Hamilton County.

Killdeer (*Oxyechus vociferus*). Most Killdeers depart from southwestern Ohio by December 15 and do not return until late February. However, the species

was present in Hamilton or Clermont Counties every month of 1932 and in every month of later years except January.

Saw-whet Owl (*Cryptoglaux acadica*). At least fifteen of these birds were observed during the winter of 1932-33 in Union Township of Clermont County. The first was a dead bird found accidentally on December 14, 1932, by kicking it from a snow-drift where it had fallen. One or more of the owls were seen each week-end until February 7, 1933, by W. Goodpaster, C. P. Grant, R. F. Drury, W. Gessing, and the writer. Allowing for duplications and the birds collected by Mr. Goodpaster and myself for the Ohio State Museum and the Cincinnati Society of Natural History, at least fifteen different individuals were seen. The birds, with a single exception, were perched in small red cedars. The owls were all quite tame, permitting one to approach to within five or six feet. One individual found asleep in a dense tangle of wild grape vines, was captured and held captive for four months, being fed on dead specimens of small birds, small mammals, amphibia, and insects. The vertebrate food ranged in size from swamp tree frogs (*Pseudacris triseriata*) to adult chip-munks (*Tamias striatus fisheri*). The pellets cast up averaged about two for each item of food consumed. The wings and feet, and occasionally the heads of birds, were not eaten. Though it devoured insects, amphibia, and seven species of mammals, such birds as Cowbirds, Redwings, and Starlings were untouched. It did, however, relish all other birds offered, especially the sparrows.

Prairie Marsh Wren (*Telmatodytes palustris dissaepius*).

Brown Thrasher (*Toxostoma rufum*). Both of these species were noted November 15, 1930, at a gravel pit near Newton, Hamilton County, Ohio. Two of the Prairie Marsh Wrens were in a small cattail marsh while a single Brown Thrasher haunted a heavy growth of willows. In both cases the birds were discovered by "squeaking". This date is a full month later than other county records for either species.

Eastern Hermit Thrush (*Hylocichla guttata faxoni*). I have but a single winter record for the region, a female collected December 26, 1932, in Union Township, Clermont County, for the Cincinnati Society of Natural History collection. This bird winters regularly farther east in the hill counties of the state.

Myrtle Warbler (*Dendroica coronata*). About a dozen of these birds passed the winter of 1931-32 in a small grove of red cedars one-half mile west of Gleneste, Clermont County. The following winter only five individuals were located, and, despite intensive search, not a single bird was seen during the past two winters.

Western Palm Warbler (*Dendroica p. palmarum*). On December 26, 1933, Mr. Woodrow Goodpaster picked up an exhausted warbler from the Japanese barberry bushes growing before the Gleneste Garage at Gleneste, Clermont County. The bird died the following day, and, having been brought to me, was made into a skin for the Ohio State Museum. Mr. Charles F. Walker and Mr. Edward S. Thomas of that institution identified the bird (skin No. 6628) as a Western Palm Warbler. This, I believe, constitutes the first winter record of the species for Ohio confirmed by a specimen, though there are two published sight records (Ohio State Museum Science Bulletin, 1, No. 1, p. 27, 1928). The 1931 edition of the A. O. U. Check-List includes Ohio in the winter range of the Yellow Palm Warbler (*Dendroica p. hypochrysea*) but does not record the western form as wintering in the state.

Common Redpoll (*Acanthis l. linaria*). A single individual was found feeding on weed tops with a company of Eastern Goldfinches (*Spinus t. tristis*) at a

gravel pit near Newton, Hamilton County, on February 14, 1931.

Eastern Field Sparrow (*Spizella p. pusilla*). Winters rarely. A female bird was collected December 5, 1931, in Union Township of Clermont County and another of the species was observed December 18, 1933, in Avondale of Cincinnati.

Eastern Vesper Sparrow (*Pooecetes g. gramineus*).

White-crowned Sparrow (*Zonotrichia l. leucophrys*).

White-throated Sparrow (*Zonotrichia albicollis*).

Eastern Fox Sparrow (*Passerella i. iliaca*). All four of these sparrows were to be found in numbers during the exceptionally mild winter of 1931-32 in Hamilton, Warren, and Clermont Counties. The following winter the sparrows were far fewer in numbers and the Vesper Sparrows were absent, though the observations included only Clermont and Hamilton Counties. During both winters notes for Union Township of Clermont County indicated an approximate ratio of one White-crowned Sparrow and two White-throated Sparrows for each Fox Sparrow seen. None of the four sparrows were detected during the winters of 1933-34 and 1934-35.

Eastern Snow Bunting (*Plectrophenax nivalis*). On March 26, 1930, twelve of these birds were observed feeding about a small bare spot of a weedy hillside in Avondale of Cincinnati. The birds were very tame and permitted me to approach to within thirty feet before taking flight.—KARL H. MASLOWSKI, *Cincinnati, Ohio*.

The Present Status of the Olive-sided Flycatcher as a Breeding Bird in Western North Carolina and Eastern Tennessee.—Any studies dealing with the distribution of bird life in more or less limited areas reveal changes that are as puzzling as, apparently, they are inevitable. Even relatively common species disappear without any obvious reason, while on the other hand new species will appear and gradually become a characteristic feature of the indigenous fauna. In the case of the Olive-sided Flycatcher (*Nuttallornis mesoleucus*) a species is represented that at one time occurred during the summer months in the mountains of western North Carolina and eastern Tennessee wherever conditions were favorable, but now is extremely scarce and rarely observed in this region. It is possible that it was never common at this extreme southern limit of its breeding range, but until recent years it was frequently noted by field ornithologists, and recorded at such widely separated spots in western North Carolina as Highlands and Roan Mountain. During a period of almost five years of intensive field work in these mountains, from January, 1930, through September, 1934, this species was looked for on every possible occasion, but seemingly it had disappeared from its former haunts, and at only one spot was one pair of these birds found. On July 10, 1932, while in the Great Smoky Mountains, the loud vigorous notes of one of these birds were heard, and a short search soon revealed it perched in the very top of a tall dead spruce at the edge of a clearing near the top of a ridge. This was within a quarter of a mile of Newfound Gap, on the Tennessee side of the line, and at an altitude of approximately 5,000 feet. Lack of time prevented any serious effort to find the nest, but judging from the action of the bird there could be little question but that it was breeding here, a fact verified the following year when a pair of these birds was found at this same spot in late June. So conspicuous a species as this one cannot easily be overlooked, so it is doubtful if many of these birds now occur in this region during the summer months, and their ultimate fate should be watched with interest.—THOMAS D. BURLEIGH, *Bureau of Biological Survey, Washington, D. C.*

ORNITHOLOGICAL LITERATURE

THE RÔLE OF ENVIRONMENT IN THE LIFE OF BIRDS. By S. Charles Kendeigh.

Reprinted from *Ecological Monographs*, Vol. 4, pp. 299-417, July, 1934.

The revolt against purely observational ornithology is taking two forms.

In one the investigator makes deductions from field observations and then seeks to check and analyze his deductions by controlled experiments. Stoddard and Errington are examples.

In the other the investigator conducts controlled experiments and then seeks to interpret the results in terms of facts observed in the field. Rowan's "Bird Migration" and Kendeigh's present paper both exemplify this approach.

The title is broader than the actual matter. "Temperature Relations of the Eastern House Wren" would be accurate, but too limited, for Kendeigh treats not only of direct temperature responses, but also the interactions between temperature and other factors, and in discussing his data he covers not only wrens, but draws many analogies from the whole ornithological field.

Our author begins with the standard ecological ritual of assigning the Eastern Wren to the *Acer-Fagus* association. However, it "is not confined to nor characteristic of the climax community itself, but occurs throughout the seral stages wherever there are *suitable nesting sites*" (italics mine). In other words, the wren is associated neither with *Acer* nor with *Fagus*, but rather with the preceding stages of the plant succession common to all forest soils. Even then the association depends on nesting holes. Such walking around the block to get next door is, I realize, common practice among ecologists, but hardly necessary for one who has plenty of substantial matter to report. To my mind it adds only length to an otherwise excellent paper.

Kendeigh presents wren census data collected since 1926 on the grounds of the Baldwin Bird Research Laboratory in Ohio. In these data he detects a fluctuation in breeding density and an inverse relation between density and reproduction. Errington's finding of an inverse relation between Bob-white density and winter survival of breeding stock would seem pertinent here, but is not cited. King, I am told, is about to publish on an inverse relation between density and egg clutch in Ruffed Grouse. This confluence of three separate investigations is noteworthy. It may herald an impending discovery of major importance.

To make this experimental study of temperature, Kendeigh had to sacrifice the lives of many birds, hence he used trapped English Sparrows instead of wrens. The survival time of confined unfed sparrows was measured, at various temperatures, for various conditions of body weight, water ingestion, age, sex, humidity, wind, light, season, and plumage. Similar measurements on a smaller number of wrens showed survival phenomena resembling those of sparrows, but controlled by a different and higher range of temperature toleration. This leads the author to the conjecture that migratory species have a faster metabolism than non-migratory, but lack certain endocrine adjustments which enable the non-migratory species to withstand more cold on less food. The long cold nights of winter and the hot humid noons of summer are conceived to be critical times for all birds. The long foodless night is liable to depress the body temperature below its lethal lower limit. Undue activity at noon is liable to raise the body temperature above its lethal upper limit. These are sample parts of a "temperature hypothesis" which can not, for lack of space, be here set forth in full.

The field of bird behavior is next reviewed and interpreted in the light of this hypothesis. Roosting, nesting, feeding, and migration phenomena check well enough. Distribution of wrens is interpreted in terms of "climographs" which seem somewhat less convincing. Incidentally, a new formula is offered for converting standard weather bureau records into temperatures affecting roosts.

New data on certain sparrows are presented in support of the theory that heavy individuals migrate north earliest. The winter survival and reproduction of wrens is analyzed in relation to the night temperatures on their winter and breeding ranges respectively.

There follows a review and discussion of solar radiation as a factor in migration, distribution, and abundance. Some suggestive but not conclusive correlations with sunshine are derived. A correlation with the six-year sunspot cycle seems visible in the survival and reproduction curves, but is not mentioned by the author.

A less thorough review and discussion of food, precipitation, wind, "biotic interactions", and physiography closes the paper.

Viewed in broad perspective, Kendeigh's monograph may be regarded as one of the rungs of a new ladder by which ornithology is climbing out of a blind alley. In the 1920's life history climbed to a higher level when interpreted by ecological studies. In the 1930's ecology seems destined to take on new meaning when interpreted in the light of physiological research. Kendeigh has ably pioneered the beginnings of this second ascent.—ALDO LEOPOLD.

THE INFLUENCE OF CLIMATIC AND WEATHER FACTORS UPON THE NUMBERS OF BIRDS ON A DEPOSITING CREEK BANK. By Jesse M. Shaver. *Ecological Monographs*, Vol. 3, No. 4, Oct., 1933, pp. 535-597, 25 figs., 19 tables.

The object of this study, as stated by the author, was "to investigate the local motility or change of habitat of birds as the weather changed" (p. 537). The habitat selected for study was a depositing creek bank having a strip of vegetation approximately thirty-six feet in width. Unfortunately, neither the length nor the area of the strip was given so that it is impossible to estimate the adequacy of the sample plot or to compute the number of individuals per unit area. The composition and character of the vegetation was, however, described in the desirable detail. There is a discussion and review of literature dealing with methods of taking bird censuses and with effects on birds of various climatic factors. The author rejects the method of counting singing males only, since censuses were taken at all seasons of the year (weekly from September 5, 1922, to October 1, 1923, and monthly from November, 1925, to January 1, 1926), and counts all species and individuals observed. The author might have mentioned two important papers concerned with methods of taking censuses (Schiermann, *Jour. f. Ornith.*, LXXVIII, 1930, 137-180; Palmgren, *Acta Zoo. Fennica*, 7, 1930, 1-218). These two papers came too late to have influenced the actual census taking but would have aided in the interpretation of the data already obtained.

A total of eighty-eight species were recorded, making an average of 10.51 species and 25.87 individuals per trip. For analysis, both graphical and statistical methods were employed, and the species were separated into permanent residents, summer residents, winter visitors, migrants, and total individuals. The year was divided into two periods for separate study, an autumn and winter period (September 21-March 21) and a spring and summer period (March 21-September 21).

For determining effect of climate on general trends in abundance, statistically smoothed curves of each climatic factor for the hours (or days) of observation were compared with smoothed curves of number of individuals. In this way it was found that, in general, the climatic factors ranked in the following order of importance: temperature, sunshine duration, relative humidity, wind velocity, atmospheric pressure, and precipitation, although the order of importance of these factors varied between the two periods of the year and from one group of birds to another. For determining the effect of weather (as contrasted with climate) on the actual abundance of birds, the deviation of each weather factor on each day from its smoothed curve was compared with the deviation in number of birds from its smoothed curve. For the most part these correlations were very low and of lesser significance, the highest correlations being found between the number of summer resident birds and sunshine duration, relative humidity, atmospheric pressure, wind velocity, and temperature.

The reviewer is of the opinion that the reliability of the correlations between climatic and weather factors and "local motility or change of habitat of birds" would have been greatly increased, if other behavior responses such as migration and establishment of territories had first been eliminated. This could have been approximated more closely by dividing the year for analysis into four three-months periods: the summer months with breeding and territory behavior in full force, the autumn and spring months with migration in full sway and local movements difficult to discern, and the winter months when these forms of behavior are mostly eliminated. Allowance should have been made also for variation in food supply in the area and for increases and decreases in number of birds due to reproduction and mortality. As it is, the results obtained can be considered suggestive only, but at that, the reviewer believes that Dr. Shaver has made a courageous pioneer attempt at analyzing fluctuations in populations of non-game species, that his use of the statistical method of analysis is commendable, and that his paper should be a stimulus to all students in avian ecology for the development of more perfect census methods and the careful and more complete analysis of the rôle played by various environmental factors in the life of birds.—S. CHARLES KENDEIGH.

A GUIDE TO BIRD SONGS. By Arctas A. Saunders. D. Appleton-Century Company, New York. 1935. Pp. i-xvii+1-285. 163 song diagrams. Pocket size. Price, \$2.50.

From his many articles and his handbook on bird song (published in 1929 by the New York State Museum, Albany), Mr. Saunders may now be regarded as the leading authority in this country on this subject.

Mr. Saunders' earlier handbook (1929) dealt more with the science and philosophy of bird song. The present book is a descriptive guide to the recognition of specific songs. And for this purpose the author has developed a rather extensive scheme of graphic representation. Many different methods of bird song notation have been suggested. In all of them a "good ear" and some knowledge of human music seem to be an asset to the student. But the method so fully worked out by Mr. Saunders does seem to have the advantage of simplicity. And anyone who has a special interest in bird song should study this book. For general principles and meaning of bird song the student will find nothing more complete than Mr. Saunders' earlier booklet.

A very ingenious key to songs, covering twenty pages of text, identifies somewhat over a hundred songs of common birds. How workable this key may be

for beginners one can only tell after testing it in the field. But, at least, up to the present time the novice has had nothing like so compact and promising an aid in the identification of bird songs. After the probable identity has been worked out in the key, a citation refers the reader to the more detailed description in the text. The text also includes a description of the field marks and habitat. Thus the book becomes a real field guide. Comments on distribution refer chiefly to the eastern part of the country. With this book in hand we anticipate renewed interest in our field work.—T. C. S.

THE HAWKS OF NORTH AMERICA, THEIR FIELD IDENTIFICATION AND FEEDING HABITS. By John Richard May. Published by the National Association of Audubon Societies, New York, 1935. Pp. i-xxxii+1-140. Pls. 36. Price, \$1.25.

In 1876 Henry G. Vennor published "Our Birds of Prey, or the Eagles, Hawks, and Owls of Canada". This work gave little emphasis to the economic status of the birds, but the existing knowledge of their habits and distribution was well summarized. In 1893 Dr. A. K. Fisher published "The Hawks and Owls of the United States in Their Relation to Agriculture", as Bulletin No. 3 of the U. S. Division of Ornithology and Mammalogy. Since that classic no similar special treatment of the hawks of America has appeared until the one here reviewed.

Dr. May's book is timely because for many years the public opinion has been against the raptorial birds in general, and they have been persecuted to the point of decimation—quite so with some species and in some localities. The body of the book includes the treatment of thirty-nine species of hawks, with various subspecies. The subject of food and feeding habits is treated fully for most species. For most species a paragraph is given to "description", but less emphasis is put on field identification than would have been expected. The range is quoted from the A. O. U. Check-List, but the small maps of distribution constitute the outstanding scientific feature of the book.

Four of the plates are in black and white, by Mr. R. T. Peterson, and show the field marks of most of the hawks. Thirty-two plates in color are by Major Allan Brooks, and illustrate most of the species. The large plates have made necessary a large format for which the editor has not found a satisfactory typographical arrangement. It is not a field guide, but a useful source of information on these raptorial birds, and we are sorry that the owls were not included. We have been told that the Audubon Association is offering this book to the public at a price below cost, and it would seem that this must be so.—T. C. S.

AMERICAN BIRD BIOGRAPHIES, CONTAINING THE COMPLETE LIFE-HISTORIES OF FAMILIAR BIRDS, WRITTEN IN AUTOBIOGRAPHICAL FORM. By Arthur A. Allen, Ph. D. Published by the Comstock Pub. Co., Ithaca, N. Y., 1934. Pp. 1-238, 183 figs., 20 pls. Price, \$3.50.

This is a beautifully made book. Its mechanical perfection is the first point to be noted. The abundance of photographic reproductions, mostly from the author's own negatives, is a feature which adds to the book's attractiveness. The twenty new full-page plates, half of which are in color, have been made especially for this work by George Miksch Sutton.

The text presents the life-history stories of twenty common birds. We had never read one of these metaphorical, ornithological, life-historical, autobiographi-

cal stories so cleverly written by Dr. Allen. So, in order to review this book we had to read one. We selected the one entitled "Jenny Wren's Diary".

Now, having read the story, we have learned a number of things, if we can believe what a bird says. Jenny Wren says that there are still a lot of boys in Florida with guns, and they shoot the birds. She also says that her mate threw the young ones out of the nest after they had hatched, and some other things that we had already heard as well as some that we hadn't heard about. For instance, that she broke the eggs in the Bluebird's nest in order to destroy competition for food. Now, should we call that an instinctive process or a reasoning process?

So these twenty stories relate many typical events in the lives of the birds. It is probably easy reading for many people, but not for us; for it is a constant mental effort to translate the narrative into reality. But the author's intensive knowledge of bird habits is evident on every page. At the end of the book we find twenty-five questions on each of the species treated. Anyone who can answer all of these questions will have a pretty good working knowledge of the birds.—T. C. S.

NATURAL HISTORY PICTURES. UNIT THREE—BIRD STUDIES. By Gayle Pickwell. Publishers Distribution Service, Inc., Los Angeles, Calif. 1935. Price, \$6.00.

This work consists of forty-eight very excellent 8x10 halftone plates of birds and their nests with eggs. These plates are printed on heavy paper, and are intended as teaching aids. The pictures prove that Dr. Pickwell is a field photographer of unusual skill. A printed text, in book form, accompanies the set of plates. This text gives much information of especial value in nature study teaching. A previous set of pictures dealt with animals in general, and another one with the life of the desert. We feel slighted because Dr. Pickwell did not include the WILSON BULLETIN among the bird magazines, but it is possible he may not have known of it at the time of writing. The publication of so large a series of plates of such size is an expensive undertaking, and we hope that it will meet with success in order that others may follow.—T. C. S.

PROCEEDINGS OF THE LINNAEAN SOCIETY OF NEW YORK. Nos. 45-46, for 1933-1934. Published by the Society at the American Museum of Natural History, New York. Issued in April, 1935. Pp. 1-119. Price, 75 cents.

This journal is probably not very well known in the Middle West, unfortunately. The reviewer has been surprised to find that its content is chiefly ornithological. The volume at hand contains several important papers worthy of extended notice, but we can scarcely do more than mention the titles. Dr. William K. Gregory has a paper entitled "Remarks on the Origins of the Ratites and Penguins". The question is whether the ratite birds have degenerated from flying ancestors, as rather generally held, or whether they have descended from birds which never possessed the power of flight, as proposed by Dr. Percy R. Lowe, of England. Dr. Gregory reaches the so-called "orthodox" view, on the basis of skeletal characters, that the ratite birds had flying ancestors. Dr. Ernst Mayr discusses "Bernard Altum and the Territory Theory". Altum's work, published in 1868, is now given credit for the first reference to the territory idea. The present paper is a translation of the portions of Altum's work which refer to territory, with a considerable amount of discussion, besides. There are five other ornithological papers and several short notes, mostly of a local nature. The pre-

ceding volume (Nos. 43-44, for 1931-1933) is likewise wholly ornithological. Of special interest is a paper on "Morse's American Bird Lists of 1789 and 1793", by L. Nelson Nichols, with interpolations by Dr. Ernst Mayr. It is a little difficult to be certain of the authorship of all bracketed interpolations—as to whether by Dr. Mayr or Mr. Nichols. Apparently the 1789 list contained 130 bird names, while the 1793 list contained 258 with possibly a few duplications. In another paper Mr. Charles A. Urner discusses the effect of the decrease in eel grass upon the population of wintering geese and brant. James L. Edwards reports that a praying mantis caught and held a hummingbird.—T. C. S.

SECOND REVISED LIST OF THE BIRDS OF OHIO. By Milton B. Trautman. Issued by the Bureau of Scientific Research, Division of Conservation. Columbus, 1935. Pp. 3-16. Price, 5 cents.

This is the second condensed list of Ohio birds issued by the same authority for sportsmen and others. It contains 345 forms, with notes on several others not admitted to the list.—T. C. S.

THE HUNGARIAN PARTRIDGE IN THE GREAT LAKES REGION. By Ralph E. Yeatter. Bull. No. 5, School of Forestry and Conservation, Univ. Michigan. 1934. Pp. 1-92.

While this report deals with a game bird, and is presented in the parlance of game management, it does contain a great amount of interesting ornithological information. The facts are assembled under these chief headings, life history, food and feeding habits, experimental liberations, mortality factors, population fluctuations, management. The student of life history problems can not overlook this paper.—T. C. S.

NOTES ON THE BIRDS OF THE WESTERN PANHANDLE OF OKLAHOMA. By George Miksch Sutton. Annals Carnegie Museum, XXIV, 1934, pp. 1-50.

The list here mentioned is based upon observations and specimens collected in 1932 and 1933, and includes 136 forms. The forms are listed under trinomials where the author feels sufficiently certain. But in a large number of instances binomials are used, followed by a more or less futile speculation as to the subspecific probability, either with the skins (e. g., Bob-white, Great Horned Owl, Hairy Woodpecker, Blue Jay, Grasshopper Sparrow, to mention only a few); or, on the basis of range (e. g., Solitary Sandpiper, Mockingbird, Nashville Warbler, etc.). In one or two cases doubt was expressed by the author as to specific identity (e. g., Brewer's Blackbird). Furthermore, in a considerable number of cases the author is safely non-committal in subspecific determination by using such words as "apparently", "presumably", and "should be". Other writers, who are more cock-sure, are probably less correct.—T. C. S.

BULLETIN OF THE ESSEX COUNTY ORNITHOLOGICAL CLUB OF MASSACHUSETTS. Salem, 1934. Pp. 1-60. Price, 50 cents (S. G. Emilio, Peabody Museum, Salem, Mass.).

This annual is published this year by the lithoprint process. Quite remarkable results were obtained in the spacing of the typewritten line. The work seems to be quite satisfactory and, because of its economy, this method of printing might be of interest to many other publishing societies. One of the leading articles is by Mr. Fred H. Kennard, and gives a rather full history of the vicissitudes of the Junco group at the hands of the systemists. All science is, of course, tentative; and it progresses by the publication of the researches and

opinions of scientific workers. However, in reading a summary of particular systematic work, such as Mr. Kennard's, one wonders whether there is not a great and unnecessary waste of effort and publication space.—T. C. S.

AT HOME WITH THE BIRDS. By Alfred M. Bailey. Illustrations by Earl G. Wright. Six pages of text. Eight colored plates. Price, ten cents.

The two authors, both of the Chicago Academy of Sciences, have produced an authentic booklet on a few of the most common birds which is to be sold in the major chain stores. The text deals chiefly with the nests. The eight colored plates, illustrating as many species, bring to our attention the work of a new bird artist, and are very pleasing. The booklet is designed, of course, to interest the children in birds.—T. C. S.

THE AUDUBON ANNUAL BULLETIN FOR 1934-1935. Published by the Illinois Audubon Society (Chicago Academy of Sciences, Lincoln Park at Center St.). Pp. 1-80.

Many short articles dealing chiefly with local ornithology are contained, as usual, in this Annual. Of particular general interest is a paper by Mr. Gault on "Martins and Martin Houses". He calls attention to a number of defects in the structure of the average martin house, and gives diagrams for one that he considers acceptable.—T. C. S.

BIRD STAMPS OF ALL COUNTRIES. Published by Grosset & Dunlap, 1140 Broadway, New York. Price, \$1.00.

This novelty in ornithological recreation may be of interest to some of our readers. It is a stamp album with spaces for stamps of all countries which carry illustrations of birds—all different types of stamps being illustrated. There are several hundreds of them. The book includes about fifty pages, half of which are for the stamps, the other half giving descriptions. It is a well bound little book, suitable for the purpose.—T. C. S.

Mr. E. A. Preble has a splendid biographical sketch of Audubon in the April number of *Nature Magazine*. Portraits of Audubon and his devoted and efficient wife are presented. On a following page in the same magazine an editorial writer gently takes Mr. J. N. Darling to task for being too outspoken in *demanding* protection for wild life, and appeals for patience, tolerance, and coöperation. We can very well understand Mr. Darling's disgust (if he has it, and we suspect it) with protectionists. For twenty years or more protectionists have been mildly or vigorously criticizing the Biological Survey for too much delay, patience, and coöperation with the duck shooters, the cattle grazing interests, and other destroyers. Now, when a Survey Chief, whose sincerity is beyond question, gets a little worked up about the waste of time, eternal discussions, passing of the buck, etc., you can depend upon some good brother conservationist stepping in to calm him down and suggest patience. It is a great world.

The last December number of the *Migrant* (V, No. 4) gives a list of nesting birds for northeastern Tennessee by Messrs. Lyle and Tyler, and numerous other short articles and notes. The issue for March of this year (VI, No. 1) appears in a very attractive new cover, designed by Mr. Ijams, of the T. O. S. With this volume Mr. A. F. Ganier becomes the Editor. The leading article is on whisper songs and is by Mrs. F. C. Laskey. Any contribution to this subject is worth while. It is a subject which has by no means been exhausted. Anyone who has

made observations on night singing and on whisper songs should not hesitate to offer them for publication.

The *Nebraska Bird Review* for January (III, No. 1) contains a list of birds, with migration dates, at Red Cloud, Nebraska, including 172 species. Among the general notes are reports of an unusually extensive invasion of Magpies into eastern Nebraska and the continued spread of the Starling. The April number (III, No. 2) has a paper on the songs of the Western Meadowlark in Nebraska. And Mrs. Geo. W. Trine presents an article condemning the Bronzed Grackle as a marauder and destroyer of other birds. A note from Red Cloud reports that birds were choked to death by the dust in the air.

Iowa Bird Life for June (IV, No. 2, 1934) gives an account of the Annual Meeting at Ames. The September issue has a very full review by P. A. DuMont of the status of the Starling in Iowa. Mr. Pierce gives in the December number a list of birds found in the Backbone State Park (Iowa). The March number (V, No. 1, 1935) contains an article by Mr. E. D. Nauman relating an early experience of Iowa farmers with wild geese. Each issue contains many notes on Iowa bird life.

The three state periodicals just mentioned now seem to be firmly established and the repositories of much valuable information on the bird life in their respective states. They are well edited and deserve the support which they are receiving. Their organizations should encourage the preservation of complete files in many public institutions.

The *Florida Naturalist* for January (VIII, No. 2, 1935) presents a portrait of Dr. T. G. Pearson, with an account of his work for the Audubon Association. Mr. S. A. Grimes gives an instructive account of the habits of the Hooded Warbler, with two very good photographs. The April number contains the report of the annual meeting and other business matters.

The *Redstart* is published by the Brooks Bird Club, of Wheeling, W. Va. The issue for October (II, No. 1, 1934) has notes on the Bewick's Wren, the Broad-winged Hawks, etc. This society is becoming interested in establishing a library. A good account of the W. O. C. meeting at Pittsburgh is found in the January number. In the February issue (II, No. 5, 1935) Prof. Maurice Brooks offers comments on the status of fifteen species as given in the A. O. U. Check-List.

The *Flicker* for October, 1934 (VI, No. 3) is devoted mainly to an annotated list of breeding birds of Minnesota for the season of 1934. The list includes 146 species. In the December issue the Blue-gray Gnatcatcher is reported nesting near St. Cloud; and an interesting experience is related of watching the drumming of the grouse by flashlight.

News from the Bird Banders for November, 1934 (IX, No. 4, issued at the Museum of Vertebrate Zoology, Berkeley, California) gives a discussion of inferiorism, based on Dr. Allen's work on the Ruffed Grouse. It is a useful summary. Numerous local notes complete the number. The April number (X, No. 1) contains a numerical summary of the birds banded in the Western Province during 1934. The total is 37,146.

Inland Bird Banding News. In the issue for September, 1934, Mr. W. I. Lyon again gives the narrative of his banding expedition to the islands of the Great Lakes, this one being his eleventh annual trip. The December number reports the Annual Meeting, and gives many notes from various states. The

March issue reports about a dozen instances of banded ducks which were shipped from Louisiana to both the Atlantic and Pacific coasts, and later re-trapped at Avery Island, La. This remarkable case of homing instinct recalls the experiments on Noddy and Sooty Terns by Dr. J. B. Watson nearly thirty years ago. In the same number Mr. Lyon mentions several cases of Cowbirds released at short distances from the trapping station, with subsequent return.

The St. Louis Bird Club Bulletin in a recent issue gives a recipe for Starling pie, with facetious remarks, and includes the statement that the result "compares fairly well with one made of blackbirds or English Sparrows ('so would shoe leather')". This may be all right for a Starling pie, but it insinuates about the sparrow pie. We come to the defense of the latter. The one we ate was more tender and more delicate in flavor than the best chicken. It was fit for an epicure. But we can not tell you how it was prepared. Later issues, through May, have been received.

The *Raven* is published by the Virginia Society of Ornithology at Lynchburg, Va., and is issued monthly. Dr. J. J. Murray is the editor. To all outward appearances this periodical got along nicely during the editor's absence of a few months, but no doubt his energy and enthusiasm were missed in the inner circles.

The *Chickadee* is the publication of the Forbush Bird Club, at Worcester, Mass. The issue at hand is for October and December, 1934 (IV, Nos. 3-4). It contains a number of local lists and records of the varied activities of the Club.

The *Night Heron* in a recent number lists seven kinds of bird baths, but not all birds are known to indulge in all forms of the bath.

The TFNA Annual Bulletin for 1934 consists of thirty-one pages of mimeographed sheets, published by the Toledo (Ohio) Field Naturalists' Association. The plan of this record is to review and summarize the activities of the Society for the year. Mr. L. D. Hiatt has an interesting discussion of photography for bird study.

EDITORIAL

THERE SEEMS to be a widespread agreement that the waterfowl of North America are in a very precarious condition as to numbers. The reduction in numbers is probably more acute in some species than in others. It seems to be impossible at the present time to determine to what extent the recent decrease is due to drouth and how much to over-shooting. The determination of these factors has a very important bearing on remedial policies. But the fact remains that one factor is not controllable, while the other one is. Since these two factors operate in relatively unknown degrees to reduce the duck supply, in order to accomplish anything towards the prevention of further reduction an attack on the controllable factor is indicated, namely the closed season.

In advocating a closed season we need not discuss the positive method of increasing the duck supply by restoration of breeding areas, because that is a wholly different and independent matter. It is more important in the long run, but it is a slower process, while the closed season is prompt in results. Restoration work should be undertaken immediately, and results will come in due time—if the birds survive in the meantime.

It is possible that the general rains of the 1935 spring may help much to correct the unfavorable drouth conditions of the last two or three breeding seasons. If this is true to any great extent a closed season may not be so imperative at the present time. Yet the article by Mr. Furniss in this issue of the *WILSON BULLETIN* indicates that even where there was suitable environment in 1934 it was not inhabited by the normal number of ducks. Of course, in so far as this is the case it must indicate that over-shooting is a more important factor in duck decrease than is lack of proper environment. And if this is true we will face in each succeeding season a stronger demand for a closed season on waterfowl.

What are the objections to a closed season? We may dismiss the reluctance of hunters to give up the sport as lacking in argument, and therefore unsound. But we are of the opinion that the great rank and file of sportsmen are today converted to the closed season idea. We believe that the greatest obstruction to the closed season on waterfowl today comes from the professional game protector, the one who is paid to save the ducks. And it is explained in this way. A closed season on waterfowl would mean that hunters would not buy licenses for hunting. This would mean the loss of thousands of dollars of income to the fish and game departments of the states. The warden forces would be cut down. Thus, it is argued, a closed season would leave the game unprotected, and poaching would go on unrestrained.

This is a formidable argument, but it leads to the extermination of the birds by law, the open season. If the season is closed the extermination may possibly result illegally—the same result in either case. It is possible that the opposition to the closed season may arise also in the thoughts of the officials because of possible loss of employment, but we need not dwell upon this aspect of the case for it is merely an assumption. The fact seems to be that under our present method of financing the fish and game departments the future of the wild fowl is a very gloomy one. They seem to be doomed by the open season, and the closed season does not seem to hold great promise either.

As a remedy we suggest that fish and game departments should be financed by legislative appropriation, in the same way that other departments of the state are financed. The purpose would be to make the wild life protection forces independent of the variable income from licenses to hunt. It would then be possible to declare a closed season whenever the emergency demands. And as time goes on it is likely that the need of a closed season will occur more often than in the past. Even with the contemplated restoration projects in full swing there will never be the abundance of wild life that has existed in the past. It is more than probable that from now on there will be a constant struggle to maintain even the present status of most species of waterfowl. The closed season expedient may have to be resorted to at intervals. Would it not be wise to organize for this possible contingency? And is it not proper for the state to protect its own property? The case of *Geer vs. Connecticut* established the principle of state ownership of wild life. However, the long-established custom of running the fish and game departments with the income from hunting license fees will not be changed easily. Like other reforms it will come slowly, and only with hard and determined effort.

While the states slowly adjust themselves, in various ways, to the emergency of waterfowl shortage, about our only hope for their recovery lies in the quick response of the federal government. If the Biological Survey can secure the necessary funds for operation, it can declare a closed season on such species as need it: put federal wardens in the field, and exercise a wholesome restraint until the states have had time to adjust themselves to the situation. The immediate problem is to finance the Biological Survey. We have a good deal of confidence in Mr. Darling's desire to do this thing.

DURING RECENT MONTHS those in control of the remaining sets of Dawson's "The Birds of California" have placed them on the market at greatly reduced prices. The Student's Edition (published at \$45.00 and finally offered at \$9.50) was promptly disposed of. The Booklover's Edition, published at \$110, was then offered at \$19.00, and will no doubt be taken up also. We mention these facts in order to offer a word of commendation to the publishers for handling their unsold remainders in this way. The practice of destroying the remainders is so selfish and mercenary that it deserves only condemnation from the scientific world.

THE ARTICLE in this issue on the birds of Wyoming is published with the aid of a subsidy.

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.

OCT 2 1935

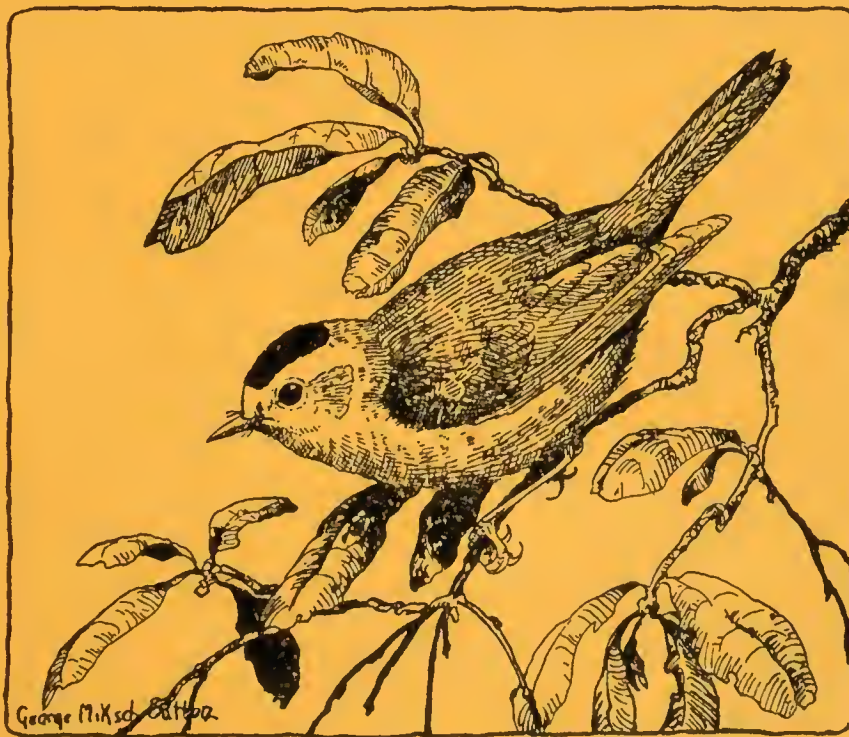
13,814

Vol. XLVII

SEPTEMBER, 1935

No. 3

THE WILSON BULLETIN



A Magazine of Field Ornithology
Published by the
WILSON ORNITHOLOGICAL CLUB
at
SIOUX CITY, IOWA

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

CONTENTS

SEASONAL SEX CHARACTERS IN BIRDS AND THEIR HORMONAL CONTROL	By Emil Witschi	177-188
NESTING OF THE RAVEN IN VIRGINIA	By F. M. Jones	188-191
OBSERVATIONS ON THE VIOLET-GREEN SWALLOW	By A. E. Shirling	192-194
A BIRD CENSUS METHOD	By W. J. Breckenridge	195-197
VALUE OF FIELD OBSERVATION IN ECONOMIC ORNITHOLOGY	By W. L. McAtee	198-204
ADDITIONAL IOWA SPECIES OF BIRDS SUBSTANTIATED BY SPECIMENS	By Philip A. DuMont	205-208
THE BIRDS OF FORT SISSETON, SOUTH DAKOTA, A SIXTY YEAR COMPARISON	By Wm. Youngworth	209-235
GENERAL NOTES		236-241
EDITORIAL		242
MEMBERSHIP ROLL		243-256

THE WILSON BULLETIN

is published quarterly in March, June, September, and December, as the official organ of the Wilson Ornithological Club, at Sioux City, Iowa, and is sent to all members not in arrears for dues. The subscription price is \$1.50 a year, invariably in advance, in the United States. Single numbers, 50 cents. Outside of the United States the rate is \$1.75. Single numbers, 60 cents. Subscriptions should be sent to the Editor.

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—Mr. W. M. Rosene, Ogden, Iowa.

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. XLVII

SEPTEMBER, 1935

No. 3

Vol. XLII (New Series) Whole Number 172

SEASONAL SEX CHARACTERS IN BIRDS AND THEIR HORMONAL CONTROL*

BY EMIL WITSCHI

Considering the widespread interest in ornithological research, it is surprising, how little information we have concerning the causative factors controlling the conspicuous seasonal phenomena in bird life.

In the light of recent work on hormones, the seasonal changes obtain a renewed interest and I wish to present here, some of the results of experiments that I have carried out with the assistance of my students during the last three years.¹

The first problem which we face is that of the *seasonal development of the gonads and the gonoducts*. During the sexually inactive period, the sex glands of most wild birds regress to tiny rudiments, resembling in every way, the corresponding organs in juvenile specimens. In the testis, at this time, one finds only inactive spermatogonia,

*This is a report on mostly unpublished results of investigations carried out with the aid of grants by the National Research Council, Committee for Research in Problems of Sex. Symposium Lecture delivered at the meeting of Section F, American Association for the Advancement of Science, Minneapolis, June 26, 1935.

¹Hormones are substances produced in the glands of internal secretion. They are released into the blood stream and thus circulate in the whole body. However, they produce effects only in specially responsive, "tuned in" organs. These hormones can be prepared by extraction of the producing gland or they may be recovered from the blood serum. Some are eventually eliminated from the body through the kidneys and are therefore found in the urine. Three groups of hormones are considered in this paper. A. *Hormones of the hypophysis gland* which stimulate development of the gonads (so-called gonadotropic hormones, maturity hormones, or hebin). They are at least of two kinds, as becomes evident from the reaction that they produce in the rat ovary. A first type stimulates follicular growth while the second type produces corpora lutea (luteinizing hormone). B. *Hormones of the gonads* (or sex glands). The active ovary releases the "female sex hormone" or oestrin; the active testis releases the "male sex hormone". These sex hormones control the full development of many of the secondary sex characters. C. *The hormone of the thyroid* is very important for maintenance of body temperature and general life functions. In some way it has an influence also on feather growth and coloration. The function of the thyroid is controlled by the hypophysis (through the thyrotropic hormone). Hormones are highly potent substances. In most instances fractions of milligrams bring about the full reactions.

in the ovary only small ovocytes. At the approach of the breeding season, these glands enlarge very rapidly. The testis increases in weight 500 fold or more, while spermatogenesis proceeds quickly to the production of millions of ripe spermatozoa. Epididymis, vas deferens, and seminal glomus, the latter taking the rôle of true seminal vesicles, enlarge correspondingly and become filled with seminal fluid. In a similar way, though starting slightly later, develop the female genital organs. The ovary in the English Sparrow increases from less than 10 to 500 and more milligrams. The thin and straight oviduct becomes convoluted and very copious, due to the enormous development of its glandular endothelia.

The same developments can be evoked at any time of the year by injection of gonadotropic hormones (Figs. 15-18). The following Table I shows that any of the gonadotropic substances known to us can activate the quiescent bird gonad, though the reactions do not show a complete quantitative parallel to those in the rat. Equal

TABLE I

Effect of Gonadotropic Hormones on the Left Testis and the Ovary of the English Sparrow.

SOURCE OF HORMONE	DRU	I. TESTIS	OVARY
Beef Hyp. F.	1	x 8 C	x 1.5
Beef Hyp. F.	3	x 72 S	x 80
Beef Hyp. F.+L.	3+(3)	x 80 S	x 40 d
Beef Hyp. L.	(3)	x 30 S	x 30 D
Sheep Hyp. L.	(2)	x 20 S	---
Human P.U.	10	x 2 c	x 1
Human P.U.	20	x 15 C(s)	x 1
Human P.U.	50	---	x 1.5 D
F.+P.U.	.5+5	x 12 c	---
F.+P.U.	.5+10	x 18 C	---
Preg. Horse Serum	1	x 15 C(s)	x 2
Preg. Horse Serum	4	x120 S	x 4
Preg. Horse Serum	20	x150 S	x 40 Ov.
Preg. Horse Serum	40	x 80 S	x 60 D

C, spermatocytes (c, only in small numbers); d, slight degeneration; D, high degeneration; F, follicle stimulating fraction of hypophyseal extract; L, luteinizing fraction of hypophyseal extract; Ov., ovulation; P.U., pregnancy urine; (s), spermatozoa in small numbers; S, spermatozoa in large numbers; DRU, daily rat units.

amounts in rat units of follicle stimulating hormone from beef hypophysis and of pregnant horse serum act similarly on the sparrow testis, but very differently on the ovary which responds more strongly to the former. Hebin from human pregnancy urine brings about complete spermatogenesis, if excessive amounts are injected. The ovaries

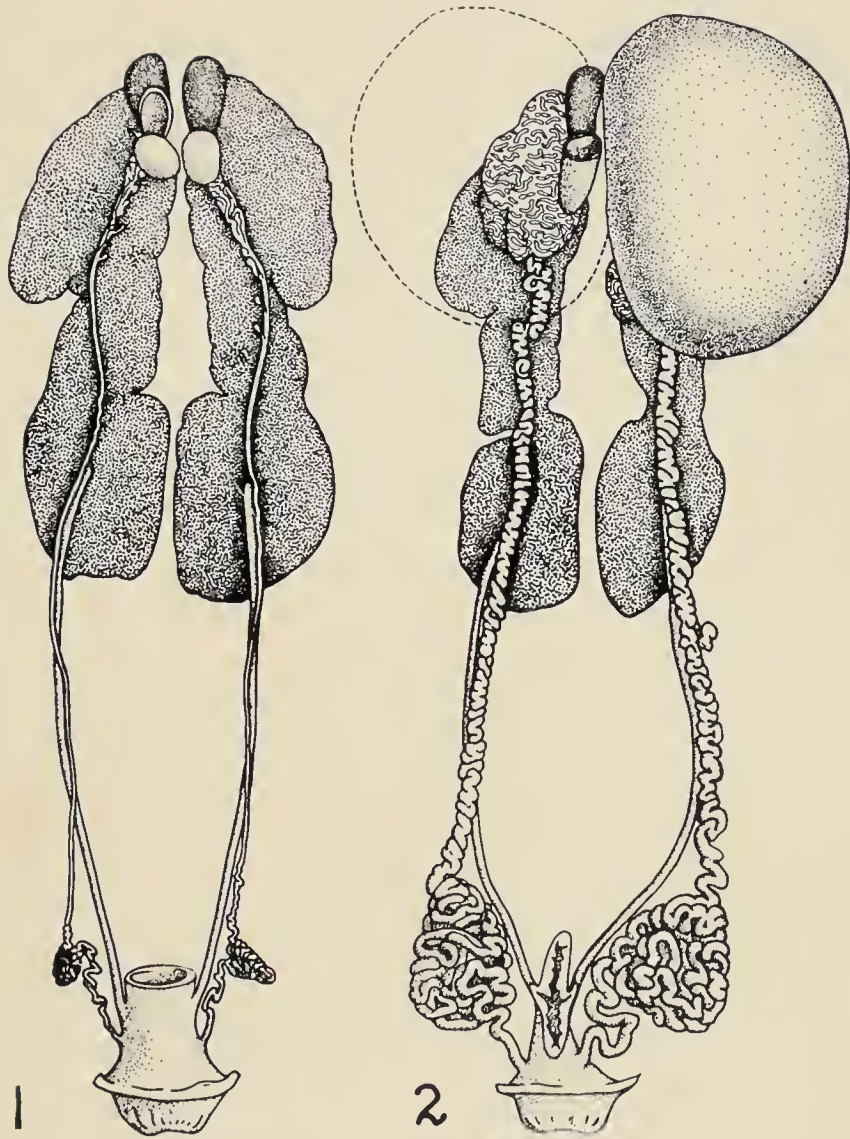


FIG. 15. 1, Urogenital organs of a male sparrow in the quiescent phase, x3. Weight of left testis, 0.5 mg., of left glomus, 0.4 mg. 2, Urogenital organs of a male sparrow in the period of sexual inactivity, after seventeen daily injections of 0.1 cc. (20 DRU) of pregnant mare serum; right testis removed to show the enlarged epididymis; x3. Weight of left testis, 345 mg., of left seminal glomus, 24 g. Note also the enlarged and convoluted vasa deferentia.

react but slightly and mainly by degenerative processes to the highest doses of urinary hebin. Purified luteinizer from beef and sheep hypophysis stimulates testicular as well as ovarian growth, though the latter soon ends in degeneration of the large oocytes. *Summarizing*, we can say that in the bird, the quiescent gonads react most easily to hormones which in the rat produce follicle stimulation. Luteinizing hormones are less potent. However, they induce complete spermatogenesis if administered in sufficiently high doses. In the ovaries, they induce some developments which soon end in degeneration. In our finches, the most perfect results were obtained, by the injection of 0.1 cc. of pregnant mare serum. In the males, the testes and seminal ducts become filled with spermatozoa before the end of the second week (Figs. 16-17), while the females begin to ovulate and to lay normal eggs with colored shells (Figs. 18, 7). This result was obtained not only with the English Sparrow but also with African weaver finches (*Quelea quelea*) which otherwise never layed in captivity, not even during the breeding season.

These experiments indicate that the reproductive cycles of the birds are under hypophyseal control. It is known that this is true also for such mammals as the rat and man. The relationship is, however, a quite different one. In the rat, if the level of *sex hormones* (produced by testes and ovaries) falls, the hypophysis answers with the release of increased amounts of *gonadotropic hormones*; if the level rises, the hypophyseal output is lowered. In the finches, however, the hypophysis makes no attempt to keep the gonads and the sex hormones at a constant level. On the contrary, ebb and flood of sex and gonadotropic hormones are coincident and the hypophysis leads the gonadal development without reacting back on variations in sex hormones. We shall soon give further evidence in support of this statement. However, first let us consider the *factors that determine the seasonal cycles of hypophyseal activity*.

