

the nest near Norristown, Pennsylvania, on June 11, 1932—A443938 to 941 inclusive. A443938 was taken from the nest-hole on June 15th by the farmer on whose farm the nest was located, and was kept in a large pen as a pet. It escaped on September 3d and on the following November 17th was killed at Augusta, Georgia, by J. Poteet. Another, A443939, was killed in Nash County, North Carolina, on October 24, 1932, by E. C. Viverette.

Four Eastern Sparrow Hawks were also banded from the same nest-hole as the above, one year later, on June 12, 1933, and A458719 was killed January 1, 1934, on Bell Isle Plantation, Georgetown, South Carolina, by Dudley Vail.

Sparrow Hawks are common resident birds in this locality, and it is surprising to find three out of eight birds banded recovered so far from their birthplace. This race is entirely migratory from the northern part of its nesting-range, but in Eastern Massachusetts it is a common permanent resident. It would accordingly be supposed to be non-migratory in Eastern Pennsylvania. The above recoveries, however, prove that the young of the year often winter hundreds of miles to the south.—RAYMOND J. MIDDLETON, Norristown, Pennsylvania.

A Correction.—In the October, 1934, number of *Bird-Banding*, in article on "The Distribution of Michigan Recovered Eastern Evening Grosbeaks near the Atlantic Seaboard," on page 177, is the following paragraph: "It will be noticed that the birds recorded by them have seldom departed from the transition life-zone in which they mainly nest." This should be amended to read: "The east and west movement is practically confined to Canadian and Transition life-zones, and, from present records, nesting is mainly, if not entirely, confined to the Canadian Zone."—M. J. MAGEE, Sault Ste. Marie, Michigan.

RECENT LITERATURE

(Reviews by Margaret M. Nice)

The articles reviewed have been selected and arranged under subjects of importance to students of the living bird and also for the purpose of suggesting problems or aspects of problems to those banders who wish to make the most of their unique opportunities.

Headings in quotation-marks are the exact titles of books or articles or literal translations of such titles. Other headings refer to general subjects or are abbreviated from titles in foreign languages. References to periodicals are given in italics.

MIGRATION STUDIES

"Bird Migration and Moonlight."—Three articles with this same title have recently appeared. In the first¹ the author, by comparing dates of arrival and departure of birds with the almanac, became convinced that birds migrated largely on moonlit nights. The second writer,² by the same method, but using more data, found no evidence of the influence of the moon. Finally Dr. R. Drost³ gives a convincing treatment of the matter, basing his conclusions on direct observation of migration at Heligoland, and also on records of the activity of birds in experimental cages; he shows that migration is as frequent during moonless nights as on moonlit ones. The only way in which the moon influences migration is when in heavily clouded weather it furnishes sufficient light so that migration can proceed; birds do not migrate in the darkest nights.

Bird Migration and Electricity.—A book⁴ and several articles^{5, 6} have been written by Dr. F. Cathelin explaining his theories on migration, which in brief are as follows: the bird is a reflex automaton and is stimulated to migration and guided on its course both by electromagnetic currents in the atmosphere and by air currents. The Stimmelmayer brothers believe that the migratory instinct depends on "the reaction of the bird to the spiral movement of the sun"⁷, and

have attempted to prove their hypothesis by keeping birds "screened off from the earth's and sun's electromagnetic currents for a rather long time by means of a Faraday apparatus," finding that the migratory impulse of their subjects was weakened.⁸ J. Bessere and R. Drost believed that the Stimmelmays' birds did not show migration restlessness because the cages were dark; they repeated the experiments both with dark cages and partially illuminated ones, finding migratory reactions absent in the former and present in the latter, despite the lack of electromagnetic currents.⁹

¹ Dörr, J. N. 1932. Vogelzug und Mondlicht (Ein Beitrag zur Ornithophänologie). *Sitzungsber. d. Ak. d. Wiss. in Wien, Mathem.-naturw. Klasse, Abt. II*, 141, 3 u. 4.

² Bretscher, K. 1934. Vogelzug und Mondlicht. *Vierteljahrszeitschr. d. Naturf. Ges. Zurich*, 69.

³ Vogelzug und Mondlicht. 1935. *Der Vogelzug*, 6, 26-33.

⁴ Les Migrations des Oiseaux. 1920. Paris. Delagrave. 165p.

⁵ La Pathogénie des Migrations. 1933. *L'Oiseau et la Revue Française d'Ornithologie*, 3, p. 77.

⁶ Étude Comparative sur les Migrations des Oiseaux et des Poissons. 1934. *Idem*, 4, 160-167.

⁷ Stimmelmayr, Anton. 1932. Neue Wege zur Erforschung des Vogelzuges. *Verh. Orn. Ges. Bayern*, 19, 418-446.

