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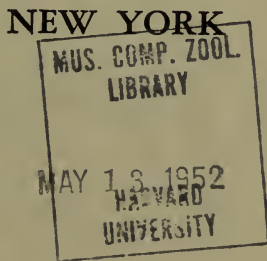
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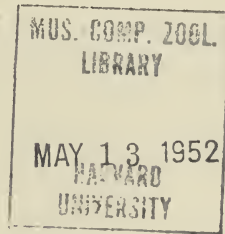
For the Five Years Ending
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Territorial Behavior in the Eastern Robin *

HOWARD YOUNG

Studies of territorial behavior, especially among the birds, stem mainly from 1920, when Elliot Howard published, in England, his *Territory in Bird Life*. In this book he outlined the essential characteristics of territorial behavior, which, with some modifications, are generally accepted today. According to Howard, territorial birds could be recognized by the following criteria:

1. The males isolated themselves in spring.
2. They restricted themselves to a well delineated area.
3. They were intolerant of intrusions upon this area by other birds, especially males of the same species, and attempted to drive them off.
4. They proclaimed their possession of the territory through loud song, which supposedly repelled other males, while at the same time attracting females.

Prior to Howard (according to Nice, 1941), the theory had been expressed in essentially the same manner by Moffat (1903), Altum (1868), and in vague form as early as 1622. Moffat (op. cit., 155), for example, wrote as follows:

Birds may, or may not, realise the importance of protecting their future families against the ills of congestion; but they certainly seem to have an instinctive feeling that the patch of ground on which a pair is nesting belongs to that pair, and that no other pair of the same species of bird has any right to attempt to nest upon it.

These predecessors of Howard's generally suffered the Mendelian fate of obscurity; except for Altum's recognition in Germany they were commonly ignored, and the territorial concept did not achieve prominence in ornithology until Howard's publication. Altum is now generally credited with being the first to adequately express the theory.

Following the appearance of *Territory in Bird Life*, the study was pursued most vigorously in Europe. Major contributions on territory appeared by Howard (1929), Meise (1930, 1936), Palmgren (1932), D. and L. Lack (1933), D. Lack (1935, 1940, 1943), Huxley (1934), Venables (1934), Tinbergen (1935, 1936, 1939), and Siivonen (1939). The most prominent investigators in the United States have been Nice

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(1933, 1937, 1941), Mayr (1935), the Micheners (1935), and Noble (1939).

With the exception of Lack's (1943) work, territorial studies have been mainly observational, with little use of quantitative or experimental approaches. Disagreements as to the definition of territory and its functions have been frequent and still exist. The study rests, *ab initio*, on a quicksand foundation; a poorly defined theory to explain behavior of an unknown function.

Purpose of the Study

Since most studies have generally corroborated Howard's main thesis, the theory has found widespread acceptance. The last major study to appear was that of Lack's (1943) on the English Robin, *Eritheca rubecula*, and there seems to have been a tendency in recent years to consider the entire question a dead issue, to be filed away as completed business.

However, the paucity of quantitative data on various aspects of territorial behavior, and the lack of agreement among leading authorities as to its definition or function, indicates that an intensive re-examination of the subject could be of value. One purpose of this study, then, is to bring the problem of territorial behavior into more critical consideration, and to test mathematically some of its major premises, as they apply to one species, the Eastern Robin, *Turdus migratorius*.

The Main Definitions of Territory

It is quite apparent that many of the researchers in this field were strongly influenced by the behavior of the particular species under investigation. As a result, their definitions of territory show considerable variation. The following, which are among those most widely quoted, are listed as examples:

Tinbergen (1939): . . . an area that is defended by a fighting bird against individuals of the same species and sex shortly before and during the formation of a sexual bond.

Mayr (op. cit.): Territory is an area occupied by one male of a species which it defends against intrusions by other males of the same species and in which it makes itself conspicuous.

Noble (op. cit.): . . . territory is any defended area . . .

The difficulty of trying to generalize a theory of territoriality to fit all species of birds is shown by the fact that Tinbergen's definition does not apply to the English Robin (Lack, 1943), Mockingbird, *Mimus poly-*

glottus, (Michener & Michener 1935), or other species in which the territory is maintained beyond the mating period. Mayr's definition does not adequately describe the behavior of the English Blackbird, *Turdus merula*, (Lack & Light 1941), the Eastern Robin (Schantz 1939), or a number of other species in which territorial behavior on the part of the female has been demonstrated. Noble's definition, while one of the best generalizations, is extremely inclusive, perhaps to the extent of lessening its value. Many ornithologists would not agree that the defense of a nest site is territorial behavior.

Other definitions have been advanced by Crawford (1939) and Meise (1936). The entire subject has been exhaustively reviewed by Meise (1930, 1936), the Lacks (1933), Mayr (1935), and Nice (1933, 1941).

The Functions of Territory

Since there is much confusion as to what constitutes territory, there is an equal amount of disagreement over its function. Altum (1868), Howard (1920), and Meise (1936) claimed that one of its chief purposes was to insure an adequate food supply after the young birds hatch. Moffat (1903) believed that it introduced a certain orderliness into the spring activities of mating and nesting, without which there might be a mad scramble for mates, and possibly a disadvantageous distribution of the breeding population.

Lack (1935) severely criticized the food-shortage theory, and advanced several examples which tend to confound it. He pointed out that many species of precocial birds desert their territories shortly after the young hatch, at the very time when the greatest amount of food is needed. Nice (1941) accepted the possibility of some benefit regarding the insuring of a food supply, but considered the chief function that of allowing the reproductive activities to proceed unmolested by competitors for the mate or nesting site. Collias (1944) provides several examples to support her view, pointing out that laboratory animals tend to interfere with each other's reproductive attempts unless separated by pairs. Tavistock (1931) stated quite categorically that the purpose of territories was to spread the nesters evenly and thus minimize the dangers of epidemics, which otherwise might soon decimate their numbers, a theory that founders on those very rocks which support such huge concentrations of sea birds.

The establishment of a territory is not a purposeful act on the part of the bird, but rather a symptom of its inherent traits for reacting to a given set of conditions; a reflection of its attachment to a certain area and its intolerance of other individuals. The biological significance of these traits is still a matter of dispute.

The Species

The Robin, *Turdus migratorius*, is probably the most familiar bird and is certainly the best known thrush of all North America. It ranges over the entire United States and has developed into several races, of which the type form, *T. m. migratorius*, is the one considered in this study.

Such a common form has naturally been the subject of much observation. There are innumerable short notes on its nesting, food habits, behavior, etc., and a considerable number of more intensive studies. Among the more important of these are those by Schantz (1939), Speirs (1946), Howell (1942), and Farner (1949). However, none of these have concentrated on its territorial behavior.

In order to get an adequate amount of data with reasonable speed and accuracy there are certain essential requirements in a species, and these the Robin filled admirably. First, it is a species which can be recognized at sight; the sexes can be quite accurately differentiated, and the adults and immatures can be readily differentiated. Its abundance insured the gathering of statistically respectable figures on the activities examined. The large conspicuous nests and the multiple broods raised simplified the gathering of information on the nesting cycle and on nesting success. Finally, its tameness allowed close observation, and its striking aggressiveness in spring seemed to indicate the probability of a strong territorial instinct; an assumption, however, which appears to have been verified only in part.

The Study Area

Most of the work was done in a small park-like area near Ho-Nee-Um Pond, in the University of Wisconsin Arboretum, at Madison, Wisconsin. The area was chosen because it represented excellent Robin habitat, i.e., an interspersed lawn and cover, with a readily accessible water supply. Numerous berry bushes, gardens, and fruit trees in the neighborhood further increased its desirability, and helped to maintain a strong population. In addition to these factors, this particular area was chosen because it was easily available, and could be visited daily.

The Ho-Nee-Um Pond area (Figure 1) is a low-lying park on the northwest shore of Lake Wingra. It is roughly trapezoidal in shape, and has an area of 5.2 acres. The two main plant communities are a mowed lawn of blue grass, *Poa spp.*, covering about 40% of the total area, and numerous plantings of closely spaced arbor vitae, *Thuja occidentalis*, covering about 26% of the total area. These plantings are arranged in irregular patterns, making for extensive (about 5000 feet) environmental edge with the grass area. The trees vary in height from 5 to 30 feet, with an average of about 15 feet. The ground cover under the plantings is mainly

blue grass, nettle, *Urtica sp.*, thistle, *Cirsium sp.*, and burdock, *Arctium sp.* There is a thick clump of black willow saplings, *Salix nigra*, in the southeast corner of the area, and near these is a small swampy pond of approximately .3 acres, thickly grown to sedge, *Carex sp.*, with a few tufts of cat-tail, *Typha latifolia*, and reed-grass, *Phragmites communis*. Scattered about the area are small clumps of red-osier dogwood, *Cornus stolonifera*, staghorn sumac, *Rhus typhina*, ninebark, *Physocarpus opulifolia*, elderberry, *Sambucus canadensis*, and white birch, *Betula alba*.

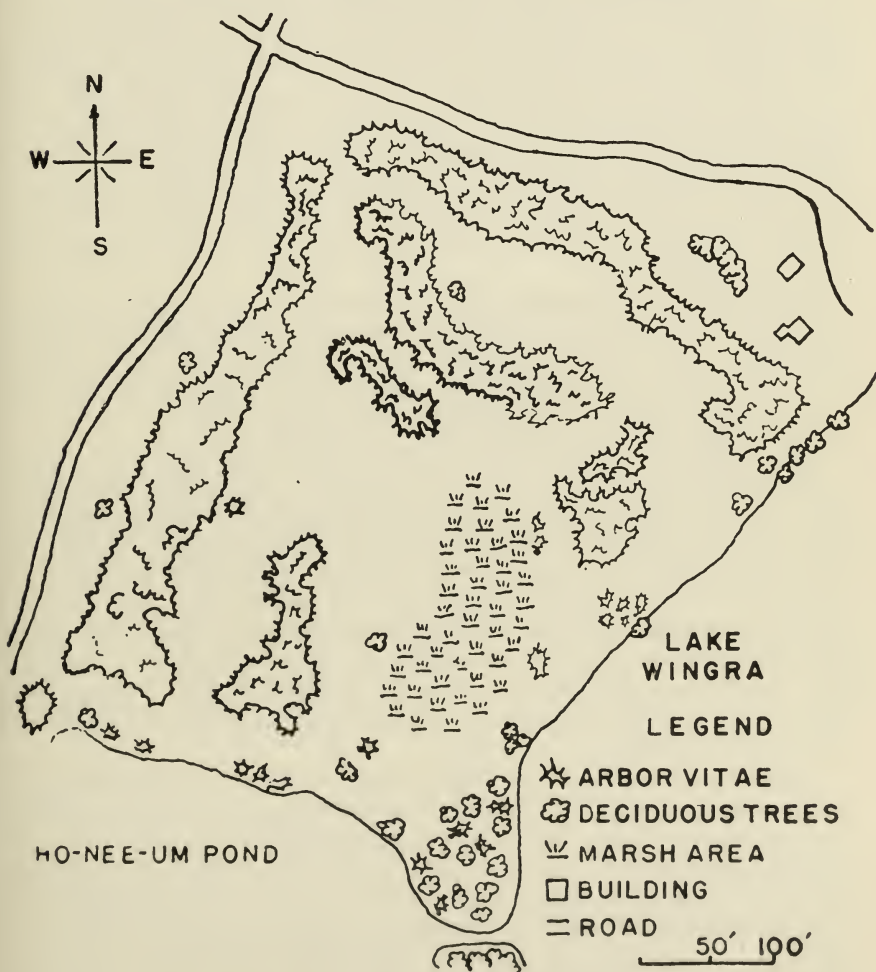


Figure 1. Ho-Nee-Um Pond Area and Vicinity.

Techniques

The essential techniques of the study were to trap and individually mark the Robins, and then to observe their movements and behavior.

The birds were marked with the regulation U. S. government leg band (#2), with a colored celluloid band above it, and with two (of five: white, red, yellow, green, blue) colored celluloid bands on the opposite leg. Each banded bird was impinged with correspondingly colored feathers, the system being generally that described by Wright (1939). For example, one Robin was marked on the left leg with a white band over a red band, and on the right leg with a blue band over a government band. This bird was then tail-marked white on the left and red on the right; the left tail feather corresponding to the top of the two color bands, and the right hand feather to the bottom color band. Slight shifts in position, width or length of the marker made it possible to identify those individuals in which the tail color combination was duplicated. All birds were given specific designations for field note reference as they were successively trapped and marked—males being listed as M 1, M 4, etc., females as 1 F, 9 F, etc.

Individually marking the birds was essential for accurate field study. Observations on territory and behavior were restricted to marked birds, so that the status and relationships of the individual under observation were always known. A total of 204 Robins was marked at Ho-Nee-Um in this manner during the three years of the study.

In the course of the field work any activity of interest was immediately written down, and the date, time, location and birds involved were noted. These field notes were then consolidated on a weekly map, which gave a graphic picture of Robin activity for that period. A portion of such a map, simplified for purposes of clarity, is presented as Figure 2. A map was always carried in the field, and by means of the gridding system it was possible to indicate closely the location of important activity. In Figure 2, for example, it can be seen that the nest of Mu is located in R-2, and that on 4/26/49, Mu was chased by M 23 in O 2. As observations of this sort accumulated, it was possible to determine the extent of each bird's territory.

Figure 3 shows some movements of another Robin, M 16 (1948), in relation to his territory. The dots represent the various places which M 16 was seen to visit. The territory boundaries were approximated by drawing a line about the clustered dots, leaving those outside to represent the number and extent of excursions. With a species such as the Robin, it appears that this is about as accurate an approximation of territorial boundaries as can be made. Another factor considered, which cannot be shown on the map, was the duration of stay at any one point. The birds spend the great majority of the time within the boundaries as here drawn;

visits outside of the territory are fairly frequent, but of short duration. Speirs (1946) spent 60 minutes watching a single male Robin and reported that it spent 52 of these 60 minutes within 150 yards of its nest. Any line drawn to represent a territory boundary is, of course, arbitrary, and merely for purposes of study. Howard (1920) is very clear on this point:

The boundary that separates two adjoining territories is by no means a definite line, but rather a fluid area . . .

"A fluid area" cannot be accurately depicted on a map, and the territorial maps used in this study were prepared in the manner illustrated by Figures 2 and 3.

The birds were trapped by means of wire Potter-type traps, variously baited with bread, water, cherries and other fruit, and string. The Robins were hard to trap and in many instances had been on their territories for several weeks before they were marked.

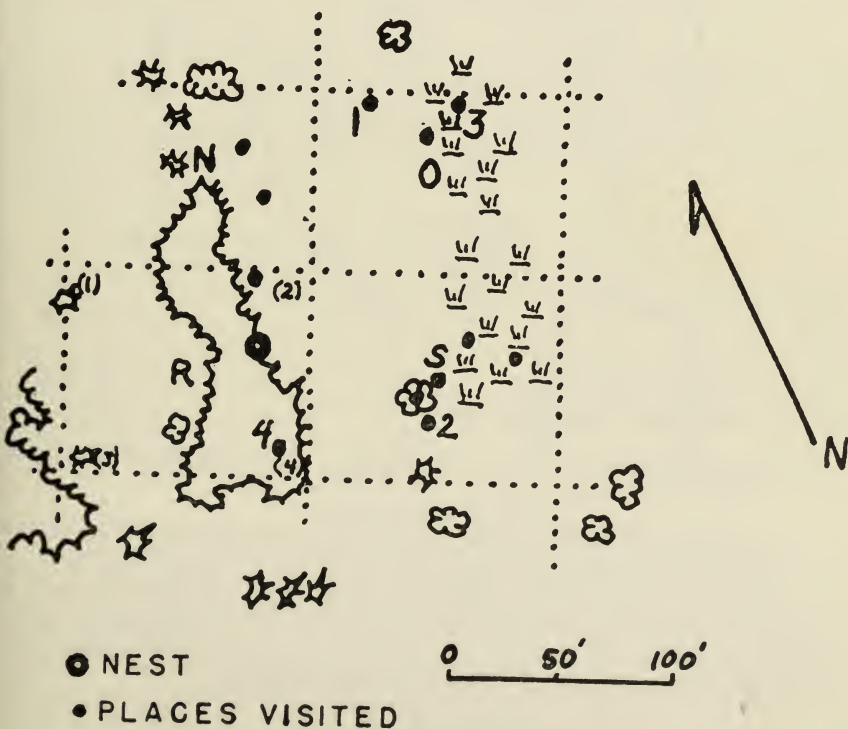


Figure 2. Portion of field-note map, showing activities of Mu, 4/25/49-5/1/49. 1. Chased M 12 4/25; 2. Chased M 12 4/25; 3. Chased by M 23 4/26; 4. Chased 12 F 4/28.

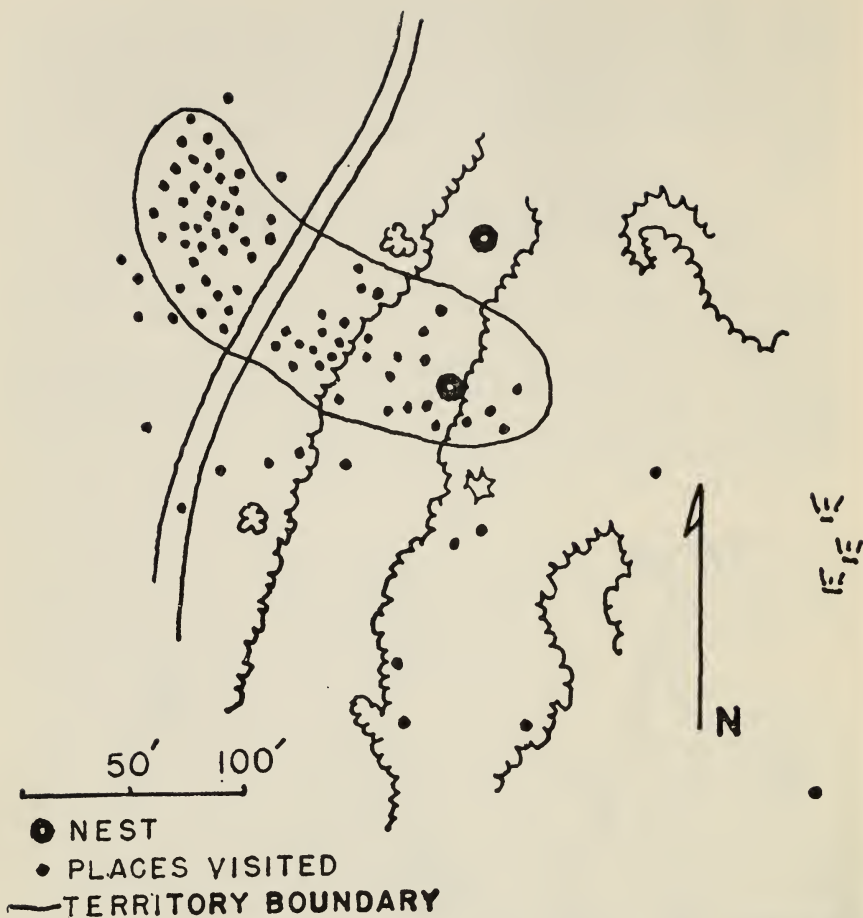


Figure 3. Movements of M 16 4/5-5/21/48. Nest to north of territory is that of neighborhood pair.

Models and stuffed dummies were used at various times in an attempt to precipitate behavior according to the system used by Lack (1943).

Observations were made with 8 or 10 power binoculars usually at a distance of less than 150 feet. The study area was visited almost daily during the spring and summer of each of the three years (1947-1949). The average duration of each visit was about 3 hours.

Acknowledgments

The study was done under the supervision of Professor John T. Em- len Jr., whose stimulating guidance and critical appraisals were inval-

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Territorial Behavior

The Robin may be considered as territorial according to the general description given by Howard (1920), but there are certain deviations of its behavior from the typical pattern which must be considered. These will be discussed as they subsequently appear in the following material.

The somewhat disordered status of research on the subject of territory results in a perplexing problem of presentation for any new worker. However, since the spring behavior of this species is sequential, and each new activity offers more information as to the *modus vivendi*, a chronological discussion seems most logical. For purposes of quick reference, the spring phenology of the Robin, during the three years of the study, has been assembled in Table 1.

Leopold and Jones (1947) give a ten-year average of March 7th as the arrival date for the Robin in Dane County, Wisconsin, which includes the site of this study. Examination of Table 1 shows that the seasons studied were slightly later than the average, but that there were no major differences among them.

Table 1

SPRING PHENOLOGY FOR THE ROBIN AT MADISON, WIS.

Activity	Earliest Dates			Ave.
	1947	1948	1949	
First Males Arrive	3/10	3/13	3/11	3/11
First Song	3/23	3/16	3/22	3/20
First Combat	3/28	3/21	3/23	3/24
First Females Arrive	3/30	3/21	3/26	3/26
First Nesting Starts	4/8	4/8	4/2	4/6

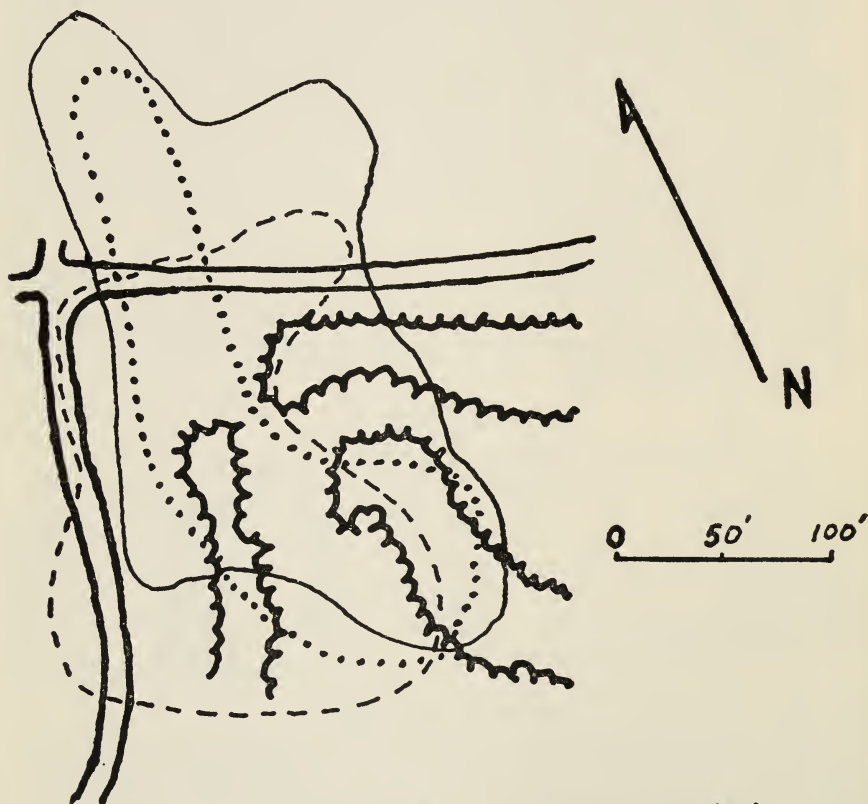
Arrival of the Males

The first males arrived at Ho-Nee-Um about the second week of March, but Robins were not present there in numbers until about a week later. In 1948 and 1949, males which had been banded in previous years were seen among the first arrivals. The same early arrival of residents had been previously noted by Howell (1940). However, some of the Ho-Nee-Um residents returned considerably later, indicating a variation in individual migration habits. Nice (1937) found a similar situation in the Song Sparrow, *Melospiza melodia*. Some of the female Robins arrive be-

fore all the resident males are present and in 1949 the third marked bird seen, arriving on the 6th day after migrants had first appeared, was a female, 24 F. Speirs (1946) has an extensive discussion of the migrational movements of the Robin; he found that each wave of arrivals was composed of some residents and some transients.

Establishment of the Territory

When the male Robins arrive, they tend to wander over a larger region than they will later claim. The large size of the area used in the



3/21-4/4 — .75 acres (56 obs.)
 4/5-4/19 ---- .45 acres (68 obs.)
 4/20-5/330 acres (68 obs.)

Figure 4. Area claimed by M1—1948.

early season may be due to a lack of pressure from other birds, the necessity of foraging more widely for food, or both. Howard (1920) described such behavior as the usual pattern for territorial species, and in the case of the Robin it seems to be quite common. A typical example, the contraction of M 1 territory (1948) is shown in Figure 4.

Concurrent with this restriction of movement is the development of intolerance towards other Robins. Up to this point their spring behavior has followed the classic style; the males tend to isolate themselves, and to confine their activities within certain regions. But the traditional descriptions of territory then break down when applied to this species. In the first place the isolation is not complete—adjoining males may share certain portions of their territories; and in the second place the confinement is not total, the birds frequently invading their neighbor's land, and sometimes moving on extensive flights. Such behavior is not because of the gradual unfolding of temporarily dormant behavior patterns, but is characteristic of the entire breeding season.

Moreover, with the appearance of intolerance and the fighting reaction, greater deviations from the accepted concepts of territorial behavior become apparent. Robins may be very aggressive far beyond their territorial boundaries, and at other times may tolerate frequent and lengthy invasions of their headquarters. This subject will be considered at length under the section on Territorial Fighting.

Still, the intolerance is present to a marked degree, and the innumerable tangles of bickering Robins are a conspicuous sight in the early Wisconsin spring. As in humans, a great deal of bluff is used, and a majority of the disputes are settled without serious struggle. Many threat postures used are quite stereotyped, and can be easily recognized in the field. Those sketched in Figure 5 are discussed below:

1. "Tail Lift"—The lifting of the tail has been noted in many cases preceding attack, and seems quite definitely to serve as a threat. In this posture the head is depressed, and the rump elevated, with the tail held stiffly upward at about a 45 degree angle. Often the bird will run for short distances while maintaining this pose. Only one reference was found which described similar threat posturing, that of Nichols (1940) for the Western Sandpiper, *Ereunetes mauri*.

2. "Crouch"—Crouching is often resorted to on the approach of a strange Robin, and is commonly followed by aggressive behavior. Brown (1937) says an English Blackbird he was studying frequently crouched before attacking its image in a mirror, and Schantz (op. cit.) describes a female Robin crouching in a threatening manner when approached by another.

3. "Attack Run"—The attack run consists of a sudden dash towards the adversary, most often with the head lowered. Ordinarily it succeeds in routing the enemy; if not, it is usually followed by combat.

4. "Normal Posture"—Aggressive behavior is sometimes launched from a normal resting position, omitting the intermediate threat poses. It is shown in Figure 5 to emphasize the postural modifications assumed by a displaying bird.

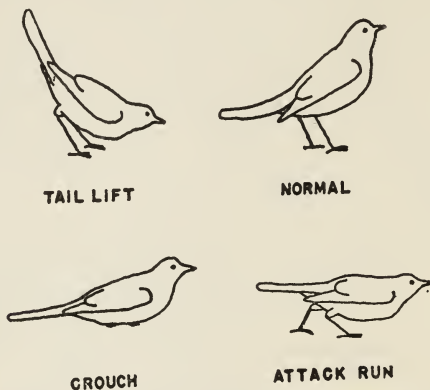


Figure 5. Threat postures of the Robin.

In addition to those shown in Figure 5, there appear to be two other methods of intimidation:

1. "Attack Flight"—When flying to attack another Robin, it appears that the wing movement is slower than usual, making the bird appear heavy, and the flight labored. Howell (1942) noticed the labored flight of Robins defending their nests against his intrusions. This type of display is not as distinctive as the others, and cannot always be distinguished.

2. "Pushing"—An example of this behavior is diagrammed in Figure 6. It consists of an approach by a defending Robin, either by flying, or on the ground, towards an intruder. The defender stops a short distance away, then after a pause of varying length, the intruder is approached again, and usually retreats. The approach may be rapid or slow, and is often intermittent, and very casual in appearance. At times the birds may make nervous feeding movements, and "watchfully ignore" each other in the manner of two strange dogs meeting. If the intruder does not re-

treat, the pushing ends either in attack, or by the defending Robin's wandering off. It seems to be one of the commonest methods of territorial defense in this species. Morley (1937) indicates that similar behavior occurs in *T. merula*. He says that intimidation is by approach; proximity is feared.

Much work has been done on the significance of plumage coloration in respect to mating ceremonies and sexual rivalries. Armstrong (1947) and Tinbergen (1948) have shown that in many species certain color areas are particularly displayed as a threat. Moffat (op. cit.) recognized this fact much earlier when he wrote:

The Robin, (*E. rubecula*) so faces his opponent as to make the fullest possible display of his red front; the cock Golden-crested Wren (*Regulus satrapa*) lowers its head like a bull, and flashes its crest right in the enemy's face.

Lack (1943) verified the threat function of the red color on the breast of *E. rubecula* by careful experiments, in some cases succeeding in drawing attack to a mere bunch of red feathers. The English Robin has a similar color pattern to *T. migratorius*, which adds interest to the fact that the red breast is depressed in the displays of the American bird.

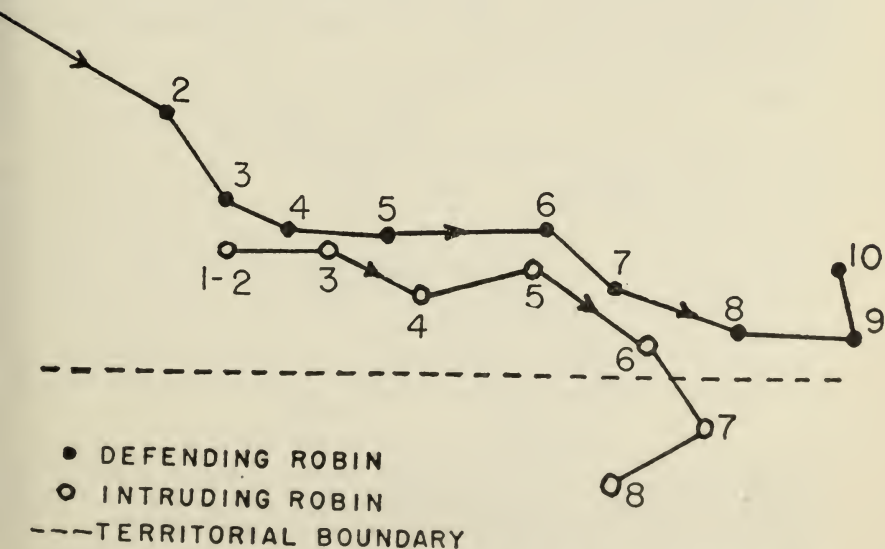


Figure 6. Territorial defense by "Pushing". The numerals show the relative positions of the two birds at consecutive intervals at the end of each run.

This, plus the fact that display is often languid, or completely omitted, suggests that it is not highly evolved in the latter.

Nevertheless, most threats are efficient; the majority of the encounters end without combat as one or the other of the disputants is intimidated and retreats. The victor sometimes follows up his advantage by pursuit, and wild twisting chases may often be seen. This frequently attracts other Robins which hurry to the scene, and a disorganized brawl, containing several birds not involved in the original incident, ensues.

In addition to the threat postures, there are certain stereotyped avoiding reactions. In one of these, the attacked bird eludes the aggressor by towering straight up, and landing again in almost the same place after the other one has passed. Another common maneuver is to flit away in a short, tight circle, landing again near the original place.

Combat in the Robin is sometimes quite spectacular. Figure 7 shows some typical attitudes observed in fights, and is an attempt to catch the spirit of these engagements. In fighting, the birds strike each other mainly with the beak. However, a male (M 13) closely watched while attacking a dummy, was clearly seen to rake its back with his claws as he swooped low over it. His repeated attacks in this fashion shortly removed a patch of skin about 1 inch square from the back of the dummy. Brown (1937) says that the English Blackbird attacks with beak and claw, mainly beak. At times the Robins appear to buffet each other with their wings, but it is hard to say whether this is purposeful, or merely results from close quarters. These fights are typically silent, but occasional snatches of "whisper song" (see later) may be heard, and the



Figure 7. Combat.

loser sometimes flies off with the alarm notes. They are of short duration, and no cases of actual injury from them were noted.

Song

Only male Robins were observed to sing. The loud carolling song may be a declaration of territory, or an advertisement for a mate, or both (as traditionally described for most bird song, e.g., Tinbergen 1939, Armstrong op. cit., Nice 1933). It is hard to associate it definitely with either function in the case of the species under study, since it is heard prior to the development of any intolerance (Table 1) and is maintained throughout the breeding season by at least some of the mated birds.

Lack and Light (1941) found song to be only "vaguely correlated" with mating and territory in the European Blackbird, and Heyder (1931) wrote of "song lazy" Blackbirds which successfully established territories and bred. The same would apply to the Robin; generally speaking they seemed able to maintain their territories with very little recourse to advertising song. In one case, however, the territory of M 1 (1948) was invaded in April, apparently by a mated pair. The male of this invading pair sang the loud carolling song frequently, and engaged in numerous quarrels with M 1, until he succeeded in permanently usurping a portion of the territory. No "song duels" were ever recorded between males. Siivonen (1939) however, has recorded this for the *Turdidae*, describing a song duel between two Song Thrushes, *Turdus ericetorum*, one of which tried to conquer part of the other's territory.

At various times the males were noted to sing a sibilant "whisper song," which was similar in form to the usual carol, but pitched higher, sung faster, and not as loud. Howell (1942) considered this very important in courtship behavior.

Observations made during this study suggest that the whisper song functions primarily as a threat. Usually only males were present when the song was heard, and in the cases where females were present, male behavior seemed to be aggressive rather than amorous. As previously mentioned, Robins occasionally sang the whisper song during combat. Brooks-King (1942) and Hillstead (1944) ascribe a threat function to the "sub-song" of the closely related English Blackbird. The possibility remains that this "whisper song" of the Robin is indicative of excitement and would occasionally be heard both during courtship and combat.

Description of Robin Territories

The following list of characteristics outlines the most important features of Robin territory as determined by field observations in this study:

1. The territory is established by the male. The males definitely precede the females in migration (Table 1). Upon their ar-

rival the resident males quickly settle down and start to establish their territories. Combat can be seen prior to the arrival of the females, indicating that the fighting is, at least sometimes, over the area rather than concerning a mate. The females then come and pair with the territorial males. No case was observed of a female establishing a territory by herself.

2. Territory defense is by both sexes, against both sexes. Both males and females were seen fighting trespassers. Intersexual fighting was common. In other birds, active participation in defense by the female has been mentioned by Howard (1920) for various species, by Drum (1939) for the Eastern Goldfinch, *Spinus tristis*, and by Lack and Light (1941) for the European Blackbird, so it is strange that the widespread opinion still exists that territorial fighting is strictly a male function. In many species the strife appears to be strictly intrasexual (Tinbergen 1939), but intersexual combat has been previously recorded for *T. migratorius* (Schantz 1939), and also for *T. merula* (Lack and Light, op. cit.).

3. The nest is within the territory. As shown in Figures 8, 9 and 10, no nests were found outside of the territory established by the nesting female's mate.

4. Overlapping of territories is common. Figures 8-10 show the mutually claimed areas where neither of a contesting pair was able to establish dominance. Speirs (1946) illustrates the same thing in his maps of Robin territories.

5. Combats do not necessarily mark the territorial boundaries. Field observations show that the Robins sometimes adopt aggressive roles far outside of their areas, and on other occasions may be attacked by an invader while well within their own territorial boundaries.

6. Being within its own territory does not insure victory for a Robin in combat. A Robin's success is enhanced by its being within its own territory, but battles here are frequently lost. A later section of this paper considers territorial fighting in detail.

7. Many of the marked pairs disappeared after raising one brood. In 1947 one pair (M 10, 6 F) re-nested about $\frac{1}{4}$ mile south of the study area after successfully fledging their first young. Seven individuals returned in 1948 from the 13 marked pairs which left after the first nesting in 1947. Nine failed to return as breeders, though two of the males were seen near the study area. In 1949, one male, M 12, marked in 1947 and never seen in 1948, reappeared and spent the entire breeding season on the area. The data on this point are summarized in Table 2.

Table 2

CHANGING OF TERRITORY BY ROBIN PAIRS

	1947	1948	1949	Total
Left after First Brood	13	7	3	23
Remained for Second Brood	2	6	8	16
Total	15	13	11	39

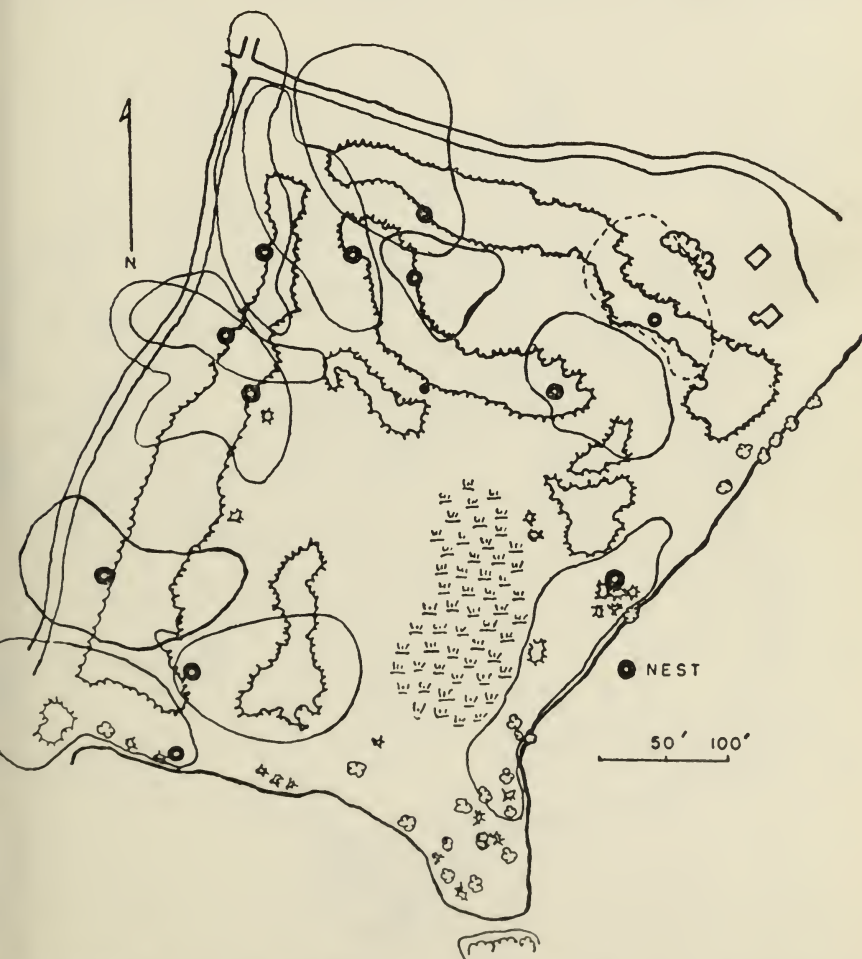


Figure 8. Ho-Nee-Um Robin Territories 5/15-5/19/47. ----- Boundaries not accurately determined.

Figures 8-10 show the pattern of Robin territories at Ho-Nee-Um. It must be understood that they represent activity "frozen in motion" as it were. Since pairs were constantly leaving the area after completion of nesting and new pairs occasionally appeared, it was decided to depict the Robin population for each year at the height of its density. Furthermore, the territories are not static, but subtle changes in size and shape may take place at any time. It has been well said that a territory is "ameboid in shape, and in motion, but without direction." Heyder (1931)



Figure 9. Ho-Nee-Um Robin Territories 5/6-5/8/48.

recognized the same fact in his studies on *T. merula*, and spoke of "labile boundaries."

Overlapping of Territories

It can be seen that Mayr's (1935) definition of territory does not apply, inasmuch as it implies that there is no overlapping of territories, and attributes aggressive behavior to the males only. Robin territories are

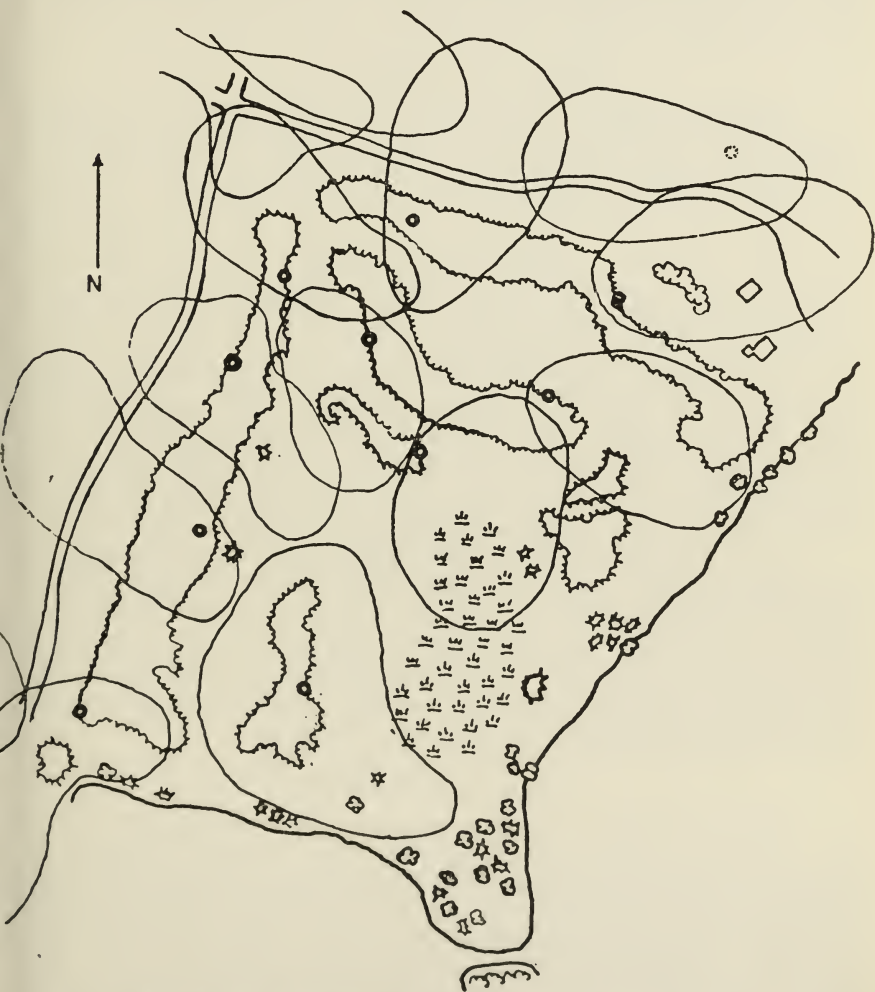


Figure 10. Ho-Nee-Um Robin Territories 5/5-5/7/49.

not unique in respect to overlapping boundaries, since Venables (1934) and Palmgren (1939) have found the same situation under conditions of dense population in the Dartford Warbler, *Sylvia undata dartfordiensis*, and the Chaffinch, *Fringilla coelebs*, respectively. It appears that even during the height of the breeding season at Ho-Nee-Um, there was room for 1 or 2 more territories of average size in every year studied. Portions of the study area not occupied in one year were occupied in other years, with no apparent reason for the change. Despite these unclaimed areas, the overlapping was present in all years.

Maintenance of Territory

The generalization of Tinbergen (1939), that territory is defended shortly before and during the formation of the sexual bond, also fails to completely encompass the behavior, since in the case of the Robin, the territory is maintained long after pairing has been completed. In all cases under observation, the territory was maintained as long as the birds were breeding on the area. Erickson (1938) describes territorial fighting by Wren-Tits, *Chamaea fasciata*, which were feeding young, which furnishes another exception to the definition, and Butts (1927) has previously given a similar description for the Robin.

If the male of a pair is lost during the course of nesting, the female remains with the nest and maintains the territory. This was seen in 1947 for 1 F and in 1949 for 29 F. In the latter case, shortly after 29 F lost her mate, she was joined by M 12, who deserted his female, 30 F. The deserted female, in turn, remained with her nest for several days until it was destroyed by a predator, at which time she disappeared.

In the single case observed where the female alone disappeared (14 F—1948), her mate (M 1) remained on the territory and eventually obtained a new mate. It is worthy of note that though 14 F had been present since at least the 28th of March, she had not yet started to build by the time she disappeared on the 26th of April. M 1 remained on his territory with her despite this lack of breeding. After the disappearance of 14 F, he was remated by at least the 4th of May.

Size of the Territory

The average size of Robin territories studied during the course of this study was .30 acres, as determined by methods previously described. But, as can be seen from Figures 8-10, the territories varied greatly in size, shape, and composition. The smallest territory mapped was about .11 acres, the largest about .60 acres. Lack (1948) noticed an equal variation among territory sizes of *E. rubecula*, the largest being five times as big as the smallest. There are several sets of data available on the size of Robin territories. Weeks (1935) estimated an average terri-

tory of .40 acres by dividing an area by the number of Robin nests it contained. Butts (1927), studying a single pair, found their territory to be slightly in excess of .50 acres. Howell (1942) found territory size varying with population densities; in a well populated area, his territories averaged around .28 acres; in a sparsely populated area they averaged around .51 acres. An indication of this was also noted at Ho-Nee-Um. In 1947, there were 2.3 pairs per acre at the height of the nesting season, and their territories averaged .23 acres in size. In 1948 the density was practically the same, 2.5 pairs per acre, with an average territory of .27 acres, and in 1949, when the density fell to 1.9 pairs per acre, the average size of the territory rose to approximately .48 acres. Drum (1939) found territory size varying with density in the Eastern Goldfinch. Apparently the Robin responds to high population density both by compression of territory size (Figure 4) and by overlapping of boundaries, so that territory in itself perhaps does not exert a strong limiting influence on density.

Successive Territories

In addition to the long movements between broods previously mentioned, successive nesting attempts sometimes resulted in smaller shiftings of territorial boundaries. In Figure 11, the changes in size and shape of the claimed area is shown for one pair (M 25 and 34 F) which made five nesting attempts on the area during 1949. While M 25 tended perhaps to move a little more widely than 34 F, the areas frequented by the two show close agreement, indicating that they tended to be restricted by the same boundaries. For the most part, birds which remained on the area for the entire season did not greatly alter their boundaries.

The reappearance of adults banded in previous years demonstrated a strong tendency to return to practically the identical territory, especially among the males. Figures 12 and 13 show the territories occupied by several birds in successive years. In the case of M 11, about 75% of all the observations (about 500) during the entire 3 years, fell within an area of .50 acres. This habit has long been well known to ornithologists, and has been previously described for the Robin by Laskey (1946), Knight (1940) and Wright (1918).

Role of the Territory

Close similarity of habits between the English Blackbird and our Robin is again shown by Kluyver's (1946) analysis of territorial requirements for the former. He found that the essential components were shrubs for nesting and shelter, and open areas for feeding. These are the two main requirements for Robin territory also. At Ho-Nee-Um, an average of about 20% of the territory was composed of shelter areas, and



- NESTS
- 4/22 - 5/5
 - 5/5 - 5/18
 - ▲ 5/19 - 6/1
 - ⊕ 6/2 - 6/10
 - ✱ 6/10 - 7/15

- TERRITORIES
- I 4/25 - 5/8
 - II 5/9 - 6/5
 - III 6/6 - 7/31

M 25 ●
34 F ○

50' 100'

Figure 11. Consecutive Territories occupied by a mated pair (M 25 and 34 F) of Robins, 1949.

the remainder was feeding ground. This varied from 4% up to 42% and showed no apparent correlation with territory size. The territory serves the Robin as a mating and nesting area, and most of the foraging for food is done within its boundaries. Accordingly, Robin territories fit best



Figure 12. Territories of Ho-Nee-Um Robins in Successive Years. (See Figure 13 for 9 F 1949.)

in Type A (Mating, Nesting, and Feeding Ground for Young) of Nice's (1941) classification. Since the males establish themselves on the territories as a first step towards mating, it appears that this is one of its significant functions. The suggestion of Burt (1940) that the familiarity gained with the area increases security from predators, would also seem to apply.

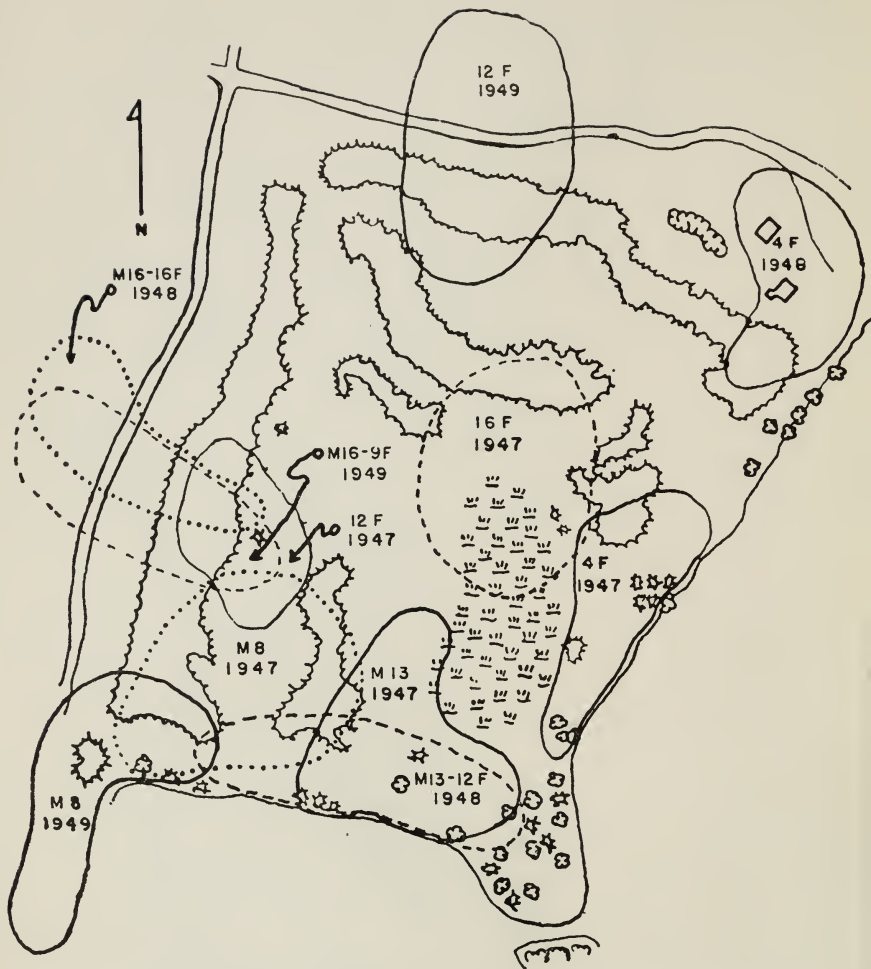


Figure 13. Territories of Ho-Nee-Um Robins in Successive Years.

Discussion

Nice (1933), in a widely quoted work, sets up 4 criteria for the recognition of territories. These are: a. Isolation, b. Advertisement, c. Fixation, d. Intolerance. "When these four aspects are not present, the bird does not truly hold territory." The Robin qualifies fairly well under the first and last of her qualifications, but poorly under the other two. Nevertheless, as has been previously indicated, it appears that the Robin

can best be described as a territorial species. The genus *Turdus* seems to have been rather a question mark in this regard. In his study of the English Blackbird, Hillstead (1944) used the term "sphere of influence," and Colquhoun (1940) said that the Blackbird and the Song Thrush, *T. ericetorum*, lacked a strict territorial sense. However, Lack and Light (1941) refer to the "territory" of the Blackbird, as does Heyder (1931), and the term has been frequently applied in the past to the Robin.

The facts that Robins show restricted movement, that they have at least some intolerance, and that they often return to the identical nook year after year, all support the view that Robins should be considered as a territorial species. Variation being one of the characteristics of all life, attempts to define territory according to rigid rules will always be embarrassed by a wealth of exceptions and border-line cases. At least until many more species have been studied in thorough fashion, the subject can probably best be discussed in detail from the standpoint of a single species, and any general definition should have boundaries as labile as the behavior it describes.

Considering birds as a group, the degree of territorial behavior might well be eventually plotted on a distribution curve. Jourdain (1921) expressed the same idea when he wrote:

. . . in some groups all individuals of the same species are rigidly driven off the whole territory. In others the idea is only present in rudimentary form, and in a third class the association is of the closest kind and individual territory is unknown.

Having demonstrated the dangers of attempting to define territory, there remains only the task of adding one more definition, which is given below, with the understanding, however, that it is meant to apply only to the Robin:

The territory is an area about the nest, in which the pair spend the greater part of their time, which they defend, and to which they persistently return.

Territorial Fighting

The spring belligerency of birds has long attracted the interests of naturalists. Darwin (1859) attributed it to sexual jealousy, and believed that the stronger male would win the mate, thereby strengthening the race through sexual selection. This explanation has lost favor with the acceptance of the territory theory, but has found support as late as 1934 (Allen).