Popular opinion credits the rising temperatures in spring with the rôle of the first cause in bringing about bird migration, nesting, and breeding. Of course, the common citizen is highly impressed by the fact that in spring the coal bills become smaller and eventually fall off entirely. However, we must not forget that the migratory birds have spent the winter in tropical or subtropical countries and in fact move into cooler environments, at least during the time of actual migration. Rowan in his charming little book on "The Riddle of Migration" has conclusively ruled out the temperature factor. On the other hand, his experiments on the junco show that an artificial in-

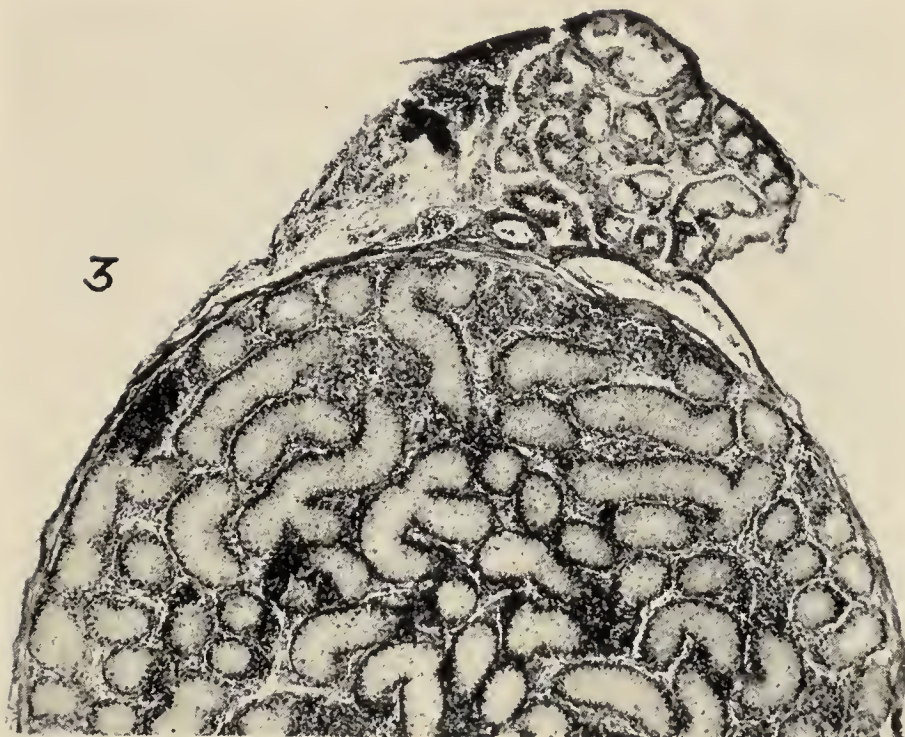


FIG. 16. Part of a cross section through testis and epididymis of a sparrow in the quiescent phase; x40.



FIG. 17. Part of a cross section through testis and epididymis of the activated sparrow of Fig. 16; x40. Note the increased diameter of the seminal tubules, active spermatogenesis, and discharge of spermatozoa into the antrum of the epididymis.

crease in daylight beginning in November causes a development of testes and ovaries reaching the breeding size by January 9 instead of March, as under normal conditions. Miyazaki (1934) reports that in Japan, it is an old practice of owners of pet birds to induce singing early in winter by exposing the birds to candle light for three or four hours daily after sunset. This "Yogai" method is found especially effective in the White Eye (*Zosterops palpebrosa*). Bissonnette, working with the Starling, and Kirschbaum in experiments on the English Sparrow, find also that artificial lengthening of the day brings about a precocious development of the sex glands, especially in the male, during the winter months. We have ourselves repeated these experiments with similar effects. However, our observations seem to indicate, that the gonads respond only toward the approach of the normal breeding season and not in late summer nor in fall. It appears that the hypophyseal year cycle of the bird is as deeply rooted as the oestrus cycle of the human and other mammalian females. Changes in illumination may help to maintain the synchronism of the inborn cycle with the seasonal periods. We have observed that prolonged "Indian summers" with sunny days extending until late November bring about precocious developments of the testes in free living English Sparrows of Iowa. Yet the changing day in itself is not sufficient to explain entirely the breeding cycles, as becomes evident in the case of trans-equatorial migrants, like the Bobolink or the Golden Plover. Spending the winter south of the equator, they are exposed also to lengthening days; though their gonads remain quiescent. One should consider also that spring migration before the 21st of March takes the bird from longer to shorter days, as in the case of the Mourning Dove (Cole, 1933). Most interesting in this respect are possibly the tropical birds of which many have also very definite periodical breeding seasons. Different explanations have been proposed, most authors (Moreau, Bissonnette) agreeing, that changes in type or quantity of food most probably determine these cycles. This assumption, however, is definitely wrong. I have kept tropical African weaver finches for three years in the animal room at Iowa City, under constant food conditions and they have maintained their African cycles to this day. Oddly enough their breeding season is in the fall. If light has any influence, then this group of birds reacts to shortening and not to lengthening of the day. Even juvenile paradise whydahs which came into their first breeding period only after they had lived one full year in Iowa (and after having traveled through the shops of bird dealers in different parts of the northern hemisphere) unhesitat-

ingly fell in line with their adult companions, coming in breeding condition in August-September of their second year. According to Delacour and Edmond-Blanc, the breeding season of these birds in Africa is coincident with the rainy season. If light has any regulating effect, these birds obviously react to decrease rather than to increase of illumination. Experiments to test this question are in preparation.

It is an interesting fact that the hypophysis of the bird reacts at least in a limited extent to light, that is, to sensory stimulation. This case, however, stands not alone. Cole has shown in very convincing experimental series that the mere sight of the incubating female induces in the male pigeon the changes necessary for crop milk secretion. We must conclude, therefore, that a specific optic perception stimulates, in this case, the release by the hypophysis of the lactation hormone, prolactin. Furthermore, it is a known fact, again borne out by our own observations, that the sparrow female in the breeding season lays four or five eggs, and then becomes broody. Her ovaries during the incubating period regress rapidly through degeneration of the larger eggs. According to Riddle, this regression seems to be due also to the release of prolactin. If, however, one removes daily the egg that the sparrow deposits, she goes on laying up to fifty eggs in succession, often twelve to nineteen on directly consecutive days. Whether the female "counts" by eye or by tactile perceptions of the ventral body surface, is not clear in this case; though in a similar observation by Phillips on continuous egg laying in the flicker, the latter alternative has the greater probability. Somewhere, obviously there is a bridge between the nervous system and the hypophysis transmitting stimuli that direct the release, by the latter, of gonadotropic hormones.

From the consideration of gonadal cycles, let us turn to the *secondary sex characters*. We mentioned already that concomitant with the development of the sex glands goes the enlargement of the gonoducts. The castrate female has an oviduct as thin as that characteristic for the quiescent phase. Injections of daily doses of one to twenty rat units of oestrin bring about a rapid growth. With the maximum dose, the full breeding size is attained within one week. Similarly in the male, the epididymis and the vas deferens of castrates react on injections of male sex hormone. In the normal course of events, quite obviously, the hypophysis stimulates the gonads; and the growing gonads, by release of sex hormones, stimulate secondarily the gonoducts.

In many birds, the *color of the bill* changes during the breeding season. In the English Sparrow and some other finches, both sexes have a horn-brown bill during the quiescent phase. During the reproductive phase, this changes in males to a jet black. Castrates have permanently lightly colored bills, but injections of male sex hormone (extracted from male human urine) in minute quantities bring about the blackening of the bill in castrates as well as in males and females of the quiescent phase. On the contrary in the Red-bill Weaver, males and females have brilliantly red bills during the inactive phase, which turn to yellow during the breeding season in the female only. These bills change to yellow in either sex, or in castrates, at any season, upon the prolonged injection of female sex hormone (from female human urine). In the love birds, or paroquets, the sexes differ mainly in the waxy skin over the root of the bills. It is blue in the male and brown in the female, at least during the breeding season. Castrated males maintain the blue color which, however, changes to brown after injection of female sex hormone. Obviously, one of the alternate bill colors always is neutral, not hormone controlled, and persists in castrates and in both sexes during the quiescent phase. The other color, appearing during the breeding season only, is conditioned by sex hormones. Surprising is the fact that in some species it is the male sex hormone, in others, the female sex hormone that brings about the dimorphic effect.

The greatest puzzle was offered by the *plumage*. Instead of describing the zigzag course of our experiments, I shall try to describe in the most direct way the results that we have in hand now, at the end of three years of observation and investigation. Matters are relatively simple in the case of the English Sparrow. The plumage in this species is the simple expression of hereditary constitution. Castrated males and females maintain and repeatedly regenerate their inherited male or female plumage. Even if injected with hormones of the opposite sex or if implanted with contrary sex glands, they always regenerate according to the hereditary type (Keek '34). Sex hormones play no part in the determination of either sex type in plumage.

Things become more interesting in the case of the birds which put on a special breeding plumage in one sex. I mention the well known case of the Indigo Bunting. The female carries a modest brown habit throughout the year. The male, however, is iridescent blue nearly all over during the breeding season and brown with just a few traces of blue, if out of season. The bill of the female is always light brown, that of the male is brown out of season and daintily black and



FIG. 18. 5. Ovary and oviduct of a female sparrow in the quiescent phase; x2. Weight of ovary, 10 mg. 6. Ovary and oviduct of a female sparrow in the period of sexual inactivity, after sixteen daily injections of two rat units (2DRU) of hypophyseal extract; x2. Weight of ovary about 500 mg. 7. Ovary and oviduct of a female sparrow after seventeen daily injections of 0.1 cc. (20DRU) of pregnant mare serum; x1. Weight of ovary, 940 mg. A window is cut into the uterine part of the oviduct to show the enclosed egg with its normal shell.

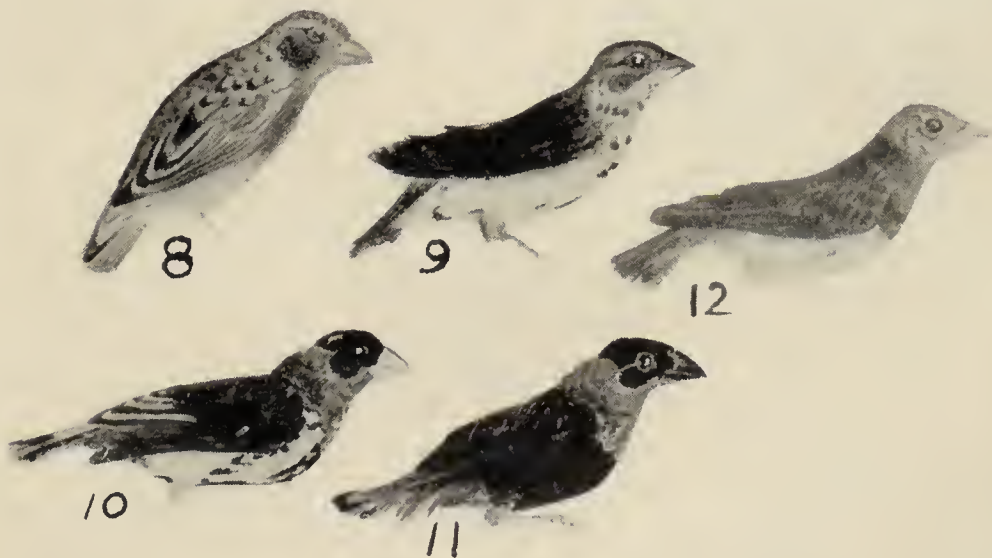


FIG. 19. Color phases of the African weaver finch, *Pyromelana (Euplectes) orix franciscana*. 8. Henny plumage, carried by females all year round and by males outside of the breeding season (January-May); the bill is ivory colored. 9, 10. Molt of the male and assumption of the cock's plumage (June-August) at the approach of the breeding season; the bill purple, changing to black. 11. Fully developed cock's plumage carried during the breeding season (August-October); the bill is black. 12. Castrated male outside of breeding season which, exceptionally, carries an intermediate type of plumage; the bill is ivory.

white during the breeding season. Castrated females so far have not exhibited any changes. Castrated males show a light brown bill throughout the year, indicating that no sex hormones are produced any longer. But to our great surprise, castrated males go on changing from brown to blue plumage and vice versa in the same rhythm as their normal male cage companions.

African weaver finches show similar phenomena. For experimental purposes they prove more valuable, because they are more hardy in captivity. At least in the case of the orange weaver, we know that the male passes through two molts, the female through one only. Probably the same condition prevails in the whole group of weaver finches. Both sexes molt at the end of the breeding season and acquire the modest henny plumage. At the beginning of the breeding season the male sheds this sober garment and dons a flashy nuptial plumage of black, and orange-red. The new pattern does not show any regard for the design of the cast off henny plumage but runs across feather tracks and natural boundary lines. At the same time, the bill of the male changes from ivory to black (Fig. 19). Castrated males permanently assume or maintain the light colored bill indicating absence of male sex hormone; though they go on changing, rhythmically, their plumages. It is interesting, however, that a few castrated males do not acquire a completely henny plumage during the inter-season, but a plumage with a mixture of nuptial and henny characters (Fig. 19, 12). The cock's plumage of the breeding season is always perfect. Females as mentioned above, do not change their modest garb at the beginning of the breeding season. Female castrates observe the same economy and even plucked feathers regenerate only rarely. However, the few that do so are of the cock's type. They are always shed at the end of the season, when a new henny plumage is acquired.

These observations suggested on the one side that the plumage type is controlled by hormones: on the other hand it was obvious that sex hormones are not the ones concerned. Consequently we suspected that the plumage type might be directly controlled by the hypophysis. We were, however, only recently able to prove our point, when we injected some of our birds with pregnant mare serum, containing that powerful gonadotropic principle. Injected at the daily dosage of 1/10 cc. of serum into normal and castrated male and female weaver finches out of the breeding season, it induced regeneration of cock's (in place of henny) plumage in all but the normal females. In the latter the change of the bill color from red to yellow (in red bill

weavers) and the rapid development of the genital organs with subsequent egg laying, clearly indicated the presence of female sex hormone (produced by the enlarging ovaries). Injection of female sex hormone into males in breeding season has always a feminizing effect on the plumage. We can conclude, therefore, from our experiments that: (1) the henny plumage of weaver finches is the neutral (not hormone conditioned) type; it is found, consequently, in both sexes and in castrates, out of season. (2) The cock's plumage is due to a high level in gonadotropic hormones. (3) Female sex hormone counteracts the "masculinizing" effect of gonadotropic hormone on the plumage. These investigations show further, (4) that castration in birds stimulates only slightly, if at all, the hypophyseal activity, and (5) that the hypophyseal seasonal cycles are wholly independent of progressive or regressive changes in the sex glands.

There is just one more point which I wish to bring out. I remarked above, that success in our work on the plumage came with the application of pregnant mare serum. Before that, we had used other gonadotropic substances, especially extracts from beef hypophysis. These gave nearly as good gonadal development in normal males and females, but the plumage reaction was of the henny type in both sexes and also in castrates. The solution of this riddle came through the examination of the whole endocrine system, which showed that the extracts brought about an enormous enlargement and an apparent rapid discharge of the *thyroids*. The thyroid hormones, however, have a very decided "feminizing" effect on the bird plumage. This has been suggested already by earlier work of Cole and others on the chick, and is brought out again by extensive studies by one of my students on the plumage of the sparrow (Miller '35). It is especially interesting that in the sparrow, where male and female sex hormones show not the least effect on the plumage, injections of thyroxin change the developing feather from the male to the female type.

The most remarkable fact brought out by these investigations on seasonal sex dimorphic plumages is their dependence on other than sex hormones. Whether the sex difference in molting periods, which is also maintained after castration, is under hypophyseal or possibly, under genetical control, we do not know at the present time. Miyazaki's experiments seem to indicate that shortening of day length causes molting in the White Eye.

If time would permit, a discussion of the different mechanisms of determination of plumage patterns should follow this presentation of mere experimental data. In concluding, may I again emphasize the

here established fact that even within the taxonomic family of the finches, the sex type of the plumage is determined in one species (sparrow) directly by the genetical constitution of the feather forming cells, and in another species (orange weaver) through free circulating hormones in the blood stream. It might well be that, through the closer study of such cases of substitution of hormone by direct genetical control, we shall be able to learn more about the physiological nature and the mode of action of the hereditary element, the mysterious gene.

BIBLIOGRAPHY

- Bissonnette, T. H. 1932. Light and diet as factors in relation to sexual periodicity. *Nature*, 129, 613.
- Cole, L. J. 1933. The relation of light periodicity to the reproductive cycle, migration, and distribution of the mourning dove. *The Auk*, 50, 284.
- Keck, W. N. 1934. The control of the secondary sex characters in the English Sparrow, *Passer domesticus*. *Jour. Exp. Zool.*, 67, 315.
- Kirschbaum, A. 1933. Experimental modification of the seasonal sexual cycle of the English Sparrow, *Passer domesticus*. *Anat. Rec.* 57, Suppl. 62.
- Miller, Dorothea S. 1935. Effects of thyroxin on plumage of the English Sparrow, *Passer domesticus*. *Jour. Exp. Zool.*, 71, 293.
- Miyazaki, H. 1934. On the relation of the daily period to the sexual maturity and to the moulting of *Zosterops palperbrosa japonica*. *Sci. Rep. Tôhoku Imp. Univ.* IV, 9, 183.
- Rowan, W. 1931. *The riddle of migration*. Baltimore.
- Witschi, E., and W. N. Keck. 1935. Differential effect of some gonadotropic substances on development of cyclical sex characters in the English Sparrow. *Proc. Soc. Exp. Biol. and Med.*, 32, 598.

DEPARTMENT OF ZOOLOGY, STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

 NESTING OF THE RAVEN IN VIRGINIA

BY F. M. JONES

Dark shadows were forming in the deep hollows leading down from the Shenandoah Mountains. The sun had already passed out of sight on the other side, and now twilight prevailed. Silence reigned everywhere over a snow-elad landscape which appeared to be devoid of life.

High up on the side of the mountain perched on an old dead snag leaning over a steep rock cliff sat a Raven in owl-like posture, seemingly in deep thought. Perhaps he was dreaming of bygone days when his kind inhabited all of the eastern mountain ranges in a land of plenty where game of all kinds was abundant and food easily procured. What now? Gone forever were the millions of Passenger Pigeons whose flight at times darkened the skies. The bugling of the elk was no longer heard. The land of abundance and plenty had van-

ished, and of the multitudes only a few remnants could now be found to mark their passing.

First came the large band-saw mills which were supplied with timber by the logging trains that penetrated even to the remotest sections of the mountains. Soon afterwards all of the best of the big trees had been cut down, and now followed devastating forest fires which destroyed everything in their path and the once enchanted fairy-land formed by nature was converted into a desolate waste.

Of a wild nature which craves freedom and seclusion the Ravens could not cross the barriers erected by civilization, and with all of their range and food supply destroyed there was nothing left for them but starvation, and starve they did. Still the older generation of the mountain folks often ask me, "What has become of the Ravens?" They do not take in consideration what had gone before, nor the part they played in the passing of the Ravens when they periodically set fires to the mountains to make huckleberry picking easier and more profitable. Such futile questions were better left unanswered.

No wonder this pitiful remnant of the multitudes seemed to be in deep thought, for he was no doubt going supperless to roost, as he had done many times before. This was one of a pair which had a nest in the cliffs below the dead snag, and to which they returned each day before nightfall—for the Ravens' nest is their home. Nearly always, too, they are seen in pairs, and it has been said by many naturalists that they remain mated for life. My limited knowledge of them tends to confirm this belief also, for one of my favorite pairs of Ravens, which I have known for fourteen years, have remained together during that time. They are not to be mistaken for any others which overlap their range, for both have voices which are quite distinctive. One has a mellow call-note somewhat similar in tone to that of the Canada Goose, and it is never without a thrill that I mark the passing of this bird high overhead on slowly beating wings, flying to the high cliffs overlooking the wide spaces below.

It is now early March and nesting time somewhat delayed by many snows and unusually cold weather, was close at hand. During the previous month the nesting shelf had been swept clean of all of the old nest material, and was ready for the new one that was to occupy the same place. Contrary to general belief and the stories which have been written about their nesting, no part of the old nest is ever used.

Soon afterwards both birds could be seen around their nesting cliffs, most any time during the day, working on their new nest or

sitting on the rocks or old snag above. From a vantage point about a mile away I could daily watch their activities through my binoculars; and they would no doubt have been much disturbed had they known how often I was spying on them. When one bird would fly to the nest on the rocks the other would perch above, and at intervals would sail from the cliffs to see that no intruder approached unobserved. Once when I saw them both leave together I went up to their cliff and inspected the nest from below, but, not wishing them to find me there on their return, I did not tarry long.

A few hundred feet down from the Ravens' nest a pair of Duck Hawks had appropriated an old nest formerly used by Ravens and were on constant guard duty there. While it is at times possible to visit Ravens' nests unobserved by them, there is not a chance of reaching the nest of these falcons unseen by one or both of them. Starting down the mountain I was soon greeted by the cries of the male Duck Hawk which immediately attracted the attention of the other. Now I had both flying over me, protesting the invasion in no uncertain terms, and the fuss they made soon brought both Ravens to see what was causing the disturbance. Looking into the hawks' nest from an adjoining chimney rock and seeing that as yet there were no eggs, I went on back and over the top of the mountain. All the way up I was escorted by one of the Ravens soaring in circles overhead. After reaching the top the male Duck Hawk seemed to get tired of the fuss the Raven was making and drove him back down under the mountain. After the first swoop of the hawk, the Raven lost further interest in me and left in undignified haste, knowing well that this was no time to hesitate if he wished to escape with a whole skin.

During the latter part of March only one Raven was seen over the cliffs, so now the full set of eggs had been laid and the female was on the nest engaged in the labor of hatching out the young ones. Going up to investigate I was met by the alert male bird on watch, who continued to circle around me until I got close to the nest when he flew directly past the nest to warn his mate of approaching danger. This she disregarded, for it was not until I was within fifteen feet of the nest above that she left and flew overhead so close that she appeared to be twice as large as she really was. Not often is an opportunity afforded of seeing a Raven so close, for they are the wildest of all birds; and even in going from one mountain range to another their flight is always high out of danger from below.

Their selection for a nesting site was a high cliff from which the whole of the surrounding country could be viewed. The nest was on a small shelf back in a pocket of the rocks and under the steep overhanging rocks above, which made it inaccessible from that point—this being the usual situation. Reaching the nest by going up from the bottom of the cliffs, I found it to contain five eggs, which was the average number found in those Ravens' nests I had examined. The nest was nicely and compactly made of small sticks with fine black birch twigs and roots on the inner side next to the lining; the latter was composed of very finely shredded inner chestnut-tree bark with a small amount of sheep's wool intermingled. Ordinarily wool is one of the principal materials used by them for their nest linings, but as this particular mountain section was not used for sheep-grazing, wool was hard for them to obtain, except in the cultivated areas where the Ravens would not venture. Beneath the thick lining I found two inches of soil, which was also used in all of the four other nests examined in this range during the nesting season of 1934. Nests found in previous years 250 miles farther south were lined with equal parts of usnea moss and wool, with no earth used beneath the lining. Just why the difference in construction of the nests in various localities I am unable to say, unless the combination of moss and wool forms a sufficient insulation for the thin-shelled eggs which is lacking in the lining made of the inner bark. It is to be remembered that when the eggs are laid the cliffs are still covered with ice and the weather is far from being spring-like.

This nest, like all the other Ravens' nests which I have found, was smoothly finished on the inside and deeply cupped, almost like an inverted cone. It measured twenty-three by thirty-six inches outside diameter, while the cavity was twelve inches in diameter and five inches deep. Where it was situated no rain nor sunshine could ever penetrate, and this location, used by many generations of Ravens, had a large accumulation of materials below which had composed the old nests. It was one of the few places left which was not likely to be disturbed by unwelcome visitors and the presence of mankind.

ABINGDON, VA.

OBSERVATIONS ON THE VIOLET-GREEN SWALLOW

BY A. E. SHIRLING

Talk about housing problems! Boom towns in gold rush times had no greater shelter problems than is the shortage of nesting cavities among Violet-green Swallows in the western mountain regions.

The Violet-green Swallow (*Tachycineta thalassina lepida*) is to the Colorado mountains what the English Sparrow is to eastern and central states. It is the most common bird about cottages and towns. In respect to relative abundance, it exceeds the English Sparrow, for the sparrow's range is confined to human surroundings of houses, barns, and picnic grounds. The Violet-green Swallow, while most abundant in the neighborhood of human dwellings, ranges widely up the mountain slopes and unfrequented forest lands.

The Violet-green Swallow has a great advantage over the English Sparrow from the point of beauty and popularity. It is a most beautiful bird in color, in trimness of shape, and in gracefulness of flight. It is pure white beneath and iridescently violet and green above, with violet rump, dark green back, and black wings. With its long tapering wings it is tireless in flight, and its aerial aerobatic movements are performed with astonishing ease and grace as it collects insect food from the air.

This swallow is not a pugnacious bird, but somehow it manages by quiet, persistent insistence to attain its end and to succeed in the struggle for existence, somewhat to the detriment of other species. So well has it succeeded, that the most trying phase of its struggle for existence among the cottages is with members of its own species rather than with other kinds of birds and enemies. More specifically, it is a struggle for nesting sites.

Violet-green Swallows nest in cavities. In olden times deserted woodpecker burrows in trees furnished most of the nesting places, but with man's advent bringing buildings, artificial bird houses, and various types of knot-hole cavities, the birds are capitalizing on these. So keen is the struggle for nesting places that there is not only a waiting line, but apparently more than one pair of birds are concerned with one nest.

We were watching a nest one day, keeping tab on the number of feeding visits of the parent birds to their young in the nest. It soon became clear that more adult birds were coming to the nest than bird-housing ordinances allow. One female swallow came with food, entered the nest and before she had gone another came, perched on the stub of a branch sticking out from the hollow nesting log and tried

to enter by way of a knot hole that was too small. Then as the first female left, the second one entered the nest, remained for a few seconds and left. (At close range and in good light sexes could be quite readily distinguished by the duller colors and grayish cheek of the female). This performance was repeated several times within an hour, one female persistently trying first to enter by way of the small knot-hole, then, failing, would enter by way of the larger opening. The other female went directly to the real entrance. One male bird stood guard and rarely entered the nest. He was kept busy chasing other male swallows away, but did not seem to object to either of the females coming.

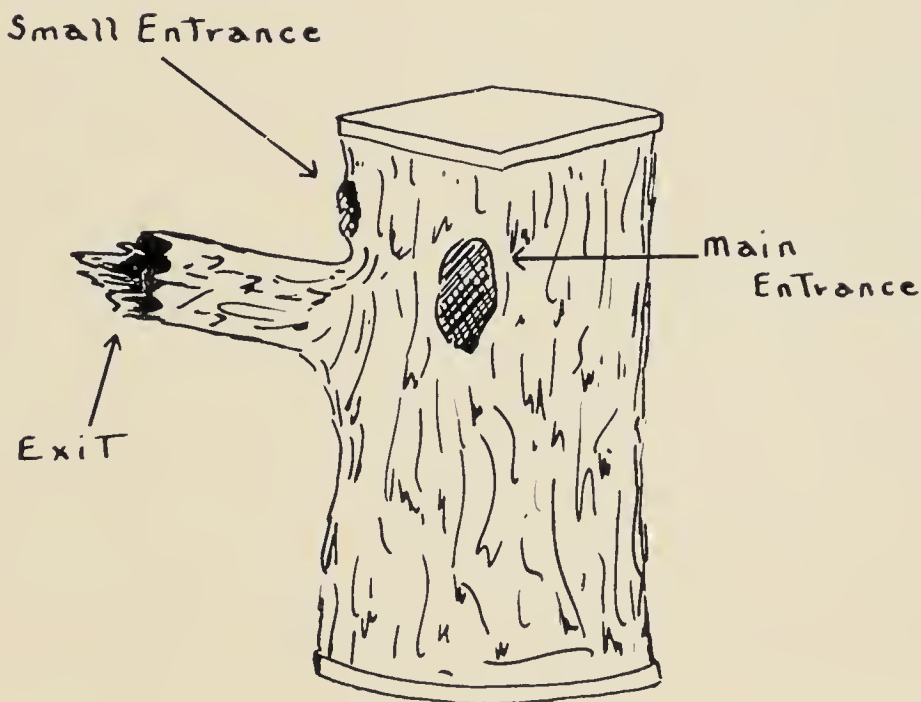


FIG. 20. Nesting box of the Violet-green Swallows.

This performance of more than one female swallow visiting the same nest was not a coincidence, nor the only instance of unusual nesting behavior of the Violet-green Swallows. After our suspicions and curiosity were aroused, we gave special attention to the birds in order to verify our first observations.

Another nest, built in a bird house made from a twisted hollow limb fastened to a pine tree near my window, could be most conveniently observed. Here, too, there was more than one female swallow interested in the nest. At one time three female birds and one male were at the nest. The male, keeping guard, paid little attention

to the other birds unless it was a bird of some other species that arrived, or a male Violet-green Swallow. A female swallow, which may be termed No. 1, entered the nest to feed the young. Another came and lit on a branch near by, then fluttered at the entrance to the nest but did not enter. Bird No. 1 left and at the same time bird No. 3 arrived and entered the nest, remained a few seconds, flew out, and perched on the branch near bird No. 2 and the male. Bird No. 1 came back after a few minutes, chased Nos. 2 and 3 away and entered the nest. At other times one of the extra females would peck at the male guard and try to drive him away without any retaliation on his part.

Female No. 1 seemed to have priority of claim to the nest. She often remained with her head at the doorway and pecked at intruders. She was also on very good terms with the male. The other female birds seemed to be merely meddlesome busybodies who had no home of their own nor young to care for, and, like a cat that has lost her kittens, just had to have some one to mother.

Mountain Bluebirds have some slight advantage over the Violet-green Swallows in securing nesting places. They arrive earlier in the season and have begun housekeeping before the swallows arrive. Even so, they have to keep close guard or their nest will be taken.

A bluebird built in a nesting box under the eaves of the lodge at Camp Olympus, Estes Park. When the swallows arrived they tried to take the place but were warded off by the vigilant male bluebird. A pair of swallows then began a patient endurance waiting game. They remained at hand constantly. If opportunity were given they would perch at the doorway and peek in. This was especially noticeable when the young bluebirds grew older and were about ready to leave the nest. Finally, when they did leave, that very day the Violet-green Swallows entered and took possession.

Violet-green Swallows are near kin to Tree Swallows that inhabit northern portions of the United States and Canada and, during migration, travel across the central portions of the country. Other relatives are Cliff or Eave Swallows that build "clay jug" nests under projecting cliffs or under eaves of buildings, and Barn Swallows that have "swallow tails", and build open cup-shaped nests of clay plastered on rafters and beams inside of barns. Still other kin are Rough-winged Swallows and Bank Swallows that tunnel into cliffs of earth. These latter, as well as the Cliff Swallows, prefer to live in colonies. Sometimes hundreds of nests are found in the same cliff.

KANSAS CITY TEACHERS COLLEGE,
KANSAS CITY, MO.

A BIRD CENSUS METHOD

BY W. J. BRECKENRIDGE

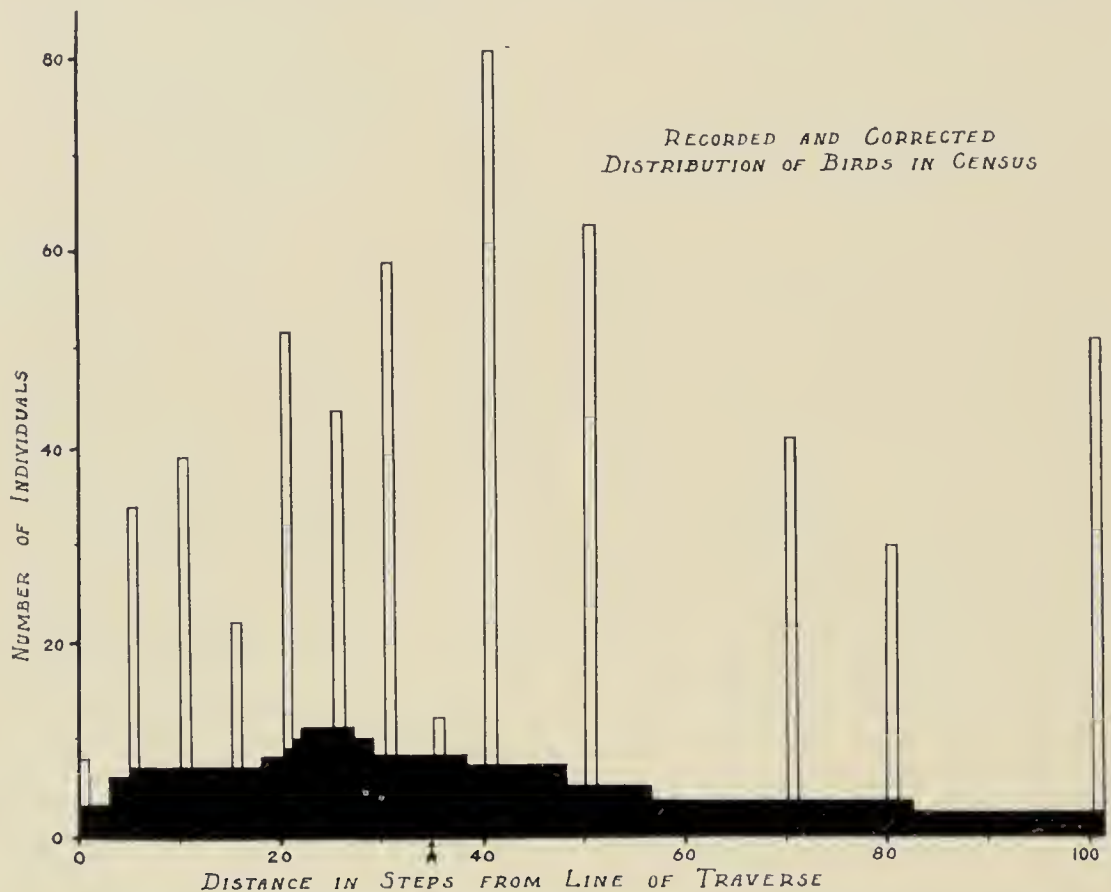
During the course of an ecological study of the Marsh Wrens in a limited area in eastern Minnesota, the writer found it desirable to ascertain something regarding the populations of other birds breeding on the same area. Numerous census methods have been described by other workers. Most of these have been devised to indicate relative densities of populations for different areas or periods and were not applicable to the present study. Others have attempted to determine actual populations of limited areas, but their methods, while workable perhaps for very small tracts, could not be applied successfully to areas of a square mile in extent, the size of the tract in the present study.

The square mile on which this census was taken lay in very slightly rolling country. The ridges were covered by a sparse timber growth, the depressions were grown up to sedges and bluegrass, while the narrow belt between these two supported short willow and dogwood brush. These vegetative types appeared in irregular, narrow strips or isolated patches so intermingled as to be impossible of separate study in regard to avian populations. The following paragraphs describe the method used in this mixed type of vegetative cover and include some results from this particular census.

The observer (the writer worked alone in this study) traversing the section along compass lines, identified each individual bird, as far as was possible, as it was encountered and recorded the species and the approximate distance in steps (2,000 of the writer's equaled one mile) from the compass line from which it was seen. The section was thus crossed four times along parallel lines separated from each other by at least three hundred and fifty steps. This avoided the possibility of counting the same individuals twice. By following compass lines the observer avoided favoring or neglecting any one type of cover. These traverses were made during the morning and evening hours when the birds were most active. In the present study one census was made along north-south lines while a checking census was made along east-west lines a week later.

The securing of the total population was the primary object in the present study. In order to obtain this, the total number of birds flushed at each of the indicated distances from the compass line was determined and plotted as one of the open bars in the accompanying figure. It was assumed that some error occurred in estimating these distances. For those recorded as flushed at ten steps, for instance, the

actual distance probably varied between seven and thirteen steps, and for those recorded at forty steps the distance varied perhaps from thirty-two to forty-eight steps. Accordingly these errors were corrected by distributing the records over those ranges and the result, appearing in the figure as the shaded portion, presented a fairly accurate picture of the actual distribution of the birds flushed. From this picture it appears that few birds were flushed directly on the line and that the number increased as the distance from the line increased



up to twenty-five steps where they dropped again to a level and then began to show a definite decrease between thirty-five and forty steps. The explanation for this was that a portion of the birds occurring on the line of traverse moved outward in the vegetation and appeared a short distance on either side of the line. Then, allowing for this movement, it is seen that the maximum flushing per step from the line occurred equally out to about thirty-seven steps where a decrease began. Therefore one may safely assume that *at least* the number of birds flushed within the thirty-five step line (two hundred and seventy in this case) would be encountered on every strip seventy steps wide (thirty-five on either side of the line) and four miles long throughout the section. On this basis the *minimum* population for this particular

mile proved to have been 1,929 birds or 3.01 birds per acre. This would necessarily be somewhat under the actual number present as one man crossing the area would not record every individual bird on a strip seventy steps wide. A number of individuals walking close together might materially reduce the error from this source. Strangely enough, due to the above mentioned outward movement of the birds before flushing, calculations based on those seen on a very narrow strip, e. g., twenty steps in this case, produced a smaller total than those using the wider strip. No way of determining just what percentage of the actual population these figures represent is known, therefore the results arrived at in the above manner must be taken as *minimum* populations.

Information regarding the actual and relative abundance of the more common species was also secured from the above mentioned data. Figures similar to the one constructed for the total population were drawn up for the more abundant species separately. Here the same scarcity of records on the line with an increase outward was evident. A limit was set in each case beyond which the records began to definitely decrease. The number of birds was determined within this limit and from this the species totals for the square mile were calculated. In the case of those species other than the very abundant ones where comparatively few individuals were encountered on four miles of traverse, numbers thus calculated would usually be rather inaccurate. Accordingly the results thus arrived at in this case were considered comparatively dependable only for the five most abundant out of the sixty-seven species found nesting on the tract. The totals for these five species follow:

1. Clay-colored Sparrow	540
2. Song Sparrow	227
3. Yellow Warbler	212
4. Catbird	143
5. Northern Yellowthroat	140

This method of determining actual bird populations, like all other methods, is open to criticism at various points. However, it is here presented as being considerably more accurate than mere estimates would be, and as producing numerical results which may be depended upon not to be in excess of the actual populations but which are in all probability a small percentage under the actual numbers of birds present on any areas so studied.

UNIVERSITY OF MINNESOTA,
NATURAL HISTORY MUSEUM AND DEPARTMENT OF ZOOLOGY,
MINNEAPOLIS, MINNESOTA.

VALUE OF FIELD OBSERVATION IN ECONOMIC ORNITHOLOGY

BY W. L. MCATEE

In the WILSON BULLETIN for June, 1934 (Vol. 46, No. 2, pp. 73-90) is an article by E. R. Kalmbach entitled "Field Observation in Economic Ornithology."

Mr. Kalmbach is careful to say that he does not wish "to discredit in the least stomach examination as a fundamental procedure in the solution of problems in economic ornithology" (p. 74), but considering the superficiality of most reading and the proneness of humans to see in a thing what they wish to see, it is, after all, not surprising that some have jumped to the conclusion that the method of stomach analysis has been authoritatively pronounced obsolete.

It may be well, therefore, to cite from Kalmbach's paper phrases additional to that just quoted, that show he had no such intention. He says, "there must be no slackening in laboratory research" (p. 80). "Let it not be inferred, however, that stomach examination . . . does not play a most important, yes, indispensable rôle in our science . . . certain of the practical problems of economic ornithology lend themselves to direct solution solely or largely through this method of approach" (p. 80). "In this capacity, the laboratory channel of approach never will be excelled. Stomach analyses of extensive and representative material is the only means, furthermore, of creating a background for proper appraisal of the general economic status of birds, something that is needed as a check upon every local or specific [i. e. field] study" (p. 81). "It is a truism . . . that stomach examination, carefully conducted, gives the best possible index to the food items of a bird" (p. 88).

The writer hopes that this grouping of Kalmbach's references to the method of stomach analysis may be the proper corrective for those who thought they saw, in his essay, something to quite the contrary effect. Kalmbach certainly did not mean to condemn the method of stomach analysis for it is the principal reliance in researches he is now conducting and directing in one of which, for example, on the food habits of the armadillo, little progress could be made in any other way.

To bring out both sides of the argument and to combat the impression the paper has made that stomach analysis is obsolete, the following comment is offered: The method of stomach examination "has acquired, in both the scientific and lay mind, a status of finality shared by no other method of approach" (p. 74). Apparently it needs saying that there is no such thing as finality in any field of

knowledge. Least of all should the scientist admit that term to his vocabulary. In science all questions are forever open.

“Limitations in this well-established procedure” [stomach analysis] (p. 74). Every method of studying the food-habits of wild life has its limitations—they are not peculiar to laboratory work on the contents of the alimentary tract. We should avail ourselves of all methods, thus taking advantage of any special excellence each may have and profiting by any mutually corrective principles that may appear.

“Knowledge of field conditions and the circumstances surrounding the collecting of stomach material is the key to proper interpretation of food items” (p. 75). If that knowledge could be full and accurate this statement might be acceptable, but as a matter of actual experience we do not often get either full or accurate knowledge of the doings of any wild thing in the field. It is a commonplace of laboratory procedure to find that the collector’s remarks on what a bird was apparently eating are not verified by analysis of the stomach contents. Not only is it difficult to make observations in the field that will be very helpful in connection with the study of individual stomach contents, but if we attempted to adopt a policy of having “the examiner of bird stomachs personally . . . collect every specimen which he later examines” (p. 75), meanwhile getting accurate “knowledge of field conditions and the circumstances surrounding the collecting” (p. 75), comprehensive investigations would be impossible. The proposal would be merely one more of those ideal conceptions that can not be accomplished in reality. What we have needed and still need in the case of certain groups of birds never reported upon is comprehensive information regardless of shortcomings as to detail that will give us a general idea as to food-habits over a wide range, perhaps the whole United States, at all seasons. We can get some sort of approximation to that knowledge by the analysis of a large number of stomach contents, well distributed both seasonally and geographically, but we can not get it by intensive field study simply because of the impracticability of allotting for the purpose, the time, the men, and the funds that would be necessary.

The field method of studying economic ornithology can not be our main reliance, not only by reason of impracticability, but also because it cannot be as comprehensive as the laboratory method, nor does it have as high a degree of accuracy. In this as in all sciences what we learn in the laboratory is the most exact and reliable part

of our knowledge. What we learn in the field is more tentative and usually in need of some process of checking or verification.

Even in studies where every effort is made to obtain in the field an accurate idea of what a bird is feeding upon, the results are far from satisfactory when checked with those derived from the analysis of stomach contents. For example, to facilitate laboratory study of a large series of stomachs of Gambel's Quail from Arizona, D. M. Gorsuch supplied notes on what he had come to regard as important foods of the species as a result of field observations. When work on the stomachs (178 in number) was completed, it was found that of foods considered important by the field observer and so recorded in his notes or in his recent report on the bird (Univ. Ariz. Bull., Vol. V. No. 4, May, 1934) six had that rank in the laboratory findings and five did not. The use of five unimportant items also was verified. Of foods not noted at all by the field observer seven were found of considerable, and eighteen of lesser, importance in the laboratory. In other words the field observer's results were verified in eleven cases (five of them unimportant) and not in five, while those results did not include at all seven items of primary, and eighteen of secondary, importance in the diet of the quail. This gives an efficiency rating of 27 per cent for the field observations, and that without taking into account some scores of minor items revealed by stomach analysis but which could not be learned at all by field study.

"Correct interpretation easily may be a matter of greater significance than the identification of the item itself" (p. 76). It should not be overlooked, however, that interpretation can not begin until the identification is made. Interpretation may be aided by field observation but it can safely be said that accurate identification of food items can be obtained in the vast majority of cases only by laboratory procedure. Without identification there is not even a beginning of knowledge.

"Correct interpretation" again, so far as applied to the intricate subject of wild life economics, denotes an ideal often unrealized. This science is peculiarly one of approximations and it can not be expected that interpretations will be of better quality than the data on which they are based. Thirdly, let it be remembered always that "interpretation" is a necessary adjunct to wild life food habit studies of whatever type. In other words, if we are wise we will bring to bear on each problem all of the information we can obtain from every source—with due credit to all and without undue disparagement of any.

English Sparrows consuming insects attracted to city arc lights "may suddenly assume the prosaic rôle of a scavenger of doubtful

utility" (p. 79). There is no doubt as to the utility, only as to its degree.

"Modern decisions" (p. 79). If the term "decision" is used in the ordinary sense of settling or terminating discussion of a given matter, it is another of the too positive expressions used in this discourse. See remarks under "finality", (p. 74). There are no such things as final decisions in wild life economics. Problems are often not only local but they may be very temporary. A "decision" may be no more than uttered before the situation changes. As applied to food habit studies, these things emphasize the necessity of generalizations from a satisfactory number of stomach analyses since the local and shifting field conditions in themselves can not be so summarized. Field problems are local and temporary and corresponding valuation is about all we can give to observations, interpretations, or decisions about them.

"General tendencies for good or harm can be shown" (p. 88). This is about all that can be expected from economic studies whenever they cease to be strictly local. It is not the function of general food habit studies to attempt to show in concrete terms how much good or harm is being done. The science, as remarked before, can only be one of approximations, hence its output should not be represented as more than statements of economic tendencies.

"The effect of feeding habits . . . in the final analysis, is the actual goal in many modern problems of economic ornithology" (p. 88). This has a matter-of-course sound but in reality the goal mentioned is attained only locally and then in case damage to a crop or other measurable thing is involved. The effect of feeding habits on unmeasurable things as natural populations of weeds, insects, etc., can hardly be referred to as a goal because in most cases it is unattainable.

"Determination of the economic status of a bird" (p. 88). There is no such thing as "determination" if that meant establishing an economic status that will have final and universal validity. It is possible to arrive at good summaries of average food habits which are the best guide we can have as to the general treatment of species. This is the basis ordinarily needed for legislation and regulation. It has been furnished by stomach analyses and is something we could never attain as a result of field studies on account of the very size and complexity of the problem.

"Economic status and food habits are, by reason of their fundamental aspects and definitions, antithetic" (p. 88). If the proposition were true, as stated, we would hardly base our studies of economic status chiefly on food habits. In the same paragraph Kalmbach admits

that the study of food habits reveals sustenance. Since choice of sustenance and its effects are what mold our opinions as to economic status, it would seem difficult to defend the antithesis.

“Primarily the objective in our problems is one of economics; yet the product of much research into the economy of birds is purely biological” (p. 88). Sufficient rebuttal to this pronouncement is that the science of economic biology fuses the two, in actuality, as well as in name.

Continuing directly from the preceding quotation, “This product, the result of painstaking stomach examination, often is looked upon as the end sought or, if not actually the goal itself, so close an approach to it that the intervening gap is but a step in a simple process of deduction. Therein lies a fallacy that has served as the theme of much of this paper” (pp. 88-89).

Has that fallacy in fact existed?

In 1880 S. A. Forbes the founder of scientific economic ornithology tells, in a paper on *The Food of Birds*¹ why he adopted the volumetric method of tabulating the contents of bird stomachs and says, “The comparison, however, is merely a quantitative one. . . . It is evident, therefore, that we cannot get at any close estimate of the economic values of this species in this indiscriminate way. . . . (and referring to insects in particular) the opinions of entomologists would probably be found to differ somewhat widely on the question of the relative values of these various elements, and each must form his own opinion from the data given” (pp. 102, 103). These remarks clearly show that Forbes recognized the necessity of interpretation of the results of stomach analysis—a recognition he put in deeds also by studies of the food of ground and lady-bird beetles so that their significance in the food of birds could be more accurately appraised. Forbes pursued his researches in the field as well as in the laboratory.

In 1897 F. E. L. Beal in commenting² on Gilmour’s statement that even the consumption of waste grain by rooks must be counted against the birds, as it shows their taste for grain, says, “This is not fair. Grain so obtained has no value to the farmer and should not be reckoned as a loss.”

In 1904 Professor Beal noted in a discussion³ of the California linnet or house finch that “fruit forms only 9 per cent of the annual food; consequently if the birds . . . were not so superabundant, the

¹Bull. Ill. State Lab. Nat. Hist. (1) 1 (3) Nov., 1880, pp. 80-148.

²The Auk, 14 (1), Jan., 1897, p. 11.

³Yearbook U. S. Dept. Agr., 1904, pp. 246-247.

harm done by them would scarcely attract attention. Their immense numbers cause the comparatively small percentage of fruit destroyed to swell into an enormous aggregate." The influence of local overabundance of birds on crop damage was a frequent topic of discussion by Professor Beal and together with the statements here quoted clearly shows recognition on his part of the necessity of interpreting the results of stomach analysis. It may be added that Professor Beal employed field work to a large extent in his studies.

In 1901 Sylvester D. Judd stated:⁴ "It is not easy to determine the exact relation of birds to agriculture, even though all of the constituents of the food are known; for the actual ratio of benefit to injury in the food habits can only be roughly approximated." Judd describes various methods of investigation in economic ornithology and recommends a combination of field work with stomach examination (pp. 11-18).

In 1912 the reviewer explained⁵ that "no one claims that percentages do express economic values. They are simply convenient handles to facts and they must be interpreted" (p. 452), and "it is very evident that interpretation of economic values is the most important point in presenting the results of stomach examination" (p. 453).

The reviewer has carried on field work in economic ornithology during a considerable part of his time for more than twenty-five years, and in connection with one project that he inaugurated—food resources of wild fowl—more field work has been done by him and his colleagues than on any other food habits undertaking of the Biological Survey.

Kalmbach charges that a fallacy has existed in that results of stomach analysis have been regarded as the end product. The quotations made here indicate that at least four of those cited by Kalmbach as leading students of economic ornithology have not entertained the "fallacy".