⁸ Stimmelmayr, Alex. 1930. *Idem Idem*, 19, 149-185.

⁹ Ein Beitrag zum Kapitel "Vogelzug und Elektrizität." *Der Vogelzug*, 6, 1-5.

BANDING STUDIES

Banding Herons in France.¹⁰—An interesting account of ringing young Gray Herons (*Ardea cinerea*), 1378 of which have been ringed since 1926, recoveries amounting to 8 to 10 per cent.

Results on Ringing Falcons.¹¹—In this thoroughgoing paper records of the Heligoland and Rossitten stations on three Falcons are discussed. Kestrels in their first summer scatter in all directions, but later migrate south and southwest. Most of the young do not settle near the birthplace. The greatest ages were eight, eight and one-half and nine and one-half years; there were one six-year bird, 3 five-year birds, 8 four-year birds, 18 three-year birds, and 48 two-year birds reported. The chief cause of death of this species, as well of the Peregrine Falcon and Hobby, was shooting, but a number came to their ends against high-power wires.

Banding in Italy.¹²—The Ornithological Observatory at Lago di Garda marked, in 1931, 9492 birds, mostly passerines. The percentage of recoveries in the same year was 3.13.

"The Waterfowl Flyways of North America."¹³—Banding has shown the existence of four definitely recognizable flyways followed in migration. Owing to drainage, drought, and overshooting, waterfowl "have alarmingly decreased in numbers" and "a complete suspension of shooting privileges for a time may become imperative over all the flyways."

Banding Bats.—An early experiment along this line and a very rewarding one was carried out by Dr. A. A. Allen,¹⁴ who marked with bird bands four female *Pipistrellus s. subflavus* in Ithaca, New York, in the summer of 1916, and found three of them in the same place in June, 1919. D. R. Griffin¹⁵ has marked with No. O bird-bands a number of *Myotis l. lucifugus* on Cape Cod, capturing them in their summer roosting places; one of them had been released thirty-four miles distant and was retaken a year later in the place of banding. Near Berlin 2800 *Myotis myotis* have been marked in their winter sleeping quarters with aluminum wing clips; over one-third were retaken in the same place the following winter, and 45 reported during the two summers—some nearby, others from 15 to 60 miles northeast.¹⁶

¹⁰ Labitte, A. 1934. Une Visite à la Héronnière de Clairmarais (Pas-de-Calais) 13 mai, 1934. *L'Oiseau et la Rev. Française d'Ornith.* 4, 713-722.

¹¹ Heidemann, J. 1935. Vom Zug des Turmfalken (*Falco t. tinnunculus*), Wanderfalken (*Falco peregrinus*) und Baumfalken (*Falco s. subbuteo*). *Der Vogelzug*, 6, 11-26.

¹² Toschi, A. 1934. Rapporto sui Risultati degli Inanellamenti dell'Osservatorio Ornitologico del Garda nel 1931. *Ist. Zool. R. Univ. di Bologna. Ricerche di Zoologia applicata alla Caccia*, VIII, 1-44.

¹³ Lincoln, F. C. 1935. U. S. Dept. Agriculture, Circ. 342, 1-12.

¹⁴ Banding Bats. 1921. *Jour. Mammalogy*, 2, 53-57.

¹⁵ Marking Bats. 1934. *Jour. Mammalogy*, 15, 202-207.

¹⁶ Eisentraut, M. 1935. Fledermauszug und Fledermausberingung. *Ornith. Monatsber.* 43, 22-25.

LONGEVITY

Among passerine birds the following records are noteworthy: Hedge Sparrows (*Prunella modularis occidentalis*) of seven and eight and one-third years are reported from England,¹⁷ while a Blue Jay (*Cyanocitta cristata*), banded as an adult by W. I. Lyon at Waukegan, Illinois, May 14, 1924, returned to the traps in 1925, 1930, 1932, 1933, and 1934, at which time it must have been at least eleven years old.¹⁸

A Peregrine Falcon (*Falco peregrinus*) fifteen years old is reported from Finland.¹⁹

A male Bean Goose (*Anser fabalis*) shot out of a migrating flock in 1902 lived in a poultry-yard in France till 1925, when it died by accident.²⁰

A Herring Gull (*Larus argentatus*) ringed as a nestling in Holland, July 1, 1915, was shot on the coast of Germany, February 18, 1933, at the age of nearly eighteen years. One of the oldest of banded birds was a Sandwich Tern (*Sterna sandvicensis*) ringed as a nestling June 17, 1912, and killed June 8, 1933—twenty-one years later—on the coast of France.²¹

For other records of longevity see No. 11.