Howard (1920) and Moffat (1903) both emphasized strongly that

the fighting between birds was over possession of an area, rather than over a female, and their concept has been widely supported by more recent research. In the Robin, the males fight before the arrival of the females. Although aggressiveness greatly decreases as the season progresses, mated birds still fight, and it does not seem reasonable to assume that this is to defend the mate, or to gain additional mates, since trespassing Robins of opposite sex are also driven from the territories.

One of the main conclusions usually drawn from a study of territorial fighting has been that the established bird is almost invariably successful in repelling intruders, and it has been postulated (Howard and Emlen 1942; Shoemaker 1939; Nice 1941) that this is due to a psychological advantage gained by familiarity with home grounds.

In this study, an attempt was made to measure the efficiency of territory defense by noting the location, date, results and, if possible, the sexes and individuals involved in each contact between Robins. These measurements are not as precise as might be desired, nor as objective. In each case the observer had to make a decision as to whether a contact occurred inside or outside of a somewhat arbitrarily plotted territory boundary. Secondly, decisions had to be made as to the sex of unmarked individuals, and finally, there was always the possibility of incorrectly reading the markers of a tagged individual.

The first source of error was controlled so far as possible by tabulating all contacts where the boundary was doubtful under "Unknown Location." The second source of error is believed to be small, judging from further observations of birds sexed when originally marked. It was found necessary to change the original sex designation on only 3 of the 75 adults color-banded. The last source is probably of no significance, since considerable caution was used, the birds were conspicuously marked, and the observer was familiar with them through many days of observation. No records are included in the tabulations for cases in which the identity of the birds was doubtful.

Effect of Territorial Position

Table 3 compares the success of Robins fighting in their own territories, in opponent's territories, and in localities of unknown territorial status. The table was compiled by a system of double entries, e.g., if a female successfully invaded the territory of a male, the encounter was recorded as *Won in Opponent Territory* under the *Females* column, and *Lost in Own Territory* under the *Males* column. Since there is a defeat recorded for every victory recorded, it is to be expected that the average of victories in the total will be fifty percent. However, the records of birds of unknown sex is not included in the table, although fights against

them were used in the calculations, so the average of victories in the grand total does not quite equal fifty per cent. When the records of both sexes from all localities are combined in the total, a 52% victory record is shown, which does not vary significantly from the expected 50% when tested by the Chi-Square method. This indicates that the use of fights against birds of unknown sex (about 25% of the total) in these calculations has not appreciably distorted the data.

Table 3
TERRITORIAL CONTACTS—PERCENT WON

LOCATION RE TERRITORY	MALES	FEMALES	TOTAL
IN OWN TERRITORY	68 <small>a 18.86**</small> <small>b 149</small>	73 <small>10.18**</small> <small>52</small>	69 <small>28.80**</small> <small>c 201</small>
IN OPPONENT TERRITORY	44 <small>1.23</small> <small>117</small>	19 <small>20.16**</small> <small>54</small>	36 <small>12.38**</small> <small>d 171</small>
UNKNOWN	52 <small>.128</small> <small>196</small>	37 <small>3.24</small> <small>52</small>	48 <small>1.98</small> <small>248</small>
TOTAL	55 <small>4.78*</small> <small>462</small>	42 <small>3.96*</small> <small>158</small>	52 <small>.854</small> <small>620</small>

a - Chi Square Value

b - No. of observations

c - Including ignored birds (66), 52% of intruders evicted

d - Including ignored birds (63), 47% of intruders evicted

When a contact occurred within territory boundaries, it was recorded as a victory for the home bird only if it succeeded in driving the opponent beyond the territorial boundaries. In contacts not within territorial boundaries, a victory was recorded for the bird which forced the other to flee.

If no advantage accrued from fighting within home territory, or if there were no disadvantages in fighting in an opponent's territory, it would be expected that the accumulation of data as described above also would tend to average out at fifty per cent in all cases. However, it can be clearly seen that both males and females won a majority of the encounters within their territories (males 68%, females 73%), and testing of this by the Chi-Square method shows a highly significant variation from the expected fifty per cent.

Both sexes suffered many more defeats when encroaching on another Robin's territory. The females showed the greatest loss of success; the males won nearly half of their contacts there, and not significantly less than the 50% expected on the basis of the hypothesis that a particular area does not give an advantage to a given bird. The influence of territory position can be further tested by examining the fights under *Unknown Location*, where territory effect was, for the most part, eliminated. The percentage of victories for each sex again does not vary significantly from fifty per cent.

These data indicate that a bird on its territory does have a definite advantage over intruders in fighting—but it is important to note that many intruders are tolerated, and when these are included in the calculations, only about half of all invaders are repulsed. At any rate, the idea of invincibility does not stand up, and such often quoted statements as "A male on his own territory is undefeatable" (Tinbergen 1939) are not applicable to the Robin. As a matter of fact in some cases the defense was sieve-like, and the territory seemed to be maintained mainly by the tendency of a given Robin to remain in a given general area. A good example of this is furnished by the data on M 1 (1948). He was the victor in only 56% of the 41 fights recorded within his territory, yet maintained a territory of average size in the densely populated northwest corner of the area. In contrast, M 9 (1948) who won all 10 fights observed within his own territory, bordering that of M 1, eventually withdrew and set up a territory just outside of the study area. In this case, an injury to his mate may have affected his position, but previously he had unsuccessfully tried to gain a territory on the western edge of the area.

Effect of Sex

It is apparent from the data in Table 3 that there is a varying degree of success between males and females. The data were, therefore, further refined by considering only birds of known sex, and computing the success for both males and females in intersexual and intrasexual fights. This material is shown in Table 4.

Some rather surprising results are obtained. It appears that males and females respond differently to territorial boundaries as far as fighting is concerned. Territorial males had only a slight advantage, if any, over invading males, but were very successful in driving off females. Females on their territories also had trouble in expelling strange males, but were quite efficient in routing other females. Contacts in which the birds ignored each other are not included in these calculations, but would reduce the victory percentage as in Table 3.

The males won 64% of all contacts observed with females, a figure

Table 4

INTER-SEXUAL TERRITORIAL CONTACTS—PERCENT WON

LOCATION RE TERRITORY	BY MALES		BY FEMALES	
	vs males	vs females	vs males	vs females
IN OWN TERRITORY	^{b89} 55 _{a.718}	³¹ 77 _{8.26**}	²⁷ 59 _{.592}	²³ 87 _{11.14**}
IN OPPONENT TERRITORY	⁸⁹ 45 _{.718}	²⁷ 41 _{.592}	³¹ 23 _{8.26**}	²³ 13 _{11.14**}
UNKNOWN	¹⁴⁶ 50 _{4.00*}	²⁵ 72 _{4.00*}	²⁵ 28 _{4.00*}	¹⁸ 50
TOTAL	³²⁴ 50 _{5.84*}	⁸³ 64 _{5.84*}	⁸³ 36 _{5.84*}	⁶⁴ 50

a - Chi square value b - No. Observations

Total Observations - 471

which varies significantly from 50%. In order to determine whether any advantage due to holding territory accrued in male-female fights, the 72% victories attained by males under *Unknown Location* was used as an estimate of male dominance. It then appeared that males had no greater advantage over females when on their own territory, but that females benefitted greatly in their fights with males by being within their own territory.

Males tend to fight males more frequently than females (Table 4), and females also tend to have more fights with the males than with other females. This may be due to the fact that more males are available as opponents during a good part of the breeding cycle. The females spend a great deal of their time (Schantz 1939 estimates 80% of the time) on the nest.

The evidence seems to support a general conclusion that male Robins derive no particular advantage in fighting on their own territory, but that females do, and that male Robins tend to be dominant over females. This is particularly unique in view of the fact that the male Robins are the birds which establish the territories. In most birds, the males are distinctly more aggressive in territory defense than the females are. Lack and Light (1941) considered the male European Blackbirds as more aggressive than the females, but Morley (1937), after studying the same

species, concluded that the females had a stronger territorial sense. Other than this disputed case, no situations comparable to that existing in the Robin were encountered in the literature.

Effect of Breeding Status

In Robin fights, victory almost always goes to the aggressor, and the victory percentages presented in Tables 3 and 4 may be considered as approximate measurements of aggressiveness under different situations.

This aggressiveness might be expected to vary with different stages of the breeding cycle. For example, birds with eggs in their nest might have a different degree of aggressiveness than those which had not yet started to build. Table 5 presents data relative to the problem. Unfor-

Table 5
EFFECT OF BREEDING STATUS ON FIGHT SUCCESS—PERCENT WON

LOCATION RE TERRITORY	STAGE OF BREEDING CYCLE	
	NON-NESTING	NESTING
IN OWN TERRITORY	67 a10.78**	72 16.22**
IN OPPONENT TERRITORY	50	25 10.02**
TOTAL	64 8.90**	56 1.93

a - Chi Square value

b - No. of observations

tunately, it was necessary to lump male and female data together in order to get an adequate sample, and to combine all stages (construction, eggs, young) of the nesting cycle. Comparisons, therefore, could only be made between birds associated with an active nest and those which had not yet started to build, or else had already fledged their young. The latter two groups are considered together as non-nesting birds. Ignored birds have again been eliminated from the computations.

The data show that both nesting and non-nesting Robins had a definite advantage in fighting on their home territories. However, no further deductions seem permissible. The apparent difference between success in *Opponent's Territory* (Table 5) is spurious, and due to the

large number of male records in the *Non-Nesting* data. No difference in aggressiveness between nesting and non-nesting Robins can be demonstrated.

Effect of Distance from Home Territory

If a bird is dominant on its own territory and, therefore, wins a majority of its fights because of a familiarity with the area, it might be suspected that it would become less and less successful in fights as it moved further away from the center of activity, and the area around it became more and more unfamiliar. To test this supposition, fight success was tallied for the birds at varying distances from their territory centers. The data are shown in Figure 14. The curve of fight success tends to fall off generally as one progresses from the center of the territory, but the smallness of the samples precludes any definite conclusion.

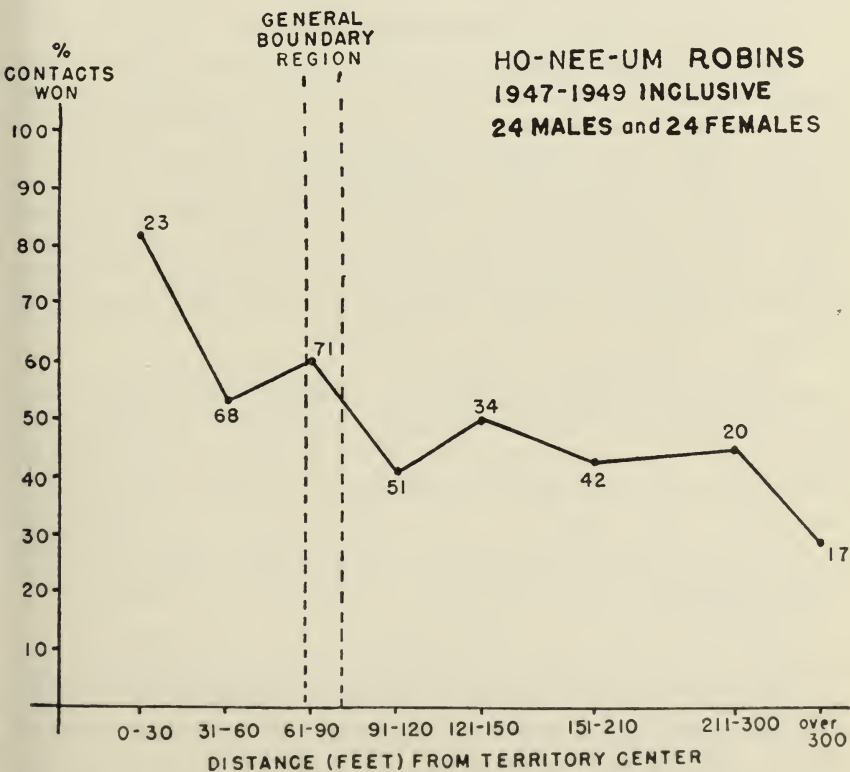


Figure 14. Effect of Distance from Home Territory on success in encounters with other Robins. The number of observations for each point is shown on the curve.

The Questions of Age and Dominance

More complete data might show differences among the fight success of various age groups. In the Robin, however, first year birds cannot be distinguished in the field from adults, and no marked yearlings nested on the area, so no information was gained on this point.

Another factor to consider is the possible effect of individual dominance on fight success, aside from the territorial influence. This has been frequently demonstrated for domestic and caged animals (Collias 1944), and Sabine (1949) has recently found indications of it in free-living Juncos, *Junco hyemalis*. If one bird tends to be dominant over another, depending upon the degree of dominance, it might to some extent nullify the effect of territorial position. The material on males versus females (Table 4) illustrates the point in question. Sufficient data were not gathered on contacts between specific Robins, where territory was not involved, to check this effect.

Defense Against Other Species

Robins ordinarily tolerate other birds on their area. On different occasions, however, they were seen to chase the following species: Bronzed Grackle, *Quiscalus quiscula*, Blue Jay, *Cyanocitta cristata*, Cardinal, *Richmondia cardinalis*, English Sparrow, *Passer domesticus*, Starling, *Sturnus vulgaris*, Red-winged Blackbird, *Agelaius phoeniceus*, Brown Thrasher, *Toxostoma rufum*, Catbird, *Dumetella carolinensis*, Cedar Waxwing, *Bombycilla cedrorum*, and Alder Flycatcher, *Empidonax traillii*. One territory-holding male was seen to chase a Thirteen-lined Ground Squirrel, *Citellus tridecimlineatus*. Bierman (1945) also mentions an attack by the Robin on this rodent.

The use of dummies and stuffed Robins to study the reactions of the birds never yielded comprehensible data. The dummies were frequently ignored entirely, even when in the heart of a territory. Both males and females were on occasion induced to attack dummies, but their attacks were usually of short duration, and the dummy was ignored after it failed to respond. Some component of the stimulus necessary to incite strong reaction, possibly motion, appeared to be lacking. Lack and Light (1941) reported that territorial individuals of *T. merula* also ignored stuffed specimens.

Summary

The following points summarize territorial fighting between Robins:

1. Fighting is associated with an area rather than with a bird of the opposite sex.
2. The majority of intruders upon a territory which are attacked, are repulsed, but many intruders are tolerated.

3. Both males and females are most successful in fights within their own territory boundaries.
4. The effect of territorial position is much more marked in females than in males.
5. Males tend to be dominant over females.
6. Nesting birds and non-nesting birds do not show any difference in the aggressiveness of their territorial defense.
7. The success of Robins in fights falls off progressively as they move away from their territorial centers.

At this point Noble's (1939) definition of territory, ". . . any defended area," may be reconsidered. The Robin territory fits this definition but only in part, since, as has been seen, the defense may be sporadic and, at times, non-existent.

Territorial maintenance with a low intensity of defense, as in the Robin, has also been mentioned for the Willow Wren, *Phylloscopus trochilus*, (Brock 1910). Examples of inefficient territorial defense are given by Tinbergen (1935) for the Red-necked Phalarope, *Phalaropus lobatus*, and in the *Turdidae* by Brackbill (1943) for the Wood Thrush, *Hylocichla mustelina*.

The importance of fighting to the territory theory, while obviously very great, may have been overemphasized in some cases. This would be a natural tendency; along with song, it is generally the most conspicuous manifestation of territory, and was given much attention in Howard's (1920) work, which has always served as a basic authority in the field. Moffat (1903) believed that weak birds would not be able to maintain territories and wrote as follows:

. . . Natural Selection . . . can, and probably does, largely work by condemning to unproductiveness the less powerful adults.

However, Lack and Light (1933) argued this point, and instead claimed that:

. . . there is no proof that the degree of isolation (size of territory) is determined by pugnacity, or that it is constant.

It would appear that, in the Robin, the true significance of fighting lies somewhere between the stand taken by Moffat (op. cit.), and that taken by Lack and Light (op. cit.). As long as there is competition for nesting areas, there will be strife of one sort or another. The frequency, intensity, and efficiency of defense in various territorial species is probably dependent upon habitat, population density and other factors, some

of which have been discussed above. Under different conditions than those existing at Ho-Nee-Um, Robins might show a wide variance in their territorial behavior.

Conclusions

On the basis of observations described in the preceding pages, the following generalities may be drawn concerning the territorial behavior of *Turdus migratorius* under the environmental conditions observed.

Robins exhibit territorial behavior in the spring by partially isolating themselves on areas in which they display varying degrees of intolerance towards intruders. The males arrive first and establish these territories, but the females, once mated and established, play a large part in maintaining them and actually seem to be more influenced by territory boundaries than do the males. The situation is complicated by a partial dominance of males over females. For the most part, Robins are successful in routing those intruders they choose to attack. They will, however, tolerate many territorial intrusions. The birds tend to return to the same territory in succeeding years.

The many qualifications in this description contrast strongly with the concise points given by Howard (1920) which were listed in the first portion of this paper. Though following the general pattern of territoriality described by Howard, it can be seen that the Robin varies in many ways, which points have been given previous consideration and need not be repeated here.

Such variation in the mode and completeness of territorial defense might be expected among many species of birds which would still be considered as definitely territorial. Further deviations in behavior would probably result in other species being classed as "semi-territorial," or "weakly territorial." There are at the present time some species of birds, e.g., Cowbird, *Molothrus ater* (Friedmann, 1929), Bronzed Grackle (Petersen and Young, 1950); Parakeets, *Myiopsitta spp.* (Nice, 1941), for which no evidence of intolerance has been shown, and these birds may possibly be completely non-territorial.

No definite line can be drawn between territorial and non-territorial birds. Among some of those species not occupying individual areas, there are still evidences of intolerance and aggressiveness. A whole field of study has built up around this phenomenon, and again varying degrees of dominance and intolerance have been found. Although the establishment of territories tends to eliminate social hierarchies (Collias, 1944), the two may to some extent overlap, as in the Black-crowned Night Heron, *Nycticorax nycticorax* (Noble, Wurm and Schmidt 1938), and as in the dominance of male Robins over females.

Jourdain (1921) suggested that territorial intensity probably followed a distribution curve, and Meise (1936) furnished several examples

to support this view. Since territory is generally considered as merely one method of manifesting intolerance, we may extend Jourdain's idea to include the non-territorial species, and quite possibly establish a series of gradations from those extremely tolerant to those extremely intolerant.

In the last analysis, territoriality should not be considered by itself, but rather as part of the life pattern of the species being studied. Where present, it is co-existent with the mating and breeding habits of the species, and these, plus their food habits doubtless have a role in determining the type of territorial behavior developed. The intriguing question of the function of territory may, therefore, have a different answer for different species of birds. The final answer to these questions awaits further work on territory, both extensive and intensive.

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Food Habits of New Jersey Owls

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The analysis of pellets of our various owls is an extremely interesting study and one calculated to prove enlightening, both as to the accurate recording of what the owl has been eating previous to the collection of its pellets and to the relative numbers and distribution of the smaller mammals which inhabit every field, woodland and swamp in the region. This study resolves itself into a comprehensive examination of the dentition and skull as well as characteristics of the various leg bones of our rodents, moles and shrews along with detailed measurements of bills and tarsi of the relatively few birds which fall prey to the ever searching owls. Occasional pieces of fur, feathers or other remains about an owl roost or on the nest greatly facilitate identification of that particular prey.

Since the data constituting the basis of this article are the result of analyses of owl pellets it might be well to explain, at this point, how a pellet is formed and what are its contents. Some hours after an animal has been swallowed and the strong digestive juices of the owl's alimentary system have broken down and absorbed the flesh of this prey the remaining indigestible material in the way of fur and bones is regurgitated in pellet form. Identification of the bones, remarkably clean and free of any adhering flesh, serves to disclose upon what species of animal the owl has been feeding.

It is not in my province at this time to discuss fully the merits or demerits of the mammals which are so avidly taken by the owls. The main food of shrews and moles is insect and these tiny animals should be classed with birds as being most beneficial. That some species of mice are very detrimental is an established fact, while others, such as the white-footed mouse, whose food includes many weed and other plant seeds along with numerous insects, should not reasonably be considered as 100% detrimental to man.

Wherever possible, accurate identification as to the pellet's origin was made; material gathered whose origin was doubtful has not been included in this paper. Unless otherwise designated the pellet material has been

* Some fifteen years ago I became acquainted with Bill Rusling while we were both members of a class in ornithology taught by the late Professor E. H. Eaton. Rusling was already then an accomplished naturalist. Later, when we were afield together near his home in New Jersey, his intimate familiarity with the local fauna and flora was evident. At one time Rusling was the Audubon Warden at Cape May and later he made studies of the hawk migration on the Virginia coast, but during the war he worked in a defense plant. His efforts to remain afield during this period indirectly lead to his death. In August, 1942, he was killed in a motor accident, apparently after falling asleep at the wheel while on a birding trip. The present paper dealing with Rusling's favorite group of birds, the raptores, was completed shortly before his death.

DEAN AMADON

collected in the northern half of the state of New Jersey, the greater part during the colder portion of the year from December through March.

I should like to acknowledge extensive and helpful information freely given by Messrs. Clarence Cottam and A. L. Nelson,* Section of Food Habits, Division of Wildlife Research, Fish and Wildlife Service, United States Department of the Interior, Washington, D. C.; also, for information on shrews from the authority on that subject, Dr. Hartley H. T. Jackson, likewise connected with the Division of Wildlife Research.

A complete record of 972 pellets, as well as numerous remains of prey (particularly with reference to the Great Horned Owl) will be found in tabular form below. A few of the more interesting pellet collections of the different species are described, illustrating how the owl's food habits differ in various habitats and how the habitat appears to influence the numbers of the different species of small mammals taken by the owls. It must be remembered that this article does not claim to be definitive on the subject of food habits, since the results of the study as given in this paper only represent a partial picture of the food habits of owls and merely disclose what has been learned over a period of five years in a portion of a small state.

Barn Owl (*Tyto alba pratincola*)

While in the employ of the National Audubon Society, as warden of the newly established "Witmer Stone Wildlife Sanctuary" at Cape May Point, New Jersey, during the fall of 1935, I discovered a roost of this partially migratory owl with a high count of four owls present there on October 27. Analyses of 75 pellets collected there from September 17 to November 10, by which time the owls had gone south, disclosed 227 individual animals taken. Of these only 20 were birds or a little less than 9% of the total Barn Owl prey.

It seems indeed remarkable that with the numbers of birds so tremendously augmented by the piling up of thousands of autumnal migrants here at the tip of the Cape May County peninsula that the inoffensive and beneficial Barn Owl did not take more than 8.8% avian prey. The following list comprises the analyses of these 75 pellets: 50 Common Shrews, 9 Short-tailed Shrews, 1 Red Bat, 87 Meadow Mice, 24 Pine Mice, 27 White-footed Mice, 4 Norway Rats, 5 Jumping Mice, 1 Virginia Rail, 1 Killdeer, 1 Kingbird, 1 Blue Jay, 2 warblers of the genus *Dendroica*, 1 Cardinal, 12 sparrows (7 *Spizella*, 5 *Melospiza*) and 1 unidentified bird.

A lot of 30 pellets collected in a deserted water tower near Plainfield, New Jersey, illustrates a rather varied bill of fare and is interesting because of the relatively large number of mole bones present in the mate-

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rial. Because of their subterranean habitat moles are not commonly taken by the owls. These 30 pellets contained 1 Common Mole, 6 Star-nosed Moles, 6 Short-tailed Shrews, 17 Meadow Mice, 1 White-footed Mouse, 1 Jumping Mouse, 3 Norway Rats, 1 Rusty Blackbird, 2 Red-wings, 1 Starling, and 1 Bullfrog (large).

An examination of the table given below for this species does not disclose as favorable a balance of detrimental rodents as is generally accredited to this owl. A small majority of the pellets was collected in areas along the coast of this state where the numbers of birds were greatly increased during the fall; this accounts for the somewhat large proportion of birds taken. This condition is, of course, the exception and not the rule where, over its entire range, the average number of beneficial birds taken is so small as to be nearly negligible.

Screech Owl (*Otus asio*)

Because of this owl's proclivity for roosting in hollow trees few pellets have been examined. Study of the food habits of one of these small owls which roosted in an old Flicker hole 8 feet from the ground in an old orchard in West Caldwell, New Jersey, revealed that it varied its diet of Meadow Mice with an occasional Blue Jay or one of the several winter sparrows. Several Screech Owl holes near brooks showed that the little owls quite commonly take crayfish. Not included in the table below was a dead rufous phase Screech Owl picked up on the road outside Long Valley, New Jersey, on November 16, 1940, which had its stomach packed with five crayfish of from 1½ to 2 inches long.

A typical lot of 9 pellets taken during March of 1935 showed 3 Short-tailed Shrews, 12 Meadow Mice and 1 Garter Snake. Too few pellets have been examined to come to any first hand conclusion but it is known that this little owl is an excellent mouser, though it occasionally does make inroads upon our commoner song birds when it has a nest full of owlets to be fed.

Great Horned Owl (*Bubo virginianus*)

The Great Horned Owl captures not only all the prey of the other owls but takes a considerable number of larger birds and mammals, to boot. This large owl's appetite is such that it captures and consumes creatures ranging in size from our smallest shrew, weighing but a fraction of an ounce, to a duck which may top three pounds by a considerable margin.

It is interesting to note how this owl's diet varies with different habitats, the Great Horned Owl apparently being a more adaptable owl than others of its family. Several pellets and numerous feather remains taken from a roost of this species in a wooded portion of a large fresh

water marsh during March of 1935 revealed: 1 Short-tailed Shrew, 2 Meadow Mice, 1 White-footed Mouse, 1 Cotton-tail, 2 drake Pintails, 1 Blue Jay and 1 Song Sparrow. Several other lots of pellets taken in this area during the spring duck flight showed this owl's readiness for that kind of prey when it was accessible. Feathers and pieces of furred hide on a nest here, containing an owl, showed one each of the following had been fed the young owl: Cottontail, Starling, Mallard and Black Duck.

In the more sparsely settled regions of north Jersey, heavily wooded with little farmland, the Great Horned Owls subsist principally on rodents, as 15 pellets collected during January, 1939 disclosed 4 Meadow Mice, 2 White-footed Mice and 6 Cottontails. An interesting batch of pellets taken from under a roost in a white pine, growing at the base of a rocky and precipitous slope of a ridge in northern Morris County disclosed the following: 2 White-footed Mice, 1 Eastern Wood Rat, 3 Cottontails and 1 Crow. The skull and lower mandibles of this Wood Rat (*Neotoma pennsylvanica*) constituted my first record of this species in the state, where it is scarce and extremely local. Numerous rat droppings on a rocky ledge and the discovery of a nest on the floor of a narrow cave some twenty feet in from the face of the ridge supplied the necessary clues as to the presence of this rat.

Pellets from Middlesex County; this section being more densely populated with a great amount of open farmland, numerous hedgerows and only isolated patches of large trees, showed a corresponding increase in the number of Ring-necked Pheasants and Norway Rats as prey. A nest located in a dense red maple swamp in southern Middlesex County was revisited on April 23, 1939 for the purpose of banding the two young. Signs of recent and plentiful meals were obvious. On the nest were the feathers of a female Pheasant along with some fresh rabbit bones. Under the nest and in several inches of water was found the head of a female Redwing while scattered about on a nearby hammock were the beautifully colored breast feathers of a cock Pheasant.

Under a pin oak roost of the male of a pair of Great Horned Owls nesting near Plainfield, New Jersey, remains of the following were found on April 23, 1939: 4 Meadow Mice, 5 Norway Rats and one each of Black Duck, female Pheasant, Flicker, Blue Jay, and chicken. Inspection of the nest revealed a single young, too small to band, and various bones, fur, and feathers showing that one each had been taken of Norway Rat, Cottontail, female Pheasant, Starling and chicken.

Although three of the four owl's nests found during the late winter and early spring of 1939 were situated in blocks of woodland also inhabited by our native partridge, the Ruffed Grouse, no grouse remains were found in the pellets.

Snowy Owl (*Nyctea scandiaca*)

Of this very scarce species I have only the result of one stomach analysis. This did not constitute information of sufficient importance for inclusion in the table of food habits. On the morning of January 30, 1938 Mr. Clarence D. Brown of Montclair, New Jersey, found a dead Snowy Owl on the Newark Meadows in the vicinity of Newark Bay. The owl was a heavily barred female weighing 3 pounds and 12 ounces. The stomach contained single specimens of Meadow Mouse, House Mouse and Norway Rat.

Barred Owl (*Strix varia*)

As this species generally lives in and hunts over a constant type of habitat, analyses of pellets of this owl collected from various localities in the state of New Jersey are remarkably similar. For this reason only one sample lot is given, illustrating a fairly typical bill of fare: 163 pellets collected on January 11, 1935 in northwestern Essex County showed that this Barred Owl had been eating for the last month and a half: 1 Common Shrew, 1 Short-tailed Shrew, 108 Meadow Mice, 2 White-footed Mice, one each of Blue Jay, Starling, Fox Sparrow and Swamp Sparrow, and 2 Song Sparrows. Of these 118 individuals only the shrews and birds were beneficial. Converting the figures into percentage it can be seen that more than 93% of the total kill constituted harmful rodents. However, several pellets collected at this same roost later in the winter disclosed the bones of a Screech Owl, illustrating the well-known cannibalistic traits of the Barred Owl.

Long-eared Owl (*Asio otus wilsonianus*)

Records for the Long-eared Owl indicate that during the colder months of the year this owl is nearly 100% beneficial as is revealed by an analysis of 71 fresh pellets, collected on February 17, 1935 from a pine grove in the South Mountain Reservation, in which the following were found: one Common Shrew, 1 Short-tailed Shrew, 45 Meadow Mice, 3 Pine Mice, 3 White-footed Mice, 1 House Mouse, 1 *Spizella*. The last named, probably a Tree Sparrow, along with two Shrews comprised the only beneficial species taken out of a total of 55 individuals. Surely, such an owl as this warrants protection. These pellets were collected by Warren F. Eaton, now deceased, who was formerly the Predation Expert of the National Audubon Society and one of the founders of the Hawk and Owl Society.

With the advance of spring the numbers of small birds taken by the Long-eared Owl appears to increase to some extent as 18 pellets taken on April 13, 1935 from under the roost above mentioned showed 2 Short-tailed Shrews, 7 Meadow Mice, 1 Pine Mouse, 14 White-footed Mice, 1

House Mouse, 1 Norway Rat, 2 Blue Jays, 1 Starling, 1 Purple Finch, 4 sparrows of the genus *Melospiza* and 3 Icterids.

One very interesting fact concerning an apparent heavy density of the Common Shrew (*Sorex cinereus*) was disclosed by analyses of 61 pellets of this owl. The roost was in a dense pin oak, one of a large number of these trees forming a heavily wooded island in a large fresh water marsh. The pellets contained: 28 Common Shrews, 1 Short-tailed Shrew, 32 Meadow Mice, 6 White-footed Mice, and 1 unidentified small bird. These pellets were collected on March 3, 1938 and showed that these tiny shrews are not at all averse to February weather. No other area inland has ever been found to have such density of these animals as revealed by analyses of owl pellets. The only other localities where there existed similar proportionate numbers of shrews were found to be coastal peninsulas such as lower Cape May County.

Saw-whet Owl (*Aegolius acadicus*)

A total of 93 pellets of this little, inoffensive owl have been examined and in no instance have any bird bones or feathers been found. This owl's activities seemed confined to the capture of two species of shrews and three species of mice. During the winter of 1939-1940 insect remains have been found on several occasions in some pellets of this species. Concerning this I should like to quote from a letter received from A. L. Nelson, "Regarding insect material that has been found in these Saw-whet Owl pellets I am inclined to believe that these possibly may be of secondary origin. The White-footed Mouse feeds to a considerable degree on insect material, including grasshoppers, small beetles, etc. and this could readily account for the presence of insect material in the pellets."

A typical lot of 34 pellets of the Saw-whet Owl disclosed the following: 1 Short-tailed Shrew, 14 Meadow Mice and 13 White-footed Mice. Upon examining all the data from the pellets of this species, it was seen that of 89 mice, 48 were Meadow, 1 Pine and 40 White-footed. No other owl appears to show such a decided preference for the White-foot. Some pellet collections show that, in a number of instances, the catch of White-footed Mice far outnumbers that of any other species, probably due to the fact that this is the common mouse of woods and brushy woodland over which the Saw-whet hunts.

Statements made in this paper are not to be considered completely definitive regarding the food habits of any of the owls, merely giving the results and subsequent conclusions of my study for a restricted locality. The greater significance of the data collected has not thus far been discussed.

The following constitutes a brief summary of the data compiled in

Table of Prey

Number of pellets	Barn 177	Screech 17	Horned 89 & remains	Barred 361	Long-ear 289	Saw-whet 93	total 972
Shrew	65	3	2	8	38	6	122
Mole	7	0	1	4	0	0	12
Bat	1	0	0	0	0	0	1
*Squirrel	0	0	3	0	1	0	4
*Muskrat	0	0	1	0	0	0	1
Mouse	183	20	39	326	274	89	931
Rat	7	0	14	1	1	0	23
*Rabbit	0	0	34	0	0	0	34
*Duck	0	0	6	0	0	0	6
*Pheasant	0	0	7	0	0	0	7
*Poultry	0	0	5	0	0	0	5
Woodpecker	0	0	1	0	1	0	2
Blue Jay	1	1	3	1	4	0	10
*Crow	0	0	3	0	0	0	3
Starling	1	0	6	2	1	0	10
Blackbird	4	0	1	1	3	0	9
Sparrow	13	2	3	17	20	0	55
Other birds	5	0	0	4	3	0	12
Snake	0	1	0	0	0	0	1
Frog	2	0	1	2	0	1	6
Turtle	1	0	0	0	0	0	1
Crayfish	1	3	0	0	0	0	4
Snail	0	0	0	1	0	0	1
Insect	0	0	0	1	0	0	1
Total individuals ..	291	30	130	368	346	96	1261

* Prey taken only by the Great Horned Owl. The single squirrel taken by the Long-ear was a Flying Squirrel.

the table of prey of the owls herein discussed. The individuals taken by the owls have been listed in the above table as single species or related groups, totaling twenty-four. The first column of the table below gives the percentage of species captured by each owl to the total list. The second column shows to what percent the owl is beneficial by destroying detrimental species while the last column indicates the average number of captured individuals per pellet for each species of owl.

	Percentage of 24 groups taken	Percentage beneficial	Average number of individuals per pellet
Barn	54	67	2.4
Screech	25	67	1.8
Horned	71	73.49	.3 to 3.5
Barred	50	90	1.02
Long-ear	37	81	1.2
Saw-whet	12	93	1.03

The Great Horned Owl's diet illustrates the most varied bill of fare with a capture of 71% of the listed prey. At the other extreme is the

little Saw-whet, its catch limited to only 12% of the total. The table shows that the Great Horned Owl is 73% beneficial; yet if the Rabbit is included in the list of beneficial rodents this percentage immediately drops to 49. Considering the wide diversity of Horned Owl prey, particularly with reference to size, the average number of individuals per pellets showed that when this owl had found Rabbit hunting good the average of .3 individuals per pellet would hold true. But if the Cottontail was elusive or scarce, numbers of mice, rats and an occasional sparrow—mere appetite teasers for big *Bubo*—raised the average to as high as three and one half individuals per pellet, it being evident that the Great Horned Owl is able to regurgitate a considerable mass of fur and bones.

The owls which have supplied the subject matter for this paper are, in general, definitely beneficial and should be assiduously protected at all times. Taking an average of the figures found in the 'Beneficial' column shows clearly that the six species under discussion are 78.5% beneficial. If the Rabbit be considered a useful animal, the percentage of beneficial kill drops to 74.5, this still allowing that three-quarters of all owl prey is economically advantageously killed. Let man's hand be stayed from further depredations against these "wise" nocturnal hunters, one of the two main groups of predatory birds, both of which are keenly suffering by continuous ignorant persecution.

Data on the Food Habits of Local Owls

RICHARD B. FISCHER

Unlike most of the birds we observe in the New York City Region, the owls are located more often by the evidences they leave than by their call notes. It is a standard procedure with many local field workers to walk about in a pine grove seeking their telltale pellets and, finding them, to look up for the owl; many birds, especially the smaller ones, which certainly would have escaped detection have been located in this manner. Soon after learning this strategem, the writer began collecting the pellets for food habits analysis, and the results of twelve year's work are presented here.

Pellets from all the owls that occur in the New York City Region, except the Great Horned (*Bubo v. virginianus*), have been secured. These were taken from nests or directly beneath the roosting birds, so that there could be no question of their origin. At first, pellets were sent to the Food Habits Laboratory of the Fish and Wildlife Service. The technicians there kindly sent me labelled skulls and skeletal parts of several small mammals, thus making possible limited personal analysis.

It was not until several examinations were made by the writer that he discovered the close resemblance between certain forms; namely, the Meadow Mouse (*Microtus pennsylvanicus*) and the Pine Mouse (*Pitymys pinetorum scalopsoides*), and the House Mouse (*Mus musculus*) and the White-footed Mouse (*Peromyscus leucopus noveboracensis*). Since specimens of the Pine and White-footed Mouse were not at hand for comparison, the accuracy of the identification of all four forms is subject to question. However, the Pine Mouse and to a lesser degree the White-footed Mouse, to judge from the analyses done for me by professional investigators, constitute a small portion of the total mammalian food. This, plus the fact that less than half the pellets were examined by me, suggests that the degree of error is small. To indicate the analyses which may contain inaccuracies, an asterisk has been placed alongside the name of the locality.

When lack of funds forced the abandonment of the Food Habits Laboratory of the Fish and Wildlife Service, Professor William J. Hamilton, Jr., at Cornell University, generously consented to do analyses for me. To him and to the men of the Fish and Wildlife Service I am most grateful for the assistance and encouragement which made this study possible.

The data secured from the pellet analyses are summarized in the accompanying table, about which a few comments are in order. Birds were included in the diets of several species, to the extent of only .03%

Species	Locality	Date	Contents					Unidentified				
			Norway Rat	House Mouse	Meadow Mouse	White-ftd. Mouse	Short-ftd. Shrew		Other Mammals	Birds		
BARN OWL	Beechhurst, L. I.	2/ 4/39	4	6	7	...	...	...	...	...	...	Meadow Mouse ?-2
	Beechhurst, L. I.	1/ 8/40	7	2	22	3	15	Pine Mouse-1	Eng. Sp.-1 Fox Sp.-2	...	...	...
	Beechhurst, L. I.	1/21/40	1	4	66	9	32	...	Meadowlark-1 Savannah Sp.-1 Song Sp.-2 Fringillid-1	...	...	...
	Pelham Bay Park, N. Y.	1/30/40	...	7	82	...	4	...	Starling-1	...	...	...
	Pelham Bay Park, N. Y.	1/30/40	1	2	49	...	12	...	...	...	...	...
	Beechhurst, L. I.*	12/14/40	1	...	4	...	...	...	...	...	...	...
	Mecox, L. I.*	12/29/41	...	...	12	...	...	...	...	...	...	...
	Manhasset, L. I.*	4/13/44	2	...	31	...	8	...	...	...	...	...
	Manhasset, L. I.*	4/23/44	3	1	101	...	12	...	...	...	...	...
	Flushing, L. I.*	12/24/48	3	...	12	...	...	...	...	...	...	...
SCREECH OWL	Flushing, L. I.	11/25/37	...	...	1	...	...	...	Chickadee-2	...	...	Acrosternum, Sp.-1 Carabid Larvae-2
	Flushing, L. I.	2/15/48	1	...	...	...	...	...	Eng. Sp.-1 Uniden. Sp.-2	...	...	...
	Flushing, L. I.	2/15/48	...	...	...	...	...	...	...	...	...	...
	Flushing, L. I.	2/29/48	1	...	1	...	...	...	Starling-1	...	...	...
	Flushing, L. I.	3/30/48	...	...	1	...	1	...	...	...	...	...
	Flushing, L. I.	4/18/48	...	...	1	...	1	...	...	...	...	...
	Flushing, L. I.	1/ 4/49	1	...	...	...	...	...	...	...	...	...
	Flushing, L. I.	1/ 4/49	2	1	...	...	1	...	...	...	...	...
	Flushing, L. I.	1/15/49	...	...	...	...	...	...	...	...	...	...
SNOWY OWL	Southampton, L. I.	12/23/41	1	...	...	...	...	...	...	...	...	...
BARRED OWL	Bronx Park, N. Y.*	2/15/41	5	...	6	...	...	...	...	...	...	...
LONG-EARED OWL	Alley Pond Park, L. I.	2/ 3/38	...	...	17	1	...	...	...	...	...	...
	East Hampton, L. I.*	12/23/41	...	...	9	...	...	...	...	...	...	...
	Flushing, L. I.*	12/27/45	1	1	14	...	...	...	Starling-1 Eng. Sp. ?-1	...	...	...
SHORT-EARED OWL	Flushing, L. I.	2/22/49	...	...	5	...	3	...	...	...	...	...
SAW-WHET OWL	Alley Pond Park, L. I.	2/ 7/37	...	2	5	2	2	...	...	...	...	White-ftd. Mouse ?-1
	East Hampton, L. I.*	12/23/41	...	...	...	...	1	...	...	...	...	...
	Pelham Bay Park, N. Y.*	2/ 1/47	...	4	2	...	3	...	...	...	...	...
	Croton Point Park, N. Y.	12/29/48	...	...	2	...	...	...	...	...	...	...
Totals	.....	.....	34	30	450	18	93	1	17	.....	.....	.....

of the total number of animals consumed by all individuals. The Starling (*Sturnus vulgaris*) recorded from one of the Screech Owls (*Otus asio naevius*) is worthy of further mention. When pellet material from the owl was examined, a bird band was discovered, but no feathers or bird remains of any kind were present. The band had been placed on a Starling three months before at a station three blocks east.

A preponderance of Meadow Mice will be immediately noticed. One would expect this in view of the species' widespread distribution, besides its habit of feeding above ground and often in exposed situations. The discovery of a Pine Mouse in one of the Beechhurst Barn Owl (*Tyto alba pratincola*) pellets was rather a surprise, for its occurrence there was not known to me. Capture of this subterranean rodent is testimony of the Barn Owl's hunting efficiency. One might nevertheless wonder how it was able to catch a Savannah Sparrow (*Passerculus sandwichensis savanna*) which field students, working in bright sunlight sometimes have difficulty in seeing. Perhaps this species of owl hunts very low and somehow manages to frighten the birds into motion.

Analysis of owl pellets can and does shed great light on the distribution of small mammals in a particular region. Forms like the Pine Mouse and some of the shrews, which are not readily taken in the mammalogists traps, are frequently captured by the owls, whose necessity far transcends our mere academic interest.

A Numerical Study of Shorebirds on Long Island in 1947

WALTER SEDWITZ

Charles A. Urner, during his life one of the most stimulating forces in the field ornithology of our region, for some ten years compiled data on the numbers of shorebirds observed on the New Jersey coast. Summaries of his data have been published (Urner, 1929, 1930, 1931, 1932, 1935; Urner and Storer, 1949). I thought it would be no less informative to make counts of shorebirds seen on my field trips on Long Island, even though the area covered was very much smaller than that embraced in Urner's compilations.

While observing birds year after year, we little realize what changes are occurring. Our memories are very deceptive. By thumbing over our field notes we may get an inkling of the more obvious and larger variations, but only a comparison of cold figures has any substantial value. My object here is to give a picture of the numbers and relative percentages of each species noted during one year by one observer, in such form that it may have a chance of meaning something to a future student of shorebirds.

Aside from the variation in the ability of an observer to estimate numbers with reasonable accuracy, bird counts are subject to many other uncertainties. Comparisons are made difficult in the case of shorebirds by the fact that whether or not they are seen at a particular spot may depend on time, tide, wind, water level, and plant growth. Thus there may be a low count on a given trip simply because at the time of day of the visit conditions were poor in the *accessible* shorebird localities. These problems are, of course, present in appraising Urner's data. In certain respects my notes may permit a closer estimate of comparative numbers. Urner's data were compilations from the field notes of several separate observers, with different tendencies in counting and estimating (Hickey, 1943: 52). The appended tables are based only on my own counts and thus are likely to be relatively consistent. My numbers are also less likely to be exaggerated by what Urner called "duplication". We know that shorebirds may linger for weeks in an area, especially in the summer and fall. As it is not generally feasible to determine which individuals were present on the previous trip and which are new arrivals, both Urner and I cumulate in our tables all birds seen on each trip, even though we may positively know in a few instances that the same individuals are involved. While this results in some duplication in the counts of a single observer, the effect is multiplied several times when the reports of several observers in the same locality are added together. What a distorted im-

pression this may create is plain from the instance of the Curlew Sandpiper. The tables list a total of four; actually the species was seen on three trips, two individuals on the first trip, and on the following two visits to the same spot one bird, which, I feel sure was one of the original two. The tables showing the maximum number of each species seen on any one day in the spring and fall help to correct the picture.

Most of the field trips were a week apart on successive Sundays. About 80% followed the same route: Plum Beach (on Sheepshead Bay), Pennsylvania Avenue dumps and flats (Jamaica Bay), Long Beach, and then over the Loop Parkway to Jones Beach (including Tobay Pond), and Oak Beach. Other points, not regularly visited, but included in the notes are Atlantic Beach, Hempstead, Moriches Inlet, Sagaponack and Mecox Bay.

Table 1

SHOREBIRDS OBSERVED ON BOTH NORTHBOUND AND SOUTHBOUND FLIGHTS IN 1947

Species	Total No. All Trips	Percent of Total
1. Semipalmated Sandpiper	4,140	22.4
2. Semipalmated Plover	2,247	12.4
3. Eastern Dowitcher	2,115	11.6
4. Sanderling	1,880	10.3
5. Black-bellied Plover	1,680	9.2
6. Red-backed Sandpiper	1,479	8.0
7. Least Sandpiper	1,101	6.0
8. Lesser Yellowlegs	1,004	5.7
9. Greater Yellowlegs	757	4.1
10. Killdeer	476	2.6
11. Piping Plover	295	1.6
12. Ruddy Turnstone	209	1.1
13. Pectoral Sandpiper	164	.9
14. Western Sandpiper	142	.8
15. Spotted Sandpiper	107	.6
16. Knot	99	.5
17. White-rumped Sandpiper	62	.3
18. Willet (Western?)	60	.3
19. Stilt Sandpiper	51	.2
20. Hudsonian Curlew	18	.1
21. Purple Sandpiper	17	
22. Upland Plover	13	
23. Wilson's Snipe	12	
24. Golden Plover	11	
25. Long-billed (?) Dowitcher	6	
26. Marbled Godwit	6	.3
27. Solitary Sandpiper	6	
28. Curlew Sandpiper	4	
29. Buff-breasted Sandpiper	2	
30. Hudsonian Godwit	1	
31. Northern Phalarope	1	
Total	18,255	

Unlike Urner, who used the entire year in his counts, I chose the period from March 15 to October 26. In New Jersey shorebirds linger later and winter in greater numbers than on Long Island; therefore Urner felt it useful to include the winter months. On my usual field trip route shorebirds are so scarce in winter as to make counts of little value. The apparently arbitrary dates were selected for the following reasons:

1. On March 15 I saw the first definitely migrant shorebird (Piping Plover). Those shorebirds noted previously could not be distinguished from locally wintering individuals of the same species (Sanderling, Purple Sandpiper, Killdeer).

2. October 26 was the last date that did not conflict too much with the hunting season, for shooting in the area distorted conditions and made observations uncertain. The number of shorebirds seen after this date and before March 15 was negligible and would have made little change in the total numbers or percentage rating of any species.

In the tables, for convenience, I have allocated birds seen until June 30th to the northbound flight and birds seen from July 1st to the southbound flight. While my treatment may seem more arbitrary than that of

Table 2

SHOREBIRDS OBSERVED ON NORTHBOUND FLIGHT MARCH 15-JUNE 30, 1947

Species	Total No. All Trips	Percent
1. Semipalmated Sandpiper	2,162	28.1
2. Black-bellied Plover	1,267	16.4
3. Semipalmated Plover	1,202	15.7
4. Red-backed Sandpiper	811	10.5
5. Least Sandpiper	790	10.2
6. Sanderling	470	6.1
7. Piping Plover	240	3.1
8. Killdeer	184	2.3
9. Greater Yellowlegs	183	2.3
10. Ruddy Turnstone	144	1.8
11. Knot	82	1.1
12. Eastern Dowitcher	43	.5
13. Spotted Sandpiper	29	.3
14. White-rumped Sandpiper	17	} .8
15. Purple Sandpiper	17	
16. Pectoral Sandpiper	14	
17. Western Sandpiper	4	
18. Solitary Sandpiper	4	
19. Curlew Sandpiper	4	
20. Wilson's Snipe	3	
21. Hudsonian Curlew	3	
22. Lesser Yellowlegs	1	
23. Upland Plover	1	
Total	7,696 aggregating 42.1% of annual total	

Urner, who treated June as falling in both groupings, I feel that the division here made is substantially in accord with the facts on Long Island. Absolute accuracy of allocation on the basis of sight observations is not possible, for an undetermined number of individuals during both periods consist, not of birds migrating in either direction, but of local breeders and their progeny and of non-breeders of several northern species summering in the region.

To convey a better idea of when each species was most numerous, I give in the appropriate tables more than one date if the period of greatest numbers extended over a few weeks or was unusually marked.

Table 3

SHOREBIRDS OBSERVED ON SOUTHBOUND FLIGHT JULY 1-OCTOBER 26, 1947

Species	Total No. All Trips	Percent
1. Eastern Dowitcher	2,072	19.7
2. Semipalmated Sandpiper	1,978	18.8
3. Sanderling	1,420	13.5
4. Semipalmated Plover	1,045	10.0
5. Lesser Yellowlegs	1,003	9.5
6. Red-backed Sandpiper	668	6.6
7. Greater Yellowlegs	574	5.4
8. Black-bellied Plover	413	3.9
9. Least Sandpiper	401	3.8
10. Killdeer	292	2.8
11. Western Sandpiper	133	1.3
12. Spotted Sandpiper	91	.8
13. Pectoral Sandpiper	82	.7
14. Ruddy Turnstone	65	.6
15. Willet (Western?)	60	.5
16. Piping Plover	55	.5
17. Stilt Sandpiper	51	.4
18. White-rumped Sandpiper	45	.4
19. Knot	17	}
20. Hudsonian Curlew	15	
21. Upland Plover	12	
22. Golden Plover	11	
23. Wilson's Snipe	9	
24. Long-billed (?) Dowitcher	6	
25. Marbled Godwit	6	
26. Buff-breasted Sandpiper	2	
27. Solitary Sandpiper	1	
28. Hudsonian Godwit	1	
29. Northern Phalarope	1	.7
Total	10,559 aggregating 57.9% of annual total	

Table 4

MONTHLY TOTALS

Month	Field Trips	Percentage of Total Birds Counted	No. Species
March	2	.40	4
April	4	5.10	6
May	6	31.00	20
June	3	5.70	14
July	3	15.00	20
August	6	24.00	25
September	6	13.00	22
October	4	5.80	19

Compared with previous years (although my notes do not give actual counts) my impression is that in 1947 the spring flight was fairly normal, while the early fall (July) flight was very good, but thereafter under normal until late September and early October.

Table 5

MAXIMUM NUMBERS DURING THE NORTHBOUND FLIGHT

1. Semipalmated Sandpiper	May 24, 600; May 25, 800; May 30, 400.
2. Black-bellied Plover	May 11, 600; May 17, 300
3. Semipalmated Plover	May 24, 350; May 25, 500.
4. Red-backed Sandpiper	April 6, 450; April 20, 125.
5. Least Sandpiper	May 11, 400; May 17, 200.
6. Sanderling	April 27, 70; May 30, 80.
7. Piping Plover	April 27, 75; May 4, 35.
8. Killdeer	March 30, 40; May 4, 30.
9. Greater Yellowlegs	May 11, 50; May 17, 40.
10. Ruddy Turnstone	June 1, 90.
11. Knot	June 1, 60.
12. Eastern Dowitcher	May 4, 15.
13. Spotted Sandpiper	June 1, 10.
14. White-rumped Sandpiper	May 25, 6.
15. Purple Sandpiper	March 15, 14.
16. Pectoral Sandpiper	May 4, 9.
17. Western Sandpiper	June 1, 9.
18. Solitary Sandpiper	May 4, 2; May 17, 2.
19. Curlew Sandpiper	May 17, 2.
20. Wilson Snipe	April 20, 1; May 4, 1; May 17, 1.
21. Hudsonian Curlew	May 4, 3.
22. Lesser Yellowlegs	May 4, 1.
23. Upland Plover	May 25, 1.