"To set forth the general course open to a fuller, a fairer, and withal, a scientific appraisal of the economies of bird life. Intensive field observations, which, in the attainment of their own peculiar objectives, may be conducted just as accurately and yield a product just as scientific as the painstaking work of the laboratory, come foremost" (p. 89).

The objectives certainly would have to be very closely limited to give validity to this dictum. As noted previously they can only

⁴Bull. 15, U. S. Biol. Survey, p. 17.

⁵Methods of Estimating the Contents of Bird Stomachs, Auk, 29 (4), Oct.,

concern readily measurable things, that is, almost exclusively crops. Field observations may yield valuable information supplementing stomach analysis in various directions, but from the very nature of things (except in the directions indicated) they can not be as accurate as laboratory work. To put the matter tersely, it is apparent that we can learn more about the harmful traits of birds by field observation and more about their beneficial tendencies by laboratory investigation. The two activities complement each other and to attempt to substitute either for the other in its proper sphere is a mistake.

Actual demand at the present time for work in economic ornithology certainly is just as strong for further laboratory investigation as it is for that in the field. In fact every field study brings its own problems that require laboratory analysis for their solution. Every one of the recent game bird investigations, and every one of the modern game management projects has produced its demands for analyses of stomach contents, feces, and pellets. Great need has arisen for information on the food of the birds concerned, their competitors, and predators, and appeals have been made in embarrassing volume to the food habits research laboratory of the Biological Survey, the only public agency from which the desired assistance can be obtained. More than 5,600 food analyses have been made of the game birds alone and hundreds of stomachs and crops are on hand waiting examination.

To sum up, it must be stated, contrary to the conclusions of some readers of Kalmbach's paper, that the method of laboratory analysis is still quite alive and in great demand as a food habits research procedure.

It can not be replaced by field work but can be valuably supplemented by that method. It should not be assumed that field work has been neglected in studies of economic ornithology in the United States. In fact, policies of the Biological Survey have always called for a combination of field and laboratory investigations and these policies have been carried out whenever practicable.

It must not be forgotten that field work has its limitations the same as laboratory work, and that it has the added disadvantage that it can never be carried on extensively enough to represent local conditions in all parts of the country. In other words, a general picture of the economic ornithology of the United States can never be obtained by field work alone, but only by intensive use of all available methods of food habits research.

U. S. BIOLOGICAL SURVEY,
WASHINGTON, D. C.

ADDITIONAL IOWA SPECIES OF BIRDS SUBSTANTIATED
BY SPECIMENS

BY PHILIP A. DU MONT

In a recent review¹ of "A Revised List of the Birds of Iowa"² it was stated that twenty-seven species of birds included in this list were unsubstantiated by specimens. Attention is directed to a mimeographed report³ issued by the writer to bird students in Iowa enumerating thirty-five species as those actually deficient of specimens at the time of publication. These were as follows: Red-throated Loon, Western Grebe, Water Turkey, Man-o'-war-bird, Little Blue Heron, Snowy Egret, Wood Ibis, Cinnamon Teal, American Scoter, Harris's Hawk, Black Rail, Hudsonian Curlew, Black-necked Stilt, Louisiana Paroquet, Burrowing Owl, Great Gray Owl, Nuttall's Poor-will, Red-shafted Flicker, Lewis's Woodpecker, Arctic Three-toed Woodpecker, Say's Phoebe, American Raven, Common Rock Wren, Eastern Mockingbird, Sprague's Pipit, Sycamore Warbler, Hooded Warbler, Northern Prairie Warbler, Western Blue Grosbeak, Lazuli Bunting, Gray-crowned Rosy Finch, Greater Redpoll, Lark Bunting, McCown's Longspur, and Chestnut-collared Longspur.

Of this list of thirty-five species twenty-nine were formerly represented by collected specimens believed to be unsaved or since have been destroyed. One species (Western Blue Grosbeak) of the six heretofore unrepresented by specimens has been collected since the publication of the list. Therefore, only the Western Grebe, Wood Ibis, Lewis's Woodpecker, Say's Phoebe, and Lazuli Bunting have been credited to Iowa without the actual taking of a specimen or the securing of an authentic set of eggs.

Since the publication of "A Revised List of the Birds of Iowa" in 1933 specimens or the eggs of twelve species of birds which were taken in Iowa and which were included in that list have been found or collected.

RED-THROATED LOON. *Gavia stellata*. The mounted specimen reported as being in Keokuk and taken on the Des Moines River near Ottumwa, Iowa, has been found in the collection of mounted birds in the Keokuk High School. This specimen was examined by the writer on May 10, 1934. Mr. E. H. Purcell of Keokuk, in checking the data, wrote that this bird, a male in winter plumage, was taken by Heiser on April 28, 1873.

¹WILSON BULLETIN, XLV, No. 4, pp. 206-208.

²Univ. Iowa Studies, Nat. Hist., XV, No. 5, pp. 1-171.

³Mimeographed bulletin, 60 copies issued from Spencer, Iowa, on February 22, 1934.

LITTLE BLUE HERON. *Florida caerulea caerulea*. Two juvenile males were secured by Logan J. Bennett and Gerald B. Spawn, both of Ames, on July 24, 1934, along the south side of Elk Lake in Clay County. Both of these specimens are in the collection of the Department of Zoology, Iowa State College, Ames, and have been examined by the writer.

CINNAMON TEAL. *Querquedula cyanoptera*. An adult male is contained in the Stempel collection at Macedonia, Iowa. M. A. Stempel advised me he had killed the bird from a flock of about fifteen Blue-winged Teal, three-quarters of a mile west of Macedonia, Pottawattamie County, during late April in the late '90s. The specimen was examined by the writer on November 9, 1934.

AMERICAN SCOTER. *Oidemia americana*. On April 6, 1934, Prof. W. E. Praeger of Kalamazoo, Michigan, wrote that the specimen of American Scoter which was "probably shot on the Des Moines Rapids" on October 31, 1894, was still in his possession.

HUDSONIAN CURLEW. *Phaeopus hudsonicus*. On April 3, 1935, P. A. Taverner, Curator of Birds at the National Museum of Canada at Ottawa, wrote that the specimen of Hudsonian Curlew which Rudolph M. Anderson had collected on the prairie west of Crystal Lake, Hancock County, May 25, 1895, had been deposited in their museum where it now is, in good condition. It is No. 17464 in the museum catalogue. Taverner stated that there was no question as to the identity.

LOUISIANA PAROQUET. *Conuropsis carolinensis ludovicianus*. On January 24, 1934, Prof. Myron H. Swenk wrote as follows: "In the United States National Museum collection are specimens of the Louisiana Paroquet (*Conuropsis carolinensis ludovicianus*) that were taken on 'Bald Island' by Dr. F. V. Hayden in the spring of 1856. I believe it was. I have identified 'Bald Island' through Lieutenant G. K. Warren's map with McKissock Island at the Otoe-Nemaha County line, which now has been cut off from Nebraska and lies entirely east of the Missouri River though technically still a part of Nebraska."

In answer to my letter of June 18 to the U. S. National Museum endeavoring to determine the present existence of a substantiating specimen from this point of intersection for Nebraska-Iowa-Missouri, Mr. J. H. Riley, Assistant Curator of Birds, sent the following reply on June 21: "There were originally eleven specimens of paroquets received through Lt. Warren, all presumably from Bald Island. The locality of three of these is in doubt, however, as it was not so speci-

fied in the catalogue. Baird, Pacific Railroad Reports, Vol. 9, 1858, p. 68, gives twelve specimens, but one of this number is duplicated and the specimen marked 'fresh', and it may not have been saved. Three of his numbers are also not definite as to locality, one simply marked 'Nebraska' and other two blank. Of the eleven specimens only one skin remains in the study series of the National Museum, though a few may have been used in an old mounted group of which the individual data have been lost. Seven were exchanged or given away. Four were sent to Verreaux, Paris, two to the University of Michigan, and one to Dr. Henry Bryant, later becoming the property of the Museum of Comparative Zoology, and the type of *Conuropsis carolinensis interior* Bangs, Proc. New England Zool. Club, Vol. 4, 1913, p. 94. The skin remaining in the study series is a typical *Conuropsis carolinensis ludovicianus*." (See also the full account of the occurrence of this bird along the Missouri River Valley, as contained in the *Nebraska Bird Review* II, pp. 55-59).

WESTERN BURROWING OWL. *Speotyto cunicularia hypugaea*. A male and a female in the study collection of the Department of Zoology, Iowa State College, Ames, were secured by Logan J. Bennett one-half mile north of Elk Lake, Clay County, July 13, 1933. These specimens were recently examined by the writer.

RED-SHAFTED FLICKER. *Colaptes cafer collaris*. Mr. Frank C. Pellett of Hamilton, Illinois, wrote on December 6, 1933, that the specimen which he secured near Atlantic, Cass County, September 25, 1896, still remained in his private collection at Atlantic. A male of this species was collected by J. R. Harlan, in Van Buren County, on October 22, 1933. On December 26, 1934, the writer collected an adult male Red-shafted Flicker along Walnut Creek in Des Moines, Polk County. The moustache marks of both this specimen and the one secured by Harlan show only a trace of black basally and the quills of wings and tail are bright orange.

PRAIRIE WARBLER. *Dendroica discolor*. Mr. Ed. S. Currier of Portland, Oregon, wrote on January 16, 1935, that he had found only one nest of this species in Lee County, Iowa. That was on June 5, 1886. The eggs, which were fresh, are number 122 and are still in Currier's Collection.

HOODED WARBLER. *Wilsonia citrina*. In Mr. Ed. S. Currier's letter of January 16, 1935, from Portland, Oregon, he stated that in his

collecting along the Mississippi River that he had found a total of twenty-five nests of this species, two being in Lee County, Iowa, and the others were in Missouri. The nests taken in Iowa were on June 24, 1894, in the bottom-land not far from the mouth of the Des Moines River. These two sets are numbered 2274 and 2275 in the Currier Collection.

WESTERN BLUE GROSBEAK. *Guiraca caerulea interfusa*. Mr. Wm. Youngworth of Sioux City, Iowa, collected one of two birds, a male, found two and one-half miles north of Sioux City along the Big Sioux River in Plymouth County, June 23, 1934. Youngworth had observed birds of this species in the vicinity on previous occasions. This is believed to be the first Iowa-taken specimen. It remains in the Youngworth collection (see WILSON BULLETIN, XLVI, p. 257) where the writer was allowed to examine it on July 1, 1934.

MCCOWN'S LONGSPUR. *Rhynchophanes mccowni*. There are three mounted specimens, two males and a female, contained in the private collection of the late Dr. George E. Stempel of Macedonia, Iowa. These birds, in spring plumage, were taken by Dr. Stempel near Macedonia, Pottawattamic County, about 1886. This collection, displayed in the town hall, is now under the custodianship of M. A. Stempel, a son, who supplied these data at the time the writer examined the collection, November 9, 1934.

The "Revised List of the Birds of Iowa" contained 364 species of birds known to have occurred in the state as well as eighteen others whose occurrence was considered hypothetical. The taking of a Black Vulture (No. 365) was appended in a footnote on page 44 (see also the WILSON BULLETIN, XLV, p. 203). The securing by the writer of what is probably the only Iowa specimen of Shufeldt's Junco is related in the WILSON BULLETIN, XLVI, pp. 200-201.

The writer has prepared notes on the recent discovery of an Iowa specimen of the European Widgeon, the taking of specimens of the Brown-headed Nuthatch during 1893 in Lee County, and the recent capture of a Chuck-will's-widow in the same county. Unfortunately, specimens of neither of the last two species were saved.

Therefore the Iowa list of birds now totals 369 species and subspecies of which all but twenty-five are represented by preserved specimens.

DES MOINES, IOWA.

THE BIRDS OF FORT SISSETON, SOUTH DAKOTA,
A SIXTY YEAR COMPARISON

BY WM. YOUNGWORTH

The location of old Fort Sisseton is in Marshall County, in the extreme northeastern corner of South Dakota. The old fort buildings are being restored at the present time by workers from a Federal Transient Camp and the fort area will then become a state park. It was here that Dr. Charles E. McChesney spent the years from 1875 to 1878 as acting assistant surgeon, and it was in this region that he studied ornithology.

In his publication, "Notes on the Birds of Fort Sisseton, Dakota Territory" (1879), he mentions that he often traveled fifteen to twenty miles or more, in different directions from the post. In his letter of transmittal, of the above mentioned paper, to the United States Geological Survey, Dr. McChesney says the following of the above mentioned areas which he traveled over: "In many respects, the region differs from any other part of the Northwest. The 'Coteau des Prairies' consists of an extensive plateau, rising, somewhat abruptly, nearly four hundred feet above the level of the surrounding country, having a length of over one hundred miles, and a variable width of from twenty to forty miles. Upon this elevated plateau are many lakes, which are the annual resort of thousands of waders and wild fowl, and the region differs greatly in its fauna from that of the lower country."

There have been many interesting changes in the bird life of this region. Settlement of the country has caused extermination of some species and a definite increase in certain other species. The writer will discuss briefly the status of some of these species in the annotations. The statements are based on observations made from five trips to the region. The first trip was during June, 1929; following trips were made in July, 1929, June, 1930, June, 1931, and June, 1935.

Again referring to Dr. McChesney's letter of transmittal, it must also be stated that when he included three western forms of grouse, he did not indicate that the birds had ever been observed at Fort Sisseton. Dr. McChesney merely included the Dusky Grouse, Sage Grouse, and Rocky Mountain Ruffed Grouse for the benefit of army officers in western Dakota and Montana, who were interested in bird life and desired a description of the birds.

The writer is greatly indebted to Mr. W. F. Kubichek of the United States Bureau of Biological Survey, Washington, D. C., for permission to use some of his records in this paper. Furthermore,

this work could not have been completed without the generous aid of Mr. Arthur Lundquist, pathologist at Peabody Hospital, Webster, South Dakota. Dr. T. C. Stephens of Morningside College, Sioux City, Iowa, and Mr. Chas. J. Spiker, formerly of the National Park Service, Washington, D. C.

Mr. Lundquist is a veteran field man and has entered the bird banding field in a wholesale manner. He has probably banded more immature Double-crested Cormorants than any other individual bander in the United States. There is an account of his work in the WILSON BULLETIN for December, 1932.

This list of birds is not presented as a complete catalogue, for a list of a given region can never be fully complete, but it is merely an effort to bridge the gap of some sixty years of time and to show some of the changes that have occurred. Binomial nomenclature is used wherever possible. The asterisk (*) is used to denote species found by Dr. McChesney, numbering 154 forms. Seventy-seven additional species have been added to Dr. McChesney's list, bringing the total to 231 species. Species which we consider as summer residents in this region are denoted by the symbol °, after the asterisk.

COMMON LOON. *Gavia immer*.* Dr. McChesney reported great numbers of loons, but at present the loon is an uncommon migrant.

HOLBOELL'S GREBE. *Colymbus grisegena holboelli*.° This large grebe is a common summer resident on the various lakes on the Coteau and was evidently overlooked by McChesney. The hoarse cries of this bird are characteristic of the rush-filled sloughs of the region.

HORNED GREBE. *Colymbus auritus*.° This bird is not found as a common species and has not been seen in numbers. Indications are that it breeds sparingly in the Rush Lake region. It was not listed by Dr. McChesney.

EARED GREBE. *Colymbus nigricollis californicus*.° The Eared Grebe is a very common summer bird and often many colonies of several hundred birds each were found breeding on Rush Lake. Mr. Kubiehek has worked in such colonies and reports nests scattered everywhere. This is another species not mentioned by McChesney.

WESTERN GREBE. *Aechmophorus occidentalis*.*° A beautiful bird when seen in its natural surroundings and while mentioned in 1878 as occasional in migration, it is today found by hundreds on Rush Lake and other lakes of the region. Mr. Kubiehek has perhaps made a more thorough study of this species than any other ornithologist of the day, and he thinks that the species is holding its own in the area under consideration.

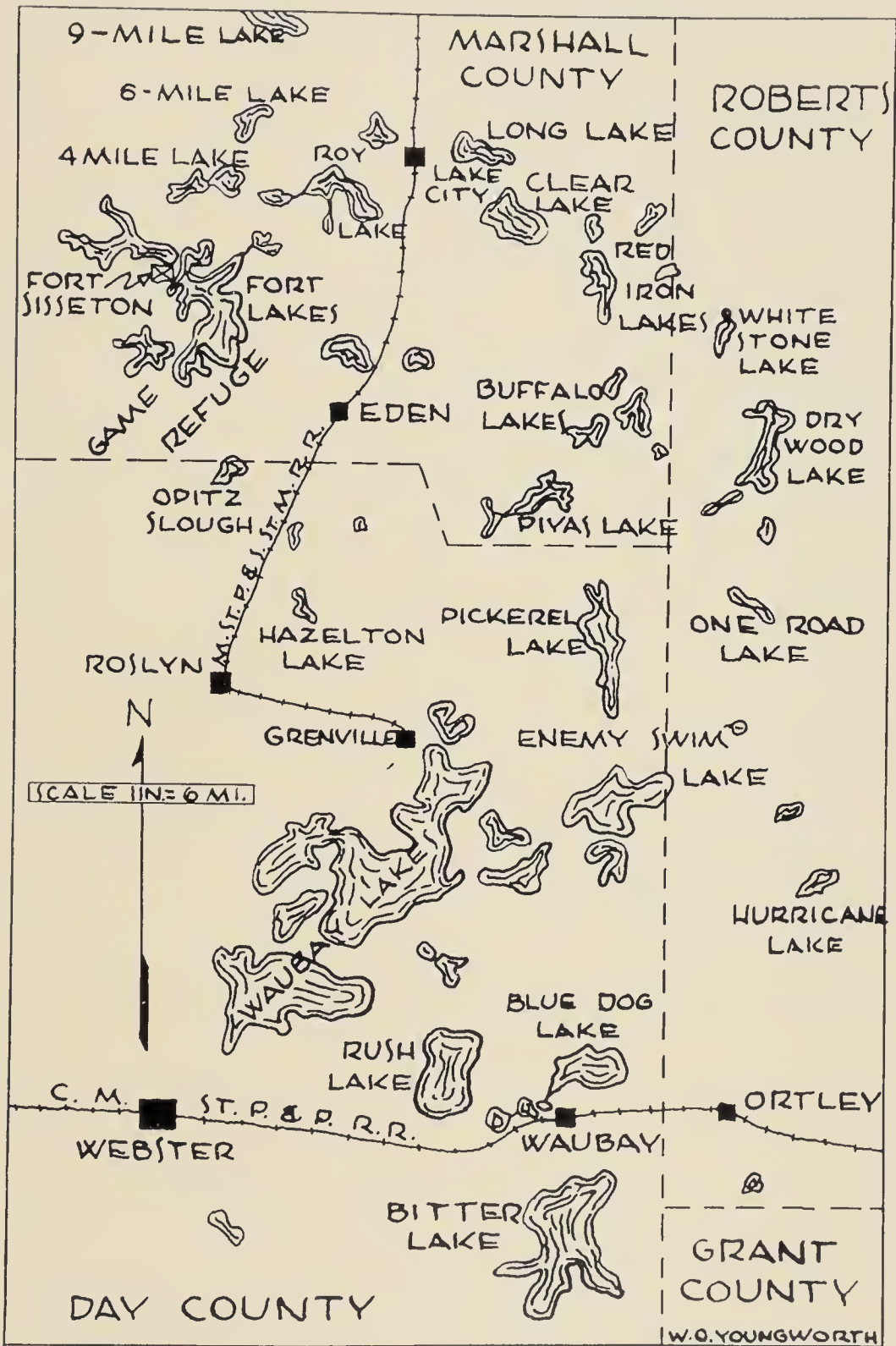


FIG. 22. The lakes of the Fort Sisseton country, in Marshall, Day, and Roberts Counties.

PIED-BILLED GREBE. *Podilymbus podiceps*.*^o A very common bird over the entire Coteau today, as in the early days.

WHITE PELICAN. *Pelecanus erythrorhynchos*.* A regular migrant on the larger lakes, but it is not a breeding bird, although in some years pelicans stay throughout the summer on the Waubay Lakes.

DOUBLE-CRESTED CORMORANT. *Phalacrocorax auritus*.*^o This big bird is still a common breeder despite constant shooting, and fine colonies nest on islands in South Waubay and Cattail Lakes. A large colony was recently destroyed on Roy Lake, not far from the old fort.

GREAT BLUE HERON. *Ardea herodias*.* A regular migrant, and it probably breeds in small numbers in this area.

AMERICAN EGRET. *Casmerodius albus egretta*. A single bird was taken by Mr. Kubichek in 1929, and was the first authentic record for the state of South Dakota. Details of this record have been published in *Iowa Bird Life* for September, 1929.

GREEN HERON. *Butorides virescens*.*^o Not any more common than in the days of McChesney's travels.

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax hoactli*.*^o Dr. McChesney did not locate a breeding colony of this species. Today, a large colony of birds nest on a wooded island in Rush Lake and are usually bothered by a family or two of Crows.

AMERICAN BITTERN. *Botaurus lentiginosus*.*^o Still found as a regular summer resident in suitable habitat.

LEAST BITTERN. *Ixobrychus exilis exilis*.^o This tiny bittern was not found by McChesney and although it has been found breeding on the Coteau, it is not a very common bird. On June 6, 1931, a pair of Least Bitterns were observed at their nest on Rush Lake.

WHISTLING SWAN. *Cygnus columbianus*. Mr. Lundquist reported to me, that he sees small flocks of these fine birds nearly every year on the larger lakes.

TRUMPETER SWAN. *Cygnus buccinator*.* The Trumpeter Swan is almost a bird of the past and is not now found in the Sisseton country, as it was in the days of Dr. McChesney.

CANADA GOOSE. *Branta canadensis*.* This goose passes through in large numbers, but the flocks are probably concentrated to a large extent, and it appears to the observer that the birds are not decreasing in numbers, yet we know that the number of geese is sadly depleted. Mr. Kubichek has taken specimens of the intermediate or Lesser Canada Goose.

WHITE-FRONTED GOOSE. *Anser albifrons albifrons*. Not mentioned by McChesney. This goose is a regular migrant, but not as common as the other forms.

SNOW GOOSE. *Chen hyperborea hyperborea*.^{*°} A common migrant in the spring and is often found resting near the larger lakes for some days at a time.

BLUE GOOSE. *Chen caerulescens*.^{*°} Probably more common than the Lesser Snow Goose and usually associated with that species while passing through this territory.

MALLARD. *Anas platyrhynchos platyrhynchos*.^{*°} The Mallard is a breeding bird and fairly large flights still occur in the fall of the year.

BLACK DUCK. *Anas rubripes*. This duck was not seen by Dr. McChesney. Mr. Lundquist says that a few Black Ducks are shot by hunters nearly every fall.

GADWALL. *Chaulelasmus streperus*.^{*°} The Gadwall is still a breeding bird and a regular migrant through the Coteau des Prairies.

BALDPATE. *Mareca americana*.^{*°} This species is a fall and spring migrant and some of the late birds still nest in this area.

PINTAIL. *Dafila acuta tzitzihoa*.^{*°} The Pintail is still considered a summer resident and quite a few are taken each fall by hunters.

GREEN-WINGED TEAL. *Nettion carolinense*.^{*°} A beautiful little fowl, which is still a regular migrant, but a rather uncommon summer breeder. A pair of these birds was found at Bitter Lake on June 7, 1929.

BLUE-WINGED TEAL. *Querquedula discors*.^{*°} The little blue-wing is one of the common nesting ducks found on the Coteau and many pleasant hours have been spent in watching this species during nidification.

CINNAMON TEAL. *Querquedula cyanoptera*. Mr. Lundquist writes that one or two have been shot by hunters since he has been hunting at Opitz Slough.

SHOVELLER. *Spatula clypeata*.^{*°} The Spoon-bill is still found as a regular summer resident near Fort Sisseton.

WOOD DUCK. *Aix sponsa*.^{*} Dr. McChesney reports a single specimen of this species. Hunters still take an occasional Wood Duck, but doubtless the birds are shot by mistake.

REDHEAD. *Nyroca americana*.^{*°} Not an uncommon breeding bird and a regular migrant.

RING-NECKED DUCK. *Nyroca collaris*.^o This species was not distinguished by Dr. McChesney. A regular migrant and possibly a few remain to breed, as birds have been seen in June.

CANVAS-BACK. *Nyroca valisineria*.^{*o} Not as common as the Red-head and only a few birds remain to breed. A nice nest was found in 1931 by Mr. Kubichek.

SCAUP DUCK. *Nyroca marila*.^{*} Dr. McChesney found this duck in some numbers during the fall migration.

LESSER SCAUP DUCK. *Nyroca affinis*.^{*o} This species is a regular migrant and a few remain to breed.

GOLDEN-EYE. *Glaucionetta clangula americana*.^{*o} Were found in the past in some numbers, this is hardly true today on the Coteau. Mr. Lundquist found the species breeding at Rush Lake during June, 1930. Two pairs were seen at Spring Lake on June 6, 1935, by the author.

BARROW'S GOLDEN-EYE. *Glaucionetta islandica*.^{*} Dr. McChesney reports a few specimens during the spring migration. There are no recent records of the species from this region.

BUFFLE-HEAD. *Charitonetta albeola*.^{*} The little Spirit Duck is not as common during migration, as it was back in 1878. Protection might restore it to some extent and preserve the species for a few years more.

OLD-SQUAW. *Clangula hyemalis*. A rare migrant in the Fort Sisseton country. Mr. Lundquist has taken this species during the hunting season.

WHITE-WINGED SCOTER. *Melanitta deglandi*. The scoters were not reported by Dr. McChesney. This species is not rare and some are shot nearly every fall.

SURF SCOTER. *Melanitta perspicillata*. This species is not seen as often as the preceding species and is usually found on the more open lakes.

RUDDY DUCK. *Erismatura jamaicensis rubida*.^{*o} Dr. McChesney found this duck as rare, while recently we have found it as common and a regular breeding bird over the whole region.

HOODED MERGANSER. *Lophodytes cucullatus*.^{*} Still found as a migrant, considered almost common in some years.

AMERICAN MERGANSER. *Mergus merganser americanus*.^{*} This large duck is also a regular migrant throughout the Sisseton country.

TURKEY VULTURE. *Cathartes aura septentrionalis*.^{*} Reported by McChesney as a common breeding bird. The vulture is not common any more, and only one bird was reported in 1931 by Mr. Lundquist.



FIG. 23. Old Fort Sisseton, looking across the parade ground to the officers' quarters.



FIG. 24. Ruins of the powder house at Fort Sisseton.

SWALLOW-TAILED KITE. *Elanoides forficatus forficatus*.* This beautiful hawk was not rare in the early days about Fort Sisseton. Today, it has disappeared from the entire northwest and is another of the vanishing species.

GOSHAWK. *Astur atricapillus*. The Goshawk was not mentioned by McChesney in his report. Mr. Lundquist reports that during certain fall seasons this hawk is a very common species.

SHARP-SHINNED HAWK. *Accipiter velox velox*.*^o This small hawk was found as a summer resident in 1878 and is still not uncommon around the old fort.

COOPER'S HAWK. *Accipiter cooperi*.*^o The Cooper's Hawk is one of the medium sized hawks which is apparently still holding its own in this part of the country.

RED-TAILED HAWK. *Buteo borealis*.*^o The four forms of the Red-tailed Hawk still pass through this region, but hardly in the numbers that they must have mustered back in the cavalry days of the West.

BROAD-WINGED HAWK. *Buteo platypterus platypterus*. This small buteo was not reported by Dr. McChesney. It is now found as a rare summer visitor.

SWAINSON'S HAWK. *Buteo swainsoni*.*^o In the old days of vast undisturbed prairies, the Swainson's Buzzard was a very common breeding bird. Now it is confined largely to the Missouri River region and is uncommon around Fort Sisseton.

AMERICAN ROUGH-LEGGED HAWK. *Buteo lagopus s. johannis*. The rough-legs were not found by McChesney during his stay. At the present time the rough-leg is a regular migrant and there are a number of mounted birds in the city of Webster.

FERRUGINOUS ROUGH-LEG. *Buteo regalis*. This species is not common like the former species.

GOLDEN EAGLE. *Aquila chrysaetos canadensis*.* The Golden Eagle is a regular migrant at Fort Sisseton. Mr. Lundquist says that this eagle is not uncommon in some falls.

BALD EAGLE. *Haliaeetus leucocephalus*.* This species also is found as a migrant, but not as often as the Golden Eagle.

MARSH HAWK. *Circus hudsonius*.* The Marsh Harrier is of course the most common of the summer hawks, as it was in the days of Dr. McChesney.

OSPREY. *Pandion haliaëtus carolinensis*. A very uncommon migrant.

DUCK HAWK. *Falco peregrinus*.* Dr. McChesney says that a few of these hawks stayed during the summer. The writer saw one on

June 5, 1931, which was having a thrilling aerial battle with a male Marsh Hawk.

PIGEON HAWK. *Falco columbarius*.* This small falcon is still a regular migrant. To date it has not been found breeding on the Coteau.

SPARROW HAWK. *Falco sparverius*.*^o The Sparrow Hawk is one of the small hawks, which has not decreased in numbers and is common during the summer season.

PRAIRIE CHICKEN. *Tympanuchus cupido americanus*.*^o The Prairie Hen nests on the Coteau in diminished numbers and will probably be crowded out by over-pasturing of land, rather than by more direct human contacts.

SHARP-TAILED GROUSE. *Pedioecetes phasianellus*.*^o This light colored grouse is still found in very small numbers in the Fort Sisseton country.

EUROPEAN PARTRIDGE. *Perdix Perdix*.^o This fine game bird has been introduced to the Coteau in recent years and is spreading rapidly everywhere. The writer believes that this bird and the Ring-necked Pheasant will in time crowd out the native Prairie Hen and Prairie Sharp-tailed Grouse.

BOB-WHITE. *Colinus virginianus virginianus*.^o Quail apparently had not reached the Fort Sisseton region when Dr. McChesney was there, but at present are found in small numbers in various wooded areas.

RING-NECKED PHEASANT. *Phasianus colchicus torquatus*.^o A foreign bird which is becoming very common.

WHOOPIING CRANE. *Grus americana*.* A fine bird, which is nearly extinct. There have been no recent reports from the region of this species, which was not considered common even back fifty years ago.

SANDHILL CRANE. *Grus canadensis*.* The Sandhill Crane formerly bred on the Coteau, but at the present time it is an uncommon bird even as a migrant.

VIRGINIA RAIL. *Rallus limicola limicola*.^o This species, which was not seen by Dr. McChesney, is not an uncommon summer resident and the nest has been found on the Coteau by Mr. Kubichck.

SORA. *Porzana carolina*.*^o An interesting little bird, which breeds in this region and is best studied from a blind.

FLORIDA GALLINULE. *Gallinula chloropus cachinnans*.^o The gallinule is a bird of the rush-filled lakes and was not listed by McChesney. It is a bird which is definitely in the class of skulkers and keeps close to cover in most cases.

AMERICAN COOT. *Fulica americana americana*.*^o The coot is one of the most common of the summer birds and is found in all the sloughs and pot-holes.

PIPING PLOVER. *Charadrius melodus*.^o The sweet voiced little piper was not found in 1878, but now the bird is a regular summer resident along some of the more open prairie lakes.

SEMIPALMATED PLOVER. *Charadrius semipalmatus*.* This plover is a regular migrant now as it was in the early days. It occurs both in the spring and fall.

KILLDEER. *Oxyechus vociferus vociferus*.*^o The Killdeer is one of the plovers which has not been decreased in numbers by the settling up of the land, and is apparently as common as it was sixty years ago.

GOLDEN PLOVER. *Pluvialis dominica dominica*.* Dr. McChesney gives a fine account of the wonderful flights of plovers, both spring and fall, in which flocks of thousands were constantly flying over. Such flights of Golden Plovers are, of course, only a memory and now one is indeed a fortunate ornithologist who sees a flock of a few hundred birds.

BLACK-BELLIED PLOVER. *Squatarola squatarola*.* Dr. McChesney states that he did not find this plover during the spring migration; however, it does come through in the spring and existing records would point to its abundance then, rather than in the fall. At this writing, however, the Black-bellied Plover is not a common migrant in any sense of the word.

RUDDY TURNSTONE. *Arenaria interpres morinella*.* The attractively marked Turnstone is a regular migrant as it was in former times and one is often privileged to see hundreds of the birds feeding in fields of sprouting corn. Smaller flocks are also found along the gravel beaches.

AMERICAN WOODCOCK. *Philohela minor*.* During 1877 and 1878 a few woodcocks were shot near the fort, but in recent years, according to Mr. Lundquist, this bird has not been found by hunters.

WILSON'S SNIPE. *Capella delicata*.* The snipe is a regular migrant and a few possibly remain to breed as they did years ago.

LONG-BILLED CURLEW. *Numenius americanus*.* This splendid bird, once common over the Great Plains, has left the Fort Sisseton country and has not been reported even as a migrant for many years.

HUDSONIAN CURLEW. *Phacopus hudsonicus*.* Dr. McChesney did not find this bird at Fort Sisseton, although he gives it in his list. No definite reports of the bird are forthcoming in recent years.



FIG. 25. Rush Lake, home of the Western Grebe.



FIG. 26. Bitter Lake. Along this shore line nested the Marbled Godwit, Upland Plover, Willet, and Piping Plover.

ESKIMO CURLEW. *Phaeopus borealis*.* Another of the vanishing species which was once so common on the Coteau during migration. Not reported for many years.

UPLAND PLOVER. *Bartramia longicauda*.*^o A fine game bird, which was formerly most abundant around Fort Sisseton during the summer time. At present the bird is found in limited numbers and present day observers believe that while this valuable bird is slowly increasing in numbers, it can never return to its former status.

SPOTTED SANDPIPER. *Actitis macularia*.*^o The Spotted Sandpiper has not decreased in numbers and is found as a common summer resident. Nests can usually be found on the islands in Waubay Lake.

SOLITARY SANDPIPER. *Tringa solitaria*. This common migrating species was overlooked by McChesney and is today found in both spring and fall.

WILLET. *Catoptrophorus semipalmatus*.*^o A very interesting wader, which seems to be gradually losing out as a summer resident of the Coteau. Three or four years ago the Willet was found breeding in quite a few places, but last year it seemed to be nearly absent.

GREATER YELLOW-LEGS. *Totanus melanoleucus*.* The Greater Tattler is not a common migrant and is slowly losing out like all of the larger shore birds.

LESSER YELLOW-LEGS. *Totanus flavipes*.* Dr. McChesney states that this bird bred in the vicinity, which is hardly the case at this writing. The yellow-legs is, however, one of the most common of all the migrating shore-birds.

PECTORAL SANDPIPER. *Pisobia melanotos*.* A medium sized wader, which has not suffered greatly from hunters and which still continues to pass to and fro through the prairie region.

WHITE-RUMPED SANDPIPER. *Pisobia fuscicollis*.* One of the small peeps, which are so common during migration time.

BAIRD'S SANDPIPER. *Pisobia bairdi*.* This sandpiper is a regular migrant over the Coteau. An interesting observation was made by Professor Kubiehek in that the Baird's Sandpiper seems to migrate earlier than the other species and is often found while the geese are still migrating north.

LEAST SANDPIPER. *Pisobia minutilla*.* A regular migrant.

RED-BACKED SANDPIPER. *Pelidna alpina sakhalina*. This well marked bird was missed by Dr. McChesney and is today found as a regular migrant. During the first week of June, 1930, several small flocks of this sandpiper were seen near Rush Lake and some were taken.

DOWITCHER. *Limnodromus griseus*.* Formerly a common migrant and considered a fine table bird by Dr. McChesney. Now the bird is an uncommon migrant and is not the most familiar of the waders as it was in the days of yore.

STILT SANDPIPER. *Micropalama himantopus*. A well known species, which was not found by McChesney. At times found as one of the commoner waders. On June 5, 1930, a flock of about 500 Stilt Sandpipers were seen on the west shore of Rush Lake.

SEMIPALMATED SANDPIPER. *Ereunetes pusillus*.* Probably without question the most abundant of all migrating sandpipers.

BUFF-BREASTED SANDPIPER. *Tryngites subruficollis*.* A strange little sandpiper, which was taken by Dr. McChesney in small numbers.

MARbled GODWIT. *Limosa fedoa*.*^o Strangely Dr. McChesney reports this godwit as common and yet not breeding on the Coteau. Professor Kubiehek has found many nests of the bird at various places and at this writing it is found much more frequently than the Willet. These two species suffer heavily from over-pasturing.

HUDSONIAN GODWIT. *Limosa haemastica*.* Much more common in 1878 than at present, as is the case with all the larger waders. Dr. McChesney said it did not stay to breed.

SANDERLING. *Crocethia alba*. Another of the shore birds which was not listed by Dr. McChesney. The species is not considered rare by Mr. Kubiehek, who has taken birds in various phases of plumage.

AVOCET. *Recurvirostra americana*.* A truly beautiful bird, which formerly bred near Fort Sisseton. At present exceedingly rare in migration.

WILSON'S PHALAROPE. *Steganopus tricolor*.*^o Wilson's Phalarope nests sparingly on the Coteau, with the bulk of the birds going farther north to pass the nidification period.

NORTHERN PHALAROPE. *Lobipes lobatus*. This phalarope is a regular migrant at Fort Sisseton, but was not reported by Dr. McChesney. Sometimes flocks of several thousand birds are found in this area in the spring. Such a flock of approximately 4,000 birds was found at Bitter Lake on June 2, 1931.

HERRING GULL. *Larus argentatus*.* Dr. McChesney gives this gull as a breeding species and as common. This is not true today and it is now considered only as a straggling migrant.

RING-BILLED GULL. *Larus delawarensis*.^o This gull was not listed by Dr. McChesney. Today, a fine nesting colony of several hundred birds is to be found on the east island in South Waubay Lake and has apparently been there many years. It is possible that it might nest elsewhere in the region in small numbers.

FRANKLIN'S GULL. *Larus pipixcan*.*^o A trim appearing gull, with a lovely rose blush on the underparts, which often nests on certain rush-filled lakes in countless thousands. Conditions must be right, however, or the birds do not nest. Some years thousands of unmated birds may stay around all summer and feed on insects in the nearby fields. Franklin's Gull is one of the many reasons why the Fort Sisseton country is a bird student's paradise.

LAUGHING GULL. *Larus atricilla*.* Dr. McChesney lists this gull as abundant and breeding, as he also does the Franklin's Gull. There have been no recent records of this species that are substantiated by specimens.

FORSTER'S TERN. *Sterna forsteri*.*^o Forster's Tern is still a regular summer resident, but it is doubtful whether it is as plentiful as it was fifty years ago.

COMMON TERN. *Sterna hirundo hirundo*.*^o This tern appeared to the writer as the more common of the two species. Nice colonies are found on Waubay Lake, Hildebrandt's Lake, and Cottonwood Lake. The birds acted as though they were going to nest on a small island in Roy Lake in June, 1931, and there are probably other small colonies scattered around on the Coteau.

BLACK TERN. *Chlidonias nigra surinamensis*.*^o A common summer resident in suitable locations over the entire region.

MOURNING DOVE. *Zenaidura macroura*.*^o The Mourning Dove can still be considered a common summer bird on the Coteau, despite open seasons in many western and southern states.

PASSENGER PIGEON. *Ectopistes migratorius*.* According to Dr. McChesney this extinct species was not an especially abundant summer resident about the fort.

YELLOW-BILLED CUCKOO. *Coccyzus americanus americanus*.^o An uncommon summer resident, not mentioned by McChesney.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus*.*^o The common breeding form, which is found probably in about the same numbers as previously.

SCREECH OWL. *Otus asio*.^o The Screech Owl was not reported by Dr. McChesney during his stay. Now the bird is found as a common resident.

GREAT HORNED OWL. *Bubo virginianus*.*^o The Great Horned Owl is a sorely persecuted bird in any locality, but despite all this the bird is still found on the Coteau.

SNOWY OWL. *Nyctea nyctea*.* Reported in small numbers in 1878. In recent years great waves of Snowy Owls have visited the



FIG. 27. Nest of the Western Grebe. The usual clutch of eggs is four, six is rather uncommon.



FIG. 28. Western Grebe nest covered. Usually they do not cover.

Coteau and a great many birds have been killed. Professor Kubiehek has found them in the spring while the wild fowl were migrating.

BURROWING OWL. *Speotyto cunicularia hypugaea*.^o It is interesting to know that this curious owl apparently did not breed near the post when McChesney lived there; however, at present this owl lives in the hills north of the fort and is not rare.

LONG-EARED OWL. *Asio wilsonianus*. Not listed by McChesney, while today it is found as a not uncommon owl.

SHORT-EARED OWL. *Asio flammeus flammeus*.^o It is rather surprising that this owl was not seen by McChesney. We now find it as a rather frequent breeding bird in the lowlands.

NIGHTHAWK. *Chordeiles minor*.^{*o} A common summer resident over the entire Coteau. The lighter colored race called Sennett's Nighthawk appears to be the most common form.

CHIMNEY SWIFT. *Chaetura pelagica*.^o This bird is found about the various towns, which now dot the Coteau. Dr. McChesney does not report this species.

RUBY-THROATED HUMMINGBIRD. *Archilochus colubris*.^{*o} This species has probably increased somewhat, especially around the towns, where an abundance of flowers attract it.

BELTED KINGFISHER. *Megaceryle alcyon*.^{*o} Not a very common bird anywhere on the Coteau. In a later note (*Bull. Nutt. Ornith. Club*, IV, 1879, p. 188) Dr. McChesney reported a pair of these birds observed near the post on April 14 and 16, 1879.

FLICKER. *Colaptes auratus*.^{*o} The Flicker is still found in small numbers about Fort Sisseton and also about the towns in the region. Hybrids between this form and the Red-shafted Flicker have also been seen.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus*.^{*o} This bird is a common summer resident.

YELLOW-BELLIED SAPSUCKER. *Sphyrapicus varius varius*. The sapsucker is a very uncommon migrant.

HAIRY WOODPECKER. *Dryobates villosus*.^{*o} Dr. McChesney did not think that this species bred in the vicinity at that time. Today, the bird is found as a breeding bird as well as a winter resident.

DOWNY WOODPECKER. *Dryobates pubescens*.^{*o} Dr. McChesney did not include this bird in his long list, but in a later note (*Bull. Nutt. Ornith. Club*, IV, 1879, p. 188) he spoke of seeing this species several times in the winter of 1878-79 and collecting a few specimens. The writer has usually found this species nesting in the willow trees in this region.

KINGBIRD. *Tyrannus tyrannus*.*^o The Kingbird is a very common summer bird. Many nests are found in low situations. Dr. Stephens has some fine pictures of these birds nesting in a snowberry thicket.

ARKANSAS KINGBIRD. *Tyrannus verticalis*.*^o The Western Kingbird is also a common species and seems to get along peaceably with the preceding form. The presence of many planted groves around farm homes and in the towns has led to an increase in the numbers of these two species.

PHOEBE. *Sayornis phoebe*.^o The Phoebe is not a common bird anywhere in the region.

YELLOW-BELLIED FLYCATCHER. *Empidonax flaviventris*. This small, dark-colored flycatcher is not an uncommon spring migrant and birds have been seen at various places on the Coteau. It was not previously reported.

ALDER FLYCATCHER. *Empidonax trailli*.^o Traill's Flycatcher is probably the most common of the small flycatchers on the Coteau. The writer has found it breeding in brush-land near water and in wild plum thickets on an island in Rush Lake.

LEAST FLYCATCHER. *Empidonax minimus*.^o The Least Flycatcher is a regular migrant through the Fort Sisseton country. It remains to breed. The three preceding species were not listed in 1878.

WOOD PEWEE. *Myiochanes virens*.*^o The writer is inclined to think that this species breeds in small numbers, while Dr. McChesney considered it as a migrant. It was found to be not uncommon in the woods near Opitz Slough in June, 1931.

HORNED LARK. *Octocoris alpestris*.*^o Dr. McChesney seemed to think that the Horned Lark was merely a migrant or winter visitant. The writer has found the bird as a regular breeding bird in recent years. Late broods are not uncommon in June. There are probably several different forms of the Horned Lark visiting this region during the course of the year.

TREE SWALLOW. *Iridoprocne bicolor*.*^o Dr. McChesney found this swallow only during one season; however, the bird is now considered a regular migrant and a not uncommon summer resident. Mr. Kubichek found, on one occasion, an unusual nest in a piece of farm machinery.

BANK SWALLOW. *Riparia riparia riparia*.*^o Still found as a common summer resident in suitable locations.

ROUGH-WINGED SWALLOW. *Stelgidopteryx ruficollis serripennis*.^o A migrant in this region and a regular summer resident.

BARN SWALLOW. *Hirundo erythrogaster*.*^o Dr. McChesney speaks of it as found in small numbers. This bird is now found about nearly every farm in the region. This is another species which has increased in numbers due to settling of the country.

CLIFF SWALLOW. *Petrochelidon albifrons albifrons*.*^o A regular migrant and summer resident.

PURPLE MARTIN. *Progne subis subis*.*^o Another species which has become quite common due to the presence of numerous bird houses and other accessible nesting sites. An interesting sight at old Fort Sisseton is the flock of martins, which nest in the now decaying buildings and fly back and forth over the old parade ground.

BLUE JAY. *Cyanocitta cristata cristata*.*^o A regular summer resident, and found as not uncommon in winter.

AMERICAN MAGPIE. *Pica pica hudsonia*. A remarkable invasion of magpies occurred during 1921 and 1922 throughout this entire region. Large numbers of the birds were found around Fort Sisseton and some of the birds stayed during the ensuing summer. There were also some reports of the birds nesting, but we have no actual nests or eggs to back up the reports.

RAVEN. *Corvus corax*.* The Raven was a rare bird about Fort Sisseton even during Dr. McChesney's stay and is not found in the region today.

CROW. *Corvus brachyrhynchos*.*^o In 1878 the Crow was considered a rare bird at the post. Today, the bird is a common migrant, but is still an uncommon breeding bird. A pair or two usually nest on the island in Rush Lake and here live and feed their young from the nests of Black-crowned Night Herons. In June, 1931, the writer put an end to their depredations for one year by dispatching the parents and two grown young birds.

BLACK-CAPPED CHICKADEE. *Penthestes atricapillus*.*^o The chickadee is a regular summer resident, and some stay throughout the coldest winter.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis carolinensis*. Dr. McChesney did not list this species or the following. The common nuthatch is today a regular resident of the region and often a familiar bird around the feeding shelf.

RED-BREASTED NUTHATCH. *Sitta canadensis*. This small nuthatch is found at times in the fall and early winter about the feeding box in Webster and other towns on the Coteau.

BROWN CREEPER. *Certhia familiaris*. The Brown Creeper was not listed in 1878. This odd little bird is found as a very common



FIG. 29. Nest of Holboell's Grebe on shore of Rush Lake.



FIG. 30. Common Kingbird on nest. In taking this picture the photographer approached on foot till the lens of camera was four feet from bird.

fall and winter resident and its peculiar feeding habits are always a source of interest to one interested in bird life.

HOUSE WREN. *Troglodytes aedon*.*^o The House Wren has also increased greatly in numbers, due to numerous bird houses in both townyards and farmyards. The House Wren has not deserted its original nesting sites however, and is found in the woods as well.

LONG-BILLED MARSH WREN. *Telmatodytes palustris*.^o This wren and the following species are the most interesting of the entire family and were apparently overlooked by Dr. McChesney. The Long-billed Marsh Wren is one of the common birds of the sloughs. The little oval grass nests are found everywhere among the beds of scirpus and the tiny birds with bubbling songs are continually flitting ahead of the observer.

SHORT-BILLED MARSH WREN. *Cistothorus stellaris*.^o This bird is not nearly as common as the above species, mainly because suitable nesting areas are not available in many places. A damp meadow is the home of this wren, with its characteristic chattering song.

CATBIRD. *Dumatella carolinensis*.*^o The writer is confident that the Catbird and the Brown Thrasher have increased greatly in numbers since 1878 due to the planting of shrubbery and trees throughout the entire region.

BROWN THRASHER. *Toxostoma rufum*.*^o This bird is often seen about farm homes and along country roads, where trees have been planted.

ROBIN. *Turdus migratorius*.*^o Dr. McChesney found the Robin in small numbers and attributed its scarcity to lack of nesting sites. As a species, the Robin has increased enormously and is today one of the most common summer birds around every farm and in every city and village over the entire "Coteau des Prairies".

HERMIT THRUSH. *Hylocichla guttata*. An uncommon migrant.

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni*.* This thrush was found by Dr. McChesney in small numbers and was also seen by the writer the first week in June, 1931.

GRAY-CHEEKED THRUSH. *Hylocichla minima aliciae*. The Gray-cheeked Thrush is a less common migrant than the Olive-backed Thrush.

BLUEBIRD. *Sialia sialis sialis*.*^o The Bluebird is a regular resident on the Coteau and has also joined the ranks of the bird box nesters around farms and towns.

CEDAR WAXWING. *Bombycilla cedrorum*. The gentle mannered waxwing was not listed by McChesney during his stay. In 1931 the writer saw several flocks of the birds near the Waubay Lakes.

SHRIKE. *Lanius ludovicianus*.^{*o} Dr. McChesney collected a single Shrike in 1877. Now the Shrike is a common bird along any roadside which boasts a few trees or shrubs large enough to nest in.