¹⁷ Recovery of Marked Birds. 1935. *Brit. Birds*, 28, 239-240.

¹⁸ 1934. *Inland Bird Banding News*, 6, No. 4, p. 5.

¹⁹ Välikangas, I. and O. Hytonen. Die Vogelberingungen in Finnland im Jahre 1932. *Memo-randa Soc. pro Fauna et Flora Fenn.* 10, 99-137.

²⁰ Berthet, G. 1934. Sur un Cas de Longévité de l'Oie sauvage *Anser fabalis*. *Alauda*, Ser. III, 6e an. 561.

²¹ Sleijser, A. J. 1934. *Ardea*, 23, 173.

TERRITORY

Territory in the St. Kilda Wren.²²—This little bird was almost exterminated by collectors within four years after "the announcement of its supposed specific identity." The present investigators found 68 pairs nesting on the four islands. The average size of territories was three thousand to five thousand square yards, but food was collected in only a very small portion of each territory, about 2.6 per cent of the whole. Moreover, each parent tended "to feed in exclusive food patches not used by the other." There appears to be but one brood a year, and the same is true of other small passerines on this group of islands. There are now no natural enemies of this Wren but man.

"Territory in the Great Crested Grebe."²³—In this important paper on *Podiceps c. cristatus* L. S. V. Venables and D. Lack state that they found that some pairs were very intolerant, others were colonial—all in the same pond. They conclude that: "The territory is not correlated with food supply," and "Extreme territorial (aggressive) behaviour seems of no advantage to the species. In the case where it limited the population density, it tended to prevent the lake from supporting the maximum number of pairs which food and nesting sites would have permitted."

The January and February numbers of *British Birds* contain letters by E. M. Nicholson, B. W. Tucker, H. E. Howard, and D. Lack—all on the subject of the food-value of territory.

T. T. McCabe in *News from the Bird-Banders*, 1934, 9, 35-38, in a very interesting review of A. A. Allen's paper on "Sex Rhythm in the Ruffed Grouse" emphasizes a different aspect of territory. He says: "What of the fact that the increasing number of close students and observers of breeding behavior agree that in 'territorial' combat power is granted to the defender to win, always or nearly always, to the extent at least of defending his frontiers, whether it be by strength, by curious formalities of mimic warfare, or by the use of the voice, over an invading neighbor or wandering renegade? Yet it is quite impossible that the defending bird should always be the strongest. Therefore in the vast majority of such natural encounters domination is determined by factors quite other than physical vigor. It may even be that territory has its chief value in protecting the individual and his household from violation by the sturdier ruffian at the gates."

²² Harrison, T. H. and J. N. S. Buchan. 1934. A Field Study of the St. Kilda Wren (*Troglodytes troglodytes hirtensis*), with especial Reference to its Numbers, Territory, and Food Habits. *Jour. Animal Ecology*, 3, 133-145.

²³ *Brit. Birds*, 28, 191-198. 1934.

LIFE-HISTORY

"Life History of the Gambel Quail in Arizona."²⁴—*Lophortyx gambeli* is gregarious except during the breeding season. The female incubates, while the male guards the nest, but in case she is injured or killed, he incubates. The sitting bird takes two periods off the nest each day. Both parents care for the young. Of 487 eggs laid in 48 nests only 111, or 22.8 per cent, hatched. The sex-ratio is equal. The weight of adult birds fluctuates greatly, being highest in December and January and in April and May, and lowest in February and June, these last dates corresponding to the courting season and incubation respectively. Overgrazing, clean farming, and house cats are among the chief factors deleterious to these fine birds.

Experiments in Raising Swallows.²⁵—Nestling *Hirundo rustica* were sent from Ferrara to Castel Fusano near Rome, where they were carefully raised on a mixture of beef heart, cornmeal, and silkworm pupæ, and finally released in the hope that next year they will return to nest. The older of the young birds (apparently hatched in early May) started June 25th to gather feathers and straw and place them in artificial nests, and on July 13th several of them—five females and one male—adopted baby Swallows and fed them faithfully, the male as late as August 7th. Prince Chigi comments on the strong gregarious instinct of these birds, for they like to feed, bathe, fly, and alight in common.

"Young Swallows assist in Building the Second Nest"²⁶—The first brood of a pair of *Hirundo rustica* in Cheshire, England, about a week after leaving the nest carried dry grass to the nest. The gathering of nesting-material in August by young Tree Swallows (*Iridoprocne bicolor*) and Cliff Swallows (*Petrochelidon albifrons*) has been reported in America.^{27, 28}

"The Golden Eagle in Scotland."²⁹—*Aquila chrysaetos* has been extirpated in England, Wales, and Ireland, but some fifty pairs still live in the mountains of Scotland, although constantly persecuted by gamekeepers. At one eyrie during nine hours on June 15th, when the young were about three and one-half weeks old, the male brought two hares, while the female came once with a hare and nine times with pieces of heather! The young fought desperately in the first few weeks but later were peaceful.