Table 6

MAXIMUM NUMBERS DURING THE SOUTHBOUND FLIGHT

1. Eastern Dowitcher	July 13, 800; July 27, 450.
2. Semipalmated Sandpiper	August 10, 350; August 11, 250; August 29, 175.
3. Sanderling	September 7, 400; September 14, 200.
4. Semipalmated Plover	August 24, 250; August 29, 250.
5. Lesser Yellowlegs	July 13, 350; July 27, 400.
6. Red-backed Sandpiper	September 28, 150; October 12, 250.
7. Greater Yellowlegs	July 20, 35; October 5, 80; October 19, 60.
8. Black-bellied Plover	August 17, 125; August 29, 90.
9. Least Sandpiper	August 24, 100.
10. Killdeer	October 5, 50; October 26, 60.
11. Western Sandpiper	September 1, 30; September 14, 35.
12. Spotted Sandpiper	July 20, 18; August 3, 30.
13. Pectoral Sandpiper	August 3, 75; October 5, 30.
14. Ruddy Turnstone	August 17, 20; August 24, 20.
15. Willet, Western (?)	September 7, 29; September 14, 19.
16. Piping Plover	August 3, 15; September 23, 5.
17. Stilt Sandpiper	August 10, 15; August 17, 8.
18. White-rumped Sandpiper	August 29, 10.
19. Knot	September 23, 8.
20. Hudsonian Curlew	July 27, 6; August 3, 5.
21. Upland Plover	August 3, 6.
22. Golden Plover	August 29, 9; September 28, 2.
23. Wilson Snipe	October 19, 9.
24. Long-billed (?) Dowitcher	August 3, 1; August 9, 1; October 19, 4.
25. Marbled Godwit	September 7, 2; October 12, 2.
26. Buff-breasted Sandpiper	September 7, 2.
27. Solitary Sandpiper	September 14, 1.
28. Hudsonian Godwit	July 13, 1.
29. Northern Phalarope	August 29, 1.

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Seven Years of Bird-Watching in Chelsea (Manhattan)

LAURENCE F. HAWKINS

The following is a record covering the years 1944-50 of birds I have observed from my third-floor apartment windows, which look out upon a row of typical Manhattan back yards. The ten yards visible contain sixteen ailanthus trees; several of the yards are grassy, with a few bushes; most are quite bare; one large yard is cemented over and provides a playground for a nursery. These yards are located between 14th and 15th Streets just west of 7th Avenue, and are enclosed on each side (north and south) by five or six four-and-five-story houses.

Attracted chiefly by the view of trees, my wife and I moved to our present quarters in the fall of 1941. Not being a bird student at that time and assuming, as people generally do, that no birds other than "English" Sparrows, Starlings, and Pigeons frequent the thickly built-up sections of the city, I did not look for birds in our trees. But seeing a male Scarlet Tanager in the spring of '42, and again in '43; finding a Hummingbird at a red geranium on the window sill; observing a Nuthatch on the trunk of the nearest tree—these experiences led me to realize that "country birds" may be seen now and then in downtown Manhattan.

It was not until April 15, 1944, however, that it occurred to me to begin keeping a record of my 14th Street birds. This was the date on which I saw what looked to me like a sparrow with a bloody pate; after studying it with opera glasses, I saw that the bird was not injured but possessed a crown of red feathers. Thumbing through my Audubon's *Birds of America*, I identified the bird as a Redpoll.

Soon I began to look for birds, and the more I looked the more birds I saw. I bought field glasses, later 8-power binoculars. I had trouble identifying birds from the Audubon pictures, and finally discovered Peterson's *Field Guide*. I enlarged my acquaintance with birds by making trips to the city parks and to the country. Of course I had many difficulties in making identifications at first. In presenting this list, however, I have made a genuine effort not to yield to wishful thinking.

I include some birds seen flying above (most of the smaller ones I can't identify), as well as birds in the trees or on the ground.

I have classified my birds as "permanent residents," "winter residents," and "migrants"; but I base these classifications upon my own observations *in this location*, not upon those of Mr. Cruickshank in his *Birds around New York City*. Strictly speaking, there are no "summer residents" *here*, except for some of the House Sparrows. As for summer

visitors, if they come in June I consider them spring migrants; if in July or August, fall migrants. (I probably miss a good many of them because of the thickness of the foliage and also because of my frequent absence from the city.) Certain birds that are permanent residents of the New York City region are seen *here* only as migrants; for example, in this record I classify Chickadees among the "migrants." The Duck Hawk is a permanent resident of the region, but for five years I have seen Duck Hawks only as winter residents.

Here is the record, including a few notes from 1951:

Permanent Residents

The only birds that are permanent residents of this neighborhood are the *Pigeons* and the *House Sparrows*. One flock of kept Pigeons is to be seen almost daily, wheeling through the air for exercise, and also some apparently free birds dart constantly from one tall building to another. I have also seen single birds and even flocks flying in a straight line across the city.

As for the House Sparrows, only one or two pair winter here as a rule; others arrive in the spring, to raise their broods, to spend the summer and most of the fall. In the fall these birds, quite numerous at this season, spend the day elsewhere but return in the late afternoon to spend the night under the eaves. These sparrows often drive away more "interesting" birds; thus they constitute an unfavorable element in this environment for the visiting birds.

Starlings, though common permanent residents of the city, rarely appear in this neighborhood. Only three birds seen: Feb. 16, 1945 (attacked and driven away by sparrows); Dec. 8, 1948; May 9, 1949.

Herring Gulls may be mentioned, since they are frequently seen flying over this part of the city in winter, and rarely in summer.

Winter Residents

Duck Hawks. The last five winters (1946-50) I have seen a Duck Hawk, and at times two hawks, on and about a tall building several blocks away. I first discovered and identified this bird on Oct. 7, 1946; the next day it perched in one spot all day long. I saw it again the following day, but not after that until Jan. 6, 1947; then again on Mar. 5. On Oct. 9, 1947, I saw two Duck Hawks; that winter I saw one or two birds at frequent intervals (on 17 days) up until Mar. 7, 1948. On Nov. 5, 1947, I saw a Duck Hawk and a *Buteo* circling about (the *Buteo* looked to me like a Broad-wing, but a Broadwing is most improbable on this date); the Duck Hawk attacked the *Buteo* and drove it away and a short time after, I saw the Duck Hawk perched on a ledge of the building plucking a pigeon. On Jan. 21, 1948, I noted pigeons streaming

across the sky in all directions and among them the Duck Hawk. During the winter of 1948-49 I saw one or two Duck Hawks on 11 dates (Sept. 24 to Feb. 3). In the fall of 1949 I discovered the Duck Hawk quite early (Sept. 2), but did not see it again until Nov. 4. I saw one or two hawks again on 13 days between Nov. 5, 1949, and Apr. 19, 1950. (On Feb. 7 I saw one of the hawks catch a Pigeon.) In 1950 I spotted the Duck Hawk on Sept. 20 and on nine other days up to and including Dec. 2. (On this last date I saw the hawk drop like a dive bomber, from a great height, onto a flock of Pigeons.) As I revise this paper, on Jan. 19, 1951, I have just seen two Duck Hawks.

On Oct. 11, 1945, a small hawklike bird pursued a smaller bird across the rooftops toward me, wheeled and flew away; it seems to me extremely likely that this was a *Sparrow Hawk*.

Migrants

Once about six years ago (I did not record the date) I caught sight of perhaps a dozen large grayish birds that flew over this house at rooftop level and rounded the corner of a taller building. I had no time to distinguish markings, but I am now convinced that these birds must have been *Black-crowned Night Herons*.

Laughing Gulls. May 6, 1950 (overhead); May 26, 1951.

Black-billed Cuckoos. Sept. 23, 1947; Sept. 9, 1950 (immatures).

Yellow-billed Cuckoo. Sept. 26, 1949.

Ruby-throated Hummingbird. Spring of 1943 (at geranium on window sill).

Belted Kingfisher. March 22, 1951, female seen at 7 a.m. and 11:30 a.m.-1 p.m., perching in the tree and on a building.

Flickers. Regular visitors in the fall; seen on 15 dates between Sept. 25 and Oct 23; also, when there are waves of migrating birds passing overhead I usually recognize Flickers among them. Only two spring birds: Apr. 11, 1947; Apr. 7, 1950.

Yellow-bellied Sapsuckers. Eleven fall birds: Sept. 24-Oct. 16.

Hairy Woodpeckers. July 8, 1949; (or Downy?) Sept. 21, 1949; Nov. 6, 1949 (2). (Woodpeckers do not, as a rule, remain here more than a few minutes.)

Crested Flycatchers. Sept. 21, 1947; May 31, 1949.

Phoebes. I have 14 fall dates for Phoebes: Sept 21-Oct. 24. Phoebes seem to feel quite at home here, and have stayed, I feel sure, for two or three days. My only spring dates are Mar. 28 and Apr. 8, 1949.

Yellow-bellied Flycatchers. June 12 and Oct. 6, 1945; Sept. 25, 1946.

Wood Pewees. Seven spring birds: May 11-June 2; five fall birds: Sept. 13-17. Singing Pewees, May 22, 27, 1951.

Least Flycatchers. (some may be other *Empidonaces*). Six spring birds: Apr. 29-May 30; 12 fall birds: Aug. 16-Oct. 14.

Blue Jays are regular visitors, spring and fall; I've seen 38: May 7-June 13; Sept. 22-Oct. 29. Flock of six on May 8, 1948. Often the Jay comes in screaming—terrifying and enraging the House Sparrows.

Chickadees. Seen only in Oct., 1949 (eight birds, Oct. 2-23); on the first date three birds announced themselves with their characteristic name-call.

White-breasted Nuthatch. Spring, 1943.

Red-breasted Nuthatches. Sept. 13, 16, and Oct 9, 1946; Sept. 22, 1948; Sept. 26, 1949.

Brown Creepers are regular in the fall (26 birds). One appeared on the remarkably early date of Aug. 31 (1949); other dates: Sept. 24-Oct. 29. This bird is always heard giving its shrill little cry. I have not yet seen the Creeper here in the spring.

House Wrens. Oct. 16, 1944; Oct. 8 and 15, 1948; Sept. 25, 1950.

Winter Wrens. Oct. 11, 1945 (2); Oct. 3, 9, and 22, 1947.

Catbirds. Five in May; one on Aug. 19, 1945; eight between Sept. 22 and Oct. 19.

Brown Thrashers are regular visitors (21 birds): Apr. 29-May 18; Sept. 13-Oct. 2.

The *Robin* is a fairly common bird in this locality. But I have only two spring dates: Apr. 14, 1945, and Apr. 18, 1950 (4). The Robin is the only bird, besides a Hairy Woodpecker, to visit the area to my knowledge in July: July 1 and 4, 1945; July 14 and 28, 1946; July 21, 1950. I have seen 24 Robins in the fall: Sept. 28-Nov. 7. Robins do not seem to feel at home here; they do not stay long.

Wood Thrushes. Oct. 4, 1945; May 3 and 14, 1947; May 5, 1950; heard one singing on May 22, 1947.

The *Hermit Thrush* is, next to the Junco, my commonest visiting bird. He seems to feel at home, and sometimes remains for two or three days. The numerous cats are a hazard to this ground-feeder; I once rescued a young Hermit, its wing broken, from a cat. I have seen about 75 Hermits here, only 18 being spring birds: Apr. 11-May 6; fall dates: Oct. 8-Nov. 13.

Gray-cheeked and Olive-backed Thrushes. It took me several years to learn to distinguish one of these species from the other, so that my earliest dates are confused. The Olive-back is regular in the fall (Sept. 1-Oct. 10), but I have recorded only seven spring birds: May 20-25 and June 7. On May 23, 1949, a bird sang at intervals from seven o'clock to one. I have recorded five spring Gray-cheeks: May 15-23, one a singing bird; and five fall birds: Oct. 4, 1946; Sept. 15, 1948 (2); Sept. 21 and Oct. 1, 1949. Olive-backs sang, 6-10 a.m., May 22, 1951.

Veeries. Sept. 12, 1946; Sept. 10 and 15, 1947; May 12, 1948; May 23, 1949; May 6, 1950.

Golden-crowned Kinglets. Twenty-three fall birds: Oct. 4-Nov. 1; five spring birds; Mar. 30-May 6.

Ruby-crowned Kinglets. Twenty-five fall birds: Sept. 16-Oct. 31; twelve spring birds: Apr. 13-May 16. The kinglets seem to feel at home, and the records would indicate that the birds sometimes stay overnight here.

White-eyed Vireos. Oct. 4, 1948; May 19, 1949.

Red-eyed Vireos. Sept. 8 and 26, 1949; June 3, 1950. Singing bird(s), May 22, 23, 1951.

Warblers. Until I got the 1947 edition of Peterson's *Field Guide* I had to let a number of warblers, especially fall birds, go unidentified. Most of the warblers seem to feel at home in this situation and find enough food to keep them here sometimes for hours, sometimes for two or three days. Though I have heard only a few singing warblers here, the warblers usually call attention to themselves by chipping as they feed.

Black-and-white W. Nine spring birds: Apr. 27-May 17; six fall birds: Aug. 16-Sept. 26.

Tennessee W. Two on Sept. 22, 1950. Also Aug. 19, 1951.

Orange-crowned W. Oct. 25, 1949 (and perhaps once or twice before).

Parula W. Six spring birds: May 3-17; four fall birds: Aug. 28-Oct. 4.

Yellow W. May 17, 1944; May 10, 1946; May 19, 20, Sept. 27 and 28, 1947; Aug. 30 and Sept. 8, 1949.

Magnolia W. Four spring birds: May 16, 1945; May 12, 17, 1946; May 20, 1947. Eight fall birds: Sept. 20, 24 (2), Oct. 3, 1947; Sept. 22, 29, 1948; Sept. 10, 1949; Sept. 20, 1950.

Cape May W. May 17, 1946 (female).

Black-throated Blue W. Sept. 27, Oct. 10, 1945; May 13, 1946 (f.); May 13 (f.), Sept. 24, Oct. 2 and 3, 1947; May 9, 1948; Sept. 19, 1949.

Myrtle W. Twenty-two fall birds: Oct. 3-Nov. 1; only four in spring: May 2 (2), 6, and 17, 1946.

Black-throated Green W. Thirteen fall birds: Oct. 4, 1945; Sept. 22, Oct. 13, 1946; Sept. 24, 26, 27, Oct. 1 (2), 10, 1947; Sept. 11, 26 (2), Oct. 1, 1949; only two spring birds: May 17, 1947; May 1, 1948.

Chestnut-sided W. Three birds on Sept. 17, 1947.

Bay-breasted W. Sept. 7 (2-3 birds), 8, and 20, 1949.

Black-poll W. Eight spring birds: May 17, 1945 (2); May 23, 1946; May 19, 1949; May 20, 31, June 1 (2), 1950: nineteen fall birds: Sept. 26, 27, Oct. 1 (3), 2, 3, 1947; Sept. 14, 1948; Sept. 25, 26, 29, 30, Oct. 1 (2), 2, 16, 1949; Sept. 20, 21, 25, 1950.

Prairie W. May 2 and 3, 1947.

Yellow Palm W. Apr. 29, 1946.

Ovenbirds. Sixteen spring birds: Apr. 29-May 24; three in fall: Sept. 26, 1946; Aug. 30 and Sept. 26, 1947. This bird is usually seen walking on the ground, as in the woods.

Louisiana Water-thrushes. May 17, 1946; Aug. 4, Sept. 3 (North-ern?), 1950.

Connecticut or Mourning W. ? Three times (Oct. 14, 1946; Oct. 9, 1947; Sept. 22, 1950) I glimpsed warblers that must have been one of these two species, but each time I have been unable to make a positive identification. Singing male, Mourning W., May 26, 1951.

Yellow-throats. Thirteen spring birds: May 3-31 (one killed by a cat); three in fall: Aug. 28 and Sept. 20, 1947; Sept. 29, 1948.

Wilson's W. May 21, 1945; Sept. 14, 1946; June 7, 1948.

Canada W. May 15 and 23, 1947; May 23, 1949 (2); May 25, Sept. 18 and 22, 1950.

Redstarts. Seven spring birds: May 18, 1945; May 16, 17, 23, 1946; May 26, 1949; May 24, 25, 1950; seventeen fall birds: Sept. 23, 1944; Sept. 9, 1945; Aug. 12, 1946; Aug. 28, 29, Oct. 1, 1947; Aug. 5, Sept. 26, 29, 30, 1949; Aug. 24, 30, 31, Sept. 2, 14, 20, 27, 1950.

Bobolinks. Heard characteristic "spink" at 6:30 a.m., Aug. 25, 1950; bird(s) flew before seen.

Baltimore Orioles. May 17, 1946 (2); two imm., Sept. 25, 1949. July 24, 1951: atypical Oriole; long white patch on wing; entire back and back of head orange.

Grackles. Oct. 21, 1948 (3).

Scarlet Tanagers. It was, I have related, the brilliant spring male Tanager, seen in 1942 and again in '43, that first startled me into the realization that not all back-yard birds are English Sparrows. Since 1943 I have seen the spring Tanager May 14 and 20, 1947, and May 23, 1950. But I have seen 15 fall Tanagers: Sept. 12-Oct. 11. These birds sometimes spend the entire day hereabouts, and, I believe, sometimes stay more than one day.

Rose-breasted Grosbeaks. Sept. 26, 1946 (m.); Sept. 21, 1950 (2 imm.).

Indigo Buntings. Oct. 1 and 3, 1947 (both f.).

Purple Finches. Oct. 11, 1945, and Apr. 26, 1949 (both males; the April bird sang).

Redpoll. Apr. 15, 1944.

Goldfinches. Nov. 13, 1947; Oct. 19, 1948 (3).

Towhees. Regular visitors, spring and fall. Eighteen spring birds: Apr. 27-May 23; eight in fall: Oct. 1-11. The Towhee, like the Hermit Thrush and the Junco, is often on the ground and much in danger from cats.

Savannah Sparrows. Oct. 4, 1948; Apr. 27, 1950 (2).

Grasshopper ? Sparrow. Oct. 20, 1947 (immature bird, streaked; a probable identification).

Slate-colored Juncos. The Junco is the commonest of my backyard birds in the fall; I have seen about 95 Juncos at this season, sometimes in small flocks: Sept. 29-Nov. 24, and one on Dec. 29, 1950. But spring Juncos have been few: one on Feb. 20, 1945; five in March; four in April; two in May (May 6, 1947; May 10, 1950). I usually see the Junco feeding on the ground.

Tree Sparrow. Nov. 15, 1949.

Chipping Sparrows. May 10-11, 1948; Oct. 18, 1949, May 10, 1950.

Field Sparrows. Oct. 14, 1946; Oct. 9 (3) and 24, 1947; May 10, 1950.

White-crowned Sparrows. Oct. 9, 1944 (2).

White-throated Sparrows. These birds are very common visitors, following the Juncos and Hermit Thrushes in numbers. My first acquaintance with this bird occurred on May 2, 1944, when I heard a thump at the window and found a pair of these beautiful little birds bouncing up and down on the window ledge (looking at their reflections, I suppose). I have seen 20 White-throats in the spring (Apr. 17-May 19) and about 45 in the fall (Sept. 24-Nov. 2).

Fox Sparrows. Early spring migrant: Mar. 14, 1945; Mar. 25, 1947; Mar. 19, 1948; late fall migrant: Nov. 12, 1944; Oct. 15, 1948; Oct. 25, 1949.

Swamp Sparrows. May 2, Oct. 9 (imm.), 1947; Apr. 17, 1948; Oct. 16 and 19, 1949; Oct. 16, 1950.

Song Sparrows. Nine spring birds: Mar. 20-31 and May 31 (several of these birds sang); 14 fall birds: Oct. 1-25.

I find that I have presented a list of 79 species of birds that I have identified from my apartment windows, besides at least five or six other species which, through inexperience or insufficient opportunity for observation, I have been unable to identify positively. Thus it would seem to be well established that most of the commoner passerine birds, and some of the relatively uncommon ones, do not hesitate to settle for a few moments, and sometimes for several days, in the back yards of Manhattan. Also one *may* occasionally see various species of hawks, or marsh or water birds overhead.

Some Additional Comments

"*Bird Days.*" As waves of migrating birds pass over Manhattan, the result for me is the occurrence of what I call "bird days." My best bird day so far has been October 9, 1947, a warm, partly cloudy day

with, I believe, a southerly wind. I was awakened by bird calls at about six o'clock. During the next two hours hundreds of birds passed overhead, all flying *north* (a local movement, probably—and not the only time I have noted flocks of birds flying northward in the fall, at this location). Of the flying birds, I could recognize numerous Flickers. My two Duck Hawks turned up for the first time that fall. In the trees outside there appeared, between six and eight o'clock, a Flicker, three Sapsuckers, a Winter Wren, two Hermit Thrushes, a small flock of Ruby-crowned Kinglets, a Junco, a Song Sparrow, a Swamp Sparrow, and about a dozen White-throats. Later that day I saw a Creeper, a Connecticut or Mourning Warbler, and three Field Sparrows.

Species Seen Most Frequently, with number of visits given in parentheses. Junco (c. 105), Hermit Thrush (c. 75), White-throated Sparrow (c. 65), Olive-backed Thrush (c. 45), Blue Jay (38), Ruby-crowned Kinglet (37), Robin (34), Golden-crowned Kinglet (28), Black-poll Warbler (27), Brown Creeper (26), Myrtle Warbler (26), Towhee (26), Redstart (23), Song Sparrow (23), Brown Thrasher (21), Scarlet Tanager (20), Ovenbird (19), *Empidonax* (18), Phoebe (16), Yellowthroat (16), Flicker (15 perching, many flying), Black-and-white Warbler (15), Black-throated Green Warbler (15), Catbird (14), Pewee (12), Magnolia Warbler (12), Sapsucker (11), Gray-checked Thrush (10?), Parula Warbler (10).

Total Number of Visiting Birds Seen. Eliminating Pigeons, House Sparrows, and Gulls, and birds flying overhead, I have recorded about 1000 birds in this location during the seven-year period 1944-50.

Fall and Spring Birds. During the seven years 1944-50 inclusive, I have seen an average of about 40 visiting birds each spring and a little over 100 visiting birds each fall. It is striking that I have seen 26 Brown Creepers and 11 Sapsuckers in the fall, but none of either species in the spring; other species have been common in the fall and more or less uncommon in the spring. (See data.)

Singing Birds. Few visiting birds feel sufficiently at home in this area to sing. But I have heard the Song Sparrow singing on three occasions. Of the thrushes, the Gray-cheek and the Wood Thrush have given out brief bits of song, and an Olive-back once sang boldly at intervals from 7:00 to 1:00. I have had three singing Redstarts: on Aug. 28-29, 1947, May 24, 1950, and Aug. 30, 1950. Two Black-polls sang on June 1, 1950. Lastly, a Purple Finch wakened me with its rich voice on April 26, 1949 (but took flight the moment it saw me looking at it). In 1951: Pewees, May 22, 27; Olive-backs, May 22, 26; Red-eyed Vireo, May 22, 23; Ovenbirds, May 9, 13; Mourning Warblers, May 26; Redstart, May 7; White-throats, May 9, 11.

Notes on the Northward Movement of Certain Species of Birds into the Lower Hudson Valley

ROBERT F. DEED

In some ways, we Rockland County birders haven't much to brag about. We have no extensive salt flats that would make our territory a mecca for shorebird enthusiasts. We have no broad freshwater swamp. We have no counterpart of Hawk Mountain. But we do have the peculiar fascination of being in a transitional zone where Canadian and Carolinian species meet and often intermix.

In the Highlands west of Bear Mountain, for example, the zones are vertical rather than horizontal. At one altitude you'll find the Hooded and Worm-eating Warblers nesting; walk 15 minutes upgrade, a few hundred feet higher, and you are on the breeding grounds of the Blackburnian Warbler and the Brown Creeper.

A notable phenomenon in my own experience of a mere 20 years of birding in Rockland County has been the generally steady, though sometimes repulsed, northward extension of several species in their range. In this 20 years I have seen the Tufted Titmouse, Cardinal and Turkey Vulture become common over most of the county. There has been a rapid increase in records for the Laughing Gull, Double-crested Cormorant, Little Blue Heron, and the American and Snowy Egrets. The Carolina Wren, too, has surged into our county's segment of the Hudson Valley . . . and has as quickly receded into New Jersey.

Rockland County is a pie-shaped sector of New York State, tucked against the New Jersey line, with the Hudson River as the "crust" on the east. It measures only about 25 miles north and south, and about 15 miles east and west. At the junction of the New Jersey border with the west bank of the Hudson, the Palisades extend two or three miles into our county. Then, to the north, comes a line of hills slightly back from the river and ranging from 300 to 750 feet high. North of Haverstraw is a low spot in the western wall of the Hudson for four or five miles. Then the Hudson Highlands start at Stony Point, rising 1100 to 1300 feet.

Each of these topographical changes along the Hudson Valley has been a significant tide-mark for birds. Each break in the wall of the valley seems to have been a Rubicon for some southern species. The river itself has been a barrier to movement northeastward.

Back in the 30's, for example, the Cardinal and the Carolina Wren seemed to move northward almost in unison. First, we would find them only as far north as the Palisades extended. Next, they had followed the hills north past Nyack. Then a few venturesome souls leap-frogged past Haverstraw to the southern edge of the Highlands. In the case of

these two birds, we chartered the advance generally at about two miles per year.

The Turkey Vulture, too, has been an excellent example of the trend—to leave the Cardinal and Carolina Wren for a moment.

In 1844 DeKay called the Vulture an occasional summer visitor to Long Island and the Hudson Valley. Fisher, a noted observer in Ossining, on the eastern side of the Hudson opposite Rockland Lake Landing, called the Vulture in 1898 an accidental visitant. L. W. Brownell's list for Rockland County ten years later showed no record of the Vulture.

My own first experience with Turkey Vultures was in northern New Jersey. Not until March 30, 1930 did I sight one in Rockland County. I saw only one in each of the two succeeding years. But by 1934 they had suddenly become numerous as far north as Bear Mountain, the northern limit of our county. I saw one flock of eight that year, and a relief worker on a highway project near Bear Mountain found a fledgling, not long out of the nest, as proof of breeding. In 1935 I recorded a total of 36 Vultures; in 1936 I recorded 161 Vultures, including one flock of 30. The 1940 Bear Mountain Trailside Museum check-list notes that the Vulture is becoming more common every year. In less than 20 years, the Turkey Vulture has gone from zero to abundance in our county.

Chapman's list for the New York area in 1894 regards the Tufted Titmouse as a local resident only on Staten Island, forty miles to the south. Griscom's similar list in 1923 continues its status as accidental except on Staten Island. On the east side of the lower Hudson, John Kuerzi's list shows only six records from 1874 to 1924.

Twenty years ago the Titmouse could be found—and not too frequently at that—only along the southern fringe of Rockland. Today it is widely distributed, except for being still uncommon in the Highlands in the north. Many of my daily field lists in April and May show the Titmouse outnumbering even the ubiquitous Chickadee.

Now, back to the Cardinal. This bird was rated by DeKay in 1844 as a summer visitant in the coastal region of the state, by Fisher at Ossining in 1898 as an accidental visitant and by Griscom in 1923 as "nearly extirpated" in the Hudson Valley. Mearns' list for the Hudson Highlands in 1890 notes only one record, May 17, 1876. Brownell's Rockland County list in 1908 reports the Cardinal as an uncommon breeding resident.

Contrast these unhopeful reports with the present status of the Cardinal. In 1930 I knew of one pair in Nyack. On one daily walk of eight blocks on the way to work, I have counted at least three pairs near my Nyack home, and I know of innumerable other pairs for miles north and south. The Cardinal has become abundant, a characteristic bird of suburban Rockland along the Hudson. It has even reached into the

Highlands. The 1940 Bear Mountain check-list reported it only as an irregular visitor to Jones Point, on the southern edge of the mountains. It shows records only in April, May and September. Only last Christmas census, I found two Cardinals very much at home at Jones Point, and I have seen them in several other localities on the rim of the Highlands in recent years.

The Laughing Gull has sharply increased. In 1890, Mearns called it an occasional winter visitant to the Hudson Highlands, which sounds dubious today since the bird is least common in winter. Griscom's Hudson Valley list in 1923 noted that this gull was *becoming* common. Today it *is* common. In summer and fall it far outnumbers the Herring Gull.

The Double-crested Cormorant, too, seems to have moved up the Hudson Valley. Mearns' Hudson Highland list in 1890 contained only two records for this bird. In 1940 it was still considered a rare migrant as far north as Bear Mountain. In more recent years it has been common enough, at least off Nyack and Piermont. Whether this represents a cyclic surge or a genuine northward advance remains in doubt at this moment. But I have seen half a dozen in a day near Nyack.

The case of the so-called "white herons" cannot be claimed, either, as a northward advance of range. It is more a restoration of former conditions. Thanks to the Audubon Society's program of protection on the breeding grounds, these beautiful birds have become almost commonplace in our area. I would like, however, to recall that Griscom's Hudson Valley list in 1923 appraised the Little Blue Heron as casual, the American Egret as having been recorded only seven times up to September, 1921, and the Snowy Egret as "extirpated" . . . just that . . . extirpated! Last year we recorded at least one Snowy Egret in Rockland County, and we've had the other two species by the dozens for the past two summers.

There is one remaining species whose story is the strangest of all. That is the Carolina Wren, one of my favorite birds.

According to Brownell's list up to 1908, it was a rare resident in Rockland County. Griscom in 1923 called it an irregular resident, adding that it had become scarce since the severe winter of 1917-18. That qualification gained meaning in our own observations.

When I first became acquainted with the Wren it was a rather rare resident along the foot of the Palisades cliffs in New Jersey, opposite the upper end of Manhattan Island. Around 1930 it crossed the New Jersey line into Rockland County on its northward march. It became quite common and conspicuous along the river edge as far as the hills north of Nyack during the early 30's. The high-water mark seemed to be reached when we found it singing on the shore just south of Haverstraw in January, 1936. A few had penetrated, probably not as permanent residents, another ten miles farther north to Bear Mountain.

The Carolina Wren seemed to be well established by the winter of 1935-36, occasionally even appearing several miles inland from the Hudson River. Then came a series of snow storms and ice storms, accompanied by bitter cold, in late January and February, 1936. The Carolina Wren simply vanished. To this moment we have not found a single specimen in Rockland County, though they have been reported again along the Palisades, five or ten miles south of the New Jersey border. Are they again working their way northward, as they did after the 1917-18 winter mentioned by Ludlow Griscom?

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Rockland Audubon Society, Nyack, N. Y.

GENERAL NOTES

Notes on Early Least Bittern on Long Island.—On February 17, 1949, a male Least Bittern (*Ixobrychus e. exilis*) was picked up alive from a slight depression along the boardwalk fronting the ocean at Lido Beach.

As far as the writer knows, this record precedes all others in this region by over two months. The earliest record in Cruickshank's "Birds Around New York City" is one at Troy Meadows, April 21, 1929 (Urner), and the next earliest, one at Van Cortlandt Park, Bronx County, April 23, 1939 (Norse).

The section of the boardwalk where the little bittern was found is in front, toward the center, of the tall block-long Lido Beach Hotel, close against the ocean; a difficult obstacle to fly over for a transocean-weakened bird, and a very unlikely spot to find a winter-weakened specimen should it be moving out of unfavorable marsh bordering the bay to the rear. Moreover, the bird's plumage was in excellent condition with well-groomed bill and feet and did not appear winter-harassed in any respect. It is presumed, therefore, that the bird had shortly arrived from the south.

The bittern was picked up at 4 p.m. by Harry Budwig, chief of police of the hotel (closed for the winter), was brought in and put in a box and kept overnight. The next day a call was sent in and the writer called to identify it. With this delay, unfortunately, the bird was 27 hours without food. Arriving, the writer fed it a small particle of fresh smelt at a time, moistened with water to slip down its throat easier. This was inserted well back of its open mandibles, and upon releasing its bill, the bird swallowed well. The procedure was repeated five or six times and after an interval of 20 to 30 minutes four or five more were swallowed.

Arriving home with the bird after an automobile ride of one-half hour, and trying it out briefly in a cattail marsh, it appeared weakened by the cool 40-45 degrees Fahrenheit, and was placed near a steam radiator for the night. With the heat it revived almost immediately.

The next morning it seemed somewhat alert, was fed again, but appeared rather slow in its leg movements, one of which was slightly twisted, as if it had struck something, perhaps the hotel. The bird's plumage contained some lice. Apparently it had digested its food well from the night before and excreted in true bittern fashion. After again feeding it, I let it select a spot apparently to its liking as I departed for the greater part of the day. This, unfortunately, was under a low piece of furniture on the floor. The room temperature was set at 65 degrees

but the floor was perhaps 10 degrees colder. Arriving home in late afternoon I found that the little bittern had died and had already turned cold.

For those finding such waifs, it appears worthwhile mentioning that I believe the bird died of the cold and had it been retained within its box of torn up paper in a warm place, it probably would have lived somewhat longer, but might not have survived into the warm spring weather, an apparent necessity for its survival.

Relative to its behavior, the bird showed an indefatigable defense against a close approach by drawing back its head and instinctively pointing its sharp-pointed rapier-like bill menacingly at the intruder. It succeeded in drawing blood by striking the finger of the hotel's engineer who offered to give it a drink, and the thumb of the writer by darting its head forward to the full extent of its neck with lightning rapidity. Once it sprang upward, striking me on the chin. After feeding it for several times it endured handling, but at the next approach, one or two hours later, it appeared as menacing as ever. On occasion, the Least Bittern can draw itself remarkably thin and slide between reeds very close together. Again, when assuming a threatening attitude it swells up its body, elevates its breast and throat feathers and becomes about one and a half times its normal size. It can point its rapier point back to or slightly past perpendicular. It weaves back and forth continually when aroused with its front puffed out. It began on the slightest provocation and, when timed, it swayed an average of 43 times a minute.

The Least Bittern appears to be poorly fitted for cold weather and although, according to Cruickshank, there was a bird collected on "the remarkable date of December 12, 1895", now in the American Museum of Natural History, it seems very improbable that the species could survive through a northern winter; and probably the reason that early May is their usual arrival date is because of associated warm weather and an abundance of food.—JOHN J. ELLIOTT

Gadwall Nest Found on South-Western Long Island.—While it is well known that the Gadwall recently nested in the vicinity of Jones Beach, Nassau County, Long Island, it was not until 1949 that the first local nest was discovered. Young Gadwall were first noted in 1947 in the pond of the Tobay Beach Bird Sanctuary. Despite the fact over a hundred young were hatched out in 1947 and 1948 in this small area, the nest and eggs of this locally common duck had not been found. To clear up this matter was the resolution made by the authors for 1949.

Knowing that the Gadwall nested from mid-June through August, (from our brood records), and with one slender clue, we decided to track down the elusive nests. The clue referred to was the sight of three ducklings crossing the concrete road that runs south of the fresh water pond.

During July 1947, we saw this small group of young ducks trying to get across the road to reach the pond, but by the time we had halted the car and backed up to the place the birds had been seen, there was no trace of them, though we beat the brush and grass in that general vicinity. Undoubtedly they were young Gadwall making way to the pond, from their nest, for they were a good deal buffier than the duckling Black Duck. Again, the Black Duck would not choose a nesting area, so far from the pond, for this nest must have been in the dune area, near the ocean front. In 1947 and 1948 we had combed the shore of the pond for nests, but had not suspected that the Gadwalls might build so far from the fresh water, where they and the young gathered after the hatchings.

June 4, 1949, we arrive at the nesting area before dawn, with clear calm weather favoring our search. At least five pair of Gadwall were flying about the pond. It was easy to see that the pairs and trios were in the midst of mating tactics. The following are some of the typical observations of that date. Gadwall were flying off the dry ground from among the brushy and sandy areas to the south of the pond, generally in pairs. Two males pursued a female from the pond, over the ocean and back to the pond. The female called as it alighted in a tone much like a Widgeon, and very unlike the Mallard call usually heard from the duck Gadwall. All the mating flights leveled off at about one hundred and fifty feet, and held that height until they landed on the pond or the brushy, grassy area south of the pond. As we approached the south side of the pond, several pairs of Gadwall flushed from the ground, usually a sandy patch near dense bushes. Many were reluctant to fly until we were very near to them. At these points we dug through the nearby bushes for telltale nests, but were disappointed each time. While searching, a pair landed not twenty yards from us and when we rushed to see where they were, they flew up; but the search revealed just a few footsteps in the sand.

We decided to change our tactics, and watch the ducks from the road. By noting their habits and passages, we thought that we might be able to trace down the general pattern of the pairs, and thus be able to locate the nests so much easier. But after two hours of following the birds in flight and then locating their landing points, we were no wiser than we had been early in the morning. Therefore, with great energy and no artifices, we boldly struck across the brush and grass, and succeeded in raising five or more pair, but with no nest for our troubles. However, we felt that the birds did or would nest where they were landing, and that the nest would be under one of the many bushes that abound on the south side of the pond, and that the birds would be found nesting not only near but at a distance from the pond's edge.

On June 12, 1949, while reconnoitering for nests, a female Gadwall was flushed from an area that had been combed the previous week, for

nesting ducks. We raced to the spot vacated by the Gadwall, and found a nest with five eggs. The nest was in the middle of a low bayberry bush, placed slightly below the soil level. The nest faced southeast, but so well concealed was the site, that it was invisible except from one particular point. The situation was about twenty-five yards from the pond and three times that distance from the road. The nest was on damp ground, and was slightly lower than the sandy soil, and seemed to be worked into the roots of the bush. The bayberry bush was the closest to the pond of any of that species, and isolated from the larger and more colonial groups of bayberry that abound at that point. At the entrance of the nest was a light growth of thin wire grass, making a clearing, while about the nest and bush were noted: three-square sedge, flat-topped golden-rod, phragmites, poison ivy, and marsh fern. The nest was about eight inches in diameter, and not more than three inches deep. There was little evidence of down feathers in the nest, which was composed mainly of thin long grasses. The female Gadwall we had flushed flew to the pond, staying as close to the nest as the water would allow.

We again visited the nest, June 18, 1949, and found seven eggs, and a great deal of down in and about the nest. The female Gadwall flushed very closely, and circled low over our heads before settling on the pond. The bayberry bush which had been sparsely foliated the week before was fuller and more dense, while the phragmites and surrounding plants had grown very rapidly, and almost enclosed the small bayberry bush.

On July 10, 1949, we found the nest with eight eggs, which appeared to be the full clutch. It was found only with great difficulty, as the weeds and grasses almost completely enveloped the nesting bush.

July 17, 1949. The nest was vacant, but one egg, infertile, was still present. Thus presumably seven young, among the many on the pond that day, had come through.—WALTER SEDWITZ, IRWIN ALPERIN, MALCOLM JACOBSON.

Occurrence of European Teal on Long Island.—The frequent occurrence of *Anas crecca* on Long Island in recent years has opened the possibility of derivation from captives raised by local breeders in some numbers. In this connection Mr. C. L. Sibley, owner of Sunnyfields Farm, Wallingford, Conn., wrote me on February 5, 1947:

“(European Teal) do not breed as readily in confinement as our native Green-wing. We bred them in 1935 and for some years thereafter. I don't know what other fanciers did so. However, none (of ours) escaped, as we pinioned the ducklings at hatching time. . . . Importers brought in a large number of them after 1930, most of them not pinioned. It is possible that some of these unpinioned birds,

sold to inexperienced amateurs, escaped and subsequently bred in this country. Quite a few Long Island duck breeders got them, and it is logical to believe that those found (around New York in the wild) are either escapes or young birds bred from escaped birds."

The most telling arguments in support of Mr. Sibley's hypothesis are (1) the nearly complete absence of current North American records of *A. crecca* outside of the New York City region, and (2) the fact that the sudden regularity of European Teal in New Jersey and Long Island coincided with the importation of this species by dealers. An equally formidable contradiction is the complete absence of local records between mid-May and mid-October (Cruickshank, "Birds around New York City," pp. 98-99) and the very decided implication that in this area *A. crecca* is as migratory as *A. carolinense*.—J. J. HICKEY

Copulatory Behavior in the Least Tern.—On May 26, 1946, H. Darrow, R. H. Herbert, I. Kassoy and the writer, while on Long Island near the Jones Beach causeway leading to Short Beach, noticed two Least Terns (*Sterna albifrons antillarum*) close to each other on the sand, a few feet from the water. One bird, presumably a male, had a small fish in his bill for which the other, apparently an adult female, was begging, much in the manner of a fledgling. From time to time, the female tried to snatch the fish away, but the male evaded by moving his head up and aside. The female then crouched low before him, but the male did not respond. Finally she actually pushed herself under him, and, after some moments of hesitation, he mounted, permitting her to take the fish from his bill as copulation was effected.

Fish presentation is frequently noted among the terns, but it is, usually at least, independent of copulation. Tompkins states, however, that the Least Tern "offers food to his mate before copulation, and giving it appears to be an indispensable part of pre-copulation behavior" (*Auk*, 61: 266, 1944). I have found no reference to a male tern's withholding the fish until coition was achieved, unless this be implied from the terse statement in "The Handbook of British Birds", 5:40, 1941 as to the European Little Tern (*S. a. albifrons*): "F. Goethe describes coition immediately following presentation, male mounting female as she takes the fish".

Instances in several unrelated species where the male held food in his bill which he relinquished to the female during or immediately following copulation are mentioned by Lack in the article "Courtship Feeding in Birds" (*Auk*, 57:171, 1940), and Thomas records an occurrence of this sort in the Yellow-billed Cuckoo (*Coccyzus americanus*) (*Proc. Linn. Soc. N. Y.* Nos. 43, 44: 46-47, 1934).—EUGENE EISENMANN.

The Prairie Warbler on Long Island.—The energetic, ascending, wiry trill of the Prairie Warbler (*Dendroica d. discolor*) is one of the characteristic bird songs of the great pine barrens of eastern Long Island from mid-May into early July and to a lesser degree later. In this dry habitat of scrub oak and pitch pine three or four males may sometimes be heard singing from a commanding post in the scrubby hills around Mt. Sinai, and five or six from the top of the bridge crossing the railroad about a mile northeast of Moriches on the Riverhead road, an excellent vantage point.

In these areas, their territories adjoining or nearly so, land blocks being large and the terrain uniform, the birds are closer than in the more or less developed areas, with buildings erected, or in course of construction, and streets cut through.

Throughout southern Nassau County, the Prairie Warbler's territory, although not great, has been somewhat reduced with post war building, especially in Massapequa and to a lesser degree in Seaford and North Bellmore. Westward there are no extensive areas. On the north shore of Nassau County scattered pairs may be found, a slight increase occurring in the scrub around Oyster Bay, Cold Spring Harbor and eastward. Suffolk County has also been developed with a few airports, and here and there new sections opened up, but for the most part it is unaffected.

The Prairie Warbler breeds over Long Island wherever dry scrub oak lands are sufficient for its needs. It is also found on dry hillsides covered with brushy tangles and breeds well down on both flukes of eastern Long Island.

Along in early July, an adult may be seen, worm in bill, flitting through the scrub on the way to feed the young. On one hot summer day near Mastic, while looking over a fire-blackened area, I observed several species of birds feeding along the edge which included a couple of Towhees. Among them was a male Prairie Warbler which showed a liking for, and moved out into, the burned area, its conspicuous yellow breast the only bright spot in the desolation. The other birds kept to the edges of the blackened tract, but the Prairie Warbler flew a hundred feet or so and alighted on a burned pine and sang from the topmost branch, a couple of feet of which offered the only greenery over a wide area.

Scrub fires appear, for the most part, to be beneficial in making up the Prairie Warbler's habitat. When scrub oaks become high and dense in solid wooded areas, as they occasionally do in richer ground, the Prairie Warbler vacates. Occasional brush fires devitalize the ground, open up, or keep open, small tracts which become vegetated with blueberry and other low ground cover, while the scrub oak breaks out afresh into clumps making the ecological conditions suitable once more in a few years.

Allan D. Cruickshank (1942) states that "In recent years the Prairie Warbler has shown a marked increase in many sections away from Long Island". Joseph Janice (1938-1939) remarks that in the "rolling scrub oak-pine country" known as the pine brush section halfway between Schenectady and Albany, he, with another observer, found a colony of about two dozen pairs. These they looked upon as an increase in numbers near the extreme northern extent of the species' nesting limits. to be the full clutch. It was only with great difficulty that we found the nest, as the weeds and grasses almost completely enveloped the nesting bush.

Increases, or a more northerly range, therefore, may have something to do with the remarkably late fall reports of recent years. At any rate, Cruickshank states that after the end of September, the species is purely casual, with several records sprinkled through October, "the latest from Freeport, Long Island, October 24, 1936 (Cruickshank)". Since then I find the following records, all later, two by over three weeks! Gilgo, October 25, 1947; Massapequa, November 9, 10, 1947; Jones Beach, November 18, 1944, all by the writer. Another report of a Prairie Warbler seen comes from Prospect Park, also on November 18, 1944 (R. Grant, J. Soll). All of these, except the Jones Beach record, are listed in Long Island Bird Notes.

CRUICKSHANK, A. D. 1942. Birds Around New York City. Am. Mus. Nat. Hist., Handbook Series No. 13. p. 400.

JANICE, J. 1938-39. Faunal Records from Eastern New York State. Proc. Linn. Soc. N. Y., 50, 51. p. 29.

Long Island Bird Notes, a weekly column appearing Saturdays in the Nassau Daily Review-Star, Rockville Centre, Long Island, publishing weekly Long Island observations. Available for reference at libraries of the National Audubon Society and The American Museum of Natural History.

—JOHN J. ELLIOTT

Warbler Dates for Central Park.—Average migration dates for warblers in Central Park are here arranged to show their relative position chronologically. The spring arrivals were compiled by Mr. and Mrs. Rich from 1932 to 1945, the departures being from the author's records during the same years. The fall tables are from observations by the author in the five years 1934, 1937, 1939, 1940 and 1941.—GEOFFREY CARLETON

SPRING ARRIVALS

April	16 Pine Warbler	May	1 Prairie Warbler
	16 Yellow Palm Warbler		1 Yellow-throat
	19 Myrtle Warbler		3 Chestnut-sided Warbler
	19 Louisiana Water-Thresh		3 Redstart
	23 Black and White Warbler		4 Blue-winged Warbler
	29 Northern Water-Thrush		4 Nashville Warbler
	30 Oven-bird		4 Black-throated Blue Warbler
May	1 Parula Warbler		5 Magnolia Warbler
	1 Yellow Warbler		5 Hooded Warbler
	1 Black-throated Green Warbler		6 Blackburnian Warbler

SPRING ARRIVALS (*Continued*)

May	7	Worm-eating Warbler	May	9	Canada Warbler
	8	Golden-winged Warbler		10	Bay-breasted Warbler
	8	Cape May Warbler		11	Wilson's Warbler
	8	Black-poll Warbler		16	Tennessee Warbler
	8	Chat		22	Mourning Warbler

SPRING DEPARTURES

April	24	Pine Warbler	May	27	Black-throated Blue Warbler
May	5	Yellow Palm Warbler		28	Blackburnian Warbler
	13	Hooded Warbler		28	Chestnut-sided Warbler
	14	Cape May Warbler		30	Parula Warbler
	16	Blue-winged Warbler		31	Wilson's Warbler
	17	Golden-winged Warbler	June	1	Black-throated Green Warbler
	18	Worm-eating Warbler		2	Magnolia Warbler
	20	Nashville Warbler		2	Redstart
	20	Bay-breasted Warbler		3	Oven-bird
	20	Prairie Warbler		3	Yellow-throat
	20	Chat		3	Canada Warbler
	21	Tennessee Warbler		4	Northern Water-Thrush
	21	Myrtle Warbler		4	Mourning Warbler
	22	Black and White Warbler		7	Black-poll Warbler

FALL ARRIVALS

Aug.	1	Northern Water-Thrush	Aug.	26	Chestnut-sided Warbler
	1	Redstart		28	Magnolia Warbler
	5	Black and White Warbler		31	Cape May Warbler
	8	Golden-winged Warbler	Sept.	1	Nashville Warbler
	9	Blue-winged Warbler		3	Black-throated Green Warbler
	15	Canada Warbler		3	Wilson's Warbler
	16	Yellow-throat		5	Western Palm Warbler
	22	Oven-bird		6	Parula Warbler
	23	Tennessee Warbler		6	Black-throated Blue Warbler
	24	Blackburnian Warbler		6	Black-poll Warbler
	25	Prairie Warbler		18	Myrtle Warbler
				22	Yellow Palm Warbler

FALL DEPARTURES

Aug.	28	Worm-eating Warbler	Oct.	1	Nashville Warbler
Sept.	1	Blue-winged Warbler		1	Cape May Warbler
	5	Golden-winged Warbler		2	Magnolia Warbler
	11	Canada Warbler		2	Yellow-throat
	14	Bay-breasted Warbler		2	Redstart
	19	Yellow Warbler		3	Oven-bird
	19	Blackburnian Warbler		5	Parula Warbler
	19	Chestnut-sided Warbler		6	Black-throated Blue Warbler
	21	Tennessee Warbler		7	Black-poll Warbler
	24	Wilson's Warbler		11	Western Palm Warbler
	25	Prairie Warbler		16	Black-throated Green Warbler
	27	Northern Water-Thrush		26	Yellow Palm Warbler
	29	Black and White Warbler	Nov.	4	Myrtle Warbler
				9	Orange-crowned Warbler

Brewer's Sparrow on Long Island.—Brewer's Sparrow (*Spizella breweri*), a bird of the Great Basin and Rocky Mountain regions, could not be expected to occur in the Northeast except accidentally. In 1873

one specimen was collected in Massachusetts (see Chapman, 1934, "Handbook of Birds of Eastern North America" p. 534), and recently there have been two sight records from the south shore of Long Island, New York. This species is not difficult to identify in the field, and on both occasions, in addition to the distinctive color characters—pallid sandy hue, finely streaked crown, and inconspicuous cheek patch—all observers noted the slender and long-tailed appearance of the bird. (Linnaean News-Letter 1(6): 3, 4, Nov. 1947; Linnaean News-Letter 4(7): 1, 2, Dec. 1950).

The first reported occurrence of this species on Long Island was on October 26, 1947 at the Gilgo Beach Coast Guard Station in Suffolk County, a few miles east of the famous Jones Beach. This Station, planted with short-cropped grassy lawns and stunted pine trees, has been, through the years, an extraordinary bird trap, where many rare and unusual species have been recorded both spring and autumn. In fact, just a week prior to the above observation, on October 19, 1947 an adult Clay-colored Sparrow was observed here for about an hour; it was in the hope of seeing it again that the party returned—and found instead the Brewer's Sparrow, the only *Spizella* present. The observers on these occasions included Alperin, Gilbert Banner, Geoffrey Carleton, Dr. Malcolm A. Jacobson and Walter Sedwitz.

A Brewer's Sparrow was again discovered on October 14, 1950, this time at Montauk Point, by Eisenmann, Robert Grant and Mr. and Mrs. Walter Dawn. On this date a heavy flight of land birds was noted throughout the region, arriving on a "high" from the west. This movement was observed at least as far west as Buffalo, where on this day E. L. Seeber reports "one of the best waves of the season" (1950. *The Kingbird* I (1):17). A surprising variety of passerine birds was concentrated about the lighthouse area at Montauk Point. This concentration—45 species of *Passeriformes* of which 16 were *Fringillidae*—had a distinctly western tinge. Besides the Brewer's Sparrow, there were present a Dickcissel, some forty White-crowned Sparrows (an extraordinary number for our region), and an Orange-crowned Warbler. Unusually late as migrants here—possibly carried out of their normal course—were an *Empidonax* flycatcher, a Blue-gray Gnatcatcher, two or three Cape May Warblers, a Prairie Warbler, a Yellow-breasted Chat, two Grasshopper Sparrows, and a puzzling female Baltimore (?) Oriole (a dull bird largely white below). All this suggests that the Brewer's Sparrow was but one of many birds carried eastward by a westerly air mass.—IRWIN M. ALPERIN and EUGENE EISENMANN.

Memorials

Dr. Clyde Fisher

The cold facts of the career and accomplishments of the late Dr. Clyde Fisher, set down with as much restraint as could be reasonably expected of one who looked on him with affectionate admiration and walked with him weekly over the countryside for a dozen years before his death on Jan. 7, 1949, are approximately as follows:

He was born near Sidney, Ohio, on May 22, 1878, the oldest boy among the numerous offspring of Harrison J. and Amanda (Rhinehart) Fisher. He went to the public schools of that region, attended Ohio Northern University for a time and was graduated from Miami (Ohio) University in 1905 with the degree of Bachelor of Arts. In 1926 he received the degree of LL.D. from the same institution. He taught in the public schools of Ohio for some six years and then moved upward as an instructor in astronomy, botany and zoology in the public high school of Troy, Ohio. He did post-graduate work at Johns Hopkins and obtained a Ph.D. from that institution in 1913 with a thesis in botany. Shortly thereafter he joined the staff of the American Museum of Natural History and was connected with it, either as an active staff member or an occasional lecturer, to the day of his death. In the museum he worked first in the educational division and later in the astronomical section. He was a member of a photographic expedition to Bermuda in 1924 and later in the same year he reached Arctic Lapland on a botanical expedition, following the footsteps of the great Linnaeus, for whom he had a profound veneration as a pioneering scientist in botany. At various times Dr. Fisher lectured on botany, ornithology and other divisions of natural history at the University of Florida, the University of Tennessee and Cornell University.