STARLING. *Sturnus vulgaris*. Strangely enough the first record of this introduced species in South Dakota came from the Fort Sisseton country. Mr. Lundquist records the first Starling on May 14, 1933, near Lake Minnewashta. Day County. (See WILSON BULLETIN for March, 1934).

YELLOW-THROATED VIREO. *Lanivireo flavifrons*. This rather brightly colored vireo has been found to be a not uncommon summer resident in areas where cottonwood trees are growing.

RED-EYED VIREO. *Vireo olivaceus*.^{*o} The Red-eyed Vireo is found regularly on the Coteau. Dr. McChesney collected one bird.

WARBLING VIREO. *Vireo gilvus*.^{*o} Not rare. Dr. McChesney also collected one bird of this species.

BLACK AND WHITE WARBLER. *Mniotilta varia*.^{*} Still found as a regular migrant and the writer feels that careful search will also reveal it as a rare summer resident, as it has been found nesting at Sioux City, Iowa.

TENNESSEE WARBLER. *Vermivora peregrina*. A very common migrant, not listed by Dr. McChesney. At times it is the most common of migrating warblers.

ORANGE-CROWNED WARBLER. *Vermivora celata*. A regular migrant, not given by Dr. McChesney.

PARULA WARBLER. *Compsothlypis americana*. A rare migrant, which was reported by Mr. Lundquist for the first time in the spring of 1927.

YELLOW WARBLER. *Dendroica aestiva*.^{*o} Then as now, one of the common small birds, which remains to breed.

MAGNOLIA WARBLER. *Dendroica magnolia*.^{*} A migrant, which was found by Dr. McChesney in small numbers and still passes through the region.

CAPE MAY WARBLER. *Dendroica tigrina*. One of the rarer warblers, which was first reported by Mr. Lundquist. A specimen has been taken in the region. A warbler of this species was seen on June 3, 1935, near Spring Lake.

MYRTLE WARBLER. *Dendroica coronata*.^{*} Dr. McChesney found this species as a common migrant, as later observers also report it.

BLACKBURNIAN WARBLER. *Dendroica fusca*.^{*} This brilliantly colored bird was reported by Dr. McChesney as a spring migrant.

CHESTNUT-SIDED WARBLER. *Dendroica pensylvanica*.* Also listed in the early days. An uncommon migrant today.

BAY-BREASTED WARBLER. *Dendroica castanea*. Mr. Lundquist first observed this bird for the region in 1927.

BLACK-POLL WARBLER. *Dendroica striata*.* Still one of the more common migrants of the warbler hosts.

PINE WARBLER. *Dendroica pinus*.* The Pine Warbler was found in small numbers by McChesney.

PALM WARBLER. *Dendroica palmarum*. This species has been seen by Mr. Lundquist.

OVENBIRD. *Seiurus aurocapillus*.^o Dr. McChesney does not list this species. Recently Mr. Lundquist has found the bird as common in migration. The writer has found that it breeds sparingly in this region.

WATER-THRUSH. *Seiurus noveboracensis*.* Dr. McChesney found this species as rare in 1878, it is however a regular migrant.

YELLOW-THROAT. *Geothlypis trichas*.*^o Dr. McChesney found the Yellow-throat as a migrant; today, however, it is a common summer resident in suitable locations.

YELLOW-BREASTED CHAT. *Icteria virens*.^o During June, 1935, the writer found the Yellow-breasted Chat not uncommon in suitable habitats and now considers this species as a regular summer resident on the Coteau.

WILSON'S WARBLER. *Wilsonia pusilla*. An uncommon migrant on the Coteau.

CANADA WARBLER. *Wilsonia canadensis*.* Dr. McChesney found this bird in some numbers, but it did not stay to breed.

AMERICAN REDSTART. *Setophaga ruticilla*.*^o Still a regular migrant through the region with a few remaining to breed in the more timbered parts of the Coteau.

ENGLISH SPARROW. *Passer domesticus*.^o An introduced species, which, happily, Dr. McChesney did not have to bother with on his field trips. This bird is at present very common around the remains of the old post.

BOBOLINK. *Dolichonyx oryzivorus*.*^o In 1878 this bird was very common about Fort Sisseton. At this writing it can hardly be said that the Bobolink is common. The bird is still found in certain meadows, but not in great numbers and seems to be one of the birds which is slowly decreasing in numbers.

WESTERN MEADOWLARK. *Sturnella neglecta*.*^o A very common bird in the past and even more common in the present. It often stays in the region until along in November.



FIG. 31. View in Double-crested Cormorant colony on East Island in South Waubay Lake.



FIG. 32. Adult Cormorants in the same colony. Photograph by W. F. Kubichek, and borrowed from WILSON BULLETIN, December, 1932.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus*.*^o The most abundant bird around the numerous sloughs of the region. They are found feeding everywhere in pastures and fields and are almost confiding in nature. Many were caught by Professor Kubichek while he sat in his blind waiting for Western Grebes to perform. The birds would sit on the corner posts of the blind, and by cutting a slit in the burlap and quickly thrusting up a hand, the birds could be grasped by the legs.

RED-WINGED BLACKBIRD. *Agelaius phoeniceus*.*^o The Red-winged Blackbird is also a common summer resident about Fort Sisseton.

ORCHARD ORIOLE. *Icterus spurius*.*^o This fine songster is a regular summer resident in this area and is another of the birds which has increased in numbers due to planting of trees about farms and towns.

BALTIMORE ORIOLE. *Icterus galbula*.*^o The Baltimore Oriole is not uncommon over the entire region and has increased greatly in numbers due to the settlement of the country.

RUSTY BLACKBIRD. *Euphagus carolinus*. A common migrant, not mentioned by Dr. McChesney in his report.

BREWER'S BLACKBIRD. *Euphagus cyanocephalus*.^o This most interesting blackbird has come into the Fort Sisseton country in recent years, as it was not found by Dr. McChesney. It has recently been found nesting in small numbers in favored localities and specimens have been taken.

BRONZED GRACKLE. *Quiscalus quiscula*.*^o Dr. McChesney puts this species down as the Purple Grackle. The grackle has also increased in numbers in recent years.

COWBIRD. *Molothrus ater*.*^o This foister of the bird family is still a very common species about Fort Sisseton.

CARDINAL. *Richmondia cardinalis*.*^o Many birds have expanded or contracted their breeding ranges in recent years, viz., Brewer's Blackbird, Arkansas Kingbird, and others. Most people in the upper Missouri Valley, however, think that the Cardinal is a recent addition to the fauna of the region. This is hardly the case, for Dr. McChesney found this bird on several occasions in the woods about Fort Sisseton, back in 1877, and although he called it casual, it meant that the species was present more than fifty years ago.

ROSE-BREADED GROSBEAK. *Hedymeles ludovicianus*.*^o The strikingly attired male grosbeak is a welcome addition to the bird life of the Coteau. From my observations, however, it is found only in small numbers and is not increasing in abundance.

INDIGO BUNTING. *Passerina cyanea*.*^o Another bird with a tropical touch is the Indigo Bunting, which is found in small numbers.

LAZULI BUNTING. *Passerina amoena*. Every day during the first week of June, 1935, the writer found Lazuli Buntings near the camp on Hildebrandt's Lake. The birds were apparently beginning nidification. The presence of this species in the Fort Sisseton region indicates the eastward movement of another western species.

DICKCISSEL. *Spiza americana*.*^o Dr. McChesney found the Black-throated Bunting in considerable numbers during the summer time. In recent years it has not been very noticeable around that region, but this is probably due to the fact that it is another species like the Lark Bunting, which seems to fluctuate at intervals as to abundance.

PINE GROSBEEK. *Pinicola enucleator*.* In Dr. McChesney's long list this species was merely mentioned. But later he reported (*Bull. Nutt. Ornith. Club*, IV, 1879, p. 187) encountering a flock of "perhaps twenty-five birds" on January 6, 1879, in some timber growth. A single specimen was secured.

REDPOLL. *Acanthis linaria*.* This species was also merely mentioned by Dr. McChesney in his first report. But he gave the details in a later note (*Bull. Nutt. Ornith. Club*, IV, 1879, p. 187). During the winter of 1878-79 many flocks were seen, and a specimen was secured on January 28. Mr. Lundquist found this species to be common during the winter of 1931-32.

PINE SISKIN. *Spinus pinus*. The very erratic little Pine Finch is found at odd times in the Fort Sisseton country; it was not mentioned by Dr. McChesney.

GOLDFINCH. *Spinus tristis*.*^o The Goldfinch is a common bird and often comes into the town gardens to drink and bathe in a conveniently placed bird bath.

TOWHEE. *Pipilo erythrophthalmus*. A migrant and I believe that a few stay to nest in the secluded glens on the Coteau.

ARCTIC TOWHEE. *Pipilo maculatus arcticus*. This form is also a regular migrant and is found migrating much later in the fall than the preceding form. These two species were not entered by Dr. McChesney.

LARK BUNTING. *Calamospiza melanocorys*.*^o The Lark Bunting is here one year and gone the next. In 1929 the birds were not uncommon, but in 1931 only one bird was seen.

SAVANNAH SPARROW. *Passerculus sandwichensis*.*^o This prairie sparrow is common all over the Coteau and its thin song is heard on every side. Dr. McChesney did not think it bred in the vicinity, but

the nest of the Savannah Sparrow has been found here and also one hundred miles south of this region.

GRASSHOPPER SPARROW. *Ammodramus savannarum*.^o The Grasshopper Sparrow, which has less of a song than the preceding bird was overlooked by Dr. McChesney. It is common and can be found most everywhere.

SHARP-TAILED SPARROW. *Ammospiza caudacuta*.^o A very elusive bird which was not reported by Dr. McChesney. A male bird was collected by the writer at Rush Lake on June 7, 1931, and was without a doubt a breeding bird. The Sharp-tailed Sparrow of this region is also called the Nelson's Sparrow.

VESPER SPARROW. *Pooecetes gramineus*.^{*o} A common summer bird at present and reported by McChesney during the winter of 1877-78.

LARK SPARROW. *Chondestes grammacus*.^o The Lark Sparrow is not a common bird in this region. It was not given in Dr. McChesney's list.

SLATE-COLORED JUNCO. *Junco hyemalis*.^{*} The junco was found as a regular winter visitor by Dr. McChesney.

TREE SPARROW. *Spizella arborea*.^{*} Dr. McChesney tells of the abundance of this sparrow and considers it a breeding bird. I think he must have confused it with the Chipping Sparrow, as the Tree Sparrow has never been known to nest either in North Dakota or Minnesota, where it would be more apt to nest than in South Dakota.

CHIPPING SPARROW. *Spizella passerina*.^o An uncommon summer resident.

CLAY-COLORED SPARROW. *Spizella pallida*.^{*o} Dr. McChesney said that this sparrow was extremely rare in 1878. The writer has found this most interesting sparrow not uncommon in many places on the Coteau. Scattered patches of snowberry seem to be its favorite nesting place. The male usually seeks some small tree nearby for his singing periods. Most of the dainty nests were found within a few inches of the ground. Occasionally a nest would be up a foot or two in some small bush.

HARRIS'S SPARROW. *Zonotrichia querula*.^{*} One of our most handsome sparrows and a common migrant over the Coteau. Dr. McChesney called it an accidental bird, but in recent years it has been found as common, especially during September and October.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*. This species was not mentioned by Dr. McChesney. This bird along with Gambel's Sparrow is a regular migrant at this writing.

WHITE-THROATED SPARROW. *Zonotrichia albicollis*. This crown sparrow was not given by Dr. McChesney in his list. It is now found as a common spring and fall migrant.

FOX SPARROW. *Passerella iliaca*. The large Fox Sparrow is a migrant in small numbers in the Fort Sisseton region. Dr. McChesney did not report this species.

LINCOLN'S SPARROW. *Melospiza lincolni*. A rather silent migrant during its stay with us and although usually common, it is often not seen because of its shyness. Not given by Dr. McChesney.

SWAMP SPARROW. *Melospiza georgiana*.^{*o} Dr. McChesney collected a single bird in the spring of 1878. This sparrow is a regular migrant and the writer is inclined to believe that a few remain to nest, as he has found birds nesting in western Minnesota in similar habitat as offered by the Fort Sisseton region.

SONG SPARROW. *Melospiza melodia*.^{*o} As in the case of the Savannah Sparrow, this sparrow was also considered as a migrant by Dr. McChesney, but now the two species are both found as breeding birds. The long wooded island in Rush Lake was found to be the home of more than one pair of Song Sparrows during the writer's trips to that spot.

LAPLAND LONGSPUR. *Calcarius lapponicus*.^{*} This migrating longspur was found by Dr. McChesney as abundant. The bird still comes in large numbers and is observed occasionally in the fall in flocks of thousands.

SMITH'S LONGSPUR. *Calcarius pictus*.^{*} Dr. McChesney saw great flocks of these birds in the fall. He adds that for a period of about two hours, he estimated that one thousand birds passed him per minute and that when he left the birds were still flying southward. This species has suffered a tremendous loss in numbers if present day observations are accurate. There are no recent reports of the species from the Fort Sisseton country and very meager reports from Minnesota in the last twenty years. Mr. Chas. J. Spiker's report of Smith's Longspurs in "Winter Bird Records, 1922 to 1926, in Northwestern Iowa" (*Proceedings of the Iowa Academy of Science*, XXXIII, 1926, pp. 307-313), seems to be the only recent record of the birds in this region.

CHESTNUT-COLLARED LONGSPUR. *Calcarius ornatus*.^{*o} This well marked species was considered as merely a migrant by Dr. McChesney, who found it in large numbers. At the present time this longspur is a regular breeding bird on the prairies of northeastern South Dakota.

SIoux CITY, IOWA.

GENERAL NOTES

Conducted by M. H. Swenk

A Three-egg Set of the Mourning Dove.—On June 5, 1934, in Woodbury Township, Stutsman County, North Dakota, I found the nest of a Mourning Dove (*Zenaidura macroura*) which contained three eggs. Perhaps this is unusual enough to be worth recording.—ARCHIBALD JOHNSON, *Stewart, Nev.*

Effect of Drouth on Birds.—In Woodbury Township, Stutsman County, North Dakota, on June 5, 1934, I found the nest of a Robin (*Turdus migratorius*) which lacked the usual mud walls. The materials used were grasses and fine plant fiber only. On the side that was habitually approached by the birds the nest wall was very much depressed, giving the structure an unsymmetrical appearance. The protracted drouth in the region was no doubt responsible for this deviation from the normal in the construction of this nest.—ARCHIBALD JOHNSON, *Stewart, Nev.*

The Black Tern Recorded in the West Virginia Panhandle.—On May 5, 1935, the writer saw a Black Tern (*Chlidonias nigra* subsp.) at Beech Bottom Swamp, Beech Bottom, West Virginia. The bird was darting after insects just above the water's edge, and came so close to the observer that its black head, throat, breast, and belly were easily discerned. The slate-colored back, wings, and tail were also noted. This is the first record of this species for the West Virginia Panhandle, and there are probably not more than a dozen records of the Black Tern for the state of West Virginia.—THOS. E. SHIELDS, *Wheeling, W. Va.*

Specimen of European Widgeon Taken in Northwestern Iowa.—A fully plumaged male European Widgeon (*Mareca penelope*) was killed during October, 1933, by George Van Wyngarden while he was hunting ducks at North Twin Lakes, Calhoun County, Iowa. Mr. Van Wyngarden stated that this bird was one of a flock of four which flew over, and all appeared to be the same species. Only one specimen was secured.

The specimen was mounted by Mr. Van Wyngarden and is displayed in his private collection of water birds and upland game birds at Manson. While the European Widgeon has been taken in all states surrounding Iowa, this is believed to be the first and only specimen of this bird secured in Iowa. This collection was examined by the writer on May 2, 1935, when permission was kindly granted for the publication of this note.—PHILIP A. DUMONT, *Des Moines, Iowa.*

The Brewer's Blackbird at Athens, Clarke County, Georgia.—In a recent issue of the WILSON BULLETIN (Vol. XLV, No. 3, September, 1933), I discussed in more or less detail the present status of Brewer's Blackbird (*Euphagus cyanocephalus*) as a migrant and winter resident in the southeastern states, and advanced the opinion, based on the relative abundance of this species both in the spring and in the fall at Asheville, North Carolina, that this western bird would prove, despite lack of records to date, to be of regular occurrence in Georgia in migration and possibly throughout the winter. It would appear now that this supposition was at least partially justified for on two brief field trips to Athens, the Brewer's Blackbird was noted on each occasion, and it is probable that others were present before and after these actual dates. On December 3, 1933, three birds, all males, were seen at the edge of the open Sandy Creek bottoms, while on April 9, 1935, four birds, three males and a female, were watched as they fed about horses grazing in a pasture on the

campus of the Agricultural College. On this latter date their similarity to Cowbirds was quite marked, and suggested a very probable reason for their being overlooked in past years. Their habits are certainly very dissimilar to those of the closely related Rusty Blackbird (*Euphagus carolinus*), and this fact should be borne in mind in watching for these birds in migration. Lack of suspicion is another trait characteristic of the small flocks seen in western North Carolina and Georgia, so positive identification is never a difficult matter.—THOS. D. BURLEIGH, *Bureau of Biological Survey, New Orleans, La.*

A Record of the Trumpeter Swan from the Late Pleistocene of Illinois.

—In material secured at Aurora, Illinois, by Professor Clarence R. Smith of Aurora College, forwarded to me for examination by Dr. L. A. Adams of the University of Illinois, I have identified humeri, a broken sternum, and part of the scapula of the Trumpeter Swan (*Cygnus buccinator*). According to Professor Smith¹ these specimens were found in a marl deposit underlying a peat bog above which was a layer of muck forming the bottom of a swamp in Phillip's Park in the southwest part of Aurora at a point a mile and a half east of the Fox River. They were obtained by C. W. A. workers during excavation of the swamp to make an artificial lake.

The swan remains were associated with bones of mastodon (*Mastodon americanus*) and giant beaver (*Castoroides ohioensis*) and are believed to have been deposited in the bed of a post-glacial lake. According to the findings of Dr. O. P. Hay² this would seem to place them in what Dr. Hay has termed the Wabash beds in late Pleistocene. Dr. Adams writes me that mollusks of Pleistocene species were taken from the pneumatic foramina of the swan humeri.

The bones are distinguished at a glance as those of the Trumpeter Swan. The sternum, while in fragments, shows the characteristic bulbous swelling projecting into the body cavity at the anterior end in addition to the swollen channel in which the trachea is folded. The humeri exhibit two sizes, possibly indicative of sexual difference in wing measurement, and are greater in size than the largest Whistling Swans. All of the specimens, which bear numbers 111, 734, B, C, D, F, H, J, and K, are fresh and clean in appearance, and are in good state of preservation.

Previously this swan has been reported from Pleistocene deposits in Oregon and Florida, the present being the first occurrence of it in the central portion of our country. The find is one of definite importance in view of the few reports of birds that have come from Pleistocene beds of the area in question.

The specimens have been returned to Professor Smith, to whose kindness and that of Dr. Adams I am indebted for permission to place this occurrence on record, and are preserved by the city of Aurora in a museum at Phillip's Park.—ALEXANDER WETMORE, *U. S. National Museum, Washington, D. C.*

Notes on the Nesting of Captive Mute Swans.—In the latter part of June, 1930, four Mute Swans (*Cygnus olor*) about a year old, and still in the gray juvenile plumage, were placed upon eighty-seven acre Fowler Lake, in the city of Oconomowoc, Waukesha County, Wisconsin. These birds were a single brood from a captive pair. Two additional birds that had been hatched the previous year, but from another pair, were placed on the lake later in

¹Science, Vol. 81, April 19, 1935, p. 380.

²Carnegie Inst. Washington, Publ. 322, 1923, p. 13.

the summer. The four original birds stayed by themselves on the lake, and would not allow the other two to come near them, but pursued them whenever they could get near them. All birds were wing-clipped at the time, but were pinioned before being taken to winter quarters.

The following spring two of the original four birds mated and started building a nest during the latter part of April. The site chosen was in a cattail marsh in the Oconomowoc River, where the stream flows into Fowler Lake. It could easily be seen from a bridge, and as a number of people came to observe the building operations, the pair abandoned this site and moved to a more secluded spot farther up stream. On June 8, 1931, the pair was seen on the lake with five newly hatched young, which must have been less than twenty-four hours old.

The Mute Swan is ordinarily supposed not to mate before three years of age, but this pair was approximately two years of age at the time of producing young.—WILLIAM JOHNSTON HOWARD, *Petoskey, Mich.*

The 1934 Fall Migration at Cleveland's Public Square.—Migrating birds were much less common at the Square this season than most years, according to my observations. The only reason that I can propose is that, with the unusual amount of clear weather which occurred during the fall months, migrants were flying higher over Lake Erie on their southward journey, and passed over the city before descending to rest in more attractive surroundings beyond the congested area.

My records for the ten species which I observed this season are as follows:

Species	First Record	Last Record	No. Days Seen	Largest No. in One Day
Canada Goose	Nov. 1	—	1	8
Sparrow Hawk	Sept. 13	Dec. 20	4	1
Herring Gull	Sept. 17	Dec. 17	11	9
Mourning Dove	Aug. 23	—	1	1
Northern Yellow-throat	Sept. 19	Oct. 22	2	1
White-crowned Sparrow	Sept. 19	Oct. 27	2	1
White-throated Sparrow	Oct. 2	Nov. 7	19	3
Song Sparrow	Oct. 10	Oct. 15	2	1
Swamp Sparrow	Oct. 8	—	1	1
Lincoln Sparrow	Sept. 18	Sept. 19	2	1

In addition, evening newspapers carried a story on October 2 that an American Bittern (identified by a qualified ornithologist) had been captured alive in the Square that morning. The geese and the Mourning Dove, the only new additions to my list, were observed flying over at a low altitude.

Starlings were as numerous as ever. This year they took over the terminal tower as one of their roosting spots, many of them finding crannies five or six hundred feet above the street, where a strong wind is blowing much of the time. This must have been a miserable roost in severe weather, but it seemed to make little difference.—WILLIAM H. WATTERSON, *Cleveland, Ohio.*

Some Corrections.—I should like to make the following corrections to my article on Walter John Hoxie in the WILSON BULLETIN, XLVI, September, 1934: On page 173, in the map of the Sea Islands, "Hunters Island" should read Hunting Island. On page 171, last line, the date should read July 2, 1906. On page 176, line 17, it was a mistake to say that "Later observations have confirmed Hoxie's records" of the Buff-breasted Sandpiper. Hoxie's notes indicate one was taken on St. Helena Island, South Carolina, on May 5, 1886, but thus far the whereabouts of the specimen is unknown. Among Hoxie's

papers is a letter to him from Arthur T. Wayne, dated June 25, 1908, in which Mr. Wayne writes: ". . . Mr. W. W. Worthington . . . mentioned that you had taken a Buff-breasted Sandpiper on St. Helena Island and that he had seen and identified it as a bird of that species. . . . Please let me know to whom you sold it." In 1934 neither Mr. Hoxie nor Mr. Worthington could give any definite information leading to what disposition was made of the specimen. There appear to be no authentic records of this bird in the spring on the South Atlantic coast. My attention was called to this error relative to the Buff-breasted Sandpiper by Messrs. Alexander Sprunt, Jr., and Edward von S. Dingle.—W. M. G. FARGO, *Jackson, Mich.*

The Savannah Sparrow in Maryland.—I was much interested in the article by Thomas E. Shields on the Savannah Sparrow in West Virginia in the March, 1935, number of the *WILSON BULLETIN* (pp. 35-42). Since there is no reference to Maryland in the article in question, I wonder whether the writer overlooked my records of the species from the adjoining county of Garrett in western Maryland. On page 438 of the 1909 volume of the *Auk*, *P. sandwichensis* is reported from Mount Lake Park, near Oakland, territory essentially of the same nature as at Terra Alta. Again, on page 599 of the 1920 volume of the same journal it is reported from Accident, Garret County, twenty miles north of Oakland, where it was rather common that summer. They, no doubt, had been nesting. Under date of July 17, 1920, I have this remark in my notes: "A Savannah is still singing in Boyer's pasture." I did not look for nests—with such a wealth of interesting material and so many fine spots to go to, I did not take much time off to look for nests, excepting such as were easy to find. However, a boy brought me a nest from the same pasture earlier in the season, which I took to be one of the species in question. It certainly was not a nest of the Song Sparrow or of the Vesper Sparrow, the only other ones that could have come into consideration. We replaced the nest, but I failed to note in my book what became of it.—C. W. G. EIFRIG, *River Forest, Ill.*

Chuck-wills-widow Collected in Southeastern Iowa.—On November 12, 1934, Wm. L. Talbot of Keokuk, Iowa, wrote that on June 17, 1933, while visiting on a farm on Sugar Creek, seven miles from the mouth of the Des Moines River in Lee County, the owner called attention to a peculiar type of "Whip-poor-will call" which he had heard for the preceding few evenings. After Talbot had heard the song, and upon his suggestion, the bird was collected.

The specimen was satisfactorily identified by the late Dr. C. E. Ehinger, of Keokuk, and Talbot as the Chuck-wills-widow (*Antrostomus carolinensis*). Notes made by Dr. Ehinger at the time were as follows: "The measurements corresponded to those in Forbush's 'Birds of Massachusetts and Other New England States.' The identification was made more certain by the presence of lateral filaments on the bristly feathers on the side of the mouth. A Whip-poor-will was heard singing along the bluff at the same time as the Chuck-wills-widow and there was very little similarity in the voices." Unfortunately, the specimen was too badly shot to be preserved as a skin.

This is believed to be the first Iowa occurrence of this southern species, although it breeds in southern Missouri and southern Illinois.—PHILIP A. DUMONT, *Des Moines, Iowa.*

An Old Record of the Brown-headed Nuthatch in Iowa and Illinois.—In a letter from Ed. S. Currier of Portland, Oregon, on November 27, 1934, he related having found the Brown-headed Nuthatch (*Sitta pusilla pusilla*) at Keokuk, Iowa. Currier wrote as follows:

"I cannot find where the Brown-headed Nuthatch has ever been recorded from Iowa and therefore I will report an unusual flight or visit of these birds to Keokuk during May, 1893. On May 9 early in the morning I saw one in town and in the afternoon, while out of town a few miles, I saw five others. I shot two of them but the shot were too large and mutilated them so they could not be made into skins. On May 10 I saw three more in town during the early morning. On May 12 two were seen in Hancock County, Illinois, across from Keokuk. Two were seen in Keokuk on May 13. These are my only Iowa observations."

Due to the repeated opportunity which Currier apparently had to observe these birds and the added verification of specimens having been collected, I see no reason why this species should not be recognized on the Iowa bird list. These records of Currier's are believed to constitute the only known Iowa occurrence of this species. It is a rare permanent resident in southern Missouri and has occurred casually in Ohio and New York.—PHILIP A. DUMONT, *Des Moines, Iowa*.

The Effect of Certain Relief Projects on Bird Life.—During the last few years newspaper readers have been surfeited with items concerning relief and the expenditure of relief funds. Great stress has been laid upon projects which would give employment to the greatest number of men. One of the favorites, since it required no planning or trained supervision, was the cleaning of streams and ditches. On the other hand practically nothing has been written on the effect of these "clean-up" projects upon wild life. True, many general statements have been made, but no definite reports based upon actual research work have appeared. With a view of supplying this need even though in a small way, the following data are presented.

The area considered is about one-half mile of the Swan Creek Valley bordering the Toledo State Hospital grounds at the southwest boundary of Toledo, Ohio. The valley is fifty feet deep and averages five hundred feet in width. Although small in size, this area in the year 1931 contained several distinct habitats: one group of large trees and a few scattered throughout the section, two apple orchards, a few open prairie-like stretches, and several places covered with small trees and shrubbery with the usual briar and grapevine tangles. The creek itself was in a natural state, shaded by willows and sycamores, and typical sandbars, fallen-tree dams, and patches of water willow. The following year the first of the "clean-up" work was begun. The city of Toledo employed quite a number of men on relief landscaping the creek valleys about the city. This meant the cutting down of shrubs and dead trees, the thinning out of saplings, and the removal of practically all grapevines and briars. Nesting birds began to suffer.

In 1933 came the great C. W. A. army which finished the work of the city relief corps, removing any chance shrub which may have escaped, leveling the willows and sycamores at the stream's edge, and cutting down the banks at a steep slope. Swan Creek was transformed into a drainage canal.

It is not the purpose of this article to criticize this relief work or enter into the motives which prompted the "clean-up" campaign. Our wish is to bring home the great disaster which was brought upon our nesting birds. The follow-

ing tabulation brings this out forcibly. As these records are based upon several hours' work each day throughout the nesting season, they are probably as accurate as possible. When nests were not actually found, a singing male during the breeding season was recorded as a pair.

Pairs of nesting birds in a half-mile stretch of the valley of Swan Creek along the State Hospital grounds for the years 1931, 1933, and 1934:

Species	1931	1933	1934
Bob-white	2	0	0
Spotted Sandpiper	1	1	0
Mourning Dove	Common	Common	2
Yellow-billed Cuckoo	3	0	0
Screech Owl	0	1	0
Belted Kingfisher	1	1	1
Red-headed Woodpecker	8	2	0
Flicker	Common	6	1
Alder Flycatcher	4	4	0
Crested Flycatcher	1	0	0
Eastern Kingbird	1	0	0
Wood Pewee	2	0	0
Phoebe	1	2	1
Rough-winged Swallow	1	1	1
Blue Jay	3	3	0
Carolina Wren	1	0	0
House Wren	6	2	1
Catbird	3	0	0
Brown Thrasher	6	3	0
Bluebird	2	0	0
Robin	Common	Common	2
Wood Thrush	3	0	0
Starling	6	10	4
Yellow Warbler	Common	6	1
Northern Yellow-throat	2	2	0
Bronzed Grackle	5	4	0
Baltimore Oriole	4	3	1
Indigo Bunting	2	1	0
Cardinal	4	3	0
Rose-breasted Grosbeak	1	0	0
Song Sparrow	Common	2	2
Goldfinch	4	2	0

If a minimum of ten nests is substituted for species marked "Common", we find a total of 127 for 1931, 78 for 1933, and 17 for 1934. In terms of percentage, this means a drop of 87 per cent in the number of nesting birds which can be accounted for only by the "clean-up" work. Multiply this decrease in numbers by ten since at least five miles of creek valley were denuded, and we arrive at some idea of the terrific loss of bird population along this stream.

Where did these missing birds go? A similar check during these years of the upland groves and fields of the Toledo State Hospital grounds shows that the number of birds there remained fairly constant. Only two species appear to have come up from the lowlands in 1934—namely, a Bob-white which nested in a currant patch, and a Spotted Sandpiper which, finding its usual sandbar removed, raised its young in the garden. An increase also was shown by Goldfinches, some of which may have come from the creek valley. But most of the missing birds seem to have vanished completely.—ARAMINTA A. BRANDENBURG and LOUIS W. CAMPBELL, *Toledo, Ohio.*

EDITORIAL

THE TWENTY-FIRST ANNUAL MEETING of the Wilson Ornithological Club will be held in St. Louis on December 30 and 31 of this year. Details can not be announced at this time, but they will be given in the Secretary's letter to all members in October. This meeting will be held in conjunction with the general sessions of the American Association for the Advancement of Science. Our only previous meeting in St. Louis was held in 1919. Mr. A. F. Satterthwait will act as Chairman of our Local Committee, others members being named later.

DR. EMIL WITSCHI's paper in this issue is another example of one of the new experimental methods of investigation in ornithology. His results indicate that the hypophysis, through its internal secretions, exercises a controlling effect on the reproductive cycle. To what extent other activities, migration for instance, are dependent upon the reproductive cycle is not yet determined. Likewise, just what regulates and controls the activity of the hypophyseal gland is unknown. Dr. Witschi also shows that the seasonal changes in plumage pattern of the male are controlled by gonadotropic hormones, but not in the female, at least in weaver finches. This experimental field affords the opportunity to re-examine many of the old ornithological ideas in the light of the new science of endocrinology; for example the phenomena of migration, molting period and sequence, feather pattern and plumage pattern, nest building, egg laying, and all the urges connected therewith. It is a search for causes, and is physiological.

DR. ALEXANDER WETMORE, of the United States National Museum, informs us that the next (Ninth) International Ornithological Congress will be held at Rouen, France, between the 1st and 15th of May, 1938. This is ample enough notice to enable those interested to plan for the occasion. It would seem to us, however, that the date is about a month too early for much of a delegation from this country.

In reading a biography of Dr. Edward Jenner, discoverer of vaccination for smallpox, we learned that he was a naturalist and lover of birds. The poem reproduced on the cover page of this issue was written by him at the age of twenty-one.

The article on the birds of the Fort Sisseton Region in this issue is published with the aid of a subsidy.

MEMBERSHIP ROLL

MEMBERSHIP ROLL OF THE WILSON ORNITHOLOGICAL CLUB*

OFFICERS, 1935

- 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—Walter M. Rosene, Ogden, Iowa.
 Editor of the WILSON BULLETIN—T. C. Stephens, Morningside College, Sioux City, Iowa.

HONORARY MEMBERS

- Ballard, Harlan Hodge, 247 South, Pittsfield, Massachusetts.....1893
 Burns, Frank L., Berwyn, Pennsylvania.....Founder
 Jones, Dr. Lynds, 352 W. College St., Oberlin, Ohio.....Founder
 Pindar, Dr. L. Otley, Nicholasville, Kentucky.....Founder
 Sherman, Miss Althea R., National via McGregor, Iowa.....1902
 Strong, Dr. R. M., 5840 Stony Island Ave., Chicago, Illinois.....Founder

LIFE MEMBERS

- Bretsch, Clarence, 2690 Broadway, Gary, Indiana.....1925
 Ellis, Ralph, Jr., Jericho, Long Island, New York.....1926
 Hicks, Dr. Lawrence E., Ohio State University, Columbus, Ohio.....1925
 Jones, Dr. Lynds, 352 West College St., Oberlin, Ohio.....Founder
 Lyon, W. I., 124 Washington St., Waukegan, Illinois.....1921
 McIlhenny, Edward Avery, Avery Island, Louisiana.....1910
 Rogers, Charles H., Museum of Zoology, Princeton, New Jersey.....1925
 Sherman, Miss Althea R., National via McGregor, Iowa.....1902
 Taylor, Dr. A. C., Washburn, Wisconsin.....1929
 Taylor, Mrs. H. J., 900 Santa Barbara Road, Berkeley, California.....1916
 Tucker, Mrs. Carl Penwood, Mount Kisco, New York.....1928
 †Whitney, Thomas Hayes.....1916

SUSTAINING MEMBERS

- Bailey, Harold H., 206 Exchange Bldg., Miami, Florida.....1908
 Baldwin, Dr. S. Prentiss, 11025 E. Blvd., Cleveland, Ohio.....1916
 Barnes, Hon. R. M., Lacon, Illinois.....1909
 Bishop, Dr. Louis B., 450 Bradford St., Pasadena, California.....1903
 Brand, Arthur R., 47 Park Ave., White Plains, New York.....1931
 Brandt, Herbert W., 11945 Carlton Road, Cleveland, Ohio.....1914
 Bruen, Frank, Apt. A-4, 22 High St., Bristol, Connecticut.....1902
 Burke, Dr. Edgar, Medical Center, Jersey City, New Jersey.....1933
 Cahn, Dr. Alvin R., 902 W. Nevada Ave., Urbana, Illinois.....1914
 Carroll, J. J., Box 356, Houston, Texas.....1926
 Coffin, Percival Brooks, Williamsburg, Wayne County, Indiana.....1911
 Coursen, C. Blair, 761 East 69 Place, Chicago, Illinois.....1927
 Fargo, William G., 506 Union St., Jackson, Michigan.....1923
 Ganier, Albert F., 2507 Ashwood Ave., Nashville, Tennessee.....1915
 Getz, Christian J., 3503 Middleton Ave., Cincinnati, Ohio.....1930
 Green, Morris M., 39 S. Wyoming Ave., Ardmore, Pennsylvania.....1931
 Hann, Dr. Harry W., Zoology Dept., Univ. of Michigan, Ann Arbor, Mich.....1930

*This is a complete membership roll of the Wilson Ornithological Club according to present records. If any names are omitted it has been from oversight. All members are urged to notify the Secretary of any errors in spelling, titles, dates, or address. Please notify us promptly when address changes are made. Errors in address cost in money and inconvenience.

†Deceased.

Harriot, S. C., 200 W. 58th St., New York City.....	1934
Havemeyer, Harry O., Mahwah, New Jersey.....	1930
Howell, Arthur H., 2919 S. Dakota Ave., Washington, D. C.....	1921
Kennard, Frederick Hedge, 246 Dudley Road, Newton Center, Massachusetts.....	1919
Marmon, Mrs. Elizabeth C., 970 Delaware St., Indianapolis, Indiana.....	1933
Magee, Michael J., 603 South St., Sault Ste. Marie, Michigan.....	1919
Mitchell, Dr. Walton L., 1644 Visalia Ave., Berkeley, California.....	1893
Monk, Harry C., Avoca Apts., Nashville, Tennessee.....	1920
Nelson, Miss Theodora, 2695 Heath Ave., New York City.....	1928
Phillipp, Frederick B., West Road and Herbert Gap Road, Short Hills, N.J.....	1933
Phillipp, Philip B., 220 Broadway, St. Paul Bldg., New York City.....	1914
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
Simons, Joseph, Suite 1025, 141 W. Jackson Blvd., Chicago, Illinois.....	1928
Stephens, Prof. T. C., Morningside College, Sioux City, Iowa.....	1911
Stoddard, H. L., Route 5, Sherwood Plantation, Thomasville, Georgia.....	1916
Sutton, George Miksch, Bethany, West Virginia.....	1920
Swenk, Prof. Myron H., 1410 N. 37th St., Lincoln, Nebraska.....	1914
Taber, William Brewster, Jr., Greenwood Farm, Kansas, Illinois.....	1926
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., Renwiek Drive, Ithaca, New York.....	1913

ACTIVE MEMBERS

Agostini, Charles T., Carnegie Museum, Pittsburgh, Pennsylvania.....	1931
Albert, W. E., Lansing, Iowa.....	1934
Aldrich, John W., Cleveland Museum of Natural History, Cleveland, Ohio.....	1930
Allen, Dr. Arthur A., McGraw Hall, Cornell University, Ithaca, New York.....	1914
Allen, Durward Leon, 2609 Florida Drive, Fort Wayne, Indiana.....	1933
Bailey, Alfred M., Chicago Academy of Science, Chicago, Illinois.....	1928
Bartel, Kart E., 2528 W. Collins St., Blue Island, Illinois.....	1934
Bartsch, Dr. Paul, U. S. National Museum, Washington, D. C.....	1894
Bennett, Mary A., 623 East Carroll St., Macomb, Illinois.....	1933
Bennett, Walter W., Arnolds Park, Iowa.....	1925
Bent, Arthur Cleveland, 140 High St., Taunton, Massachusetts.....	1893
Bergtold, Dr. William Harry, 1159 Race, Denver, Colorado.....	1916
Blain, Dr. Alexander W., 2201 Jefferson Ave., East Detroit, Michigan.....	1902
Blincoe, Benedict Joseph, Route 13, Dayton, Ohio.....	1920
Book, Miss Lois Adclaide, 733 Franklin St., Columbus, Indiana.....	1930
Bowdish, B. S., Demarest, New Jersey.....	1924
Breckenridge, Walter J., Museum of Natural History, University of Minne- sota, 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
Bruun, Charles A., 1510 Central Ave., Hot Springs, Arkansas.....	1921
Bryens, Oscar McKinley, McMillan, Luce Co., Michigan.....	1924
Buchanan, Charles J., Marott Hotel, Indianapolis, Indiana.....	1933
Burdick, Harold C., Zoological Bldg., S. U. I., Iowa City, Iowa.....	1929
Burleigh, Thomas D., U. S. Biol. Surv., 223 Federal Bldg., Asheville, N. C.....	1922
Burtch, Verdi, Branchport, New York.....	1924
Butler, Dr. Amos W., 52 Downey Ave., Indianapolis, Indiana.....	1911
Cahalane, Victor H., Wild Life Division, National Park Service, Washington, D. C.....	1933
Carpenter, F. S., 2402 Longest Ave., Louisville, Kentucky.....	1934
Chasc, Henry B. Jr., So. Biological Supply Co., New Orleans, Louisiana.....	1932
Chasc, H. D., University of Tulsa, Tulsa, Oklahoma.....	1935

Chapman, Dr. Frank M., American Museum of Natural History, 77th St., and C. P. W., New York City.....	1910
Christy, Bayard H., 403 Frederick Ave., Sewickley, Pennsylvania.....	1922
Clay, Miss Marcia B., Bristolville, Ohio.....	1924
Clow, Miss Marion, P. O. Box 163, Lake Forest, Illinois.....	1929
Coffey, Ben, Tennessee Inspection Bureau, 1434 Bank of Commerce Bldg., Memphis, Tennessee.....	1927
Colburn, Albert E., 716 South Flower St., Los Angeles, California.....	1928
Cole, Dr. Leon J., Genetics Bldg., Univ. of Wisconsin, Madison, Wisconsin.....	1921
Cook, G. M., 2301 Elm St., Youngstown, Ohio.....	1923
Coryell, Sherman, 1500 Hood Ave., Chicago, Illinois.....	1920
Cottam, Clarence, U. S. Dept. Agr., Biological Survey, Washington, D. C.....	1929
Dakan, Prof. E. L., Poultry Dept., Ohio State University, Columbus, Ohio.....	1932
Danforth, Prof. Stuart T., 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
Douglass, Donald W., Dept. Biol., Texas Teachers College, Lubbock, Texas.....	1929
DuMont, Philip A., 306 51st St., Des Moines, Iowa.....	1928
Eaton, Warren F., 128 Wildroot Ave., Upper Montclair, New Jersey.....	1932
Eifrig, C. W. G., 1029 Monroe Ave., River Forest, Illinois.....	1907
Ekblaw, Dr. George E., 506 W. Main St., Urbana, Illinois.....	1914
Ekblaw, Prof. W. Elmer, Clark University, Worcester, Massachusetts.....	1910
Emilio, S. Gilbert, 7 Winter St., Salem, Massachusetts.....	1929
English, Dr. P. F., Game Division, Dept. of Conservation, Lansing, Michigan.....	1934
Errington, Dr. Paul L., Iowa State College, Ames, Iowa.....	1932
Esten, Sidney R., 4112 Graceland Ave., Indianapolis, Indiana.....	1931
Fleming, James Henry, 267 Rusholme Road, Toronto 4, Ontario.....	1906
Floyd, Judge Joseph L., 1009-11 Geo. D. Harter Bank Bldg., Canton, Ohio.....	1903
Freer, Prof. Ruskin S., Lynchburg College, Lynchburg, Virginia.....	1930
Friedmann, Dr. Herbert, U. S. National Museum, Washington, D. C.....	1932
Gabrielson, Ira N., U. S. Biological Survey, Washington, D. C.....	1913
Gault, Benjamin True, 570 Anthony St., Glen Ellyn, Du Page Co., Illinois.....	1895
Gorski, Arthur J., Route 2, Box 143, Merrill, Wisconsin.....	1933
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., 480 Spruce St., Morgantown, West Virginia.....	1934
Hankinson, Prof. T. L., 96 Oakwood Ave., Ypsilanti, Michigan.....	1911
Helmuth, Dr. William T., 667 Madison Ave., New York City.....	1934
Henderson, Prof. Junius, 1305 Euclid Ave., Boulder, Colorado.....	1903
Hendrickson, Prof. Geo. O., Iowa State College, Ames, Iowa.....	1933
Herrick, Dr. Francis H., 2863 Noble Road, Cleveland Heights, Ohio.....	1917
Himmel, Dr. Walter J., Dept. of Botany, Univ. of Nebraska, Lincoln, Nebr.....	1915
Hinnen, Dr. G. A., 1343 Delta Ave., Cincinnati, Ohio.....	1934
Hinshaw, Thomas D., 1908 Scottwood Ave., Ann Arbor, Michigan.....	1926
Holt, Ernest G., U. S. Soil Conservation Service, La Crosse, Wisconsin.....	1926
Jenner, William, 806 W. Davis St., Fayette, Missouri.....	1933
Johnson, Dr. Charles E., Roosevelt Wild Life Station, New York State College of Forestry, Syracuse, New York.....	1933
Jung, Clarence S., 4612 N. Oakland Ave., Milwaukee, Wisconsin.....	1921
Kelso, Leon, Food Habits Research, U. S. Biol. 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
Kretzmann, Dr. Paul E., 801 DeMun Ave., St. Louis, Missouri.....	1924
Larrabee, Prof. Austin P., Yankton College, Yankton, South Dakota.....	1921
Laskey, Mrs. F. C., Graybar Lane, Nashville, Tennessee.....	1928
Leopold, Prof. Aldo, New Soils Bldg., Univ. of Wisconsin, Madison, Wis.....	1928

Lewis, John B., Amelia, Virginia.....	1924
Lewy, Dr. Alfred, 2051 E. 72nd Place, Windsor Park, Chicago, Illinois.....	1915
Lowe, Dr. John N., Northern State Teachers College, Marquette, Michigan....	1927
MacCracken, Dr. W. H., Detroit College of Medicine and Surgery, 1516 St. Antoine St., Detroit, Michigan.....	1933
Magann, J. Wilbur, Oklahoma Gas and Electric Co., Oklahoma City, Okla....	1927
Maillaird, Joseph, 1815 Vallijo St., San Francisco, California.....	1930
McAtee, W. L., U. S. Biological Survey, Washington, D. C.....	1911
McCabe, T. T., Museum of Vertebrate Zoology, Berkeley, California.....	1928
McConnell, 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
Metcalf, Prof. F. P., Lingnan University, Canton, China.....	1919
Minich, Edward C., 1047 Fairview Ave., Youngstown, Ohio.....	1923
Mitchell, Mrs. Osborne S., 24 Wychwood Park, Toronto, Canada.....	1933
Morse, Harry G., Huron, Ohio.....	1914
Morse, Margarette E., Box 96, Viroqua, Wisconsin.....	1921
Moseley, Prof. Edwin L., State College, Bowling Green, Ohio.....	1925
Moses, Charles W., 216 Park St., West, Bismarck, North Dakota.....	1935
Mote, G. A., Marshalltown, Iowa.....	1930
Munger, Mrs. Edith, Hart, Michigan.....	1925
Neff, Johnson A., Bur. of Biol. Survey, 270 Federal Bldg., Sacramento, Calif..	1920
Nice, Dr. Leonard B., 156 W. Patterson Ave., Columbus, Ohio.....	1932
Nice, Mrs. Margaret M., 156 W. Patterson Ave., Columbus, Ohio.....	1921
Nichols, Charles K., 31 Ethelbert Place, Ridgewood, New Jersey.....	1933
Northcutt, Charles E., 7 West Blvd., Columbia, Missouri.....	1930
Oberholser, Dr. Harry C., 2805 18th St., N. W., Washington, D. C.....	1894
Olsen, Humphrey A., Nashville Agr. Normal Inst., Madison, Tennessee.....	1932
Osgood, Dr. Wilfred H., Field Museum of Natural History, Chicago, Illinois..	1910
Over, Prof. William H., University Museum, Vermillion, South Dakota.....	1930
Palmgren, Dr. Pontius, Museum Zoologicum Universitatis, Helsenki, Suomi, Helsingfors, Finland.....	1935
Palmer, Dr. Theodore S., 1939 Biltmore St. N. W., Washington, D. C.....	1914
Parker, Herbert, South Lancaster, Massachusetts.....	1928
Pemberton, John Ray, 3031 N. Lake Ave., Altadena, California.....	1922
Pennock, Charles John, Kennett Square, Chester Co., Pennsylvania.....	1900
Perkins, Samuel E. III, 709 Inland Bldg., Indianapolis, Indiana.....	1923
Pettingill, Dr. Olin S., Maple St., Middleton, Massachusetts.....	1930
Phelps, Frank M., 312 5th St., Elyria, Ohio.....	1912
Phillips, Allan R., P. O. Box 357, Scarsdale, New York.....	1934
Pickwell, Prof. Gayle B., Dept. Natural Science, San Jose State Teacher's College, San Jose, California.....	1923
Porter, James V., 226 E. Minnesota Ave., Glenwood, Minnesota.....	1928
Praeger, Prof. William E., 417 Douglas Ave., Kalamazoo, Michigan.....	1916
Preble, Edward A., U. S. Biological Survey, Washington, D. C.....	1929
Quillian, Prof. Marvin C., Wesleyan College, Macon, Georgia.....	1927
Randall, Mrs. W. S., No. 2, Enfield Road, Austin, Texas.....	1925
Reid, Russell, 811 Twelfth St., Bismarck, North Dakota.....	1920
Riley, Joseph H., 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, Harry J., Box 683, Couer d'Alene, Idaho.....	1921
Satterthwait, Elizabeth A., 118 Waverly Place, Webster Groves, Missonri....	1925
Saunders, W. E., 352 Clarence St., London, Ontario.....	1902
Saur, B. C., Rockwell Nursery, Foster, Ohio.....	1934
Schaefer, Oscar F., 724 Woodbine Ave., Rochester, New York.....	1921
Schantz, O. M., 3219 Maple Ave., Berwyn, Illinois.....	1903
Schmidt, F. J. W., 2 New Soils Bldg., Univ. of Wisconsin, Madison, Wisc....	1934
Schorger, Dr. A. W., 168 N. Prospeet Ave., Madison, Wisconsin.....	1927
Shaffer, Chester M., Dorcas, West Virginia.....	1934