"At the Eyrie of the Sea Eagle."³⁰—A pair of *Haliaeetus albicilla* were watched for several days while there were eggs in the nest; on April 4th the female incubated through the night till 5.40 A.M., the male from then till 9.56, and the female from 10.12 till night.

Bigamy in the European Blackbird.³¹—A male *Turdus merula* had two mates that fought constantly in March and April, but later avoided each other. The young of one female left the nest May 4th; the next day the male ceased feeding them and devoted himself entirely to the other nestlings that were fledged on May 8th. At this time the quarrels between the two mothers broke out anew.

Three adults feeding Young at one Nest.—Several cases have recently been reported of three adult Long-tailed Titmice (*Aegithalos caudatus europæus*) feeding young at one nest.^{32, 33, 34}

"How far does the Falcon See?"³⁵—Peregrine Falcons recognize sitting doves at 1077 meters, "feather play" at 1559 meters, and apparently white handkerchiefs used with the "feather play" at 1661 meters.

"Why does the Stork Throw its Young from the Nest?"³⁶—At times, particularly in dry years, White Storks (*Ciconia ciconia*) are apt to throw some or all of their young out of the nest; this procedure has sometimes been attributed to the wise foresightedness of the parents, who realized that the ponds would soon dry up and there would not be enough food for them to raise their children. Herr Szidat examined two of these unfortunate young birds and found them suffering from a heavy infestation of intestinal trematodes, whose intermediate host is a frog. Warm, sunny weather favors the development of these parasites, and this

may be the reason for the small number of storks raised in dry years, rather than lack of food, for the birds can turn to other sources after the ponds are gone. The young become too sick to react normally to their parents, and the latter in turn probably no longer recognize them as their young.

"Nest Building—New Style."—H. S. Williams. 1934. *Natural History*, 34, 431-446. In this beautifully illustrated article a most surprising tale is told of the fantastic nests built by Baltimore Orioles, Kingbirds, Cedar Waxwings, and others with all sorts of brilliant yarns, and also of the changes in "fashions" during the years.

²⁴ Gorsuch, D. M. 1934. Univ. of Arizona, Biol. Sci. Bull. No. 2, 1-89.

²⁵ Chigi, F. 1934. Esperimento di Formazione di Colonie di Rondini artificialmente allevate a Castel Fusano nell'anno 1934—XII. *Rassegna Faunistica*, 1, Nos. 3-4, 4-24.

²⁶ Astley, A. 1934. *Brit. Birds*, 28, 204.

²⁷ Brewster, W. 1898. *The Auk*, 15, 194-195.

²⁸ Chapman, F. M. 1898. *The Auk*, 15, 271.

²⁹ Gilbert, H. A. 1934. Der Steinadler in Schottland. *Jour. f. Ornith.* 82, 561-567.

³⁰ Schuster, L. 1935. Am Horst des Seeadlers. *Beitr. z. Fortpfl.d. Vögel*, 11, 23-27.

³¹ Kochs, W. 1935. Ein Amselhahn betreut zwei Weibchen? *Idem*, 11, 31-32.

³² Groebbels, F. 1934. *Idem*, 10, 69.

³³ Klug, E. 1934. *Idem*, 10, 147.

³⁴ Dupond, Ch. 1934. *Le Gefaut*, 24, 110-111.

³⁵ Schmid, B. 1934. Wie weit sieht der Falke? *Deutsche Jagd*, No. 32, 635-636.

³⁶ Szidat, L. 1935. Warum wirft der Storch seine Jungen aus dem Nest? *Jour. f. Ornith.* 83, 76-87.

POPULATION STUDIES

"The Winter Starling Roosts of Great Britain, 1932-1933."³⁷—*Sturnus vulgaris* has greatly increased in England during the past century. Two hundred and eighty-five roosts containing five hundred or more birds were located in Great Britain; eighteen of these were new in 1932-1933, but some were decidedly old, nineteen having been occupied for forty years or upwards, one for one hundred thirty-five years and another for one hundred eighty years! "The favourite situation for a starling roost is a reed bed or small dense plantation. The actual type of cover seems to be immaterial as long as it is dense, but the roosts used all through the winter are mostly in conifers, rhododendrons, or laurels. The birds appear to prefer to be crowded together and will roost so thickly on the reeds that they break them down." Roosts in towns are not very common except in London where seven thousand Starlings sleep on St. Paul's.