In 1925 the American Museum of Natural History sent Dr. Fisher to Europe to inspect the planetariums in which had been installed the now famous Carl Zeiss projectors for the display of celestial bodies in their courses. Dr. Fisher was amazed and entranced by the fidelity and the spectacular appeal of such presentations by the Zeiss projectors and returned to the United States with the statement that the Zeiss instrument was "the greatest invention ever devised by man as a visual aid in teaching." Up to that time Dr. Fisher's particular scientific field had been botany, his avocation had been ornithology, and his main work at the American Museum of Natural History was on the educational side, teaching all divisions of natural history to young people through the many

resources of the museum. After he had seen the Zeiss projector in operation, he concentrated on astronomy and the hope of obtaining such a machine for a planetarium at the American Museum of Natural History.

It was ten years before the Hayden Planetarium (started with a gift of \$122,000 by the banker, Charles Hayden, in 1931) was opened to the public as an adjunct and integral part of the American Museum of Natural History, with Dr. Fisher as the curator and principal lecturer. In 1936 he was a member of the Harvard-M.I.T. eclipse expedition to Siberia and in 1937 he headed the American Museum of Natural History eclipse expedition to Peru. In 1943 and again in 1944 he was a member of museum groups that investigated and photographed the Paricutin volcano in Mexico from the ground and from the air. He was officially retired in 1941 and became Curator Emeritus of Astronomy, but to the year of his death he was a regular worker in his office at the museum and a frequent lecturer in the dome hall at the demonstrations in the Hayden Planetarium.

Dr. Fisher was one of the organizers of the Amateur Astronomers' Association and he was elected a fellow of the Royal Astronomical Society. He was the author of *Exploring the Heavens*, *The Story of the Moon* and other scientific books, monographs and magazine articles. He was the editor of *Nature Encyclopedia*. In the astronomical field he bore his blushing honors thick upon him but, to the end of his days, he retained his ancient enthusiasm for botany, ornithology and outdoor adventures of any kind. At the time of his death he was president of The Explorers' Club. He was an expert photographer and made many fine colored slides and color motion pictures of birds and flowers that he used on lecture tours about the country. He was married in 1905 to Bessie Wiley, by whom he had three daughters, Ruth Anna, Beth Elinor and Katherine Wiley Fisher. This marriage ended in divorce and in 1933 Dr. Fisher took as his second wife Te Ata of the Chickasaw Nation, a lecturer on Indian lore, singer of Indian songs and interpreter of Indian legends and dance rituals. Te Ata was a great help to Dr. Fisher in late years when his health began to fail. She drove the car wherever they went. She helped him with his photography. A lecturer herself, she assisted him on lecture tours. She shared his enthusiasm for outdoor life and braved the worst weather or terrain to be with him on his excursions.

So runs the record of the late Dr. Clyde Fisher, but what the record fails to reveal is the great character of the man, the enthusiasm of youth that never waned to his 70th birthday, the boyish twinkle in the kind eyes that shone from under the towering crop of white hair that was, perhaps, his only pride. The modesty with which he carried his learning was en-

gaging; the width of his study was remarkable. He walked with John Burroughs. He talked with Dr. Albert Einstein. He went to baseball games and track meets and enjoyed them hugely. He was the ideal companion for field trips, always in a merry mood, always carrying more than his share of the burdens. He was an inspiring teacher, an industrious student, a modest scholar, a delightful friend and a great gentleman. It was a wonderful privilege to have known him.

JOHN KIERAN

Samuel Harmsted Chubb

In the death of Samuel Harmsted Chubb on May 6th, 1949, at the age of eighty, the Linnaean Society of New York lost one of its oldest members,—both in actual age and in years of membership.

Mr. Chubb joined the Society in 1893 and was active in field work and a regular attendant at meetings until quite recently. From time to time he presented interesting papers before the Society,—usually illustrated by his own still or moving pictures. He had been, in fact, one of the early wildlife photographers in this country.

Born in Lakesville, Md., the son of a physician who moved with his family to Palenville, N. Y., in the Catskill Mountains, when the son was ten years old, he lived there until the age of sixteen. Coming then to New York, he worked as a machinist, acquiring experience which later helped him in the preparation of his mounted animal skeletons. His great interest, apparently, was in the field of natural history, and most of his spare time was spent at the American Museum, where he eventually met Professor Henry Fairfield Osborn, Curator of Vertebrate Paleontology, and demonstrated to him the fact that many of the mammal skeletons in the museum were mounted in unnatural postures.

In 1897 Mr. Chubb obtained an order to restore the fossilized skeleton of an Irish elk for Columbia University and four years later he joined the American Museum staff and began the series of mounted mammal skeletons for the Hall of Osteology.

The writer well remembers many pleasant chats with Mr. Chubb in his laboratory on the top floor of the south-east tower of the museum, where, as Associate Curator of Comparative Anatomy, he worked surrounded by bones and partially completed mounts. He was a kindly, genial, soft-spoken man who never tired of answering questions or demonstrating his methods to friends or casual visitors. These methods were based almost entirely on still and moving pictures of animals, most of

which he had himself taken. In this way he was able to produce an absolutely accurate representation of his subject in a certain pose.

Although particularly interested in osteology and comparative anatomy, Mr. Chubb was an expert amateur ornithologist and botanist and regularly attended the annual May Nature Conferences at Branchville, N. J., where he delighted in guiding parties on bird walks and botanical field trips. He spent many summer vacations in the Catskills, where he had lived as a boy, and where he could listen again to the songs of the winter wren and hermit thrush.

Although Mr. Chubb retired from the museum staff about ten years ago, he still worked in his old laboratory two or three days a week up to a very short time before his death. He had been appointed Associate Curator Emeritus of the Department of Comparative Anatomy,—an honor which he richly deserved.

The Linnaean Society of New York has lost not only one of its oldest, but also one of its kindest and most respected members.

EDMUND R. P. JANVRIN, M.D.

Necrology

Honorary Member

1941 PERCY ALGERNON TAVERNER, d. May 9, 1947.

Fellows

- 1886 DR. FRANK M. CHAPMAN, V. Pres. 1889-1897; Pres. 1897-1899; d. Nov. 15, 1945.
1878 DR. ALBERT KENRICK FISHER, V. Pres. 1884-1888; d. June 12, 1948.
1878 ERNEST INGERSOLL, *Founder*, Sec. 1878; d. 1948.
1878 WILLIAM CHURCH OSBORN, *Founder*; d. Jan. 3, 1951.

Active Members

- 1898 CLINTON G. ABBOT, V. Pres. 1910-1914; d. March 5, 1946.
1892 DR. LOUIS B. BISHOP, d. April 3, 1950.
1935 LEON W. BOWEN, d. 1950.
1923 COURTENAY BRANDRETH, d. Nov. 3, 1947.
1946 MRS. MARKHAM CHEEVER, d. Jan. 31, 1950.
1893 SAMUEL HARMSTED CHUBB, Sec. 1924-1931; d. May 6, 1949.
1927 NOYES A. CROWELL, d. 1945.
1945 RALPH ELLIS, d. Dec. 17, 1945.
1917 DR. G. CLYDE FISHER, d. Jan. 7, 1949.
1923 ALLEN FROST, d. Jan. 9, 1946.
1940 BENONI B. GATTEL, d. 1948.
1902 DR. ARTHUR H. HELME, *Life Member*; d. 1949.
1912 JULIUS M. JOHNSON, *Life Member*; V. Pres. 1914-1919; d. June 14, 1946.
1944 MRS. ROWENA LASERSOHN, d. 1949.
1941 EDWARD MOERAN, d. July 1946.
1922 CLIFFORD HAYES PANGBURN, d. Dec. 16, 1949.
1886 CLARENCE B. RIKER, d. 1946.

Associate Member

1943 DR. ALDO LEOPOLD, d. April 21, 1948.

Report of the Secretary for the Year 1945-1946

At the Annual Meeting of the Society on March 13, 1945, the following officers were elected for the ensuing year:

<i>President</i>	HUSTACE H. POOR
<i>Vice-President</i>	EUGENE EISENMANN
<i>Secretary</i>	R. DUDLEY ROSS
<i>Recording Secretary</i>	CHRISTOPHER K. MCKEEVER
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	ANNA NORTH COIT

The Society elected John L. Bull, Jr., Ernst Mayr, and Richard H. Pough to serve on the Council until March 1948.

During the year the Society held fourteen regular meetings instead of the usual sixteen. The second December meeting fell on Christmas Day and the meeting scheduled for February 12, 1946 was not held due to the closing of all public buildings by proclamation of the Mayor because of a strike. The program of meetings was as follows:

- March 13, 1945: Annual Meeting. "The Birds of Pymatuning Swamp"
—Mrs. James P. Chapin.
- March 27: Symposium on the Causes of Bird Migration.
- April 10: "Butterflies of the New York City Region", John L.
Bull, Jr.
- April 24: "Some Aspects of the Effects of Hormones on Animal
Behavior", Dr. Frank A. Beach.
- May 8: "The Breeding Birds of Churchill, Manitoba", Law-
rence I. Grinnell.
- May 22: Reports on the Spring Migration.
- October 9: "The Birds of Alaska", Dr. Ira N. Gabrielson.
- October 23: "Adirondack Adventure", Randolph Ashton.
- November 13: "Venezuela Wildlife", Dr. William Beebe.
- November 27: "Plumage Variations in Banded Herring Gulls",
Hustace H. Poor.
- December 11: "DDT—What it does and does not do", Richard H.
Pough.
- January 8, 1946: Discussion of Christmas Bird Counts.
- January 22: Symposium on Conservation.
- February 26: "Belgian Congo National Parks", Dr. James P.
Chapin.

In addition, informal summer meetings were held once per month from June to September inclusive and were unusually well attended.

Attendance at the regular meetings was consistently in the neighbor-

hood of 100 so that it became necessary to arrange with the Museum for larger quarters. Upon the occasion of Dr. Beebe's talk, there were more than 200 members and guests present.

During the year the membership of the Society increased by 36 resulting in a total membership of 307. This figure includes 5 Honorary Members, 8 Fellows, 23 Associate Members and 271 Active Members.

Thirteen field trips were undertaken and met with very gratifying response.

The Society lost by death seven of its members: Dr. Frank M. Chapman, Fellow of the Society and member since 1886; William T. Davis, a Life Member and member of the Society since 1911; Clinton G. Abbott, associate member who, at the time of his death, was Director of the San Diego (California) Museum of Natural History and had been Vice-President of the Linnaean Society from 1910 to 1914; John F. Mathews and Carol Stryker, both members for over twenty years; Noyes A. Crowell a member since 1927, and Hugh Birkhead who lost his life in France while a member of the Armed Forces.

We can speak in a happier vein of the safe return of a number of other members from foreign service. Their home-coming will, we hope, contribute materially to the future progress of this Society.

Respectfully submitted,

R. DUDLEY ROSS, *Secretary*

March 12, 1946.

Report of the Secretary for the Year 1946-1947

At the annual meeting of the Society held on March 12, 1946 the following officers were elected:

<i>President</i>	HUSTACE H. POOR
<i>Vice President</i>	EUGENE EISENMANN
<i>Secretary</i>	HOBART M. VAN DEUSEN
<i>Recording Secretary</i>	WILLIAM O. ASTLE
<i>Treasurer</i>	EVA RICH

Charles K. Nichols was appointed the Society's representative to the Council of the New York Academy of Sciences, a post made vacant by the resignation of Dr. Ernst Mayr.

On March 26, 1946, Irving Kassoy, Charles K. Nichols, and Robert Arbib were appointed to the Council for three year terms. Dr. Charles Vaurie was appointed to the Council on October 22, 1946 to serve out the term of Benjamin Gilbert who resigned.

The Society held fifteen regular meetings, and four informal summer meetings during the year. Attendance at the regular meetings has averaged in the neighborhood of one hundred persons, and the increasingly popular summer meetings averaged over fifty persons.

The Council has always felt that member participation in the programs is highly desirable. Nine meetings saw one or more of our members as speakers. We hope that this good showing will be continued, and even improved upon during the coming year. The summer meetings were featured by discussions of original field work by members, and of local observations.

The calendar for the year was as follows:

- March 12, 1946: Annual meeting. "The Birds of Australia", Commander John A. Hess.
- March 26: "The Alcids", Carl W. Buchheister.
- April 9: "Audubon, The Artist", Miss Nell Dishman.
- April 23: Symposium: "Territory in Bird Life".
- May 14: "A Review of the New World Blackbirds, Orioles and Cowbirds", Charles Rogers.
- May 28: Discussion of Spring Migration, members.
- October 8: "The Birds of the Douglas Lake Region in Northern Michigan", Dr. Theodora Nelson.
- October 22: "Notes on the Natural History of Central Florida", Dr. John Eric Hill.
- November 12: "Observations on Pelagic Birds", Dr. Robert C. Murphy.
- November 26: "The Early History of Birds", Dr. Edwin H. Colbert.

- December 10: "The Arctic Tern", Carl W. Buchheister.
 January 14, 1947: Discussion of the Christmas Bird Counts.
 January 28: Symposium: "Local Field Problems".
 February 11: "Familiar Hawaiian Birds", J. d'Arcy Northwood.
 "Evolution of Hawaiian Birds", Dean Amadon.
 February 25: "A Naturalist in Uniform Sees England", Frederick
 A. Ulmer, Jr.

Numbers 54 through 57 of the Proceedings were published as a single issue on Sept. 16, 1946, and distributed to members during the year.

The Urner-Edwards field card was completely revised by James L. Edwards and Hobart M. Van Deusen and made available to the Society.

The Council approved the publication of a "Linnaean News-Letter" to be distributed to all members. This project owes its start to the enthusiasm of Robert Arbib, who will act as editor.

The Field Trip Committee, under the able guidance of Eugene Eisenmann, has conducted a number of interesting and well attended trips during the year.

A New York City Region Map Committee was approved to provide in published form a compendium of information on the birding areas of our region. The Museum's Department of Popular Publications has agreed to print this report.

Cooperative effort in the solution of biological problems is one of the valid reasons for the existence of such natural history organizations as the Linnaean Society. With this in mind, the Field Work Committee, under the leadership of Robert Arbib and John Bull, has drawn up a program of research on the many problems involved in the breeding cycle of our local birds.

The Committee on Vernacular Nomenclature has completed its work, and has forwarded a report of its findings to the American Ornithologists' Union. This report, which was written by Hustace Poor and Eugene Eisenmann, was published in the *Wilson Bulletin*,* and the Society will devote one of its meetings to a hearing of the Committee's recommendations.

The Conservation Committee has cooperated during the year with the Bird Club of Long Island in the matter of saving the Jones Beach Bird Sanctuary. Another item of conservation interest has been the formation of a Federation of Bird Clubs in the State of New York. The Linnaean Society is a charter member, and as such we hope that the Society will take a more positive interest in conservation work than it has in the past.

* Vol. 58, No. 4, pp. 210-215.

Member activity has set a new high mark this year.

Dr. Ernst Mayr, a fellow of the Society, was awarded the Leidy Medal in recognition of his outstanding contributions to the field of Biology.

Dr. Tinbergen, an Associate Member, gave an extremely valuable series of lectures in the field of animal behavior at the American Museum of Natural History.

The ending of the war has resulted in the resumption of program meetings by most scientific societies. Several of our members have taken an active part in the stated meetings of the American Ornithologists' Union, the Society for the Study of Evolution, the Princeton Bicentennial, and the National Wildlife Conference, to name only a few.

A former president of the Society, Richard H. Pough, published his valuable and well received "Audubon Bird Guide." The book was illustrated by another member, Don Eckelberry. Dr. Ernst Mayr and Jean Delacour published their "Birds of the Philippines," one of the finest of the Pacific World Series of books. Many other members have contributed articles during the year to the various ornithological journals.

The Society has announced plans for an Art Exhibit for members to be held during the month of May in the Museum's new Corner Gallery. To date ten members have sent in their entries to the Secretary.

The Society has lost by death several of its distinguished amateur ornithologists: Clarence B. Riker, a member since 1886; Julius Johnson, Vice President of the Society during the years 1914-19; Allen Frost, a member since 1923; and Edward Moeran, a member since 1941.

There were four resignations from the Society, but off-setting this loss was the election of twenty-one new members.

Our membership totals now stand at the following figures:

Honorary Members	5
Fellows	8
Associate Members	34
Active Members	<u>267</u>

The total of 314 is the highest figure in the sixty-nine year history of the Society.

The Secretary extends his kindest thanks to the officers and members of the Linnaean Society for their advice and willing help during his year of office.

Respectfully submitted,

HOBART M. VAN DEUSEN, *Secretary*

March 11, 1947.

Report of the Secretary for the Year 1947-1948

At the annual dinner and meeting of the Society at Schrafft's Restaurant, (Fifth Avenue), March 11, 1947, the following officers were elected for the ensuing year:

<i>President</i>	EUGENE EISENMANN
<i>Vice President</i>	HOBART M. VAN DEUSEN
<i>Secretary</i>	ROBERT S. ARBIB, JR.
<i>Treasurer</i>	EVA RICH
<i>Recording Secretary</i>	GEORGE KOMOROWSKI
<i>Editor</i>	THEODORA NELSON

Mr. Komorowski later regretfully resigned and Geoffrey Carleton was elected to serve in his place for the major part of the year.

As a regular meeting in March, 1947, Hustace H. Poor, Dr. A. J. C. Vaurie, and Hubert Doering were elected to the Council for 3-year terms, William O. Astle for a 2-year term, and George A. Rose for a one-year term. On May 27th Mr. Doering resigned and Walter Sedwitz was elected to fill the vacancy.

During the past year the Society held sixteen regular and four informal meetings. Attendance at regular meetings has ranged between 60 and 165 members and guests, while attendance at summer meetings averaged 45.

The calendar for the year was as follows:

March 11, 1947:	Annual meeting. "Birds of the Churchill Bay Region", Dr. Arthur A. Allen.
March 25:	"Certain Problems of Local Bird Banding Work", Richard B. Fischer.
April 8:	"Where have the Waterfowl Gone?", Mrs. Charles N. Edge.
April 22:	"Common Sense in Vernacular Nomenclature", Ludlow Griscom.
May 13:	"Bird Art and Illustration", Donald Eckelberry. First Linnaean Art Exhibit.
May 27:	Discussion of Spring Migration.
October 14:	"Botanical Associations of the New York Region", Dr. Henry K. Svenson.
October 28:	"The Wideawakes or Sooty Terns of Ascension Island", Dr. James P. Chapin.
November 11:	"The Banding of 950 Bald Eagles", Charles L. Broley.
November 25:	"Wild Life and Land in Latin America", William Vogt.
December 9:	"Voices in the Night", Dr. Peter Paul Kellogg.

- December 23: Symposium: "Aspects of Avian Coloration".
 January 13, 1948: "Discussion of Christmas Bird Counts".
 January 27: "Bats", Charles E. Mohr.
 February 10: "Some Birds and Bird Habitats of the San Francisco Bay Region", Robert W. Storer.
 February 24: "The Practical Approach to Conservation", Charles B. Belt and Ray Benson.

Ten of these meetings featured speakers who are members of the Society while six meetings featured outside guests. Eight meetings were concerned with local ornithological problems, five dealt with more distant regions, and three with allied fields of natural history. The meeting of May 13th was notable for the opening of the Society's first art exhibit, featuring drawings and paintings by more than a dozen members of the Society, and displayed as the opening exhibit of the Two-Dimensional Exhibition Hall of the American Museum of Natural History. The exhibit was held over for a two month period and viewed by thousands of visitors to the museum. As a result, several of our artists were invited to exhibit in other cities.

During the year the membership gained very slightly and now stands as follows:

Honorary Members	5
Fellows	8
Active Members	272
Associate Members	<u>34</u>
Total	319

One Honorary Member was elected, as well as 32 Active Members and 4 Associate Members. The Society lost one Honorary Member by death, 8 active and two Associate Members by resignation, and 21 Active and 2 Associate Members were dropped from the rolls. The Society regrets the passing, last spring, of Canada's distinguished ornithologist, Percy A. Taverner, of Ottawa, who had been an Honorary Member since 1941; and Dr. Arthur H. Helme, a Life Member.

Numerous field trips to various points of interest were sponsored by the Society during the year, a popular continuation of the practice begun during the war years.

The year saw the formation of the Federation of New York State Bird Clubs, of which our Society is a Charter Member. This organization was assisted in its creation by our President, Mr. Eisenmann, who served as a delegate for the Society.

President Eisenmann, C. K. McKeever, and other members were active in taking the Society's part in opposing a proposed highway through Van

Cortlandt Park in the Bronx. Unfortunately their efforts were in vain. However, the Society's appeal to the Governor of New York State opposing the proposed water power project at Higgle Mountain on the Moose River helped to defeat this project.

The year saw the publication of Volume I, Nos. 1-9, of the Linnaean News-Letter, which have been sent to all classes of members free of charge.

The Secretary thanks the members of the Program Committee and the many other officers and members of the Society for their assistance during the year.

Respectfully submitted,

ROBERT S. ARBIB, JR. *Secretary*

March 9, 1948.

Report of the Secretary for the Year 1948-1949

At the annual meeting of the Society on March 9, 1948, the following officers were elected for the ensuing year:

<i>President</i>	EUGENE EISENMANN
<i>Vice President</i>	ROBERT S. ARBIB, JR.
<i>Secretary</i>	WALTER SEDWITZ
<i>Recording Secretary</i>	GEORGE C. ROSE
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

At a regular meeting on March 23, 1948, the Society elected Mr. John L. Bull, Jr., Mrs. Herbert E. Carnes, and Mr. Herman Goebel to serve on the Council until March 1951.

Mr. Christopher K. McKeever was elected to serve on the Council until March, 1949.

At the first regular fall meeting on October 12, Herman Goebel was elected to succeed Walter Sedwitz as Secretary. Mr. Sedwitz was elected to serve on the Council for the unexpired term of the newly elected Secretary.

During the year, the Linnean Society held sixteen regular meetings and four informal summer meetings. The programs for the regular meetings were as follows:

- March 9, 1948: Annual Meeting. Prof. S. Dillon Ripley spoke on a recent expedition made to Nepal and Northern India.
- March 23: "Birds at Your Fingertips", Mrs. Herbert E. Carnes.
- April 13: "Bird Word Migrations—An Armchair Adventure in Ornithological Etymology", Dr Ernest A. Choate.
- April 27: Symposium: "Migration in the New York Region".
- May 11: "The Biome, a Super Organism", Richard H. Pough.
- May 25: Discussion of the Spring Migration by the Members.
- October 12: "The Whooping Crane", Robert P. Allen.
- October 26: "The Peregrine Falcon", Richard A. Herbert.
- November 9: "Sable Island, the Home of the Ipswich Sparrow", John J. Elliott.
- November 23: Symposium: "How Birds Find Their Way on Migration".
- December 14: "The Alcidae", Charles H. Rogers.
- December 28: "Animals Unaware", Howard H. Cleaves.
- January 11, 1949: Report on Christmas Censuses.
- January 25: "G. I. Birding in New Guinea", Walter Sedwitz.

- February 8: Symposium: "Winter Incursions".
 February 22: "Game Birds in Flight with a Camera Gun", Richard
 Borden.

During the past year, most of the field trips to various points of ornithological interest that were sponsored by the Society were quite successful and were both numerous and well attended. We owe a particular debt of gratitude to one of our younger members, Richard Ryan who organized these trips.

No publications were issued during the year with the exception of the monthly Linnaean News-Letter. The Society is deeply indebted to Robert S. Arbib, Jr., and to Thomas F. Higgins for the very considerable effort they continue to put into the preparation and distribution of this valuable paper.

During the year eighteen persons were elected to active membership and two active members became associate members. The membership in all classes at the present writing is as follows:

Honorary Members	5
Fellows	6
Active Members	265
Associate Members	38
Total for all classes	<u>314</u>

During the year the attendance at regular meetings varied between 80 and 100 persons.

The Society has been most unfortunate during the past year in losing by death a number of its most distinguished members. Among these were Ernest Ingersoll a founder of the Society and a member since 1878, Dr. Albert Kenrick Fisher a member since the second meeting of the Society in 1878, Dr. G. Clyde Fisher, Dr. Aldo Leopold, Courtney Brandreth, Benomi B. Gattell, and Mrs. Rowena Lasersohn.

The Secretary would like to take advantage of this opportunity to publicly thank the President, Eugene Eisenmann, for having done the greater part of the work in preparing the programs for these meetings and for the counsel and assistance which greatly aided in the performance of his duties. Sincere appreciation is also extended to all the officers and members who have done so much to aid the functioning of the Society in so many ways.

Respectfully submitted,

HERMAN GOEBEL, *Secretary*

March 8, 1949.

Report of the Secretary for the Year 1949-1950

At the annual meeting of the Society on March 8, 1949, the following officers were elected for the ensuing year:

<i>President</i>	ROBERT S. ARBIB, JR.
<i>Vice President</i>	DEAN AMADON
<i>Secretary</i>	HERMAN GOEBEL
<i>Recording Secretary</i>	GEORGE C. ROSE
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

At a regular meeting on April 12, 1949, the Society elected Eugene Eisenmann, Christopher K. McKeever, and Irwin Alperin to serve on the Council until March 1952.

During the period from March 1949 thru February 1950, the Linnaean Society held sixteen regular meetings, four informal summer meetings, and one seminar.

The programs for the regular meetings were as follows:

- March 8, 1949: Annual Meeting. "Birds from the Gaspé to Florida", M. Albert Linton.
- March 22: "Collecting for a Habitat Group on Bataan", E. Thomas Gilliard.
- April 12: Symposium: "Some Effects on Bird Life of Ecological Changes in our Region".
- April 26: "Tropical Birds of Trinidad and Tobago", Lawrence I. Grinnell.
- May 10: Photographic show of members' work and a film by James B. Dixon on "The Life History of the Goshawk" with comments by Dr. Dean Amadon.
- May 24: Discussion of the Spring Migration.
- October 11: "The Ornithological Year on Eastern Long Island", Dr. William T. Helmuth, Jr.
- October 25: "Report on the United Nations Conference on Conservation", Richard H. Pough.
- November 8: "Meteorological Aspects of Two 1948 Spring Waves", Aaron Moore Bagg.
- November 22: "Thru the Year with the Pileated Woodpecker", Southgate Y. Hoyt.
- December 13: "Tropical Birds and Flowering Trees of Trinidad", Mrs. Gladys Gordon Fry.
- December 27: "The Loons and Grebes", Charles H. Rogers.
- January 10, 1950: Report on Christmas Censuses, by Members.

- January 24: "Birds of the Salt Marshes", Dr. Heathcote Kimball.
 February 14: Symposium: "Speciation in Birds".
 February 28: "Fish in the Economy of Bird Life", Malcolm S. Gordon.

On November 29, 1949, the Society held a seminar meeting of a somewhat more technical nature than the regular meetings. The subject discussed was "Distribution and Species Distinction in Dowitchers". The introductory paper was read by Dr. Frank A. Pitelka, Curator of Birds, University of California Museum of Vertebrate Zoology.

On May 28 and 29 the Society acted as host for the second annual meeting of the Federation of New York State Bird Clubs.

Throughout the year, the Linnaean Society sponsored a series of field trips to a number of well-known bird watching areas. The success of these trips is in large part attributable to the organizing efforts of Richard Ryan.

The only publication issued during the past year was the monthly Linnaean News-Letter. The Society is indebted to Robert S. Arbib, Jr., Thomas F. Higgins, and to Mrs. Gina Miuccio for their work in preparing and distributing this paper. Numbers 58-61 of the Proceedings of the Linnaean Society are in preparation and the Society's Map Committee is working toward the publication of an ornithological atlas of our region.

In June, the American Museum of Natural History acquired title to Great Gull Island in Block Island Sound. This island is to be converted into a bird sanctuary and biological research station and it is the Museum's intention that the Linnaean Society administer it. For this purpose an administrative committee has been set up which is composed of six members of the Society and three representatives of the Museum. Christopher K. McKeever is the chairman of this committee and as such he merits the gratitude of the Society for his persistent efforts in its behalf. The members of the Linnaean Society subscribed liberally to a special Great Gull Island Fund the proceeds of which are to be used for the maintenance of the island.

During the past year, twenty-five persons were elected to active membership and three to associate membership. Two active members changed their status to that of associate member. The membership in all classes is as follows:

Honorary Members	5
Fellows	6
Active Members	267
Associate Members	41
Total for all classes	<u>319</u>

This represents a net gain of five members over last year.

The Society was unfortunate in losing by death Leon W. Bowen who has been a member for fifteen years.

The Secretary would like to thank the President Robert S. Arbib, Jr. and the Vice-President, Dr. Dean Amadon, for their aid and counsel in preparing the programs for the meetings. Sincere appreciation is also extended to all the officers, committee chairmen, and members whose combined efforts have permitted our Society to function.

Respectfully submitted,

HERMAN GOEBEL, *Secretary*

March 14, 1950.

Condensed Treasurer's Report for the Four Years Ending March 1, 1949

RECEIPTS

Dues	\$2,727.00
Sale of publications	1,196.70
Interest, income on funds, etc.	798.97
Total	\$4,722.67

EXPENDITURES

Publications	\$1,088.28
Memberships and subscriptions to periodicals	99.75
Postage, stationery, printing, meeting room charges and other expenses	1,882.89
TOTAL	\$3,070.92
Surplus for the four years ending March 1, 1949	\$1,651.75
Funds on Hand—March 1, 1945	
On deposit Emigrant Industrial Savings Bank	\$2,001.59
U. S. Bond, Series G	1,000.00
	\$3,001.59
Charles A. Urner Memorial Fund on deposit Union Dime Savings Bank	534.58
Checking Account on deposit National City Bank of New York	1,099.54
Total	\$4,635.71
Funds on Hand—March 1, 1949	
On deposit Emigrant Industrial Savings Bank	\$1,988.46
Three U. S. Savings Bond, Series G	2,500.00
	\$4,488.46
Charles A. Urner Memorial Fund on deposit Union Dime Savings Bank	79.33
1 U. S. Savings Bond, Series G	500.00
Checking Account on deposit National City Bank of New York	1,219.67
TOTAL	\$6,287.46

Respectfully submitted,
EVA RICH, *Treasurer*

Treasurer's Report for the Year Ending March 1, 1950

RECEIPTS

Dues	\$ 764.10
Federation of N. Y. State Bird Clubs (dinner receipts)	170.25
Sale of Publication	89.85
Annual Dinner	351.00
Gull Island Contributions	661.50
Other	11.00
Interest: Union Dime Savings Bank	\$ 1.58
Emigrant Industrial Savings Bank	40.26
U. S. Bonds, Series G	75.00
	116.84
TOTAL	\$2,164.44

EXPENDITURES

Publication of News Letter	\$ 363.24
Cost of Meetings in American Museum of Natural History (Rooms, Postage, Services)	325.53
Memberships, Subscriptions: Audubon Society, Auk, Wilson Orn. Club, Ebba News	51.50
Printing, Expenses of Officers, Other expenses	156.20
Guest and Exchange Speakers	48.97
Dinner and dues, Federation of Bird Clubs	215.95
Annual Dinner	443.82
Gull Island	56.28
TOTAL	\$1,661.49
Surplus for the Year Ending March 1, 1950	502.95
Funds on Hand—March 1, 1949	6,287.46
Funds on Hand—March 1, 1950	6,790.41

DISTRIBUTION OF FUNDS

Revolving Publication Fund:		
Deposit in Emigrant Industrial Savings Bank	\$2,199.17	
3 U. S. Savings Bonds Series G	2,500.00	
		\$4,699.17
Charles A. Urner Memorial Fund on Deposit in Union Dime Savings Bank	93.41	
1 U. S. Savings Bond, Series G	500.00	
		593.41
Checking Account in National City Bank		1,497.83
TOTAL		\$6,790.41

Respectfully submitted
EVA RICH, *Treasurer*

Approved by the Auditors:
GINA D. MIUCCIO
SAM C. HARRIOT

Constitution and By-Laws of the Linnaean Society of New York

(As Amended February 28, 1950)

CONSTITUTION

Section 1. *General Organization.*

Article 1. This Society shall be composed of persons interested in natural history.

Article 2. It shall consist of Life, Active, Associate, and Honorary Members, and Fellows.

Article 3. Active Members, Life Members and Fellows only shall be entitled to vote, to hold office, to serve on committees and Council, and to transact business. Associate Members and Honorary Members may attend the meetings and take part in the scientific discussions of the Society. All members, not in arrears of dues, shall be entitled to receive without charge the various publications of the Society issued during the period of membership, unless the Council shall otherwise provide on the basis of cost or class of membership.

Article 4. The officers of the Society shall be a President, a Vice-President, a Secretary, a Recording Secretary, a Treasurer, and an Editor. With the exception of the Treasurer and Editor no officer shall hold the same office more than two consecutive years, but shall again be eligible for election one year after the expiration of such a term. Such officers, together with nine members at large, shall form a board for the management of the concerns of the Society to be called the Council. Councilors shall be elected for a term of three years, in such manner that the term of three councilors shall expire every year.

Article 5. By-Laws for the more particular regulation of the Society shall from time to time be made.

Article 6. This Constitution may be altered or amended by a three-fourths vote of the Active Members, Life Members and Fellows present at any meeting of the Society, provided written notice of the proposed change and of the meeting at which the proposed change is to be acted upon has been sent to each Active Member, Life Member and Fellow at least 30 days previously.

Section 2. *Of Members.*

Article 1. Active Members shall be persons who have shown an interest in some branch of natural history. Active Members may become Life Members upon the payment to the Treasurer of Fifty Dollars, at one time, which shall be in lieu of annual dues.

Article 2. Associate Membership shall be open to persons interested in some branch of natural history, residing 50 miles or more from New York City and unable to attend meetings of the Society regularly.

Honorary Members shall not exceed ten in number, and shall be persons eminent for their attainments in zoology.

Any Member may be elected a Fellow in recognition of distinguished service to the Society.

Article 3. All classes of Members shall be chosen by majority vote, after having been nominated at a preceding meeting and approved by the Council. Candidates for Active Membership must be known personally to at least two members of the Council. The amount and time for payment of dues shall be fixed by the By-Laws.

Article 4. Any undesirable member may be expelled from the Society, upon recommendation of the Council, by a three-fourths vote of the Active Members, Life Members and Fellows present at any regular meeting, provided written notice of the proposed action and of the meeting at which such action is proposed to be taken has been sent at least 30 days previously to each Active Member, Life Member and Fellow and to the member involved.

Section 3. *Of Officers and Their Duties.*

Article 1. The President shall preside at meetings of the Society and of the Council, preserve order, regulate debate; and shall conduct all proceedings in accordance with parliamentary usage.

Article 2. The Vice-President shall have charge of the archives of the Society; shall, with the advice and assistance of the President and Secretary, plan and prepare the programs for meetings of the Society; and shall perform the duties of President in the absence of the latter.

Article 3. The Secretary shall give notice to persons of their election as members, and to committees of their appointment; shall give notice of all regular meetings of the Society; shall call special meetings when directed by the President; shall give notice to all members of the Council of all Council meetings; shall inform officers of all matters requiring their attention; shall conduct the correspondence of the Society and prepare all letters to be written in its name, retaining copies of them; and shall assist the President and Vice-President in planning the programs for meetings of the Society.

Article 4. The Recording Secretary shall take and preserve correct minutes of all meetings of the Society and shall preserve and compile in systematic order field notes presented by members.

Article 5. The Editor, with the assistance of Associate Editors, who may be appointed by the President when necessary, shall edit and supervise all publications of the Society, and shall exchange and distribute them.

Article 6. The Treasurer shall collect all money due, shall pay all bills against the Society as authorized by the Council; shall keep a correct account of all receipts and expenditures; and shall make a detailed report of the same at the Annual Meeting.

Article 7. Officers shall be nominated by the Council and chosen at the Annual Meeting and a majority vote of the Active Members, Life Members, and Fellows present shall be sufficient for a choice. The slate of officers nominated by the Council shall be announced at a meeting prior to the Annual Meeting. Any other qualified member may be nominated if such nomination is subscribed in writing by 15 persons who are Active Members, Life Members or Fellows and is received by the President or Secretary at least 5 days prior to the Annual Meeting. Any office becoming vacant during the year shall be filled at the next meeting of the Society in the same manner, except that the Council need not announce its nomination in advance of the meeting, and other nominations may be made from the floor.

Section 4. *Of the Council and its Duties.*

Article 1. The Council shall pass upon all nominations of candidates for membership, and shall make such recommendations as it sees fit on new business initiated by properly qualified members. Its recommendations shall be presented by the Secretary at the next meeting whenever possible. A majority vote of the members present shall be sufficient to ratify favorable recommendations.

Article 2. It may initiate any new business promoting the general interests and welfare of the Society, and a majority vote of the members attending the meeting at which such business is presented shall be sufficient for ratification. The prior authorization or approval by a majority of the Councilors, given at meeting of the Council, shall be necessary for any expenditures in excess of \$50.00.

Article 3. It shall act as a nominating committee for officers and shall hold a special meeting for this purpose prior to the Annual Meeting of the Society.

Article 4. It shall hold regular meetings for the transaction of general business. Special meetings may be called by the President or upon the request of any three Councilors.

Article 5. Councilors shall be nominated by a committee to be appointed by the President at the Annual Meeting, such committee to consist of three members of the Society who are not members of the Council. This shall not be construed as precluding additional nominations from the floor. Councilors shall be chosen at the first regular meeting after the Annual Meeting, up to the number sufficient to fill the vacancies. In case the number of nominations exceeds the number of

vacancies the elections shall be by ballot. Those receiving the largest number of votes of Active Members, Life Members and Fellows present shall be elected. If, for any reason, a Councilor does not complete his term of office his successor for the remainder of the term shall be chosen at the next regular meeting by nomination from the floor and election as prescribed above.

Section 5. *Of Meetings.*

Article 1. A meeting shall be held annually for the choice of officers and for other general purposes. At this meeting the Secretary shall present a report upon the publications, meetings, membership, etc.; the Treasurer upon the receipts and expenditures. Previous to the Annual Meeting the President shall appoint a committee of two members, neither of whom shall be a member of the Council, to audit the accounts of the Treasurer.

BY-LAWS

Section 1. *Of Members.*

Article 1. Every Active Member shall be subject to annual dues of four dollars (\$4.00) and every Associate Member to annual dues of one dollar and fifty cents (\$1.50) payable at the first regular meeting in March. Dues of newly elected members shall be payable upon election to membership, but those persons elected in the period between the first regular meeting in October and the first regular meeting in March shall be obligated to pay only one half the regular dues for such period. Any member absent on a scientific expedition, on military service, or engaged in academic studies during an entire year may, upon application to the Treasurer and with the approval of the Council, be excused from payment of dues for that year. Upon recommendation of a majority of the Council, a person who has been an Active Member of the Society for twenty-five consecutive years may be considered a Life Member.

Article 2. Any member who shall neglect to pay his regular dues for one year from the date when payable shall be dropped from the roll of members after having been sent notification to that effect in writing by the Treasurer.

Article 3. Any Active or Associate Member may withdraw from the Society, by giving written notice of this intention and paying all arrearages due the Society.

Section 2. *Of Meetings.*

Article 1. The Annual Meeting shall be held the second Tuesday in March.

Article 2. Regular meetings shall be held on the second and fourth Tuesdays of each month from October to May inclusive, except when suspended by a majority vote of the Society at a preceding meeting.

Article 3. Twenty-one Active Members, Life Members and Fellows shall form a quorum.

Article 4. The order of proceedings at meetings shall be, at the discretion of the presiding officer:

1. Reading of minutes of the previous meeting by the Recording Secretary.
2. Reading of correspondence received by the Secretary.
3. Proposal of candidates for membership.
4. Election of members.
5. Business (a) Unfinished; (b) New.
6. Presentation of formal papers.
7. Presentation of field notes.
8. General discussion.
9. Adjournment.

Section 3. *Of Changes of By-Laws.*

Article 1. The By-Laws of the Society may be altered or amended by a three-fourths vote of the Active Members, Life Members and Fellows present a) at any one meeting, provided written notice of the proposed change and of the meeting at which the proposed change is to be acted upon has been sent to each Active Member, Life Member and Fellow at least 30 days previously, or b)

at two regular meetings held on the second Tuesday of two successive months, provided such change has been recommended by a vote of three-fourths of the Council.

Section 4. *Of Committees.* The President shall appoint such Committees as he or the Society may deem necessary to conduct its affairs and interests.

Article 1. A Conservation Committee shall be appointed annually by the President to investigate such matters involving the preservation of the fauna and flora of the New York City region as may arise from time to time; and to represent the Society on conservation matters in general.

Article 2. An Editorial Committee, with the Editor acting as chairman, shall be appointed annually by the President to read and prepare papers for the Society's publications. Such Committee shall publish, annually if possible, and with the consent of the Council, an issue of the Society's *Proceedings*, which shall contain the annual reports of the Secretary and Treasurer, reports of pertinent Committees, general notes, and such scientific papers as may be available on the birds of the New York City region, or otherwise written by Members of the Society. The Editorial Committee shall also recommend to the Council, for inclusion in the Society's *Transactions*, publication of extensive papers that are submitted to it from time to time and which, by reason of their length, are disbarred from the ordinary channels of scientific communication. Upon recommendation by the Council, the publication of each volume of the *Transactions* shall be subject to the approval of a majority of the Fellows, Life Members and Active Members present at a regularly scheduled meeting of the Society.

Article 3. A Field Work Committee shall be appointed annually by the President to encourage and conduct constructive field work in the New York City region; and to promote the discussion of local faunal problems at meetings of the Society.

Section 5. *Of Funds and Prizes.*

Article 1. A prize of twenty-five (\$25.00) dollars, to be known as the Linnaean Prize for Ornithological Research, shall annually be awarded at the discretion of the Council to that Member of the Society who submits the best paper which embodies the results of ornithological research not previously published and not undertaken in the course of professional duties. The Council shall fix the conditions of the prize, shall act as final judge, and shall announce such awards as are made at the annual meetings of the Society.

Article 2. The Society shall administer a fund to be known as The Charles A. Urner Memorial Fund,* the principal and interest of which is to be used for the promotion of field ornithology in New Jersey, New York and Connecticut, and for the publication of studies made in said areas.

Article 3. The Treasurer is authorized to accept from Members and other interested persons contributions to a Publication Endowment Fund, the income of which is to be devoted primarily to the publication of worthy scientific papers.

* The sum of \$500.00 has been appropriated toward the fund by the Society.

Linnaean Society of New York

Officers

1946 - 1947

<i>President</i>	HUSTACE H. POOR
<i>Vice President</i>	EUGENE EISENMANN
<i>Secretary</i>	HOBART M. VAN DEUSEN
<i>Recording Secretary</i>	WILLIAM O. ASTLE
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	ANNA NORTH COIT

1947 - 1948

<i>President</i>	EUGENE EISENMANN
<i>Vice President</i>	HOBART M. VAN DEUSEN
<i>Secretary</i>	ROBERT S. ARBIB, JR.
<i>Recording Secretary</i>	GEORGE KOMOROWSKI GEOFFREY CARLETON
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

1948 - 1949

<i>President</i>	EUGENE EISENMANN
<i>Vice President</i>	ROBERT S. ARBIB, JR.
<i>Secretary</i>	WALTER SEDWITZ HERMAN GOEBEL
<i>Recording Secretary</i>	GEORGE C. ROSE
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

1949 - 1950

<i>President</i>	ROBERT S. ARBIB, JR.
<i>Vice President</i>	DEAN AMADON
<i>Secretary</i>	HERMAN GOEBEL
<i>Recording Secretary</i>	GEORGE ROSE
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

1950 - 1951

<i>President</i>	ROBERT S. ARBIB, JR.
<i>Vice President</i>	DEAN AMADON
<i>Secretary</i>	HERMAN GOEBEL
<i>Recording Secretary</i>	IRWIN ALPERIN
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	THEODORA NELSON

<i>President</i>	DEAN AMADON
<i>Vice President</i>	CHRISTOPHER K. MCKEEVER
<i>Secretary</i>	RICHARD E. HARRISON
<i>Recording Secretary</i>	JOHN H. MAYER
<i>Treasurer</i>	EVA RICH
<i>Editor</i>	EUGENE EISENMANN

Council

(The Council consists of the six officers and nine council members of whom three are elected each year for a three year term.)

- 1946 - 1947 Term expiring March, 1947: Benjamin Gilbert (Resigned—Replaced on October 22, 1946 by Dr. Charles Vaurie), Mrs. Marie V. Beals (Moved to California—Replaced by George Komorowski), William O. Astle (Elected Recording Secretary—place on Council not filled). Term expiring March, 1948: John L. Bull, Jr., Ernst Mayr, Richard H. Pough. Elected for the term expiring March, 1949: Charles K. Nichols, Irving Kassoy, Robert S. Arbib, Jr.
- 1947 - 1948 One year term ending March, 1948: George Rose. Two year term ending March, 1949: William Astle. Three year term ending March, 1950: Hustace H. Poor, A. J. C. Vaurie, Hubert Doering.
- 1948 - 1949 Term expiring March, 1949: Christopher K. McKeever. Term expiring March, 1951: John L. Bull, Jr., Mrs. Herbert E. Carnes, Herman Goebel (served until October 12 when he was elected Secretary. Walter Sedwitz elected to serve on the Council in Mr. Goebel's place).
- 1949 - 1950 Term expiring March, 1952: Eugene Eisenmann, Christopher K. McKeever, Irwin Alperin.
- 1950 - 1951 Two year term ending March, 1952: George Rose. Three year terms ending March, 1953: Mrs. John Y. Dater, Jr., Thomas F. Higgins, George Komorowski.
- 1951 - 1952 Three year term ending March, 1954: Robert S. Arbib, Jr., Herman Goebel, Richard Ryan. One year term expiring 1952: Thomas Appel, Leslie Pearl.

Membership List, June, 1951

Honorary Members

- 1941 BENT, ARTHUR C., 140 High Street, Taunton, Mass.
1947 MURPHY, DR. ROBERT CUSHMAN, American Museum of Natural History,
New York 24, N. Y.
1937 NICE, MRS. MARGARET MORSE, 5725 Harper Avenue, Chicago 37, Ill.
1941 PINTO, DR. OLIVERIO, Dept. de Zoologia, São Paulo, Brazil.
1938 STRESEMANN, PROF. ERWIN, Zoologisches Museum der Universität, Invaliden
Strasse 43, Berlin, Germany.

Fellows

- 1908 CHAPIN, DR. JAMES P., American Museum of Natural History, New York
24, N. Y.
1907 GRISCOM, LUDLOW, Museum of Comparative Zoology, Cambridge, Mass.
1924 HICKEY, DR. JOSEPH J., 13A Eagle Heights, Madison 5, Wis.
1932 MAYR, DR. ERNST, American Museum of Natural History, New York 24,
N. Y.
1905 NICHOLS, JOHN T., American Museum of Natural History, New York 24,
N. Y.

Active Members

- 1928 ABBOTT, MRS. RICHARD M., "Madryn", R. D. #1, West Chester, Pa.
1945 ADELBERG, ERNEST, 200 West 109th Street, New York 25, N. Y.
1931 ALLEN, ROBERT P., 1000 Fifth Avenue, New York 28, N. Y.
1941 ALPERIN, IRWIN M., 2835 Ocean Avenue, Brooklyn 35, N. Y.
1938 AMADON, DR. DEAN, Amer. Mus. of Natural History, New York 24, N. Y.
1948 APPEL, THOMAS G., 63 Sunnyside Avenue, Pleasantville, N. Y.
1938 ARBIB, ROBERT S., JR., 231 West Lena Avenue, Freeport, L. I., N. Y.
1931 ARCHBOLD, RICHARD, Amer. Mus. of Natural History, New York 24, N. Y.
1950 ARNY, MRS. ROBERT, 149 Watchung Avenue, Upper Montclair, N. J.
1944 ARONOFF, ARTHUR, 59 West 71st Street, New York, N. Y.
1935 ASTLE, WILLIAM O., 45-64 158th Street, Flushing, N. Y.
1949 AUSTIN, CYRUS, 156 East 52nd Street, New York, N. Y.
1924 BAKER, JOHN H., 1000 Fifth Avenue, New York 28, N. Y.
1928 BALDWIN, ROGER N., 282 West 11th Street, New York 14, N. Y.
1948 BANNER, GILBERT, 98-25 65th Road, Forest Hills, N. Y.
1950 BARBER, ARTHUR F., 54 Platt Avenue, Rochelle Park, N. J.
1944 BARRAS, MOSES, 1571 Sheridan Avenue, New York 57, N. Y.
1944 BATCHELDER, MISS LOIS, 137 Corlies Avenue, Pelham 65, N. Y.
1949 BELT, CHARLES B., 37 Town Path, Glen Cove, L. I., N. Y.
1944 BLACKBURN, HAROLD C., 667 East 232nd Street, Bronx, N. Y.
1951 BOCK, WALTER, 76-30 85th Drive, Woodhaven 21, N. Y.

* Life member.

- 1900 BOWDISH, BEECHER S., Demarest, N. J.
 1949 BOYAJIAN, NED, 187 Alden Place, Englewood, N. J.
 1941 BRAND, MRS. ALBERT R., 50 West 72nd Street, New York 23, N. Y.
 1944 BRANDI, ALFRED, 326 West 89th Street, New York, N. Y.
 1931 BRESLAU, LEO, 31 Ocean Parkway, Brooklyn 18, N. Y.
 1950 BREWER, MRS. HARVEY, 433 East 87th Street, New York, N. Y.
 1950 BREWER, HARVEY, 433 East 87th Street, New York, N. Y.
 1938 BRIGHAM, H. STORRS, JR., 3817 Sedgwick Avenue, New York 63, N. Y.
 1947 BRINKERHOFF, REMSON, 156 Sherwood Place, Englewood, N. J.
 1934 BROWN, CLARENCE D., 222 Valley Road, Montclair, N. J.
 1938 BUCHHEISTER, CARL W., 1000 Fifth Avenue, New York 28, N. Y.
 1939 BULL, JOHN L., JR., 49 Merrall Road, Far Rockaway, N. Y.
 1942 BURDSALL, RICHARD, King Street, Port Chester, N. Y.
 1944 BURKER, LARRY, 240 Central Park South, New York, N. Y.
 1950 BUSCH, MRS. PHYLLIS, 956 East 18th Street, Brooklyn 30, N. Y.
 1943 BUSSE, MRS. HERBERT A., Gulf Island, Lewiston, Maine.
 1938 CANT, GILBERT B., 461 North Barry Avenue, Mamaroneck, N. Y.
 1940 CANTOR, IRVING, 206 West 104th Street, New York 25, N. Y.
 *1932 CARLETON, GEOFFREY, 121 Washington Place, New York 14, N. Y.
 1943 CARNES, MRS. HERBERT E., 25 Kenwood Road, Tenafly, N. J.
 1921 CARTER, T. DONALD, Amer. Mus. of Natural History, New York 24, N. Y.
 1934 CHALIF, EDWARD L., Barnsdale Road, Short Hills, N. J.
 1946 CHEEVER, MARKHAM, 35 East 76th Street, New York 21, N. Y.
 1943 CHRISTANSEN, MISS INGER, 47 West 52nd Street, New York, N. Y.
 1910 CLEAVES, HOWARD H., 8 Maretzek Court, Staten Island 9, N. Y.
 1948 COBB, BOUGHTON, 25 East End Avenue, New York, N. Y.
 1949 COBB, DR. CLEMENT B. P., 56 East 76th Street, New York 21, N. Y.
 1945 COLE, MISS HELEN D., 2829 Herschel Street, Jacksonville, Fla.
 1949 COLLINS, HENRY HILL, JR., 58 Park Avenue, New York 16, N. Y.
 1951 COMBS, MRS. ROBERT, Paramus Road, Ridgewood, N. J.
 1928 COOLIDGE, OLIVER H., Broad Brook Road, Bedford Hills, N. Y.
 1950 COONEY, WILLIAM P., 101 West 11th Street, New York 11, N. Y.
 1947 COPELAND, MRS. JOSEPH, 200 East 2nd Street, Watkins Glen, N. Y.
 1946 CORMIER, FRANCIS, 27 North Central Avenue, Hartsdale, N. Y.
 1949 CORT, AMBROSE, JR., 305 East 21st Street, New York, N. Y.
 1920 CRANDALL, LEE S., New York Zoological Park, Bronx 60, N. Y.
 1943 CRANS, MISS VERA E., 72 Barrow Street, New York, N. Y.
 1944 CROOKS, MISS MYRTLE, 609 West 137th Street, New York 31, N. Y.
 1926 CRUICKSHANK, ALLAN D., 1000 Fifth Avenue, New York 28, N. Y.
 1939 DALE, MRS. ALLENE H., 390 Riverside Drive, New York 25, N. Y.
 1942 DARKOW, PROF. MARGUERITE, 16 East 82nd Street, New York 28, N. Y.
 1939 DARROW, HENRY N., 49 East 2nd Street, Mount Vernon, N. Y.
 1947 DATER, MRS. JOHN Y., JR., 259 Grove Street, Ramsey, N. J.
 1948 DATER, JOHN Y., JR., 259 Grove Street, Ramsey, N. J.
 1944 DAWN, WALTER H., 1143 Rogers Avenue, Brooklyn 26, N. Y.
 1949 DEAN, MRS. IRIS, Philosophy Hall, Columbia University, N. Y.
 1951 DE HONDT, MISS BARBARA, 33-12 213th Street, Bayside, L. I., N. Y.