Shelford, Prof. Victor, Vivarium Bldg., Wright and Healy Sts., Champaign, Illinois.....	1931
Skinner, M. P., 1316 Harding St., Long Beach, California.....	1926
Smith, Prof. Frank M., 79 Fayette St., Hillsdale, Michigan.....	1910
Smith, Frank R., Fredericktown, Pennsylvania.....	1930
Smith, Malcolm M., 327 Ashbourne Road, Elkins Park, Pennsylvania.....	1927
Spiker, Charles J., Branchport, New York.....	1916
Stebbins, Miss Fannie A., 31 Ely Ave., W. Springfield, Massachusetts.....	1935
Stillwell, Jerry E., 7523 San Fernando Way, Dallas, Texas.....	1935
Stoner, Dr. Dayton, New York State Museum, Albany, New York.....	1912
Stuart, Anne, 1905 D. Street, Lincoln, Nebraska.....	1924
Sutton, Mrs. J. G., 122 South West 7th St., Richmond, Indiana.....	1930
Swarth, Harry S., 2800 Prince St., Berkeley, California.....	1910
Thomas, Edward S., 1116 Madison Ave., Columbus, Ohio.....	1921
Tinker, Almerin D., 519 Oswego, Ann Arbor, Michigan.....	1909
Tyler, Dr. Winsor M., 112 Pinckney St., Boston, Massachusetts.....	1914
Urner, Charles A., 596 Westminister Ave., Elizabeth, N. J.....	1928
Van Tyne, Dr. Josselyn, Museum of Zoology, Ann Arbor, Michigan.....	1922
Visseher, Dr. Paul, Biological Laboratory, Western Reserve University, Cleveland, Ohio.....	1924
Von Jarchow, Dr. B. L., 1519 Washington Ave., Racine, Wisconsin.....	1934
Wallace, George E. Jr., McKean, Pennsylvania.....	1934
Warren, Edward R., 1511 Wood Ave., Colorado Springs, Colorado.....	1911
Weber, Alois J., 904 Grand Ave., Keokuk, Iowa.....	1928
Webster, Walter A., Sycamore Lawn Farm, R. D. 1, 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 N., 804 Lawrence St., Ann Arbor, Michigan.....	1924
Wilson, Prof. Gordon, 1434 Chestnut St., Bowling Green, Kentucky.....	1925
Wineman, A., 150 Michigan Ave., Detroit, Michigan.....	1934
Wright, George M., 328 Hilgard Hall, Berkeley, California.....	1934
Yoder, William H. Jr., 859 Granite St., Philadelphia, Pennsylvania.....	1926
Zimmerman, Harold A., 915 W. Gilbert St., Muncie, Indiana.....	1932

ASSOCIATE MEMBERS

Adams, I. C. Jr., 1600 Hinkson St., Columbia, Missouri.....	1933
Albaugh, Ross B., 1632 Fruitland Ave., Mayfield Heights, Ohio.....	1934
Allan, Philip F., Soil Conservation Service, Coon Valley, Wisconsin.....	1934
Allen, A. F., 108 Terrace Apartments, Sioux City, Iowa.....	1925
Allen, Walter I., 2057 Pepper Drive, Altadena, California.....	1934
Allert, Oscar P., R. R. 1, McGregor, Iowa.....	1923
Amandon, Dean, R. D. 1, Franklinville, New York.....	1935
Anmann, George Andrew, Museum of Zoology, Ann Arbor, Michigan.....	1935
Angus, H. L., 617 Payson Ave., Quincy, Illinois.....	1933
Applegate, Wilson, Rhinebeck, New York.....	1935
Austin, Dr. Oliver L., Tuckahoe, Westchester Co., New York.....	1930
Back, Mary Cooper, 1015 South 12th Ave., Maywood, Illinois.....	1934
Backofen, Margaret, 76 West Columbia Ave., Battle Creek, Michigan.....	1934
Badger, T. Hallett, Birds Nest, Virginia.....	1935
Bailey, Mrs. Florence Merriam, 1834 Kalorama Road, Washington, D. C.....	1911
Bailey, Mrs. Mary L., 2109 Nebraska St., Sioux City, Iowa.....	1918
Baker, John H., 1165 5th Ave., New York City.....	1930
Baker, William C., 223 W. Pershing St., Salem, Ohio.....	1931
Baldwin, Dorothy A., Hardwick, Massachusetts.....	1934
Ball, William H., 1861 Ingleside Terrace, N. W., Washington, D. C.....	1924
Banks, Robert D., 310 East 5th St., Superior, Wisconsin.....	1934
Barber, Bertram A., 350 West St., Hillsdale, Michigan.....	1923

Barnett, Dorothy I., Lucas, Ohio.....	1933
Bassett, Mrs. V. H., 1010 E. Park Ave., Savannah, Georgia.....	1931
Batchelder, C. F., 7 Kirkland St., Cambridge, Massachusetts.....	1927
Beals, Mrs. Marie V., 5833 85th St., Elmhurst, Long Island, New York.....	1930
Beebe, Ralph, 353 Salliotte St., Ecorse, Michigan.....	1924
Beehly, J. L., Boardman Road, Youngstown, Ohio.....	1933
Bellrose, Frank, Jr., 1220 W. Madison St., Ottawa, Illinois.....	1935
Benedict, Mrs. Howard Smith, 18320 Kinsman Road, Shaker Heights, Cleveland, Ohio.....	1926
Bennett, Logan J., 1818 Arlington Ave., Des Moines, Iowa.....	1934
Bennitt, Prof. Rudolph, Dept. of Zoology, University of Missouri, Columbia, Missouri.....	1932
Benson, Seth B., Museum of Vertebrate Zoology, Berkeley, California.....	1930
Bergner, Harold J., 420 Warwood Ave., Wheeling, West Virginia.....	1934
Berner, Glen, 121 East Front St., Jamestown, North Dakota.....	1930
Bicking, Charles A., 1006 W. 8th St., Wilmington, Delaware.....	1933
Bird, Otto A., 1510 Harding Road, Ann Arbor, Michigan.....	1932
Birkeland, Henry, Route 2, Nevada, Iowa.....	1934
Black, Charles T., 3836 Lowell Ave., Chicago, Illinois.....	1935
Black, J. D., Winslow, Arkansas.....	1925
Blanchard, Dr. Frank N., Dept. of Zoology, University of Michigan, Ann Arbor, Michigan.....	1928
Blincoe, Mrs. Benedict J., Route 13, Dayton, Ohio.....	1926
Bodine, Miss Margaret L., Ritterhouse Plaza, 19th and Walnut St., Philadelphia, Pennsylvania.....	1930
Boggs, I. B., Oglebay Hall, Morgantown, West Virginia.....	1933
Book, Dr. R. D., Corning, Ohio.....	1933
Bordner, Mrs. Robert I., Hudson, Iowa.....	1930
Borror, Donald J., Dept. of Zoology and Entomology, Ohio State University, Columbus, Ohio.....	1927
Boulton, Rudyard, Field Museum, Chicago, Illinois.....	1922
Bowman, Lawrence L., Orchard Hills, R. D. 7, 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
Brant, Irving W., %St. Louis Star, St. Louis, Missouri.....	1932
Breece, Russell, Delaware, Ohio.....	1933
Breslau, Leo A., % Laurel Printing Co., 480 Canal St., New York City.....	1933
Brooks, A. B., Ogelbay Park, Wheeling, West Virginia.....	1931
Brooks, Maurice, French Creek, West Virginia.....	1926
Broomhall, W. H., Stockport, Ohio.....	1926
Brosius, Ralph R., Valentine, Nebraska.....	1933
Brown, J. Wilcox, White Plains, Montchanin, Delaware.....	1932
Brown, Ralph M., V. P. I., Blacksburg, Virginia.....	1935
Brown, Robert B. Jr., 806 Rosewood Ave., Winnetka, Illinois.....	1935
Bruce, James A., 557 Spring St., Wooster, Ohio.....	1929
Bujak, B. J., 932 N. Fairfield Ave., Humboldt Park Station, Chicago, Illinois.....	1935
Bullock, D. J., Commodore Hotel, Des Moines, Iowa.....	1932
Burt, W. H., Museum of Zoology, Ann Arbor, Michigan.....	1928
Cain, B. C., Box 796, Oakland, California.....	1934
Campbell, S. H., Oak Grove, Louisiana.....	1934
Campbell, John S., Bienville, Louisiana.....	1932
Campbell, Louis W., 304 Fearing Blvd., Toledo, Ohio.....	1926
Carlson, 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.....	1930
Case, Rodman C., R. D. 1, Troy, Pennsylvania.....	1935
Chaffee, H. L., Amenia, North Dakota.....	1930
Chamberlain, Glen D., 22 Academy St., Presque Isle, Maine.....	1930
Chapman, Floyd B., 1944 Denune Ave., Columbus, Ohio.....	1932

Chapman, L. B., 67 Chester St., Newton Highlands, Massachusetts.....	1934
Chambers, W. Lee, 2068 Escarpa Drive, Eagle Rock, Los Angeles, California.....	1909
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., Dept. of Biology, University of Toronto, Toronto, Ontario.....	1932
Clayton, Miss Luella B., Feasterville, Pennsylvania.....	1930
Clippinger, Miss Florence, 4300 Midway Ave., Dayton, Ohio.....	1933
Clout, G. A., 89 North St., St. Catherines, Ontario.....	1935
Coles, Victor, 2910 Grasselli Ave., Cincinnati, Ohio.....	1929
Collett, Grace, 37 W. Tulane Road, Columbus, Ohio.....	1934
Collins, Henry H. Jr., 1620 P. St. N. W., Washington, D. C.....	1931
Compton, Lawrence V., Museum of Vertebrate Zoology, Berkeley, California.....	1923
Compton, Leila A., 846 E. Bowman St., Wooster, Ohio.....	1930
Conant, Roger, Toledo Zoological Society, Toledo, Ohio.....	1930
Conklin, Charles, Canal Winchester, Ohio.....	1933
Cook, Mrs. Horace P., 412 W. 11th St., Anderson, Indiana.....	1931
Cox, Rodman D., 785 South Ave., Rochester, New York.....	1933
Craig, Gerald S., Teacher's College, Columbia University, New York City.....	1932
Crandell, Herbert A., Ohio State University, Columbus, Ohio.....	1934
Crane, Francis V., South St., Needham, Massachusetts.....	1932
Crook, Compton N. Jr., Tennessee Polytechnical Inst., Cookeville, Tennessee.....	1929
Curl, A. Lawrence, Quincy, Ohio.....	1932
Currier, Elmonde S., 8541 N. Chicago Ave., St. Johns Sta., Portland, Oregon.....	1930
Curtis, John T., 325 Grand Ave., Waukesha, Wisconsin.....	1935
Curtler, Martin, % Mrs. George P. Cook, Kauluwai, Kaunakai P. O., Malo- kai, Hawaii.....	1934
Dambach, Charles A., Burton, Ohio.....	1934
Damon, David, 717 West St., Rapid City, South Dakota.....	1933
Danner, Mrs. Mary S., 1646 Cleveland Ave., N. W., Canton, Ohio.....	1921
Davidson, W. M., R. D. 1, Silver Spring, Maryland.....	1933
Davis, Mrs. L. Irby, Box 669, Harlington, Texas.....	1933
Davis, Russel S., Clayton, Illinois.....	1932
Dawley, Jean Wilson, 13962 Clifton Blvd., Lakewood, Ohio.....	1931
Dawley, Jessie Sprague, 1002 Garfield St., Madison, Wisconsin.....	1935
Dawson, Sallie, 807 N. 4th St., Terre Haute, Indiana.....	1933
Denton, Fred J., Dept. Zoology, University of Georgia, Athens, Georgia.....	1935
Dille, Fred M., Rapid City, South Dakota.....	1912
Dingle, Edward von Seibold, Huger, South Carolina.....	1921
Dole, J. Wilbur, 51 East Stone St., Fairfield, Iowa.....	1930
Dyer, Mrs. Minnie M., Byington, Tennessee.....	1930
Eastman, Mrs. E. P., 719 Columbia St., Burlington, Iowa.....	1926
Eastwood, Sidney K., 301 S. Winebiddle Ave., Pittsburgh, Pennsylvania.....	1928
Eckler, Harlan E., 1757 Hertel Ave., Buffalo, New York.....	1933
Edge, Mrs. Charles Noel, 136 E. 67th St., New York City.....	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 Road, 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, Berkeley, California.....	1930
Evans, Dr. Evan M., 550 Park Ave., New York City.....	1929
Everett, Constance, 206 9th St. N. E., Waseca, Minnesota.....	1934
Evens, Samuel N., 38 E. 14th St., Atlanta, Georgia.....	1921
Fabert, Harry John, 413 Linwood Ave., Columbus, Ohio.....	1932
Farley, Frank L., Camrose, Alberta.....	1934
Favell, Mrs. Angela Haste, 714 6th Ave. East, Superior, Wisconsin.....	1934
Feighner, Lena Veta, 298-1 South Tremont, Kansas City, Kansas.....	1935
Felker, J. O., R. 1, Box 403, Clayton, Missouri.....	1934

Felton, W. R., 1709 Summit St., Sioux City, Iowa.....	1934
Ferratt, Miss Elizabeth F., 2310 Connecticut Ave. N. W., Washington, D. C.....	1933
Foster, George, 2352 E. Magnolia Ave., Knoxville, Tennessee.....	1935
Finster, Ethel B., Ashville Normal School, Ashville, North Carolina.....	1930
Fisher, Dr. G. Clyde, American Museum of Natural History, New York City.....	1925
Fitzpatrick, Prof. Fred L., Teacher's College, Columbia Univ., New York, N. Y.....	1924
Fleetwood, Raymond J., Great Smoky Mountains National Park, Gatlinburg, Tennessee.....	1934
Fleming, Mrs. Allen W., 44 Woodland Ave., Columbus, Ohio.....	1934
Foote, M. E., Norwalk, Ohio.....	1934
Ford, Louise Pettigrew, Barnwell Ave., Aiken, South Carolina.....	1930
Forsthoefel, Paul, 303 East Fulton St., Celina, Ohio.....	1932
Franks, Roscoe W., State Civil Service Commission, Columbus, Ohio.....	1932
Franzen, Albert J., Field Museum, Chicago, Illinois.....	1929
Frazer, Dr. T. Atchinson, Marion, Kentucky.....	1934
Frazier, John M., Station A, Box 156, Hattiesburg, Mississippi.....	1930
Frothingham, Mrs. Randolph, 56 Sargent Crossway, Brookline, Massachusetts.....	1932
Frydrych, Paul B., 1508 Valley St., Dayton, Ohio.....	1934
Fryklund, P. O., Roseau, Roseau Co., Minnesota.....	1926
Furniss, Owen C., 2203 1st Ave., W. Prince Albert, Sask., Canada.....	1934
Gander, Frank F., Natural History Museum, Balboa Park, San Diego, Calif.....	1928
Ghigi, Alessandro, R. Universita, Bologna, Italy.....	1931
Giles, Norman H. Jr., 959 Drewery St., N. E., Atlanta, Georgia.....	1930
Gill, Geoffrey, 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., Berrywood Wilds, Ada, Michigan.....	1935
Glenn, Robert W., 509 Orchard Ave., Avalon, Pittsburgh, Pennsylvania.....	1934
Gloyd, Prof. H. K., Dept. of Zoology, Univ. of Michigan, Ann Arbor, Mich.....	1925
Goerlitz, George, 520 E. Main St., Boonville, Indiana.....	1934
Goldsmith, G. W., Box 1611 University Station, Austin, Texas.....	1931
Gordon, Dr. Robert B., Dept. of Botany, Ohio State Univ., Columbus, Ohio.....	1931
Gordon, Seth, American Game Assoc., Investment Bldg., Washington, D. C.....	1933
Gowen, Carl, 606 S. Illinois Ave., Carbondale, Illinois.....	1932
Grant, Cleveland P., 620 Greenup St., Covington, Kentucky.....	1928
Grant, William W., 816 S. Main St., Geneva, New York.....	1933
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
Gromme, Owen J., Milwaukee Public Museum, Milwaukee, Wisconsin.....	1924
Gross, Dr. Alfred O., Bowdoin College, Brunswick, Maine.....	1927
Guy, Mrs. Katherine Christie, Box 416, Beckley, West Virginia.....	1934
Haberger, 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., R. D. 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 J. Jr., Dept. of Zoology, Cornell Univ., Ithaca, N. Y.....	1933
Hamerstrom, F. J. Jr., Ruthven, Iowa.....	1934
Hanawalt, Prof. Fred A., Otterbein College, Westerville, Ohio.....	1932
Handlan, Mrs. John W., Oglebay Park, Wheeling, West Virginia.....	1934
Handley, Charles O., Richmond, Virginia.....	1925
Hargrave, Lyndon L., Box 203, Flagstaff, Arizona.....	1932
Harkin, J. B., Commissioner Dept. of Interior, Ottawa, Ontario.....	1924

Harper, Dr. Francis, 732 Yale Ave., Swarthmore, Pennsylvania.....	1930
Harris, C. L., 921 W. Central, Eldorado, Kansas.....	1928
Harris, Mrs. W. Gray, Boylston Center, Massachusetts.....	1932
Hartsook, Mrs. Fred P., Winterset, Iowa.....	1934
Hayward, C. Lynn, Dept. of Zoology, B. Y. University, Provo, Utah.....	1933
Hayward, W. J., Box 1282, Sioux City, Iowa.....	1913
Head, Glenn B., 337 Haskin St., Klamath Falls, Oregon.....	1935
Heising, Clara M., 311 Way Ave., Kirkwood, 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., Fredericktown, Ohio.....	1932
Hicks, John N., West Point, Illinois.....	1935
Heitt, Lawrence D., 3758 Brookside Road, Toledo, Ohio.....	1929
Hill, Howard, Desloge, Missouri.....	1933
Hillmer, Davis B., 454 Colburn Place, Detroit, Michigan.....	1926
Hilton, Dr. David C., 305 Richards Block, Lincoln, Nebraska.....	1918
Hinchman, Richard May, 501 Randolph Ave., Milton, Massachusetts.....	1931
Hoag, Ena, P. O. Box 407, Pacific Grove, California.....	1934
Holland, Harold May, Box 515, Galesburg, Illinois.....	1915
Holt, Prof. William P., Bowling Green, Ohio.....	1932
Howard, William J., Wilderness State Park, Carp Lake, Michigan.....	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
Huff, Prof. N. L., 1219 7th St., Minneapolis, Minnesota.....	1928
Huggitt, Floyd C., Bellevue, Michigan.....	1933
Hughes, George T., Box 153, Plainfield, New Jersey.....	1929
Hunter, Lawrence E., Dallas City, Illinois.....	1934
Hutchins, Harold L., 21 Lake St., Hamden, Connecticut.....	1934
Hyndway, Mrs. Eleanor, R. D. 2, Marcus, Iowa.....	1933
Ijams, H. P., Box 1150, Knoxville, Tennessee.....	1924
Ingersoll, Albert M., 908 F. St., San Diego, California.....	1921
James, Mrs. O. A., 4100 Grove Ave., Richmond, Virginia.....	1931
Janzen, Daniel H., Michigan State College, East Lansing, Michigan.....	1934
Jarrard, Miss Berma L., 54 Briarcliff Circle N. E., Atlanta, Georgia.....	1933
Jelier, F. P., Groote Visscherystraat 19a, Rotterdam, Holland.....	1931
Jenks, Randolph, Mt. Kemble, Morristown, New Jersey.....	1934
Jensen, J. P., Box 364, Dassel, Minnesota.....	1926
Johnson, D. E., 2269 Grandview Road, Cleveland Heights, Ohio.....	1934
Johnson, D. Elmer, 279 S. 6 West, Provo, Utah.....	1934
Johnson, Mrs. Irene W., 38 Portland Place, St. Louis, Missouri.....	1931
Johnson, Robert A., State Normal School, Oneonta, New York.....	1930
Jones, F. M., Box 105, Abington, Virginia.....	1933
Jones, Gordon Willis, 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 West Ave. N., Waukesha, Wisconsin.....	1921
Kalmbach, E. R., 527 Custom House, Denver, Colorado.....	1926
Kamm, Mrs. Oliver, 365 Lake Shore Drive, Grosse Pointe Farms, Michigan.....	1934
Kearns, Lucy Pendleton, Lynnhaven P. O., Lynnhaven, Virginia.....	1935
Keller, L. Floyd, Zion National Park, Springdale, Utah.....	1934
Kellog, Dace C., Box 343, Norwalk, Ohio.....	1932
King, Fain W., Wickliffe, Kentucky.....	1934
Kingsbury, Elizabeth W., Hockaday School, Dallas, Texas.....	1933
Klepfer, Ward, Box 1031, Granville, Ohio.....	1934
Knapp, Elmer, R. R. No. 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
Krug, Carl B., % George Krug, Minonk, Illinois.....	1930
Kubichek, W. F., 164 19th St., Cedar Rapids, Iowa.....	1926
Kummerlowe, Dr. Hans, Cichorius Strasse 6 III, Leipzig, Germany.....	1931
Langelier, Gus, R. R. 1, Frubourg St. Jean Baptiste, Quebec, Ontario.....	1933
Lawrence, A. G., City Health Dept., Winnipeg, Manitoba.....	1928
Lee, Addie, 2111 Dixie Place, Nashville, Tennessee.....	1933
Leedy, Charles A., % The Telegram, Youngstown, Ohio.....	1927
Lewis, Merriam G., Langhorne Place, Salem, Virginia.....	1930
Lincoln, Frederick C., Bureau Biological Survey, Washington, D. C.....	1914
Linsdale, Dr. Jean M., Museum of Vertebrate Zoology, University of Cali- fornia, Berkeley, California.....	1928
Lloyd, C. K., 11 Elm St., Oxford, Ohio.....	1925
Lloyd, Hoyes, 582 Mariposa Ave., Rockcliffe Park, Ottawa, Ontario.....	1922
Lodge, William R., Silver Lake Blvd., R. D. 1, Cuyahoga Falls, Ohio.....	1935
Lomax, Dr. Claude C., Dale, 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
Lovell, Mrs. Ray, 101 N. Monroc Ave., Columbus, Ohio.....	1932
Low, Seth H., 50 Glendale Road, Quincy, Massachusetts.....	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
MacLoughlin, Mrs. F. E., 43 Inglewood Drive, Hamilton, Ontario.....	1928
MacLulich, D. A., Rayol Ontario Museum of Zoology, Toronto, Ontario.....	1933
Marburger, Clifford, Denver, Lancaster Co., Pennsylvania.....	1924
Marden, Aaron, Eagle Island, S. Harpswell, Maine.....	1933
Marsh, V. L., Box 597, Great Falls, Montana.....	1934
Marshall, Raymond O., Box 72, R. D. 1, Leetonia, Ohio.....	1930
Maslowski, Karl H., 950 Glenwood Ave., Cincinnati, Ohio.....	1934
Mayr, Dr. Ernst, American Museum of Natural History, New York City.....	1933
McCall, Mrs. Irene S., 2716 19th St., Racine, Wisconsin.....	1934
McCarthy, T. J., 1524 Hughitt Ave., Superior, Wisconsin.....	1935
McGill, Dr. J. T., Vanderbilt University, Nashville, Tennessee.....	1930
McIntosh, Duncan, Fairhope, Alabama.....	1931
McLaughlin, Vincent, 1813 Kensington Ave., Youngstown, Ohio.....	1935
McNeil, Dr. Charles A., 111 W. Fourth Ave., Sedalia, Missouri.....	1914
McNutt, Dorothea R., Greensboro, North Carolina.....	1935
Meltreat, Burton W., Paullina, Iowa.....	1930
Melzer, James P., Milford, New Hampshire.....	1931
Mendenhall, Eugene W., 97 Brighton Road, Columbus, Ohio.....	1932
Meyer, Miss Adelpia, 2016 Belmont Blvd., Nashville, Tennessee.....	1931
Michener, Harold, 418 N. Hudson Ave., Pasadena, California.....	1926
Miller, Alden H., Museum Vertebrate Zoology, Berkeley, California.....	1930
Miller, Empey, Freeland, Michigan.....	1931
Miller, Henry C., 9 Sheridan Drive, Monroe, Michigan.....	1933
Miller, J. Paul, Box 51, Mill Village, New Hampshire.....	1931
Miller, Miss Louise J., 2708 Elizabeth Ave., Zion, Illinois.....	1929
Million, A., 2060 Rustic Road, Dayton, Ohio.....	1931
Mills, Daisy, Woodside, New Brunswick.....	1934
Moffit, James, 1879 Broadway, San Francisco, California.....	1931
Molloy, Mrs. R. B., 418 W. Third Ave., Corsicana, Texas.....	1930
Monroe, Burt, 110 S. 5th St., Louisville, Kentucky.....	1935
Mouson, Gale, Box 432, Safford, Arizona.....	1933
Moore, Miss Dora, 60 E. Mulberry St., Athens, Ohio.....	1934
Moreland, G. E., 219 Eastern Ave., Greenville, Illinois.....	1934
Morse, Frank E., Boston Bird Book Co., 162 Boylston St., Boston, Mass.....	1926
Mounts, Mrs. Beryl Taylor, Ballard Normal School, Macon, Georgia.....	1923
Monsley, William H., 4073 Tupper St., Westmount, Montreal, Quebec.....	1922
Mulaik, Dorothea Upp, Box 155, Edinburg, Texas.....	1933

Munter, Capt. W. H., U. S. Coast Guard, 209 Federal Bldg., Jacksonville, Florida.....	1933
Murie, Adolph, 328 Hilgard Hall, Berkeley, California.....	1932
Murie, O. J., Jackson, Wyoming.....	1934
Murray, Rev. J. J., Lexington Presbyterian Church, Lexington, Virginia.....	1931
Myrus, A. A., 81 Ford Ave., Oneonta, New York.....	1934
Naeser, Charles P., 515 Bash Court, Champaign, Illinois.....	1932
Nagel, Weaner Otto, Butler Apts., Columbia, Missouri.....	1933
Nelson, Arnold L., Food Habits, U. S. Biological Survey, Washington, D. C.....	1932
Nelson, Miss Viola, 35 W. Washington, Athens, Ohio.....	1935
Nicholson, Donald J., 534 S. Eola Drive, Orlando, Florida.....	1927
Norton, Arthur H., 22 Elm St., Portland, Maine.....	1934
Oakes, Mervin E., State Normal School, Fredonia, New York.....	1933
Odum, Eugene, Box 792, Chapel Hill, North Carolina.....	1930
O'Keefe, Mrs. Ethel, Glenarm, Illinois.....	1932
Oliver, Mary C., 909 Santa Rita St., Silver City, New Mexico.....	1934
Ortman, Mrs. Enid D., 4660 South Franklin, Englewood, Colorado.....	1930
Overing, Robert, Landover, Maryland.....	1930
Owre, Oscar, Jr., 2625 Newton Ave., South, Minneapolis, Minnesota.....	1935
Palmer, Miss Mary C., 760 Midlothian Blvd., R. D. 2, Youngstown, Ohio.....	1927
Palmer, Ralph S., Route 1, Brunswick, Maine.....	1934
Palsson, William F., Halldorsstadir, Laxardal, via Husavik, Iceland.....	1931
Patrick, Dr. Leon Patrick, Smith-Grote Bldg., Orange, California.....	1931
Patterson, J. E., 341 Giannini Hall, Berkeley, California.....	1930
Peabody, Rev. P. B., Box 55a, R. D. 6, Star Prairie, Wisconsin.....	1930
Peasley, Mrs. Harold, 1807 6th Ave., Des Moines, Iowa.....	1934
Pellew, Miss Marion, Box 455, Aiken, South Carolina.....	1920
Pennell, Miss Edna, 503 N. Main St., Mount Vernon, Ohio.....	1931
Pepper, William, Jr., 110 Glenview Ave., Wyncote, Pennsylvania.....	1932
Perin, Miss Kate P., Withrow High School, Cincinnati, Ohio.....	1931
Perry, Harold E., 1329 Ethel St., Glendale, California.....	1932
Peters, A. S., 529 Hickory St., Mankato, Minnesota.....	1933
Peterson, Alfred, Lock Box 211, Pipestone, Minnesota.....	1931
Peterson, N. Theodore, 80 Oaklawn Ave., Battle Creek, Michigan.....	1931
Pickens, A. L., 4029 Life Science Bldg., University of California, Berkeley, California.....	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., W. K. 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
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, John B., 532 Alvarado, Stanford University, California.....	1931
Quattlebaum, W. D., 1925 Paloma St., Pasadena, California.....	1930
Rahe, Carl W., 4666 Turney Road, Cleveland, Ohio.....	1931
Ramsden, Charles Theodore, Apartado 146, Guantanamo, Cuba.....	1914
Rapp, F. W., Vicksburg, Michigan.....	1926
Ray, Edward M., Fordsville, Kentucky.....	1935
Raz, George F., Box 83, Union Pier, Michigan.....	1933
Reeder, J. T., 318 College Ave., Houghton, Michigan.....	1926
Reeder, John P., 502 Seldon Road, Iron River, Michigan.....	1934
Reis, C. O., 646 Juanita Drive, Los Angeles, California.....	1931
Rice, Mrs. Bird Wells, 1035 S. Miller St., Cyanthiana, Kentucky.....	1935
Rich, Dr. Guy C., 1820 El Cerrito Place, Hollywood, California.....	1914
Richardson, Hubert, 182 Rusholme Road, Toronto, Ontario.....	1931
Rieks, Jesse J., 30 East 42nd St., New York City.....	1931
Ritter, John H., 1015 Old Orchard Ave., Dayton, Ohio.....	1932
Roasch, Gilbert O., Science Hall, University of Wisconsin, Madison, Wisc.....	1931
Roberts, Dr. Francis L. R., 419½ S. Governor St., Iowa City, Iowa.....	1924

Roby, Mrs. John W., Lima, Ohio.....	1935
Rollert, Judson, 1234 Chicago Ave., Evanston, Illinois.....	1933
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, Miss Julia E., Box 82, Kimball, Minnesota.....	1920
Rottenstein, Vilma, 2907 Scottwood Ave., Toledo, Ohio.....	1931
Russell, Henry N. Sr., 19 Alexander St., Princeton, New Jersey.....	1932
Sanders, R. D., U. S. Forest Service, Rhinelander, Wisconsin.....	1935
Sargent, William D., Entomology Dept., Cornell University, Ithaca, New York.....	1931
Sattire, A. M., Concordia College, Moorhead, Minnesota.....	1934
Saunders, Aretas A., 48 Longview Ave., Fairfield, Connecticut.....	1934
Saunders, George B., Staff Ornithologist, Game Division, Dept. of Conservation, Lansing, Michigan.....	1926
Schafer, John J., 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. and S. C. Home, Knightstown, Indiana.....	1935
Selter, Vivian, P. O. Box 21, St. Petersburg, Florida.....	1934
Shadle, Prof. Albert R., Biology Dept. University of Buffalo, Buffalo, N. Y.....	1930
Schaftesbury, 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 Moulard Ave., Niagara Falls, Ontario.....	1933
Shields, T. H., 150 18th St., Warwood, Wheeling, West Virginia.....	1934
Shipman, Charles W., 114 Ridge Road, Willoughby, Ohio.....	1930
Shirling, Prof. A. E., 3849 E. 62nd St., Kansas City, Missouri.....	1924
Shoop, Cora E., Steelville, Missouri.....	1935
Sibley, John E., R. D. 2, Whittemore, Michigan.....	1933
Sibley, Norman O., R. D. 2, Whittemore, Michigan.....	1933
Skaggs, Merit B., 15973 Euclid Ave., E. Cleveland, Ohio.....	1934
Slaek, 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, 8018 Winston Rd., Chestnut Hill, Philadelphia, Pa.....	1931
Smith, Napier, % Credito Balear, Palma de Mallorca, Balearic Islands, Spain.....	1928
Smith, Wendell Phillips, Wells River, Vermont.....	1921
Smyth, J. Adger, Salem, Virginia.....	1933
Smyth, Dr. L. C. R., 10819 Clifton Blvd., Cleveland, Ohio.....	1935
Snow, K. C., Route 1, Dexter, New Mexico.....	1932
Snyder, L. L., Royal Ontario Museum of Zoology, Bloor St. and Avenue Road, Toronto 5, Ontario.....	1929
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
Sterry, Elizabeth, Teacher's College, San Marcos, Texas.....	1930
Stevens, O. A., State College Station, Fargo, North Dakota.....	1926
Stevens, Ross O., Soil Conservation Service, Coon Valley, Wisconsin.....	1934
Stein, Hilda A., Southern Illinois State Teacher's College, Carbondale, Ill.....	1933
Stein, Stanley F., Shakopee, Minnesota.....	1932
Stephens, Mrs. A. B., 1695 Filbert St., San Francisco, California.....	1935
Stevenson, James, National Park Service, Oklahoma City, Oklahoma.....	1931
Stewart, Paul A., Lectionia, Ohio.....	1925
Stiles, Bruce F., 3726 7th Ave., Sioux City, Iowa.....	1935
Stillwell, W. H., Mt. Vernon, Ohio.....	1934
Stine, Perna M., State Teacher's College, Minot, North Dakota.....	1931
Stoner, Emerson A., Box 144, Benicia, California.....	1934

Stooksberry, C. L., 1814 South Miller Ave., Alliance, Ohio.....	1931
Stophlet, John J., 2612 Maplewood Ave., Toledo, Ohio.....	1934
Storer, Dr. Tracy L., Div. of Zoology, University Farm, Davis, California	1928
Strickland, Miss Laura Raymond, 578 E. Central St., Franklin, Mass.....	1935
Stroley, Miss Elsie A., Morristown, New Jersey.....	1935
Stuart, Mrs. Margaret J., Box 546, Wheaton, Illinois.....	1933
Stump, Jack, 1014 Price Rd., Clayton, Missouri.....	1934
Sturgeon, Myron, 259 W. 2nd St., Salem, Ohio.....	1934
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, 3305 47th Ave. South, Minncapolis, Minnesota.....	1927
Swedenborg, Ernie D., 4905 Vincent Ave., South, Minneapolis, Minnesota.....	1929
Swenk, Mrs. Myron H., 1410 N. 37th St., Lincoln, Nebraska.....	1925
Tanner, Orey, 5019 Constance St., New Orleans, Louisiana.....	1933
Taverner, P. E., National Museum of Canada, Ottawa, Ontario, Canada.....	1925
Teachenor, Dix, 1020 West 61st St., Kansas City, Missouri.....	1923
Test, Dr. Frederick H., 511 Russell St., West Lafayette, Indiana.....	1931
Thomas, Otho S., 205 S. Greene St., Rock Rapids, Iowa.....	1932
Thompson, Paul A., Northville, South Dakota.....	1934
Thorp, George B., Carnegie Institute of Technology, Pittsburgh, Pa.....	1935
Tompkins, Ivan R., U. S. Dredge Morgan, Savannah, Georgia.....	1931
Townsend, James E. Jr., R. D., Brookings, South Dakota.....	1935
Trautman, Milton B., Museum of Zoology, Ann Arbor, Michigan.....	1932
Travis, Bernard V., Iowa State College, Ames, Iowa.....	1935
Trempe, A. E., 612 Kimball St., Sault Ste. Marie, Michigan.....	1932
Trimble, Ruth, Carnegie Museum, Pittsburgh, Pennsylvania.....	1935
Tubbs, Farley F., 924 Cleo St., Lansing, Michigan.....	1935
Turtle, Lancelot J., Rosemount Khoek, Belfast, Ireland.....	1930
Tuttle, Henry C., 50 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.....	1934
Van Deusen, H. M., 406 Parker St., Newark, New Jersey.....	1934
Varner, L. S., McMillan, Michigan.....	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
Wachter, William, Hotel Martin, Sioux City, Iowa.....	1934
Wagner, Miss Elizabeth E., 11 8th Ave., Danbury, Connecticut.....	1932
Walker, W. M. Jr., 1638 White Ave., Knoxville, Tennessee.....	1925
Walkinshaw, Dr. Lawrence M., 1421 W. Michigan Ave., Battle Creek, Mich.....	1928
Wanamaker, Paul, 443 Seminole St., Oradell, New Jersey.....	1934
Watkins, Allen G., U. S. Forest Service, Saucier, Mississippi.....	1934
Ward, Lawrence, St. Johns, R. D. 1, Michigan.....	1934
Watson, Lucius Howard, 4103 Sheridan Blvd., Lincoln, Nebraska.....	1922
Watterson, William H., 14315 Milverton Road, Cleveland, Ohio.....	1929
Webster, E. H., Fairhope, Alabama.....	1932
Wells, William, Colony, Kansas.....	1934
Welshimer, A. G., Urbana, Ohio.....	1934
Welter, Wilfred A., Teacher's College, Moorhead, Kentucky.....	1934
West, Joe Young, Virginia State Teacher's College, East Radford, Virginia.....	1931
Wetherbee, Mrs. Kenneth B., 11 Dallas St., Worcester, Massachusetts.....	1930
Weyl, Edward Stern, 6506 Lincoln Drive, Mt. Airy, Philadelphia, Pa.....	1927
Whitaker, Inness, Hotel Robert Fulton, 228 W. 71st St., New York City.....	1930
Whitten, Easton W., Coffeen, Illinois.....	1930
Whittle, Charles L., River Crossroads, Peterboro, New Hampshire.....	1931
Wilkinson, Alexander Stanley, Kapiti Island, Wellington, New Zealand.....	1930
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, Warren J., 24824 89th Ave., Belle Rose, Long Island, New York.....	1928
Wilkins, W. N., Chapman, Kansas.....	1934
Wilson, Miss Belle, 5920 Goodwin Ave., Dallas, Texas.....	1928
Wilson, Sue, 1010 First National Bank Bldg., Omaha, Nebraska.....	1931
Witschi, Dr. Emil, Dept. Zoology, S. U. I., Iowa City, Iowa.....	1935
Wolfe, John N., 205 N. Warren Ave., Columbus, Ohio.....	1933
Wolfe, Capt. L. R., 1819 W. Pershing Road, Chicago, Illinois.....	1934
Wolfram, George S., Canal Winchester, Ohio.....	1932
Wood, Dr. Casey A., E. W. S. Library, McGill University, Montreal, Quebec.....	1924
Wood, Dr. Harold B., 3016 N. Second St., Harrisburg, Pennsylvania.....	1932
Wood, Mary Adele, Gates Hall, University of Chicago, Chicago, Illinois.....	1930
Wood, Norman A., Museum of Zoology, University of Michigan, Ann Arbor, Michigan.....	1925
Woods, W. C. Stephen, Minnesota.....	1934
Woodhull, Dr. Maurice W., Cottonwood Falls, Kansas.....	1931
Woolman, Edward, Box 128, Haverford, Pennsylvania.....	1928
Work, Mrs. Mary Robert, Bosky Acres, Barrington, Illinois.....	1934
Worthley, W. F., Chicago Academy of Sciences, Lincoln Park, Chicago, Ill.....	1930
Yeatter, R. E., Ill. Nat. History Survey, Nat. His. Bldg., Urbana, Illinois.....	1932
Youngworth, William, 3119 E. 2nd St., Sioux City, Iowa.....	1934
Yunker, Emilie, 1140 Everett Ave., Louisville, Kentucky.....	1935
Zimmerman, Fred R., 1105 W. Johnson St., Madison, Wisconsin.....	1935
Zeigler, C. W., Murray City, Ohio.....	1934
Zurcher, Miss Olga, 133 S. Richardson Ave., Columbus, Ohio.....	1933

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.

Address to a Robin

“Come, sweetest of the feather’d throng,
And soothe me with thy plaintive song:
Come to my cot, devoid of fear,
No danger shall await thee here:
No prowling cat, with whisker’d face,
Approaches this sequester’d place:
No schoolboy with his willow bow
Shall aim at thee a murd’rous blow.
No wily lim’d twig ere molest,
Thy olive wing or crimson breast:
Thy cup, sweet bird, I’ll daily fill
At yonder cressy babbling rill.
Thy board shall plenteously be spread
With crumblets of the nicest bread:
And when rude winter comes and shows
His icicles and shivering snows,
Hop o’er my cheering hearth and be
One of my peaceful family.
Then soothe me with thy plaintive song,
Thou sweetest of the feather’d throng.”

—EDWARD JENNER, 1770.

JAN 2 1936

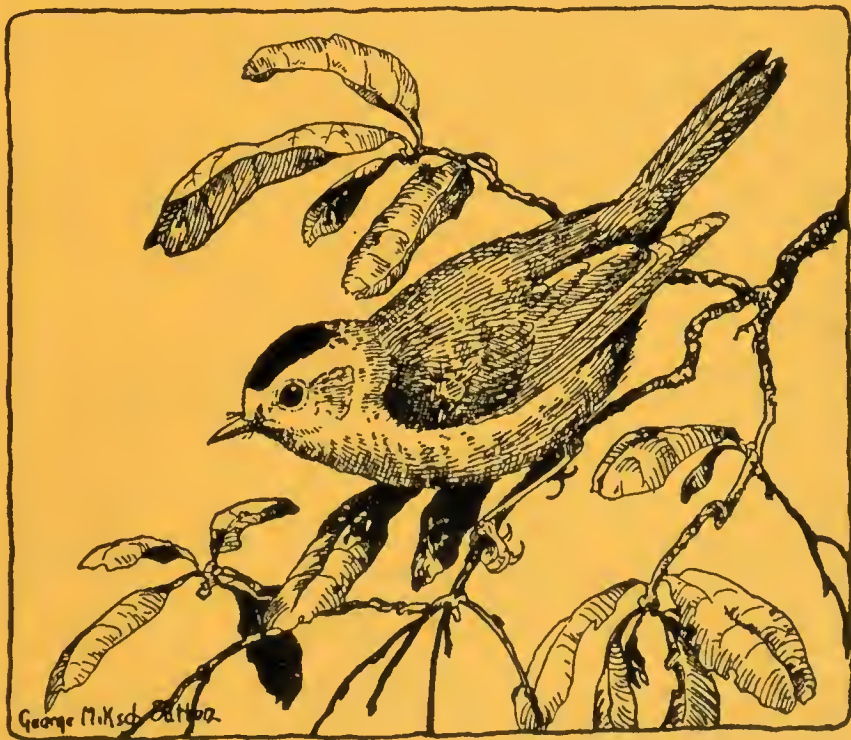
13,814

Vol. XLVII

DECEMBER, 1935

No. 4

THE WILSON BULLETIN



A Magazine of Field Ornithology
Published by the
WILSON ORNITHOLOGICAL CLUB
at
SIOUX CITY, IOWA

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

CONTENTS

RIM ROCK AND SOLITAIRE	By P. B. Peabody	257-265
BEACH-COMBERS	By Bayard H. Christy	265-269
STORKS IN TREES	By Margaret Morse Nice	270-271
WINTERING WARBLERS IN CAMERON COUNTY, TEXAS, DURING THE SEASON OF 1934-1935	By L. Irby Davis	272-274
AN EXAMPLE OF PARTIAL ALBINISM IN THE EASTERN CROW	By Dayton Stoner	274-276
THE SEX RATIO IN DUCKS	By O. C. Furniss	277-278
A STUDY OF THE WINTER BIRD LIFE IN BEAR LAKE AND UTAH LAKE VALLEYS	By C. Lynn Hayward	278-284
THE CARDINAL NOW TWELVE YEARS OLD	By A. F. Ganier	285-286
ARIZONA FIELDS ARE VIRGIN FOR BIRD BANDERS	By Fred M. Dille	286-293
GENERAL NOTES		294-299
ORNITHOLOGICAL LITERATURE		300-307
EDITORIAL		308

THE WILSON BULLETIN

is published quarterly in March, June, September, and December, as the official organ of the Wilson Ornithological Club, at Sioux City, Iowa, and is sent to all members not in arrears for dues. The subscription price is \$1.50 a year, invariably in advance, in the United States. Single numbers, 50 cents. Outside of the United States the rate is \$1.75. Single numbers, 60 cents. Subscriptions should be sent to the Editor.

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—Mr. W. M. Rosenc, Ogden, Iowa.

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. XLVII

DECEMBER, 1935

No. 4

Vol. XLII (New Series) Whole Number 173

RIM ROCK AND SOLITAIRE

BY P. B. PEABODY

That picturesque yet highly exaggerated figure wherein Mr. Trippe once described the song of the Townsend's Solitaire (*Myadestes townsendi*) became for me, once, a fascinating lure to Wyoming wilds. The prospect of long rides beneath clear skies amid rock masses, over deep-lying gorges resplendent with flowers and resonant with song, so gripped me that, fairly before I realized it, I found myself domiciled in a little cabin at the rear of a church in Newcastle, Wyoming.

One radiant October morning a few weeks later, after staging across fifty miles of alternating sage plain and bull pine studded canyon-gorge, passing by picturesque, lone Inyan Kara, skirting, finally, the deep, sloping talus of venerable Sundance Mountain, I landed at the village of Sundance. It was a paradisaic place, nestling against the northeastern bosses of the Bear Lodge. A mile wide area to the west gave outlet, behind fringes of willows, to the spring fed waters of the Bear Lodge and of Sundance Mountain.

Next morning I sauntered down to the odd, deserted church, far down the mesa. On its weathered porch I soon stood transfixed, with every nerve a-tingle. Eyes went sweeping up the steeps of the northward bench of the Bear Lodge. Quaintly weazened cedars, writtled into the grotesque forms that Dore once so loved, were foiling the sombre masses of young bull pines. Here and there, amid the scattered talus, there peered gaunt, jutting crags. Far up the slopes there towered the primeval pines. Their dark green tops cameoed the clear sky; while many a blanched top bespoke the deadly work of the tiny beetles that were already so rapidly converting whole masses of ponderosa pines into festering, shattered, falling, and fallen personifications of the Abomination of Desolation. And then, as I ardently looked and listened, as if in token that life and beauty everywhere shall ultimately triumph over death and decay, suddenly there stole forth from somewhere up the heights, mysteriously, delicately, vibrantly, a rippling song that seemed to know little of limit or of tiring. It was the song of the Solitaire.

Thereafter, I heard it often. Wherever there were rim-rock, cedar, and bull-pine, right there often echoed the Solitaire song. One heard it from January to May; and again from August until January. For, the Solitaire is resident. Like all true residents he is ever hardy, and unchangeably cheerful. No storm can silence him, no cold benumb, no heat over-power. When fog masses hurtle tumultuously across the muffled crags, right there masterfully sings the Solitaire in fullest nuptial ecstasy. The song trickles vibrantly downward through the hiss and roar of the storm, among the pines, the devoted pair falling and rising, over and below each other, high in air. It is amid such environs, as if in mastery over storm fury, that the mating time melodies of this rarest of "thrushes" bear the most bewitching charm.

But, one must learn to see the Solitaire. That short flute note wherewith he calls his mate in love time, or his male companions in winter, is both ventriloquial and bewildering. No bird call is more tantalizing, more stubbornly baffling. Yet, by and by, as one listens intently, with many cranings of neck and stumblings of foot, at last one really sees him. "Frozen", he is crouching against the bark of a pine sapling of his own color. In a moment, with that characteristic "thrush" rigidity, he mounts the sapling. Here, with outstretched neck, he listens, and listens, apparently for another of his own kind. Meanwhile he watches, for the ever-persistent foe.

In winter one finds the Solitaire, ever, among the cedars. Not often is he to be found elsewhere. For here is his granary; here his hammock and his bed; and here his City of Refuge from sharp-shins and screech owls. And always, in the main, it is among the cedar clad rocks which crown the gorges that the Solitaire loves to dwell during the halcyon hours of his winter days. E. S. Cameron has considered the Solitaire to be only a wintral sojourner in the fastness of Montana. And I, also, once believed this eerie creature to be just a wintral habitant. But both of us were wrong. For when May comes with its scattered bebies of hurrying storm attendants, then does the Solitaire sink into silence—utter silence. And then do the sundry pairs begin to home-fly back to their castles in the air, along the margin, perhaps, of some canyon wall; or amid the numberless crannies of a rock seam in some little gorge; or even, amid the stumps of some small clearing among the pines. Or perhaps the nesting place may lie in a secluded bank which margins the storm stream that rages, betimes, down some narrow water-shed, on its way to the river and the sea. Here, at his nest location, the Solitaire has little to say. Like certain other of our western mountain dwellers, he has learned the value of



FIG. 33. Inyan Kara, a "mountain" with an elevation of 6,500 feet in Wyoming, on the western margin of the Black Hills, and a famous landmark in early history.



FIG. 34. Sundance Mountain lies across the valley that flanks the Bear Lodge Mountains. The erosion is at the southeast, where the mountain skirts the valley; note the talus at the base, right-hand. The southwest crest slopes gently and is heavily wooded with ponderosa pines, and a few deciduous trees. This is especially the haunt of the Solitaire. In the early days the Indians gathered at the southeast crest at sunrise to perform their mystical rites.

prudent silence. However, one whose ear has been trained to keenness may hear, once in a great while, just a stifled, distant call; or again more rarely still, a smothered reminiscence of the nuptial song may scatter its fragments amid the deepening dark of a summer evening.