A similar study in this country would be of great interest. It is unfortunate that most American bird-students take the attitude of unmitigated dislike towards the Starling, instead of utilizing these abundant and interesting birds as subjects of study, following the lead of E. S. Thomas and L. E. Hicks (see *Bird-Banding*, July, 1934). When Starlings are killed in large numbers by city authorities, ornithologists should take the opportunity of examining them for bands, weights, sex-ratio, state of gonads, bill-color, etc. As Dr. Hicks says, "Starlings can be used as the guinea pigs of the bird world."

"Periodic Fluctuations in British Game Populations."³⁸—A. D. Middleton using records of the numbers of animals killed on preserves during the last hundred years, gives tables and graphs showing "indications of a periodicity averaging approximately 8 years in the numbers of rabbits (*Oryctolagus cuniculus*) hares (*Lepus europaeus*), and partridges (*Perdix perdix*), and one of approximately 6 years in the numbers of grouse (*Lagopus scoticus*). Graphs are also given of the fluctuations in numbers of mountain hares (*Lepus timidus*), blackgame (*Tetrao tetrix*), woodcock (*Scolopax rusticola*) and weasels (*Mustela vulgaris*), which also showed marked fluctuations of a periodic nature." He points out that with most of these species the aim of game-management has been "directed towards maintaining a stable though high density" and considers that "it is most likely that man's activities tend to mask any natural cycles among animal populations." As to causes, he concludes that, "The most fruitful line of enquiry may be a study of the effects of different types of radiation and their qualitative fluctuations, acting either directly on the animals or indirectly through plants."

"A Ten Year Study of a Bird Population in Central Ohio."—L. E. Hicks. 1935. *Am. Midland Naturalist*, 16, 177-186. University Press, Notre Dame, Indiana. Careful censuses were taken of the breeding birds of an eighty acre tract of creek bottom. A total of 86 species bred within the ten-year period, the numbers varying from 48 to 66, the total numbers of pairs varying from 177 to 258. The great drought of 1930 is reflected in the decreased numbers of species and individuals during the following years. The numbers of each species present each year are tabulated, and an interesting table is given of the number of species recorded during each month of the year. The astonishing total of 1664 nests was located. This paper is a model of thorough, well-planned work and also of conciseness in summarizing the results.

Population Studies on the Bob-white.—Important work is being done by Paul L. Errington on the factors which influence survival in *Colinus virginianus*, some of his most notable papers being on "Life Equation"³⁹, wintering,⁴⁰ and predation.⁴¹ Especially valuable is his recent article on "Vulnerability of Bob-white Populations to Predation,"⁴² in which he concludes: "Winter survival of Bob-white populations under observation appeared—save when over-shot, starved out, or decimated by natural cataclysms—largely determined by the carrying capacity of the land, as expressed in terms of coverts habitable for given population levels of birds.

"Kinds and numbers of wild predators, migrant or resident, had no measurable influence on carrying capacity, despite heavy quail mortality sometimes due to predation. Material winter losses from predators have pointed to quail populations top-heavy for the environment. Stated otherwise, the predators consumed mainly an ill-situated surplus."

³⁷ Marples, B. J. 1934. *Jour Animal Ecology*, 3, 187-203.

³⁸ 1934. *Idem*, 3, 231-249.

³⁹ The Nesting and the Life Equation of the Wisconsin Bob-White. 1933. *Wilson Bulletin*, 45, 122-132.

⁴⁰ The Wintering of the Wisconsin Bob-White. 1933. *Trans. Wisconsin Acad. Sciences, Arts and Letters*, 28, 1-35.

⁴¹ Bob white Winter Survival in an Area heavily populated with Gray Foxes. 1933. *Iowa State College Jour. Science* 8 (1), 127-130.

⁴² 1934. *Ecology*, 15, 110-127.

CENSUSES

Some years ago Gottfried Schiermann made a remarkable study of the number of birds nesting in a swamp hardwood forest, finding 77 species; from 32.8 to 284 pairs nested per square kilometer, the average being 117.5.⁴³ Recently he has made a similar study in a tract of nineteen square kilometers of Scotch pine forests of different ages, recording the avian ecological succession. Here he found only 45 species, but there were more individuals of each species than in the hardwood, the numbers of pairs ranging from 32 to 236 per square kilometer, averaging 106.8.⁴⁴

For those who specialize on counting individual birds wherever they go, C. A. Urner's statistical study⁴⁵ is full of suggestions as to how long-continued counts can become of much scientific value. One excellent technique is that of giving the average number of each species seen per hour in the field; the author has used this method to compare birds of upland and salt marsh during eight years. W. F. Eaton⁴⁶ makes an interesting comparison of four different regions in New Jersey by giving "the number of individuals of a species one should see in the respective area in an average (four-hour) day in the field, all based on actual counts."