- 1943 DELACOUR, JEAN, Amer. Mus. of Natural History, New York 24, N. Y.
- 1943 DENHAM, REGINALD K., 100 Central Park South, New York, N. Y.
- 1929 DESMOND, THOMAS C., 94 Broadway, Newburgh, N. Y.
- 1949 DICKENSON, MRS. HENRY EARL, 19 Burling Avenue, White Plains, N. Y.
- 1949 DOCK, GEORGE, JR., 131 Cedar Street, New York 6, N. Y.
- 1939 DOEPEL, MRS. HENRY W., 30 Cooper Lane, Larchmont, N. Y.
- 1943 DUFLOT, MISS HELEN, 320 East 61st Street, New York, N. Y.
- 1949 DUHL, DR. LOUIS, 33 West 42nd Street, New York 18, N. Y.
- 1947 EBERWEIN, MISS GERTRUDE, 344 East 87th Street, New York 28, N. Y.
- 1930 EDGE, MRS. CHARLES N., 1215 Fifth Avenue, New York, N. Y.
- 1940 EISENMANN, EUGENE, 110 West 86th Street, New York 24, N. Y.
- 1939 ELLIOTT, JOHN J., 3994 Park Avenue, Seaford, Long Island, N. Y.
- 1949 ENGLE, G. CURTIS, 216 Circle Avenue, Ridgewood, N. J.
- 1937 EYNON, ALFRED E., 5 Beach Road, Verona, N. J.
- 1950 FEINBERG, EZRA J., 60 East 42nd Street, New York 17, N. Y.
- 1946 FEINBERG, HAROLD, 147 West Tremont Avenue, Bronx 53, N. Y.
- 1939 FISCHER, RICHARD B., Laboratory of Ornithology, Fernow Hall, Cornell University, Ithaca, N. Y.
- 1949 FITZGERALD, MICHAEL, 75-15 141st Street, Flushing, N. Y.
- 1945 FLAHERTY, MISS ANNA M., 866 Bushwick Avenue, Brooklyn 21, N. Y.
- 1942 FLAVIN, JOHN W., JR., 201 Allegheny Avenue, Towson 4, Md.
- *1914 FLEISHER, PROF. EDWARD, 20 Plaza Street, Brooklyn 17, N. Y.
- 1944 FLUEKIGER, MISS DORA WHITMAN, Hotel Dauphin, Broadway at 67th Street, New York 23, N. Y.
- 1921 FRIEDMAN, RALPH, 14 East 75th Street, New York, N. Y.
- 1925 FRY, MRS. GLADYS GORDON, 66 Eagle Rock Way, Montclair, N. J.
- 1944 FRY, VARIAN, 56 Irving Place, New York, N. Y.
- 1942 FURNESS, MRS. GEORGE A., 84 Beacon Street Circle, Milton 86, Mass.
- 1921 GARRICK, MRS. FRED, 112 West 59th Street, New York 19, N. Y.
- 1944 GARRITY, DEVIN A., Sylvan Road, Port Chester, N. Y.
- 1923 GARVAN, MRS. FRANCIS P., 740 Park Avenue, New York, N. Y.
- 1948 GERSHON, RICHARD, 500 West 111th Street, New York, N. Y.
- 1941 GILBERT, BENJAMIN, 265 Cabrini Boulevard, New York, N. Y.
- 1939 GILLEN, H. W., 120 Broadway, New York, N. Y.
- 1937 GILLIARD, E. THOMAS, Amer. Mus. of Natural History, New York 24, N. Y.
- 1946 GOEBEL, HERMAN, 78-52 80th Street, Brooklyn 27, N. Y.
- 1945 GOLDSTEIN, GEORGE, 2760 Grand Concourse, Bronx 58, N. Y.
- 1949 GORDON, MALCOLM S., 1305 53rd Street, Brooklyn, N. Y.
- 1947 GOSNER, KENNETH L., 453 Mount Pleasant Avenue, Newark, N. J.
- 1950 GRANT, ROBERT H., 2415 Newkirk Avenue, Brooklyn 26, N. Y.
- 1948 GRELLER, GEORGE, 627 Chestnut Street, Cedarhurst, L. I., N. Y.
- 1944 GRIERSON, STANLEY, 44 Sunrise Avenue, Katonah, N. Y.
- 1928 GRINNELL, LAWRENCE I., 710 Triphammer Road, Ithaca, N. Y.
- 1946 GROSCH, PHILIP H., 9 Allen Place, Fair Lawn, N. J.
- 1944 GROSSMAN, LEONARD J., 580 West End Avenue, New York 24, N. Y.
- 1934 GUERNSEY, RAYMOND G., 7 Eden Terrace, Poughkeepsie, N. Y.
- 1935 HARRIOT, SAMUEL C., 200 West 58th Street, New York 19, N. Y.

- 1948 HARRISON, RICHARD EDES, 313 East 51st Street, New York 22, N. Y.
 1924 HASBROUCK, HENRY C., 88 Douglas Road, Glen Ridge, N. J.
 1935 HECK, DR. EDSON B., 563 Park Avenue, New York 21, N. Y.
 1932 HELMUTH, DR. WILLIAM T., JR., 70 East 77th Street, New York, N. Y.
 1928 HERBERT, RICHARD A., 961 Fox Street, Bronx 55, N. Y.
 1946 HIGGINS, THOMAS F., Box #221, Sound Beach, L. I., N. Y.
 1942 HINES, JOSEPH A., 30-12 49th Street, Long Island City 3, N. Y.
 1945 HORN, FRANK E., 538 East 21st Street, Brooklyn 26, N. Y.
 1921 HOWLAND, R. H., 92 Livingston Street, New Haven 11, Conn.
 *1924 HUNTER, ROWLAND JACKSON, 68 Broad Street, Freehold, N. J.
 1950 HUSSEY, MISS LOIS, Amer. Mus. of Natural History, New York 24, N. Y.
 1933 INGERSOLL, MRS. RAYMOND V., Box 30, Duck Island, Northport, L. I., N. Y.
 Winter address, 1 Beekman Place, N. Y. 22, N. Y.
 1929 INGRAHAM, EDWARD A., 430 Clinton Avenue, Brooklyn, N. Y.
 1942 IRVING, JAMES GORDON, JR., 821 Red Road, Teaneck, N. J.
 1948 IRVING, MRS. WILLIAM GARY, VanHouten Fields, West Nyack, N. Y.
 1947 ISLER, MORTON, 107 Magnolia Avenue, Mount Vernon, N. Y.
 1939 JACOBSON, DR. MALCOLM A., 855 East 19th Street, New York 9, N. Y.
 1918 JANVRIN, DR. E. R. P., 38 East 85th Street, New York 28, N. Y.
 1925 JAQUES, FRANCIS L., 610 West 116th Street, New York 27, N. Y.
 1946 KARLIN, EDWARD, 2715 Webb Avenue, New York 63, N. Y.
 1925 KASSOY, IRVING, 251 Chittenden Avenue, Columbus, Ohio.
 1951 KATSORAS, PETER, 2520 Broadway, Astoria 6, N. Y.
 1945 KESNER, ROBERT T., #1 River Glen, Hastings, N. Y.
 1914 KIERAN, JOHN F., 4506 Riverdale Avenue, Bronx 63, N. Y.
 1945 KIMBALL, MRS. HEATHCOTE, 86 Fourth Street, Garden City, N. Y.
 1942 KIMBALL, DR. HEATHCOTE, 86 Fourth Street, Garden City, N. Y.
 1950 KITCHEN, HERMAN, 1000 Fifth Avenue, New York 28, N. Y.
 1943 KOMOROWSKI, GEORGE, 240 East 199th Street, Bronx 58, N. Y.
 1950 KREISSMAN, DAVID, 1078 East 15th Street, Brooklyn 30, N. Y.
 1929 KUSER, MRS. C. D., Bernardsville, N. J.
 1947 LANDECKER, LOUIS, 1551 Unionport Road, New York 52, N. Y.
 1950 LANDSBERG, MELVIN, 990 Leggett Avenue, Bronx 55, N. Y.
 1943 LEVINE, NORMAN, 2116 Grand Avenue, New York, N. Y.
 1947 LIDICKER, WILLIAM Z., 114 Overlook Road, Ithaca, N. Y.
 1951 LINZ, ARTHUR, 468 Stevens Avenue, Ridgewood, N. J.
 1949 LITWIN, LEWIS, 4712 45th Street, Woodside, L. I., N. Y.
 1946 MACKENZIE, DR. LOCKE, 829 Park Avenue, New York 21, N. Y.
 1944 MACLAY, MRS. MARK, 158 East 81st Street, New York 28, N. Y.
 1944 MACLAY, MARK, 158 East 81st Street, New York 28, N. Y.
 1950 MANDELL, PAUL, 127 West 94th Street, New York, N. Y.
 1937 MANNING, MISS ELIZABETH S., 1000 Fifth Avenue, New York 28, N. Y.
 1944 MANZER, DR. CHARLES W., 10 Sheridan Square, New York, N. Y.
 1932 MATHEWS, WILLIAM H., JR., 2 Berkeley Avenue, Yonkers 5, N. Y.
 1944 MATHEWSON, MISS HOPE, 82 East End Avenue, New York 28, N. Y.
 1949 MAYER, JOHN H., 122-67 134th Street, South Ozone Park, N. Y.
 1950 McDERMOTT, JOHN J., 71 Lotus Lane, Paramus, N. J.

- 1940 MCKEEVER, MRS. C. K., 1043 Carroll Street, Brooklyn 25, N. Y.
 1937 MCKEEVER, CHRISTOPHER K., 1043 Carroll Street, Brooklyn 25, N. Y.
 1950 MESSING, MRS. PAULINE, 383 Central Park West, New York 25, N. Y.
 1947 MEYERRIECKS, ANDREW J., Box 4251, U. of Tennessee, Knoxville, Tenn.
 1949 MEYERRIECKS, ROBERT, 119-30 146th Street, South Ozone Park 20, N. Y.
 1949 MIUCCIO, MRS. GINA D., 205 Columbus Avenue, New York 23, N. Y.
 1948 MOHR, CHARLES E., Audubon Nature Center, R. D. 4, Greenwich, Conn.
 1949 MORRISON, KENNETH, 1000 Fifth Avenue, New York 28, N. Y.
 1946 MURPHY, JAMES, 50 Plaza Street, Brooklyn 17, N. Y.
 1944 NAGLER, ROBERT, 174 West 76th Street, New York, N. Y.
 1919 NAUMBURG, MRS. ELSIE M. B., Amer. Mus. of Natural History, New York
 24, N. Y.
 1934 NELSON, DR. THEODORA, 315 East 68th Street, New York 21, N. Y.
 1930 NICHOLS, CHARLES K., 212 Hamilton Road, Ridgewood, N. J.
 1916 NICHOLS, L. NELSON, 331 East 71st Street, New York, N. Y.
 1949 NICHOLSON, DR. ELLEN M., 1060 Park Avenue, New York 28, N. Y.
 1937 NORSE, WILLIAM J., 531 West 211th Street, New York 34, N. Y.
 1947 NORTHWOOD, J. D'ARCY, 270 North Fullerton Avenue, Montclair, N. J.
 1945 O'BLENIS, MRS. PETER M., 594 East 25th Street, Paterson 4, N. J.
 1949 O'BRIEN, EDMUND H., 197 Shepherd Lane, Roslyn Heights, N. Y.
 1946 PEARL, LESLIE S., 230 East 50th Street, New York 22, N. Y.
 1945 PECK, ARTHUR, 1311 Needham Avenue, Bronx 67, N. Y.
 1940 PELOUBET, MRS. SIDNEY W., 228 Sagamore Road, Millburn, N. J.
 1950 PESSINO, MISS CATHERINE, Amer. Mus. of Natural History, New York 24,
 N. Y.
 1943 PETERS, MISS ELLEN, 442 Fifth Street, Brooklyn 15, N. Y.
 1927 PETERSON, ROGER T., P. O. B Box #7, Glen Echo, Md.
 1938 PETTIT, THEODORE S., 29 Donahue Road, Inwood, L. I., N. Y.
 1944 PHELPS, DR. WILLIAM H., Almacen Americano, Apartado 2009, Caracas,
 Venezuela.
 1950 PHILLIPS, WILLIAM B., 155 East 82nd Street, New York 28, N. Y.
 1939 POOR, HUSTACE H., 230 East 71st Street, New York 21, N. Y.
 1939 PORTER, JOHN F., 5 Crow's Nest Road, Bronxville, N. Y.
 1939 POUGH, MRS. RICHARD H., 33 Highbrook Avenue, Pelham 65, N. Y.
 1937 POUGH, RICHARD H., Amer. Mus. of Natural History, New York 24, N. Y.
 1941 RAYNOR, GILBERT S., Manorville, Long Island, N. Y.
 1948 REED, MRS. D. PAUL (JEAN D.), 16 East 92nd Street, New York 28, N. Y.
 1948 REGAN, MRS. FRANCES M., 113-19 Colfax Street, St. Albans 11, N. Y.
 1947 REITH, MISS MARIE, 120-05 Long Street, Jamaica, N. Y.
 *1922 RICH, MRS. EVA, 150 West 80th Street, New York 24, N. Y.
 1944 RISSANEN, WILLIAM, 516 West 167th Street, New York 32, N. Y.
 1947 RITCHIE, MRS. JAMES, Clark Street, Massapequa, L. I., N. Y.
 1944 ROCHE, DAVID, JR., 3836 Bailey Avenue, Bronx, N. Y.
 *1911 ROGERS, CHARLES H., Princeton Museum of Zoology, Princeton, N. J.
 1934 ROSE, GEORGE C., 202 Linden Road, Mineola, N. Y.
 1942 RUBIN, MRS. ANIVA H., 328 Archer Street, Freeport, N. Y.
 1950 RUSSAK, MARSHALL L., 1675 Metropolitan Ave., Bronx 62, N. Y.

- 1945 RYAN, RICHARD, 5009 Broadway, New York 34, N. Y.
- 1951 SCHERMAN, MRS. HARRY, 322 East 57th Street, New York 22, N. Y.
- 1949 SCOFIELD, WILSON B., 15 Wardman Street, White Plains, N. Y.
- 1948 SCORDATO, JOSEPH, 28 Central Drive, Bronxville, N. Y.
- 1931 SEDWITZ, WALTER W., 17 West 182nd Street, Bronx, N. Y.
- 1945 SHAPIRO, JOSEPH J., 110 West 94th Street, New York 25, N. Y.
- 1948 SHEPPARD, MISS MILDRED C., 22 Grove Street, New York 14, N. Y.
- 1948 SKELTON, MRS. KATHLEEN, 353 West 57th Street, New York, N. Y.
- 1939 SKOPEC, ARTHUR, 48-20 207th Street, Bayside, N. Y.
- 1946 SLOSS, RICHARD A., 65 Brower Avenue, Woodmere, L. I., N. Y.
- 1947 SMITHE, F. NORTON, 647 East 14th Street, New York, N. Y.
- 1944 SOLL, JEROME, 649 East 22nd Street, Brooklyn 10, N. Y.
- 1948 SOLOMON, WILLIAM, 1155 Walton Avenue, New York 52, N. Y.
- 1947 SPEAR, MRS. MURRAY, 7 Washington Square, New York 3, N. Y.
- 1933 STALOFF, CHARLES, 1776 Weeks Avenue, Bronx 57, N. Y.
- 1943 STEGLE, JOSEPH, 220 Pondfield Road West, Bronxville, N. Y.
- 1950 STERLING, JOSHUA, 49 Wellington Court, Brooklyn 30, N. Y.
- 1929 STEVENS, MRS. CHARLES W., 170 West 74th Street, New York, N. Y.
- 1939 STOCKELBACH, MRS. F. E. (LAVONIA R.), 25 Gordon Place, Verona, N. J.
- 1945 STONER, MRS. C. BIRCH (LUCY F.), 357 Hobart Avenue, Short Hills, N. J.
- 1950 STRYKER, MRS. MIRIAM, Amer. Mus. of Natural History, New York 24, N. Y.
- 1947 SULLIVAN, DR. WILLIAM J., 132 Pondfield Road, Bronxville 8, N. Y.
- 1944 TAINTER, MISS GRACE, 161 Emerson Place, Brooklyn 5, N. Y.
- 1948 TATE, MISS SALLY, 1245 Madison Avenue, New York, N. Y.
- 1945 TEALE, EDWIN WAY, 93 Park Avenue, Baldwin, L. I., N. Y.
- 1933 THOMAS, ALLEN M., Graham School, Hastings-on-Hudson, N. Y.
- 1926 THOMAS, MRS. MARGARET L., 366 West 245th Street, Riverdale 63, N. Y.
- 1946 THORLEY, ROBERT F., 3 Midland Gardens, Bronxville 8, N. Y.
- 1949 THORNE, OAKLEIGH II, Box 347, Islip, N. Y.
- 1925 THORNTON, A. P., 114 Hawthorne Street, New Bedford, Mass.
- 1946 TIFFANY, JOHN, 136 Seaman Avenue, New York 34, N. Y.
- 1942 TREAT, MISS DOROTHY, 303 East 71st Street, New York 21, N. Y.
- 1946 TROWBRIDGE, MRS. WINTHROP, 160 Columbia Heights, Brooklyn 2, N. Y.
- 1923 TUCKER, MRS. CARLL, 733 Park Avenue, New York, N. Y.
- 1925 TUCKER, CARLL, 733 Park Avenue, New York, N. Y.
- 1933 VAN DEUSEN, HOBART MERRITT, 12 Highland Avenue, Montclair, N. J.
- 1944 VAURIE, DR. A. J. C., 231 East 76th Street, New York, N. Y.
- 1949 VOGEL, HERBERT, 760 Fox Street, Bronx 55, N. Y.
- 1951 VON GLAHN, JOHN H., R. F. D. Smithtown Branch, L. I., N. Y.
- 1948 WACHENFELD, MRS. WM. A., 787 East Clarke Place, Orange, N. J.
- 1924 WALSH, LESTER L., 69 Tappan Landing Road, Tarrytown, N. Y.
- 1906 WALTERS, FRANK, Hollis, N. H.
- 1947 WATERMAN, RALPH T., 51 Market Street, Poughkeepsie, N. Y.
- 1944 WAUGH, DAN F., 277 Park Avenue, New York 17, N. Y.
- 1945 WEART, MISS EDITH L., 35-36 76th Street, Jackson Heights, N. Y.
- 1949 WEBSTER, MRS. L. J., 201 Park Avenue, Allendale, N. J.
- 1949 WEBSTER, L. J., 201 Park Avenue, Allendale, N. J.

- 1950 WEINGRAFF, ABRAHAM, 431 East 81st Street, New York, N. Y.
 1946 WEINSTEIN, WILLIAM, 60 East 94th Street, New York 28, N. Y.
 1944 WEIRICH, MISS MARJORIE C., 89 Crooke Avenue, Brooklyn 26, N. Y.
 1943 WENMAN, MISS LOIS M., Sand Spring Road, Morristown, N. J.
 1943 WERNER, MISS IDA F., 2701 Webb Avenue, Bronx, N. Y.
 1928 WILCOX, LEROY, Speonk, Long Island, N. Y.
 1945 WILEY, MISS FARIDA A., Amer. Mus. of Natural History, New York 24, N. Y.
 1945 WILLIAMS, MISS HELEN J., 129 North Arlington Ave., East Orange, N. J.
 1947 WOLFF, JOHN L., 38 Crane Road, Scarsdale, N. Y.
 1942 WOOD, RAWSON L., 5 Bonnie Heights Road, Manhasset, N. Y.
 1946 WOODELTON, MRS. ROY, 454 Seventh Street, Brooklyn 15, N. Y.
 1947 WOOLF, MRS. EDWARD L., 83 Garrabrant Avenue, Bloomfield, N. J.
 1940 YOUNG, J. ADDISON II, 60 Argyle Avenue, New Rochelle, N. Y.

Associate Members

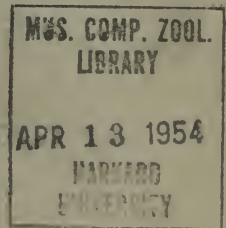
- 1943 ARCHARD, MISS HELEN, 2544 County Street, Somerset, Mass.
 1919 AYER, MRS. NATHAN EDWARD, 1300 Hillcrest Drive, Pomona, Calif.
 1950 BAILEY, SETH T., 1424 Bay Street, Alameda, Calif.
 1931 BEALS, MRS. A. T., 165 South Marengo Avenue, Pasadena 5, Calif.
 1951 BERGSTROM, E. ALEXANDER, 37 Old Brook Road, West Hartford, Conn.
 1943 BLAZER, WARREN G., 31 Conant Hall, Harvard U., Cambridge 8, Mass.
 1949 BURCKHARDT, DIETER, Sevogelstrasse 81, Basle, Switzerland.
 1925 COFFEY, MRS. BEN B., JR., 672 North Belvedere St., Memphis, Tenn.
 1944 DOERING, HUBERT R., 414 Rivard Boulevard, Grosse Point 30, Mich.
 1937 EATON, MRS. TRACY A., Box 72, Greenville, N. H.
 1950 FARLEY, COLVIN, Sherman, Conn.
 1944 FIFE, MISS MARGARET, c/o Miss Hope Mathewson, 82 East End Avenue,
 New York 28, N. Y.
 1951 FLYNN, MICHAEL G., 282 Rider Avenue, Syracuse 4, N. Y.
 1948 GROSS, DR. ALFRED O., Bowdoin College, Brunswick, Maine.
 1933 HICKEY, MRS. JOSEPH J., 13A Eagle Heights, Madison 5, Wis.
 1939 IMHOF, THOMAS, Medical Division, Army Chemical Center, Md.
 1884 INGERSOLL, A. M., 908 F. Street, San Diego, Calif.
 1950 ISHAM, HENRY W., 460 Bellefontaine Street, Pasadena 2, Calif.
 1927 KUERZI, RICHARD G., Box 29, St. Mary's, Ga.
 1951 LAMORE, DONALD, 312 College Avenue, Ithaca, N. Y.
 1947 MAZZEO, ROSARIO, 120 Elm Street, North Cambridge 40, Mass.
 1949 NATHAN, BERNARD, Hotel Stuyvesant, Buffalo, N. Y.
 1943 PALMER, DR. RALPH S., New York State Museum, Albany 1, N. Y.
 1947 RICHTER, MAURICE, 102 Crescent Avenue, Leonia, N. J.
 1925 RIGGENBACH, H. E., c/o A. Sarasin & Co., Basle, Switzerland.
 1943 ROSS, MRS. R. DUDLEY, 796 Stony Hill Road, Springfield 8, Mass.
 1943 ROSS, R. DUDLEY, 796 Stony Hill Road, Springfield 8, Mass.
 1939 SABIN, WALTON B., 122 Simms Road, Syracuse, N. Y.
 1943 SCOTT, FREDERICK R., 4600 Coventry Road, Richmond 21, Va.
 1943 SMALL, ARNOLD, 1840 West 11th Place, Los Angeles 6, Calif.

- 1939 SPOFFORD, DR. WALTER R., University of the State of New York Medical Center, Syracuse University, Syracuse 10, N. Y.
- 1937 STEPHENSON, DR. O. K., JR., New Bloomfield, Pa.
- 1938 STEVENSON, JAMES O., c/o Fish and Wildlife Service, Dept. of the Interior, Washington, D. C.
- 1947 STONE, RUDOLPH H., 505 Bedford Road, Schenectady 8, N. Y.
- 1937 STORER, ROBERT W., Museum of Zoology, U. of Mich., Ann Arbor, Mich.
- 1938 TINBERGEN, DR. NIKOLAS, Dept. of Zoology, Univ. Museum, Oxford, England.
- 1947 VAN TYNE, DR. JOSSELYN, Mus. of Zoology, U. of Mich., Ann Arbor, Mich.
- 1928 VOGT, WILLIAM, 32 Cunningham Avenue, Floral Park, N. Y.
- 1938 WATSON, FRANK G., c/o Shell Chemical Co., Box 2633, Houston 1, Texas.
- 1944 WELLES, PHILIP, 227 Brooklyn Avenue, Brooklyn, N. Y.
- 1948 WELLS, JOHN, 83-64 Talbot Street, Kew Gardens 15, N. Y.
- 1945 WHITING, ROBERT A., 1228 Chittoc Avenue, Jackson, Mich.
- 1938 WHITMAN, F. B., JR., Brunswick Savings Inst., Brunswick, Maine.
- 1921 WILLIAMS, LAIDLAW, R. D. #1, Box 138, Carmel, Calif.
- 1944 YRIZARRY, JOHN, 1143 Carroll Street, Brooklyn, N. Y.

1951 - 1953

Nos. 63 - 65

PROCEEDINGS
OF THE
LINNAEAN SOCIETY
OF
NEW YORK



For the Three Years Ending
March, 1953

Date of Issue, March, 1954

The Linnaean Society of New York

Regular meetings of the Society are held on the second and fourth Tuesdays of each month from October to May. Informal meetings are held at least once a month during June to September, inclusive. All meetings (except the Annual dinner meeting on the second Tuesday of March) are held at the American Museum of Natural History, and are open to the public.

Persons interested in natural history are eligible to membership in the Society. Annual dues for Active Members are \$4.00, and for Associate Members (residing more than fifty miles from New York city) are \$1.50.

The Society conducts field trips and maintains a small circulating library for its members. It distributes free to all members a monthly *News-Letter*, and every two or three years an issue of *Proceedings* containing articles and notes of ornithological interest. At irregular intervals longer papers and monographs called *Transactions* are published, which members receive free or at a substantial discount.

Communications, and inquiries regarding publications, should be addressed to:

Secretary, Linnaean Society of New York,
c/o American Museum of Natural History,
79th Street at Central Park West,
New York 24, N. Y.

1951 - 1953

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PROCEEDINGS
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Seventy-Five Years of the Linnaean Society of New York

On March 7, 1878, responding to a call signed by Franklin Benner and Ernest Ingersoll, ten enthusiastic amateurs met in New York to organize a local natural history society. Thus began the Linnaean Society of New York, the oldest—save for the Nuttall Ornithological Club—of existing American ornithological societies. While the group of founders (see Appendix A) included the already well-known John Burroughs, the leadership came from the young men. At the first meeting, Dr. Clinton Hart Merriam, then only twenty-two, was elected president. Another founder, Eugene P. Bicknell, had not yet attained his majority; he became president in 1879 and led the Society during the eight critical years of its infancy.

None of the founders was a professional ornithologist. Indeed it is doubtful whether in 1878 there were in the United States any persons earning their livelihood from the study of birds. The American Museum of Natural History had only just erected the first small section of its building. There was no National Audubon Society, no American Ornithologists' Union, no Fish and Wildlife Service. Audubon's plates still constituted the most useful set of American bird portraits, and there were no guides for field identification. The basic ornithological handbook was Elliott Coues' "Key to North American Birds," an excellent work for identification—of a dead bird. Bird-banding was a wholly undeveloped technique. National bird conservation laws were unknown, and state legislation protected very few species.

The foregoing is more than a mere background of conditions in 1878. To a remarkable extent the facilities, the organizations, the books, which bird students in the eastern United States take for granted, are the product of members of the Linnaean Society of New York.

The minutes of the Society show from the very start that the members were overwhelmingly interested in ornithology, though during the early years relatively more time was devoted to other aspects of natural history than was the case later.

In 1882 and 1884 the Society published the first volume of *Transactions*, devoted chiefly to Merriam's account of the mammals of the Adirondacks. (Merriam had elsewhere published a paper on the birds of that region.) Birds were not ignored in the first *Transaction*, for it included a discussion of the status of the Fish Crow by William Dutcher (a member since 1880, who later founded and served as first president of the national Audubon organization). There was also an account of Catskill bird-life by Bicknell, whose name is attached to a subspecies of the Gray-checked Thrush.

The first *Abstract of Proceedings* appeared in 1889, a nine-page

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summary of the minutes of meetings held during the preceding year. The Society at that time was meeting at the rooms of the Geographic Society at 11 West 29th Street. As is true today, meetings were held twice a month from October to May inclusive. The membership as of March 1, 1889, totalled 61, comprising 28 Resident Members (including, in addition to those mentioned, such well-known names in ornithology as J. A. Allen, Frank M. Chapman, A. K. Fisher, George Bird Grinnell, Jonathan Dwight, E. A. Mearns and George B. Sennett), 3 Honorary Members (Elliott Coues, George N. Lawrence and Daniel Giraud Elliot), and 30 Corresponding Members (including Theodore Roosevelt and Dr. Juan Gundlach of Cuba).

The content of meetings was surprisingly similar to that of recent years. For example: At the meeting of April 13, 1888, the chief paper was "a chronological sketch of the life of John James Audubon" by L. S. Foster. William Dutcher reported the capture of a Wilson's Plover "several years ago on Long Island," Frank M. Chapman described the abundance and tameness of shorebirds on the west coast of Florida, and Jonathan Dwight exhibited specimens of this group. At the next meeting, May 11, 1888, Mr. Foster read "Notes upon the migration of birds of the spring of 1888 as observed near Cortland, N. Y., and Woodside, Long Island." There was general discussion as to the effect on birds of the "blizzard" of March 12, 1888, which caused general destruction of English Sparrows around the City, while "on Staten Island a Blue Jay was seen dropping dead from a tree, and near Lawrenceburg, Long Island, a Seaside Finch was found dead on March 12, this being also an early record for this species."

Thus meetings went along—much as they do today. Even the bemoaning of lost natural riches with encroaching urbanization is represented by a paper published in the first *Abstract of Proceedings*, "Former Abundance of Some Species of Birds on New York Island at the Time of Their Migration to the South," by George N. Lawrence.

The *Abstracts of Proceedings* (up to and including No. 38) are especially interesting to those with an antiquarian bent, for they summarize each meeting, reporting not only the substance of the formal papers, but also other matters discussed, with the number, and generally the names, of those attending. In the early *Abstracts* few formal papers were published, for it was pointed out that many of the papers given at meetings subsequently appeared in *Forest and Stream* or in *The Auk*. This is hardly surprising, for J. A. Allen, first president of the American Ornithologists' Union and editor of *The Auk* from its initial appearance in 1883 until 1911, served as president of the Linnaean Society for seven years during the same period. Several Linnaean members were among

the founders of the A.O.U., and at least twelve have served as president of that organization.

The U. S. Biological Survey (later called Fish and Wildlife Service) had as its founder and first chief the same enterprising Merriam who was first president of our Society, and who devised the stimulating life-zone concept of animal distribution. Merriam drew down to Washington another M.D., Dr. A. K. Fisher, who had joined the Linnaean Society in its first year, and whose work on feeding habits of hawks and owls established a basis for overcoming the ancient prejudice against these predators.

Conservation legislation was early a matter of interest to the Society. At the meeting of March 6, 1891, its third president, Mr. Sennett (remembered in "Sennett's White-tailed Hawk") reported upon his recent trip to Albany on behalf of bird protection. "The proposed new law will repeal 174 old ones and promises to be an excellent one, although it outlaws cranes, hawks, owls, shrikes, English sparrows, blackbirds and crows. Of 28 species of hawks and owls found in the State, only five are proved to be foes of the farmer. The usefulness of crows and blackbirds is still questionable."

The popular nature of annual meetings is indicated by the fact that Dr. C. Slover Allen, supplementing an earlier talk on the pit vipers, "thrilled those present by shaking out of a bag a large rattlesnake and moccasin alive, and then endeavoring to provoke them to coil and strike." At the same 1891 meeting the Society voted to move to the American Museum of Natural History, where it has met ever since. For many years the Society used the Library of the Museum, shifting rooms when increasing attendance required.

During this period attendance at regular meetings was very small. Thus in 1893, though the membership was 77, on April 19 only 7 members and 2 guests attended, on May 3 the meeting adjourned for lack of a quorum, and on May 17 only 6 members and 2 guests were present. A membership campaign was launched, by sending invitations, among others, to all persons affiliated with the American Museum and by providing a special series of public lectures at the Museum. The campaign, continued over several years, succeeded in improving finances and greatly increasing the membership, but the attendance at regular meetings remained low. By March 1894 total membership had increased in one year from 77 to 177 and rose by 1898 to a total of 200—a figure not attained again until 1941. With optimism so engendered, the Society amended its constitution in 1894 to create the classes of Life Member and Patron, on payment of \$50 and \$500 respectively. Though several well-known millionaires became members as a result of the campaign, none chose to immortalize himself as a Patron.

At this time one of the leaders of the Society was Dr. Frank M.

Chapman, vice-president from 1888-97 and president from 1897-99. A man of tremendous energy, he ran the bird department at the American Museum, published many important technical papers, edited *Bird-Lore* for the Audubon Societies, and wrote an amazing number of popular bird books. His "Handbook of Birds of Eastern North America," first published in 1895, was the "bible" of eastern bird students for half a century, and is still useful. He probably did more to further popular bird study than any one man of his generation.

Though by then essentially a bird club, the Society between 1899 and 1911 published in its *Abstracts* (Nos. 7-23) a series of useful papers on other vertebrate groups found in the New York City region. Popular interest in birds was already sufficient to warrant the American Museum's publishing as guide leaflets in 1904 and 1906 annotated lists of the birds of the vicinity of New York City, written by Chapman. From 1899-1921, twenty-one years, Dr. Jonathan Dwight, a physician with an absorbing interest in ornithology, was president of the Society. His work on moults and on the taxonomy of the gulls of the world remains of outstanding importance. He also was elected president of the American Ornithologists' Union and served on the Committee which prepared the third and fourth editions of the A.O.U. Check-List. Incidentally, of the seven men who prepared the Third Edition of the Check-List, *three* had been president of the Linnaean Society, including the Chairman of the Committee.

Doubtless Dr. Dwight's interest lay in the more technical aspects of ornithology, and, possibly because of this, the total membership gradually fell to 111 by 1920. The hard core of the regular attendants at meetings was formed chiefly of persons affiliated with the American Museum—though not all of them were employed in the bird department. Thus, aside from Dr. Dwight, two of the three other officers in 1920 were on the Museum staff, Dr. Walter Granger and C. H. Rogers, and of the 81 Resident Members at least 11 were so affiliated.

Nevertheless, the minutes show an increasing reliance on sight observations. Others very active in this period were C. G. Abbott, James Chapin, Ludlow Griscom, George Hix, Dr. E. R. P. Janvrin, J. M. Johnson, L. N. Nichols and J. T. Nichols. Meanwhile, too, some members had become interested in developing the new bird-banding technique; the American Bird Banding Association was formed, and the Linnaean Society acted as custodian of records until 1920, when the Biological Survey took over. One of the leading early bird-banding papers was written by our member Howard Cleaves, also a pioneer in bird photography. The Society itself published another influential paper on the techniques of this fruitful method of study, "Bird-Banding by Means of Systematic Trapping" by S. Prentiss Baldwin—which was widely

circulated as a separate, and later reprinted.

In 1919, at Dr. Chapman's suggestion, a committee of the Linnaean Society had been appointed to collect local records. This culminated in 1923 with the appearance of Griscom's "Birds of the New York City Region," prepared with the cooperation of the Society and based chiefly on records of its members. As stated in the preface, comparing conditions with those when Dr. Chapman's leaflet appeared in 1907:

"For one person interested in birds then there are now hundreds, who cover almost every section of the area at every season of the year. . . . Twenty-five years ago an active field man went out collecting a few dozen times a year, or made two or three trips lasting a week or so apiece. Nowadays an active student will often be afield a hundred times in one year. . . .

"The Linnaean Society of New York, throughout this period, has been the main center and nucleus for this growth of ornithological interest."

The data in this excellent book stimulated the competitive urge to "beat" the published record and to explore the less known portions of the region. It thus served not only to summarize existing knowledge but to encourage additional field work.

A new constitution in 1925 forbade reelection to the same office (other than treasurer) for more than two consecutive years, except after the intervention of a year, thus assuring change in the leadership and the opportunity for new points of view to be fully expressed. This constitution, in essence, remains in force today, with amendments made in 1927, 1941 and 1950.

Since March 1920, the Society has had a steady growth, with occasional spurts and minor recessions. Attendance at meetings has grown proportionately. During the 1920's the Society was enriched by the appearance of a remarkably enthusiastic group of youngsters from the Bronx. At least six of these boys ultimately were elected officers of the Society. One of the most active, John F. Kuerzi, compiled the local distribution data for the 1932 edition of Chapman's "Handbook," and two, Joseph J. Hickey and Allan D. Cruickshank, served as president of our Society and went on to achieve national reputations. Another vitalizing influence, from 1921 to his untimely death in 1938, was Charles A. Urner, recognized as an outstanding expert on shore-birds and water-fowl. His tireless ardor and thoroughness, exemplified in his bird list for Union County, New Jersey (published by the Society), stimulated others to investigate distribution on a more ecological basis. He began an exhaustive survey of the birds of his native state and organized the bird club at Newark which now bears his name. Many of his New Jersey friends be-

came members of the Linnaean Society and greatly contributed to its activities, notably Warren F. Eaton, who succeeded Urner as president, and several of whose papers were published by the Society. Eaton was one of the organizers in 1931 of the Hawk and Owl Society, designed to encourage the study and protection of these predators, whose importance in nature is not yet sufficiently appreciated. The hawks have for many years had enthusiastic advocates in our Society. Mrs. C. N. Edge, founder of the Emergency Conservation Committee and of the Hawk Mountain Association, was long a member.

In 1933 the president of our Society, John F. Baker, became executive head of the National Audubon Society (then called National Association of Audubon Societies), which a Vice-President of our Society and one of its early members, Dr. Dutcher, had founded and successfully carried through the early struggle for bird protection. Baker took into the Audubon organization a number of other Linnaean members. The gain was not all one sided, for Audubon staff members, coming to New York from other parts of the country, frequently became active in Linnaean affairs.

The techniques of field identification, worked out over the years by many bird-watchers, were brilliantly illustrated and developed in the "Field Guide to the Birds" (1934) of Roger T. Peterson, who, as a young art student, had become a member in 1927. The first edition acknowledged by name the aid of ten fellow Linnaeans and states that "without the highly appreciated prompting and constant criticism and help of William Vogt [then president of our Society] this guide would probably never have been undertaken nor completed." The latest edition recognizes the continuing interest of his fellow members by acknowledging suggestions from at least twenty additional Linnaeans.

As a result of the great increase in field reports, it was decided in 1934 to create a new office of Recording Secretary to handle minute-taking and record-keeping. At the same time the Constitution was amended to add the office of Editor, with the responsibility for publications, a post exempt from the restriction on reelection.

The *Abstracts of Proceedings* had long ceased to include abstracts of minutes, and consisted chiefly of formal articles and notes. Accordingly the name was shortened to *Proceedings* beginning with Nos. 45, 46 (1933-1934). The Society also published longer papers in the form of *Transactions*: In 1933 Griscom's "Birds of Dutchess County" based on the records compiled by our member, Maunsell Crosby; in 1939 Tinbergen's "The Behavior of the Snow Bunting in Spring"; and in 1937 and 1943, in two parts, Margaret Morse Nice's monumental "Studies in the Life History of the Song Sparrow"—the most thorough study of an American passerine, and the basis of a Brewster award in ornithology.

Demands for the Nice paper soon exhausted our available supply. During most of this period Dr. Ernst Mayr served as editor. He urged the Society to study bird behavior more intensively, particularly territoriality—an aspect that had been neglected by local observers. His influence was reflected not only in the publications during his term of office, and for years thereafter, but also in the field activities of many members.

A Linnaean prize was established for the best papers submitted by a member to the Society not undertaken in the course of professional duties. The first Linnaean prize was awarded in 1938 to William Vogt for his paper on the Willet. Vogt later organized and headed the conservation work of the Pan American Union, and wrote the well-known "Road to Survival." In 1940 the Linnaean prize went to Robert P. Allen and Frederick P. Mangels for their "Studies of the Nesting Behavior of the Black-crowned Night Heron." Allen, also a president of our Society, has, since leaving our area, conducted research and published books on the Roseate Spoonbill and Whooping Crane.

Roads enabling automobiles to reach all parts of our region, the increased number of birders, the facilitation of field identification by Peterson's guides, all combined to enhance our knowledge of the bird-life of the region. Allan D. Cruickshank, today one of our finest bird photographers, and since his boyhood one of the most active and energetic Linnaean members, produced in 1942 (with the cooperation of the Society) "Birds Around New York City," which admirably summarized the then existing information as to our local avifauna. His introductory analysis of the bird-life of the region should have value long after changed conditions have altered the status of individual species—which has already occurred in several instances.

In 1943 Joseph J. Hickey, a former president of our Society, also a member from boyhood, published his stimulating and entertaining "Guide to Bird Watching," which every amateur should own. This book is full of ideas on the functions of bird clubs and the opportunities for useful investigation open to the amateur bird watcher, who is urged to graduate from "the Field Card School of Ornithology, which measures success in terms of the rarity, the first migrant, and the big list." Still another recent president of our Society, Richard H. Pough, is the author of the useful *Audubon Field Guides* published in 1946 and 1951.

In mentioning a few of the numerous Linnaean authors, emphasis has been on major works of popular ornithology, because it is felt that in their production the Society certainly served as a stimulating factor. As in the past, Linnaean members, including many who are or have been very active in its affairs, continue to write valuable, and often outstandingly important, ornithological papers of a more technical nature. Indeed it is a rare issue of *The Auk* that does not contain a contribution by one of our

members. This is reasonable enough, for almost all ornithologists working about New York City have been Linnaean members, and many now living elsewhere spent formative years in our area.

The Second World War drew many of our most active field students into the Armed Forces, and restrictions on the use of binoculars in coastal areas were a handicap to those that remained. Nevertheless, attendance at meetings, as well as membership, showed a striking increase. In March 1942 membership was 206. By March 1945 it had reached 277. Attendance by 1945 so consistently ranged around a hundred that larger quarters had to be obtained in the Museum to replace the room that had been used for many years. In March 1946 the membership rose to 307—a remarkable jump caused in part by a post-war influx of new people into our area, though many of our pre-war leaders, after separation from the Armed Services, settled in other parts of the country. By March 1948 membership increased to 319; though by 1953 it dropped to 316.

In 1947 the Society, under the editorship of Robert S. Arbib, Jr., assumed the publication of a monthly *Linnaean News-Letter*. It also actively participated in the organization of the Federation of New York State Bird Clubs, designed to facilitate cooperation among the societies scattered through the state. A result of such cooperation was a revised New York statute protecting almost all hawks and owls. In 1949 the Linnaean Society acted as host to the Annual Convention of the Federation.

In 1949 the American Museum of Natural History acquired title from the United States to Great Gull Island in Block Island Sound under an arrangement by which it was to be administered in cooperation with our Society as a bird sanctuary and biological research station. The Society raised funds in the hope of restoring the tern colonies that existed before the Government covered the island with buildings and concrete.

In addition to its two monthly meetings from October to May, for a number of years the Society has held informal meetings in June, July, August and September. These informal meetings are usually attended by between 20 to 40 persons, though September attendance has at times exceeded 70. Regular meetings generally have an attendance of from 60 to 100, depending on the character of the program. Well-known, popular speakers occasionally attract twice the latter figure. For the past few years special seminar meetings of a more technical nature have been held at irregular intervals, especially when some ornithologist from beyond our region, temporarily in town, has been willing to discuss with us his current study.

A glance over the list of our Society's publications reveals that its activities have reflected the interests of those then most active in its

affairs. These interests have varied in emphasis over the years—though remarkably little in basic character. The Society has resisted any specialization more narrow than ornithology itself, though, of course, the chief interest has been the birds of the New York City region. Enterprising members, needing a more channelized outlet for their activities, have felt it desirable to form other organizations, devoted, for example, to conservation, bird-banding, predator protection, and the like. The Linnaean Society has retained the simplicity and (we hope) resiliency characteristic of relatively unspecialized organisms. From time to time proponents of excellent ideas have been disillusioned by the inertia of members to undertake cooperative projects. This should not be surprising considering the largely urban or suburban residence of the members, many of whom can get out-of-doors only on week-ends and are disinclined to commit themselves to a particular form of research.

What the Society does best is to provide a forum where bird students may exchange views and experiences, thus mutually enlarging their knowledge and strengthening their common interest. The accomplishments of the Society have been almost always the accomplishments of individual members. But the Society as an organization may justly claim a part, for in most instances the encouragement, or merely the respectful interest, of fellow-members has served as a spur to individual effort. Even the relatively passive portion of the membership, which appears to do little more than pay dues and attend meetings, provides a sounding-board for ideas and gives the dignity of numbers to our hobby. Moreover, the quiet auditor generally has a strong interest in natural history or he would not seek membership, and in his immediate circle may be actively spreading the good word. Only when more people share in some measure our appreciation of nature will sufficient popular interest be roused to protect the vanishing habitats on which depend the variety of our birds and the enjoyment of our hobby.

The attached lists of officers of the Society and of its more formal publications (Appendices A and B) give a fair idea of its leadership and activities. The Secretaries' reports in this and the last issue of the *Proceedings* cover our recent history. Yet there have always been members—among the most valued in the Society—who have never held office nor written an article. They have served the Society loyally on the Council, or on committees, or in connection with publications or programs, or by leading field-trips or caring for our library, or simply by the stimulus of their field activities or their active participation at meetings. Such men and women, young and old, have been the ever-changing core of our Society; they have kept it vigorous these seventy-five years.

EUGENE EISENMANN, *Editor*

(APPENDIX A)

THE LINNAEAN SOCIETY
OF NEW YORK

1878

1953

FOUNDED MARCH 7th, 1878

by

H. B. BAILEY
FRANKLIN BENNER
E. P. BICKNELL
JOHN BURROUGHS
HAROLD HERRICK

DR. FREDERICK H. HOADLEY
ERNEST INGERSOLL
NEWBOLD T. LAWRENCE
DR. C. HART MERRIAM
WILLIAM C. OSBORN

Presidents

C. Hart Merriam, M.D., 1878-79
Eugene P. Bicknell, 1879-87
George B. Sennett, 1887-89
Joel A. Allen, 1889-97
Frank M. Chapman, Sc.D., 1897-99
Jonathan Dwight, M.D., 1899-1921
Walter Granger, 1921-22
John T. Nichols, 1922-25
E. R. P. Janvrin, M.D., 1925-27
Ludlow Griscom, 1927-28
James P. Chapin, Ph.D., 1928-29
Charles A. Urner, 1929-31

Warren F. Eaton, 1931-33
John H. Baker, 1933-35
William Vogt, 1935-37
Joseph J. Hickey, 1937-39
Allan D. Cruickshank, 1939-41
Charles K. Nichols, 1941-43
Richard H. Pough, 1943-45
Hustace H. Poor, 1945-47
Eugene Eisenmann, 1947-49
Robert S. Arbib, Jr., 1949-51
Dean Amadon, Ph.D., 1951-53
John L. Bull, 1953-

Vice-Presidents

Harold Herrick, 1878-79
H. B. Bailey, 1879-80, '82-84
Richard F. Pearsall, 1880-82
A. K. Fisher, M.D., 1884-88
Frank M. Chapman, Sc.D., 1888-97
Jonathan Dwight, M.D., 1897-99
William Dutcher, 1899-1903, '06-10
John L. Childs, 1903-04
Walter Granger, 1904-06, '19-21
Clinton G. Abbott, 1910-14
Jullus M. Johnson, 1914-19
John T. Nichols, 1921-22
Ludlow Griscom, 1922-23
James P. Chapin, Ph.D., 1923-24
E. R. P. Janvrin, M.D., 1924-25, '39-41

I. Nelson Nichols, 1925-27
Charles A. Urner, 1927-29, '33-35
Samuel H. Chubb, 1929-31
T. Donald Carter, 1931-33
Joseph J. Hickey, 1935-37
Charles K. Nichols, 1937-39
Richard H. Pough, 1941-43
Hustace H. Poor, 1943-45
Eugene Eisenmann, 1945-47
Hobart M. Van Deusen, 1947-48
Robert S. Arbib, Jr., 1948-49
Dean Amadon, 1949-51
Christopher K. McKeever, 1951-53
Irwin M. Alperin, 1953-

Secretaries

Ernest Ingersoll, 1878
Franklin Benner, 1878-79
Clarence H. Eagle, 1880-82
L. S. Foster, 1882-86
Louis A. Zerega, M.D., 1886-87
Jonathan Dwight, M.D., 1887-92
Arthur H. Howell, 1892-94
Walter Granger, 1894-1904
Clinton G. Abbott, 1904-10
Francis Harper, 1910-12
Ludlow Griscom, 1912-15
Charles H. Rogers, 1915-20
E. R. P. Janvrin, M.D., 1920-22
James P. Chapin, Ph.D., 1922-23
T. Donald Carter, 1923-24, '30-31
Charles A. Urner, 1924-26
Warren F. Eaton, 1926-28

John F. Kuerzi, 1928-30
William Vogt, 1931-33
Ernst Mayr, Ph.D., 1933-35
Charles K. Nichols, 1935-37
Robert P. Allen, 1937-39
John F. Mathews, 1939-41
Margaret Brooks, 1941-42
Hustace H. Poor, 1942-43
John L. Bull, 1943-44
Eugene Eisenmann, 1944-45
R. Dudley Ross, 1945-46
Hobart M. Van Deusen, 1946-48
Robert S. Arbib, Jr., 1947-48
Walter Sedwitz, 1948
Herman Goebel, 1948-51
Richard E. Harrison, 1951-53
Catherine Pessino, 1953-

Recording Secretaries

Joseph J. Hickey, 1934-35
Allan D. Cruickshank, 1935-36
Richard G. Kuerzi, 1936
Walter Sedwitz, 1936-38
Alfred E. Eynon, 1938-39
Robert W. Storer, 1939-40
Richard H. Pough, 1940-41
Hustace H. Poor, 1941-42
Richard B. Fischer, 1942-43
Eugene Eisenmann, 1943-44

John L. Bull, 1944-45
Christopher K. McKeever, 1945-46
William O. Astle, 1946-47
George Komorowski, 1947
Geoffrey Carleton, 1947-48
George C. Rose, 1948-50
Irwin Alperin, 1950-51
John H. Mayer, 1951-53
Ned Boyajian, 1953-

Treasurers

H. B. Bailey, 1878-79
Newbold T. Lawrence, 1879-89
C. Slover Allen, M.D., 1889-90
L. S. Foster, 1890-1901
Lewis B. Woodruff, 1901-21
T. Gilbert Pearson, LL.D., 1921-25
John H. Baker, 1925-29
Maunsell S. Crosby, 1929-31

E. R. P. Janvrin, M.D., 1931-35
C. B. P. Cobb, M.D., 1935-38
Allan D. Cruickshank, 1938-39
Irving Kassoy, 1939-41
Samuel C. Harriott, 1941-43
Mrs. Eva Rich, 1943-52
Theodora Nelson, Ph.D., 1952-

Editors

Ernst Mayr, Ph.D., 1934-41
Joseph J. Hickey, 1941-42
Dean Amadon, 1942-44

Anna North Coit, 1944-47
Theodora Nelson, Ph.D., 1947-51
Eugene Eisenmann, 1951-

(APPENDIX B)

Publications of the Linnaean Society of New York

TRANSACTIONS

- Vol. I, 1882, Royal Octavo, 168 pages. Frontispiece.—Portrait of Linnæus.
The Vertebrates of the Adirondack Region, Northeastern New York. First Instalment. Clinton Hart Merriam.
Is Not the Fish Crow (*Corvus ossifragus* Wilson) a Winter as Well as a Summer Resident of the Northern Limit of Its Range? William Dutcher.
A Review of the Summer Birds of a Part of the Catskill Mountains, with Prefatory Remarks on the Faunal and Floral Features of the Region. Eugene Pintard Bicknell.
- Vol. II, 1884, Royal Octavo, 233 pages. Frontispiece.—Plate of Bendire's Shrew.
The Vertebrates of the Adirondack Region, Northeastern New York. Second Installment, concluding the Mammalia. Clinton Hart Merriam.
A New Genus and Species of the Soricidae (*Atophyrax Bendirii* Merriam) Clinton Hart Merriam.
- Vol. III, 1933, Royal Octavo, 184 pages, 3 plates.
The Birds of Dutchess County, New York. Ludlow Griscom, from records compiled by Maunsell S. Crosby.
- Vol. IV, 1937, 247 pages, 3 plates, 33 tables, 18 charts, 14 maps.
Studies in the Life History of the Song Sparrow, I. Margaret Morse Nice.
A Population Study of the Song Sparrow.
- Vol. V, 1939, 94 pages, 2 plates, 20 text figures.
The Behavior of the Snow Bunting in Spring. Dr. N. Tinbergen.
- Vol. VI, 1943, 328 pages, 6 text figures, 26 tables.
Studies in the Life History of the Song Sparrow, II. Margaret Morse Nice.
The Behavior of the Song Sparrow and Other Passerines.