Yet there is a call, apparently unknown to science, a strange, wierd, smothered, yet intensely vibrant warning cry, a barely audible "*Pur-r-v-v-e*". This caution call, which may be uttered by either sex, I first heard under a thrilling circumstance. I stood, once, among scattered pine stumps and a few isolated clumps of ground juniper on the Bear Lodge. I had just seen a single Sharp-tailed Grouse alight, with a subdued, fearsome, "*Whuck-whuck-whuck*". Statuesque, there the slender creature stood, for all of a minute, intently eyeing me. When the grouse flushed I followed it down a narrow gorge which broadened into a level area covered with small bur oak trees. Forty rods to the northward there lay the rim-rock verge of a narrow "pocket" canyon. Steeply walled it was, at the apex, with steep slopes leading down to the canyon-mouth. The heights were clad in tenderest willow and aspen greenery. Out from the canyon opening there swept a vista of rolling plains, with their outlines softened in the undulating air. Westerly frowned the Black Buttes. To the north, fifteen miles away, enwrapped in purple haze, lay beautiful, isolated Inyan Kara. One stood transfixed. Then, suddenly, out from the hidden mazes of the narrow canyon there came floating the *motif* of a Solitaire song. It was but a faint suggestion, yet that was quite enough.

But in just a moment, in quite the usual inconsequential way, a Solitaire came liting up over the rim-rock and straight toward the observer. But, midway of the bur oak area, it seemed to sense the intruding human, and swerved, a moment, in midair. Then the canny creature alighted in a little oak; and, instantly, there came rasping its way through the still morning air that previously unheard warning cry, that creepy, pervasive, nasal "*Pur-r-v-v-e*". For a few moments, then, bird and man stood still, eyeing each other, though a full hundred yards apart. Then, for just one unguarded moment, the human eye swerved from its focus; and, the bird had disappeared!

Down through the oak-brush-covered space there wound a whilom water-way. Its course wound, tortuously, between banks of earth. Toughened by root-fibre, the bank edges over-hung. Intently traversing the deepest of these sections, I came, at a sudden turn, upon a sitting Solitaire, my missing bird. Her four eggs lay in a rough nest of weeds, grasses, yarrow-blades, and rootlets. This rested *upon*, rather



FIG. 35. The nest of the Solitaire "under the turfy over-hang", with bird sitting. 1906.



FIG. 36. The nest of the Solitaire on a tiny rock-shelf, "deep sheltered by the ferns and poison ivy", in the Bear Lodge Mountains. Crook County, Wyoming, May, 1901.

than *in*, a hollow, right in the runway continually used by many a vole, white-footed mouse, and chickaree, winding in and out, under the turfy over-hang. Here, storm-fended, the Solitaire was brooding her treasures. Silently, steadily, she eyed me. And then, amid the falling rain, there was wrought out that mystery of gentling whereby the wildest of the wild grow tame, at last, in home-defense; when danger no longer threatens.

My very first occupied Solitaire nest was found in this very canyon. It was the work of a previous year, in June. The fretful caekling of a Western Sharp-shinned Hawk had led the camerist through endless mazes of undergrowth, straight across to a steep slope whereon a few tall birches grew amid pines and aspens. In one of these birches, upon a revamped nest of the always terrible red squirrel there lay five eggs of the no-less-terrible wiry hawk. Hardly had the sight of these very rare eggs rewarded one's wearisome climb before there was heard, from the far-opposite rock wall, which I had just left, the furtive song of a Solitaire—never before heard in June. Straight across, then, to the nesting-niche I went. The site was in a sheltered nook upon a shelf, snug and inaccessible. It held four oddly-spotted young, already full-feathered on that late June day. Their cradle was just a mat of the long pine needles that were lying everywhere about. As usual the parents of these awkward younglings were curiously apathetic during my study of their brood.

Just such another nest I later found, at sunset of another late June day. It was on a tiny shelf, half way up the steep slope of a very narrow water course, not very far from the little old dilapidated church. This nest was betrayed, as occupied nests of this species almost invariably are, by the flushing of the sitting bird. In this nest, sheltered by poison ivy, there crouched four spotted young.

Rough as are all Solitaire nests, but unique in its deep foundation of stout pine twigs, was a nest, many years old, that I once found in the very bottom of a pine stump in a clearing. It had been built upward to a ten-inch height, and it had a matted lining of plant fibre.

Uneanny is the Solitaire, especially in baby-time. Sitters cling closely to their nests, whether with eggs or with young. And Solitaire parents worry precious little about human presences near their nests. There is no outcry. Even the warning call made by most parent birds when nearing their nests with food is, with this unconventional creature, only a faint utterance, and even this is sometimes not to be heard at all. Yet, curiously enough, with all that apparent indifference, I



FIG. 37. An old nest of the Solitaire is located in the bottom of the pine stump in the clearing.



FIG. 38. A Solitaire's nest "among broken layers of porphyry" in a deep cleft of the Bear Lodge rim-rock. Crook County, Wyoming, May, 1901.

have never known Solitaires to come near their nests, with food, when a man was just nosing about.

Beautiful as are normal eggs of the Townsend's Solitaire, I once found an entire "set" of them that were of rarest beauty. The pearly, somewhat rosy ground tint was heightened by the boldness and the brightness of the warm, red-brown markings. And there were five of them, which is rare, indeed.

A single pair of Solitaires that I once knew evinced a rare susceptibility. These birds were undoubtedly the very pair that reared their young in 1905 in the little niche among rocks near the crest of the Bear Lodge. The nesting place they had chosen for 1906 was but a hundred feet further up, on the same flood groove. On the abnormally late breeding date of July 10 I was intent upon the perplexing ways of a pair of Canada Jays. Behind and beneath a solitary pine sapling, at the head of the narrow gorge, I was hiding from the jays. Then, of a sudden, straight down the slope from which my jays had disappeared, a subdued Solitaire song was heard. It must have been a female's love-song, while she was resting and feeding near her nest. Quickly I sighted her, as she sat on the lowest dead branches of a little pine. I watched her mate come, wing-poised, across from the opposite side of the narrow and shallow gorge to a spot beside the female. The wings of the eager creature relaxed, and began to quiver. Her beak opened wide to receive the morsel her mate had brought her. Instantly, the almoner passed out of sight; but his mate still sat where she was, placidly preening.

By experience, the watcher knew exactly what was going to happen. He dared not move his very eyes. In an instant he shrank to half his size. With wings in poise the female Solitaire glides downward, aslant, to the bottom of the slope, a hundred feet away; and she has instantly disappeared. But, I found her, a bit later, on a juniper shrouded shelf, back among the broken layers of porphyry. A tender-foot might have "rushed" her, instanter, but I just "froze", and watched! No miracle of words could possibly tell just how craft finally began to triumph over fear.

Two days went by. My camera was set up and left. Gradually, with infinite slowness, it was moved, nearer and nearer to the nesting spot; yet, always, in vain. At the critical moment, a drab shadow would be wafted from the nesting nook to some favored perching spot on the gaunt branch of a pine log; or to the lower twigs of a feeding tree. Then, while I crouched beneath my covert, burying my body among dead leaves and stems of bear-berry, the drab Lady would

come cautiously back, rod by rod, yard by yard, from one perch to another; until, at last one might almost foretell just what road she would take next, in going home. Then, more swiftly than the untrained eye might follow, she would have vanished out of space; and her bright eye would peer out at one from her half hidden eyrie. Finally, in near despair, I hid the camera just back of a blackened stump, behind a pine sapling. There I left it, for a while, "all set".

In due time the observer had crushed himself into shapelessness, among the rough herbage, but within reach of the holder-slide. And, there, scorched by a mounting sun, pinched by wandering ants, devoured by hungry deer-flies, he lay, a long, long time, waiting as only an enthusiast can wait! Cautiously, when the climatic moment came, the slide was slowly drawn, inch by inch, with a hand upreached. The noisy shutter elicited its closing. And, the ghost of a shadow went flitting, quick as thought, out from the covert, into the sunlight, and far away, down the steeps.

TOPEKA, KANSAS.

BEACH-COMBERS

BY BAYARD H. CHRISTY

A gently curving bay opens northeastwardly to the breadth of Lake Superior. To the left against the horizon extends the blue band of Keweenaw Point; its mountains, often undercut by mirage, seem to float in air; to the right lake and sky meet in a far line that is serrated and notched when the waters are tossed by storm. The bay swings inland between forest-crowned headlands of red sandstone. A long, low sand dune, extending from one promontory to the other, wind-built from behind, storm-beaten in front, falls abruptly to a narrow beach.

The crest of the dune is grown with harsh grass and beach peas; its landward slope is covered with red-berried kinnikinnick; beyond extends a ridged, sandy plain, sparsely grown with jack pines and norways, carpeted with huckleberry bushes that now, in early October, are aflame amidst faded brakes and dim gray mosses. Wavelets lap the beach and raise a gentle murmur. When the wind is offshore even the murmur fails; but when lake winds blow a heavy surf mounts and roars landward. The breadth of the beach, from the precipitous face of the dune to the inconstant margin of water, is not great—two, three, six paces, at most. The waves beat upon a firm, steep slope, and in places reach the very base of the dune; but, for the greater part, there is a level interval between of loose, dry sand.

Peeled logs lie cast about, half buried; and each spent wave leaves an arc of small litter, to be caught and cast up again, endlessly. The water is cold and clean, the air fresh, and within the forest spreads the fragrance of the pines.

At the season of which I speak, during the early days of October, the lake side is alive with migrating birds. To what extent the hundred-and-fifty-mile-wide lake is an obstacle in the northward and southward movements, I do not certainly know. To the waterbirds, certainly, it is none. From the sand I pick up the frail body of a warbler, the life spent perhaps at the very completion of a long over-water flight; but repeatedly I have observed transients moving high in air, not in a north-and-south course across the lake, but east and west along its shore.

By whatever route they come, here along the dunes Tree Sparrows rise from the grasses; at the edge of the woods White-crowned and Harris's Sparrows are skulking. Gray-cheeked Thrushes appear in the shadows of the deeper forests; and the bands of Myrtle Warblers and Juncos are, I doubt not, augmented by newcomers from the north.

It is not, however, of the generality that I mean to speak, but only of a small part; only of those few birds that frequent the beach itself. This is the narrowest, the slenderest, the most diminutive of beaches—a strip of wave-dashed sand, three or four miles long, thirty or forty feet wide; slight in comparison with the beaches of the lower lakes, but adequate for my purpose. It serves to sift out from the moving hosts a few birds of riparian habit; not many kinds, not many individuals, but sufficient to constitute a group apart. There are among them birds of different and remote families, with nothing more in common than that they are birds and that they feed from the same table. I gain my specimens selectively, as the chemist gains his on a sheet of filter paper, and devote to them my further attention.

Setting out one morning under a gray sky, I find the lake tossed by a stiff, cold, northeast wind, and the waters tumbling and roaring on the strand. Far out to the north the sky is clear, and against it a skein of smoke is thrown from some steamer that passes below the horizon line. Herring Gulls come stringing along, two hundred feet in air, following exactly the line of the beach. Manifestly an aerial billow, as over a sunken reef, mounts above the rim of the forest, and along the crest of this billow the gulls find a highway. They course along it on scarcely moving wings. Occasionally one swings aside and glides to the surface of the bay. Very rarely one flies from the water to rest upon the shingle and sun himself. They

feed in the open water, rather, and not upon the beach itself. It is different with the Ring-billed Gulls, a species of which a few are present. Frequently I find one of them standing plover-like at the water's edge. They are deliberate in movement, and, as I suppose, happen occasionally upon some small fish east ashore.

Advancing along the dune this wild, gray morning, I cross the trail of a deer that has lately come to water and gone again; a gang of ducks, flying high, comes down-wind from the open lake; an eagle rises from the woods and flaps out to sea. His flight is heavy and powerful. Occasionally he furls a wing, slips sidewise, and rises again, as though this breasting of the strong, cold wind were pleasurable. The eagles have an eye upon the beach, and upon the wide waters beyond, and anticipate even the gulls in finding fish when they rise gasping to the surface. Ravens, too, fly over the treetops; and it may be that they come sometimes to the strand; I do not, however, recall seeing one there.

Reaching at length the very bottom of the bay, I come upon the first of the true beach-combers, a Pipit. The lake tumbles and roars, the wind throws the spray afar; and amid the tumult the Pipit walks daintily, prettily; wagging its tail after its manner; not a feather ruffled; picking on this side and that as it goes. As I come near, the bird eyes me alertly, and presently darts up with its clear, sweet *pipit* cry, flying out over the water, leaping upward in its flight; but presently it swings back and pitches again only a short distance remote, and there recommences its busy progress, and I do not again disturb it.

Next day, the wind having spent itself, I find in the same place a company of three birds—two Pipits and with them a Lapland Longspur. The Pipits stand erect and walk daintily; the Longspur crouches and creeps. The Pipits manifest some timidity; the Longspur is quite confident. Moving gently I find I can approach him so nearly that I have no need of field-glasses. Indeed, I am so near that the field-glasses may not be brought to focus upon him. The Pipits seem to feed preferably on the hard wet slope, along the lines of freshly east-up drift; the Longspur creeps over the dry and softer sand near the base of the dune.

The birds now are in winter plumage. Nevertheless, upon the creamy olive-gray plumage of the Pipits—and upon one of them, particularly—spreads a faint glow, a certain impalpable suffusion, of cinnamon red. As for the Longspur, the black of the head is in eclipse, and shows somewhat uncertainly in a band across the upper breast and in emphatic spots at the margins of the ochre-colored cheek areas. The

large patch of sorrel brown over the nape of the neck is well defined. I note the long hind claw, almost as though I held the bird in my hand.

A rather unexpected element in this riparian gathering of birds is the Rusty Blackbird. He is a bird that more commonly is found gathered in small bands and moving about in alder-grown swampy places; but he frequents the shore too, and that regularly. In such place, however, I have invariably found him singly. He walks briskly, quite in the manner of the more familiar Bronzed Grackle. He follows the edge of the retreating wave, his bright, pale-amber eye alert, gleaning from the slight swath of drift. He is wary, and yet fearless; when disturbed he flies swiftly to a fresh stand a hundred yards down the beach; and when disturbed again he will raise his head, flick his tail, utter a low, harsh note, and fly to refuge in the woods.

It is in autumn that the significance of the name Rusty Blackbird is manifest. The jet black plumage is then, over the fore part of the body, veiled in golden brown; it is when the bird flies away that the black outspread wings and tail, together with the manner of flight, afford the familiar appearance of a blackbird.

The Black-bellied Plover is the only true shorebird on my list of beach-combers. Individual plovers linger here well into October. They are not timid birds, but they are very wary. Only from afar and through field-glasses can I detect them actually feeding. They cover the beach widely, from the water's edge to the face of the dune, feeding most commonly in the higher, drier portion.

As I approach, the bird comes to attention, and as I draw nearer still he runs fitfully before me. It is only by swifter approach that I can put him to flight, and then on broadly white and outspread wings and tail he swings away over the water and curves again to the strand, perhaps a quarter of a mile away. A silvery gray bird, with conspicuous black points of bill, eye, and folded primaries, and feet. The only question that rises is whether he may by chance be a Golden Plover, and the only sure field mark is the hind toe—its presence or its absence. And I challenge any one easily to detect that character. He stands, sunk a quarter of an inch deep in soft sand; you disturb him and, though he takes to firm moist footing, his legs go twinkling away, so fast that you get nothing. Only after slow and patient following and repeated fumbings of chance does your bird at last pause, broadside on, and afford that glimpse of the small elevated, almost wart-like enlargement on the slender shank that settles the matter at last.

On the morning of the seventh of October the Horned Larks appeared—a party of seven. They are sociable creatures, roaming and

feeding in companies. These are newcomers from the north, easily distinguishable by their lemon-yellow faces from the paler, southerly ranging birds of the interior. They run about over the drift; and, when disturbed, run hurriedly. They easily take wing, climb high, and sweep about with sweet, twittering calls, as though irresolute. But at length hesitation is gone, and they swing down to another feeding place.

There is but one bird more on my list—the Snow Bunting. I expected him. Each morning as I came out and searched the strand, he was in my mind; but it was not until the last morning of my stay—that of the thirteenth day of October—that the Snow Buntings appeared, two of them, crouching and feeding, very much after the manner of longspurs. But the birds are of very different coloring. The longspur is a black and brown bird, trimmed with white; the bunting is a white bird, trimmed with black and brown. He has come from Arctic islands, from granite hills pocketed with snow; and here along the lake shores he will continue through all the ice and storm of winter. But once have I seen him as far to southward as at my home in the Ohio Valley. His is the hardihood of the ptarmigan, and here he finds an adequate economy.

What provender, then, does nature afford these few birdlings on a wave-beaten strand? Thinking of this, I gathered between my fingertips and spread upon my palm a pinch of this small wreck. And of what did it consist? Of pine needles, bits of bark, the keys from maple trees, the small winged seeds of birch, alder, pine; and here the diaphanous shell of some minute shrimp-like creature. It is such matters as these that are the prizes of the beach-combers.

Presently the gathering will have dispersed. Indeed, when the buntings came, the plovers had already gone. And the plover will fly far—perhaps to another continent, and even to another hemisphere—before the urge within him will be spent. It was but by chance that, pausing here, he was found in association with half a dozen other particular kinds.

Are these trivial matters? Certainly they are. What matters then are significant? Let us adapt to our purpose the parable of the Saxon chronicle. We too are creatures busied on our arena along our reach of sand. On one side spread infinite waters across which we have come. Presently winter will be upon us, and we shall be going to some far and unseen place. Please God we go as confidently and as unerringly as the birds.

STORKS IN TREES

BY MARGARET MORSE NICE

It was my privilege to spend a day in early June in the Unterspreewald with the ornithologist who has made a notable study of the bird life of these woods and meadows.¹ We had taken an early train from Berlin to the village of Lubözl, fifty miles southeast; here many of the houses and barns were old and quaint; the women wore black peasant costumes handsomely embroidered, and every one greeted us kindly.

Swallows (*Hirundo rustica*) were abundant in the village nesting in the barns, the jolly little Serin (*Serinus canarius serinus*) sang, and the Greenfinch (*Chloris chloris*) gave his absurd note. Soon we began to hear the lovely Sky-Larks (*Alauda arvensis*). Two years ago² I had been sorely disappointed in their song, but this time I rejoiced in it with my whole heart; it is altogether charming, brimming over with the delight of living. And then I heard my first Cuckoo (*Cuculus c. canorus*). The song is a melodious, peaceful, satisfying sound, and I do not wonder that it is loved.

The meadows were sweet with the scent of new-mown hay and fields were bright with pink ragged robin, while along the paths grew yellow irises and the bluest of forget-me-nots. I was delighted to hear the Chiffchaff (*Phylloscopus c. collybita*) again; he also improved on acquaintance. All day we kept hearing his simple, earnest lay and it always pleased me. I am very fond of the handsome and confiding Yellowhammers (*Emberiza citrinella*) whose song cannot be mistaken. The gorgeous Golden Orioles (*Oriolus o. oriolus*) were heard time and again; the spirited song has much in common with that of our Baltimore Oriole (*Icterus galbula*). White-throats (*Sylvia communis*) were busily singing; one of their songs reminded me very much of that of our Bell's Vireo (*Vireo belli*), but others are more musical and less easy to remember.

A notable feature of wooded areas in Germany consists in the numbers of Raptores that nest in them. We saw five or six Buzzards (*Buteo buteo*) during the day, a Red Kite (*Milvus m. milvus*), and three Black Kites (*Milvus m. migrans*), two of which were chasing the third and at the same time giving a curious trilling sound. We also observed a Hobby (*Falco subbuteo*) in flight and a Kestrel (*Falco tinnunculus*) in the woods.

¹Gottfried Schiermann, 1930. Studien über Siedelungsdichte im Brutgebiet. Journal für Ornithologie, 78, pp. 137-180.

²1933. Some Ornithological Experiences in Europe. Bird-Banding, 4, pp. 147-154.

A new and exciting bird to me was the Hoopoe (*Upupa erops*) with its extraordinary crest. We found a mossy *Spielnest* of a Wren (*Troglodytes t. troglodytes*) and saw several fat babies that had been raised nearby. Herr Schiermann was always examining bushes with his walking stick and the count of nests thus discovered was as follows: a Turtle Dove's (*Streptopelia turtur*), a Garden Warbler's (*Sylvia borin*), a Hooded Crow's (*Corvus cornix*), and eight nests of the pretty, tame Red-backed Shrike (*Lanius collurio*) containing from one to six eggs, while one had also a Cuckoo's egg. There were also two empty nests of especial interest—that of a Screaming Eagle (*Aquila pomarina*) and the hollow tree where a Goosander (*Mergus m. merganser*) had raised her brood of young.

A flash of emerald—and a shining little Kingfisher (*Alcedo atthis ispida*) darted up the Spree. A pair of Curlews (*Numenius arquata*) pursued a Buzzard, a Yellow Wagtail (*Motacilla flava*) walked importantly along, and from a clump of weeds we heard the surprising medley of a Marsh Warbler (*Acrocephalus palustris*).

But the most exciting sight of the whole trip was the colony of White Storks (*Ciconia ciconia*) in a group of oaks. Although storks nest in trees quite commonly in many places in their range, almost always they do so in single pairs. Just why this typically solitary bird should become colonial in this place is a mystery. Several times during the day we had seen the handsome great birds walking unconcernedly about the meadows and we had passed two nests in trees in different places. But here there were fifteen nests in the tops of ancient oaks, two, three, and four in the same tree. A parent was on each nest and two to three white babies could be seen sitting stiffly erect. The nesting trees are surrounded by a wire fence and the colony is strictly protected. We sat down to watch and soon some storks came flying home. It was a wonderful sight to see the immense black and white birds sailing in the air. And most thrilling of all was the response of the mate on the nest—it threw its head way over on its back and gave the loudest kind of *Klappen* with its great beak. Herr Schiermann said, "You can imagine what it must be like when father, mother, and four babies 'clap' on your roof!"

Through the long twilight as we made our way back to the station we still heard the soft call of the Cuckoo and the happy singing of the Sky-Larks. It had been a wonderful day and we had a record of fifty-five birds.

COLUMBUS, OHIO.

WINTERING WARBLERS IN CAMERON COUNTY, TEXAS,
DURING THE SEASON OF 1934-1935

BY L. IRBY DAVIS

In my report on the wintering of the Black-throated Green Warbler (*Dendroica virens*) and the Wilson Warbler (*Wilsonia pusilla*) in Cameron County, Texas, during the season of 1933-1934 (WILSON BULLETIN, December, 1934), I indicated that I considered it likely a temporary condition with which we were dealing. This winter I have had cause to wonder if there is taking place a general and permanent northward extension of the winter range of warblers. It must be admitted, however, that we again had a mild winter and what is more important a large insect crop. The summer rains were not heavy this time but there was such an enormous crop of insects the previous year that we naturally got a lag effect. Caterpillars were even more numerous, in fact, than during the wet fall.

In order not to miss the incoming winter residents as I did in the fall of 1933, I went at least once a week to the southwestern corner of the county from the latter part of August until the last of December, 1934. This season the Black-throated Green Warblers and the Wilson Warblers which remained as permanent winter residents seemed to arrive the latter part of November. There were early waves of migrants but after a short stop they would go on. At any rate they would be plentiful one day and a week later I could find none at all. From the last week in November until April, 1935, there was no apparent change in the concentration of these two species.

This year the total number of Black-throated Green Warblers wintering in the county seemed to be about the same as last season but there was a further extension of their range to the north. They were observed during December, 1934, and January, 1935, along the Aroyo Colorado east of Harlingen and north along the banks of that stream as far as Willacy County. They were also found north of the Aroyo Colorado in suitable habitats near Harlingen and about the City Lake within the corporate limits of that city.

I was asked some questions by bird students who read my report on the birds here last year in regard to the chances of these birds being golden-cheeked Warblers (*Dendroica chrysoparia*). I might say that the birds wintering here have the typical auricular patch of *virens* and that the belly shows a distinct yellow wash.

This season the Wilson Warbler was found much farther to the east (as far as the eastward limit of the Black-throated Green Warbler the previous year) and slightly north of the Resaca del Rancho Viejo

in the western part of the county. As in the previous season they were at all times relatively scarce and seldom could more than two or three be encountered on an all-day field trip. Sometimes one could stay out all day without seeing a single one.

The rarest winter resident this year was the Yellow Warbler (*Dendroica aestiva*). As far as I know it has never before been known to winter in the United States. Two birds tentatively identified as of this species were seen near the City Lake in Harlingen during the last week of December, 1934. However, they could not be approached near enough for positive identification and it was not until January 20, 1935, that I was absolutely certain this species was also wintering here. On that date I was driving slowly past the courthouse in Brownsville when I heard a "pitting" in a tepaguaje tree on the lawn. I stopped quickly and got out of the car to investigate. As soon as I observed its bright yellow color I called to my wife and Mrs. Anita Miller, a visiting bird student from Cincinnati, to come and see it. Although the tree was rather small we were able to approach it without frightening the bird in the least. Hence we were able to study the bird from as close quarters as our binoculars would permit. It was a male in full plumage and the reddish-chestnut lines on the breast and sides showed up as plainly as though the specimen were in hand. Later in the month others were reported from the vicinity of Brownsville. My first record for the Yellow Warbler for the fall of 1934 was on August 12. By the 19th they had become quite plentiful, and on that date I observed large flocks of them devouring leaf worms on the cotton plants near Santa Maria. They were present in large numbers all during September, but rapidly thinned out the first week in October and one recorded on the 7th was the last seen until the very few winter specimens were located. I did not visit the Brownsville section during November or December; hence, can not report on their concentration there during the first part of the winter.

The Pine Warbler (*Dendroica pinus*) was present in still larger numbers this winter and was observed over all that part of the country which has a suitable growth of trees. This species was also found in Willacy County which is just north of Cameron.

Other warblers wintering here in about their usual concentration and of general distribution were (in order of their importance in number): Myrtle Warbler (*Dendroica coronata*), Western and Northern Yellow-throats (*Geothlypis trichas*), Orange-crowned Warbler (*Vermivora celata*), Black and White Warbler (*Mniotilta varia*), Sycamore Warbler (*Dendroica dominica*), Audubon Warbler (*Den-*

droica auduboni), Nashville Warbler (*Vermivora ruficapilla*), and the Tennessee Warbler (*Vermivora peregrina*).

It might be of interest to note that our summer resident warblers returned long before there was any indication that the winter residents were considering leaving. (The Myrtle Warbler is an exception to this statement as they were becoming noticeably scarce by the first of March and not one could be found on the 24th of that month. The Pine Warblers also left early and a few at a time). The Sennett Warbler (*Compsothlypis nigrilora*) was heard singing on all sides in the southwestern part of the county on March 6, but there was no attempt at song by any of the winter residents. The Orange-crowned Warbler was the first of the winter group to sing. They were first heard on March 29.

Instead of gradually thinning out as the Myrtle Warblers did the Black-throated Green Warblers left all at once as they did in the spring of 1934. The time of leaving was again the second week of April—not a one could be found on the 14th.

HARLINGEN, TEXAS.

AN EXAMPLE OF PARTIAL ALBINISM IN THE EASTERN CROW

BY DAYTON STONER

The unusual arrangement and extent of the white areas in the plumage of an Eastern Crow (*Corvus b. brachyrhynchos* Brehm) recently received by the Zoology Section of the New York State Museum prompts the present contribution.

On December 9, 1933, the writer received a telephone message from Mr. J. Hofman who lives in the west section of the city of Albany, New York, inquiring whether "partly white" crows were rare. He stated that he had such a bird in captivity and asked whether the Museum would be interested in obtaining it. On being assured that the specimen would make a welcome addition to our collection Mr. Hofman sent his son to get the bird but the boy found that the crow had died some time within the preceding twenty-four hours.

This crow was captured alive on November 26, 1933. From that date until the time of its death it had been kept in captivity during which period it fed and appeared to thrive. Upon examination of the specimen in the laboratory, it was found to be in a considerably emaciated state although its stomach was well filled. However, the condition of the plumage was very good and it exhibited few signs of wear or results of abrasion.

The measurements of the specimen, which upon sexing proved to be a male, were made in the flesh and are as follows: Length, 438 mm.; wing, 292 mm.; tail, 174 mm.; tarsus, 51 mm.; middle toe with claw, 46 mm.; exposed culmen, 42 mm.; depth of bill at nostrils, 19 mm.

It will be noted from the above that in two respects, length of tarsus and of exposed culmen, this individual is somewhat below the lowest range for *C. b. brachyrhynchus*. Both these measurements con-



FIG. 39. Partial albino Crow taken in New York.

form closely with those for *C. ossifragus*; all other measurements are about average for *C. b. brachyrhynchus*. However, it often happens that animals which depart strongly from normal in the matter of coloration are somewhat under the average in size; the crow here discussed appears to partake of this characteristic and may be considered as a depauperate form.

The vagaries of arrangement of the black and white areas in the feather covering of this "pied" or "calico" crow may be summarized briefly as follows:

General: Back, nape, occiput, ocular region, tail and all principal contour feathers of the wings except the outer primaries and

secondaries more or less glossy black; lower throat, breast and upper belly together with left tibia also uniform black.

Head: Front to crown, white with a few scattered black feathers; antrorse feathers white except a small black "pencil" on the left side; right ear coverts white, the extreme tips and margins of a few of the feathers black; left ear coverts black; chin, throat, and upper neck white, a few of the feathers sparsely black; occiput and nape black. Irises brown.

Right wing: Primaries 2, 3, and 4 (from outside) and five outer primary coverts white. Remainder of wing feathers black.

Left wing: Seven outer primaries white except dusky tips. Eighth primary (from outside), with outer vane entirely black; inner vane partly black. Ninth primary mostly white, dusky near tip and near middle of outer vane. Tenth primary with outer vane mostly black; inner vane mostly white with black along rhachis. Outer secondary with outer vane grayish, inner vane white. Primary coverts mostly white; a few faint dusky streaks. Two of lesser wing coverts tipped with white; other lesser coverts black. Alula mostly white suffused with dusky. Remainder of wing feathers black.

Body: Left side of lower belly white, a few scattering white feathers forming a diagonal band extending to right leg. Remainder of body plumage black.

Right leg: Feathers of thigh mostly white as also the short feathers covering anterior and outer sides of tibia; feathers on interior and hinder margin of tibia black.

Left leg: Elongate feathers of thigh only tipped with white; remainder of leg feathers black.

Claws mostly white or whitish, the bases only black.

It will be observed that while this unique bird partakes of some of the size characteristics of both the Eastern Crow and the Fish Crow it also bears, in some degree, the plumage coloration of another near relative, the American Magpie (*Pica p. hudsonia* Sabine).

The partly albino crow here discussed has been mounted and is now on exhibit in the New York State Museum (Cat. No. 5255).

NEW YORK STATE MUSEUM,
ALBANY, N. Y.

THE SEX RATIO IN DUCKS

BY O. C. FURNISS

There seems to be quite a diversity of opinion regarding the sex ratio in waterfowl. Mr. E. A. McIlhenny in the *Auk* for July, 1934, gives ratios that he found among winter birds on the Gulf Coast. He based his conclusions on large numbers of banded birds. Other correspondents have also pointed out that an excess of males over females exists. Never having read of any survey being made on the actual breeding waterfowl, it was thought that some information might be gained by a survey in this district. The area chosen consisted of twenty quarter-sections containing eighty-three sloughs and pot-holes from one-quarter to twelve acres in size. All the bodies of water were small enough to enable an observer to count the actual number of ducks on each, thus making conditions much more accurate and also easier.

Nineteen species of waterfowl were noted this spring (1935) of which fourteen remained to breed, either the nests being found or the broods seen later in the summer. The other five species were transients or too rare to be included.

Observations were carried on daily from April 29 until May 18. The hours spent in the field were from 4:30 A. M. until 7:00 A. M. and from 5:30 P. M. until dark; also most of the hours of daylight on Saturdays and Sundays. Ducks were not noted as going north in numbers; the so-called northern flight, at this point, seems to be largely a myth. The work was discontinued after May 18, as Mallards, Pintails, and Canvas-backs were definitely nesting in numbers, and the report would have shown an overwhelming excess of males over females.

The area was divided into twenty divisions each consisting of one-quarter section. A map of each was drawn and the sloughs numbered and listed. A time-table was followed so that each was visited once a week in turn. The ducks on every slough were listed specifically, sexually, and according to numbers. Some of the surface feeders flew up and there was the possibility that they settled in the slough next to be visited. When in the opinion of the observer such was the case, due allowance was made. However, this did not happen often as they usually flew to another area; also, out of a total of eighty-three sloughs it was very unlikely that they would fly to the next particular slough to be visited. Ducks on adjacent areas were not counted until the time came to study that area. The following information was derived in this manner from April 29 until May 18.

Species	Total in Three Counts	Males	Females	Ratio Males to Females
Mallard	137	86	51	1.7—1
Gadwall	5	3	2	1.5—1
Widgeon	36	21	15	1.4—1
Green-winged Teal	29	16	13	1.2—1
Blue-winged Teal*	64	38	26	1.5—1
Shoveller*	10	5	5	1.0—1
Pintail	35	26	9	2.9—1
Redhead	20	11	9	1.2—1
Canvasback	91	55	36	1.5—1
Lesser Scaup	424	259	165	1.6—1
Ring-necked Duck	24	12	12	1.0—1
American Golden-eye	21	11	10	1.1—1
Bufflehead	15	10	5	2.0—1
Ruddy Duck*	31	24	7	3.4—1
Totals	952	577	365	
Average totals	317.33	192.33	121.66	1.6—1

The ratios were derived from lesser numbers of birds than those used by other observers but they were taken from the actual breeding birds in their breeding territories.

PRINCE ALBERT, SASKATCHEWAN.

A STUDY OF THE WINTER BIRD LIFE IN BEAR LAKE AND UTAH LAKE VALLEYS†

BY C. LYNN HAYWARD

INTRODUCTION

During a number of years past I have had the privilege of making collections and observations of the bird life in certain parts of Utah and Idaho. These studies have been carried on in Bear Lake Valley which lies partly in the extreme southeastern corner of Idaho and partly in Utah, and in Utah Valley in central Utah. It is a striking coincident that these two valleys lying some 200 miles apart contain within their borders two of the largest and most interesting fresh water lakes in the Intermountain West, and possess many general topographical features in common; yet a difference in elevation of about 1,500 feet with its accompanying climatic variations has a significant effect upon the winter bird population in the two areas.

While no attempt is to be made in this paper to present a complete list of the winter birds of these two valleys, an effort will be

*Blue-winged Teals, Shovellers, and Ruddy Ducks increased towards the end of the survey so that there were actually more present in the district than the above table shows. However, in the case of the Shovellers by far the larger numbers were always in pairs so that the one-one relation is fairly close.

†Contribution No. 53 from the Department of Zoology and Entomology, Brigham Young University, Provo, Utah, June, 1933.

made to point out the predominating bird life as well as to indicate the contrasting climatic and environmental conditions which seem to govern the bird populations.

The collections and observations on which this study is based were made chiefly during the months of November, December, January, February, and the early part of March. It includes, roughly, the period between the end of the autumn and the beginning of the spring migrations. The Bear Lake Valley observations were made from 1928 to 1930 and the Utah Valley observations from 1931 to 1933.

I wish to acknowledge with thanks the assistance of Dr. H. C. Oberholser and Mr. Clarence Cottam of the U. S. Biological Survey in the identification of a number of doubtful specimens. I also appreciate the many helpful suggestions of Dr. Vasco M. Tanner, Brigham Young University, in the preparation of the manuscript. Numerous students and friends have supplied me with helpful information, but I wish especially to mention the assistance of Mr. D. Elmer Johnson who accompanied me on many field trips and aided in the preparation of skins and data.

TOPOGRAPHIC AND CLIMATIC FEATURES

Bear Lake Valley is located chiefly in Bear Lake County in the extreme southeastern corner of the state of Idaho. About fifteen miles of its southernmost end extends into Rich County, Utah. It is long and narrow in outline, having a maximum width of about eight miles and a total length of approximately fifty miles. In the extreme southern end of the valley, Bear Lake, a beautiful, deep, freshwater body is located; and northward there extend many acres of swamps and plains traversed by numerous wandering streams. Along the western border of the valley, low, sage covered foothills rise rather gently toward the crest of the Bear River Range of mountains which presents a somewhat even skyline and has an elevation of 8,000 to 9,000 feet. The eastern border of the valley is formed by the steep scarp of the Bear Lake Fault, and the elevated Bear Lake Plateau extends eastward for many miles into Wyoming. The valley floor is occupied largely by farming land where it is not covered by lake or swamp. It has an elevation of about 6,000 feet.

Due to the high elevation, the winters of Bear Lake Valley are rather long and severe. A summary of the climatic conditions as to mean temperature, snowfall, and periods of freezing temperatures, as shown by the records of the United States Weather Bureau are given below in Table I. As a result of these conditions, snow often lies in the valley for four or five months often to a depth of two or

three feet, covering almost every vestige of ground food, and long periods of severe sub-zero temperatures make living conditions most difficult.

On account of its great depth, Bear Lake does not usually completely freeze over until February, but it remains frozen often until the middle of April. During at least three or four of the winter months practically all of the ponds, swamps, and streams are completely frozen over or break up only for very short periods.

Utah valley is situated slightly north of the central part of Utah state in Utah County. In general topographic features it is very similar to Bear Lake Valley just described except that it is somewhat larger. Utah Lake has a greater area than Bear Lake but is a much more shallow body and is, therefore, frozen over during the greater part of the winter. The valley is bounded on the east by the high Wasatch Mountains and on the west by lower hills and mountains. The valley floor has an elevation of about 4,500 feet. Due chiefly to the lower elevation this valley has somewhat milder winters as will be seen in the accompanying charts. Snow is ordinarily not more than a foot deep at any time, and then usually for a month or two only.

While temperature often drops below the zero mark, these cold periods are ordinarily broken regularly by warmer days which melt the snow from sunny exposures and make considerable quantities of ground food available to birds. A considerable number of streams remain open throughout the winter affording feeding grounds for several varieties of ducks.

TABLE I. Summary of Some General Climatic Conditions in Bear Lake and Utah Valleys.

Record of Annual Snowfall from U. S. Weather Reports.

Place	No. Yrs.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Provo, Utah Valley	18	14.7	10.2	10.9	2.7	0.1	0	0	0	0	0.4	3.6	11.4
Paris, Bear L. Val.	15	16.3	12.6	11.7	2.9	1.6	0	0	0	1.1	4.5	7.3	9.4

Record of Mean Temperature, Degrees Fahrenheit.

Place	No. Yrs.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Provo, Utah Valley	20	27.0	31.4	40.6	49.3	56.5	64.5	72	70	60.5	49	39.3	28.5
Paris, Bear L. Val.	15	19	19	27.4	39.6	49.2	55.8	63.5	63	55	44	33	21

Record of Early and Late Frosts.

Place	No. Yrs.	Av. Date Last Killing Frost	Av. Date First Killing Frost
Provo, Utah Valley	20	May 24	September 24
Paris, Bear Lake Valley	15	June 14	September 3

The above charts demonstrate a number of interesting things as to the climatic conditions of the two valleys, some of which have al-

ready been pointed out. It will be noted in addition that the period in which frosts are expected in Bear Lake Valley is approximately forty-two days longer than in Utah Valley and that the snowfall is correspondingly greater and the temperature lower.

CONTRASTING BIRD POPULATIONS

The greatest contrast in bird populations in the two areas is shown, as would be expected, in the ground or near-ground feeding forms, particularly the Fringillidae and Icteridae. The contrast, however, is in number of individuals rather than in number of species since the same species in most cases may be found in Bear Lake Valley that inhabit Utah Valley but in far less numbers. The heavy snowfall of Bear Lake Valley is undoubtedly the indirect cause of this situation since a large part of the available ground food is covered for a considerable length of time.

In Utah the more common ground or near-ground feeding birds include as perhaps the most abundant the various varieties of Juncos. Shufeldt's Junco (*Junco oreganus shufeldti*) is by far the most common form. The Gray-headed Junco (*Junco caniceps*), the common breeding species of the Wasatch Mountains, is probably next in abundance; while the Pink-sided Junco (*Junco mearnsi*), which nests in the Bear River Mountains to the north, is fairly common. The Slate-colored Junco (*Junco hyemalis hyemalis*) was taken in Bear Lake Valley in March, and I have a specimen taken in Provo on November 12, 1932. Although not common, the Montana Junco (*Junco oreganus montanus*) is to be found consistently in winter in both Bear Lake and Utah Valleys.

These various species of juncos occur on the foothills and lower in Utah Valley throughout the entire winter. In Bear Lake Valley, however, I have never seen them in December or January although all of them occur in late fall and early spring.

Undoubtedly the most common finch in Utah Valley in winter is the Northern Pine Siskin (*Spinus pinus pinus*). These birds are to be found in flocks of many hundreds on the foothills where they feed upon sunflower seeds that may project above the snow. In company with them are smaller numbers of the Pale Goldfinch (*Spinus tristis pallidus*). Both of these species are rarely seen in Bear Lake Valley in mid-winter but they are replaced in numbers in that region by great flocks of Western Tree Sparrows (*Spizella arborea ochracea*). This latter species, however, seems to wander considerably and is not likely to be found in the same locality for very many days in succession.

Other common ground feeders that are found abundantly in Utah Valley but rarely in Bear Lake Valley in mid-winter are the White-crowned Sparrow (*Zonotrichia leucophrys leucophrys*), Gambel's Sparrow (*Zonotrichia leucophrys gambeli*), the Mountain Song Sparrow (*Melospiza melodia fallax*), the Spurred Towhee (*Pipilo maculatus montanus*), the Common House Finch (*Carpodacus mexicanus frontalis*), the American Pipit (*Anthus spinoletta rubescens*), the Long-crested Jay (*Cyanocitta stelleri diademata*), Woodhouse's Jay (*Aphelocoma californicus woodhousei*), and the Thick-billed Redwing (*Agelaius phoeniceus fortis*). Most of these species while occurring in Bear Lake Valley in November and again in February are not likely to be found there in large numbers during January and December.

Birds that obtain their food from the fruits, seeds, buds, or blossoms of trees are about equally abundant in both valleys throughout all of the winter months. Very large flocks of Western Evening Grosbeaks (*Hesperiphona vespertina brooksi*) are found in both valleys throughout the entire winter period. They seem to be particularly fond of the fruit of the boxelder and the white ash. These birds often remain until the latter part of May, feeding upon the buds and blossoms of elms and other trees during the spring months.

An interesting winter bird of Bear Lake Valley is the Common Redpoll (*Acanthis linaria linaria*), but I have never as yet seen this bird in Utah Valley. I have often noted these birds in large flocks in February and early March feeding on the blossoms of the Fountain Birch which grows so profusely along the streams in Bear Lake Valley. Under similar circumstances considerable numbers of Rocky Mountain Pine Grosbeaks (*Pinicola enucleator montana*) are often encountered feeding upon the blossoms of the alder. This latter species seldom visits Utah Valley in winter but prefers to remain much higher in the mountains.

Both the Eastern Ruby-crowned Kinglet (*Corthylio calendula calendula*) and the Western Golden-crowned Kinglet (*Regulus satrapa olivaceous*) are fairly common in Utah Valley in winter, but I have never seen either of them in Bear Lake Valley during the winter months. The Golden-crown may scarcely be called a valley bird since it confines itself largely to the mountains and higher portions of the canyons even in winter. On March 11, 1933, a party of students and

I encountered a large flock of these in the Canadian zone in Rock Canyon near Provo. On the eighteenth of the same month we saw a similar flock on the mountain east of Provo. Specimens were obtained on both days. On April 22, 1933, I was surprised to collect another specimen of this kinglet in the Juniper Belt on some low hills west of Utah Lake.

Considerable numbers of Western Robins are to be found in both valleys throughout the winter months. These birds more frequently occur in the mouths of canyons where dried berries of various kinds are available. A few Townsend's Solitaires (*Myadestes townsendi*) are to be found consistently on the outskirts of towns every year. During the winter of 1933 we were surprised to see a number of Mountain Bluebirds (*Sialia currocooides*) about the campus of the Brigham Young University at Provo in the early part of January. They remained in the vicinity until spring in spite of the fact that it was one of the coldest and longest winters of a number of years.

Other smaller winter birds of both Utah and Bear Lake Valleys are the Rocky Mountain Hairy Woodpecker (*Dryobates villosus monticola*), Batchelder's Woodpecker (*Dryobates pubescens leucurus*), the Rocky Mountain Creeper (*Certhia familiaris montana*), and many others less common which space will not permit me to mention at this time.

In suitable localities where the water is open throughout the winter, considerable numbers of ducks remain. The most common of these are the Common Mallard (*Anas platyrhynchos platyrhynchos*), Baldpate (*Mareca americana*), American Pintail (*Dafila acuta tzitzihoa*), Green-winged Teal (*Nettion carolinense*), Cinnamon Teal (*Querquedula cyanoptera*), American Golden-eye (*Glaucionetta clangula americana*), and Buffle-head (*Charitonetta albeola*). In Utah Valley most of these ducks concentrate on two or three warm streams that remain open throughout the winter. In Bear Lake Valley only one small stream known as Spring Creek remains unfrozen, and consequently very few ducks are to be found in that region in mid-winter.

Of the shore birds only Wilson's Snipe (*Capella delicata*) and the Killdeer (*Oxyechus vociferus vociferus*) remain with us during the entire winter. These birds are to be found frequently along small, open streams in both Bear Lake and Utah Lake Valleys.

Members of the hawk family are fairly common in both areas in winter, although in recent years shooting campaigns against them

have greatly reduced their numbers. With the exception of the migratory forms, the winter species are about the same as those of summer except that the Eastern Goshawk (*Astur atricapillus atricapillus*) often wanders into this territory. The Western Goshawk (*Astur atricapillus striatulus*) is fairly common in winter, and Mr. R. G. Bee informs me that this species remains here during the summer, nesting in the vicinity of Provo.

The more interesting winter representatives of the family Strigidae include the Montana Horned Owl (*Bubo virginianus occidentalis*), the Snowy Owl (*Nyctea nyctea*) and the Saw-whet Owl (*Cryptoglaux acadica acadica*). A specimen of the Montana Horned Owl was taken by Mr. Clarence Cottam at Aspen Grove near Provo, April 4, 1928, and I obtained two specimens at Paris, Idaho, in February, 1930, which I believe to be this species. A single specimen of the Snowy Owl was taken on Provo Bench in December, 1908, and is now in the collection of the Brigham Young University. On February 20, 1929, one of my students brought me a Saw-whet Owl that was taken at Paris, Idaho, and a few days later I saw another bird near my home at that place. A number of other more common species of owls are to be found in this area in winter as well as in the summer.

CONCLUSIONS

Many problems of an ecological nature present themselves in connection with the winter bird life of these inter-mountain valleys of the West. More details as to the exact food of our winter birds would be of interest and value. While much data of interest and value has been accumulated during the past number of years, much is yet to be done before we can have a really accurate knowledge of the winter bird inhabitants of these interesting areas.

DEPARTMENT OF ZOOLOGY, BRIGHAM YOUNG UNIVERSITY,
PROVO, UTAH.

THE CARDINAL NOW TWELVE YEARS OLD

BY ALBERT F. GANIER

In the *WILSON BULLETIN* for December, 1933, and again in December, 1934, the writer gave the history of a male Cardinal, banded February 12, 1934. At the present writing (November 15, 1935) this individual is still living and is at least twelve years old. The bird was originally trapped at the writer's home and has been a permanent resident about the place. Each morning he comes for his breakfast of sunflower seed and grain which is placed on a feeding shelf near my dining room window. When not found waiting in a nearby tree, he will usually come in response to a whistled call. The mate of this bird, which had been his constant companion for at least three years, was killed on her nest, by a cat, on April 6. They had built this first nest, as usual, in the same crotch of the same shrub that has been used for years as a nest site for the first nest. It was begun on March 17, and proceeded leisurely. The female was killed at dusk on the first day she had begun to incubate her three eggs. On the following night I trapped and killed the cat.

An unmated young female, which had been about the place all spring, immediately became the consort of the old male and on April 15 they began a nest in a low shrub. The female began to sit on April 30, on three eggs. On the following morning, the nest was found tilted and one egg was missing but she had resumed incubation. On the next morning the nest was found turned over and the other eggs were missing. The third nesting attempt for the season was in the top of a high privet bush near my bedroom window and here, incubation of the three eggs began on May 30. These young successfully left the nest on the morning of June 19. At dusk they were located high up in a big hackberry tree but the following morning one of them was missing. On the second morning, another had been taken during the night. The surviving youngster was carefully tended by its parents but disappeared after a few weeks. I attribute these losses to a pair of Screech Owls which paid nightly visits to my premises. A fourth and last nest was built by the pair, ten feet up in the upper branches of a privet near my neighbor's house. The two eggs hatched and on August 9, the young looked nearly ready to leave the nest. The following morning the nest was found tipped over and both young were missing. Since the parent birds were not feeding them it was evident that they had been captured, presumably by the owls. The female had escaped with her life but the skin of her breast had been torn by a claw which resulted in her being marked permanently

by a tuft of feathers protruding from her breast. The season's efforts resulted in a net loss and demonstrated how difficult it is for this species to perpetuate its kind when confronted with the enemies mentioned.

As was the case with his former mate, the new one is constantly with him and he brooks no rivals for his favor. During the early winter the birds roost in a tall green privet hedge along the side of the yard. Last January, after the privet leaves had fallen, the pair resorted to the inside of my neighbor's double garage to roost, he kindly leaving a door open for them. Aside from looking rather bedraggled at molting time, there is but little in his appearance or manner to betray his unusual age.