⁴³ Studien über Siedlungsdichte im Brutgebiet. 1930. *Jour. f. Ornith.* 78, 137-180.

⁴⁴ Studien über Siedlungsdichte im Brutgebiet II. Der brandenburgische Kiefernwald. 1934. *Idem*. 82, 455-486.

⁴⁵ Birds of Union County, N. J. and its Immediate Vicinity—a Statistical Study. 1930. *Abst. Linnæan Society of New York*, Nos. 39 and 40.

⁴⁶ Eighteen Years of Wyanokie, 1916-1933. 1934. *Idem*. Nos. 33 and 34, 14-26.

BIRD SONG

"A Method for the Intensive Study of Bird Song."—A. R. Brand, 1935, *The Auk*, 52, 40-52. By studying with the microscope his motion-picture films

of bird song, Mr. Brand has made some astonishing discoveries as to the nature of bird song. He finds there are far more notes than any one had supposed—Song Sparrows averaging fifteen to seventeen notes *per second* instead of the three or four which can be heard by human ears. Some of these notes are only one-fiftieth of a second long, and intervals may be less than one-two hundredth of a second. "Bird song averages around the highest note on the piano," and much of it is much higher. Only two sounds studied were within the range of the human singing voice—the Catbird's mew and the Great Horned Owl's call.

"A Method for Registering the Variation in the Amount of Singing in the Course of a Day."⁴⁷—Pontus Palmgren took records during a bright calm day—June 23d—in Finland every half-hour from 12.22 A.M. to 8.22, every hour till 3.22, every half-hour again till 8.52, and finally at 11.37, recording every individual bird heard singing during each minute for ten minutes, also keeping track of the temperature and relative humidity. He divided birds into night singers (mostly thrushes) and day singers, finding the curve of the latter followed that of relative humidity.

The only study at all like this of which the reviewer knows is that by H. J. Fry, in which a somewhat similar method (recording every song heard each minute from 7.00 to 7.30 A.M. three times a week) was used in "A Study of the Seasonal Decline of Bird Song," *The Auk*, 1916, 33, 28–40. Both of these methods offer interesting possibilities for quantitative studies of bird song.

"The Inheritance of Song in Birds."⁴⁸—H. C. Sanborn cites the experiments of E. D. Scott,⁴⁹ of Princeton, New Jersey, who raised a number of native birds from the nest and found that many of them failed to sing the song of the species—the case of his female Baltimore Orioles being often quoted. Professor Sanborn then describes his own experiences with a half-dozen or so species, most of which he states did sing their proper songs, although they heard no adults of their own species. However, he appears to be rather unfamiliar with the songs of our native birds.

There has been much argument over this problem, although the answer to it was given some years ago by Oskar Heinroth, who with his wife raised hundreds of species from babyhood to adulthood. Dr. Heinroth⁵⁰ says that in the case of very simple songs the song is inborn in the bird. With other birds song must be learned; if raised alone, they do not sing like their wild fellows, and no one could guess their species from their song; but in the spring, if they hear one of their own species, they quickly learn the proper song.

⁴⁷ Ein Versuch zur Registrierung der Intensitätsvariation des Vogelgesanges im Laufe eines Tages 1932. *Ornis Fenn.* 9, 68–74.

⁴⁸ 1932. *Jour. Comparative Psychology*, 13, 345–364.

⁴⁹ *Science*, 1901, 14, 522–526; 1902, 15, 178–179; 1904, 19, 957–959.

⁵⁰ Lautäusserungen der Vögel. 1924. *Jour. f. Ornith.* 72, 233–244.

BIRD ACTIVITY AND LIGHT

Roosting habits of the European Blackbird have been studied by Richard Heyder,⁵¹ who watched flights of these birds during two seasons from September to May. He found that the duration of the flight was much shortened in winter, and that the birds went to bed about sunset in the fall, considerably later in the winter (the height of the flight on nineteen dates averaged seventeen minutes after sunset), and still later in spring (average of six dates, thirty-three minutes after sunset).

"Time of Singing of the Goatsucker."—S. E. Ashmore, 1925. *Brit. Birds*, 28, 259–260. *Caprimulgus e. europæus* between June 5th and Aug. 23d started its dusk song between 18 and 101 minutes after sunset, and its "at dawn" song between 123 and 27 minutes before sunrise. The average time of beginning singing before sunrise when the moon was shining was 78 minutes, without moonlight 40 minutes; the average time after sunset with moonlight was 51 minutes, without it 35 minutes. It would be interesting to have similar studies on the Whip-poor-will, Chuck-will's-widow, and Poorwill.