PROCEEDINGS

(Leading articles listed)

- No. 1, for the year ending March 1, 1889, 9 pages.
Former Abundance of Some Species of Birds on New York Islands at the Time of Their Migration to the South. George N. Lawrence.
- No. 2, for the year ending March 7, 1890, 10 pages.
Notes on the Carolina Paroquet in Florida. Frank M. Chapman.
- No. 3, for the year ending March 6, 1891, 11 pages.
- No. 4, for the year ending March 2, 1892, 8 pages.
- No. 5, for the year ending March 1, 1893, 41 pages.
Rilicete Indiana Natural History. Tappan Adney.
- No. 6, for the year ending March 27, 1894, 103 pages.
Recent Progress in the Study of North American Mammals. J. A. Allen.
A Consideration of Some Ornithological Literature with Extracts from Current Criticism. L. S. Foster.
- No. 7, for the year ending March 26, 1895, 41 pages.
Notes on Cuban Mammals. Juan Gundlach.

- Salamanders Found in the Vicinity of New York City, with Notes upon Extralimital or Allied Species. W. L. Sherwood.
- No. 8, for the year ending March 24, 1896, 27 pages.
The Snakes Found within Fifty Miles of New York City. Raymond L. Ditmars.
- No. 9, for the year ending March 9, 1897, 56 pages.
The Fishes of the Fresh and Brackish Waters of the Vicinity of New York City. Eugene Smith.
- No. 10, for the year ending March 8, 1898, 27 pages.
The Frogs and Toads Found in the Vicinity of New York City. Wm. L. Sherwood.
- No. 11, for the year ending March 14, 1899, 32 pages.
The Turtles and Lizards of the Vicinity of New York City. Eugene Smith.
- No. 12, for the year ending March 13, 1900, 9 pages.
- No. 13, for the year ending March 12, 1901 }
No. 14, for the year ending March 11, 1902 } 70 pages.
- Notes on the Mammals of Long Island, N. Y. Arthur L. Helme.
The Mammals of Westchester County, N. Y. John Rowley.
Some Food Birds of the Eskimos of Northwestern Greenland. J. D. Figgins.
- No. 15, for the year ending March 10, 1903 }
No. 16, for the year ending March 9, 1904 } 70 pages, 2 plates: *out of print*.
- Field Notes on the Birds and Mammals of the Cook's Inlet Region of Alaska. J. D. Figgins.
Some Notes on the Psychology of Birds. C. Wm. Beebe.
Some Apparently Undescribed Eggs of North American Birds. Louis B. Bishop.
- No. 17, for the year ending March 14, 1905 }
No. 18, for the year ending March 27, 1906 } 136 pages, 2 plates.
No. 19, for the year ending March 12, 1907 }
A List of the Birds of Long Island, N. Y. Wm. C. Braislin.
- No. 20, for the year ending March 10, 1908 }
No. 21, for the year ending March 9, 1909 }
No. 22, for the year ending March 8, 1910 } 122 pages, 14 plates.
No. 23, for the year ending March 14, 1911 }
- Bird's Nesting in the Magdalen Islands. P. B. Philipp.
The Bird-Colonies of Pamlico Sound. P. B. Philipp.
A List of the Fishes Known to Have Occurred within Fifty Miles of New York City. John Treadwell Nichols.
- No. 24, for the year ending March 12, 1912 }
No. 25, for the year ending March 11, 1913 } 156 pages, 22 plates.
- The Red-Winged Blackbird; A Study in the Ecology of a Cat-tail Marsh. Arthur A. Allen.
An Interesting Ornithological Winter around New York City. Ludlow Griscom.
- No. 26, for the year ending March 10, 1914 }
No. 27, for the year ending March 9, 1915 } 49 pages.
No. 28, for the year ending March 14, 1916 }
No. 29, for the year ending March 13, 1917 } 114 pages, 6 plates.

- Natural History Observations from the Mexican Portion of the Colorado Desert. Robert Cushman Murphy.
- No. 30, for the year ending March 12, 1918, 38 pages, 1 plate.
 Bird Notes from Florida. John Treadwell Nichols.
 Bird Temperatures. Jay A. Weber.
- No. 31, for the year ending March 11, 1919, 67 pages, 7 plates.
 Bird-Banding by Means of Systematic Trapping. S. Prentiss Baldwin.
- No. 32, for the year ending March 9, 1920, 39 pages.
 A Revision of the Seaside Sparrows. Ludlow Griscom and J. T. Nichols.
- No. 33, for the year ending March 8, 1921 }
 No. 34, for the year ending March 14, 1922 } 141 pages.
 No. 35, for the year ending March 13, 1923 } With appendix, 7 pages, 1 plate.
 No. 36, for the year ending March 11, 1924 }
- Notes on the Winter Bird Life of Southeastern Texas. T. Gilbert Pearson.
 Notes on West Indian Herpetology (Appendix to No. 33) K. P. Schmidt.
 (Separately.)
- No. 37, for the year ending March 10, 1925 }
 No. 38, for the year ending March 9, 1926 } 139 pages.
- The Observations of the late Eugene P. Bicknell at Riverdale, New York City, Fifty Years Ago. Ludlow Griscom.
 A Detailed Report on the Greater Bronx Region. John F. Kuerzi.
 Birds of Prospect Park, Brooklyn. Lester L. Walsh.
- No. 39, for the year ending March, 1927 }
 No. 40, for the year ending March, 1928 } 103 pages.
- The Ornithological Year 1926 in the New York City Region. Ludlow Griscom.
 The Ornithological Year 1927 in the New York City Region. Ludlow Griscom and Warren F. Eaton.
 Birds of Union County, N. J., and Its Immediate Vicinity—A Statistical Study. Charles A. Urner.
- No. 41, for the year ending March, 1929 }
 No. 42, for the year ending March, 1930 } 68 pages.
- The Ornithological Year 1928 in the New York City Region. John F. Kuerzi.
 The Ornithological Year 1929 in the New York City Region. John F. Kuerzi.
 Summer Birds of Putnam County, New York. John F. Kuerzi.
 Gardiner's Island Spring Bird Records, 1794-1797. L. N. Nichols.
- Nos. 43, 44, for the two years ending, 1932, 86 pages.
 Notes on the Summer Birds of Western Litchfield County, Conn. John and Richard Kuerzi.
- Eighteen Years of Wyanokie (1916-1933). Warren Eaton.
 More's American Bird Lists of 1789 and 1793. L. N. Nichols.
 Rhode Island Bird Records from 1781 to 1804. Compiled from "Tom Hazard's Diary." L. N. Nichols.
 The Eel Grass Blight on the New Jersey Coast. C. Urner.
 What Ditching and Diking Did to a Salt Marsh. C. Urner.
- Nos. 45, 46, for the two years ending March, 1934, 119 pages.
 Remarks on the Origins of the Ratites and Penguins. William Gregory, with discussion by R. C. Murphy.
- How Many Birds Are Known? Ernst Mayr.
 Bernard Altum and the Territory Theory. Ernst Mayr.

- A Preliminary List of the Birds of Jones Beach, Long Island, New York.
 William Vogt.
 Some Mid-Nineteenth Century Records from Westbury, Long Island.
 John Matuszewski, Jr.
- No. 47, for the year ending March, 1935, 142 pages.
 A List of the Birds of Essex County and of Hudson County, New Jersey,
 with Especial Reference to City Growth and Bird Populations. W. F. Eaton.
 Shorebirds of the North and Central New Jersey Coast. C. Urner.
 The Half-Hardy Birds That Wintered Through 1933-1934 in the New York
 City Region. W. Sedwitz
- No. 48, for the year ending March, 1936, 112 pages.
 The Great Wisconsin Passenger Pigeon Nesting of 1871. A. Schorger.
 Notes on the Development of Two Young Blue Jays. A. Rand.
 Recent Notes on Bermuda Birds. William Beebe.
- No. 49, for the year ending March, 1937, 103 pages.
 Preliminary Notes on the Behavior and Ecology of the Eastern Willett.
 William Vogt.
 Black-crowned Night Heron Colonies on Long Island. Robert P. Allen.
- Nos. 50, 51, for the two years ending March, 1939, 93 pages.
 Studies of the Nesting Behavior of the Black-crowned Night Heron.
 Robert P. Allen and Frederick P. Mangels.
- Nos. 52, 53, for the two years ending March, 1941, 164 pages.
 Life History Studies of the Tree Swallow. Richard Gottron Kuerzi.
 Notes on the Distribution of Oceanic Birds in the North Atlantic, 1937-1941.
 Hilary B. Moore.
 The Ornithological Year 1939 in the New York City Region.
 Robert W. Storer.
 Notes on Bermuda Birds. Hilary B. Moore.
 Red-wing Observations of 1940. Ernst Mayr.
 Distribution and Habitat Selection of Some Local Birds.
 Christopher K. McKeever.
- Nos. 54-57, for the four years ending March, 1945, 85 pages.
 Some Critical Phylogenetic Stages Leading to the Flight of Birds.
 William K. Gregory.
 The Chickadee Flight of 1941-1942. Hustace H. Poor.
 The Ornithological Year 1944 in the New York City Region.
 John L. Bull, Jr.
- Suggestions to the Field Worker and Bird Bander
 Avian Pathology.
 Collecting Mallophoga.
- Nos. 58-62, for the five years ending March, 1950, 109 pp.
 Territorial Behavior in the Eastern Robin. Howard Young.
 Food Habits of New Jersey Owls. William J. Rusling.
 Data on the Food Habits of Local Owls. Richard B. Fischer.
 A Numerical Study of Shorebirds on Long Island in 1947.
 Walter Sedwitz.
 Seven Years of Bird-Watching in Chelsea (Manhattan).
 Lawrence F. Hawkins.
 Notes on the Northward Movement of Certain Species of Birds into the
 Lower Hudson Valley. Robert F. Deed.

Historical Developments of Sight Recognition

LUDLOW GRISCOM

Period I: First of all there was no such thing as a sight record. Ornithology really got going in the late sixties and seventies of the last century and was followed by a period of unrestricted collecting and shooting. There were also sportsmen collectors who were only interested in getting ducks and the various game birds, which in those times included practically all water birds, hawks, and owls. The literature is stuffed with innumerable errors based on specimens erroneously identified: The Blue Geese turned out to be immature Lesser Snows, the Golden Eagles were Bald Eagles, the rare Philadelphia Vireos were Tennessee Warblers, the American Three-toed Woodpeckers were Hairy Woodpeckers with yellow crown-spot, and Bohemian Waxwings were nothing but Cedars with some white feathers in the wings! For identification all small birds were automatically shot, and no reasonable man should have any quarrel with the people trained in this school for their attitude and their point of view.

Period II: The decline of general collecting and the beginning of the era of protection and conservation.

Laws of steadily increasing severity exterminated the lucrative profession of taxidermy. Spring shooting of game birds was abolished and an increasing series of restrictive laws greatly reduced the category of game birds in many different directions. Some of this was regarded as quite disastrous by the older ornithologists, and Witmer Stone records an amusing story of a conversation he had with Daniel Giraud Elliot, who in his late eighties mourned the decline of ornithology! Stone, as editor of the *Auk* and active with the Delaware Valley Ornithological Club at Philadelphia, was well aware that never previously in the history of the world had there been such a boom as was then taking place in ornithology! And, of course, what Elliot had in mind was the decline of general collecting, as that was the only way known to him by which younger people could acquire competent knowledge and experience.

Period III: The first appearance of sight records from 1900 on.

As a young man interested in local faunistics, I was told by both Dwight and Chapman to study Brewster's *Birds of the Cambridge Region* as an example of how a local fauna should be done. I did so. Brewster's criterion now seems to us exceedingly severe and almost unreasonable. Sight records of rare birds relatively easy to identify were accepted, provided that the maker was known to be an experienced observer and provided that he had previous acquaintance in life with such rare bird. Mr. Brewster did not hesitate to give sight records of rare birds of his own,

but he was always most careful to state that he was thoroughly familiar with this species in life in other parts of the United States where he also had had field experience. With the passage of time everybody accepted his statements, as everybody knew that he had indeed had the field experience he claimed. It was this that started me off on my own chase of a large life list from 1907 on—for which I have been teased all my life—as in reporting rare birds I, too, wished to be able to say that I knew this bird well from field experience in other sections of the country.

Mr. Brewster has published a charming letter written to him on January 20, 1905, about a sight record of a Glaucous Gull, then so rare a bird in Massachusetts that every case was a matter of record. The youthful author, in reciting his observation, closed with the following remark: "While I do not feel this observation was conclusive, . . . I still believe the bird to be a glaucous gull." Brewster writes: "While this observation was certainly *not* conclusive, . . ." The youthful author of the letter was Glover M. Allen, soon to attain a national reputation as an ornithologist!

The next point I wish to make is that the reporting of an observation required some similar phrase of humility, which was exacted from all young men reporting sight records of birds in my youth. I asked myself the rhetorical question, What was the matter with this observation, and why was it certainly not conclusive? The answer is that there was no specimen, no good glasses were used, because none existed, and there was no comparison with other species, such as the Herring or the Black-backed Gull. While this lack of favorable circumstances of observation was certainly not the observer's fault, you just had to wait until this happened to you!

In December, 1911, I persuaded the late Waldron DeWitt Miller to visit Gardiner's Island, Long Island, with me in search of rare ducks and other sea birds. I wish here to pay tribute of my indebtedness to Miller for many valuable experience pointers in the field and to state how much I feel I owe him. But as we were going down in the train to Greenport, I chattered happily about what birds we might expect to see, and I was so rash as to mention that we ought to find the Red-throated, as well as the Common Loon. Miller immediately interrupted me and said in a displeased tone of voice, "Everybody knows that these species are inseparable in life." I find from my journal that we saw one Red-throated Loon on December 1, five on the 2nd, and two on the 3rd, and one specimen in excellent condition was found dead on the beach and collected. Mr. Miller's notes read, "One specimen collected, others believed seen."

I may now mention that on this trip we found a Black Guillemot on one of the ponds and had a most excellent observation, and it was Miller

who first identified this bird and who proved that it could not be a White-winged Scoter. This bird has never been mentioned for forty-two years, and I now wish to give the reasons, as proof of the type of training that I had to undergo in my youth and the rigid discipline that was exacted from a young man starting in ornithology. The guillemot was at that time the rarest of winter stragglers to Long Island, and December 3 appeared too early a date. That is *Item 1*. *Item 2*: Neither of us had ever seen the guillemot alive before. *Item 3*: The guillemot was in full *summer* plumage instead of *winter* plumage. (It was forty years later that a published revision of the guillemots showed delayed moult in this species to be very common.) Those are the reasons why Miller and I most carefully suppressed this guillemot record for so long a period of time. And the point is also psychological; when people were known to have suppressed what they were convinced they actually saw, they were believed when they finally did publish a sight record.

I have recently heard from a friend, not a collector, that he once sent an article to the *Auk* containing a list of the birds from some mountain locality in Pennsylvania. He made the frightful mistake of reporting the Louisiana Water-thrush as a common summer resident (which it undoubtedly was) and the Northern Water-thrush as a common spring and fall transient (which it also was), and the editor of the *Auk* refused the article on the ground that "everybody knows that the two species of water-thrushes are inseparable in life." Similarly, it was not believed that anybody studying the warbler migrations in spring could walk through the woods identifying the various species in the treetops, including all the particularly rare transients. This was proved by the late Louis B. Bishop, of Connecticut, who was good enough to look into it and who went out with younger members of the New Haven Bird Club. Whenever they said, "There is a male Blackburnian Warbler in the treetop," Bishop promptly shot it, and, to his great surprise, it turned out to be a Blackburnian Warbler! Both Brewster in the Nuttall Club and Dwight in the Linnaean Society would not hesitate to put younger men through the third degree about the sight records that they reported at the meetings. If a young man was frightened and tongue-tied and was unable to give his reasons for his identification, he was indeed seriously out of luck, but if, on the other hand, he was able to speak up and give the true facts, they were both fair and courteous gentlemen, and would say in public that the characters given were indeed very well and correctly described.

By way of summary, as I look back on my own life I regard this as a magnificent piece of training, even if at times it was unpleasant and disagreeable. Younger people must remember that in dealing with techniques previously unheard of they had to be established and validated. This inevitably took time, and it was even harder on the older ornitholo-

gists of the collecting period, who couldn't possibly acquire this technique themselves. It is much harder, in terms of common humanity, to expect an older and more experienced man to admit that a younger and less experienced man can do something that he can't do.

The next period might be regarded as the period of success. Thanks to automobiles, improved field glasses, spotting scopes, the matchless Peterson *Guides*, and colored plates of every species of North American birds readily available to everyone, we have seen what might be called the victory for the struggle of sight records. I should like to call your attention to the splendid summary by Witmer Stone in *Birds of Old Cape May*. He no longer worries about whether or not the two water-thrushes are separable in life, and he doesn't even bother to cite whether or not specimens of any of these commoner birds exist in the collections of the Philadelphia Academy of Sciences. In other words, the struggle for sight records took about twenty-five years.

We pass now automatically to what I wish to call present-day problems. We are living in an *era of superficiality*. Excellent as Peterson's *Guides* in fact are, they are guides and not encyclopedias to our knowledge of North American birds. My point is, that there are many real facts about North American birds which the users of Peterson's *Guides* and other popular manuals never acquire, and it must be admitted by the fair-minded that in the old collecting days these facts were acquired by students from the constant handling of specimens. I wish to give an illustration of what I mean by "superficiality." I have in mind the story of a young student who spent his summer college vacation motoring out to the prairies of northern North Dakota, where he was taken by a refuge manager to an island where some forty thousand Franklin's Gulls were nesting. It cannot, therefore, be doubted that he saw Franklin's Gulls and that he added the species to his life list perfectly legitimately. Six weeks later he joined my party down at Monomoy. There on the beach within shotgun range, and standing between two Laughing Gulls, was a perfect adult Franklin's Gull, which he was unable to recognize, spot, or identify. My point is, that he really knew nothing about the Franklin's Gull and could not have given its various characters of identification properly from memory.

Just as Witmer Stone said in the work already cited, we now have hordes of incompetent and inexperienced observers, whose activities in birding consist primarily in an increasingly frantic effort to secure the credence of so-called higher authorities for rarities which they say they see. We are constantly getting a flood of these incompetent sight records in the literature, and the country is now so full of one type or another of bird bulletins that it is impossible for the private individual to secure a complete collection, nor is it possible for them to be reviewed in the

standard ornithological magazines. This has been followed by what might be termed a decline of censorship and healthy skepticism. Actually, it is impossible for Brewster's criterion to be followed out in the present day and age. I have tried it myself in Massachusetts and it cannot be done. It is impossible to know everybody who is interested in birds, to arrange to go out in the field with everybody and size up their competence and experience, nor is it any longer possible to state categorically, as Brewster was able to do, that such a person was previously unfamiliar with the species in life. You cannot keep track of everybody's life list any more, nor can you keep a list of all the people who have window feeding stations for birds, where something rare or unusual might turn up at any moment.

I do not profess to know what the future solution will be, as it cannot conceivably be worked out in my own lifetime, but I wish to conclude with an earnest plea for my favorite science. I don't wish it to fall into disrepute because the so-called battle of sight records has been won. Whether we like it or not, popular bird study has come to stay. People will chase rarities with their field glasses just as they did with their guns in earlier times. It is impossible and unreasonable to expect that everyone will become a convert to the scientific methods of ornithology, or that they will all secure collecting permits in the interest of science. Some means must be found to prevent local faunistics from being by-passed as amateurish, unscientific, and unworthy of serious attention and study. There is a desperate need for severe, careful, and competent screening and censoring.

Received March 24, 1953.

* This paper is an abbreviated version of a talk given on March 10, 1953, at the Annual Meeting of the Linnæan Society in celebration of its 75th Anniversary. It was prepared for publication with the kind assistance of Mrs. Ruth P. Emery.

Life History of the Tropical Kingbird

ALEXANDER F. SKUTCH

No small bird of tropical America is at once so widely and uniformly distributed, so tolerant of sharply contrasting climatic conditions, so common and conspicuous, as the Tropical or Neotropical Kingbird (*Tyrannus melancholicus*). The species breeds from the southern border of the United States in Texas (where known as Couch's Kingbird), southward through Central and South America to northern Argentina, and from the Atlantic to the Pacific Oceans. In the extreme northern and southern parts of its immense range it is migratory, but between the Tropics it appears to be a permanent resident wherever it nests. It is at home no less in semi-desert areas covered by cacti and thorny scrub than in the wettest districts of tropical America, and in altitude it ranges from sea-level up to at least 5000 feet in Guatemala, 8000 feet in Costa Rica, 5000 feet in the Santa Marta region of Colombia (Todd and Carriker, 1922: 339), over 8000 feet in the interior of Colombia (Wyatt, 1871: 334; de Schauensee, 1950: 816), and 6000 feet in the equatorial Andes. A bird of open spaces, it is present wherever a few scattered trees or bushes supply lookouts whence it can dart in pursuit of flying insects, and sites for its nest. It is often a conspicuous inhabitant of savannas and extensive grassy marshlands with here and there a sickly tree. Wherever man has strung telephone or telegraph wires, the Tropical Kingbird finds them excellent perches and lookouts. It is quite absent from the midst of woodland; but a narrow clearing with a few tall, dead trees is likely to support a pair of kingbirds; and the shores of the wider waterways traversing the forest offer favorable conditions for flycatching and nesting. With the exception of the ubiquitous vultures, no other feathered inhabitant of tropical America will draw the traveller's attention at so many and such widely separated points.

This is one of the biggest as well as most common of the members of the great family of American flycatchers (Tyrannidae). Its upper plumage is predominantly light gray. When freshly acquired, the feathers of the back are bright olive-green, but they fade to gray soon after the molt; or if any are replaced at any time of the year, their greenish color contrasts with the gray of the surrounding plumage and gives the back a mottled aspect. In the center of the crown there is a concealed patch of flame-colored feathers, displayed only in the angry or otherwise excited moods of the bird. A stripe of dark gray extends from the base of the bill under the eye to the ear-coverts. The throat is pale gray, the chest yellowish clouded with olive, and the abdomen and under-tail coverts

canary yellow. The end of the folded tail is conspicuously emarginate or notched. The fairly long bill is black, the eyes dark, the feet black. The sexes are alike in appearance.

At higher latitudes, the kingbirds may flock during the months when they are not engaged in breeding. In the Guatemalan highlands, in October, I found 11 kingbirds resting together in the tree-tops in the late afternoon. But in Costa Rica, nearer the Equator, they remain mated throughout the year; and each pair stays more or less by itself. Yet I have known three individuals to keep company during the "winter" months. One January, a trio of kingbirds was to be found day after day in the tops of the tall dead trees of a forest clearing. Over a period of several weeks, these three birds associated together and seemed always on the best of terms. If at any season a kingbird loses its mate, it perches alone on some exposed bough and calls incessantly until it finds the missing partner, or wins a new one.

One night in December, I found a pair of kingbirds roosting in a small tree of *Inga spectabilis* in the pasture behind my house, in the basin of El General in Costa Rica. They rested about a yard apart on thin lower boughs, where they were wholly exposed below, but above were shielded by the entire leafage of the tree. Mated flycatchers often roost in this fashion, near each other but not in contact. I have observed similar roosting with the Boat-billed Flycatcher (*Megarhynchus pitangua*) and the Yellow-bellied Elaenia (*Elaenia flavogaster*); but the pair of Common or Black-crowned Tody-Flycatchers (*Todirostrum cinereum*) sleep in closest contact.

Food

The Tropical Kingbird subsists almost wholly upon insects which it captures in the air. In dash of movement and agility on the wing, it is surpassed by no other flycatcher. Often it rises swiftly high above the tree-tops, overtakes the insect its keen eyes have espied, then gracefully drops back to its exposed perch, whence it keeps a sharp lookout for another victim. In the evening, when after a warm day the cooling air is full of insect life, the kingbird may soar high into the air, where it rises and falls, circles and hovers, snatching up insect after insect, as it flies around and around, without ever pausing to rest. Except for its greater size and slower flight, one might almost mistake the kingbird for a swallow. As a rule, other flycatchers content themselves with the capture of a single insect on each high aerial sally. I have watched Tropical Kingbirds flycatching with the Chipsachery or Vermilion-crowned Flycatcher (*Myiozetetes similis*) and Gray-capped Flycatchers (*M. granadensis*); and although the latter win admiration by their long, graceful, sharply

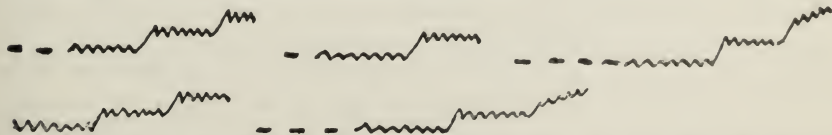
ascending darts, ending abruptly at the point where they capture the quarry which has lured them upward, their movements are simple in comparison with the intricate maneuvers of the kingbird.

At times when insects are not flying freely, the kingbird may look downward for its prey. One afternoon after a shower, a kingbird perching in a tree in front of my house darted down to the wet grass and seized a small frog, which it carried up to the tree-top and with difficulty gulped down. This is the only time that I have seen the Tropical Kingbird eat such food. Occasionally the kingbirds vary their diet with berries; and I have seen them eat the seeds of *Alchornea latifolia*, each of whose hard little seeds is enclosed in a soft, bright red aril. But kingbirds eat less fruit than many other kinds of American flycatchers.

Voice

Most naturalists who meet the Tropical Kingbird for the first time are surprised to hear notes so high and thin issue from the throat of a bird so big and bold. The kingbird's most common utterance is a rapid, high-pitched twitter, pleasant enough to hear, but seeming to belong to some far smaller bird. This twittering call becomes shrill and sharp as the kingbird angrily pursues an intruding hawk. But when the members of a pair come together on neighboring perches after a temporary separation, they often greet each other with long-drawn, high-pitched trills, uttered passionately with wings a-quiver.

At dawn, the kingbird sings tirelessly for many minutes together. He is one of the earliest of all the birds, and the very first of the flycatchers, to break silence when the eastern sky begins to brighten. Often choosing a perch only a few feet above the ground, he voices his high-pitched twitter. His clear, pleasant notes rise as though by steps, in two or three series each consisting of a few rapidly trilled syllables. Usually each ascending sequence is initiated by an indefinite number of short, distinct (not trilled), clear notes, which may be paraphrased by the syllable *pit*. Occasionally this monosyllable is omitted between two series of trills. The whole song may be represented so:



where the short dashes represent the note *pit*, the zig-zag lines the trilled notes. This sequence is continued for many minutes without a pause. At the height of the nesting season, the dawn-song goes on, with short interruptions, for about half an hour. It is one of the most characteristic

dawn sounds of the warmer parts of the American continents. The kingbird's dawn-song is rarely repeated after sunrise, and not delivered in the evening twilight. The high twitters which it utters during the day are readily distinguished from the dawn-song by those who have heard both types of utterance. When twittering in the air, the kingbird takes very short, mincing wing-strokes, quite different from the longer beats of its ordinary flight. This, I think, must be associated with its habit of fluttering its wings as it trills while perching.

In the valley of El General in southern Costa Rica, the Tropical Kingbird delivers his dawn-song over a greater part of the year than any other flycatcher, except only the little Paltry Tyrannulet or Northern Tyranniscus (*Tyranniscus vilissimus*). In 1943, the kingbirds about my house sang at dawn from March 2 until the end of July. The following year, there was sporadic singing from February 8 until the middle of March, after which the dawn-song was more regularly delivered; again the period of song lasted until the end of July. In 1945, a very dry year unfavorable for birds, I recorded the dawn-song from March 11 to June 6. In 1947, a bird in my garden sang the dawn-song on January 31, but there were a number of mornings in early February when I failed to hear him. Toward the end of February, his dawn-singing became more constant. In 1948, I heard a little dawn-singing on February 3. The period of singing continued from this date until August 14; but after early June the amount of singing at daybreak was usually slight, and on some mornings I failed to hear it. In 1949, there was a little singing as early as January 26. In this locality, then, the extreme dates of the kingbird's dawn-song are late January and mid-August, but the period of more sustained and constant singing is from early or mid-March into June. In the Caribbean lowlands of Honduras, kingbirds continued their dawn-singing into August.

Nest-Building

According to Belcher and Smooker (1937: 229) in Trinidad and Tobago the Tropical Kingbird nests from January to July, but the nesting season is at its height in May. In the Canal Zone, also, the kingbird may begin to breed early; here I found a nest with two eggs on February 24, 1935. In the valley of El General, Costa Rica, between 2000 and 3000 feet above sea-level, I have not found the birds building before mid-March, and usually not until April. Farther north, in Honduras and Guatemala, the kingbirds apparently do not begin to build before April.

The kingbird's frail, shallow nest is placed in a bush or tree standing in a pasture, by the roadside, on the gravelly floodplain of a river, or in almost any open space, but never in the midst of crowded vegetation.

Thirty-one nests found by me ranged in height from six to 40 feet above the ground, but only ten of these nests were above 15 feet. About the shores of Barro Colorado Island, Canal Zone, I found, in 1935, a number of nests built on stumps that still remained from the forest submerged twenty years earlier, when the valley of the Río Chagres was flooded to form Gatún Lake. Some of the rotting stumps that supported nests rose above the water about a hundred feet from shore. The structures were placed among the ferns, aroids, or epiphytic trees and shrubs that grew attached to the decaying stubs, and in many instances clothed them with an almost continuous mantle of vegetation. The four nests ranged in height from three to 25 feet above the water. The lowest was hardly above the reach of the waves stirred up by the larger ships that "transited" the Canal.

Hudson (1920: 189) wrote of this species, which he called the "Bellicose Tyrant": "A tall tree is usually selected for the nest, which is not infrequently placed on the very topmost twigs, exposed to the sight of every creature passing overhead, and as if in defiance of birds of prey". The Central American members of this species show the same inclination to place their nests in an exposed position which Hudson noticed in La Plata, at the other end of the bird's vast range. Often disregarding opportunities for concealment, they build in a position exposed to the open sky, at times in a dead or leafless tree, where the sun beats down hotly through most of the day, the rain strikes with force unabated by sheltering foliage, and the nest seems to invite the attention of every passing bird of prey. For any bird less valiant in the defence of its eggs and young to nest in sites so exposed would be suicidal; and its carelessness of concealment costs even the doughty kingbird many a set of eggs and many a nestling.

While hunting a site for the nest, one of the pair sits in promising crotches and utters a low, rapid twitter, which somewhat resembles the dawn-song, but is not so loud and high-pitched. This ritual may be repeated day after day in various positions, until at last the female brings a long piece of dead vine or some similar material to one of them, flying up with much twittering. Doubtless it is she who sings the low nest-song, while her mate looks on. This nest-song somewhat resembles that of the Chipsacheery or Vermilion-crowned Flycatcher; and in March I have heard kingbird and Chipsacheery sing in neighboring trees, both seeking nest-sites and doubtless stimulated by each other.

I have watched more or less the construction of four nests, and seen nothing to suggest that the male helps to build. One of these nests was made in Guatemala by a female which I had marked with vermilion paint while she incubated at an earlier nest that was despoiled by some egg-eater. The kingbird then began to tear apart her empty structure and

transfer its materials to a new site in the top of a lemon tree about 75 yards distant. From a blind, I watched this growing nest during four hours divided between two mornings. The marked female worked at an exceedingly leisurely pace, bringing material only 14 times during the four hours—yet replacement nests are as a rule built more rapidly than first nests. Usually she flew up to the nest in silence, rested on its rim while she deposited her load inside, then sat in the hollow and made vigorous movements with her feet, while she pressed down her breast until she seemed almost to stand on her head and turned around and around to mold the cup into shape. Upon leaving the nest, she generally twittered in her high, weak voice and went to a low, dead branch hard by, whence she darted out to catch a few insects before she flew away for more material. The male did not come near the new nest, except during the excitement which prevailed while I was setting up the blind.

At a second nest, the male was more attentive while his mate built, and sometimes followed her on journeys to gather material, sometimes rested, preening his feathers, while she came and went. As she neared the nest, bringing a long piece of dead vine which trailed far behind her, she often voiced her high-pitched trill; and her mate, if he happened to be perching in the nest-tree, replied with a similar trill, fluttering his wings the while. Yet another male kingbird behaved in much the same fashion while his mate built; and sometimes he would fly out from his perch to meet her as she approached the nest-tree with material in her bill, then return with her to its boughs. Most of the building kingbirds that I have tried to watch have spaced their visits to the nest so widely that it was difficult for me to maintain an interest in the procedure.

The finished nest of the Tropical Kingbird is a broad, shallow, saucer-shaped structure, containing so little material that as a rule it is possible to distinguish more or less of the eggs through the meshes in the sides and bottom. It is composed largely of lengths of dead herbaceous vines, some of which dangle untidily far below the supporting branch, rootlets, tendrils, fine woody twigs, weed stems, grasses, and similar coarse, dry vegetation, with finer material of the same nature, and sometimes horse-hair, in the lining. One nest was $4\frac{1}{2}$ inches in outside diameter by $2\frac{1}{2}$ inches high. The cavity was $2\frac{3}{4}$ inches in diameter by $1\frac{1}{4}$ inches deep.

A kingbird who built in an orange tree in Panamá would sometimes go to sit in her completed structure, although it still contained no egg. As she entered the nest she would expose the scarlet feathers of her crown and twitter softly to herself, seeming to express happiness that the nest was finished and ready to receive the spotted eggs.

The Eggs

Of 22 nests found by me in Panamá, Costa Rica, and Guatemala, 12 contained two eggs or nestlings each, ten held sets of three. There appears to be a tendency for larger sets to be found at higher latitudes. My five nests in the Canal Zone all had sets of two. Of 11 nests in Costa Rica, five held two eggs and six contained three eggs. Of the six Guatemalan nests, two had sets of two eggs and four held sets of three. But Cherrie (1916: 246) records a nest with three eggs from Venezuela, and Stone (1918: 268) a set of three from the Canal Zone. For Guatemala, sets of four have been reported by Salvin and Godman (1888: 103). Beyond the Tropics, Couch's Kingbird (*T. melancholicus couchi*) lays, according to Bent (1942: 52) "three to five eggs, oftener three or four"; and in Argentina Hudson (1920: 190) states that the "Bellicose Tyrant" lays four eggs.

In the basin of El General in Costa Rica, the dates of laying of 19 sets of eggs (as observed or computed from subsequent observations) were distributed as follows: 1 in March, 9 in April, 7 in May, and 2 in June.

In a nest with two eggs, two days separated the laying of the first and the second. In two instances when the bird laid three eggs, the interval between the deposition of the first and second was only one day, but two days intervened between the laying of the second and the third. The eggs are laid rather late in the morning: one appeared between 9:35 and 11:00 A.M., another between 11:30 A.M. and 1:00 P.M. In this late laying, the Tropical Kingbird agrees with other flycatchers (Skutch, 1952).

The eggs are whitish or pale buff, more or less heavily blotched with reddish-brown, pale brown, and pale lilac, the markings most crowded on the thicker end. At times there are a few fine, black spots. Twelve eggs measured at the nest in various parts of Central America averaged 24.7 by 18.2 millimeters. Those showing the four extremes were 26.6 by 19.1 and 22.2 by 17.5 millimeters.

Incubation

On May 18, 1932, a boy showed me a nest of the Tropical Kingbird containing two eggs, situated seven feet above the ground in a mimosa bush in a hillside pasture, at the edge of the Motagua Valley in Guatemala. It was well situated for watching, for by setting my blind up the slope I could overlook it from a higher level. I was at the time most interested in learning whether statements frequently repeated with regard to a number of North American species of Tyrannidae, that the male

takes a share in incubation, held true for the tropical members of the family. I had already satisfied myself that with the Chipsacheery and the Yellow-bellied Elaenia the male does not regularly take a part in warming the eggs, and I eagerly seized this opportunity to extend my studies to another species. In order to make quite sure that I could distinguish the male kingbird from his mate, I decided to mark one member of the pair. Wrapping some absorbent cotton about the end of a fine stick, I soaked the wad in vermilion enamel and stuck the twiglet in the nest beside the eggs, then went away. Returning twenty minutes later, I found one of the kingbirds sitting in the nest. When it flew off at my approach, it had a small but conspicuous vermilion spot on the crown (in addition to the usual concealed patch), heavy markings of the same color on the breast and belly, and a vermilion left foot. I was sorry about the foot, and hoped that its coat of paint would cause the bird no harm. But I was delighted to find it so unmistakably marked. Since during seven hours of subsequent watching I saw only this marked bird on the nest, I decided that it was the female.

This female kingbird incubated quietly and faithfully. Her seven sessions on the eggs varied from 10 to 56 minutes in length and averaged 32.4 minutes. Her eight recesses lasted from 9 to 20 minutes, the average being 12.1 minutes. She devoted 73 per cent of the seven hours to incubation. From time to time she regurgitated the indigestible parts of insects and allowed them to drop to the ground. While sitting on the nest she was nearly always silent; I heard her call only once. But she might twitter as she flew from the nest, or as she approached it flying down the hillside with mincing wing-beats. The male, if resting near the nest when she returned in this fashion, would lift and vibrate his wings as a greeting.

During much of the day, the male kingbird perched near the nest and defended it from intruders. He was dashing and fearless in pursuit of hawks, but as a rule permitted small and harmless birds, as doves and seedeaters, to rest quite near the nest without molestation. Once a trespassing Groove-billed Ani (*Crotophaga sulcirostris*) was driven away, but later two of these slender black birds were allowed to remain near the nest without being disturbed. When a Golden-fronted Woodpecker (*Centurus aurifrons*) flew into the next bush, the male kingbird drove at him, causing him to cling beneath the branch and look up defiantly at the aggressive flycatcher. But the latter made only a half-hearted attempt to drive the woodpecker away, whence I inferred that he was not looked upon as a dangerous character.

Eight years later, in Costa Rica, I began to study the mode of incubation at another nest, which unfortunately was despoiled by some unknown agent before I was able to devote much time to it. This female was a far less patient sitter than the Guatemalan kingbird. During two

hours late in the morning, she took five sessions ranging from 3 to 30 minutes in length and averaging 12 minutes. Six recesses varied from 5 to 10 minutes and averaged 7.7 minutes. She kept her eggs covered only 61 per cent of the two hours. During her absences, either she or her mate was always in sight of the nest conspicuously situated in a leafless tree in the midst of a pasture, save possibly for a period of three minutes, when neither seemed to be keeping guard. Usually the male watched over the nest during the female's recesses, either while perching in the nest-tree itself, or in a neighboring leafless tree which commanded a good view of it. Twice the female flew from the nest as he arrived in the nest-tree to keep guard; and twice he flew away as she returned to her eggs. But on other occasions, the female continued to incubate after his arrival, and he lingered in the nest-tree after her return.

If, as sometimes happened, a passing insect tempted the female from the nest while her mate was away, she caught insects from perches in view of the nest until he returned to take charge. With these Tropical Kingbirds, the alternation of female and male in incubating and guarding the eggs was far less methodical than at a neighboring nest of the Boat-billed Flycatcher (*Megarhynchus pitangua*). But since the nest was placed in an exposed position, and the kingbirds caught insects from perches commanding a wide view, one or the other of the pair had it nearly always in sight. Yet despite their vigilance, this nest so conspicuously situated caught the eye of some marauder which despoiled it.

I might add here that my own observations covering scores of nests of some 30 species of the Tyrannidae have failed to bring to light a single instance of incubation by both members of the pair. Although statements that the male of one or another species of flycatcher incubates are not lacking in print, all the accounts known to me that give evidence of careful observation agree that only the female covers the eggs.

Although I have made a number of attempts to determine the incubation period of the Tropical Kingbird, at only three nests did I meet with success. At one nest which contained three eggs when found on April 9, two nestlings hatched on April 25, giving an incubation period of at least 16 days. At the second nest, the third and last egg was laid on May 12; two of these eggs hatched on May 27 and the other on the following day, giving an incubation period of 16 days. At the third nest, the set of two eggs was completed on May 20 and the nestlings hatched on June 4, giving an incubation period of 15 days.

The Nestlings

The newly hatched Tropical Kingbird is a typical passerine nestling, with sparse gray down that fails to cover its pink skin, tightly closed

eyes, and the interior of the mouth orange. The nestlings are fed and guarded by both parents, but apparently incubated only by the female.

Near the end of a long, narrow cove that formed a deep indentation in the irregular, wooded shoreline of Barro Colorado Island in Gatún Lake, a decaying trunk, about 25 feet high, rose above the still water about a hundred feet from the nearest shore. Attached to the rotting wood grew a great variety of epiphytic plants, including aroids, orchids, ferns, and a small bush with wide-spreading branches. A small colony of Yellow-rumped Caciques (*Cacicus cela*) were using the terminal twigs of this bush for the attachment of their long, woven pouches, some of which were already completed, others just begun. At the end of April, 1935, a pair of Tropical Kingbirds were feeding feathered nestlings in a shallow cup built among the epiphytic vegetation near the top of the trunk, just below the swinging pouches of the caciques. Nearer the water a pair of Rusty-margined or Cayenne Flycatchers (*Myiozetetes cayanensis*) had built a bulky roofed nest. In addition to the nests of these three kinds of birds, the decaying trunk supported a variety of nests of wasps and of little, black, stingless melipone bees. The hives of the latter were made of black carton in furrows in the trunk; and the funnel-like entrance of one was just below the kingbirds' nest.

At first, birds, bees, and wasps all seemed to get along together fairly well. But one morning the bees, for reasons unknown, became highly excited. A great swarm of them formed a dark, troubled cloud that hung stationary in the air in front of the nests. Although the cloud itself did not change its position, it was composed of thousands of restless units all gyrating and circling about each other in the liveliest fashion. Sometimes the little biting bees attacked the caciques perching atop the trunk, but the birds merely nipped them with the tips of their sharp bills and dropped them wounded into the water.

Then the bees began to attack the two kingbird nestlings, which fortunately had a fair covering of feathers to protect them, although still unable to fly. The poor little birds frantically flapped their wings, tried to pick off the biting bees with their bills, and in their distress hopped restlessly from side to side of the narrow nest. The parents looked on without being able to protect their youngsters; they could only perch in the barrigón tree on the shore, vibrate their raised wings and twitter to each other, as is their custom when excited. Hitherto the kingbirds and the caciques had been on fairly friendly terms, although there was a certain amount of rivalry between them—as among the caciques themselves—for the coveted perch at the very top of the trunk. But now, as though to relieve their feelings, the parent kingbirds darted angrily, with clacking bills, at the caciques, especially the bigger males, and made them flee. Perhaps there was a certain amount of justice in these attacks; for the

heavy male caciques, dashing about among the epiphytic bushes, helped to keep the bees angry and aggressive, if they did not in the first place stir them up.

For my part, I was eager to help the nestling kingbirds, but as powerless to do so as their parents. To climb the decaying, epiphyte-encumbered trunk would have been difficult and dangerous, if not impossible; and the effort to do so might have angered the wasps, whose stings were far more to be dreaded than the bites of the little bees. For over an hour the latter continued their vicious attack on the nestlings, but at last they quieted down and withdrew. I could not see in what condition they left their victims, but after their departure the parent kingbirds came and fed the nestlings. Two days later I found the youngsters in good health and spirits. While sitting in the nest they often voiced low twitters much like the call of the adults, and they were eager for the insects and berries that were brought them. The parents, now in a more peaceful mood, did not attack the caciques so often.

On the first of May, it was my good fortune to witness the departure of both of these young kingbirds from the nest. Paddling through the still waters of the lake at dawn, I tied my dugout canoe to a submerged stump near the head of the cove and sat quietly watching the caciques and their neighbors. The young kingbirds kept up an almost continuous weak twittering and received many morsels from their parents. Just as the sun appeared above the tree-tops on the ridge to the east of the cove, one of the youngsters suddenly left the nest, quite spontaneously, in the absence of the parents or of any outside disturbance. It turned its course toward the nearest shore, about a hundred feet away, and flew well, high above the water. As soon as the watchful parents saw it go, they hurried after it; and while it was still many feet from the shore one of them caught up and flew directly above it, apparently in contact with it. The parent certainly did not attempt to support the little bird in the air, and if anything, forced it lower. Together parent and fledgling reached the shore, where the latter came to rest on a bush fully exposed to view. Immediately both parents dashed at it and knocked it from its conspicuous perch into the midst of the foliage, where it was well concealed. Then they flew up into the tops of the trees, vibrated their spread wings and twittered as though in mutual congratulation on the successful termination of their nesting.

The second act, that of knocking the fledgling into the bushes, was commentary upon the first. The only significance I could find in the parent's method of accompanying the fledgling on its first flight was to protect it, while still weak upon the wing, from possible attack by a bird of prey. Should a hawk attempt to strike while the parent flew above the fledgling, the adult bird would be in a position to shield it; or more

probably, it would attempt to dart aside at the critical moment, and the hawk, with its eye upon the uppermost bird, would follow, giving the youngster a chance to escape. After the young kingbird alighted in an exposed position, the parents lost not a moment in forcing it into concealment, doubtless with the same motive of protecting it from attack from the air.

Such "shielding flight" seems to be the manifestation of a behavior pattern widespread among birds whose nests are situated in high, exposed places, or facing an extensive open area without concealing vegetation. I have witnessed this close escort of the fledgling on its earliest flight by parent birds of species so various as the Montezuma Oropéndola (*Gymnostinops montezuma*), White-tipped Brown Jay (*Psilorhinus mexicanus*), Rough-winged Swallow (*Stelgidopteryx ruficollis*), White-backed Dipper (*Cinclus leucocephalus*), Black-crowned or Inquisitive Tityra (*Tityra inquisitor*), and several kinds of flycatchers. Danforth (1930: 82) saw an American Kestrel or Sparrow Hawk (*Falco sparverius*) follow closely one of its young as it flew from the flicker's hole where it was reared. Among birds more or less gregarious during the nesting season, as oropéndolas, swallows, and Brown Jays, the first flight of a fledgling may be a spectacular event; for the youngster, untried on the wing, is often followed closely not only by its parents but also by such neighbors or helpers as happen to be close by when it launches forth into the air. The value of this practice, in shielding the weakly flying fledgling from aerial attack, has already been suggested.

About two hours after the departure of the first young kingbird, the second decided to quit the nest. As it flew out over the water, three caciques followed, and one or two of them struck against it. One of the parent kingbirds hurried to the rescue, and the caciques turned back to their nests. Although doubtless this fledging was just as capable as its nestmate of flying to the shore, the caciques' interference caused it to fall into the water a few yards short of its goal. I paddled swiftly toward the spot in order to give assistance; but before I could arrive the young kingbird had flapped its way over the surface to the land, where it crawled up on the sloping bank. Here the parents flew down to it, and tried to coax it farther inland.

I am not sure why the caciques pursued the fledgling flycatcher. They are not predatory birds, and it could not have been because of enmity toward their young neighbor—they had ample opportunity to attack it in the nest, in the absence of the parents, had they so desired. I think it may have been that the strangeness of the flying kingbird caused the caciques to rush in pursuit of it—its slow, fluttering progress was so different from the swift, direct flight of the mature kingbirds who had been visiting the nest-tree. But it may be that the caciques were actuated by

the same parental instinct to protect a fledging on its first flight which caused the parent kingbirds themselves to rush to the first of their youngsters as it winged away from the nest, and that the unfortunate outcome to the little kingbird was a result of the disparity between its own size and that of its would-be protectors. Apparently the behavior we have called "shielding flight" can be called forth by a weakly flying fledgling of another species. In the following section of this paper, we shall refer to similar conduct of an adult kingbird with reference to an immature martin.

I do not know the exact age of the two young kingbirds reared below the caciques' nests. The lone nestling of another pair left when 18 or 19 days old. After the departure of the young from the nest, both parents and fledglings become very noisy. One pair of kingbirds, who were feeding fledglings in mid-June, called almost incessantly. The bird I took to be the male uttered from two to six high, sharp notes in a series, repeating this over and over at short intervals. His mate called in a similar fashion, but in a still higher, sharper voice. On coming together in a tree-top, they greeted each other with twitters and spread, quivering wings. They continued this demonstrative behavior through most of the day, devoting so much time to calling that I doubted whether they could be burdened with parental obligations. But soon I discovered that the pair were feeding fledglings, which were fast becoming as loquacious as their parents, although they called in weaker voices. The parents seemed to be able to satisfy the wants of their fledglings with very little effort.

I have no information on a second brood. My latest Central American nest of the Tropical Kingbird was found near Zacapa, Guatemala, on August 12, 1935, when it contained well-feathered nestlings. But nests occupied after the end of June are rare. In the upper Pastaza Valley of Ecuador, 1.5 degrees south of the Equator and 4300 feet above sea-level, I found, on October 26, 1939, a nest containing a single nestling two or three days old.

Relations with Other Birds

Like its relative the Eastern Kingbird (*Tyrannus tyrannus*), the Tropical Kingbird is generally considered to be a creature of a fiery disposition. Thus W. H. Hudson (1920: 189) writes of the "Bellicose Tyrant," the southernmost representative of our species: "In Buenos Ayres these birds arrive in September, after which their shrill, angry cries are incessantly heard, while the birds are seen pursuing each other through the air or in and out amongst the trees—perpetually driven about by the contending passions of love, jealousy, and rage. As soon as their domestic broils are over, a fresh war against the whole feathered race

begins, which does not cease until the business of propagation is finished. I have frequently spent hours watching the male, successively attacking, with scarcely an interval of rest, every bird, big or little, approaching the sacred tree where its nest was placed. Its indignation at the sight of a cowardly Carrion-Hawk (*Milvago*) skulking about in search of small birds' nests, and the boundless fury of its onset, were wonderful to witness."

As applied to the kingbirds that I have known in Central America for many years, the foregoing account would be little short of libel. Like so many other non-migratory tropical birds which remained mated through the year, Tropical Kingbirds here choose their partners and select their territories in so gradual and unobtrusive a fashion that it is difficult to learn how or when these matters are settled; and only rarely do the birds attract attention by noisy quarrels among themselves. Migratory birds, which often have only a brief period available for the winning of mates and the establishment of breeding territories, are as a rule far more quarrelsome in the spring than tropical birds which at the outset of the breeding season have long been mated—which may account for the greater pugnacity of the migratory La Plata kingbirds at this season.

As to quarreling with neighbors of other species, we have already seen, in our account of incubation, that the pair of kingbirds allowed small and harmless birds to rest in their little nest-tree, attacking only intruders which they looked upon as dangerous to their nest or at least not above suspicion. And the pair that fed nestlings in the cove of Barro Colorado Island got along remarkably well with their bigger neighbors the caciques, becoming hostile toward them only while the bees attacked their nestlings, which they were powerless to protect. They relieved their feelings by pouncing upon the innocent caciques, much as I have seen other birds peck savagely at leaves and other inanimate objects when enraged by my intrusion at their nests. In a clearing on the Island, I watched a Chipsacheery Flycatcher build her nest in a small orange tree, where a pair of Tropical Kingbirds had a newly completed nest still without eggs. The male kingbird often rested on a dead twig at the top of the tree and caused the poor Chipsacheeries a good deal of trouble. Whenever he saw the female approaching with material for her nest he darted at her and drove her away. The smaller flycatchers would usually turn tail without any show of resistance, although at times they would display their vermilion crownpatch in anger. And often the female Chipsacheery would dart past the kingbird and take her billful of material into the nest, to which he never offered the least violence. Thus for all the kingbird's bluster, the Chipsacheery was able to complete her nest close below his own. A pair of little Bananaquits (*Coereba flaveola*),

nesting in the same orange tree, went about their affairs without appearing to attract the kingbirds' notice.