NASHVILLE, TENN.

ARIZONA FIELDS ARE VIRGIN FOR BIRD BANDERS

BY FRED M. DILLE

From an ornithological viewpoint, there is probably no portion of the United States more intriguing than the "Southwest", and particularly Arizona. Especially to those that have punctuated their studies of birds with collections. I have been afflicted with an Arizona urge for years, and though I have been footloose for some time and could have gone, it was but last winter (1933-1934) that I got out of the old rut and made the break. A good sized blizzard in the Dakotas just prior to the date chosen for our departure, caused us to leave our car at home and start the journey by train. Therefore in due course of time, the early morning of the last day of the year 1933, found Mrs. Dille and myself rubbing the grime from the windows of the Pullman with our noses, in our efforts to obtain a first-view impression of Arizona.

As our train gradually dropped to lower levels and the sonoran regions, I saw my first sahuaro (Cactus) and mistook it for an abandoned fence post. But finally with too many fence posts to account for, I realized what they were. Recalling many oölogical yarns of collectors and climbing such hazards for eggs of the elf owl, I pointed out a good healthy specimen of sahuaro to the car porter and told him I would like to have a photograph of him climbing one of those cactuses. He took a good look at them and replied, "Boss, I do not believe I could do it." Later in the winter I had occasion to look up Mr. D. D. Stone, whom I found on a homestead near the historic town of Casa Grande. He is an old-time oölogical acquaintance of forty

years vintage from New York State. I discussed with him the practicability of climbing a sahuaro and he said it had been done by first burning off the spines with kerosene torches.

Now! I would not impose this article upon BULLETIN space, unless I thought there might be bird notes of value to some reader taking the status of a prospective visitor. And let me suggest to any northern reader, who has never been to Arizona of a winter season, to, by all means, arrange for such a visit. Winter in Arizona is by name only—by courtesy of the calendar, so to speak. I must emphasize the delights in the climate, the evenness of the days, the reliability of good weather, and the new and rare bird life that you will come in contact with.

If you choose Phoenix, as we did, you will make no mistake. Although it is a large city with an extensive suburban population you will have easy access to the desert. And by going from ten to forty miles out in some directions, you will find bird life of three zones. As a location for stopping, choose to the northwest or northeast of the city center, and your routings through the street traffic will be easier. But do not make the error we did in leaving your car back home.

For a bird student from Iowa, Minnesota, or eastward there will be made pleasing discoveries than for one from locations north of Arizona, on account of direct autumn migrations. I did not realize until out in the field, that, like ourselves, there would be birds from the north spending the winter here also. And therefore I did not tally up on so many that were new in my experience. But the few that were new were sufficient to make the winter long remembered. The Cactus Wrens, the Verdins, the Gila Woodpeckers, and the wealth of Thrashers! And of former summer bird friends, on this, their winter playground, such surprises in the brightness of their winter plumage and the young in all stages of seasonal changes! To see flocks of Mountain Bluebirds in one field, flirting with a flock of Western or Chestnut-backed cousins in the adjacent area is one thrill. You will find birds in winter migration from western Utah, eastern Oregon, mixed with birds from southern California and from the higher elevations of the Rockies of Colorado. All these are pleasures necessary for you to experience to round out your field knowledge of your northern summer birds.

It is regrettable to Arizona, that the foundational bird records have been published by outsiders on visits to the State, notably by ornithologists from California. As a basis with which to work, one

has to have a copy of Swarth's Distributional List of the Birds of Arizona.* To continue on such a substantial basis, there is an immense field for research work open to anyone who will make residence in Arizona and keep systematic records.

The migration detail alone, is tremendous and mystifying in trend. This study is complicated by first the northern birds that come to the lower sonoran zones of Arizona for their winter sojourn and the large group that do not leave Arizona the year around, but can move from the lower levels to high elevations within the State's borders. Also confusing are the winter visitors from the north, that act like the human tourist, here today in numbers and forty miles away tomorrow. Bird banding holds high possibilities and any systematic study of the routes in migration within the State will require much pioneer bird banding.

Now, as I have intimated, my traditional information about the birds peculiar to Arizona has been founded upon printed narrative and records, and I have had fixed ideas about their habits and habitats. But there has been a tremendous change in the character of the region about Phoenix, and much of my bird knowledge had to be readjusted. I refer to the development following the completion of the Hugh Government Irrigation System. The region about Phoenix for twenty miles in all directions is now under intensive cultivation with resultant citrus groves over twenty years in age.

The city of Phoenix itself harbors many birds. The residential section is extensive. Homes are on ample lot plan and shrubbery is semi-tropical and varied. Cactus Wrens, Abert's Towhees, Inca Doves, Palmer's Thrashers, and Gila Woodpeckers are as common throughout the city as out in the country. And hummers are legion. I had not encountered the House Finch since leaving Denver, and that was a pleasing contact. It brought to memory our old club meeting in Denver, and the much discussed topic of why and how the House Finch, without being a quarrelsome bird, could stay and thrive in close contact with English Sparrows. There is also an ample English Sparrow population in Phoenix.

One of the tragic angles to Arizona ornithology is the large amount of specimen material that has been taken out of the State, with no records or data resulting to the benefit of the State. The details of some of this collecting are deplorable and there will be a reaction to the detriment of coming students. Public sentiment has

*A Distributional List of the Birds of Arizona. By Harry S. Swarth. Pacific Coast Avifauna No. 10, Published by the Cooper Ornithological Club.

already reacted against depredations of the desert plant life, and a movement is under way to prohibit export of archaeological treasures. Bird life will be next in order.

The following notes I offer to emphasize my experience, and to take occasion to mention lines for Arizona research as I could see them; and also to add to the data available in the Swarth distributional list referred to.

INCA DOVE. *Scardafella inca inca*. I was in the field by January 18, 1934, and these doves were east of Phoenix in large flocks. About the border areas between the orange groves and the unclaimed desert. They had either just arrived from somewhere, or were flocking to be on their way elsewhere. This flocking broke up in a few days and they took on an even distribution throughout the city and the suburban citrus acreage for a continued stay and the nesting season. There are no citrus groves west of town and there were practically no Inca Doves in that direction. Of the allied species of doves about Phoenix, in season, the Mexican Ground Dove did not put in an appearance until the first of April and then in scarce numbers. The first record obtained for a White-winged Dove was of March 21, but I was informed that that date was early.

GILA WOODPECKER. *Centurus uropygialis uropygialis*. A truly typical woodpecker for the Phoenix region and a species that claims your admiration. They do considerable daily routine ranging, are very busy, mind their own business, and are as common as any flicker or woodpecker that you are familiar with. Home owners complain of a bird that with its long bill, punctures the grape fruit and orange. Some claim it is the work of this bird. Others blame the Cactus Wren or the Thrasher. My idea on the matter was that the Cactus Wren was the guilty party. But I would wish more research on this before being sure. I do not know sufficient chemistry to diagnose fruit juice in a bird's stomach. The damage is slight, however. A few grape fruit in an orchard is no loss. But you know how a farmer will react.

BLACK PHOEBE. *Sayornis nigricans nigricans*. With the coming of the canals and the water, this bird is common but stays close to the water. It is found nesting and uses every suitable site such as flumes, bridges, head-gates.

NORTHERN CACTUS WREN. *Heleodytes brunneicapillus conesi*. With my first specimen of Cactus Wren in hand, I was puzzled. I thought it was a Thrush. Dr. Coues, in his Key to North American

Birds, emphasizes this thrush similarity. The field notes which came from Dr. Coues always convey that original field touch which helps.

But this bird has deserted the desert and cholla cactus nesting sites for the proximity of the house and the citrus groves. One nest I saw was built in a mass of climbing vine on the trellis of a front porch (house occupied). And another in an empty tool box on a work bench in an open garage. The habit of building several extra dummy nests has not been given up. This bird is not quarrelsome, but sly and persistent in any plan. The bird is more welcome by the natives than the mockingbird.

BENDIRE'S THRASHER. *Toxostoma bendirei*.

PALMER'S THRASHER. *Toxostoma curvirostre palmeri*. The latter, *palmeri*, is an abundant nesting resident about the homes and orchard acreage. Every suburban home has a pair or more. The bird is commonly referred to as the "Bendire Thrasher", the name having been spread as popular information by some bird student. It resulted from my investigation that it was *palmeri*, so frequent about the orchards but one has to go out to more typical desert to find *bendirei*. I think the general distribution in this region is approximately three *bendirei* to four *palmeri*. There is a close similarity in the two birds. Dr. Coues in the "Key" comments on this very neatly. He states that if one has but a specimen or two it is hard to differentiate. But if one has a half dozen of each, they can readily be sorted into the two groups. I did not want to accumulate anything like a series of these two thrashers because I did not feel justified. But one day, I had the good fortune to obtain two thrashers that looked very much alike in plumage, and yet there was a striking contrast in weight and size, chiefly weight. Both were old birds and the location was desert. I used these two birds as my types for later sortings. The thrashers are nicknamed "pretty quick", which is the way the usual call note sounds to the native. Oölogy is good evidence sometimes to substantiate classification in ornithology. These two birds closely resemble each other in casual comparisons, but the eggs respectively are very different.

CEDAR WAXWING. *Bombycilla cedrorum*. As for my observation it remains as Swarth states, "Of rare and irregular occurrence." There were four birds that stayed with Mr. Yetter in his orange grove eight miles northeast of Phoenix, from January to April. The attraction appeared to be a large mulberry tree in full fruit. And I saw my first intoxicated bird from too much mulberry juice. I only took one of them for a specimen and for a record. I showed the bird to two per-

sons in the Valley who know birds and they stated they had never seen the waxwing before.

WHITE-RUMPED SHRIKE. *Lanius ludovicianus excubitorides*. My designation as above, will do for the present and until the revision of the group, now in progress, has been accepted. I dislike to bring any misfortune down on this shrike by divulging inside information to the plumage splitters, but there were hundreds along all the farming lanes west of Phoenix. They had not moved out by the middle of April. What was holding them was the great flocks of White-crowned Sparrows along the roadside thickets which they could not resist harassing. I suspect that this shrike wave came from the west and southern California.

ORANGE-CROWNED WARBLER. *Vermivora celata celata*. I have a few specimens that I obtained fourteen miles west of Phoenix in a wet back water growth of willows adjacent to Salt River. There were considerable numbers of them in the brush and they were there from March 1 until April 15, of my recording.

AUDUBON'S WARBLER. *Dendroica auduboni auduboni*. When Mr. Swarth states this warbler as abundant in winter in the lower sonoran valleys of southwestern Arizona, he gives their status exactly. The orange groves and suburban tracts about Phoenix are their favorite refuge, but also west of town fourteen miles and east for forty miles. Recall in connection with these notes, that as you go east from Phoenix, you gain elevation; but you get more in line with what I have figured out to be the chief migration route from the south of that region. They are not a flock bird and did not begin to bunch until approximately April 10. I take it that the bunching of the winter birds in Arizona closely precedes the beginning of the movement for the north. But in the north, the bunching in August or September is but a prelude to an erratic regional movement, instead of the beginning of the journey south. I am referring to most all smaller birds, not Audubon's Warblers alone. This would be an interesting question to solve in Arizona.

The only difference between this warbler and *coronata* is the yellow throat patch of *auduboni*. These warblers are more difficult to approach than sparrows, and I was bothered by making errors in shooting. What few specimens I did take were in various stages of plumage and my material indicates that the throat patch is the last one to come. I do not believe that the inclusion of *Dendroica coronata* in the Arizona list is justified excepting by actual specimens with a May or June label at the earliest.

ARIZONA CARDINAL. *Richmondia cardinalis superba*. You will be shocked to learn that this handsome bird should work out in an offensive manner. My first specimen had so foul an odor I had to investigate the food contents, and it was horse manure. This will explain the presence of pairs about whatever cow yard or stable (or worse) the various farm sites offer. They go in pairs, often more than one pair in company. They are shy and a little difficult to approach, at least in the winter season. This shyness of some birds seems to vary with the season. Up in the foothills, sixty miles east of Phoenix I found two pairs sticking close about the garbage heap of a C. C. C. camp.

ABERT'S TOWHEE. *Pipilo aberti*. The comment by Mrs. Bailey in her handbook, "Birds of Western United States", is typical of the cases of needed readjustment from that traditional knowledge I have been telling you about. This bird, like the Cactus Wren and Palmer's Thrasher, has abandoned the desert spaces for adjacent farming regions, citrus grove homes, and the city of Phoenix. It is not "extremely shy" but one might say it is "coy". In the city if there was an empty house, they were coming and going under the sheds of porches. And about the farms their runways were close to the stables or out-buildings that had space under the floors. "Runways" is a term used in speaking of small mammals but if the quail have runways, so does the towhee and *aberti* more so than any towhee I have ever made contact with.

LARK BUNTING. *Calamospiza melanocorys*. No bird has yet fooled me so completely as did the winter flocks of this old friend of my Colorado and Nebraska experience. If there is one bird on its northern nesting ground that I have known longer than any other it is the Lark Bunting. But what were these birds in this nervous, closely packed, quickly startled moving flock, acting just like a flock of wild scaled quail? There were no males of full colors in the bunch, which did not help my recognition. But my experience was exactly in corroboration of the comments by Mrs. Bailey in her Handbook. How they must tame down during their tedious journey northward, for when they arrive with us in Colorado and take location, they are very sociable, and full of song. There was a slight increase of black in the plumage with the first of April. They had not left the Phoenix region by the tenth of April, but the black colors were coming fast, on the males. We get first arrivals in northern Colorado usually by May 10.

CLAY-COLORED SPARROW. *Spizella pallida*. In the general vicinity of a locality in the dry bed of the Agua Fria River fourteen miles west of Phoenix, I took three of these sparrows at three different dates in February. The birds were in company, singly with dominating numbers of the White-crowned Sparrow. If one would work over these bunches of "white-crowns" with a glass and a gun, the sparrow tally for Arizona could be increased materially.

BREWER'S SPARROW. *Spizella breweri breweri*. During February-March there were but a few single birds mixed with flocks of "white-crowns". But by April 11 large numbers appeared in migration wave from the south, and this movement kept up for a week. This route was definitely from the south, down the valley of the San Pedro River, around the large Superstition Mountain, west side, and into a valley at the junction of the Verde and Salt Rivers. What brief study I could give Arizona migration routes was applied as above outlined, as I had it selected for close observation. My first specimens of this sparrow in Meade County, South Dakota, have been May 12. The large canal full of water with the heavy desert thicket on the bank was too good a refuge for a few days stay to be overlooked, and the sparrows hung up here in large numbers before gradually working up the Verde River Valley.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*. There were without attempting to exaggerate over 100,000 of these sparrows scattered in the Phoenix region. From points twenty miles west, all through the valley of the Salt River, in every gulch and thicket, on every farm and suburban tract where there were thickets, in all the lanes, every gulch and thicket of the higher areas for sixty miles east up to 4,000 feet elevation, these birds were bunched. There were not so many with very conspicuous head markings developed so that I could determine them until April and I was shooting these birds in error. My field discernment on small birds is not as sharp as with some bird friends I know and I finally had to send back home for the bird glasses so that I would not be making kills I did not want. It was not until about April 11 that the flocks about Phoenix cleared out and I was sure glad of higher elevations east of town until April 22. I can thank them, however, for being host to other interesting sparrows that I plucked from their midst. If I had not wished to conserve my limitations more for daily specimens of other material I would have taken more of these sparrows, for I believe that April material would indicate that *leucophrys* and *gambeli* are about equal in numbers upon the Arizona winter range.

PHOENIX, ARIZONA.

GENERAL NOTES

Conducted by M. H. Swenk

Another Snow Bunting Record for Utah.—In the WILSON BULLETIN for June, 1935 (XLVII, p. 160), the writer reported collecting a female Eastern Snow Bunting (*Plectrophenax nivalis nivalis*) in February, 1934, near Provo. On February 9, 1935, he observed three individuals of this species at the same place, one of which, a female, was collected. Both skins remain in the writer's collection.—D. ELMER JOHNSON, *Brigham Young University, Provo, Utah.*

A Savannah Sparrow as a Cowbird Victim.—On June 10, 1935, I came upon a nest of a Savannah Sparrow (*Passerculus sandwichensis savanna*) containing three eggs—two of its own and one of the Cowbird. I succeeded in securing a photographic record of this. For some reason, however, either because it was infertile or because the victimized sparrow refused to incubate it, the Cowbird egg did not hatch, and after the sparrow's pair of young left the nest the parasite egg was found intact, buried in the grass forming the bottom of the nest.—JOHN M. VASICEK, *Cleveland, Ohio.*

A Recent Record of the Hudsonian Curlew in the Chicago, Illinois, Region.—Since the last published sight record, as given by Messrs. Ford, Sanborn, and Coursen (*Birds of the Chicago Region, 1934*), of the Hudsonian Curlew (*Phaeopus hudsonicus*) is over eleven years old, a new record of the bird in the Chicago region should be of interest. On June 16, 1935, Merrill McGawn and the writer observed one specimen along Lake Michigan, Lake County, Illinois. It was an interesting subject, especially in its flight above the water. The distinct median stripe through the crown was seen while the bird fed along the shore. It seemed attached to a particular feeding ground, and when approached too closely, instead of flying directly away it would circle over the beach, fly over the water before us and land on an opposite point, never flying beyond these points but keeping within the limits. It repeated this performance a number of times.—B. J. BUJAK, *Humboldt Park Station, Chicago, Ill.*

The Starling at Kingfisher, Oklahoma.—Since the normal migration of the European Starling (*Sturnus vulgaris vulgaris*) is being watched with interest and concern by all bird students, I wish to report the following collections by Mr. Cecil Bilger, an F.E.R.A. employee at the Oklahoma Agricultural and Mechanical College. On December 26, 1934, one specimen was taken seven miles northeast of Kingfisher; December 18, 1934, another in a chicken house after nightfall six miles northeast of Kingfisher; and December 31, 1934, one from a large flock of blackbirds seven miles northeast of Kingfisher. These birds are preserved as skins in the Oklahoma Agricultural and Mechanical College collection.

When these specimens were obtained, I had a feeling that this was the farthest west that any of these birds had been taken, but recently I received an unofficial report that a specimen had been taken at Alva, Oklahoma, and is in the Museum of the Northwestern State Teachers College.

Mrs. H. P. Holley of Bristow, Oklahoma, reported a flock of twelve that came to feed with other birds in her yard during the winter of 1930. She reports that they have not been seen since that time.—GEORGE A. MOORE, *Stillwater, Okla.*

Migration of Waterfowl in Tidewater Virginia.—My home is on the Lynnhaven River, in Princess Anne County, Virginia, where we hear the "honk"

of the wild goose at eventide very close to us during migrating time. The geese and ducks both spend the night in the tall rushes where sago pond weed and wild celery are found plentifully near by. This year in Back Bay the growth of feed has been ideal, owing to the remedial measures taken by both the Federal and State governments to reduce the salinity of the water, which condition was caused by the overflow of Chesapeake Bay in the storm of two years ago. As far back as the 1880's the hunting and fishing facilities of this county and adjacent waters have made this area a real sportsman's paradise, as is well known. Two years ago, after the Big Storm, quite a tragedy occurred here. Residents far up the river heard terrific shooting at midnight. Investigation found marauders in small boats shooting into the roosting places, killing both geese and ducks by the hundreds, getting a few but leaving most of them to die in the marshes. We had much trouble getting the game warden of the county, who lives at Back Bay, quite a distance. It was too late to make any arrests, but I am happy to say nothing of the kind has happened since and I believe our wild life is now being given good protection.—LUCY PENDLETON KEARNS, *Lynnhaven, Va.*

The Lazuli Bunting in Northeastern South Dakota.—During the first week of June, 1935, the writer was working on a waterfowl survey in the Waubay Lakes region in Day County, South Dakota, and it was here near Spring Lake that a male Lazuli Bunting was seen on several successive days. The strange thing, however, was the fact that the bird was consorting with two females. One female was an Indigo Bunting and the other a Lazuli Bunting. On every occasion when the male Lazuli Bunting was flushed the two females would also flush. The writer was sorry that he could not stay longer to determine whether both females started nest-building. The location of these birds was approximately thirty miles from the border lines of both Minnesota and North Dakota. The record is interesting in that it shows that previous reports of the Lazuli Bunting in Iowa and Minnesota were not accidental and that this bunting is actually extending its breeding range eastward. The question of hybrids between the Lazuli Bunting and the Indigo Bunting is again brought to mind and suggests that probably such hybrid specimens as taken by W. J. Breckenridge, in Warren County, Minnesota, on June 26, 1929, and by the writer in Cherry County, Nebraska, on June 1, 1932, will be found more frequently by ornithologists of the future.—WM. YOUNGWORTH, *Sioux City, Iowa.*

Nests of Crows and Other Birds in the Same Evergreen Grove.—During the past three springs we have answered a number of calls from farmers in the vicinity of Ames, requesting help in driving away Crows that were molesting small chickens. All of these calls have been from farmsteads in which a few to several hundred evergreen trees have served as quite regular roosting places for Crows during the winter. Observations on our part and by the farm folks have shown that Crows will dispose of a few young chicks when these are accessible close to their roosting places. So far, in the limited number of cases contacted by us, from two to eight evenings of firing with shotguns into the small number of Crows at each roost have sufficed to drive them away until autumn, the larger number going elsewhere to roost, probably in the deciduous woodlands along the streams, since only a few Crows were killed at each grove.

While answering these calls we conjectured as to what would happen if the Crows were permitted to nest undisturbed in a grove of evergreens, and as to

how they would behave toward other birds. This past spring (1935) a closely planted evergreen grove at the north end of the Iowa State College campus, covering a nearly rectangular area of about one acre, and containing red, Austrian, and jack pines on the north half and Douglas fir, spruce, and white pine on the south half, was placed under observation. On April 27, two Crow's nests were observed in the grove, one about twenty-five feet up in a jack pine at the west end of the grove, and the other about thirty feet up in a jack pine a little north of the center of the grove. The adult birds were at the nests at nearly all of the ten visits made by us. The young left the west nest about May 15 and the other nest was vacated May 25. We saw no evidence of the Crows molesting other birds or their nests during about twelve hours of observation made while the adult Crows were at the grove. A Mourning Dove was nesting about fifteen feet up in a red pine about five rods east and three and a half rods south of the central Crow's nest. Another Mourning Dove's nest was built about twenty feet up in a white pine about six rods south and three rods east of the central Crow's nest. A Robin's nest was set fifteen feet up in a Douglas fir about six rods east and three and a half rods south of the central Crow's nest. No other nests were seen in the grove. The Mourning Doves' and Robins' nests were well protected from view in the more densely branched Douglas fir and pines, and, although the data are few, support is lent to a generalization that such good concealment is of value for nesting Mourning Doves and Robins. During the twenty hours of observations, chiefly during the afternoons in late April and May, 319 individuals of sixty-six species of birds were seen in this evergreen grove and in several rods of deciduous trees at its west end.—GEORGE O. HENDRICKSON and ROBERT TRENEMAN, *Dept. Zoology and Entomology, Iowa State College, Ames, Iowa.*

Observations on Nest Site Trials by the Eastern Robin.—The maneuvers of a male and female Eastern Robin (*Turdus migratorius migratorius*) in several large American elms, approximately eighty feet in height, were noticed on the morning of April 15, 1935, in St. Paul, Minnesota. The day was cloudy and cool and sufficiently early in the season that no foliage hampered observation of the birds in the trees.

They were seen to flit from one crotch to another, in a very random manner, until the entire tree was inspected. Occasionally one bird would fly to an adjoining tree and shortly return to be near its mate. The greatest interest lay in the procedure followed at each visited crotch. The bird would spread its legs in order to support itself with one foot on each of the conjuncting limbs and in this position it would crouch and shift its weight from side to side, and at the same time ruffle its feathers and slightly extend its wings. After several seconds it would reverse its position and repeat the process. In no case did this procedure consume more than a minute's time. The routine appeared to be so similar to the characteristic shifting and turning observed during actual nest building and after nest completion, that it was immediately believed that these birds were giving trials to various sites for their nest.

The Robins evidently preferred to start at the lower branches of the trees, which were twenty-five feet above the ground, and gradually work their way upward until they were approximately fifty feet from the surface of the ground. At this point, the limbs had a tendency to thin and branch out. This was apparently a characteristic without appeal to the birds, for at that height they left with a downward flight to begin over again in an adjoining elm.

The birds disappeared after completing their trials, but on April 29th, when the trees were visited again for observation, a partially completed nest was seen in the last elm. As closely as could be determined, the crotch the conjuncting limbs of which were about five inches in diameter was approximately fifty feet above the ground and formed an angle of about fifty degrees. This is the vicinity in which the birds were last seen during their hunt for a nest site. While the evidence is not positive that the present winged occupants, which at the moment were busily chasing sparrows from the tree, were the birds seen previously, the likelihood is great, for no other nest of any other species could be seen in the neighborhood.—L. J. MEULI, *Lake States Forest Experiment Station, St. Paul, Minn.*

The Song of the Yellow-breasted Chat.—The Yellow-breasted Chat (*Icteria virens*) will sit still in one position for half an hour, if not disturbed, and sing, mocking the Crested Flycatcher, Brown Thrasher, Red-headed Woodpecker, Blue Jay, Bob-white, and many other nearby birds. He has the habit of saying “*Ur ur ur ur ur ur ur ur*” either eight or sixteen times, as a rule, similarly to the Red-headed Woodpecker, then may say it once or twice alone. One said “*Ke-ouck*” six times, almost like a little turkey, seeming to dare one to approach. If mocked, he repeats the call, often saying “*ur*” for a number of times, then “*tut tut tut*” about the same number of times, changing back then to “*ur*” again, first one way and then the reverse. I have never heard two chats sing exactly alike, so it takes some study to be able to tell them at once by their calls, although all of them generally say the above two notes occasionally, no matter what their song may be. The bird often sits in the top of a dead tree, with head up and tail bent down, for long periods of time, then will disappear and appear again, often at close range if not frightened.

If mimicked, he will approach cautiously, giving the note “*kuk*” in a soft tone. This note is used only at such times, when it is answered in the same tone. I have stayed in our car, calling and answering him, until he came right up to me and crept under the car and out on the other side, trying to find out what it was all about. I believe I was waving a red flag in his face when I spoke in his own tongue, which to me was not translated into English exactly, although I figured it out pretty well from his actions.

The Quail often says, “*Bob, bob white*”, but the chat never does. He either says “*Bob white*” or just “*white*”, in a hesitating and uncertain manner, as if not quite sure of himself. One chat said plainly, “*cack*” either three or six times, then “*ur ur ur*” from one to six times, then “*ah ah ah*”. Although the chat, Brown Thrasher, and Catbird are seldom seen together, they of course may be in the same woods and within calling distance of each other. All of these birds are mockers. The Red-headed Woodpecker has a common call of “*ur ur ur*” given a number of times very similarly to the chat, but it never substitutes the “*tut*” or “*cack*” or “*ah ah ah*” intermittently, as does the chat. But the red-head often changes from the “*ur*”, which he says on certain occasions, to “*error, error, error*” which is also just as commonly heard at times. This particular note is his species “trade mark”, as I like to call any special markings, notes, habits, or other traits of birds. When the chat mimics other birds, even though he does a good job of it and fools one at times, if we wait a bit and continue to listen, sooner or later we can hear the “*ur ur ur*” interchanged with the “*tut tut tut*” or other variations of the chat’s calls, which will give him away, and we may then stamp his “trade mark” upon him with certainty. If we look closely enough and study

birds for their own characteristics, we may learn the individual qualities belonging to them alone, and by which we may know them—their own “trade marks”.
—MRS. HORACE P. COOK, *Anderson, Ind.*

An Unusual Banding Experience.—The evening of December 24, 1934, was one of sleet, rain, and snow alternating. It was not very cold but was unusually disagreeable; consequently, wild life, as well as man, sought shelter early in the afternoon to avoid the battling elements. One section of my artificial shade, built for the purpose of protecting various native and medicinal plants, the shade proper being composed of brush and cornstalks, passes very close to my east study window. Ears of corn are often left attached to some of the stalks when placed on the frame-work and brush in the fall, and this furnishes considerable food each winter for five or six pairs of Eastern Cardinals (*Richmondia cardinalis cardinalis*) that are resident on the premises at all times. They appreciate this huge post-supported pile of “debris”, and, together with great numbers of Slate-colored Juncos (*Junco hyemalis*), utilize it as a roosting place throughout the winter months. This evening, however, the birds must have found their shelter insufficiently water-proof, for shortly after supper, as I sat reading at my desk, I was attracted by a bird fluttering against the window beside me. I opened it and a Slate-colored Junco fluttered in. I experienced little difficulty in capturing it, but, when preparing to band it, another sought admittance. This was granted and the two were banded. Shortly thereafter two more were taken in this manner, and both at about the same time, though one entered by the same route as the first two while the other was admitted through a window in an adjoining lighted room. Later in the evening another junco, the last, was taken in this room. Four of the five juncos were males.

After the last junco was taken I decided to try a little experiment. I placed lamps close to the opened windows and sent my brother-in-law, armed with an old broom, to disturb the birds’ slumbers, hoping thereby to entice more of them inside. However, we had not the success that chance could boast, for the rudely awakened juncos shot bewilderingly out of the brush, fluttered upward and away. But one bird, a female Cardinal, the only Cardinal seen, though others were heard, was captured. The birds were banded, caged for the night and released the next morning. Hereafter I shall be tempted to light all rooms and open all windows on stormy nights.—GRANT HENDERSON, *Route 6, Greensburg, Ind.*

Behavior of a Pet Robin.—One cold, wet morning in June we found an unhappy young Robin. He was taken into the house, warmed, and then fed upon earthworms, hard-boiled yolk of eggs, flies, and chopped raisins. He thrived very well on that diet, and soon grew to full size. In a short time he became very tame, and would allow us to pick him up, answer our calls, and alight on our hands—and also on our heads, which we did not enjoy so well. He became especially fond of the master of the house, and would fly to meet him when he came in. When the master sat down to read, the bird would often sit on the back of his chair and talk to him in a low tone, or play with his hair and glasses, or, sometimes, go to sleep. He learned other ways of playing. When the young lady would flirt a handkerchief at him he would snap at it. If she threw the handkerchief over his head, he would back out, then run toward her and snap his bill. When he became tired he would fly up and alight on her head.

In the mornings he often would fly upstairs and sing until someone opened a bedroom door. Then he would enter and amuse himself in various ways. Some-

times he would look at himself in the mirror. Again he would pull the pins out of the pin-cushion or throw the cuff buttons and collar buttons to the floor. At times he would play with a ball of string, much like a kitten.

After the Robin had been with us for about six weeks we found another orphan bird, apparently a kind of vireo. We were not having much success in feeding this young bird, when the Robin flew up with a fly in his beak. We lifted the vireo close to him, and he deftly inserted the fly into the vireo's throat. From that time on the job of feeding the young bird belonged to the Robin. When the vireo cried, as he did most of the time, the Robin would fly into the plant room and dig up a worm, pick it to pieces, and feed it to the nestling. This continued for three days, when the younger bird died.

But on that same day the Robin heard the call of the wild, flew out of the basement window, over the garden wall, and out of sight. Twice he returned to the garden, but seemed very shy. Once in a while he came to the porch to receive raisins, which I even put in his mouth, but he soon disappeared and did not return. If he returns in the spring we will recognize him, for we had an aluminum band placed on his leg before he departed.—MRS. ANGELA HARTE FAVELL, *Superior, Wis.*

A Clever Bird or Two.—One day I looked out of my window and saw a Red-breasted Nuthatch at my suet cafeteria, busily engaged in eating his lunch. But his meal was arrested by the swift flight of a Hairy Woodpecker, which suddenly appeared at the table, giving a sharp note as he descended upon the feast. The startled nuthatch disappeared quickly from the scene, but almost at once reappeared on the ground under the suet and looked up and waited expectantly for the crumbs which were starting to fall from the aforesaid woodpecker's table. As they fell, the clever little bird ate his fill of the crumbs which were already prepared for him in small bites. The woodpecker did not seem to notice that he was also feeding the nuthatch below, but ate till satisfied, as did the nuthatch on the ground below. Then each bird went his way.

At another time I saw a Downy Woodpecker feasting at the feeding table, paying no heed to a half-dozen English Sparrows on the ground under the suet, also getting their fill of suet crumbs as he let them fall. Another day I watched a Downy Woodpecker working at the suet on the tree, eating what he wanted and then filling every crack and crevice in the bark with food for future use. When he had finished, away he went, probably intending to return and feast again when hungry. But no sooner had he gone than an intruder appeared in the form of a nuthatch with similar intentions. The intruder crept over the tree, seeking out and collecting the hidden suet from the cracks and crevices of the bark as fast as he could work. Birds are very clever at such tricks, which Nature has taught them.—MRS. HORACE P. COOK, *Anderson, Ind.*

ORNITHOLOGICAL LITERATURE

WILD BIRDS AT HOME. By Francis Hobart Herrick. D. Appleton-Century Co., New York. 1935. Pp. i-xxii+1-345. Figs. 1-137, and frontispiece. Price, \$4.00.

Those who were interested in bird study thirty years ago will remember Dr. Herrick's book, "The Home Life of Wild Birds". In some ways this book marked the beginning of a new period in ornithology. It taught the growing hosts of bird students how to use the bird-blind. The reviewer has never been quite certain who is entitled to the credit for the introduction of the tent-blind or umbrella-blind. But there is glory enough for all, and Dr. Herrick's practical demonstration of the method must have stimulated many other workers in the same direction. The three decades since have witnessed more careful and more critical study of the bird as a living animal than in all previous time.

Dr. Herrick's present work is perhaps not so much an exposition of a method, as a summary of the results of the method developed thirty-odd years ago. It is a book which discusses the most profound problems in bird behavior, and yet one which may be taken to an easy chair and read for hours without mental fatigue or monotony. Practically all phases of the bird's home life are discussed, and with more than ordinary understanding of the psychological principles involved. The numerous illustrations are new and original. Literature citations are given in foot-notes, rather than in a terminal bibliographic list. Dr. Herrick has made another contribution to ornithological literature.—T. C. S.

ZUR BIOLOGIE DES REPHUHNS (Biology of the Hungarian Partridge). By Dr. W. Nolte. Published under the auspices of the Reichbundes Deutsche Jägerschaft (National German Hunters' Association). Publisher, J. Neumann, Neudamm, Berlin, 1934. Pp. 105.

This new booklet on the biology of the Hungarian Partridge (*Perdix perdix*) in Germany should be of particular interest to American ornithologists and sportsmen for two reasons.

First, it parallels the University of Michigan's recently published study of this bird by Yeatter,¹ and the Oxford University study now under way by Middleton,² without any awareness of similar work under way in the English-speaking countries, or vice versa.

Secondly, it illustrates certain basic differences in game management research, organization, and methods, from which mutually profitable deductions may possibly be drawn.

Dr. Nolte's study was undertaken because the 1932 partridge crop was bad, and the 1933 crop spotty. (This illustrates an important point: game research in Germany is a matter of finding the cause of specific difficulties encountered in actual practice; with us it is an attempt to build comprehensive biological foundations for a practice which is hoped for, but does not yet exist).

¹Yeatter, Ralph E. The Hungarian Partridge in the Great Lakes Region. Bul. No. 5, School of Forestry and Conservation, Univ. of Michigan, Ann Arbor. December, 1934.

²Middleton, A. D. The Population of Partridges (*Perdix perdix*) in 1933 and 1934 in Great Britain. Jour. Animal Ecology, Vol. 4, No. 1, May, 1935, pp. 137-145.

The project was sponsored and financed, not by universities or by bureaus, as with us, but by the national sportsmen's association (Deutsche Jägerschaft). Membership in this is now universal, being paid for as part of the hunting license fee (which, by the way, is the substantial sum of \$12). There is now only one national association, and it is strongly affiliated not only with the Reichsjagdamt (Biological Survey), but with its official mouthpiece, "Die Deutsche Jagd", published by the publisher of this booklet.

The technique of the study follows from these premises: funds were limited and an answer needed quickly, so the technique consisted not (as with us) of a field study in a limited locality to decipher the basic ecology of the partridge, but rather of a compilation and analysis of hunters' reports and weather data for all Germany. The technique, in short, is an attempted correlation starting with an inferred premise (that weather governed the crop). This is the method of my "Game Survey", not the method of Stoddard, Errington, Schmidt, Wight, Yeatter, et al.

Dr. Nolte's findings are in many respects startlingly similar to Yeatter's. I here give his own summary, supported by interpolated explanations from the text, and from the American and English studies in so far as published:

1. The partridge is a prairie bird (Steppentier), which finds its optimum range on loessial soils, which are "warm" soils.

2. On "cold" soils heavy populations are attainable only by drainage.

3. Heaths and moors are "cold". They delay the nesting.

(Maxwell, Page, and other English authors point out the unsuitability of heavy soils. Yeatter found fair populations on heavy lake-bottom in Michigan and Ohio, but these are all tiled and drained, as is much of the northeast Illinois and Iowa-Minnesota range. The outstanding confirmation of Nolte's assertion, however, lies in the superior density of partridge in the Canadian wheat prairies, and in the semi-arid regions of eastern Washington and northern Montana).

4. Small management units are not favorable.

5. Breaking new land damages the partridge stand. (I think he means the breaking up of the remnants of grass cover).

6. Feral dogs and cats are bad. The worst predator is the free-ranging sheep dog and his progeny.

7. Weasel, iltis, and fox have no effect on the partridge crop.

8. Raptorial predators have virtually no effect. The goshawk and perhaps the female sharpshin, are definitely damaging, and in winter the migrant roughleg.

9. The horned owl kills partridge, but *because of its rarity such depredation is to be endured* (see American Game Policy on rare predators!). Whether swamp owls, when abundant, influence the crop remains undetermined.

10. All these predatory birds were too scarce in 1932 and 1933 to produce appreciable damage.

11. The raven is too scarce to influence the crop.

(It is interesting to note that all these conclusions on predation are drawn from geographic correlations, not from food habits research. Thus, if a good partridge crop occurred where these predators were present, and also where absent, the conclusion is that they have no effect. I see here also the influence of the strong German movement for "Naturschutz" (nature protection), one of whose tenets is, of course, moderation in predator control).

12. Mouse years are partridge years (an interesting side-light on the wild life cycle).

13. Food shortage during the vegetative period can occur only during drouths.

14. It is improbable that the partridge needs drinking water when there is enough dew.

15. Poisoned wheat, properly put out, may not be dangerous, but arsenicals are probably (always) dangerous.

16. The influence of pheasants on the partridge is still controversial.

(Dense mixed populations are alleged to occur in Bohemia, but in many other localities increase in pheasants shows decrease in partridge. Nolte thinks the competition may occur only during nesting, and only when both species are dense. He pleads for special research on this question).

17. The existence of contagious diseases is not proved.

18. Dangerous fighting between cocks during mating is doubted.

19. "Peepers" (immature young) should be shot off. The question of whether they in turn breed "peepers" (because of immaturity and consequent late nesting) is unsolved.

20. Small coveys of well-grown birds are perfectly good breeding stock.

21. Albinos should be preserved for their research value (i. e. as marked birds whose behavior and longevity can be observed).

22. Old and young hens are equally valuable as breeders. The latter may lay more eggs, but the former are safer mothers.

23. Longevity is unknown. One white hen is known to have raised a large normal brood for four successive years.

24. Migration in partridge is not proved.

(But in October, 1911, partridges appeared in the mountains at a point thirty-nine air-line miles from an inhabited range. Partridges are known regularly to evacuate southwestern Memel. Drowned partridges have been found far from land. In 1932 drifting flocks appeared on the shores of the Main in Bavaria, and later disappeared. Some localities have partridges in winter only. I am reminded forcibly of Audubon's descriptions of the fall shuffle in quail, and the endless subsequent discussions on "migration").

25. The alleged migration is a "shuffle".

26. The spread of "technical" agriculture is injurious to partridge only where it affects environment (a truism!).

27. Grazing is always injurious to partridge.

(This I think is an unscientific assertion. It might, in too-heavy cover, be beneficial).

28. Vineyards and nurseries of large size can serve as refuges.

29. The partridge crop depends on which field crops start growing first. If grain springs up before clover and alfalfa, they nest in grain and are safe. If, however, the clover or hay springs up before the grain, there is heavy loss (of nests) in mowing. (This is precisely Yeatter's conclusion).

30. Partridges are not adaptable to climatic fluctuations.

31. Planting stock is best obtained from less favorable climates.

32. Every range has an optimum breeding density determinable by experience. It is useless to hold over more stock than this optimum. (This fails to assert that the optimum can often be raised by environmental control, and coincides with the rarity of actual range-improvement measures in Germany).

33. Plantings on empty range are best made in dry years, and have no great effect until the second of a succession of good years. In wet seasons the birds evacuate "cold" soils.

34. On bare agricultural areas the partridge must be winter-fed.

35. Satisfactory dog-hunting is possible only in good cover. Without cover the birds "pack" and are wild.

36. The welfare of partridge is directly proportional to sunshine, warmth, and dew, and inversely proportional to rainfall.

(Nolte elaborates this in the form of a mathematical formula:

$$A = \frac{wt}{n} \cdot C$$

where A is population or yield, w is solar energy as expressed in sun and warmth, t is dew, n is rainfall during the breeding season, and C is a constant representing the optimum breeding density for the particular range).

Taken all together, this piece of work exhibits a keen insight into ecological fundamentals. One can not help but wish that such a man might have the benefit of the inductive method initiated in America by Stoddard, as well as financial support for a trial of this method in Germany. This otherwise over-long review is to give American game managers at least a bird's-eye view of his conclusions.—ALDO LEOPOLD, *Berlin*, October 12, 1935.

FAMILIAR BIRDS OF THE PACIFIC SOUTHWEST. By Florence Van Vechten Dickey.

Pub. by the Stanford University Press, Palo Alto, California, 1935. Pp. i-lviii +1-241. Col'd plates, 102. Price, \$3.75.

One of the most pleasing bird books we have seen is presented under the above title. It may be regarded either as a pocket field guide or as a delightful desk book. The large number of beautiful, colored plates is the most important feature of the book. These are described as "full color reproductions from photographs chiefly by Donald R. Dickey", to whose memory the book is dedicated. We judge that most of these photographs were made from life, though we do not find such a statement. Their coloring brings out the field marks very clearly, and they serve well for the purpose of identification.

The text is presented in two parts, first a key, then descriptions of the various species included. In the key the first division is based on size, the second on color, and the third on various physical characters. The descriptions are designed wholly for the student in the field, with technical anatomical phraseology omitted. It is just the kind of a popular field guide which we wish might be prepared for the middle west, now that both coasts have one. We observe that about sixty-three species (not necessarily the same subspecies) of the 163 species considered are also found in the middle west. So, the book will not be without practical value in this region. As a pleasant avenue of extending our acquaintance with western birds the little book is at present without a peer.—T. C. S.

THE AMERICAN EAGLE. A STUDY IN NATURAL AND CIVIL HISTORY. By Francis Hobart Herrick. D. Appleton-Century Company, New York. 1934. Pp. i-xx +1-266. Figs. 1-94 and frontispiece. Price, \$3.50.

Professor Herrick's studies on the American Bald Eagle are pretty well known from his occasional reports in the current literature. This book is a summary of these studies, which, apparently, began as long ago as 1900. Probably

no other intensive bird study ever attempted covers the life history of a species as completely as does this one on the eagle. Not only have the studies been carried on throughout a very long period of time, but the enormous towers erected for the purpose of the study are unique in the history of bird study methods.

The story of the method of studying the eagles from high steel towers is fully told. This, in itself, is interesting enough. The catastrophic endings of certain great nests bring tragedy into the picture. We do not like to use the word romance in this connection, but results came, nevertheless, and Professor Herrick goes into the psychological analysis about as far as any author has gone. The daily routine, the life-history story, is told in detail.

Several extra-ornithological chapters are offered at the end of the book, viz., "The Eagle as Emblem", "The Eagle in Apotheosis", "The Eagle with Two Heads", "America's National Emblem", "The Numismatic Eagle", all of which make an interesting climax to the eagle story.

Since the question of what subspecies of Bald Eagle is the breeding form along Lake Erie has been frequently raised, we expected that this matter would be disposed of by Dr. Herrick. But, so far as we can discover, he has not committed himself in this book. Of course, the matter of subspecies is of very little consequence in life-history studies—it is more a matter of curiosity rather than of scientific importance. If Dr. Herrick does not know what subspecies he has been working on for thirty-five years, so much the worse for the subspecies. If he thinks the matter is of too little importance to treat in his book on these eagles the rest of us can breathe easier when thinking about it. This is another book for the easy chair, and will dispel the worries of any ornithologist on a long winter evening.—T. C. S.

THE PASSENGER PIGEON IN ONTARIO. By Margaret H. Mitchell. Published under the Reuben Wells Leonard Bequest as Contribution No. 7 of the Royal Ontario Museum of Zoology. 1935. Univ. Toronto Press. Pp. 1-181. Price, \$1.00 in paper, \$1.50 in cloth.

While this paper deals primarily with the nesting and migration of the Passenger Pigeon in Ontario, yet the entire life-history is discussed in more or less detail, thus making the paper one of general interest. The author makes free use of the literature on many points, but the original material was derived from replies to a widely distributed questionnaire, which was circulated in 1926 from the Royal Ontario Museum of Zoology. While perhaps the best contributions relate to local nesting colonies, distribution, and migration, yet the features of most interest to the reviewer are those of the general life-history.

Thus, the author presents a very full discussion of the food habits of the Passenger Pigeon—about the most complete account we have seen. The question of the number of eggs in the clutch is raised again, but the answer is no more conclusive than in previous accounts. Under the heading, "Economic Status", the birds are considered as destructive agents and as a source of food supply or income for the pioneers; methods of trapping and marketing are fully treated.

The author thinks that the extermination of the Passenger Pigeon was a gradual process—not as sudden an event as many have affirmed—and that no one cause is to be credited alone for the outcome. Among the most important factors which combined to reduce the birds below an "optimum population density" are considered the "clearing of the land", "disease", "market hunting", etc. A

"psychological effect" of diminished numbers as a contributing cause of extinction is suggested, but without sufficient discussion of its probable nature and mode of operation on a population. The suggestion merits further investigation.

The report is splendidly embellished by a reproduction in color of a painting of the Passenger Pigeon made in 1835 by William Pope. This portrait is one which was not included in Shufeldt's catalogue of Passenger Pigeon portraits in the *Scientific Monthly* (XII, May, 1921).

A bibliography of 196 titles, many of which are obscure, adds much to the general value of this work, which we may regard as an excellent contribution on the subject.—T. C. S.

BIRDS OF JEHOL. By Prince N. Taka-Tsukasa, Marquis M. Hachisuka, N. Kuroda, D. Sc., Marquis Y. Yamashina, S. Uchida, D. Agr. Sect. V, Div. II, Pt. III, of the Report of the First Scientific Expedition to Manchoukuo. Pp. 1-91, pls. 1-28. April, 1935. Waseda University, Tokyo, Japan.

The Report is printed in both Japanese and English, and is based upon material collected in 1933 by Messrs. Mori and Kishida. The authors, as enumerated above, were commissioned by the Ornithological Society of Japan to make the identifications and prepare the report. The seventy species listed belong to twenty-seven families and thirteen orders. The report contains twenty-eight colored plates, which illustrate forty of the forms listed. Many of the species have a much wider range throughout Asia, only two of which are found in the A. O. U. Check-List. The plates are excellent, and make the bird the outstanding feature; the background is a color wash which strengthens the bird portrait.—T. C. S.

MICHIGAN WATERFOWL MANAGEMENT. By Miles David Pirnie, Ph. D. Michigan Department of Conservation. Lansing, 1935. Pp. i-xxii+1-328. Figs. 1-212. Price, \$1.50.

The literature on the subject of game management is growing very rapidly, and is of all sorts—propaganda, technical papers, and digested summaries. The title just listed comes under the last classification. It deals, of course, only with the ducks and geese. And while the emphasis is placed on conditions in Michigan, yet the amount of general material is great, and we know of no other available work that comes no near being a textbook on the subject covered.

Chapter I (57 pp.) gives a non-technical description of all the ducks and geese which occur in Michigan, and this includes all the common species of the interior. This is followed by chapters on the numerical status of waterfowl, on natural enemies (including predators and disease), and on methods of hunting waterfowl. The greater part of the book deals with "management", and this includes chapters which discuss the legal regulation of hunting, refuges and sanctuaries, the problem of food and food planting programs, propagation, predator control, restoration of breeding grounds, etc. An appendix includes a very useful key to the more common pond and marsh vegetation, which, together with the nearly fifty photographic illustrations of such plants, presents the student with a most helpful means of becoming acquainted with that phase of the birds' environment. This outline will give the reader some conception of the ground covered in the book, but it can not show how readable the book is. We must add, therefore, that the book is well written, and makes interesting reading whether the reader be a hunter, an ornithologist, or a nature lover.

An incidental thought brought up by this book is its relation to a developing profession. As our country is becoming conscious of the importance of its wild life, steps are being taken slowly, but perhaps surely, to preserve what is left. To thus save the wild life of the continent will require the services of many trained experts. This means a new profession, and a new problem for educational institutions. Some few colleges and universities will have to prepare young men for this field. It is interesting to observe that trained minds are at work collecting, sorting, systematizing the facts which are to form the foundation of this new science. It means that young men who are so inclined may take up the subject of ornithology seriously, with the thought of making it a life work in its applied aspects. The trend of the times is in this direction.—T. C. S.