"Some Observations on the Behavior of Starlings and Grackles in Relation to Light."—M. M. Nice. 1935. *The Auk*, 52, 91–92. On 8 mornings between October 6 and 15, 1934, the flights of these two species from a nearby roost were timed and the light measured with a Weston Illumination Meter, Model 603. The first flights of *Sturnus vulgaris* left on seven clear mornings from 10 to 14 minutes before sunrise, at light-values ranging from 7 to 9.9 foot-candles; on the cloudy morning 5 minutes before sunrise at 9.9 foot-candles. The first flights of *Quiscalus quiscula aeneus* left on clear mornings from 7 to 9 minutes before sunrise at light-values of 13 to 16 foot-candles; on the cloudy morning at 3 minutes before sunrise at 13.5 foot-candles. (On the partially clear morning of March 3, 1935, eight Starlings flew past our house 8 minutes before sunrise at 8 foot-candles, and three Bronzed Grackles 5 minutes before sunrise at 14 foot-candles.)

⁵¹ Das Zuruhegehen der Amsel, *Turdus merula*, L., in seinem Verhältnis zur Tageshelle. 1933-*Mitt. Ver. sachs. Ornith.* 4, 57–81.

PROTECTIVE COLORATION

Two excellent studies on this question, based on controlled experiments, have been made by American scientists. Frank M. Jones⁵² offered a variety of freshly killed insects to wild birds at a feeding station at Martha's Vineyard, Massachusetts; the majority were eagerly taken, but brilliantly colored species and also the dull-colored blister beetles (*Epicauta*) were refused. By means of infusions of various insects in thick, fresh cream, the author found that several of these rejected insects were also refused by ants, particularly species that feed on the plant family Asclepiadaceæ (milkweed) "or upon the closely related Apocynaceæ, plants with abundant, acrid and poisonous milky juices (latex)." Since these insects also have a "daytime habit of display rather than of concealment," it seems reasonable to conclude that this combination of brilliant coloring, conspicuous behavior, and bitter—perhaps poisonous—taste all point to "warning coloration."

Dr. Jones cites W. L. McAtee's much discussed paper,⁵² in which the numbers of identifications of animals in eighty thousand bird stomachs in the United States Biological Survey are compared with the estimated number of species within each phylum in the animal kingdom, the author (W.L.M.) concluding that "there is utilization of animals of practically every kind for food approximately in proportion to their numbers," and stating that "the phenomena classed by theorists as protective adaptations have little or no effectiveness." Dr. Jones points out that Mr. McAtee's figures on Coleoptera show that "a Scarabæid has about eleven times as great a chance of being eaten as a Meloid" (blister beetle), and concludes, "Whatever evidential value those comparisons may possess, here (and in many other instances) they seem to leave abundant margin for the operation of 'so-called protective adaptations'."

Recent experiments with fish performed in the San Diego Zoo⁵⁴ are concerned with the problem of color-changes in animals—whether this in reality is "an adaptation for concealment, either from enemies or from prospective prey." Large numbers of mosquito fish (*Gambusia patruelis*) were adapted to black and white respectively by sojourns of seven to eight weeks in tanks of these colors; then equal numbers of both shades of fish were placed in either a pale or black tank and two hungry Galapagos Penguins (*Spheniscus mendiculus*) introduced for a period sufficient for them to catch about half the fish, after which the survivors were counted. It was found in eight experiments involving over one thousand fish that in the pale tank 61 per cent of those eaten were "blacks" and 38 per cent "whites;" in the black tank 27 per cent "blacks" and 61 per cent "whites." Dr. Sumner concludes "that fishes which harmonize in shade with their immediate surroundings are less likely to be eaten by birds (or at least by certain birds) than fishes of the same species which do not harmonize."

It is undoubtedly true that many people have carried the theory of protective adaptation to ridiculous lengths, but these researches by Jones and Sumner give

convincing evidence that warning coloration with certain insects, and adaptive coloration with certain fishes, mean longer life for many individuals.

⁵² Insect Coloration and the Relative Acceptability of Insects to Birds. 1932. *Trans. Entomological Society of London*, 80, 345-386.

⁵³ Effectiveness in Nature of the So-called Protective Adaptations in the Animal Kingdom, chiefly as Illustrated by the Food Habits of Nearctic Birds. 1932. *Smithsonian Mis. Coll.* 85, No. 7, 1-201.

⁵⁴ Sumner, F. B. 1934. Does "Protective Coloration" Protect? Results of Some Experiments with Fishes and Birds. *Proc. National Academy of Sciences*, 20, No. 10, 559-564.