Occasionally the Tropical Kingbird pursues a small, weakly-flying bird. One morning I stood in a clearing in the forest, watching a family of Gray-breasted Martins (*Progne chalybea*), admiring the deft way the parents placed food in their fledglings' mouths while one or both of the birds concerned in the transaction hovered in mid-air. Presently a kingbird alighted in the top of the dead tree with the young martins, and perched for some minutes peaceably enough a few feet from them. But when a fledgling started off on one of its slow, circling flights, the kingbird pursued, not in an angry fashion, as though it chased a hawk, but rather, so it seemed, as though trying to catch an insect. The kingbird followed the young martin through the air, touching it much of the time—much as I had earlier seen a kingbird parent follow its own youngster newly emerged from the nest—until one of the parent martins arrived, and pursuing the flycatcher in turn, caused it to change its course. Apparently a young bird in weak, unsteady flight elicits a set reaction from an adult kingbird, and this is true whether the youngster is the kingbird's own offspring or a fledgling of another species. But it is also possible that the kingbird chased the martin in a rough sort of play; somewhat as a Boat-billed Flycatcher that I once watched amused itself by alternately dropping and recovering a feather. Or could it have mistaken the young martin, with its weak flight, for a large moth?

Although the Tropical Kingbird only exceptionally molests smaller birds, and never in my experience does them actual harm, it is the relentless enemy of all birds of prey and other nest-robbers. Whether it has eggs or young to defend, or its nesting season has long been over, the kingbird can hardly ever see a hawk, kite, vulture, or toucan fly past its watch tower without darting forth in hot pursuit, twittering shrilly, sometimes striking the bigger bird on the back and causing it to cry out in alarm or pain, and never relaxing the chase until the enemy has flown afar. For its enmity to these birds, the kingbird has good cause. The Swallow-tailed Kite (*Elanoides forficatus*) preys upon eggs and nestlings from arboreal nests in exposed positions which it can reach while hovering on wing, without alighting. The kingbird's nests are often situated where they attract the kite's keen eye and are easily accessible to it. They must frequently be despoiled by the kites in the absence of the vigilant and warlike owners. Although I have not witnessed a kite plunder a kingbird's nest, I have on numerous occasions seen these graceful predators take the contents of nests belonging to other species. When a Swallow-tailed Kite swooped down and carried off nest and nestlings of a pair of Golden-masked Tanagers (*Tangara nigro-cincta*) from a tree

in front of my house, a kingbird was in close pursuit and almost succeeded in preventing the tragedy.

Although they harry toucans in the air, like other small birds the kingbirds appear to be no match for these nest-robbers while they perch and can defend themselves with their enormous bills. One afternoon at the end of May, hearing cries of distress among the birds behind my house and suspecting what was taking place, I rushed out in time to frighten a Chestnut-mandibled or Swainson's Toucan (*Ramphastos swainsonii*) from the kingbird's nest in the top of a guava tree. The marauder flew off with a single nestling in its bill, but two remained in the nest. The parents, although present and darting angrily toward the toucan, had been powerless to defend their family. Despite my having saved *two* of their nestlings from the toucan, after this episode I could scarcely appear behind the house without having them dart angrily close above my head. To look into their nest among the slender branches at the very top of the guava tree, I would climb a ladder and raise up a mirror attached to the end of a long pole. Darting past with angry twitters, the parent kingbirds repeatedly struck the back of the mirror, apparently with their feet. They kept vigilant guard over their nest from the dead top of an avocado tree close by. But for all their care, their other two nestlings vanished a week after the toucan ate the first, doubtless having followed it down the same capacious maw.

The Tropical Kingbird is a valuable member of the feathered community; if it sometimes mildly annoys the smaller birds, it makes ample amends by defending them and their nests from hawks and other predators.

Summary

1. The Tropical Kingbird is one of the most widespread and conspicuous of all the passerine birds of continental tropical America. It requires scattered trees and bushes, or woodland bordering open spaces; and wherever within its vast range this requirement is met it is likely to be found, whether in regions of high rainfall or in semi-desert. It ranges from sea-level up to 5000 feet in Guatemala and 8000 feet in Costa Rica.

2. At both extremes of its breeding range, as in southern United States and northern Argentina, this kingbird is migratory. At higher elevations in Guatemala, it gathers in small flocks during the "winter" months. But in Costa Rica it appears to remain paired, and in close contact with its breeding territory, throughout the year.

3. Its food consists largely of insects caught on the wing in spectacular fashion. Berries, small frogs, etc., form a subordinate part of its diet.

4. The kingbird's notes are high, shrill twitters and trills. During about half the year, the male sings an elaborate dawn-song before sunrise. On coming together after a separation, male and female greet each other with trills and twitters, uttered with the wings spread and vibrating.

5. The slight, open nest, usually placed in an exposed tree-top, is built by the female alone. She works in a leisurely fashion, while her mate may rest near by and greet her as she approaches the nest-tree.

6. The number of eggs in a set increases with latitude. In Costa Rica two or three form the set. In Guatemala nests with four eggs have been recorded. Beyond the Tropics in Argentina, four seems to be the usual number; while in southern United States sets vary from three to five eggs. The kingbird's eggs are laid rather late in the morning, on consecutive or alternate days.

7. The female alone incubates, as was proved with a marked bird, with corroborative observations at other nests. In this our kingbird agrees with other flycatchers that have been carefully studied. The eggs hatch in 15 or 16 days.

8. The nestlings are fed and guarded by both parents, but apparently brooded only by the female. In one instance the nestling period was 18 or 19 days.

9. When a fledgling flew from the nest, a parent flew just above it, forcing it downward. Similar behavior has been observed for a number of other kinds of birds whose nests are in exposed treetops, or face wide spaces devoid of sheltering vegetation, as often with streamside birds. Such "shielding flight" is apparently of importance in screening weakly flying fledglings from aerial attack. This behavior may be called forth not only by the first flight of fledglings belonging to other parents of the same species, but even, apparently, by weakly flying youngsters of distinct species.

10. The aggressiveness of these kingbirds toward harmless birds of other species has been greatly exaggerated. The parent kingbirds often permit such birds to rest and even to nest close by their own nests. Toward hawks, kites, toucans, and other nest-robbers the kingbirds are boldly aggressive; but their courageous attacks do not always shield their little ones from disaster. The kingbird's pugnacity toward predators, coupled with its tolerance of harmless small birds, make it an asset to the feathered community.

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Do Birds Hear Their Songs as We Do?

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Evidence from published phonograph records of bird songs shows that human beings are quite deaf to much of the music that birds hear among themselves. Some birds apparently can distinguish sounds when delivered in such rapid succession that we fail to catch the true number of separate impulses and also mistake the intervals in pitch between any two of those notes which we are able to hear. This is not to say that birds have a greater range of hearing with respect to pitch, but rather that their hearing is more efficient than ours within the ordinary range. The anatomical rationalization would be that the organ of Treviranus in birds recovers more quickly after a stimulus than does its homologue, the organ of Corti in mammals. From studies of telegraphy it is known that humans begin to make mistakes when required to count more than three short impulses of sound delivered at faster than 0.1 second apart (Taubman, 1950). Birds, on the other hand, are twice as competent, and can hear accurately impulses only 0.05 second apart, according to my measurement based on the phonograph recordings published by Cornell University and the Audubon Society. This should interest any comparative anatomists who have supposed that the coiled condition of the mammalian cochlea entails better hearing than the primitive and unelaborate apparatus of birds.

It need not be supposed that all birds are so endowed. No blackbird or tanager on these recordings, for example, gives any indication of such auditory skill. Most of the wood warblers and thrushes, some wrens, finches, flycatchers and goatsuckers do, however.

It has long been supposed that the Whippoorwill (*Caprimulgus vociferus*) sings a song of three (or at most, four) notes, corresponding to its name. If, however, the phonograph recording of its song is played at about half speed (at 33 1/3 instead of 78 rpm), the Whippoorwill proves to sing a five-note score that is almost the same as that of its larger and more southern relative, the Chuck-will's-widow (*C. carolinensis*), excepting for the fact that the song is delivered so fast that we usually hear but three of the five notes.

The immediate question is whether the Whippoorwill itself hears its song any more clearly than we do. One could argue reasonably that it would not continue to sing all five notes if some are never heard, but there is a better argument than this. The Audubon Society has published a record of a Mockingbird (*Mimus polyglottos*) imitating some thirty species of birds, among them the Whippoorwill. When played at both

78 and 33 1/3 rpm, the Mockingbird record gives exactly the same phenomenon as the record of the Whippoorwill itself. The Mockingbird sings the full five-note Caprimulgan score, though this is not noticeable to us at 78 rpm. This proves that Mockingbirds hear better than we do. I conclude, therefore, that it is likely that the birds imitated do, too. The same effect may be checked by comparing the Mockingbird imitations on the Audubon record with the Cornell recordings of the actual birds in the cases of the Phoebe, the Carolina Wren, the Robin and Wood Thrush.

In addition to the greater quickness in the auditory perception of birds, it may now be said that bird songs as *they* hear them are more like what we are used to in our own music. Without the two-speed phonograph, we receive only a bizarrely distorted impression of the songs. At slow speed, many songs take on a character similar to human melodies, and this is apparently how the birds hear them, save for the fact that the slowing-down to half speed lowers the pitch by about an octave. The extreme speed of delivery, the consequent abrupt, explosive and apparently shapeless and tuneless performance so characteristic of many songs is probably not evident to them. This phenomenon accounts for the difficulty ornithologists have had in describing many bird-songs, for in many cases the task was heretofore humanly impossible.

It may also account for the difficulty in locating the exact position of these birds when singing, because the effect of fatigue—the inability of the human ear to follow sound pattern accurately—changes the apparent position of the source of a sound. In other words, the extremely rapid singers have achieved a degree of ventriloquism, which could have a certain selective advantage in deceiving predators as to the birds' exact location while communicating with other birds.

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The Behavior of Birds Attending Army Ant Raids on Barro Colorado Island, Panama Canal Zone

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On a walk through the forest in tropical America, long periods may pass without the glimpse of a bird. Then, suddenly, all about one hears the chirring, twittering and piping of birds, and sometimes a dim murmur, as if a light shower were striking the leaves of the forest floor. This gentle pattering—it soon becomes clear—is caused by the frantic fluttering and hopping of countless insects trying to escape a swarm of raiding army ants, whose blackish hordes relentlessly advance over the ground, deploying searching columns in all directions. A lateral ant column climbs a twig where sits a grasshopper; it jumps—and lands in the voracious swarm, where it is quickly torn to pieces. An immense roach, flushed from under a decaying log, vainly flails its wings seeking to evade its many small assailants; it is soon overwhelmed.

The insects and other arthropods driven from cover by the army ants provide a readily accessible food supply for the birds. The excited voices of those first finding the ant raid attract other birds to the scene. Before long, a group of many individuals and several species is accompanying the ant swarm. These bird flocks have inevitably engaged the interest of naturalists. They offer the best opportunity to observe certain species that are rarely seen except with army ants. Yet, so far as I am aware, no intensive study of this association has been published.

My stay on Barro Colorado Island in 1948 afforded an opportunity for a preliminary investigation of this bird-ant relationship. The most characteristic of the ant attendants were certain members of the Antbird family (Formicariidae). Because of this well-known association, most species of this sub-oscine family (even those that never attend ant raids) have been given names like antbird, antthrush, antshrike or antwren. The ant followers observed on Barro Colorado Island also included representatives of other families, such as motmots (Momotidae), puffbirds (Bucconidae), woodcreepers (Dendrocolaptidae), flycatchers (Tyrannidae), and tanagers (Thraupidae).

Quite independent of the army ant associations are the wandering mixed bands of insectivorous birds, which one sees in the forest even more often than the ant attendants, but which may temporarily join them.

The primary purpose of this study was to assess the adjustment in behavior of the ant followers to their association with the ants. A secondary purpose was to appraise the relationship between the birds attending the ants and the independent wandering bands that visit ant raids occasionally.

Method of Study and Acknowledgments

This study was made at the Canal Zone Biological Area, better known as Barro Colorado Island, during the dry season of 1948, from January to April. It was stimulated by the cooperation and assistance of Dr. T. C. Schneirla and Robert Z. Brown, who were then engaged in an investigation of the biology and activities of army ants. Three colonies of the army ant *Eciton burchelli* were used as a basis for study. Daily records were kept of the birds that followed the raids of these colonies over a period of time covering both the *statory* and *nomadic* phases in colony life—when there are contrasting levels of ant activity and swarm raid strength. The flock and individual behavior of the birds associated with the ants was watched. No birds were collected on Barro Colorado Island, and, in view of the need for disturbing them as little as possible, no method of marking or banding the birds seemed feasible. Some individual birds were identified on subsequent days by peculiarities of plumage or by individual or pair behavior. Many of the birds became so accustomed to the presence of the observer that they would feed two or three feet from him.

Identification of birds was made from comparison with the collection of study skins at the Barro Colorado Island laboratory and by use of Sturgis' *Field Book of Birds of the Panama Canal Zone* (1928). The nomenclature here adopted is that of Eisenmann's recent Barro Colorado list (1952).

The author wishes to express his appreciation to Dr. Schneirla, Mrs. Margaret M. Nice and Dr. Harvey I. Fisher for valuable assistance with the manuscript, to Dr. Schneirla and Mr. Brown for aid given in the field, and to James Zetek, the Custodian of Barro Colorado Island, for many favors. The field work was effected during a period of sabbatical leave from the State Teachers College, Oneonta, New York.

Ecological Setting

Barro Colorado Island is a humid forest area of almost six square miles. Its character and ecology have been reported by Chapman (1929, 1938), Allee (1926a and b), Kenoyer (1929), and Eisenmann (1952). At present much of the forest appears to be in climax or subclimax condition and consists chiefly of mesophytic dicotyledonous trees. The large trees are usually weighted with lianas and epiphytes. Among the numerous species of the under-canopy various palms are common. In places, wild pineapple (*Ananas magdalenae*) forms a thick ground cover, which, because of thorns, is more difficult to penetrate than any undergrowth formed by palms, shrubs and vines. Traces of former cultivation have mostly disappeared, so that only in scattered areas can one discern the

younger phases of forest succession. As the dry season—January to April—advances, some trees lose all or part of their leaves, though the forest as a whole retains its evergreen aspect. The forest floor becomes covered with dead leaves, and a greater amount of sunlight reaches the ground than during the rainy season. Kenoyer (1929), referring to work by Allee (1926), estimated that for January and February the light intensity for the forest canopy is 25 times as great as that on the ground. He thought the forest floor would have an intensity of about 0.4 per cent of full sunlight.

The Swarm Raid Situation as a Background for Bird Activities

The life history and behavior of army ants of the genus *Eciton* have been under intensive investigation on Barro Colorado Island by Schneirla for many years (Schneirla 1933, 1934, 1938, 1945, 1948, 1949, 1950, 1952). These studies have disclosed, for the various species of *Eciton*, a regular cycle in which *nomadic* phases, with large daily raids and emigrations, and *statory* phases, with minimal raids from a fixed site, occur in alternation throughout the year in both rainy and dry seasons. In the case of *E. burchelli*, the ant with which we are concerned in this paper, the typical duration of the *nomadic* phase is 12–14 days; that of the *statory* phase is 20–21 days. The length of the respective phases is constant for each species, as it is dependent on the brood production processes of the colony, which continue with great regularity throughout the year. Each *E. burchelli* colony may be depended upon to stage large daily raids for roughly two weeks, then to become relatively quiescent for three weeks, in regular alternation.

In the *nomadic* phase, when swarm raids are maximally developed, the colony gathers nightly at a new location, into a bivouac formed by the bodies of the living ants; and each successive raid occurs in a situation 100 meters or more removed from the scene of the previous raid. In contrast, the smaller, irregular, raids of the *statory* phase are carried out successively in different directions from a fixed site. The swarm raids of *E. burchelli* present a fairly uniform front for a "moving army of ants," varying from 3 to 20 yards in width as the raid advances. During the most active days of the cycle, the raid may move out from the bivouac a distance of 75 to 200 yards by the noonday period and in the afternoon proceed another 100 yards. As the swarm fans out over the forest floor, driving out insects, spiders, scorpions, centipedes, and the like, concealed in the debris, lateral branches of the swarm climb the shrubbery and well up into the large trees searching for prey.

The swarm raids of *E. burchelli*, presenting an environmental feature of considerable prominence and great regularity, must play an important part in the lives of various insect-feeding birds. The swarm

raids of *Eciton* (*Labidus*) *praedator* are also attended by birds, although apparently not as regularly and extensively, perhaps because of the more subterranean habits of these ants (Schneirla, 1949: 75). The narrow column-pattern raids of such army ants as *E. hamatum* and *E. rogeri*, in which soft-bodied insect brood is normally the only booty, seem to attract the birds scarcely at all.

The activities of an *E. burchelli* swarm drive into the open a variety of hard-bodied, agile, and elusive arthropods of interest to birds. This ant commonly extends its raids up the trunks of forest trees and lianas, where it routs out, from concealment among the epiphytes and saprophytes growing on the trees, a great variety of prey. When such raids penetrate the trash-ridden crowns of palms, they scare out numbers of orthopterans, and offer a particular attraction to such arboreal birds as motmots, puffbirds, and woodcreepers. Generally the birds follow the most heavily populated part of the ant raid, shifting their position over the forest floor as the raid progresses. Some species wait quietly above until activity reaches up into the trees.

Certain naturalists have assumed that the birds attending the army ants were feeding upon them; but, as Belt long ago (1874) pointed out, the birds do not feed upon the ants, but upon the insects the ants disturb. There is no apparent conflict between the ants and birds, though they both seem to take the same sort of prey. The birds commonly enter the ant swarm in pursuit of such prey, but I never observed them eating* the ants, or "anting." The ants did not attack the birds. An ant, crawling along a twig that serves as a perch for a bird, usually turns back when encountering the foot of a living bird, or sometimes crawls over it.

The number of birds attending a raid depends on the strength of the raid and how long it has been active. The strength of the ant raid and the hour at which it starts are dependent on the current reproductive status of the ant colony involved. Raids during the *nomadic* phase are generally strong, and start as the morning light reaches the forest floor. Raids during the *statory* phase are generally weak, and, on some days during the middle of that phase, no raid may occur.

To make maximum use of the food supply afforded by the ant raids, several birds have made recognizable adjustments in their behavior patterns. Thus, were attending birds to restrict themselves to territories comparable in size to those of temperate zone passerines, or were they to associate themselves exclusively with a single ant colony, an adequate food supply based on ant activities would at times be difficult to obtain (cf. Davis, 1941; Nice, 1933, 1943). If they had restricted feeding territories, small birds would not be expected to follow the successive

* Doubtless birds may sometimes fortuitously swallow ants attached to their prey, but Dr. Schneirla says he has never seen *any* vertebrate *feed* on army ants.

daily raids of an ant colony during its *nomadic* wanderings. It is doubtful that there are enough army ant colonies to provide a dependable routine of daily swarm raids within the limited area equivalent to the territory of a temperate zone passerine bird. At times swarm raids from different ant colonies may be active in closely adjacent sections of the forest, and thus become competitive in their attraction for birds (as was observed on February 26, discussed hereafter). Generally, however, the contemporaneous swarm raids of different colonies are at a considerable distance apart.

Classification of Bird Aggregations Attending Army Ant Raids

A variety of birds attended the ant swarms from time to time. After many days of close observation, it was possible to discern general behavior patterns in groups of species, as well as in particular species. Some ant-following species are more gregarious than others; some are more actively stimulated by the swarm raid and follow it more persistently than others. Thus it is indicated that the "symbiotic" association formed by the birds with the ants during these raids, at first, presumably, on a nutritional basis, has brought about greater adjustments in behavior pattern for certain bird species than for others.

As indicated, there can be distinguished on Barro Colorado Island two major types of mixed bird associations: those composed of birds whose association is primarily in connection with the feeding opportunities afforded by the ant raids—called here the "feeding aggregations"; and those composed of birds whose association is independent of the ant raids and apparently serves some social function—called here the "social aggregations." The members of these two types may be classified in relation to their attachment to the army ant swarms as follows:

1. Feeding aggregations composed of birds which associate only or chiefly in connection with army ant swarm raids:

a. Birds which follow the swarm raids through nomadic wanderings without reference to territory. Examples are the antbirds *Gymnopithys leucaspis*, *Hylophylax naevioides*, and *Phaenostictus mcleannani*.

b. Birds which attend the swarm raids only while the raid is passing through or near their territory. Examples are the motmot *Baryphthengus ruficapillus*, the puffbird *Notharchus macrorhynchus*, and the tanager *Eucometis penicillata*.

2. Social aggregations composed of birds whose association is independent of the army ant swarm raids, but which attend them for varying periods:

a. Birds which travel in the forest in mixed social groups but readily join the swarm raids and follow them for long periods. Examples are the woodcreepers *Dendrocincla fuliginosa* and *Dendrocolaptes certhia*.

b. Birds which travel in the forest in mixed social groups and sometimes join the birds associated with the swarm raids, but only for brief periods. Examples are the small arboreal antwrens *Microrhoptias quixensis* and *Myrmotherula axillaris*.

Wandering mixed flocks of birds are characteristic of tropical forests in both Old and New Worlds (Swynnerton, 1915; Friedmann, 1935; Winterbottom 1943, 1949; Chapin, 1932; Davis, 1946). On Barro Colorado Island it is apparent that the mixed social groups wandering through the forest have a basis distinct from the feeding aggregations associated with army ant raids. An active noisy feeding aggregation will attract, and temporarily engulf, a passing social group. But after a relatively short period (never more than a fraction of an hour), the more active members of the social group will wander away from the ant swarm, while certain of their associates will adhere to the ant followers as long as the raid is in a highly active state. When that subsides, these birds drift off to become attracted to other social aggregations.

Behavior and Relationships of the Bird Groups

The Feeding Aggregations Attached to the Army Ants

The birds exhibiting the greatest degree of adjustment to the army ant raids, as indicated by their almost constant association with *E. burchelli* swarms, regardless of their nomadic wanderings, constitute the basic feeding group. Their primary motivation appears to be food-getting, and they evidence a freedom from territorial controls. They remain in the vicinity of the swarm raid, hour after hour, and return to follow the same ant colony day after day.

During this study, the Bicolored Antbird (*Gymnopathys leucaspis*), the Spotted Antbird (*Hylophilax naevioides*), and, to a slightly less de-



Bicolored Antbird
Gymnopathys leucaspis

gree, the Ocellated Antthrush (*Phaenostictus mcleannani*) commonly remained in the vicinity of the ant raid throughout the hours it was active (see also Chapman, 1929: 185). When the swarm raid on certain days withdrew early, *Gymnopithys* and *Hylophylax* settled quietly in some protective cover nearby. If it was the midday lull that caused cessation of the raid, the birds were still in the vicinity when raiding activities were resumed after the rest period. When the raid was only a short one from a *statory* colony, which started late in the forenoon or not until afternoon, the birds often did not find it at all. When some birds were present on such a short weak raid, for only part of the feeding day, they apparently sought another raiding ant colony later, and, in this manner made a new liaison with some other ant colony which was in or entering the *nomadic* cycle. These birds of the basic feeding group, with their adherence to the swarm raid situation, appeared to follow the daily raids of the same ant colony, regardless of *nomadic* wanderings, as long as that colony remained in the relatively high activity phase of its cycle and consistently put out strong raids maintained through most of the daylight period. (Tables 1-3 indicate this kind of bird attendance.)

The basic feeding species may be located in the forest from a considerable distance by their vocal calls, *cherr* and *churr*. *Gymnopithys* and *Hylophylax* were especially noisy birds. Their calls gave a sure clue to the presence of a swarm raid. If the observer arrived at the ant bivouac early in the morning to see the swarm emerge, he could watch the effect of the noisy early birds as others came from the forest to join the group. On various occasions, I have been present when the raids started in the morning. The first birds to arrive were always individuals of these two antbird species. When the first arrival began to feed, its *churr* attracted other birds, which, in turn, added to the noise.

On two occasions I watched *Hylophylax* come upon a developing raid as the first bird attendant of the day. By following the general route of the day before, the bird in each case came to the new bivouac location, and thus hit upon the developing swarm of the new day. After a few minutes, this bird was joined by a pair of *Gymnopithys*. These two most regular species of the basic feeding aggregation are characteristically first on the scene and remain until the end. *Hylophylax* was less often seen in pairs than *Gymnopithys*, and, on a few occasions, an individual absented itself for short periods during the day. I saw no evidence that any of the basic feeding species were nesting, although some behavior that appeared to be courtship was observed.

During the study *Gymnopithys* was seen in the forest only once when not attending an ant raid, and on that occasion it was searching about the base of a large tree which contained the *statory* bivouac of colony B-XIX

(Table 1). The incident occurred in the morning before a raid started from that bivouac and perhaps indicated that the bird remembered the previous day's activity around that spot. While *Gymnopathys* was the species most often observed on the raids, I estimated that the entire Island had no more than two dozen individuals—all spending the greater part of each day with an army ant swarm. This accords with the opinion of Davis (1946) as to the relatively small number of individuals of any one species in a tropical forest compared with temperate zone areas.

The freedom from territorial limitations shown by the antbirds *Gymnopathys*, *Hylophilax* and *Phaenostictus* seems to represent the greatest degree of adjustment which birds have made to the swarm raid situation. The stimuli of noise and activity appear to have developed as the mechanisms by which the various birds are attracted and kept together. It is of interest that all three of these antbirds have chirring calls among their various notes (Eisenmann, 1952: 36).

The persistence of these three species in remaining for long periods with the raids applies, to a qualified extent and in varying degree, to another group of otherwise non-gregarious species. This group, in order of persistence in following the ants, consists of the Gray-headed Tanager (*Eucometis penicillata*), the Black-faced Antthrush (*Formicarius analis*), the White-necked Puffbird (*Notharcus macrorhynchus*), and the Rufous Motmot (*Baryphthengus ruficapillus*). These birds accompanied the ants only on certain days or in certain sections of the forest. A record of their attendance on the raids of colonies B-XIX and B-XVII (Tables 1 and 2) leads me to believe that they are localized in the forest and that they are persistent swarm followers only within given ecological or territorial limitations. Moreover, these species, except perhaps the tanager, are often seen feeding alone in the absence of any swarm raid.

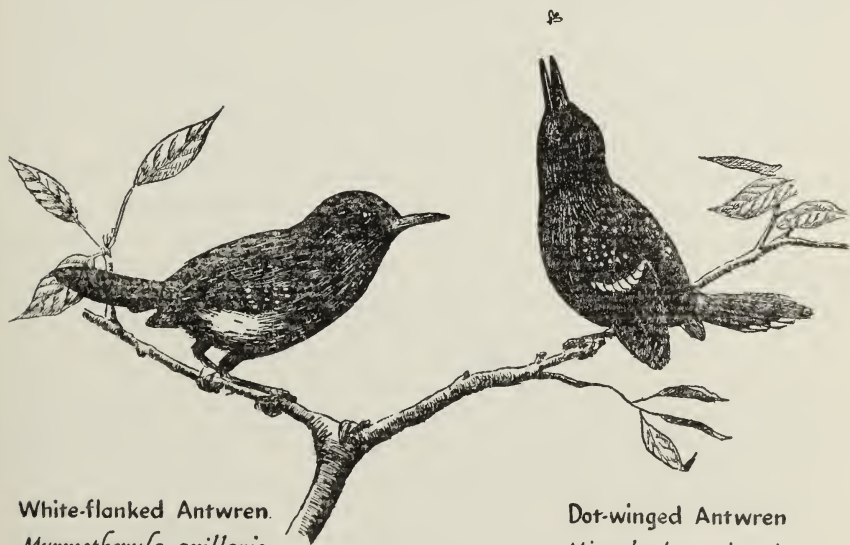
The Social Aggregations

The composition and behavior of the "social aggregations" is another story. These little wandering bands of birds, often encountered in the Barro Colorado forest, are treated separately because their association is independent of the army ants and their attendance on swarm raids is only occasional. The motivations which bring these mixed bands together are obscure, but probably involve certain social advantages, resulting from gregariousness, not limited to food-getting. Birds of the feeding aggregation, on the other hand, gather primarily in response to the feeding opportunities of the swarm raid situation and do not otherwise associate.

In order to understand better the composition and group behavior

of the mixed social aggregations, some time was spent observing them, both when they attended the ant raids and at other times when they were moving independently in the forest.

The nucleus and leadership of a group were made up of a small number of diminutive, arboreal Dotted-winged and White-flanked Antwrens (*Microrhopias quixensis* and *Myrmotherula axillaris*). The males in both species are largely black with conspicuous white areas. Typi-



White-flanked Antwren.
Myrmotherula axillaris

Dot-winged Antwren
Microrhopias quixensis

cally, these birds, both males and females, flitted about showing a great amount of activity in apparent search for food among the twigs and leaves of thick secondary canopy or vine-covered thickets, generally 10 to 30 feet above ground. They were noisy and usually could be located by their twittering and by the frequent movement of individuals within the group. This twittering and flashing activity appears to be the stimulating factor which causes other species to become affiliated and thus form the entire social assemblage or group.

After searching the branches of one low tree, the antwrens move on to another. Individuals of other species soon follow. With the antwrens as leaders and other species in the periphery, the group gradually moves over a circuit, favoring localities where the successional stages of the forest are in the intermediate phases.

The most frequent species following the antwrens was the Slaty Antshrike (*Thamnophilus punctatus*). One sex or the other, and sometimes both members of a pair, was invariably present as a member of the wandering social flocks. The other members varied. Usually one or more of several species of woodcreepers (Dendrocolaptidae) attached themselves to the group. Sometimes the Spotted Antbird (*Hylophilax naevioides*) followed a social company for a while. Several times I noted the Fulvous-bellied Antwren (*Myrmotherula fulviventris*), and, once, the Plain Xenops (*Xenops minutus*), an arboreal member of the Furnariidae with tit-like habits.

In the vine-draped thickets and trees of the dimly-lit forest, it is easy to overlook some of the birds forming part of a restless social group. Although within sound of each other, the scattered members of the party may be screened off from the observer by intervening foliage. It is therefore possible that some of the social groups hereafter described included more individuals and species than I was able to determine.

When, in its routine travel, a social group encounters an active swarm raid situation (either with or without an attending feeding aggregation of birds), it usually joins the feasting activities, mingling with the species of the feeding group, if present. While in such mixed aggregation, antbirds, antshrikes, and the Brown Woodcreeper (*Dendrocincla fuliginosa*) move to ground level to capture and pursue prey. But after a few minutes, (usually 10 to 30), the antwrens re-form their noisy little company and move away from the swarm raid locale. After a short time, as if reluctantly, the Slaty Antshrike will follow the more active, noisy, antwrens, moving off into the small trees. But not the Brown Woodcreeper, for it readily transfers its attachment to the basic feeding group represented by the Bicolored Antbird (*Gymnopithys*), and will continue to attend the ants for long periods.

With my time chiefly devoted to watching the ant-followers, I was unable to make any intensive study of the wandering social groups, especially during the morning hours when they seem to be most active. The accompanying records describe a few of such groups whose composition and movement I was able to determine during varying periods of observation in the forest.

February 4, 1948. A noisy group of eight birds was encountered on Lutz trail at 12:50 P.M. During the one hour they were observed, the group completed a circular route (50 by 75 yards) through low forest cover, returning to a site near the place where the observation started. The group had the following species composition:

- 4 antwrens (*Myrmotherula axillaris* and *Microrhophias quixensis*), 3 males and a female.
- 2 antshrikes (*Thamnophilus punctatus*), male and female.

1 woodcreeper (*Dendrocolaptes certhia*).

1 antbird (*Hylophilax naevioides*), which left the group after 20 minutes.

February 5, 1948. A noisy group of eight birds was encountered at 9:00 A.M. near station 4 on Lutz trail. During the two-hour period of observation the group moved up a slope for 75 yards, then crossed a ravine and moved off at a right angle to the first direction for 25 yards, after which it returned, recrossed the ravine and came down the same slope on a course a few yards to the left of the uphill route. This group consisted of:

5 antwrens (*Myrmotherula axillaris* 4 and *Microrhophias quixensis* 1).

1 antshrike (*Thamnophilus punctatus*).

1 woodcreeper (*Dendrocincla fuliginosa*).

1 antbird (*Hylophilax naevioides*), joined the group for a few minutes.

March 17, 1948. A group encountered at 9:15 A.M. and watched for 20 minutes near station 4, Miller trail had the following composition:

4 antwrens (*Myrmotherula axillaris*).

1 antshrike (*Thamnophilus punctatus*), female.

March 17, 1948. A group was observed at 1:15 P.M. and watched for 15 minutes in secondary forest growth near the junction of Zetek and Armour trails. This noisy group had the following composition:

4 antwrens (*Myrmotherula axillaris* and *Microrhophias quixensis*)

1 antshrike (*Thamnophilus punctatus*), female.

March 19, 1948. A group of seven birds was encountered at 3:30 P.M. near station 3, Zetek trail and watched for 15 minutes. The group had the following composition:

5 antwrens (*Myrmotherula axillaris*), 4 males and 1 female.

2 antshrikes (*Thamnophilus punctatus*) 2 females, one carrying food in the beak.

These observations suggest that some of the members of the mixed social groups remain together and active even during the relatively quiet middle hours of the day.

It is interesting to assess the interplay between the differently motivated bird groups that sometimes merge into complex aggregations.

During my stay, courting groups of male Red-capped Manakins (*Pipra mentalis*) were easy to locate by their snapping and buzzing. The wandering social groups often moved among and through such a group

of manakins. On one occasion I watched such a mixed party mingle with the courting manakins in trees 12 to 15 feet above the ground, and, while these groups were together, a large *E. burchelli* raid, with its associated feeding birds, moved directly below the manakins. This temporarily created a complex mixed association of three different groups. The manakins showed not the slightest interest in the feeding opportunities afforded by the raid. After a while, the two traveling groups of birds went their way, leaving the manakins buzzing and snapping as before. It would seem natural for a hungry manakin to avail itself of the food uncovered by a swarm raid, and Skutch has reported females or immatures feeding in such a raid (1949: 2). But courting males are apparently too stimulated by other activities to be concerned with food.

Behavior of Birds Which Followed Certain Army Ant Colonies

The attached tables show the birds which followed each colony during the period of observation and the time spent by each bird with the swarm. The colony designation is that given it by Schneirla and Brown (1950) in connection with their army ant studies of 1948. Certain occurrences, not apparent from the tables, are discussed here.

Colony B-XIX

On February 9 ant colony B-XIX was engaged in its last raid of a *statory* period, which was strong, though it started late, at 10:00 A.M. The birds attending the raid were watched for five hours. By noon the birds seemed to have lost all fear of the observer, who moved from time to time in order to remain close to the swarm front where bird activity was greatest. In their feeding, the birds often approached within four feet. During this and subsequent raids of the following ten days, two pairs of Bicolored Antbirds (*Gymnopithys leucaspis*) were present most of the time. Because of their fearlessness of the observer, their behavior towards each other, and the characteristic plumage marks on one bird, they were identified as the same four birds on each successive day. They followed this ant colony (*nomadic* after February 9) each day into a different part of the forest, without regard to any apparent territorial restrictions.

One to three (usually two) Spotted Antbirds (*Hylophylax naevioides*) were likewise fairly regular attendants. Apparently the same pair of birds was present on successive days, though they were not as attentive to each other as the pairs of *Gymnopithys* and of Ocellated Antthrush (*Phaenostictus mcleannani*). A pair of the latter was observed on the raid of February 12, and was in almost daily attendance for long periods until observation of this colony ended on February 19.

The Brown Woodcreeper (*Dendrocincla fuliginosa*), though often attached to the wandering social groups, would remain in attendance for hours, and was observed with this ant colony on a number of days when other members of the social group were not about. This species is not conspicuous on an ant raid as it often perches quietly on a tree trunk for many minutes, though sometimes going to the ground in search of prey. At times two of these birds chased each other, performed some introductory courtship, and sang repeatedly.

By following the attendance records of the different species in the attached tables, one may understand how, from time to time on different days, the *nomadic* ant raids seemed to pass through localized habitats of White-necked Puffbirds, Rufous Motmots and Gray-headed Tanagers, which followed the swarms persistently on those days.

Colonies B-XII and B-XVII

The *statory* bivouac of colony B-XII was in the base of a large hollow tree in a good forest cover. While observing the nest of the Dotted-winged Antwren, a few yards from this bivouac, I saw a Spotted Antbird on three occasions examining the tree where the bivouac was located, yet (unlike the situation with colonies B-XVII and B-XIX) neither this nor any other bird was noted attending the small late *statory* raids of this colony. Even the antwrens nesting near the bivouac tree secured food for their young elsewhere.



Spotted Antbird *Hylophylax naevioides*

Yet, by the time the strong second *nomadic* raid of colony B-XII occurred, following its *statory* period, a large number of birds was in attendance (Feb. 26). On that date, the *nomadic* swarms of colonies

B-XII and B-XVII approached each other until less than 200 yards apart. The large number of birds that had attended the raid of B-XVII on the previous morning of February 25, and had been following that colony for several days, now switched over to the nearby strong raid of B-XII (Tables 2 and 3). As a result, the largest aggregation of birds seen on any raid (19 individuals of 13 species) was observed attending the B-XII raid the morning of February 26.

Colony B-XVII, whose raids, both *statory* and *nomadic*, had steadily attracted birds, was attended on February 26, during my period of observation, by only one bird, a Gray-headed Tanager. This attendance was noted at a time when the raid of B-XII was only 130 yards from that of B-XVII and moving in the same direction. The one tanager remaining with B-XVII appeared to be one of two that had been following that colony for a couple of days, its companion having joined the other birds attending colony B-XII. Both colonies were at this time issuing strong swarm raids and traveling under similar forest cover. Comparison of bird attendance on February 25 and 26 indicates the strong attraction that the flock, not merely the feeding situation, has for the birds following the ants.

Notes on Individual Bird Species Attending the Ant Raids

The members of the feeding and social aggregations will be treated separately, in order of their attachment to the ant swarms. It should be borne in mind, however, that certain members of the feeding group, though treated first (because regarded as gregarious only in connection with ant raids), are actually less persistent ant followers than some members of the social group.

Birds of the Feeding Aggregation

The Bicolored Antbird (*Gymnopithys leucaspis*) is the most characteristic ant follower, and usually is the first to appear. It seems to have no specific ecological preference in the forest, and during the dry season conducts its diurnal activities along the route of the ant raids. Hour after hour, during all the active periods of the raids, the same individuals remain near the front, feeding, courting, singing or resting, and thus continue with a nomadic ant colony as it traverses successive sections of the forest. I was unable to learn where these birds spend the nights, but each morning the same individuals came out of the thicket to attend the ant columns soon after the raid got started. One morning I saw a bird approach and examine the bivouac tree before the ant raid emerged. In the case of late *statory* raids, the birds usually transfer their attention to another *nomadic* colony with an earlier, stronger raid.

With the degree of adjustment *Gymnopathys leucaspis* has made to the army ant, and especially to *E. burchelli*, it seems likely that the population mechanics of the bird are related to those of the ant. It is likely, also, that any serious problems which the dry season presents for the ants would reflect upon the birds.

Predation did not seem to be a serious problem to this antbird. The individuals showed little evidence of fear during their daily activities. During the 8 weeks I saw only one predator attack while I was observing at close range. My notes give the following account of the incident: On February 12 at 10:26 A.M., two pairs of *Gymnopathys* were feeding as usual, close over the raid, when a small hawk struck without warning directly from above. The birds scattered. One flew off screeching with the predator in pursuit; the other three disappeared into concealment nearby. The incident occurred within 25 feet of my observation post which was in open cover with no blind. At 10:30, everything being quiet, I walked toward a nearby tree and there disturbed one of the birds from its concealment among fallen leaves between roots at the base of the tree. At 10:37 another flew from its hiding place and disappeared, screeching. At 11:00, more than 30 minutes after the attack, I moved again and disturbed the fourth bird which flew to a nearby perch. After a period of complaining, it resumed feeding. At 11:10 two of the former birds returned cautiously, to rejoin the one remaining at the site. Later all four were back.

This species feeds directly in and over the thickest part of the swarm. Frequently a bird jumps to the ground for prey, but generally it flies from one perch to another, a foot or so above the ground. The food preference is for fairly soft-bodied prey, spiders, small roaches, and isopods. When food animals escape, the bird will frequently go to the ground and seize fallen leaves, throwing them aside or over its back in search of fleeing prey.

The Spotted Antbird (*Hylophylax naevioides*) is a regular attendant of the swarm raid, generally in the low shrubbery near the ground. One of the first to appear on the raid in the morning, it remains for long periods during the day. During February and March the birds were often seen in pairs (sexes are easy to distinguish in this species), but frequently a single bird was present on a raid.

Early one morning, when I was trying to determine how the birds located the new position of a swarm raid after a colony's nightly migration, *Hylophylax* was the first to appear. One moved along the route of the previous day until it came upon the bivouac established during the night. From there it followed the new raiding column to the swarm front. There, it began to feed and to give the "well known" succession of *Churr, Churr* notes. *Gymnopathys* soon came in apparent response, and

then the Woodcreeper *Dendrocincla fuliginosa* appeared. Because of the persistence with which *Hylophylax* seeks the ant raids and stays with them, it must be considered one of the leaders of the basic feeding flocks of birds (cf. Skutch, 1946).

In late March there was some courting among birds of this species. Males displayed, both to females and to other males. In this display, the male lowers the head and flattens the back by spreading the shoulders and the tail slightly, to expose the white spots on the back and on the wings. The posture assumed for this display was similar to that of injury-feigning in the Dotted-winged Antwren (*Microrhopias quixensis*) at the nest-site, except that, with the latter the posturing was more like flashes exhibited only for a second. These display incidents in *Hylophylax* appeared to be induced when one bird approached within a few feet of another on the swarm raid. Some chasing took place, but no combat was observed and no peck order was evident.

The Ocellated Antthrush (*Phaenostictus mcleannani*) was seen frequently in the eight weeks, and I observed it during many hours of watching ant raids. Usually the birds of a pair remained close to each other as they moved among others of the basic feeding aggregations. They were generally shy, but after a while accepted an observer and moved around him without alarm. On the raid, they hawked food close to the earth, sometimes jumping to the ground for a catch. After periods of active feeding a pair often sought a sheltered perch under a fallen tree top where the birds sat side by side for a rest period of 5 to 15 minutes.

Ocellated Antthrush

Phaenostictus mcleannani



This species sang frequently during March. Often one member of a pair fed the other individual, although both birds participated in a general chase of prey animals. In feeding, usually the bird which presented the food delivered it to the location of the recipient. But in the case of some pairs, one individual, at times, followed the other and begged. Sometimes, after receiving food, the recipient would attack the donor which always made a rapid retreat after feeding. If it was the male feeding the female, he made no advances other than delivering the food. I was unable to correlate this behavior with any exact phase of the reproductive cycle. *Phaenostictus*, while similar in behavior to the other two species of the basic feeding aggregation, and a persistent ant attendant, was completely absent from the locale of many swarm raids, perhaps indicating a small population of this species on Barro Colorado Island.

The Black-faced Antthrush (*Formicarius analis*) walked about the floor of the densest part of the forest, with short tail uptilted—suggesting more a rail than a thrush. Although a wild and secretive species, it followed the ant swarms with the basic feeding bird group, except that it seemed more restricted in range and was present only on certain days. Individuals of this species seemed less affected by the presence of other birds than are most species of the aggregation, and Skutch reports them foraging alone, independently of army ants (1945: 123).



Gray-headed Tanager
Eucometis penicillata

The Gray-headed Tanager (*Eucometis penicillata*), the only tanager observed on the swarm raids, was a very persistent ant attendant and

appeared to be well-adjusted to the feeding opportunity afforded by the raids. The birds were always seen in pairs, except in one instance when the members of a pair were temporarily apart because of two raids working concurrently a short distance apart. The tanagers fed directly over the swarm front, usually from one to six feet above the ground. When they occur at a raid, they are likely to remain in the attending bird aggregation one to three hours. At times demonstrations of courtship, singing, and chasing were in evidence. The birds were seen passing food to each other on a few occasions.

This tanager occurred only in certain sections of the forest. It was not present, as were some other species, following the successive daily raids of an ant colony. Instead, it appeared on swarm raids through intermittent sections, remaining at such times for a long feeding period, and it might be present on a raid the second day in succession. February 19, one pair was observed feeding for 2.5 hours (Table 1). Although I had an excellent opportunity to study the species and to learn its song as it worked over the raids, I never found it moving independently in the forest, and Chapman says he rarely saw it except with ants (1929: 186).

The White-necked Puffbird, (*Notharcus macrorhynchus*) was first recorded with a swarm raid on February 9. Subsequently this species was found associated with the swarm raids as a member of bird aggregations following the ants. As Skutch (1948: 82) states, referring to members of this family, it sits "for long periods on the same exposed bough, its feathers fluffed out, a picture of stupid lethargy." Though motionless, these birds are ever alert. Let any edible insect appear, whether flying in the air or crawling over leaf or trunk, the "stupid" puffbird will dart swift and straight, seize the insect in its strong beak, return promptly to its perch, and pound the victim loudly against the perch before gulping it down. For 75 minutes I watched a pair which gave a typical picture of the way they follow and feed with the ant raids, when attracted by the noise of the other birds. A puffbird may perch a dozen feet or more above the ground, on a branch or liana, and remain there with the feathers puffed out until a strong column of ants starts raiding the crown of a palm tree or some suspended tangle of vegetation from which large grasshoppers or scorpions emerge. The bird does not make an active search for prey but waits until a prey animal moves out into the open. Then the bird goes directly to the spot to seize the prey, usually returning to the same perch for the kill. Although traveling in pairs, they often perched several yards apart so that the presence of both birds was not always apparent to the casual observer. I have seen a bird capture food three times in 20 minutes, and, on another occasion, I have seen one perch quietly for 40 minutes. Sometimes they perch like a

nighthawk, parallel to the direction of the branch. The food is chiefly tree-grasshoppers, found in palms and among epiphytes of other forest trees, and scorpions. On swarm raids the bird moves forward, from time to time, thus remaining near the feeding activities at the swarm front, yet, it is so quiet that its presence is little noticed. While availing itself of ant raids, this species does not seem to be dependent on them.

The Rufous Motmot, (*Baryphthengus ruficapillus*) was first observed attending a swarm raid on February 15 when one appeared at 12:15 P.M., continued to feed until 1:30, disappeared, and then returned at 2:30. During a part of this time a second motmot, presumably the mate, attended the raid. Each, in turn, was seen to leave the site of the raid for a time and fly into a deep shady ravine where it appeared there might be a favorable location for a nest. Further examination disclosed a few burrows in the steep bank; also, well-worn perches evidenced recent use. A motmot was seen entering one of these burrows. On February 17, the swarm raid of ant colony B-XIX again approached this ravine, and the two motmots attended for 90 minutes of the observation period. Again these birds were seen visiting the prospective nest site in a ravine. This record seems to be evidence that their range in the forest did not, at that time, extend far from the unfinished burrows in the ravine. On one other occasion a motmot joined the flock feeding over a swarm raid. Evidently the motmot's foraging is not limited to ant swarm situations.

When feeding, motmots behave much like puffbirds. They sit rather quietly on a horizontal liana or branch, watching the moving ant columns working up tree-trunks and vines. When a prey animal moves out to escape the ants, the motmot pursues, taking the prey from the trunk of a tree or the leaf of a palm. I watched one take a large scorpion and spend five minutes killing the creature before swallowing it whole. At times, when over a swarm raid, these birds come close to the ground after food. I did not hear a vocal note, but the pendulum-like swing of the racket tail was an aid in locating them. The motmot shows little interest in the raid when the ants are moving on the forest floor, but when the ants start plundering overhead tangles of palms and epiphytes the motmot quickly moves into the center of activities.

Birds of the Social Aggregation

Three species of woodcreeper (*Dendrocolaptidae*) were repeatedly seen attending army ant raids. They were sometimes seen in the forest when not attending raids and commonly followed along the periphery of the social aggregations. They readily transferred their adherence to the basic feeding group when they encountered a good raiding situation.

The Brown Woodcreeper (*Dendrocincla fuliginosa*) was a common and persistent attendant of the ants. The Barred Woodcreeper (*Den-*

drocolaptes certhia) and Buff-throated Woodcreeper (*Xiphorhynchus guttatus*) were less frequently in attendance. On a raid the woodcreepers followed the moving scene of activity, or at times remained quietly perched on the side of a tree-trunk in an inconspicuous place several yards from the center of activity on the ground. But when an ant column invaded the realm of lianas and tree-trunks, these birds were on the job. These woodcreepers carried on active hunting and feeding when attached to the social aggregations, in contrast to the periods of quiet waiting for opportune moments when associated with the swarm raid.



Brown Woodcreeper
Dendrocincla fuliginosa

The Slaty Antshrike (*Thamnophilus punctatus*) visits the swarm raids frequently for short periods. Though a bird of low trees and shrubbery, I saw it feed among the ants on the ground on several occasions. This was noticed when a passing swarm raid approached the breeding locality of the antshrike. A nest was found in the course of construction on February 3; by February 11 the two eggs had been laid; they hatched on February 25. This species and the Dotted-winged Antwren were the only ant-following birds definitely established to be breeding at the time of the study. The males of this antshrike appeared to

be calling from selected localities. The notes described by Skutch (1934: 9) were commonly heard. Sometimes the female answered the male. This species produced the greatest repertoire of non-musical utterances of all the antbirds I encountered. Its breeding status at the time of my study may be part of the explanation.

The Dotted-winged Antwren (*Microrhoppias quixensis*) and the White-flanked Antwren (*Myrmotherula axillaris*) have been discussed in the social structure of the mixed bird groups. A nest of the Dotted-winged Antwren was found on February 5 with two eggs which had hatched on February 6. Whether gonadal activity may have influenced the role of these species as leaders of the wandering social groups is an interesting question. Little appears to be known about the breeding season of these birds or whether some individuals may be nesting at all seasons. Skutch found nests of the White-flanked Antwren in late March, April, and May, and courtship display in early February (1946: 21-26).

The Ochre-bellied Flycatcher (*Pipromorpha oleaginea*) was observed a few times attached to the social groups led by the antwrens. It was the only member of the Tyrannidae observed with the ants. Its degree of adjustment as an ant follower seemed slight in comparison to the other species mentioned. After short periods of feeding, it would disappear into the forest.

Summary

1. Birds attending swarm raids of army ants were studied in the tropical forest of Barro Colorado Island during January to April, 1948. Raids of army ant species using columnar formation were found to be of little interest to birds.

2. The basis of study consisted of three colonies of the swarm raiding army ant, *Eciton burchelli*. These colonies were watched over a period covering both the *nomadic* phase when extensive daily raids occur from a bivouac moved daily, and the *statory* phase when daily raids are weak, or sometimes absent, and proceed from the same location. The investigations of Dr. T. C. Schneirla show that these phases regularly alternate throughout the year on Barro Colorado Island, regardless of season.

3. The number of birds associated with a raid is greatest during the active *nomadic* phase of a colony, which lasts 12 to 14 days, and decreases during the *statory* phase of 20 to 21 days, when sometimes no birds attend the weak raids. During the *nomadic* phase, the front of moving ants varies from 3 to 20 yards in width and the swarm may advance as much as 300 yards in a day.

4. Birds attending the raids feed on the insects and other arthropods flushed out by the ants, and were not seen to eat army ants, to show fear of the ants, or to "ant." The ants did not attack the birds.

5. On the basis of their relation to the army ant swarms, two major types of bird associations were discerned: a) birds of the feeding aggregation, whose association seemed wholly dependent on the feeding opportunities afforded by the army ant raids and which remained with the ants for long periods of time; b) birds of the social aggregations, whose association was independent of the army ant raids, but which would attend the raids for varying periods of time.

6. Birds of the feeding aggregations may be subdivided into: a) those forming the nucleus, which through all or most of their feeding day remain with the ants, following them regardless of territorial or ecological limitations, i.e., the antbirds *Gymnopithys leucaspis*, *Hylophilax naevioides*, and *Phaenostictus mcleannani*; and b) those that remain with the ants only so long as they traverse certain areas of the forest and seem less dependent upon the ant raids, e.g., the motmot *Baryphthengus ruficapillus*, the puffbird *Notharcus macrorhynchus*, the antthrush *Formicarius analis*, the tanager *Eucometis penicillata*.

7. Birds of the social aggregations may also be subdivided into: a) those that, on encountering the swarm raid, remain with it for considerable periods, e.g., the woodcreepers *Dendrocincla fuliginosa* and *Dendrocolaptes certhia*; and b) those that, on encountering a swarm raid, remain with it only a short time, e.g., the antwrens *Microrhopias quixensis* and *Myrmotherula axillaris*.

8. Vocal noise and movement are the synthesizing elements of both the feeding and the social aggregations.

9. The antbird *Gymnopithys leucaspis* was always a conspicuous member of the feeding aggregation, and was usually the first to appear at a swarm raid. Occasionally the antbird *Hylophilax naevioides* was the first. The chirring notes of these species attracted others.

10. Apparently the same individuals of these two species tend to follow the raids of a given ant colony so long as its raids are strong; when the colony enters the *statory* phase of weak raids, the birds readily transfer their attention to a colony in the active *nomadic* phase.