SYSTEMATIC STATUS OF SOME NORTHWESTERN BIRDS. By H. S. Swarth. Condor, XXXVII, 1935, pp. 199-204.

Swarth presents an argument to show that there is not good ground for distinguishing the two subspecies of *Tringa solitaria*, viz., *solitaria* and *cinnamomea*. Likewise, the validity of *Falco columbarius bendirei* is questioned. We suspect that the future will witness a questioning of many present-day subspecies, and the elimination of many of them from official check-lists. The chief difficulty has been a lack of a sound criterion of subspecies. Another difficulty has been the ease with which a proposed subspecies can be foisted upon the ornithological literature. The burden of proof has been placed upon the scientific public rather than upon the describer of the proposed subspecies. The pernicious custom among systematists of naming new forms after each other has bred a class of polite gastons instead of a class of rigorous scientific critics.—T. C. S.

A POPULAR ACCOUNT OF THE BIRD LIFE OF THE FINGER LAKES SECTION OF NEW YORK, WITH MAIN REFERENCES TO THE SUMMER SEASON. By Chas. J. Spiker. Roosevelt Wild Life Bull., Vol. 6, No. 3, 1935. Pp. 391-551. Figs. 228-284.

Another splendid bulletin from the pen of Mr. Spiker. The many excellent photographs are by the author and the late C. F. Stone. These photographs illustrate the various bird habitats, and should be a welcome aid to the student of birds in this region. An enlarged map of the entire Finger Lakes region is also included.

The introduction presents a description of the topography and habitat areas of the region, as well as of the topography of the various State Parks of the Finger Lakes area. The bulk of the text consists of descriptions of the distribution, habits, and migration of the common birds; the style is non-technical, and suitable alike to the younger and the more advanced student. These notes are based on the author's personal observations during his several years of connection with the Roosevelt Wild Life Forest Experiment Station.—WM. YOUNGWORTH.

A CONTRIBUTION TO A BIBLIOGRAPHY OF THE DESCRIBED IMMATURE STAGES OF NORTH AMERICAN COLEOPTERA. By J. S. Wade, U. S. Bureau of Entomology, 1935.

This paper consists of 114 mimeographed pages. It does not deal with birds in any way, but is an unusual and valuable piece of work for entomologists. We do not know where it is published, nor how it may be obtained, except through the author.—T. C. S.

WHITE HERONS IN INDIANA. By Amos Butler. Reprinted from Proc. Ind. Acad. Sci., Vol. 44, 1935, pp. 228-230.

Dr. Butler presents here a brief account of what is known concerning the three species of white herons as breeding birds in Indiana.—T. C. S.

A STUDY OF THE SHARP-TAILED GROUSE. By L. L. Snyder. Univ. Toronto Studies, Biol. Series, No. 40. 1935. Pp. 1-66.

The study deals with population cycles, seasonal distribution, food, migration, and taxonomy of the various forms of the species named. Much new material is introduced.—T. C. S.

The *Migrant* for September, 1935, is an exceptionally interesting number. It contains too much good material for the reviewer to handle properly. Several authors jointly present a "History of the Tennessee Ornithological Society". "Early Reminiscences", by Dixon Merritt, "Biographical Sketches of Founder Members", by George R. Mayfield, "Among Our Contributors", are articles which continue the account of the activities and the leaders of one of the older state ornithological societies. Four pages of portraits and snap-shots complete a record which will be received with satisfaction by all who are engaged in similar work. Our attention is taken especially by an article entitled, "A T. O. S. Annual Field Day", by John Craig. The author is a stranger to us, but we salute him as a master of descriptive writing. Besides furnishing the bird lover with a very entertaining account of his favorite pastime, we consider this article to present the best single bit of propaganda for the study of birds (without a gun), extant. It would be fine if this article could be reprinted in quantity for public use. A reprint sent to a hunter friend might make many a convert to the use of a field glass.

The *Redstart* continues to appear regularly at monthly intervals. The September number contains a very well thought out statement by Mr. J. W. Handlan on the two opposing views of wildlife conservation. We find ourselves in agreement with it. With this number Mr. T. E. Shields relinquishes the editorship. Mr. Shields is entitled to a hearty "Well Done" for his services in conducting the *Redstart* through two complete volumes. Much ornithological material of local importance has been preserved, and no doubt much good has been accomplished in uniting the efforts of bird lovers in West Virginia. The October number begins a new volume (III, No. 1, 1935) under the editorship of Mr. J. W. Handlan, whom we welcome into the fold.

The *Prothonotary* is a new mimeographed publication issued by the Buffalo Ornithological Society, and is being issued monthly. Anyone may subscribe at fifty cents per year. Each number contains a record of the month's weather conditions, noteworthy records of birds, and news of the activities of the members. It is edited by Mr. Harold D. Mitchell, 378 Crescent Ave., Buffalo, N. Y.

The *Snowy Egret* for Autumn, 1935, (Vol. X, No. 1), appears in a smaller and more attractive format. Articles are by Mr. H. A. Olsen, Mr. R. E. Olsen, and Mr. O. M. Bryens; and notes are reprinted from Audubon and Thoreau. Publication is now dated at Pippapass, Ky., and the paper continues to be directed by the Messrs. Olsen.

EDITORIAL

WE CAN NOT BE SURE that this issue will reach our readers much in advance of the Annual Meeting on December 29-31. While *Science* included the W. O. C. among organizations having headquarters at the New Jefferson Hotel, we presume that Secretary Hicks' letter is correct in assigning us to the Melbourne Hotel. A special tour of the Missouri Botanical Garden (Shaw's Garden) has been arranged for Saturday (the 28th, 1.30 P. M) for our members. A field trip is also planned for Sunday morning. For details of these excursions consult the Local Chairman, Mr. A. F. Satterthwaite, 118 Waverly Place, Webster Groves, Mo. Monday and Tuesday will be filled with the program of papers, with the annual dinner on Tuesday evening.

TWO GENERAL INVITATIONS for coöperation have reached this office. One is from the National Association of Audubon Societies, to the effect that data are being gathered for a popular booklet on the owls. It has not been decided at the present time whether this material will be incorporated in a second edition of Dr. May's book on the hawks, or issued as a separate and similar book on the owls alone. In either case the Association will be glad to receive any notes on the distribution, food habits, and behavior of all North American owls. Such contributions may be addressed to Mr. Warren F. Eaton, in charge of the N. A. A. S. Hawk and Owl Campaign.

The second invitation relates to the series of life history bulletins by Mr. Arthur Cleveland Bent, issued by the United States National Museum. Mr. Bent informs us that since Bulletin 162 on the gallinaceous birds was published in 1932, the manuscripts have been completed for two volumes on the birds of prey, including the vultures and owls. As yet these volumes have remained unpublished because funds were not available for the purpose. There seems to be some hope that at least one of these volumes may appear during the coming year.

However, Mr. Bent is continuing his labor on a third volume, which will be the twelfth in the series, and which will cover the groups of parrots, cuckoos, kingfishers, woodpeckers, goatsuckers, swifts, and hummingbirds, and in the sequence of the third A. O. U. Check-List. Mr. Bent is now ready to receive notes on habits and photographs relating to any of the birds in these groups. There is no doubt about the wisdom of carrying forward the completion of these manuscripts, and hoping for their publication at an early date. Those who are in a position to do so will undoubtedly assist by sending their contributions to Mr. A. C. Bent, Taunton, Mass.

THE INDEX has been delayed but will be printed and furnished to all members and subscribers.

MAR 28 1936

SUPPLEMENT TO
THE WILSON BULLETIN

March, 1936. Part 2.

INDEX FOR VOLUME XLVII, 1935

- Aldrich, John W., Bird notes from the Big Horn Mountain region of Wyoming, 57-59
- Blincoe, Benedict J., A Cowbird removes a Robin's egg, 158
- Breckenridge, W. J., A bird census method, 195-197
- Bujak, B. J., A recent record of the Hudsonian Curlew in the Chicago, Illinois, region, 294
- Burleigh, Thomas D., The present status of the Olive-sided Flycatcher as a breeding bird in western North Carolina and eastern Tennessee, 165
—The Brewer's Blackbird at Athens, Clark County, Georgia, 236
- Campbell, Louis W., The effect of relief projects on bird life, 240
- Carpenter, J. Richard, Forest edge birds and exposures of their habitats, 106-108
- Christy, Bayard H., Beach-combers, 265-269
- Cook, Mrs. Horace P., The Golden Plover in Indiana, 163
—The song of the Yellow-breasted Chat, 297
—A clever bird or two, 298
- Crook, Compton, Eastern Tree Sparrows wintering in Christian County, Kentucky, 73
- Davis, L. Irby, Wintering warblers in Cameron County, Texas, during the season of 1934-1935, 272-274
- Dille, Fred M., Arizona fields are virgin for bird banders, 286-293
- DuMont, Philip A., Caspian Terns in north-central Iowa, 72
—Northern Phalaropes in northwestern Iowa, 72
—Specimen of Greater Scaup Duck found in northern Iowa, 72
—A Red-shafted Flicker secured at Des Moines, Iowa, 158
—Prairie Falcon records from northwestern Iowa, 162
—Additional Iowa species of birds substantiated by specimens, 205-208
—Specimens of European Widgeon taken in northwestern Iowa, 236
—Chuck-wills-widow collected in southeastern Iowa, 239
—An old record of the Brown-headed Nuthatch in Iowa and Illinois, 240
- Eaton, Warren F., Communications, 96
- Eliot, Samuel A., Jr., Birds at a rain-pool in Massachusetts in October, 1933, 49-46
- Eifrig, C. W. G., The Savannah Sparrow in Maryland, 239
- Errington, Paul L. and Logan J. Bennett, Food habits of Burrowing Owls in northwestern Iowa, 125-128
- Errington, Paul L., Winter-killing of Mourning Doves in central Iowa, 159
- Fargo, Wm. G., Some corrections, 238
- Favell, Mrs. Angela Harte, Behavior of a pet Robin, 298
- Fitzpatrick, F. L., Notes on the renal blood vessels of raptorial birds, 43-44
- Furniss, O. C., The duck situation in the Prince Albert district, central Saskatchewan, 111-119
—The sex ratio in ducks, 277-278
- Ganier, Albert F., The Cardinal now twelve years old, 285-286
- Gill, Geoffrey, The constancy of Catbirds to mates and to territory, 104-106
- Hamilton, W. J., Jr., Notes on nestling Robins, 109-111
- Hayward, C. Lynn, Observations on some breeding birds of Mount Timpanogos, Utah, 161.
—A study of the winter bird life in Bear Lake and Utah Lake Valleys, 278-284

- Henderson, Grant, A Blue-winged Warbler record for Decatur County, Indiana, 160
 —An unusual banding experience, 298
- Hendrickson, George O. and Robert Treneman, Nests of Crows and other birds in the same evergreen grove, 295
- Hicks, Lawrence E., The Louisiana Paroquet in Ohio, Kentucky, and Indiana, 76
- Hinnen, Dr. G. A., Notes on a hand-reared Flicker, 77-79
- Howard, William Johnston, Notes on the nesting of captive Mute Swans, 237
- Hunter, Lawrence E., Some bird tragedies, 74
- Jones, F. M., Nesting of the Raven in Virginia, 188-191
- Johnson, Archibald, A three-egg set of the Mourning Dove, 236
 —Effect of drouth on birds, 236
- Johnson, D. Elmer, Some bird notes from Utah, 160
 —Another Snow Bunting for Utah, 294
- Johnson, R. A. and Hazel S., A study of the nesting and family life of the Red-throated Loon, 97-103
- Jung, Clarence S., Migration of hawks in Wisconsin, 75
- Long, W. S., Second record of the Starling in Douglas County, Kansas, 73
- Kearns, Lucy Pendleton, Migration of waterfowl in tidewater Virginia, 294
- Kemsies, Emerson G., Changes in the list of birds of Yellowstone National Park, 68-70
- McAtee, W. L., Value of field observation in economic ornithology, 195-197
- McCreary, Otto C. and Arthur B. Mickey, Bird migration records from south-eastern Wyoming, 129-157
- Maslowski, Karl H., Notes on some winter birds of southwestern Ohio, 163
- Meuli, L. J., Observations on nest site trials by the Eastern Robin, 296
- Moore, George A., The Starling at Kingfisher, Oklahoma, 294
- Murray, J. J., Water birds of a Virginia mountain county, 59-67
- Nice, L. B., Margaret M. Nice, and Ruth M. Kraft, Erythrocytes and hemoglobin in the blood of some American birds, 120-124
- Nice, Margaret M., Storks in trees, 270-271
- Peabody, P. B., Rim-rock and Solitaire, 257-265
- Shields, Thos. E., A study of the Savannah Sparrow in West Virginia, 35-42
 —Some bird notes from Belmont County, Ohio, 74
 —The Black Tern recorded in the West Virginia Panhandle, 236
- Shirling, A. E., Observations on the Violet-green Swallow, 192-194
- Smith, Lloyd, An October record of the American Egret in Lee County, Iowa, 72
- Spawn, Gerald B., Some shore birds collected in South Dakota, 72
- Stoner, Dayton, An example of partial albinism in the Eastern Crow, 274-276
- Swenk, Myron H., Robert Henry Wolcott, 45-49
- Thompson, Paul R., The Golden-winged Warbler in South Dakota, 80
- Vasicek, John M., A Savannah Sparrow as a Cowbird victim, 294
- Walkinshaw, Lawrence H., The incubation period of the Sora Rail, 79
- Watterson, William H., The 1934 migration at Cleveland's Public Square, 238
- Welter, Wilfred A., The natural history of the Long-billed Marsh Wren, 3-34
- Wetmore, Alexander, A record of the Trumpeter Swan from the late Pleistocene of Illinois, 237
- Witschi, Emil, Seasonal sex characters in birds and their hormonal control, 177-188
- Youngworth, Wm., McCown's Longspur in southwestern North Dakota, 72
 —Notes on the American Egret and Little Blue Heron in Iowa, 73
 —The Starling in southeastern South Dakota, 158
 —Apparent scarcity of certain North Dakota birds, 158
 —The birds of Fort Sisseton, South Dakota, a sixty year comparison, 209-235
 —The Lazuli Bunting in northeastern South Dakota, 295

- Acanthis linaria*, 153, 164, 233, 282
Accipiter cooperi, 74, 135
Accipiter velox, 135, 216
Actitis macularia, 66, 138, 220
Aechmophorus occidentalis, 131, 210
Aeronautes s. saxatalis, 143
Agelaius phoeniceus, 232
Agelaius p. californicus, 130
Agelaius p. fortis, 130, 282
Aix sponsa, 64, 130, 213
Ammodramus bairdi, 154
Ammodramus savannarum, 234
Ammospiza caudata, 234
Amphispiza n. nevadensis, 70, 154
Anas platyrhynchos, 63, 129, 213, 283
Anas rubripes, 63, 132, 213
Anas r. tristis, 63
Anser albifrons, 130, 213
Anthus spinoletta rubescens, 58, 148, 282
Anthus spraguei, 148
Antrostomus carolinensis, 239
Aphelocoma c. woodhousei, 130, 282
Aquila chrysaetos canadensis, 129, 216
Archilochus colubris, 224
Ardea herodias, 62, 212
Ardea h. treganzai, 32
Arenaria interpres morinella, 72, 218
 Arizona, 286-293
Asio flammeus, 142, 224
Asio wilsonianus, 224
Astur atricapillus, 135, 216, 284
Astur a. striatulus, 284
Asyndesmus lewis, 143
 Avocet, 140, 221
- Baldpate, 55, 63, 133, 213, 283
Bartramia longicauda, 66, 137, 220
 Bittern, American, 62, 132, 212
 Least, 130, 212
 Blackbird, Brewer's, 152
 Red-winged, 232
 Rusty, 55, 152, 232
 Yellow-headed, 151, 232
 Bluebird, 107, 130, 228, 241
 Chestnut-backed, 130
 Mountain, 147, 283
 Bluejay, 107, 145, 226, 241
 Bobolink, 58, 151, 230
 Bob-white, 129, 159, 217, 241
Bombycilla cedrorum, 148, 228, 290
Bombycilla g. pallidiceps, 148
Botaurus lentiginosus, 62, 132, 212
 Brant, American, 49
 Black, 130
Branta canadensis, 62, 68, 138, 212
Branta c. hutchinsi, 130
Branta nigricans, 130
 Bronzed Grackle, 107, 152, 232, 241
 Brown Creeper, 107, 226
 Brown Thrasher, 107, 146, 164, 228, 241
Bubo virginianus, 222
Bubo v. occidentalis, 129, 284
 Buffle-head, 64, 134, 214, 278, 283
 Bunting, Indigo, 233, 241
 Lark, 153, 233, 292
 Lazuli, 152, 205, 233, 295
 Snow, 160, 165, 294
Buteo borealis, 43, 216
Buteo b. calurus, 135
Buteo lineatus, 43
Buteo l. sancti-johannis, 136, 216
Buteo platypterus, 74, 216
Buteo regalis, 129, 216
Buteo swainsoni, 135, 216
Butorides virescens, 62, 130, 212
- Calamospiza melanocorys*, 153, 233, 292
Calcarius lapponicus, 235
Calcarius l. alascensis, 156
Calcarius ornatus, 156, 235
Calcarius pictus, 235
 Canada, 111, 277
 Canvas-back, 49, 64, 134, 214, 278
Capella delicata, 66, 129, 218, 283
 Cardinal, 107, 232, 241, 285, 298
 Arizona, 292
Carpodacus cassini, 153
Carpodacus m. frontalis, 130, 282
Casmerodius albus egretta, 62, 72, 73, 212
 Catbird, 58, 104-106, 107, 146, 197, 228, 241
Cathartes aura septentrionalis, 135, 214
Catherpes mexicanus conspersus, 146
Catoptrophorus s. inornatus, 138, 220
Centrocercus urophasianus, 129
Centurus uropygialis, 289
Certhia familiaris, 226
Certhia familiaris montana, 130
Chaetura pelagica, 75, 224
Charadrius melodus, 137, 218
Charadrius nivosus, 137
Charadrius semipalmatus, 66, 137, 218
Charitonetta albeola, 64, 134, 214, 283
 Chat, Yellow-breasted, 297
Chaulelasmus streperus, 63, 133, 213
Chen caerulescens, 213
Chen hyperborea, 130, 213
 Chickadee, 107, 226
 Long-tailed, 129
 Montana, 129
 Chimney Swift, 224
Chondestes grammacus strigatus, 154, 234
Chordeiles minor, 142
Chordeiles minor howelli, 70
Chlidonias nigra, 236
 Chuck-wills-widow, 208, 239
Cinclus mexicanus unicolor, 129

- Circus hudsonius*, 129, 216
Cistothorus stellaris, 130, 228
Clangula hyemalis, 64, 69, 163, 214
 Clark's Nutcracker, 129
Coccyzus americanus, 130, 222
Coccyzus erythrophthalmus, 57, 142, 222
Colaptes a. luteus, 130, 224
Colaptes cafer collaris, 130, 158, 206
Colinus virginianus, 129, 159, 217
Colymbus auritus, 61, 131, 210
Colymbus grisigena holboelli, 131, 210
Colymbus n. californicus, 131, 210
 Communications, 96
Compsothlypis a. pusilla, 149, 229
Compsothlypis nigrilora, 274
Conuropsis c. ludovicianus, 206
 Coot, 66, 136, 218
 Cormorant, Double-crested, 49, 62, 131, 212
Corthylio c. calendula, 148, 282
Corvus brachyrhynchos, 226
Corvus b. hesperis, 145
Corvus c. sinuatus, 130, 226
 Cowbird, Eastern, 158, 232, 294
 Nevada, 152
 Crane, Little Brown, 136
 Sandhill, 69, 136, 217
 Whooping, 217
 Creeper, Brown, 107, 226
 Rocky Mountain, 130
Crocethia alba, 140, 221
 Crossbill, Bendire's, 130
 White-winged, 130
 Crow, Eastern, 226, 274
 Western, 145
Cryptoglaux acadica, 129, 164, 284
 Cuckoo, Black-billed, 57, 142, 222
 Yellow-billed, 130, 222, 241
 Curlew, Eskimo, 220
 Hudsonian, 49, 205, 206, 218, 294
 Long-billed, 218
 Canadian Long-billed, 57
 Northern, 137
Cyanocephalus cyanocephalus, 130
Cyanocitta cristata, 145, 226
Cyanocitta s. annectens, 129
Cyanocitta s. diademata, 129, 282
Cygnus buccinator, 68, 130, 212, 237
Cygnus columbianus, 132, 212
Cygnus olor, 237

Dafila acuta tizitioha, 63, 133, 213, 283
Dendragapus obscurus, 129
Dendroica aestiva, 150, 229, 273
Dendroica ae. morcomi, 58
Dendroica auduboni, 150, 273, 291
Dendroica caerulescens, 130
Dendroica castanca, 230
Dendroica coronata, 150, 164, 229, 273
Dendroica discolor, 206

Dendroica dominica, 273
Dendroica fusca, 229
Dendroica magnolia, 150, 229
Dendroica palmarum, 150, 164, 230
Dendroica pensylvanica, 150, 230
Dendroica peregrina, 274
Dendroica pinus, 230, 273
Dendroica striata, 150, 230
Dendroica tigrina, 229
Dendroica townsendi, 150
Dendroica virens, 272
 Dickcissel, 130, 233
 Dipper, 129
Dolichonyx orizivorus, 58, 151, 230
 Dove, Inca, 289
 Dove, Mourning, 159, 142, 222, 236, 238, 241
 Dovekie, 49
 Dowitcher, 49, 50, 139, 160, 221
Dryobates pubescens, 224
Dryobates p. leucurus, 129, 162, 283
Dryobates villosus, 224
Dryobates v. monticola, 129, 283
 Duck, Black, 50, 63, 132, 213
 Greater Scaup, 72, 134, 216
 Lesser Scaup, 134, 214
 Red-legged Black, 63
 Ring-necked, 64, 69, 133, 214, 278
 Ruddy, 49, 65, 214
 Wood, 50, 64, 130, 213
Dumetella carolinensis, 58, 146, 228

 Eagle, Bald, 130, 216
 Golden, 129, 216
Ectopistes migratorius, 130, 222
 Egret, American, 62, 72, 73, 212
 Brewster's, 132
 Snowy, 205
Egretta thula brewsteri, 132
Elanoides forficatus, 216
Empidonax difficilis, 144
Empidonax flaviventris, 74, 224
Empidonax hammondi, 144
Empidonax minimus, 144, 225
Empidonax trailli, 144, 225
Empidonax wrighti, 144
Ereunetes pusillus, 67, 140, 221
Erismatura jamaicensis, 65, 134, 214
Euphagus carolinus, 152, 232, 237
Euphagus cyanocephalus, 152, 232, 236
Eupoda montana, 137

Falco columbarius, 74, 217
Falco c. richardsoni, 136
Falco mexicanus, 129, 162
Falco p. anatum, 136, 216
Falco sparverius, 217
Falco s. phalaena, 136
 Falcon, Prairie, 129, 162

- Finch, Black Rosy, 130
 Brown-capped Rosy, 130
 Cassin's Purple, 153
 Common House, 130, 282
 Gray-crowned Rosy, 153, 205
 Hepburn's Rosy, 153
 Flicker, Northern, 77, 107, 130, 224, 241
 Red-shafted, 130, 158, 205, 206
 Florida c. *caerulea*, 62, 73, 206
 Flycatcher, Alder, 144, 225, 241
 Ash-throated, 130
 Crested, 130, 241
 Hammond's, 144
 Least, 144, 225
 Olive-sided, 144, 165
 Western, 144
 Wright's, 144
 Yellow-bellied, 74, 225
 Fulica a. *americana*, 46, 136, 218

 Gadwall, 49, 63, 133, 213, 278
 Gallinula c. *cachinnans*, 65, 217
 Gallinule, Florida, 65, 217
 Gannet, 49
 Gavia immer, 61, 210
 Gavia i. *elasson*, 131
 Gavia stellata, 205
 Geothlypis trichas, 230, 273
 Geothlypis t. *occidentalis*, 151
 Glaucionetta c. *americana*, 64, 134, 214, 283
 Glaucionetta islandica, 129, 214
 Gnatcatcher, 130
 Godwit, Hudsonian, 221
 Marbled, 140, 159, 221
 Golden Eagle, 129, 216
 Golden-eye, American, 64, 134, 214, 278, 283
 Barrow's, 49, 129, 214
 Golden Plover, 49
 Goldfinch, Arkansas, 153
 Common, 233, 241
 Pale, 130, 281
 Goose, Blue, 213
 Canada, 62, 68, 132, 212, 238
 Hutchin's, 130
 Snow, 49, 130, 213
 White-fronted, 130, 213
 Goshawk, 135, 216, 284
 Grebe, Eared, 131, 210
 Holboell's, 131, 210
 Horned, 131, 210
 Pied-billed, 50, 61, 131, 212
 Western, 131, 205, 210
 Grosbeak, Pine, 233
 Rocky Mountain, 152
 Rocky Mountain Pine, 129, 282
 Rose-breasted, 152, 232, 241
 Western Blue, 205, 208
 Western Evening, 130, 282

 Grouse, Columbian Sharp-tailed, 129
 Dusky, 129
 Prairie Sharp-tailed, 129
 Sharp-tailed, 217
 Grus canadensis, 69, 136, 217
 Grus c. *tabida*, 136
 Guiraca c. *interfusa*, 208
 Gull, Bonaparte's, 67, 141
 California, 130
 Franklin's, 141, 222
 Great Black-backed, 49
 Glaucous, 140, 160
 Herring, 141, 221, 238
 Laughing, 49, 221
 Ring-billed, 67, 141, 221
 Sabine's, 130
 Short-billed, 130

 Haliaeetus leucocephalus, 130, 216
 Hawk, American Rough-legged, 136, 216
 Broad-winged, 74, 75, 216
 Cooper's, 74, 75, 135
 Duck, 136, 216
 Eastern Red-tailed, 43-44, 216
 Ferruginous Rough-legged, 216
 Harris's, 205
 Marsh, 129, 159, 216
 Pigeon, 74, 136, 217
 Sharp-shinned, 75, 135
 Swainson's, 135, 159, 216
 Western Red-tailed, 135
 Hedymeles ludovicianus, 152, 232
 Hedymeles m. *papago*, 152
 Heleodytes brunneicapillus *coesi*, 289
 Heron, Black-crowned Night, 67, 132, 212
 Eastern Green, 62, 130, 212
 Great Blue, 62, 212
 Little Blue, 62, 73, 205, 206
 Treganza's, 132
 Hesperiphona v. *brooksi*, 130, 282
 Himantopus mexicanus, 140
 Hirundo erythrogaster, 145, 226
 Hummingbird, Broad-tailed, 143
 Ruby-throated, 224
 Rufous, 143
 Hydrochelidon n. *surinamensis*, 67, 142, 222
 Hydroprogne caspia *imperator*, 72
 Hyllocichla f. *salicicola*, 147
 Hyllocichla guttata, 147, 228
 Hyllocichla g. *auduboni*, 148
 Hyllocichla g. *faxoni*, 164
 Hyllocichla m. *aliciae*, 147, 228
 Hyllocichla u. *swainsoni*, 147, 228

 Ibis, White-faced Glossy, 132
 Wood, 205
 Icteria v. *longicauda*, 151
 Icteria virens, 230

- Icterus bullocki*, 152
Icterus galbula, 152, 232
Icterus spurius, 232
 Indiana, 76, 163, 297, 298
 Indigo Bunting, 233, 241
 Illinois, 106, 237, 240, 294
 Iowa, 72, 73, 125, 158, 159, 162, 205, 236, 239, 240
Iridoprocne bicolor, 145, 225
Ixobrychus exilis, 130, 212
- Jay, Black-headed, 129
 Long-crested, 129, 282
 Piñon, 130
 Rocky Mountain, 129
 Woodhouse's, 130, 282
 Junco, Gray-headed, 155, 281
 Montana, 154, 281
 Pink-sided, 155, 281
 Shufeldt's, 154, 208, 281
 Slate-colored, 107, 154, 234, 281, 298
 White-winged, 59, 154
 Junco aikeni, 59, 154
 Junco caniceps, 155, 281
 Junco hyemalis, 154, 234, 281, 298
 Junco mearnsi, 155, 281
 Junco o. montanus, 154, 281
 Junco o. shufeldti, 154, 281
- Kansas, 73
 Kentucky, 73, 76
 Killdeer, 50, 52, 66, 75, 137, 163, 218, 283
 Kingbird, Arkansas, 143, 225
 Cassin's, 144
 Eastern, 143, 225, 241
 Western, 57
 Kingfisher, Belted, 129, 224, 241
 Kinglet, Golden-crowned, 148, 282
 Ruby-crowned, 107, 148, 282
 Kite, Swallow-tailed, 216
 Kittiwake, Atlantic, 141
 Knot, 49
- Lagopus l. altipetus, 129
Lanius b. invictus, 148
Lanius ludovicianus, 229
Lanius l. excubitorides, 148, 291
Lanivireo flavifrons, 229
 Lark Bunting, 72
 Lark, Desert Horned, 70, 130
 Horned, 72, 225
 Saskatchewan Horned, 130
Larus atricilla, 222
Larus a. smithsonianus, 141, 221
Larus californicus, 130
Larus canus brachyrhynchus, 130
Larus delawarensis, 67, 141, 221
Larus hyperboreus, 140, 160
Larus philadelphia, 67, 141
Larus pipixcan, 141, 222
Limnodromus griseus, 160, 221
Limnodromus g. scolopaceus, 139
Limosa fedoa, 140, 221
Limosa haemastica, 221
Leucosticte atrata, 130
Leucosticte australis, 130
Leucosticte t. littoralis, 153
Leucosticte t. tephrocotis, 153
Lobipes lobatus, 72, 141, 221
 Longspur, Alaska, 156
 Chestnut-collared, 72, 156, 205, 235
 Lapland, 235
 McCown's, 72, 156, 205, 206
 Smith's, 235
Lophodytes cucullatus, 65, 130, 214
 Loon, Common, 61, 210
 Lesser, 131
 Red-throated, 49, 97-103, 205
 Louisiana Paroquet, 76
Loxia c. bendirei, 130
Loxia leucoptera, 130
- Magpie, 129, 226
 Mallard, 55, 63, 74, 129, 213, 278, 283
 Man-o'-war-bird, 205
Marca americana, 63, 133, 213, 283
Mareca penelope, 130, 236
 Martin, Purple, 162
 Maryland, 239
 Massachusetts, 49
 Meadowlark, Western, 130, 230
Megaceryle alcyon, 129, 224
Melanerpes erythrocephalus, 57, 74, 143, 224
Melanitta deglandi, 134, 214
Melanitta perspicillata, 214
Melospiza georgiana, 235
Melospiza lincolni, 156, 235
Melospiza melodia, 235
Melospiza m. fallax, 130, 282
 Merganser, American, 65, 129, 214
 Hooded, 65, 130, 214
 Red-breasted, 49, 67, 135
Mergus m. americanus, 65, 129, 214
Mergus serrator, 67, 135
 Michigan, 79, 265
Micropalama himantopus, 139, 221
Mimus p. leucopterus, 146
 Minnesota, 4, 195, 296
Mniotilta varia, 229
 Mockingbird, Eastern, 205
 Western, 146
Molothrus ater, 158, 232
Molothrus a. artemisiae, 152
 Mourning Dove, 159, 222
 Murre, Brunnich's, 49
Myadestes townsendi, 130, 257-265, 283
Mycteria americana, 68
Myiarchus c. boreus, 130

- Myiarchus c. cinerascens*, 130
Myiochanes r. richardsoni, 144
Myiochanes virens, 225
- Nannus hiemalis pacificus*, 146
Nettion carolinense, 63, 129, 213, 283
 New York, 3, 104, 109, 274
 Nighthawk, 142
 Howell's, 70
 North Carolina, 165
 North Dakota, 72, 158, 236
Nucifraga columbiana, 129
Numenius americanus, 218
Numenius a. occidentalis, 57, 137
 Nuthatch, Black-headed, 146
 Brown-headed, 208, 240
 Red-breasted, 107, 130, 226
 Rocky Mountain, 129
 White-breasted, 146, 226
Nuttallornis mesoleucus, 144, 165
Nyctea nyctea, 70, 130, 222, 284
Nycticorax n. hoactli, 67, 132, 212
Nyroca affinis, 64, 134
Nyroca americana, 64, 133, 213
Nyroca collaris, 64, 69, 133, 213
Nyroca marila, 72, 134, 214
Nyroca valisineria, 64, 134, 213
- Oberholseria chlorura*, 153
 Ohio, 74, 76, 163, 238, 240, 294
Oidemia americana, 130, 206
 Oklahoma, 294
 Old Squaw, 49, 64, 69, 163, 214
Oporornis tolmiei, 151
Oreoscoptes montanus, 147
 Oriole, Baltimore, 152, 232, 241
 Bullock's, 152
 Orchard, 232
 Ornithological Literature, 166-174, 300-307
 Osprey, 74, 130, 216
Otocoris alpestris, 225
Otocoris a. enthymia, 130
Otocoris a. leucolaemia, 70, 130
Otus asio, 222
Otus a. maxwelliac, 129
 Oven-bird, 230
 Owl, Burrowing, 125-128, 142, 205, 206, 224
 Great Gray, 70, 205
 Great Horned, 222
 Long-eared, 224
 Montana Screech, 129, 284
 Rocky Mountain Screech, 129
 Saw-whet, 129, 164, 284
 Screech, 222, 241
 Short-eared, 142, 224
 Snowy, 70, 130, 222, 284
Oxyechus vociferus, 66, 75, 137, 163, 218, 283
- Pandion haliaëtus*, 130, 174, 216
 Paroquet, Louisiana, 76, 205, 206
 Partridge, European, 217
Passer domesticus, 129, 130
Passerculus sandwichensis, 35-42, 154, 233, 239, 294
Passerella iliaca, 165, 235
Passerella i. schistacea, 156
Passcrina amoena, 152, 233
Passcrina cyanea, 233
Pediocetes phasianellus, 217
Pediocetes p. campestris, 129
Pediocetes p. columbianus, 129
Pelecanus erythrorhynchos, 131
Pelecanus occidentalis, 130
 Pelican, Brown, 130
 White, 131
Pelidna alpina sakhalina, 139, 220
Penthestes atricapillus, 226
Penthestes a. septentrionalis, 129
Penthestes g. gambeli, 129
Perdix perdix, 217
Perisoreus c. capitalis, 129
 Petrel, Leach's, 49
Petrochelidon albifrons, 74, 146, 226
 Pewee, Western Wood, 144
 Wood, 225, 241
Phaeopus borealis, 220
Phaeopus hudsonicus, 206, 218, 294
Phalacrocorax auritus, 62, 131, 212
Phalacroptilus n. nuttalli, 142
 Phalarope, Northern, 49, 72, 141, 221
 Red, 49, 140
 Wilson's, 140, 220
Phalaropus fulicarius, 140
Phasianus c. torquatus, 129, 217
 Pheasant, Ring-necked, 129, 217
Philohela minor, 66, 218
 Phoebe, 75, 225, 241
 Black, 289
 Say's, 144, 205
Pica hudsonia, 129, 226
Picoides tridactylus dorsalis, 129
 Pigeon, Passenger, 130, 222
 Pine Siskin, 233, 281
Pinicola enucleator, 233
Pinicola e. montana, 129, 282
 Pintail, 50, 63, 133, 213, 278, 283
Pipilo aberti, 292
Pipilo erythrophthalmus, 233
Pipilo m. articus, 153, 233
Pipilo m. montanus, 233
 Pipit, American, 55, 58, 148, 282
 Sprague's, 148, 205
Piranga erythromelas, 130
Piranga indoviciana, 152, 162
Pisobia bairdi, 139, 220
Pisobia fuscicollis, 139, 220
Pisobia melanotos, 67, 138, 220
Pisobia minutilla, 67, 139, 220

- Plectrophenax nivalis*, 156, 160, 165, 294
Plegadis guarauna, 132
 Plover, Black-bellied, 49, 52, 137, 218
 Golden, 49, 52, 137, 163, 218
 Mountain, 137
 Piping, 50, 137, 218
 Ring-necked, 52
 Semipalmated, 66, 137, 218
 Snowy, 137
 Upland, 66, 137, 159, 220
Pluvialis dominica, 137, 163, 218
Podilymbus podiceps, 61, 131, 212
Polioptila caerulea, 130
Poocetes gramineus, 165, 234
Poocetes g. confinis, 154
 Poor-will, Nuttall's, 142, 205
Porzana carolina, 65, 79, 136, 217
 Prairie Chicken, 130, 217
 Prairie Falcon, 129, 159, 162
 Proceedings, 81-95
Progne subis, 130, 162, 226
 Ptarmigan, Southern White-tailed, 129
 Purple Martin, 130, 162, 226

 Quebec, 97
Querquedula cyanoptera, 133, 206, 213, 283
Querquedula discors, 64, 133, 213
Quiscalus q. aeneus, 59, 152, 232

 Rail, Black, 205
 Clapper, 65
 Sora, 65, 79, 136, 217
 Virginia, 65, 136, 217
Rallus limicola, 65, 136, 217
Rallus l. crepitans, 65
 Raven, American, 130, 188-191, 205, 226
Recurvirostra americana, 140, 221
 Redhead, 49, 64, 133, 213, 278
 Redpoll, Common, 153, 164, 233, 282
 Greater, 205
 Redstart, 58, 230
 Red-wing, Bicolored, 130
 Thick-billed, 130, 282
Regulus s. olivaceus, 148, 282
Rhynchophanes meadowi, 72, 156, 206
Richmondia cardinalis, 232
Richmondia c. superba, 292
Riparia riparia, 145, 225
Rissa tridactyla, 141
 Robin, 75, 107, 109-111, 228, 236, 241, 296, 298
 Western, 147
 Rough-leg, American, 136, 216
 Ferruginous, 129, 216
 Ruddy Duck, 49, 65, 131, 278

 Sage Hen, 129
Salpinctes obsoletus, 146
 Sanderling, 49, 72, 140, 221
 Sandpiper, Baird's, 51, 52, 139, 220
 Buff-breasted, 72, 220
 Least, 51, 52, 67, 139, 220
 Pectoral, 50, 52, 67, 138, 220
 Purple, 49
 Red-backed, 49, 51, 52, 139, 220
 Semipalmated, 51, 52, 67, 140, 221
 Solitary, 50, 52, 66, 220
 Spotted, 52, 66, 138, 220, 241
 Stilt, 50, 139, 221
 Western, 50
 Western Solitary, 138
 White-rumped, 51, 52, 139, 220
 Wilson's, 52, 66
 Sapsucker, Natalie's, 130
 Red-naped, 143, 163
 Yellow-bellied, 107, 224
 Saskatchewan, 111
Sayornis nigricans, 289
Sayornis phoebe, 75, 225
Sayornis saya, 144
Scardafella inca, 289
 Scaup, Lesser, 64, 134, 278
 Scoter, American, 130, 205, 206
 Surf, 49, 214
 White-winged, 49, 134, 214
Scotiaptex nebulosa, 70
Seiurus aurocapillus, 150, 230
Seiurus notabilis, 151, 230
Selasphorus platycercus, 143
Selasphorus rufus, 143
Setophaga ruticilla, 58, 151, 230
 Shoveller, 49, 64, 133, 213, 278
 Shrike, Northwestern, 148
 White-rumped, 148, 291
Sialia currucoides, 147, 283
Sialia mexicana bairdi, 130
Sialia sialis, 228
 Siskin, Pine, 130, 233, 281
Sitta canadensis, 130, 226
Sitta carolinensis, 226
Sitta c. nelsoni, 129
Sitta pusilla, 240
Sitta pygmaea melanotis, 146
 Snipe, 50, 66, 129, 218, 283
 Solitaire, 257-265, 283
 Sora, 65
 South Dakota, 72, 80, 158, 209-235, 295
 Sparrow, Baird's, 154
 Brewer's, 155, 293
 Chipping, 234
 Clay-colored, 155, 197, 234, 293
 English, 129, 230
 Field, 107, 165
 Fox, 165, 235
 Gambel's, 156, 282
 Grasshopper, 234
 Harris's, 155, 234

- Lark, 234
 Lincoln's, 156, 235, 238
 Mountain Song, 130, 282
 Nelson's, 234
 Northern Sage, 70, 154
 Savannah, 35-42, 154, 233, 239, 294
 Sharp-tailed, 234
 Slate-colored Fox, 156
 Song, 197, 235, 238, 241
 Swamp, 235, 238
 Tree, 73, 107, 234
 Vesper, 165, 234
 Western Chipping, 155
 Western Lark, 154
 Western Tree, 155, 281
 Western Vesper, 154
 White-crowned, 155, 165, 234, 238, 282, 293
 White-throated, 107, 156, 165, 235, 238
Spatula clypeata, 64, 133, 213
Speotyto c. hypugaea, 142, 206, 224
Sphyrapicus t. nataliae, 130
Sphyrapicus varius, 224
Sphyrapicus v. nuchalis, 143, 162
Spinus p. pinus, 130, 233, 281
Spinus p. psaltria, 153
Spinus tristis, 233
Spinus t. pallidus, 130, 281
Spiza americana, 130, 233
Spizella arborea, 73
Spizella a. ochracea, 155, 234
Spizella breweri, 155, 293
Spizella pallida, 155, 234
Spizella passerina arizonae, 155, 234
Squatarola squatarola, 137, 218
 Starling, 73, 158, 229, 241, 222
Steganopus tricolor, 140, 221
Stelgidopteryx r. serripennis, 145, 225
Sterna a. antillarum, 142
Sterna forsteri, 70, 141, 222
Sterna hirundo, 130, 222
 Stilt, Black-necked, 140, 205
Sturnella neglecta, 130, 230
Sturnus vulgaris, 73, 158, 229, 294
 Swallow, Bank, 145, 225
 Barn, 145, 226
 Cliff, 74, 145, 226
 Rough-winged, 145, 225, 241
 Tree, 145, 225
 Violet-green, 145, 162, 192-194
 Swan, Mute, 237
 Trumpeter, 68, 130, 212, 237
 Whistling, 132, 212
 Swift, White-throated, 143

Tachycineta thalassina lepida, 145, 162
 Tanager, Scarlet, 130
 Western, 152, 162

 Teal, Blue-winged, 50, 55, 64, 133, 213, 278
 Cinnamon, 133, 205, 206, 213, 283
 Green-winged, 50, 55, 63, 129, 213, 278, 283
Telmatodytes palustris, 3-34, 228
Telmatodytes p. dissaeptus, 3, 146, 164
Telmatodytes p. iliacus, 3
Telmatodytes p. plesius, 146
 Tennessee, 165, 285
 Texas, 272
 Tern, Black, 49, 67, 142, 222, 236
 Caspian, 72
 Common, 49, 130, 222
 Forster's, 70, 141, 222
 Least, 142
 Thrasher, Bendire's, 290
 Brown, 107, 146, 164, 228, 241
 Palmer's, 290
 Sage, 147
 Thrush, Alaska Hermit, 147
 Audubon's Hermit, 147
 Gray-cheeked, 147, 228
 Hermit, 164, 228
 Willow, 147
 Wood, 241
 Towhee, 107, 233
 Abert's, 292
 Arctic, 153, 233
 Green-tailed, 153
 Spurred, 282
 Townsend's Solitaire, 130
Toxostoma bendirci, 290
Toxostoma curvirostre palmeri, 290
Toxostoma rufum, 146, 164
Tringa solitaria, 66, 220
Tringa s. cinnamomea, 138
Troglodytes aedon, 74, 228
Troglodytes a. parkmani, 146, 162
Tryngites subruficollis, 72, 221
 Tufted Titmouse, 107
Turdus migratorius, 75, 228, 236
Turdus m. propinquus, 147
 Turkey, Water, 205
 Turstone, Ruddy, 49, 72, 218
Tympanuchus c. americanus, 130, 217
Tyrannus tyrannus, 143, 224
Tyrannus t. hespericola, 57
Tyrannus verticalis, 143, 224
Tyrannus vociferans, 144
 Utah, 160, 161, 278-284, 294
Vermivora celata, 149, 229, 273, 291
Vermivora chrysoptera, 80
Vermivora peregrina, 149, 229
Vermivora pinus, 160
Vermivora ruficapilla, 149, 274

- Virco, Plumbeous, 148
 Red-eyed, 149, 229
 Warbling, 229
 Western Warbling, 149
 White-eyed, 107
 Yellow-throated, 229
 Vireo gilvus, 229
 Vireo g. swainsoni, 149
 Vireo olivaceus, 149, 229
 Vireo s. plumbeus, 148
 Virginia, 59, 188, 294
 Vulture, Turkey, 135, 214
 Warbler, Audubon's, 150, 273, 291
 Bay-breasted, 230
 Blackburnian, 229
 Black and White, 149, 229, 273
 Blackpoll, 150, 230
 Black-throated Blue, 130
 Black-throated Green, 272
 Blue-winged, 160
 Canada, 230
 Cape May, 229
 Chestnut-sided, 150, 230
 Golden-winged, 80
 Hooded, 205, 206
 Macgillivray's, 151
 Magnolia, 150, 229
 Myrtle, 150, 164, 229, 273
 Nashville, 149, 274
 Northern Parula, 149
 Northern Pileolated, 151
 Northern Prairie, 205
 Orange-crowned, 149, 229, 273, 291
 Parula, 229
 Pine, 230, 273
 Prairie, 206
 Sennett's, 274
 Sycamore, 205, 273
 Tennessee, 149, 229, 274
 Townsend's, 150
 Western Palm, 150, 164, 230
 Western Yellow, 58
 Yellow, 150, 197, 229, 241, 273
 Waxwing, Bohemian, 148
 Cedar, 148, 228, 290
 West Virginia, 35, 236
 Widgeon, European, 130, 208, 236
 Willet, 49, 138, 220
 Western, 159
 Wilsonia canadensis, 230
 Wilsonia pusilla, 230, 272
 Wilsonia p. pileolata, 151
 Wilson's Snipe, 50, 129, 218, 283
 Wisconsin, 75, 237, 298
 Wolcott, R. H. (sketch and portrait),
 45-49
 Woodcock, 66, 218
 Wood Ibis, 68
 Woodpecker, Alpine Three-toed, 129
 Arctic Three-toed, 205
 Batchelder's, 129, 162, 283
 Downy, 107, 224
 Gila, 289
 Hairy, 107, 224
 Lewis's, 143, 205
 Red-bellied, 107
 Red-headed, 74, 143, 224, 241
 Western Red-headed, 57
 Wood Pewee, 225
 Wood thrush, 107
 Wren, Cactus, 289
 Cañon, 146
 Carolina, 241
 House, 74, 159, 228, 241
 Long-billed Marsh, 3, 228
 Prairie Marsh, 164
 Rock, 146, 205
 Short-billed, 130, 228
 Western House, 146, 162
 Western Marsh, 146
 Western Winter, 146
 Xanthocephalus xanthocephalus, 151,
 232
 Xema sabini, 130
 Yellow-legs, Greater, 50, 52, 66, 138
 Lesser, 50, 52, 67, 138
 Yellow-throat, Northern, 197, 238, 241
 Zenaidura macroura, 159, 222, 236
 Zenaidura m. marginella, 142
 Zonotrichia albicollis, 156, 165, 235
 Zonotrichia leucophrys, 155, 165, 234,
 282, 293
 Zonotrichia l. gambeli, 156, 282
 Zonotrichia querula, 155, 234




Our Library

The Wilson Ornithological Research Library at Ann Arbor is about to complete its fifth year of existence in the Museum of Zoology of the University of Michigan. It has grown steadily and should continue to do so. Publications on ornithology, and the allied subjects of ecology, anatomy, exploration, travel, etc., are desired. The following types of publications are suggested as especially desirable:

- Single volumes, bound or unbound
- Magazines, sets, volumes and numbers, foreign or domestic
- Authors' reprints
- Maps
- Reports and journals of explorations
- Biographies
- Bibliographies, printed and manuscript
- State natural history and geological surveys
- Proceedings or transactions of state scientific societies
- Manuscript notebooks
- Original paintings or drawings of birds
- Photographs of birds, nests, eggs, habitats, etc.
- Portraits of ornithologists

All portraits and photographs should be accompanied with full identifying data. Authors are requested to deposit a set of reprints of their publications. Members who wish to bequeath their libraries are invited to correspond with the officers of the Club. All gifts should be addressed to:

THE W. O. C. ORNITHOLOGICAL LIBRARY
Museum of Zoology,
ANN ARBOR, MICHIGAN



Dues for 1936

ANNUAL DUES FOR 1936 ARE NOW PAYABLE

This is the Treasurer's first notice to all members that dues for 1936 are now due and payable to the Treasurer

**Mr. W. M. Rosene,
Ogden, Iowa**

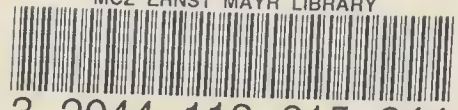
You are earnestly requested to remit at your earliest convenience, thus saving postage to the Club and much time to the Treasurer. A receipt will be returned only if requested.

Life Members	\$100.00
Sustaining Members	\$5.00 Annually
Active Members	\$2.50 Annually
Associate Members	\$1.50 Annually

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

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

MCZ ERNST MAYR LIBRARY



3 2044 118 615 244