BOOKS

"On the Habits and Distribution of Birds in the North Atlantic."—V. C. Wynne-Edwards, 1935. *Proc. Boston Society of Natural History*, 40, 233-346. An admirable, thorough treatment of a long-neglected field, discussing ecology, field characters, and occurrence of these birds, aptly illustrated with sketches by the author. This study offers a foundation for further observation and will prove invaluable to the bird-student crossing the Atlantic.

"Bird Notes."—H. L. Rhodes, Wellington, Kansas, Hildebrandt, 1933, 2nd. ed. 258 p. \$1.50. This little book, designed to interest school-children, gives brief "biographies" of some seventy birds, instructions for building bird-houses, and lists "Seasons of Birds" in Kansas.

"The Romance of the Animal World." **"The Romance of Insect Life."**—Edmund Selous, 1921. Seeley, Service & Co., London. Lippincott, Phila. \$3.00 each. These popular books offer entertaining reading to children and the general reader, being compilations of anecdotes. The first treats largely of mammals, birds, and reptiles. The second, telling of strange doings of ants and spiders, was particularly interesting to the reviewer. In both books there are the dry-as-dust museum man. Neither illustrations nor paper are so good as they should be.

"The Nature of a Bird's World." **Eliot Howard**, 1935. Cambridge University Press, 102 p. 7s.6d. In this latest book the ornithologist who made English-speaking bird-students "territory-minded," deals primarily with theoretical aspects of bird behavior—with psychology, physiology, and philosophy. His method is to state a problem and give a tentative explanation; then to test this either with instances of unusual behavior that he has himself observed, or with actual experiment—transferring young from the proper nest into another placed next it, etc. He sets problems, shows us the difficulties, examines this hypothesis and that, and often finds them all lacking. No one could accuse him of dogmatism in this book!

"The Nature of a Bird's World" is divided into three long chapters: Of its Physical Basis; Of its Division into Different Worlds; Of its Relation to Learning. The first problem analyzed is that of "the relation between the different reactions," the word "instinct" being avoided. As to the "Different Worlds" the author means "that each internal state has its own external world. Brooding is an internal state, its external world the nest." (Page 44.) Knowing and learning are distinguished; the baby chick pecks indiscriminately at first, but soon finds out "what is nasty and what is nice," but the immature bird does not experiment in making her nest; she builds it correctly from the first.

In the discussions relating to territory, Mr. Howard is at his best. In the first chapter there is a charming account of a Waterhen's (*Gallinula c. chloropus*) territorial, mating, and nesting behavior, including a telling explanation of the expression "owning a territory." "The pond with the surrounding ground is his, in the sense that he lets no other male upon it or strays himself beyond it." (Page 2.)

In the last chapter he gives us something of the philosophy of territory, and in the opinion of the reviewer this is the most important contribution of the book. Territories have "duration;" *i. e.* they endure for a season or a series of seasons, and even if a lapse of territorial behavior occurs after the young are hatched, there

is a renewal of defense in preparation for a second brood (for example the Tree Pipit, *Anthus t. trivialis*). They have position, for they are in the natural habitat of the bird, even if that habitat looks very different in early spring from what it did in fall. And they have a specific size. "But sometimes a free individual occupies a space larger than that innately prescribed; and if he is attacked by a male in search of territory he readily yields the extra space." (Page 70.)

"These three qualities of territory—duration, size, position—are provided in a bird's inherited organization. But there is still one to be considered, shape." (Page 74.)

"Shape is individual not specific, acquired not provided at birth, and comes from landmarks which each individual chooses for himself. A landmark is part of the organization and in so far as it ministers to the success of territory has biological value; but its interest lies in the act of choosing which it discloses, not in itself as a physical thing." (Page 76.)

And then he generalizes: "Territory is not merely localized space, it is the objective aspect of a bird's subjective state; it is action on the part of the bird from which emerges shape, size, position and duration." (Page 75.)

In a very interesting way and with citations of the behavior of Coots (*Fulica a. atra*) he explains how territory affords a "field of reference." "This spatial field of reference is not a thing of fancy; it controls attack and defence, choice of landmarks and the position of platforms." (Page 79.)

In commenting on his various experiments, the author remarks: "Thus in experiment the mental slowness impresses me, in natural life the mental quickness." (Page 82.) "In their world of difficulty and strife a blunderer cannot live or a dullard procreate its kind." (Page 82.)

This is a small book, beautifully printed, provided with an index and a list of scientific names of the birds mentioned. A summary at the end of each chapter would have been helpful. Although written in distinguished style, it is not an easy book to read, yet it will well repay careful attention and thoughtful study.

In closing let me quote from the preface:

"In this book I seek the nature of a bird's world, not with any hope of finding it but to know what to find. There is more joy in finding a problem than in trying to solve one, for to solve a problem is vain delusion."