11. Localized groups of courting male manakins (*Pipra mentalis*) paid no attention to passing social aggregations or to an army ant raid below them; no member of this species was seen associated with ants.

12. Tables are included showing the birds attending raids of each colony during the period of study, with the date and period of attendance.

13. Each species of bird observed attending the army ant raids is separately discussed in relation to its apparent behavioral adjustment to, and dependence upon, the swarm raids.

Table 1

RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XIX *

	Feb. 9, 1948 9:15 A.M.-2:30 P.M.	Feb. 10, 1948 1:00-2:00 P.M.	Feb. 11, 1948 9:00-11:15 A.M.	Feb. 12, 1948 9:00-11:30 A.M.	Feb. 13, 1948 12:00-1:45 P.M.	Feb. 14, 1948 9:00-10:30 A.M.
White-necked Puffbird	*****					
<i>Nothareus macrorhynchus</i>	***					
Bicolored Antbird	****	****	*****	****	*****	**
<i>Gymnophaps leucaspis</i>	****	****	*****	****	*****	**
	***	***	*****	****	*****	**
	***	***	*****	****	*****	**
Spotted Antbird	**	*	*****	*****	*****	**
<i>Hylophylax naevioides</i>			*****	****	*****	**
Ocellated Anthrush			*****	****	*****	*****
<i>Phaenostictus mcleannani</i>			*****	****	*****	*****
Slaty Antshrike			*****	****	*****	*****
<i>Thamnophilus punctatus</i>			*****	****	*****	*****
<i>Black-faced Anthrush</i>			*****	****	*****	*****
<i>Formicarius analis</i>			*****	****	*****	*****
Dotted-winged Antwren			*****	****	*****	*****
<i>Microrhopias quizensis</i>			*****	****	*****	*****
Brown Woodcreeper	*****	**	*****	**	*****	**
<i>Dendrocincla fuliginosa</i>	*****	**	*****	**	*****	**
Barred Woodcreeper	*****		*****	**	*****	**
<i>Dendrocolaptes certhia</i>	*****		*****	**	*****	**
Buff-throated Woodcreeper			*****	**	*****	**
<i>Xiphorhynchus guttatus</i>			*****	**	*****	**

* Each asterisk represents 15 minutes attendance of a bird at a swarm raid.

Number of birds of each species indicated by number of rows of asterisks, as **** shows the record of two birds for one hour. Feb. 9, last day of statutory period for this ant colony (strong raid). All other days show records for nomadic raids of *E. burchelli*.

Table 1 (Continued)

RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XIX

	Feb. 15, 1948 12:15 A.M.-2:15 P.M.	Feb. 16, 1948 9:00-11:00 A.M.	Feb. 17, 1948 8:30-10:15 A.M.	Feb. 18, 1948 9:30-11:30 A.M.	Feb. 19, 1948 9:30-12:00 A.M.
White-necked Puffbird <i>Notharcus macrorhynchus</i>	*** **	***** *****			
Rufous Motmot	**** * ** *				**
<i>Baryphthengus ruficapillus</i>	** ***** ** *****	***** *****	***** *****	***** *****	***** *****
Bicolored Antbird <i>Gymnopithys leucaspis</i>	** * ** *	***** *****	**** *** ****	***** ***** **	***** ***** ***** *
Spotted Antbird <i>Hylophylax naevioides</i>	*** * ** * ** *		**** ****		***** **
Ocellated Anthrush <i>Phaenostictus mcleannani</i>	* * *** ***	***** *****	****		***** *****
Slaty Antshrike <i>Thamnophilus punctatus</i>		*	*	*** *	**
White-flanked Antwren <i>Myrmotherula axillaris</i>		*	*	*	*
Barred Woodcreeper <i>Dendrocolaptes certhia</i>			****		*****
Buff-throated Woodcreeper <i>Xiphorhynchus guttatus</i>		*****			*****
Grey-headed Tanager <i>Eucometis penicillata</i>					***** *****

Table 2

RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XVII *

White-necked Puffbird <i>Notharcus macrorhynchos</i>	Feb. 13, 1948 A.M.	Feb. 14, 1948 A.M.	Feb. 15, 1948 A.M.- 12:30 P.M.	Feb. 16, 1948 P.M.	Feb. 17, 1948 A.M.	Feb. 18, 1948 P.M.	Feb. 19, 1948 P.M.	Feb. 20, 1948 A.M.
Rufous Motmot								**** *
<i>Barythengus ruficapillus</i>								****
Bicolored Antbird	*	****	*	*		****	****	*****
<i>Gymnopithys leucaspis</i>								*****
Spotted Antbird	*****	*****	*	*	**	**	**	*****
<i>Hylophylax naevioides</i>	*****	*****	*	*				*****
Ocellated Anthrush								*****
<i>Phaenostictus mcleannani</i>						**	**	*****
Slaty Antshrike	*							*
<i>Thamnophilus punctatus</i>	*					*	*	*
Black-faced Anthrush	*****							*****
<i>Formicarius analis</i>	***	*			**	*	*	*****
White-flanked Antwren	*	*****						*****
<i>Myrmotherula axillaris</i>								*****
Brown Woodcreeper	****	*****	*			*	****	*
<i>Dendrocincla fuliginosa</i>							****	*
Barred Woodcreeper				*****		*		*
<i>Dendrocolaptes certhia</i>								
Grey-headed Tanager	*****			*****				
<i>Eucometis penicillata</i>	*****			*****				
Ochre-bellied Flycatcher	**							
<i>Pipromorpha oleaginea</i>				***				

* Each asterisk represents 15 minutes attendance of a bird at a swarm raid. This colony, stationary until Feb. 23, was rearing the annual brood of winged males. Its raids, erratic in strength, were generally stronger than those of a normal stationary colony (see record of B-XI) and they continued to attract birds.

Table 2 (Continued)

RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XXVII

	Feb. 21, 1948 10:45 A.M.-12:45 P.M.	Feb. 22, 1948 10:00-11:00 A.M.	Feb. 23, 1948 9:15-10:15 A.M.	Feb. 24, 1948 8:45-10:30 A.M.	Feb. 25, 1948 8:30-10:45 A.M.
White-necked Puffbird			****		
<i>Notharcus macrorhynchus</i>			****		
Bicolored Antbird	*****	****	****	*****	**
<i>Gymnophrys leucaspis</i>	*****	****	****	***	
Spotted Antbird				**	*****
<i>Hytophylax naevioides</i>	****	****	****	****	***
	***		****	*****	
Ocellated Anthrush	*****	**	****	***	*****
<i>Phaenostictus mcleannani</i>	*****		**	***	*****
Slaty Antshrike					*
<i>Thamnophilus punctatus</i>				***	
Black-faced Anthrush	****				
<i>Formicarius analis</i>	**				
Brown Woodcreeper	*				*****
<i>Dendrocincla fuliginosa</i>					*****
Barred Woodcreeper					***
<i>Dendrocolaptes certhia</i>					
Grey-headed Tanager				*****	*
<i>Eucometis penicillata</i>				*****	*
Ochre-bellied Flycatcher					
<i>Pipromorpha oleaginea</i>					*

Table 2 (Continued)

RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XVII

	Feb. 26, 1948	Feb. 27, 1948	Feb. 29, 1948	Mar. 1, 1948
	9:15-10:00 A.M.	9:00-9:30 A.M.	10:00-10:45 A.M.	7:45-8:45 A.M.
	10:45-11:45 A.M.	10:30-11:00 A.M.		
Bicolored Antbird		*		**
<i>Gymnophrys leucaspis</i>				**
Spotted Antbird		*	***	
<i>Hylophylax naevioides</i>				
Ocellated Antthrush	*	*		**
<i>Phaenostictus mcleannani</i>	*	*		*
		*		
Slaty Antshrike			**	
<i>Thamophilus punctatus</i>				
White-flanked Antwren			*	
<i>Myrmotherula axillaris</i>			*	
Brown Woodcreeper		*		
<i>Dendrocincla fuliginosa</i>	*	*		
Barred Woodcreeper	*	*	***	****
<i>Dendrocolaptes certhia</i>	*	*	***	***
Grey-headed Tanager		*		
<i>Eucometis penicillata</i>				

Table 3
RECORD OF BIRDS FOLLOWING ARMY ANT COLONY B-XII *

	Feb. 26, 1948	Feb. 27, 1948	Feb. 29, 1948	Mar. 1, 1948	Mar. 2, 1948
White-necked Puffbird	**	****			*****
<i>Notharcus macrorhynchus</i>	*	*			*****
Bicolored Antbird	**	****	**	****	*
<i>Gymnophithys leucaspis</i>	**	****	**	**	**
Spotted Antbird	**	****	*	**	*
<i>Hylophylax naevioides</i>		****			
Ocellated Anthrush	**	****	**	*	**
<i>Phaenostictus mcleannani</i>		****	**	*	**
Slaty Antshrike					**
<i>Thamnophilus punctatus</i>					**
Black-faced Antthrush	**	**			**
<i>Formicarius analis</i>					*
Dotted-winged Antwren	*	*			*
<i>Microhospus quizenis</i>					*
White-flanked Antwren	*				*
<i>Myrmotherula axillaris</i>					
Brown Woodcreeper		****			
<i>Dendrocincla fuliginosa</i>					
Barred Woodcreeper	**	***	*		*
<i>Dendrocolaptes certhia</i>	**		*		*
Buff-throated Woodcreeper		**			*
<i>Xiphorhynchus guttatus</i>					
Grey-headed Tanager	*	*****			
<i>Eucometis penicillata</i>					
Ochre-bellied Flycatcher					*
<i>Pipromorpha oleoginea</i>					

* Each asterisk represents 15 minutes attendance of a bird at a swarm raid.
Note—No birds on stationary raids of this colony Feb. 20-24.

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Editorial Committee

The editorial committee which participated in preparing for publication this issue of the *Proceedings* consisted of the following: Leslie Pearl who handled the business arrangements, Thomas Higgins who supplied the illustrations, James R. Nolan who prepared the lay-out, Dr. Dean Amadon, Robert S. Arbib and Miss Catherine Pessino who helped to edit one or more of the papers, Richard E. Harrison, Hustace H. Poor and Mrs. Kathleen G. Skelton who aided in the selection of papers for inclusion, and Dr. Theodora Nelson whose experience and assistance proved invaluable in all aspects of the editorial task.

E. EISENMANN, *Editor*

GENERAL NOTES

Observations on the Screech Owl (Otus asio)—Early in April 1952 we became aware of increased disturbance around a large nesting box in our yard in Montclair, N. J. The box is made of a hollow log and is set in the crotch of a tree some twenty feet above the ground. The Norway maple is in healthy condition but the crotch in which the house is placed is free of foliage and offers clear entrance from all directions. The opening of the house faces southwest.

We watched with interest the progress being made by a grey Screech Owl in ousting the squirrels which had in the two previous years, raised their young in the box. The owl sat on the perch outside the door in broad daylight, burbling incessantly. Then it put its head in the hole and muttered threateningly. After several repetitions of this behavior it entered the hole and a wild scuffle ensued. The owl came out, resumed its perch and maintained silence.

At night more burblings, mutterings and scabbings ensued, and the following morning all signs of grey squirrels departed from the yard. They no longer entered the banding traps, and were not seen again until late July.

We watched the nesting box carefully but neither saw nor heard any further signs of activity until on June 2 Mr. Robert Arny climbed to the box and looked in. On that date he saw four eggs, laid on a coiled up raccoon skin. This skin was of secondary origin, having been pilfered by small boys from the back of a neighbor's garage where it had been stretched. We had seen it lying on the hen house roof and the owl apparently purloined it from there.

On June 8 the first egg hatched. The owlet *backed* out of the egg. Whether this is typical we do not know. We have found no other description of the hatching of screech owls. The egg broke in half in the middle and was not pecked thru at the end as are most eggs. We were unable to check this against the other hatchings as the eggs were either eaten or discarded thereafter.

The newly hatched bird was white and about the size of the usual marshmallow used by children for toasting on campfires.

On June 15 the nest was again examined. At this time there were three young, still pure white, and all still had their eyes closed. The nest contained the remains of rats and mice and of one young robin. The nest was very malodorous.

On June 18 we found a red screech owl feather, and thereafter we saw on several occasions a red owl. We assumed this to be the male.

On June 28 the young were banded and photographed. At this time they were well developed, grey, and had down on the flanks and underparts.

On July 4 the young were taken from the nest for examination, the remaining egg, which was found to be damaged, was extracted.

By July 10 all of the young had left the nest and could be seen in varying places usually high up in the surrounding trees. As we left town on July 18 we cannot give the date when the young abandoned the neighborhood.

Several items of interest were noted. There was no attempt at attack by the parent birds until after the young had been handled and banded. After that date to go into the garden after dark was to invite attack, and no fooling about it. Both birds would swoop in, clacking and storming, and would drive us out of the area. Defense would have been possible, but only at the risk of hurting the birds.

The hunting was done for the most part at a distance. A catbird nesting some thirty feet from the owls, as well as a robin some seventy five feet away, escaped molestation. One nest within thirty feet was cleaned out. Goldfish were also taken from a small pool in the immediate area.

Large moths, cicadas, beetles, mice and shrews were seen taken into the nest. One attack on a roosting catbird was seen; *if* it was successful the parent bird must have eaten the catbird, as it was not brought to the nest. That some song birds were taken was evidenced by feathers in the nest, though we never saw a bird brought in. Both parents apparently brought food to the nest. While we were unable to distinguish between the sexes, we base this assumption on the fact that approaches were consistently from two directions, and at times two birds could be seen at the nest at once.

The hunting started at dusk and trips were made to the nest with surprising frequency. Sometimes as little as three minutes elapsed between the taking of prey, feeding, and the return with the next victim.

From observations of this brood, and previous experience in hand-rearing a nest of owlets taken from a felled tree (Nature Magazine, Oct. 1950, pp. 400-404) the following conclusions are drawn:

The owlets open their eyes between six and nine days after hatching.

The eyes are blue at first and change to amber in from five to seven days after opening.

The grey feathers begin to appear at about fifteen days of age.

Owlets can learn to fly without any parental assistance.

They fly adequately five to six weeks of age depending on development of bird, the runt being last to fly.

The parental protective instinct increases with the development of the young but is not actively aggressive unless cause is given.

The parental instinct is strong. In the hand reared case the parent bird waited around for three months fussing to get in to her children. She refused to rear them however once the nest had been moved. (This moving was necessary because the tree was flat on the ground.)

In both cases in which we have dealt intimately with owlets, at least one parent was a red phase bird.

Screech owls are easily reared by hand, easily tamed, and have a long memory for kindness or harm. We were able to handle without any trouble the young of the hand-reared owlets which nested the following year in our garden. They made no effort to keep their young even out of reach. We could pick them up off shrubbery and low limbs and there was never a parental attack.

Screech owls eat a good many insects. I have counted over 400 Japanese beetle carapaces in one pellet. Screech owls scratch for worms. Screech owls bathe in puddles; I have seen them at twilight. Screech owls do not deplete the actual bird population of an area, though they do attack nests; our bird population has increased this year over last—if banding statistics prove anything.—MARY TRAVIS ARNY.

Peculiar Behavior of Tree Swallows in Relation to Dead of Their Species.—On October 5, 1952, thousands of migrating Tree Swallows (*Iridoprocne bicolor*) were flying close to the shore over the parkway between Point Lookout and Gilgo Beach, Long Island. At about 10:30 A.M. we noticed that on the road between Point Lookout and Short Beach there were many dead swallows, killed by automobiles. Living birds in some places were sitting in the middle of the road and seemed reluctant to rise until the speeding cars were almost upon them. The previous day, though sunny, had been quite cool, and in all probability many of the birds had been killed while resting or warming up on the concrete. We noticed that several swallows were perched upon the bodies of the dead and were picking away where flesh was exposed. Whether they were hunting insects attracted to carrion, or were eating fat or flesh, we were not able to determine; in either event neither of us had ever seen Tree Swallows do anything but aerial feeding—even when taking bayberries in winter.

While we watched (having stopped our car at the risk of a no-parking ticket), a swallow flew down to a dead bird, which lay on its belly at the side of the road. The live swallow landed on the back of the dead one and proceeded to go through the motions of copulation. We surmised that the crouching posture of the dead swallow, so similar to that of a

receptive female, had stimulated this unseasonable and inappropriate response in a migrating male. On examining the dead swallow, we found that no fluid had been deposited and that the body showed no external injuries.—EUGENE EISENMANN and JOHN L. BULL, JR.

Common Tern Feeding from Tin Can.—On August 2, 1953, at Beach Haven Inlet, New Jersey, I saw several Common Terns (*Sterna hirundo*) hovering over a tin can on the ocean beach. The can (a one pound ground coffee container about 6 in. wide by 6 in. deep) held water in which a number of small live bait fish were swimming. As I approached, a tern flew off carrying a small fish; another dropped down to perch on the rim of the can, eyeing its contents with evident interest. The terns were dispersed by a surf-caster, who baited his hook with one of the fish. He then covered the can with a shoe, remarking that the birds had amused him for the past hour at the cost of half his bait.

Common Terns ordinarily get food by diving, though at times they pick up floating matter while on the wing. This incident may indicate about the minimum water surface area required for feeding, and suggests a possibly useful device for bird photographers.—ROBERT H. GRANT.

A Possible Effect of Sewage Pollution on Duck Abundance.—In our region the great concentrations of Greater Scaup (*Aythya marila*) and Canvasback (*A. valisineria*) are found within New York City—in the badly polluted Pelham, Flushing, Little Neck, and Jamaica Bays. Canvasback have become numerous only in the past five years; dense rafts of several thousand now winter on the waters about Flushing and Little Neck Bays. Scaup have always been common and more generally distributed, but they are much less plentiful on the cleaner Great South Bay than on nearby Jamaica Bay. That hunting is forbidden within city limits doubtless has an effect, but considerable gunning still occurs on Jamaica Bay.

Worth investigating is the probability that the chief factor may be the prohibition of clamming in the city estuaries for over twenty years because of sewage pollution. The less urban neighboring waters are heavily worked for clams, thus probably disturbing the bay bottoms and reducing the supply of mollusks, on which these ducks feed. Bottom samples from Jamaica Bay show there are now large beds not only of mussels (*Mytilus edulis*) and hard clams (*Venus mercenaria*), but also of soft clams (*Mya arenaria*) that are almost non-existent elsewhere on the South Shore of Long Island.—IRWIN M. ALPERIN

Report of the Secretary for the Year 1950-1951

At the annual meeting of the Society on March 14, 1950, the following officers were elected for the ensuing year:

<i>President</i>	MR. ROBERT S. ARBIB, JR.
<i>Vice-President</i>	DR. DEAN AMADON
<i>Secretary</i>	MR. HERMAN GOEBEL
<i>Recording Secretary</i>	MR. IRWIN M. ALPERIN
<i>Treasurer</i>	MRS. EVA RICH
<i>Editor</i>	DR. THEODORA NELSON

At the meeting on January 23, 1951, Mr. Irwin M. Alperin found it necessary to resign his position as Recording Secretary. Mr. Walter W. Sedwitz was appointed to succeed Mr. Alperin.

At a regular meeting on March 28, 1950, the Society elected Mrs. John Y. Dater, Jr., Mr. Thomas F. Higgins, and Mr. George Komorowski to serve on the Council until March 1953. Mr. George C. Rose was elected to serve on the Council until March 1952.

During the period from March 1950 thru February 1951, the Linnaean Society held sixteen regular meetings, four informal summer meetings, and one scientific seminar session. The programs for the regular meetings were as follows:

March 14, 1950:	Annual Meeting. "A Naturalist in New Zealand" by Dr. Robert Cushman Murphy.
March 28:	"Gems of the Gaspé" by Mr. Joseph B. McCall, Jr.
April 11:	"So You Want More Ducks" by Mr. Charles B. Belt, Jr.
April 25:	"Birds of the Iranian Region" by Dr. A. J. C. Vaurie.
May 9:	"The Living Earth Series" motion pictures filmed by Mr. John H. Storer.
May 23:	Discussion of the Spring Migration by the Members.
October 10:	"Display of the Umbrella Bird, Congo Peacock, and Other Birds" by Mr. Robert M. McClung.
October 24:	"Wildlife of the Cape York Peninsula" by Mr. Hobart M. Van Deusen.
November 14:	"The Baltimore Oriole Project of the Urner Ornithological Club" by Mr. Robert C. Frohling.
November 28:	"Zoology at the New York State Museum" by Dr. Ralph S. Palmer.
December 12:	"A Southern Bird Trip" by Mr. Richard A. Herbert.

- December 26: "Studies in the Breeding Behavior of the Chimney Swift" by Mr. Richard B. Fischer.
- January 9, 1951: Report on Christmas Censuses by the Members.
- January 23: "Banding Osprey and Piping Plover on Long Island" by Mr. LeRoy Wilcox.
- February 13: "The Honey Guides; Birds of Amazing Behavior" by Dr. James P. Chapin.
- February 27: "Impressions of European Bird Life" by Mr. Roger Tory Peterson.

On January 31, 1951, the Society held a special seminar meeting. The subject for discussion was "Variation and Adaptation in Asiatic Larks" and was presented by Dr. A. J. C. Vaurie.

Thruout the year, the Linnaean Society sponsored a full program of field trips to a number of areas known for their interesting bird life. These trips were for the most part quite well attended and were well received by those members who were able to participate in them.

The only publication issued during the past year was again the monthly *Linnaean News-Letter*. An edition of the *Proceedings* of the Linnaean Society is in preparation and should go to press some time during the coming year. Work is also proceeding on the preparation of an ornithological atlas of our region.

During the past year, seventeen persons were elected to active membership and three people became associate members. Three active members changed their status to that of associate member and one associate member became an active member. The membership in all classes is as follows:

Honorary Members	5
Fellows	5
Active Members	262
Associate Members	41
	<hr/>
Total for all classes	313

This represents a net loss during the past year of six members.

We have been particularly unfortunate this year in learning of the death of Mr. William C. Osborn a Fellow of the Society who was our last surviving founding member. Mr. Osborn had been a member of the Linnaean Society since its first meeting in 1878 seventy-three years ago. We also regret to note the passing of Dr. Louis B. Bishop who had been a member for fifty-nine years.

The Secretary would like to extend the appreciation of the Society to the officers who give so much of their time and effort in conducting its

affairs. The chairmen and members of our many committees are to be commended for their voluntary efforts in helping to serve the aims and purposes of the Society. Sincere appreciation is also due to all our members whose interest and activity permit the Linnaean Society to exist.

Respectfully submitted,

HERMAN GOEBEL, *Secretary*

March 13, 1951.

Report of the Secretary for the Year 1951-1952

At the Annual Meeting of the Society on March 13, 1951, the following officers were elected to serve for the ensuing year:

President DEAN AMADON
Vice-President CHRISTOPHER MCKEEVER
Secretary RICHARD EDES HARRISON
Recording Secretary JOHN H. MAYER
Treasurer EVA RICH
Editor EUGENE EISENMANN

At the meeting held on March 27, 1951, the following members were elected to the Council for three year terms expiring March 1954: Herman Goebel, Richard Ryan and Robert S. Arbib, Jr. and for one year terms expiring March 1952: Thomas G. Appel and Leslie Pearl.

From March 1951 through February 1952, the Society held 15 regular meetings, four informal summer meetings and one seminar. The calendar of the regular meetings was as follows:

- March 13: Annual Meeting. "Land of Paradise Birds and Stone Age Man", Thomas E. Gilliard.
- March 27: "Hawks and Falcons; Afield and at Hand", Heinz Meng.
- April 10: "Birds of the Barrier Islands from Jones Beach to Bull's Island", Dr. Heathcote Kimball.
- April 24: "The Rediscovery of the Takahoe (*Notornis*) of New Zealand", Dr. Robert Cushman Murphy.
- May 8: "Plants and Birds for the Summer Garden", Alfred E. Runk.
- May 22: Annual Discussion by Members of the Spring Migration.
- October 9: "Some Birds of New Jersey, including the Nesting of the Cerulean Warbler", Angelo d'Angelo.

- October 23: "The Natural History of Great Gull Island", Lois Hussey and Catherine Pessino.
- November 13: A program of two films furnished by the Fish and Wildlife Service; "Haunts of the Hunted" and "The Courtship of the Western Grebe".
- November 27: "Conservation is Everybody's Business", Theodore Pettit.
- December 11: "Problems in Gull Identification", Hustace H. Poor and Walter Sedwitz.
- January 8: Discussion, by members, of the Annual Christmas Bird Count.
- January 22: "North with the Spring; a Personal Account", Edwin Way Teale.
- February 12: "Observations on the Birds of Bimini and Western Cuba", Dr. Charles Vaurie.
- February 26: "A Symposium on Field Work Problems", led by Richard H. Pough, Mrs. Eleanor Dater and Robert S. Arbib, Jr.

On October 30 the Society held an extra seminar meeting on, "Some Problems of Panama Bird Life" by Eugene Eisenmann. The four summer meetings were well attended and were a pleasant mixture of field notes, discussion and social contact.

Following our established custom, the Field Trip Committee, ably led by Richard Ryan, conducted one or two field trips each month except during the summer. The attendance at these was variable—not to say unpredictable along with the weather—but those who made the trips generally found them instructive and enjoyable. This program reached a climax on the Cape Ann, Massachusetts, trip in January, on which the six members who participated were treated to the sight of many rare and fascinating birds.

The *Linnaean News-Letter* continued publication under the editorship of Robert S. Arbib, Jr., assisted by Walter Sedwitz, and is rapidly becoming a stimulating forum for the discussion of problems vital to the Society. Thomas Higgins, who, as Assistant Editor, had for several years devoted an enormous amount of time to the production of the publication, had to resign this post because of the pressure of other duties, and was replaced by James R. Nolan. The Society is not only greatly indebted to Mr. Higgins and the other editors, but also to the distribution staff consisting of William P. Cooney and Mrs. Gina Miuccio, for their devotion to a time-consuming and unrewarding task. The Society, under the editorship of Dr. Theodora Nelson, likewise produced a volume of *Proceedings* Nos. 58-62, consisting of 109 pages.

During the year a number of members were active in non-society publications of natural history interest. Not including the many articles and notes in leading ornithological journals written by our members, the following is a partial list of their recent books and longer papers: Jean Delacour, "Pheasants of the World"; Eugene Eisenmann, *Annotated List of Birds of Barro Colorado Island, Panama Canal Zone* (Smith. Misc. Coll. vol. 117, no. 5); Ludlow Griscom, *Distribution and Origin of the Birds of Mexico* (Bull. Mus. Comp. Zool. vol. 103, no. 6); Richard H. Pough, "Audubon Water Bird Guide", Roger T. Peterson, "Wildlife in Color"; Edwin Way Teale, "North with the Spring"; Charles Vaurie, *A Study of Asiatic Larks* (Bull. Am. Mus. Nat. Hist. vol. 97, art. 5); Farida Wiley edited "John Burroughs' America", illustrated by another member, Francis Lee Jaques; Robert S. Arbib, Jr. contributed the chapter on the New York City region in Pettigill's "Guide to Bird Finding". A busy year in publication.

The Gull Island Committee, to initiate its practical program of attracting nesting Terns, organized a work party last April to tear down buildings and prepare the ground. Destruction, it turned out, was not our line, and subsequently a firm in New London was persuaded to undertake the job for salvage. Last summer, Miss Pessino and Miss Hussey continued their natural history studies on the island.

As evinced by the symposium of February 26th, the field work activities of the Society are in a state of healthy ferment. The Field Work Committee, under the leadership of George Komorowski has in the past experienced difficulty in obtaining volunteers but it may now anticipate an increase in participation.

Conservation matters were considered at practically every meeting and this was largely the result of the alertness of Chairman McKeever and Richard Pough in unearthing situations of interest to the Society. In at least two important projects—the Jamaica Bay and Sandy Hook developments—the Society has taken the initiative by offering the cooperation of its members to the governing agencies. If we can succeed in introducing sound conservation measures at the design stage we will have conserved some of our *energy of protest* for other matters. Thomas Appel's Map committee has been struggling for a long time with a major project—An Ornithological Atlas of the New York City Region. He has recently reported a spurt in progress but it is not certain that publication will be within the next year. (Perhaps he doesn't get enough help from the cartographers in our midst.)

At the end of the Society year, the various classes of membership stood as follows:

Honorary Members	5
Fellows	8
Active Members	250
Associate Members	46
Total	<u>309</u>

This represents a drop in membership for the second successive year and leaves us with the lowest total since 1946. There has been an unusually high number dropped for *non-payment of dues and resignations* and on the other hand the acquisition of new members has not kept pace. The membership of the Society should be reminded that the life and growth of the Society is dependent upon all of you in your absolutely essential role as recruiting agents. (In simple English let us all keep a lookout for new members.)

The present Secretary wishes to express his thanks to the officers and members of the Council all of whom have worked with him—a comparative newcomer—in a spirit of friendly cooperation. He is especially indebted to Dean Amadon, Christopher McKeever and Herman Goebel for assistance and counsel.

Respectfully submitted,
 RICHARD EDES HARRISON, *Secretary*

March 11, 1952.

Report of the Secretary for the Year 1952-1953

At the annual meeting of the Society held on March 11, 1952, the following officers were elected:

<i>President</i>	DR. DEAN AMADON
<i>Vice-President</i>	CHRISTOPHER K. MCKEEVER
<i>Secretary</i>	RICHARD EDES HARRISON
<i>Recording Secretary</i>	JOHN H. MAYER
<i>Treasurer</i>	DR. THEODORA NELSON
<i>Editor</i>	EUGENE EISENMANN

This represented a re-election of all incumbents, except the Treasurer—Mrs. Eva Rich having retired after many years of efficient and faithful service.

At the next regular meeting, according to our custom, the expired positions on the Council were filled by Irwin Alperin, John L. Bull, and Mrs. Gina Miuccio.

From March 11, 1952 to February 24, 1953 the Society held 16 regular and 4 informal summer meetings. The programs were as follows:

March 11 Annual Meeting and Dinner—"Nature Studies in New Jersey" (color film)—George Regensberg

- March 25 "The Blue Dolphin Expedition"—Malcolm Gordon
 April 8 "Subspecies of Northern Birds Migrating through
 New York"—Kenneth Parkes
 April 22 "Animals Are Exciting" (color film)—Howard
 Cleaves
 May 13 "The Anatomy of Birds"—Dr. John H. Arnett Jr.
 May 27 Discussion of the spring migration by the members
 October 14 "A Naturalist in Venezuela"—Dr. Robert Cushman
 Murphy
 October 28 "Some Endocrine Aspects of Avian Migration"—
 Irwin Alperin
 November 11 "Report on the Third Assembly of the International
 Union for the Protection of Nature"—Richard
 Pough
 November 25 "Army Ants and Their World"—Dr. T. S. Schneirla
 December 9 "The Birds of Shakespeare"—Charles H. Rogers
 December 23 "Wildlife at Elk Lake, Adirondacks"—Frank Schetty
 January 13 Discussion of the Christmas Counts by the members
 January 27 "Plumages, Pterylography and Moults"—Dr. Theo-
 dora Nelson
 February 10 "A Trip to the Sonora Desert"—Dr. Charles Vaurie
 February 24 "Geological History of the New York City Region"—
 Robert S. Arbib, Jr.

Mention must be made of the experiment in programming which has been under way since fall. This, of course, is the introduction of the so-called technical programs, and the genesis of these lies close to the heart of the current history of the Society. The ferment at the crossroads, which started, perhaps, with Robert Arbib's able and provocative editorial in the *News-Letter* of January '52, continued bubbling all spring; and in June, at a five-hour meeting of the Council (augmented by some selected stirrers of the broth), a first attempt was made to reduce the temperature of the argument and essay some practical measures. To avoid drifting toward either of the threatened extremes of becoming a society of Chickadee lovers or a group of desiccated taxonomists, it was decided to try to strengthen the good middle ground and provide better liaison between the amateur and professional members.

This was to be accomplished, first, by changing the traditional pattern of meetings by adding two and devoting at least five per season to more technical aspects of ornithology and related sciences; and, second, by a stepped-up program of Field Work Projects, aiming toward a broader membership participation. The first method nearly came a cropper when it was pointed out by our ever-watchful "house-dick" (Richard Herbert) that additional regular meetings would violate the

By-Laws. The problem was solved simply by deferring the contemplated increase of regular meetings until the time when the technical meetings had become a demonstrated success, meanwhile increasing to two the informal meetings held in June and September. It is too early to render a verdict, but it may be said that, though the technical meetings have been interesting and informative, they are, frankly, open to improvement. This Secretary, for one, believes that we have much to learn in the realm of the communication of technical facts and ideas. (Since the Secretary has ideas for this program, he will now seize the opportunity to drop a broad hint to the in-coming President, that he name the ex-Secretary to the Technical Program Committee.)

The Field Work Committee, under the chairmanship of George Komorowski, has on its agenda a number of continuing projects and has added a new and exciting one. This stems from the Jamaica Bay Recreation Development Scheme, part of which—to our astonishment—was to set aside certain areas for the protection of breeding and wintering birds. The Society had, at the outset of the scheme, vainly offered its cooperation to Robert Moses, but Mr. Alperin discovered a slightly lower level where our aid in census work, etc. was welcomed. At any rate, this marked the first time that the Society found itself at peace instead of at war with a Moses agency, and perhaps the event should be memorialized by naming the Project "Moses in the Phragmites" (otherwise known as bulrushes).

The year found us with a new chairman of the Field Trip Committee—Donald Tead, who has proved very successful in filling Richard Ryan's shoes. As an added phase to the Society's new look, he has made a determined effort to get more of our veteran field men to participate in the trip program. The objective is two-fold: first, to give the less experienced field-trippers object lessons in sound and accurate field observation; and second, to acquaint the veterans with the newer generation, with an eye to developing and encouraging promising recruits. In the past, we have too often allowed potential Hickeys or Griscoms to slip away into chemistry or insurance.

Robert Arbib has continued to edit the *News-Letter*, and, in spite of his chronic protests that nobody ever sends him material, he manages to put out a sprightly and interesting sheet. (Just the same, send him some material.)

The membership of the Society showed a net gain of seven members for the year, making a total of 316 of all classes: Honorary—5, Fellows—8, Active—255, Associate—48.

Small as this gain is, it represents an encouraging reversal of the downward trend in the previous year.

In recognition of outstanding and long-continued services to the Society and to the development of interest in the ornithology of our region, the Society elected as Fellows Allan D. Cruickshank, Roger T. Peterson, and Mrs. Eva Rich. The Society also elected as Life Members the following persons who have participated actively and continuously in the Society's affairs since prior to 1920: Beecher S. Bowdish, Howard H. Cleaves, Dr. E. R. P. Janvrin, and L. Nelson Nichols.

Members of our Society continue to be selected for positions of responsibility in the ornithological world. At the 1952 meeting of the American Ornithologists' Union our Associate Member, Josselyn Van Tyne, was elected President, our Fellow and former President, Ludlow Griscom, was elected a Vice-President, and our Associate Member and former Secretary, Robert W. Storer, was elected Editor of *The Auk*. In the Federation of New York State Bird Clubs, with which our Society is affiliated, our present Editor, Eugene Eisenmann, was re-elected President, and our Active Member, Mrs. William G. Irving, was elected Recording Secretary.

On September 25 last, we lost through death, an old and valued member, Dr. Edson B. Heck of New York; and scarcely more than a week ago the body of member Richard Burdsall of Port Chester was found near the peak of Aconcagua in South America (the highest mountain outside of Asia). He evidently had been trying to climb the peak alone—a spectacular and tragic death.

The present Secretary winds up his term of office regretful of his shortcomings on the job, but wishes all the more to offer warm thanks to the other officers, members of the Council and members who have helped him perform his duties. He is especially grateful to John L. Bull, chairman of the special dinner committee arranging the March 1953 celebration of the Seventy-Fifth Anniversary of the founding of our Society.

Respectfully submitted,

RICHARD EDES HARRISON, *Secretary*

March 10, 1953.

Report of the Treasurer for the Year Ending March 1, 1951

RECEIPTS

Dues	\$ 996.25	
Sale of Publications	65.95	
Annual Dinner	406.40	
Sale of Cards	3.25	
Interest		
4 United States Bonds	75.00	
Emigrant Industrial Bank	44.46	
Union Dime Savings Bank	1.88	
Total		\$1,593.19

DISBURSEMENTS

Publication of News-Letter	\$ 319.13	
Cost of Meetings (Room, Postage, etc.)	425.41	
Subscriptions and Memberships	41.50	
Printing; Expenses of Officers	58.83	
Speakers, etc.	57.80	
Gull Island	127.44	
Dinners	423.85	
Total		\$1,453.96
Surplus for the Year ending March 1, 1951		139.23
Funds on Hand March 1, 1950		6,790.41
Funds on Hand March 1, 1951		6,929.64

DISTRIBUTION OF FUNDS

Revolving Publication Fund:

1 Deposit in Emigrant Industrial		
Savings Bank	\$2,371.58	
3 U. S. Savings Bonds	2,500.00	
		\$4,871.58
2 Charles A. Urner Memorial		
Fund, Union Dime Savings Bank	\$ 107.79	
1 U. S. Savings Bond	500.00	
		\$ 607.79
3 Checking Account in the		
National City Bank	\$1,450.27	
Total		\$6,929.64

Submitted by Treasurer EVA RICH, March 1, 1951

Approved by Auditors: JEAN D. REED

LESLIE S. PEARL

March 6, 1951

Report of the Treasurer for the Year Ending March 1, 1952

RECEIPTS

Dues	\$	998.00
Sale of Publications		181.60
Annual Dinner		367.50
Sale of Cards		35.60
Interest		
4 United States Bonds		75.00
Emigrant Industrial Bank		48.14
Union Dime Savings Bank		2.16
Total		\$1,708.00

DISBURSEMENTS

Publication: of Proceedings Nos. 58-62	\$	965.20
of News-Letter		284.87
Cost of Meeting, Postage, etc.		467.65
Subscriptions and Memberships		59.30
Expenses of Officers, Printing, etc.		57.85
Speakers		54.73
Gull Island		71.02
Annual Dinner		390.75
Total		\$2,351.37
Deficit for the Year Ending March 1, 1952	\$	643.37
Funds on Hand March 1, 1951		\$6,929.64
Funds on Hand March 1, 1952		\$6,286.27

DISTRIBUTION OF FUNDS

Revolving Publication Fund:

1 Deposit in Emigrant Industrial Savings Bank	\$2,535.58	
3 U. S. Savings Bonds	2,500.00	
		\$5,035.58
2 Charles A. Urner Memorial Fund in Union Dime Savings Bank	\$ 122.45	
1 U. S. Savings Bond	500.00	
		\$ 622.45
3 Checking Account in National City Bank		628.24
Total		\$6,286.27

Submitted by Treasurer EVA RICH, March 1, 1952

Approved by Auditors: W. P. COONEY

EZRA J. FEINBERG

March 7, 1952

Report of the Treasurer for the Year Ending March 1, 1953

RECEIPTS

Dues	\$ 945.00	
Sale of Publications, Gifts, etc.	161.74	
Annual Dinner	318.50	
Interest: Union Dime Savings Bank	2.81	
Emigrant Industrial Bank	63.76	
U. S. Bonds	75.00	
TOTAL	1,566.81	\$1,566.81

EXPENDITURES

Publication of Newsletter	278.97	
Cost of Meetings in Museum	361.55	
Memberships; Subscriptions	51.00	
Printing; Officers expenses	41.39	
Speakers expenses	54.20	
Gull Island	35.06	
Refunds	7.25	
Annual Dinner	299.00	
TOTAL	1,128.42	\$1,128.42

Surplus for the year ending March 1, 1953		438.39
Funds on hand March 1, 1952		\$6,286.27
Funds on hand March 1, 1953		6,724.66

DISTRIBUTION OF FUNDS

Revolving Publication Fund:		
Deposited in Emigrant Industrial Savings Bank		\$2,823.63
3 U. S. Savings Bonds		2,500.00
Charles A. Urner Memorial Fund:		
Deposited in Union Dime Savings Bank		137.76
1 U. S. Savings Bond		500.00
Checking Account in National City Bank		763.27
TOTAL		\$6,724.66

Submitted by Treasurer (Theodora Nelson) March 1, 1953.

Approved by the Auditors March 10, 1953

EVA RICH
LESLIE S. PEARL

Officers, Council, and Committee Chairmen of the Linnaean Society of New York

1951-1954

OFFICERS

<i>President (1951-1953)</i>	DEAN AMADON
<i>President (1953-1954)</i>	JOHN L. BULL
<i>Vice-President (1951-1953)</i>	CHRISTOPHER K. MCKEEVER
<i>Vice-President (1953-1954)</i>	IRWIN M. ALPERIN
<i>Secretary (1951-1953)</i>	RICHARD EDES HARRISON
<i>Secretary (1953-1954)</i>	CATHERINE PESSINO
<i>Recording Secretary (1951-1953)</i>	JOHN H. MAYER
<i>Recording Secretary (1953-1954)</i>	NED BOYAJIAN
<i>Treasurer (1951-1952)</i>	EVA RICH
<i>Treasurer (1952-1954)</i>	THEODORA NELSON
<i>Editor (1951-1954)</i>	EUGENE EISENMANN

COUNCIL

(The Council consists of the six officers and nine members three of whom are elected each year for a three year term)

1951-1952: Irwin M. Alperin, Mrs. John Y. Dater, Jr., Thomas F. Higgins, George Komorowski, Robert F. Arbib, Jr., Herman Goebel, Richard Ryan, Thomas Appel, Leslie Pearl.

1952-1953: Mrs. John Y. Dater, Jr., Thomas F. Higgins, George Komorowski, Robert S. Arbib, Jr., Herman Goebel, Richard Ryan, Gina Miuccio, Irwin Alperin, John L. Bull.

1953-1954: Robert S. Arbib, Jr., Herman Goebel, Richard Ryan, Gina Miuccio, Dean Amadon, Harry Darrow, Richard Edes Harrison, Leslie Pearl, Hustace H. Poor

COMMITTEE CHAIRMEN

Standing Committees

<i>Program</i> (the Vice-Pres. <i>ex officio</i>):	C. K. McKeever; I. M. Alperin
<i>Editorial</i> (the Editor <i>ex officio</i>):	Eugene Eisenmann
<i>Records</i> (the Recording Sec. <i>ex officio</i>):	J. H. Mayer; Ned Boyajian
<i>Conservation</i> :	C. K. McKeever, T. S. Pettit
<i>Field Work</i> :	George Komorowski
<i>Field Trip</i> :	Richard Ryan; Donald Tead
<i>Linnaean News-Letter</i> :	R. S. Arbib, Jr.
<i>Librarian</i> :	Mrs. D. Paul Reed; Mrs. Gina Miuccio

Special Committees

<i>Great Gull Island</i> :	C. K. McKeever; Miss Lois Hussey
<i>Map</i> :	Thomas Appel; R. E. Harrison
<i>New York State Bird Book</i> :	R. S. Arbib, Jr.

Membership List, February, 1954

Honorary Members

- 1941 BENT, ARTHUR C., 140 High Street, Taunton, Mass.
1947 MURPHY, DR. ROBERT CUSHMAN, American Museum of Natural History,
New York 24, N. Y.
1937 NICE, MRS. MARGARET MORSE, 5725 Harper Avenue, Chicago 37, Ill.
1941 PINTO, DR. OLIVERIO, Dept. de Zoologia, Sao Paulo, Brazil.
1938 STRESEMANN, PROF. ERWIN, Zoologisches Museum der Universitat, In-
validen Strasse 43, Berlin, Germany.

Fellows

- 1908 CHAPIN, DR. JAMES P., c/o IRSAC, Boite Postale, 217 Costermonville,
Congo Belge, Africa.
1926 CRUICKSHANK, ALLAN D., Box 256, Rockledge, Florida.
1907 GRISCOM, LUDLOW, Museum of Comparative Zoology, Cambridge, Mass.
1924 HICKEY, DR. JOSEPH J., 5517 Dorsett Drive, Madison 5, Wis.
1932 MAYR, DR. ERNST, Museum of Comparative Zoology, Cambridge, Mass.
1905 NICHOLS, JOHN T., American Museum of Natural History, New York 24,
N. Y.
1927 PETERSON, ROGER TORY, P. O. Box #7, Glen Echo, Maryland.
1922 RICH, MRS. EVA, 150 West 80th Street, New York 24, N. Y.

Active Members

- 1928 ABBOTT, MRS. RICHARD M., "Madryn", R. D. #1, West Chester, Pa.
1931 ALLEN, ROBERT P., Box 37, Tavernier, Florida.
1941 ALPERIN, IRWIN M., 2845 Ocean Avenue, Brooklyn 35, N. Y.
1938 AMADON, DR. DEAN, Amer. Mus. of Natural History, New York 24, N. Y.
1948 APPEL, THOMAS G., 63 Sunnyside Avenue, Pleasantville, N. Y.
1938 ARBIB, ROBERT S., JR., 231 West Lena Avenue, Freeport, L. I., N. Y.
1931 ARCHBOLD, RICHARD, Amer. Mus. of Natural History, New York 24, N. Y.
1944 ARONOFF, ARTHUR, University Hospital, Ann Arbor, Michigan.
1935 ASTLE, WILLIAM O., 45-64 158th Street, Flushing, N. Y.
1949 AUSTIN, CYRUS, 200 East 66th Street, New York 21, N. Y.
1928 BALDWIN, ROGER N., 282 West 11th Street, New York 14, N. Y.
1948 BANNER, GILBERT, 98-25 65th Road, Forest Hills, N. Y.
1952 BARNES, FLORENCE, 105 S. Grove Street, East Orange, N. J.
1944 BARRAS, MOSES, 1571 Sheridan Avenue, New York 57, N. Y.
1951 BELMAN, MRS. HILDA, 94-06 34th Road, Jackson Heights 72, N. Y.
1949 BELT, CHARLES B., 233 Broadway, New York 9, N. Y.
1953 BENTON, MRS. JULIETTE T., 110 Riverside Drive, New York, N. Y.
1951 BOCK, WALTER, 76-30 85th Drive, Woodhaven 21, N. Y.
*1900 BOWDISH, BEECHER S., Demarest, N. J.
1949 BOYAJIAN, NED, 187 Alden Place, Englewood, N. J.

* Life member.

- 1941 BRAND, MRS. ALBERT R., 50 West 72nd Street, New York 23, N. Y.
- 1944 BRANDI, ALFRED, 326 West 89th Street, New York, N. Y.
- 1931 BRESLAU, LEO, 31 Ocean Parkway, Brooklyn 18, N. Y.
- 1950 BREWER, MRS. HARVEY, 270 Herbert Avenue, Closter, N. J.
- 1950 BREWER, HARVEY, 270 Herbert Avenue, Closter, N. J.
- 1938 BRIGHAM, H. STORRS, JR., Fremont, N. H.
- 1934 BROWN, CLARENCE D., Rockport Cottages, P.O. Box 508, Rockport, Texas
- 1938 BUCHHEISTER, CARL W., 1130 Fifth Avenue, New York 28, N. Y.
- 1939 BULL, JOHN L., JR., 49 Merrall Road, Far Rockaway, N. Y.
- 1944 BURKER, LARRY, 47 Cloverfield Road, South Valley Stream, N. Y.
- 1950 BUSCH, MRS. PHYLLIS, 956 East 18th Street, Brooklyn 30, N. Y.
- 1943 BUSSE, MRS. HERBERT A., Flying Point Road, R.F.D. #1, Freeport, Maine.
- 1938 CANT, GILBERT B., 316 Beach Avenue, Mamaroneck, N. Y.
- 1940 CANTOR, IRVING, 206 West 104th Street, New York 25, N. Y.
- *1932 CARLETON, GEOFFREY, 40 West 12th Street, New York 11, N. Y.
- 1943 CARNES, MRS. HERBERT E., 25 Kenwood Road, Tenafly, N. J.
- 1921 CARTER, T. DONALD, Amer. Mus. of Natural History, New York 24, N. Y.
- 1934 CHALIF, EDWARD L., Barnsdale Road, Short Hills, N. J.
- 1953 CHAMBERS, KENNETH A., R. D. 2, Newfield, N. Y.
- 1946 CHEEVER, MARKHAM, 35 East 76th Street, New York 21, N. Y.
- 1943 CHRISTENSEN, MISS INGER, 47 West 52nd Street, New York, N. Y.
- *1910 CLEAVES, HOWARD H., 8 Maretzek Court, Staten Island 9, N. Y.
- 1948 COBB, BOUGHTON, 25 East End Avenue, New York, N. Y.
- 1949 COBB, DR. CLEMENT B. P., 56 East 76th Street, New York 21, N. Y.
- 1954 COLIE, MRS. KATHARINE, 165 East 61st Street, New York 21, N. Y.
- 1949 COLLINS, HENRY HILL, JR., 136 Parkview Avenue, Bronxville, N. Y.
- 1951 COLLINS, WILLIAMS, 61 Ellwood Street, New York 34, N. Y.
- 1951 COOMBS, MRS. ROBERT, 375 Paramus Road, Paramus, N. J.
- 1928 COOLIDGE, OLIVER H., Broad Brook Road, Bedford Hills, N. Y.
- 1950 COONEY, WILLIAM P., 101 West 11th Street, New York 11, N. Y.
- 1947 COPELAND, MRS. JOSEPH, 351 Bedford Avenue, Mt. Vernon, N. Y.
- 1940 CORMIER, FRANCIS, 27 North Central Avenue, Hartsdale, N. Y.
- 1949 CORT, AMBROSE, JR., 29-02 163rd Street, Flushing, N. Y.
- 1920 CRANDALL, LEE S., New York Zoological Park, Bronx 60, N. Y.
- 1943 CRANS, MISS VERA E., 72 Barrow Street, New York, N. Y.
- 1944 CROOKS, MISS MYRTLE, 609 West 137th Street, New York 31, N. Y.
- 1953 CUMMINGS, CLARK, 314 Lynden Avenue, Montclair, N. J.
- 1939 DALE, MRS. ALLENE H., 390 Riverside Drive, New York 25, N. Y.
- 1942 DARKOW, PROF. MARGUERITE, 16 East 82nd Street, New York 28, N. Y.
- 1939 DARROW, HARRY N., 49 East 2nd Street, Mt. Vernon, N. Y.
- 1947 DATER, MRS. JOHN Y., JR., 259 Grove Street, Ramsey, N. J.
- 1948 DATER, JOHN Y., JR., 259 Grove Street, Ramsey, N. J.
- 1952 DEED, ROBERT F., 50 Clinton Avenue, Nyack, N. Y.
- 1951 DE HONDT, MISS BARBARA, 33-12 213th Street, Bayside, L. I., N. Y.
- 1943 DELACOUR, JEAN, Director, Los Angeles Co. Museum, Exposition Park, Los Angeles, California.
- 1943 DENHAM, REGINALD K., 100 Central Park South, New York 19, N. Y.
- 1929 DESMOND, THOMAS C., 94 Broadway, Newburgh, N. Y.

- 1949 DICKENSON, MRS. HENRY EARL, 19 Burling Avenue, White Plains, N. Y.
 1949 DOCK, GEORGE, JR., 32 Bank Street, New York 6, N. Y.
 1939 DOEPFL, MRS. HENRY W., 30 Cooper Lane, Larchmont, N. Y.
 1943 DUFLLOT, MISS HELEN, 430 East 20th Street, New York 9, N. Y.
 1947 EBERWEIN, MISS GERTRUDE, 344 East 87th Street, New York 28, N. Y.
 1940 EISENMANN, EUGENE, 110 West 86th Street, New York 24, N. Y.
 1939 ELLIOTT, JOHN J., 3994 Park Avenue, Seaford, L. I., N. Y.
 1953 EMERSON, GUY, 221 West 57th Street, New York, N. Y.
 1949 ENGLE, G. CURTIS, 460 Spring Avenue, Ridgewood, N. J.
 1937 EYNON, ALFRED E., 5 Beach Road, Verona, N. J.
 1950 FEINBERG, EZRA J., 60 East 42nd Street, New York 17, N. Y.
 1946 FEINBERG, HAROLD, 147 West Tremont Avenue, Brox 53, N. Y.
 1939 FISCHER, RICHARD B., Laboratory of Ornithology, Fernow Hall, Cornell University, Ithaca, N. Y.
 1945 FLAHERTY, MISS ANNA M., 866 Bushwick Avenue, Brooklyn 21, N. Y.
 *1914 FLEISHER, PROF. EDWARD, 20 Plaza Street, Brooklyn 17, N. Y.
 1944 FLUEKIGER, MISS DORA WHITMAN, Hotel Dauphin, Broadway at 67th Street, New York 23, N. Y.
 1921 FRIEDMAN, RALPH, 14 East 75th Street, New York, N. Y.
 1925 FRY, MRS. GLADYS GORDON, 66 Eagle Rock Way, Montclair, N. J.
 1944 FRY, VARIAN, 321 West 78th Street, New York 24, N. Y.
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